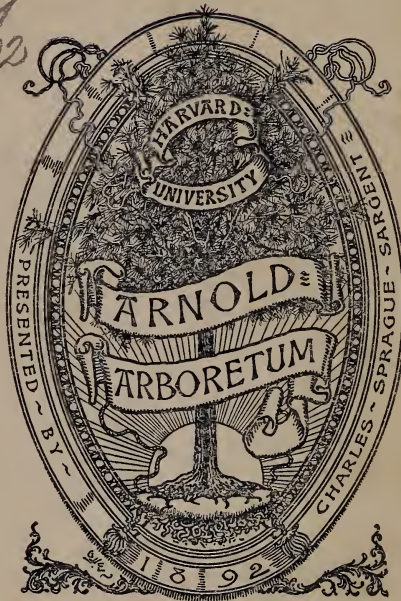


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THE  
TREES, SHRUBS, AND WOODY-CLIMBERS

OF THE

BOMBAY PRESIDENCY.

BY

W. A. TALBOT, F.L.S.,

CONSERVATOR OF FORESTS.

SECOND EDITION.

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## P R E F A C E .

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THE first edition of this work was published early in 1894, eight years ago. Since then a number of trees, shrubs and climbers, new to the Bombay presidency and some new to science, have been discovered and included herein. Additional matter about distribution, bark, woods and economic products, along with a large number of vernacular (principally Kánarese) names, has been also added. At the same time numerous typographical and other errors have been as carefully as possible eliminated. The synopsis of Natural Orders and the keys to the genera and species have been recast and arranged so that the reader may now be enabled to more easily determine the names of the trees, &c., found in the Bombay forests. This edition, entirely re-written and revised, contains a fairly correct list of the indigenous ligneous vegetation of the presidency, and it may reasonably be hoped that by the addition of the botanical descriptions of the species and of the more important sylvicultural and physiological facts relating to the principal indigenous timber trees, the next edition will expand into a handy Bombay Forest Flora. Our limited knowledge of the life histories of the large number of plants included in an Indian local forest flora as well as the small number of botanical workers in the field, effectually prevent the writing of a work like Mathieu's *Flore Forestiere de la France*, a model of its kind. A hand-book on the lines of Brandis' *Flora of North-Western and Central India*, with a companion volume of convenient sized plates of a large proportion of the species described, is, however, within our reach and hopes of practical accomplishment. The synonymy and citations are, as in the first edition, for the most part restricted to Indian forest literature and to Sir J. Hooker's *Flora of British India*, which latter work was not completed when the first edition of this book was published. In conclusion, the author has to thank the Superintendents of the Royal Botanical Gardens, Sibpore, Calcutta, and the Curators of the Kew Establishment for their ever ready and kind assistance in naming critical and other species of plants referred to them. He also wishes to gratefully acknowledge the kindness of the Bombay Government in allowing this book to be printed at public expense.

A note on the Bombay species of *Momecydon* received from Sir D Brandis whilst this book was in the press is added as an appendix (over-leaf).

*September 1902.*



## APPENDIX.

Note by Sir D. Brandis, F.R.S., on the Bombay Species  
of *Memecylon*.

1. *M. edule*, Roxb. (1795), must eventually be called *M. umbellatum*, Burm. (1768). See Trimen II. 217. Berries black.

*M. angustifolium*, Wight t. 276 and *M. Heyneanum*, Benth. (*M. jambosoides*, Wgt. t. 277) I have not from Bombay.

2. *M. Talbotianum*, sp. nov. Mahábaleshvar (D. B., October 1881). Konkan, Stocks; Kánara (Ritchie, May 1853). North Kánara (Talbot, March 1896, Nos. 3568, 3658). Neilghiris and Coorg (T. Thomson). A large shrub or small tree; branchlets terete, slightly quadrangular below the nodes. Leaves thickly coriaceous, ovate or elliptic, shortly and obtusely acuminate, blade 3—4 in. narrowed into petiole .25 in. long; secondary nerves invisible. Flowers small, sessile, in compact clusters on bracteate nearly sessile tubercles. Connective shorter than anthers. Fruit yellow, globose, .25 in. in diameter; pericarp thickly coriaceous.

3. *M. malabaricum*, Cogn. Syn. *M. amplexicaule*, Roxb. var. *mala-barica*, Fl. Br. I. II. 559; *M. amplexicaule*, Wight Ic. t. 279; *M. umbellatum*, Bedd. Fl. Sylv. t. 206.

*M. amplexicaule*, Roxb., is a different eastern species from Penang. *M. deccanense*, C. B. Clarke, from the Peninsula without locality. Leaves narrower than in 3, probably equal *M. malabaricum*.

4. *M. Wightii*, Thwaites. Kánara (Ritchie, 1853). Of this species, which is well marked by winged branchlets, there are only two poor specimens here, (kew.) one from Ritchie, the other from Ceylon.

5. *M. amabile*, Bedd. Ic. t. 163 and

6. *M. terminale*, Dalz. N. Kánara gháts, I have kept distinct, but believe they are the same species.

D. BRANDIS.



## DICTIONARY OF TECHNICAL WORDS.

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- ACHENE OR AKENE . An indehiscent, 1-seeded, dry fruit with a thin pericarp.
- ACUMINATE ... Extremity of a leaf, &c., prolonged in a more or less elongated point.
- AERIAL ... Growing in the air.
- ALBUMEN ... A body which accompanies and usually encloses the embryo and contains nutrient matter to supplement that of the cotyledons.
- AMPLEXICAUL ... That which embraces the stem or branch.
- ANASTOMOSE ... When the nerves or veins unite and form a network.
- ANDROGYNOUS ... A spike of flowers is so called when there are male and female mixed on it.
- ANTHER ... A 2-celled, male organ containing the pollen.
- APETALOUS ... Without petals.
- APICULATE ... Terminating in a small point.
- APOCARPOUS ... When the carpels are free and distinct.
- ARIL. ARILLUS ... An accessory, exterior envelope of the seed. An expansion of the funicle, complete or partial.
- AXILE ... Placentas are axile when the ovules are attached to the axis.
- AXILLARY ... Growing in the angle formed by the leaf and the branch.
- BERRY ... A fleshy or pulpy fruit formed of several united carpels and containing several seeds.
- BIFID ... 2-lobed,
- BILABIATE ... 2-lipped.
- BRACT ... A more or less modified leaf at the base of the flower.
- BRACTEOLE ... Small bract.
- BUSH ... A low much branched tufted shrub.
- CADUCOUS ... Early deciduous.
- CALYX ... The exterior of the 2 floral envelopes is usually green and formed of free or united sepals. When only 1 envelope is present in the flower it is considered to be a calyx.

- CAMPANULATE ... Formed like a bell.
- CANESCENT OR HOARY. ... When the hairs on the epidermis of an organ are so short as not to be easily distinguished but yet give a whitish colour to the surface.
- CAPITATE ... Applied to an inflorescence in which the axes are so reduced that the flowers are arranged in a head or capitulum.
- CAPSULE ... A dry dehiscent fruit of two or more valves.
- CARPEL ... The primary female organ consisting of an ovary, style and stigma. Several carpels united form a pistil.
- CARYOPSIS ... The 1-seeded fruit of the Gramineæ, &c.
- CATKIN ... A spike-like inflorescence with the axis articulated at the base and the flowers of which are without a corolla and unisexual.
- CHLOROPHYLL ... The green colouring matter of plants and agent for the assimilation of carbon from the air.
- CILIATE ... Bordered with fine straight hairs like the eye-lash.
- CIRCUMCISS ... When a capsular fruit separates into parts by a horizontal line.
- CIRRHOSE ... Climbing by means of tendrils (Cirrho).
- COMA ... A tuft of hairs, cotton or wool, on the outer coat or testa of the seed.
- CONFERRUMINATE . Applied to united cotyledons without a line of separation.
- CONNATE ... Applied to opposite leaves so united at the base as to resemble 1 leaf, in the centre of which is the branch, or to united parts of a flower which cannot be separated without laceration.
- CONNECTIVE ... The tissue which unites the two anther-lobes.
- CORDATE ... Applied to the indented or heart-shaped base of a leaf.
- CORIACEOUS ... When the consistence of the leaf or other organ is hard, dry and leathery.
- COROLLA ... The inner of the 2 floral envelopes. It is generally coloured and composed of free or united petals. When one of the two envelopes is absent it is generally the corolla.
- CORYMB ... Applied to an inflorescence of which the branches and pedicels attain the same level. It is a flat-topped or fastigiate panicle.



- COTYLEDON ... The primary more or less modified leaf of the embryo, contains much nutrient matter used during germination. The number of cotyledons is one or two, rarely more (in certain Coniferæ).
- CRENATE ... Edged with rounded teeth.
- CULM ... A name sometimes given to the stems of Gramineæ and other monocotyledonous plants.
- CUNEATE ... Applied to the base of leaves, &c., in which the sides unite at an acute angle.
- CUPULAR ... Cup-shaped.
- CUSPIDATE ... Ending in a rigid point.
- CYME ... A definite inflorescence in which the flowers open from the centre to the circumference.
- DECIDUOUS ... Organs which dry or decay and fall off.
- DECUSSATE ... When one pair of opposite leaves, &c., is at right angles to the next pair above or below, they are said to be decussate.
- DEHISCENCE ... Regular opening of a cavity so that the contents may escape.
- DENTATE ... Edged with sharp teeth.
- DIADELPHOUS ... Stamens whose filaments are united in two distinct clusters.
- DIALYPETALOUS ... Applied to a corolla formed of distinct, non-united petals.
- DICHLAMYDEOUS... When the perianth is double with a distinct calyx and corolla.
- DIGITATE ... Folioles, lobes or nerves radiating from one point.
- DIOECIOUS... When the male and female flowers of the same species are on different plants.
- DISK ... A circular enlargement of the receptacle generally glandular sometimes between the corolla and the stamens or on which the stamens are inserted.
- DISTICHOUS ... Alternatively placed to right and left in the same plane.
- DRUPE ... A fleshy 1-seeded fruit.
- ECHINATE ... When a surface is covered with sharp protuberances almost prickly.
- EMARGINATE ... A leaf indented at the apex or end of midrib.
- EMBRYO ... Essential part of the seed formed of a miniature plant which germinates, developes and perpetuates the species.

- ENDOCARP** ... The inner part of the pericarp.  
**EPICARP** ... The exterior skin or rind of the fruit.  
**EPIPHYTES** ... Plants which grow upon other plants without penetrating their tissues.  
**EXSTIPULATE** ... Without stipules.  
**EXTROSE** ... When the dehiscence of an anther is towards the circumference of the flower.  
  
**FALCATE** ... When curved like a scythe-blade.  
**FASCICLED** ... When two or more organs grow from the same point.  
**FILAMENT** ... The part of the stamen which supports the anther.  
**FIMBRIATE** ... Fringed.  
**FLABELLIFORM** ... Fan-shaped.  
**FOLLICLE** ... A dry unilocular fruit with numerous seeds dehiscent by the ventral suture.  
**FUNICLE** ... Support of the seed or stalk by which it is attached to the placenta.  
**GAMOPETALOUS** ... Corolla formed of petals joined together.  
**GLABROUS** ... Without hairs.  
**GLAUCOUS** ... When of a pale bluish green, often covered with a fine bloom.  
**GYNOPHORE** ... The elongated receptacle below the ovary.  
  
**HERMAPHRODITE** A flower in which both sexes are present.  
**HISPID** ... Covered with stiff erect hairs.  
**HYOCRATERIFORM** Salver-shaped.  
**HYPOGYNOUS** ... Insertion of the stamens on the receptacle below the ovary.  
  
**IMBRICATE** ... Over-lapping like the tiles of a roof.  
**IMPARIPINNATE** ... Applied to a pinnate leaf ending in a single foliole.  
**INDEHISCENT** ... Which does not open.  
**INFLORESCENCE** ... Arrangement of flowers on the plant.  
**INTROSE** ... When the dehiscence of the anther is towards the centre of the flower.  
**INVOLUCRE** ... A number of bracts free or united disposed in one or more verticels.  
**LEPIDOTE** ... Covered with flat disks or scales.  
**MEDULLARY RAYS** . Flat radiating plates of cellular tissue found in all woods, varying in thickness and height.  
**MEMBRANOUS** ... When thin and not stiff.  
**MIDRIB** ... When one principal vein runs from the stalk to the summit of the leaf it is called the midrib.

- MONADELPHOUS ... When the filament of several stamens are united in one bundle.
- MONANDROUS ... A flower with 1 stamen.
- MONILIFORM OR TORULOSE. A fruit contracted at intervals but not separating into articles.
- MONOECIOUS OR MONOICOUS. A plant of which the flowers are unisexual and situated on the same stem.
- MUTICOUS ... Without appendages.
- OVARY ... The lower portion of the carpels which contain the ovules.
- OVULES ... Condition of the seed before fertilization.
- PALMATE ... See Digitate.
- PANICLE ... An inflorescence in which the axis is divided into branches bearing two or more flowers.
- PEDATE ... When the segments or veins of leaves are at first ternate with the two outer branches forked, the outer ones again forked and so on regularly, like a bird's foot.
- PEDICEL, PEDUNCLE. Part of the axis which immediately supports the flower.
- PELTATE ... Disposition of an expansion, leaf, scale, &c., attached by the centre.
- PERIANTH ... The floral envelope.
- PERICARP ... Covering of the fruit, consisting of the developed coats of the ovary. Epicarp = exterior membrane ; Mesocarp = middle zone which when it becomes fleshy is called the Sarcocarp ; Endocarp = internal membrane which lines the cavity containing the seeds.
- PERIGONIUM ... Applied to the ensemble of the floral envelopes.
- PERSONATE ... 2-lipped corolla, the orifice of the tube closed by the palate.
- PETALS ... Name of the folioles which compose the corolla.
- PILOSE ... A surface thickly covered with long, simple hairs.
- PINNATE ... Feathered, compared to the branches of a feather.
- PLACENTA... The cord along which the ovules are attached.
- POD ... A dry, unilocular fruit dehiscent into two valves each containing seeds in one series.
- POLLEN ... A granular material, often yellow, contained in the anther. Each grain or cell contains the fecundating material or fovilla.

- POLYGAMOUS ... Plants with flowers, sometimes hermaphrodite, sometimes unisexual, on the same or different stems.
- PORES (WOOD VESSELS). Tubes found in the fibrous tissue of broad-leaved trees (not present in the Coniferæ). They are solitary or variously grouped.
- PUTAMEN ... The endocarp of a drupe which may be cartilaginous or hard and woody.
- PYRENES ... When there are several distinct stones or nuts in a drupe each containing a seed they are called pyrenes.
- RACEME ... An inflorescence in which the flowers are borne on pedicels along an undivided axis or rachis.
- RACHIS ... The axis of inflorescence.
- RAPHIDES ... Microscopic crystals or amorphous masses of mineral substances in the cells of plants.
- RECEPTACLE OR TORUS. ... Is the extremity of the peduncle above the calyx on which the corolla, &c., are inserted. The receptacle of inflorescence is the convex or flat axis on which the flowers of a head or capitulum are collected.
- RHYTIDOME ... Exterior dead part of the bark, separated by the periderm from the living active region.
- RUGOSE ... When a surface is wrinkled or marked with irregular raised or depressed lines it is so called.
- RUMINATED ... Albumen interrupted by folded plates of a different tissue.
- SACCATE ... When the spurred petal of a corolla is round like a small bag.
- SCABROUS ... A surface rough to the touch.
- SEPALS ... Name of the folioles which compose the calyx.
- SPADIX ... A form of inflorescence enclosed in bracts or spathes.
- SPATHE ... A much developed bract or floral leaf enclosing the spadix.
- STAMEN ... The male sexual organ, the 3rd verticil from the exterior of the complete flower, consisting of the anther and filament.
- STAMINODES ... Are imperfect or rudimentary stamens.
- STIGMA ... The extremity of the style, the pollen-receiving surface of a female organ.
- STIPULES ... Small leafy or scaly appendages usually found at the base of the petiole.

STROBILIFORM	...	In the form of a fir cone.
STROPHIOLE	...	Is an appendage of the seed similar to the aril but proceeding from the testa near the funicle.
STYLE	... ..	Part of the carpel which unites the stigma with the ovary.
SUTURE	... ..	The line along which two parts are joined. In the simple ovary the ventral suture is the line which joins the edges of the carpellary leaf.
TOMENTOSE	...	When the epidermis is more or less densely and intricately covered with short and soft hairs.
TORULOSE	...	See Moniliform.
TORUS	... ..	See Receptacle.
TRI	... ..	3-divided.
URCEOLATE	...	When the corolla tube is swollen or nearly globose and contracted at the top with a narrow rim.
VALVATE	... ..	When the edges of two petals, sepals, &c., are whorled and join without overlapping.
VERSATILE	... ..	When the anther is attached at the back to the filament by a point so as to swing loosely.
VERTICELLATE	...	Disposed in a verticel.
VIRGATE	... ..	Twiggy.
VISCOUS	... ..	Sticky.



# TREES, SHRUBS AND WOODY-CLIMBERS

OF THE

## BOMBAY PRESIDENCY.

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## SYNOPSIS OF NATURAL ORDERS.

### CLASS I. **DICOTYLEDONS.**

Stem when woody consisting of pith surrounded with concentric layers of wood and bark. Leaves net veined. Flowers often 5-merous. Embryo with 2 cotyledons, rarely more; radicle forming a tap-root.

#### DIVISION 1. **ANGIOSPERMS.**

Ovules in a closed vessel and fertilized through a stigma. Embryo usually with 2 cotyledons only.

#### SUB-CLASS I. **POLYPETALÆ.**

Calyx and corolla present. Petals several, distinct, rarely united or wanting.

A. *Thalamifloræ*.—Torus small or elongate, rarely disciform. Ovary superior. Stamens usually indefinite, hypogynous.

1. *RANALES*.—Stamens usually indefinite. Carpels distinct, free, or immersed singly in the torus, rarely connate below. Albumen often copious; embryo relatively small.

Petals and sepals in a single series.

1. *Ranunculaceæ*.—Herbs or climbing shrubs. Leaves alternate or opposite. Sepals deciduous. Stamens indefinite. Seeds without an arillus.

2. *Dilleniaceæ*.—Trees or shrubs. Leaves alternate, simple; lateral veins prominent. Sepals persistent. Carpels usually distinct. Seeds with an arillus.

Petals or sepals, or both, in two or more series.

3. *Magnoliaceæ*.—Shrubs or trees. Leaves alternate, simple; sepals and petals trimerous, imbricated, deciduous. Stamens indefinite. Carpels distinct. Albumen uniform.

4. *Anonaceæ*.—Trees or shrubs, often scandent. Leaves alternate, simple. Stipules 0. Sepals 3. Petals 6, in 2 series of 3 each. Stamens indefinite. Carpels distinct in fruit, (united in *Anona*). Albumen ruminant.

5. *Menispermaceæ*.—Climbing or twining shrubs. Leaves alternate, simple. Stipules 0. Flowers small, unisexual, deciduous, usually trimerous. Stamens definite, free, or connate, opposite the petals. Embryo usually curved.

2. **PARIETALES**.—Stamens definite or indefinite. Ovary syncarpous, with parietal placentation, one-celled or spuriously divided by cellular placentary dissepiments. Ovules rarely solitary. Fruit various, single from each flower.

6. *Violaceæ*.—Herbs, shrubs or trees. Leaves simple, alternate. Flowers irregular or regular. Petals and Stamens 5, the connective produced. Seeds albuminous.

7. *Capparidæ*.—Trees or shrubs often scandent or herbs. Leaves alternate, simple or palmately foliate. Petals 4. Stamens indefinite. Ovary stalked, seeds on parietal placentas. Albumen 0.

8. *Resedaceæ*.—Herbs or shrubs. Leaves entire or pinnatisect. Flowers bracteate. Disk usually conspicuous (0 in *Oligomeris*). Stamens numerous. Fruit a capsule or berry. Seeds numerous.

9. *Bivineæ*.—Trees or shrubs. Leaves simple, alternate. Sepals 4 or 5. Stamens indefinite, free or connate. Seeds few or many, on parietal placentas. Albumen fleshy.

3. **POLYGALES**.—Sepals 5, equal or unequal. Petals 5. Stamens 5, 6 or 8, free or monadelphous. Ovary 2-merous.

10. *Pittosporæ*.—Trees or shrubs. Leaves simple, alternate exstipulate. Sepals unequal. Stamens 5. Embryo minute. Seeds albuminous.

4. **CARYOPHYLLINÆ** —Sepals 5—4—2, free or connate. Petals 5, rarely fewer, sometimes minute. Stamens 5—10 or numerous. Ovary 1-celled, usually with a free central placenta. Albumen mealy; embryo usually curved.

11. *Tamariscinæ*.—Small trees or shrubs. Leaves alternate, scalelike. Flowers regular, bisexual; sepals and petals each 4, 6. Stamens as many as petals or twice as many. Ovary 1-celled. Seeds tufted.

5. **GUTTIFERALES**.—Sepals 2—6 or more, imbricate. Petals as many, rarely more. Stamens indefinite. Ovary usually syncarpous, with axile placentation.

12. *Guttiferæ*.—Resinous trees, juice often coloured. Leaves coriaceous, opposite, without stipules. Flowers unisexual or polygamous. Calyx imbricate. Stamens indefinite, free or connate. Ovary syncarpous.

13. *Ternstræmiaceæ*.—Trees or shrubs. Leaves alternate. Flowers regular, bisexual. Stamens indefinite, free or connate at base. Ovary 3-5-celled. Embryo oily.

14. *Dipterocarpeæ*.—Trees (1 genus climbing shrubs). Leaves alternate, entire, often with large stipules. Flowers hermaphrodite. Calyx-segments usually enlarged in fruit. Cotyledons thick. Albumen 0.

6. **MALVALES**.—Sepals or calyx-lobes valvate in bud. Petals as many as sepals or 0. Stamens monadelphous or free. Ovary syncarpous, with axile placentation.

## Anthers 1-celled.

15. *Malvaceæ*.—Herbs, shrubs or trees. Leaves alternate, stipulate, simple, often palmi-nerved. Stamens numerous, monadelphous; anthers 1-celled. Ovary syncarpous with axile placentation. Fruit a dehiscent capsule.

## Anthers 2-celled.

16. *Sterculiaceæ*.—Trees, shrubs or herbs. Leaves alternate, simple, or digitate. Stamens monadelphous or free; anthers 2-celled.

17. *Tiliaceæ*.—Trees, shrubs or herbs. Leaves alternate, simple with deciduous stipules. Stamens indefinite, usually free; anthers 2-celled.

**B. Discifloræ**.—Torus usually disciform, free or adnate to the calyx or ovary or to both, rarely absent. Ovary superior or more or less immersed in the disk, divided into cells with axile placentas, or the carpels distinct.

7. GERANIALES.—Disk within the stamens or confluent with the staminal tube or reduced to glands or 0. Gynœcium lobed or apocarpous, or entire. Ovules usually 1—2 in each cell, one or both pendulous; raphe ventral.

18. *Linææ*.—Herbs or shrubs, rarely trees. Leaves simple, alternate, stipulate. Stamens definite, more or less connate below. Disk glandular or absent. Styles free or connate. Albumen fleshy.

19. *Malpighiaceæ*.—Climbing shrubs. Leaves opposite, entire. Flowers bisexual, pentamerous. Stamens 10. Ovary 3-lobed. Fruit winged.

20. *Geraniaceæ*.—Herbs or shrubs, rarely trees. Leaves simple or compound. Stamens definite. Ovary angular or lobed.

21. *Rutaceæ*.—Trees or shrubs. Leaves simple or compound, pellucid glandular-dotted. Disk annular thick. Stamens as many or twice as many as petals, rarely indefinite.

22. *Sinarubecæ*.—Trees or shrubs with bitter bark. Leaves alternate, usually compound. Flowers small. Filaments generally hairy. Ovary lobed.

23. *Ochnaceæ*.—Shrubs or trees. Leaves alternate, simple, shining. Flowers bisexual, regular. Anthers linear. Ovary deeply lobed. Fruit of 3-10 distinct, 1 seeded drupes.

24. *Burseraceæ*.—Trees or shrubs with resinous or balsamic juice. Leaves alternate, compound. Stamens 8-10. Ovary entire. Seeds 1 or few.

25. *Meliaceæ*.—Trees or shrubs. Leaves usually compound, alternate. Flowers paniced. Stamens 8-10, monadelphous (except in *Oedrela* and *Chloroxylon*). Ovary entire.

26. *Chailletiaceæ*.—Trees or shrubs. Leaves simple, alternate. Stipules present. Petals 2-cleft. Ovary entire.

8. OLACALES.—Disk various or 0. Ovary entire; ovals 1—3 in a solitary cell or 1 in each cell, pendulous; raphe dorsal, the integuments not distinct from the nucleus. Seeds solitary in the fruit or in the cells; albumen copious.

27. *Olacineæ*.—Trees or shrubs, sometimes climbing. Leaves simple, alternate. No stipules. Petals free or connate, usually valvate. Fruit 1-seeded. Seeds albuminous.

28. *Ilicineæ*.—Trees or shrubs with alternate simple leaves. Petals free, imbricate. Ovary 3-6-celled. Seeds albuminous.

9. CELASTRALES.—Disk fleshy and thick, free or adnate to the calyx. Stamens rarely more than the petals, inserted outside, within or upon the disk. Ovary entire; ovules 1-2 in each cell, erect; raphe ventral.

29. *Celastraceæ*.—Trees or shrubs. Leaves simple, opposite or alternate. Stamens 5 alternating with the petals or sometimes only 3. Ovary more or less immersed in the disk, entire or lobed.

30. *Rhamnaceæ*.—Trees or shrubs. Leaves simple, alternate or opposite. Stamens opposite the petals and equal in number. Ovary entire, often inferior.

31. *Ampelideæ*.—Shrubs or herbs with jointed stems, often scandent. Leaves alternate, simple or compound. Calyx small. Petals valvate. Stamens as many as petals and opposite to them.

10. SAPINDALES.—Disk various. Ovary entire or lobed; ovules 1-2, rarely more in each cell, ascending, pendulous or laterally attached. Flowers often unisexual or polygamous. Leaves usually compound.

32. *Sapindaceæ*.—Usually trees. Leaves alternate, compound or simple. Flowers polygamous, often irregular. Stamens free, often anisomerous.

33. *Sabiaceæ*.—Trees or shrubs. Leaves alternate, simple or compound. Stamens often unequal in size and opposite the petals.

34. *Anacardiaceæ*.—Trees often resinous. Leaves alternate, simple or compound. Stipules 0. Flowers small. Ovary 1-celled (in *Spondias* 2-5-celled). Cells 1-ovuled. Fruit a drupe.

#### Anomalous order.

35. *Moringeæ*.—Trees. Leaves alternate, bi-tri-pinnate. Flowers bisexual. Petals unequal. Stamens 10, 5 fertile opposite to the petals alternating with 5 sterile. Capsule 3-valved, pod-like.

C. *Calcifloræ*.—Calyx gamosepalous. Stamens usually perigynous or epigynous, definite or indefinite. Ovary superior or inferior and adnate to the calyx-tube.

11. ROSALES.—Flowers regular or irregular, usually hermaphrodite. Stamens more or less distinctly perigynous. Styles distinct.

36. *Connaraceæ*.—Trees or shrubs. Leaves 1-3-foliolate or pinnate. Flowers regular. Stamens definite. Carpels hirsute, 1-5, free.

37. *Leguminosæ*.—Trees, shrubs or herbs. Leaves usually alternate, compound. Flowers irregular (regular in *Mimosæ*). Carpel 1, free.

38. *Rosaceæ*.—Trees, shrubs or herbs. Leaves alternate, simple or compound. Flowers regular. Ovary of 1 or more free or combining carpels, often adherent to the calyx-tube.

12. MYRTALES.—Leaves simple. Flowers regular or nearly so, usually hermaphrodite. Pistil syncarpous, inferior (or free in some *Rhizophoræ*); styles 1-5.

39. *Rhizophoraceæ*.—Trees or shrubs. Leaves opposite, coriaceous. Stipules deciduous. Flowers regular. Petals usually fringed. Stamens twice as many as petals or more. Ovary usually inferior.

40. *Combretaceæ*.—Trees or shrubs. Leaves alternate or opposite. No stipules. Ovary inferior 1-celled. Fruit winged or angled, 1-seeded. Albumen 0.

41. *Myrtaceæ*.—Trees or shrubs. Leaves usually opposite, translucent, glandular-dotted, entire. Stamens indefinite. Ovary inferior, with axile placentation.

42. *Melastomaceæ*.—Herbs or shrubs. Leaves opposite, entire, without stipules. Petals twisted in bud. Stamens 10 or fewer, perigynous; anthers opening at the apex by pores or slits. Ovary inferior. Seeds exalbuminous.

43. *Lythraceæ*.—Trees, shrubs or herbs. Leaves opposite or alternate. No stipules. Calyx free, lobes valvate in bud. Stamens definite or indefinite; anthers dehiscing longitudinally. Fruit a capsule. Seeds exalbuminous.

13. PASSIFLORALES.—Flowers regular or irregular. Stamens perigynous (rarely hypogynous). Pistil syncarpous; ovary free or adnate, 1-celled with parietal placentation, or 3-celled with axile placentation.

44. *Samydaceæ*.—Trees or shrubs. Leaves alternate, distichous. Stipules deciduous. Flowers regular. Stamens definite or indefinite. Ovary free. Fruit a 1-celled capsule. Albumen fleshy.

45. *Datisceæ*.—Trees, rarely herbs. Leaves alternate. Stipules 0. Flowers unisexual, petals often absent. Ovary inferior often open at the apex. Placentas and styles as many as calyx-lobes. Seeds numerous, minute.

46. *Cactææ*.—Shrubs or herbs, with succulent stems and minute leaves. Flowers large, bisexual. Stamens indefinite. Fruit fleshy.

14. UMBELLALES.—Flowers regular, 2 or many celled; 1 ovule pendulous in each cell. Styles distinct or connate at the base, surrounded by the disk. Stamens often definite. Albumen copious; embryo minute or longer and straight.

47. *Araliaceæ*.—Trees, shrubs or herbs. Leaves alternate, simple or compound. Flowers umbellate or capitate, petals caducous. Ovary inferior.

48. *Cornaceæ*.—Trees or shrubs. Leaves entire, usually opposite. Stipules 0. Flowers regular. Ovary inferior. Fruit succulent, 2-celled. Albumen fleshy.

#### SUB-CLASS II.—GAMOPETALÆ.

Calyx and corolla present. Petals united (gamopetalous).

##### A. Ovary inferior (*Perigynous gamopetalæ*).

15. CAPRIFOLIALES.—Flowers regular or irregular. Stamens as many as the corolla lobes. Ovary inferior, 2-many-celled; ovules 1-many in each cell. Albumen present rarely 0.

49. *Caprifoliaceæ*.—Shrubs or herbs, often climbing, rarely trees. Leaves opposite, simple or pinnate. Flowers regular or irregular. Stamens attached to the corolla. Fruit a berry or drupe.

50. *Rubiaceæ*.—Trees, shrubs or herbs. Leaves opposite. Stipules free or connate. Flowers usually regular. Stamens as many as corolla-lobes, alternating with them. Ovary 2 or more celled. Cells 2 or many ovuled. Albumen fleshy or horny.

16. ASTERALES.—Flowers regular or irregular, usually collected in involucrate heads. Stamens—the corolla lobes, rarely fewer. Ovary inferior 1-celled, 1-ovuled.

51. *Compositæ*.—Herbs, shrubs, rarely trees. Leaves alternate or opposite. Flowers in involucrate heads. Anthers united in a tube round the style, attached to the corolla. Calyx 0 or reduced to a pappus of hairs, scales or bristles. Ovary 1-celled, 1-ovuled.

17. CAMPANALES.—Flowers usually irregular, rarely unisexual or collected in involucrate heads. Stamens—the corolla-lobes or fewer. Ovary 2-6-celled, rarely 1-celled with numerous ovules, rarely 1 ovule in each cell; style simple; stigma often indusiate.

52. *Goodenovicæ*.—Herbs or shrubs, rarely trees. Leaves alternate. Stipules 0. Stamens 5, free or connate in a ring. Ovary 1-2-celled. Seeds albuminous.

##### B. Ovary free (*Hypogynous gamopetalæ*).

18. PRIMULALES.—Corolla regular, hypogynous. Stamens as many as the corolla-lobes and opposite to them. Ovary 1-celled, with free basal placentas.

53. *Myrsinæ*.—Trees or shrubs. Leaves alternate. Stipules 0. Stamens as many as lobes of the corolla. Ovary 1-celled; ovules peltate, on a free, central placenta. Fruit fleshy or hard, usually indehiscent. 1 or few seeded.

19. **EBENALES.**—Corolla 1-polypetalous, hypogynous or epigynous, rarely perigynous. Stamens usually many. Ovary 2 or more celled, cells usually few ovuled. Fruit rarely capsular.

54. *Sapotaceæ*.—Trees or shrubs, usually with milky juice. Leaves simple, alternate. Stipules 0. Stamens as many as corolla-lobes or in 2-3-series. Ovary 2 or more celled. Fruit 1-few seeded.

55. *Ebenaceæ*.—Trees or shrubs. Leaves alternate, entire. No stipules. Flowers often dioecious. Anthers introrse. Ovary 3 or more celled, cells 1-ovuled. Fruit a berry. Seeds albuminous.

56. *Styraceæ*.—Trees or shrubs. Leaves alternate, simple. Stamens often indefinite. Ovary more or less inferior, 2-5-celled, ovules 2 or more in each cell. Fruit 1-seeded. Albumen fleshy.

20. **GENTIANALES.**—Corolla usually monopetalous, hypogynous. Stamens as many as the corolla-lobes or fewer always inserted on the corolla and usually included in the tube. Ovary usually syncarpous and 2-celled.

57. *Oleaceæ*.—Trees or shrubs, often scandent. Leaves opposite, entire or pinnate. Stipules 0. Stamens 2. Ovary 2-celled. Seeds with or without albumen.

58. *Salvadoraceæ*.—Trees or shrubs. Leaves opposite, entire. Stipules minute. Stamens 4. Ovary 2-celled. Fruit a 1-seeded berry.

59. *Apocynaceæ*.—Trees, shrubs or herbs often with milky juice. Leaves opposite, or whorled. Stamens 5, free. Fruit of 1-2-follicles, drupes or berries. Seeds often plumose.

60. *Asclepiadeæ*.—Shrubs or herbs, often climbing and with milky juice. Leaves opposite, entire. Stipules 0. Anthers connate round the stigma. Pollen in 1-2-waxy masses in each anther-cell. Fruit of 2 follicles. Seeds usually winged or plumose. Albumen copious.

61. *Loganiaceæ*.—Trees, shrubs or herbs. Leaves opposite, simple. Flowers regular, 4-5-merous. Ovary free, 2-celled. Albumen copious.

21. **POLEMONIALES.**—Corolla regular, monopetalous, hypogynous. Stamens as many as corolla-lobes and inserted on the tube; filaments usually exerted. Ovary usually syncarpous, 1-5-celled; cells 1-2 ovuled. Albumen present.

62. *Boraginææ*.—Trees or shrubs. Leaves alternate. Stipules 0. Inflorescence cymose. Flowers 4-5-merous. Ovary 2-4-celled, often 2-4-lobed. Fruit a drupe or dry, and separating into 2-4-nuts.

63. *Convolvulaceæ*.—Herbs or shrubs, often climbing. Leaves alternate. Stipules 0. Flowers large, regular, bisexual, pentamerous. Fruit capsular or succulent and indehiscent. Seeds few. Albumen 0 or scanty.

22. SOLANALES.—Corolla monopetalous, hypogynous, regular or oblique. Stamens as many as corolla-lobes, epipetalous, equal or unequal. Ovary syncarpous, 2-celled; ovules numerous in each cell.

64. *Solanaceæ*.—Herbs or shrubs, rarely small trees. Leaves alternate. Stipules 0. Flowers regular, pentamerous. Fruit a berry or capsule. Seeds albuminous.

23. PERSONALES.—Corolla monopetalous, hypogynous, often 2-lipped. Stamens fewer than the corolla-lobes, unequal, usually 4 didynamous or 2. Ovary 1-2, rarely 4-celled, ovules usually numerous; style simple, stigmas 1-2. Fruit usually capsular.

65. *Gesneraceæ*.—Herbs or shrubs. Leaves opposite or alternate. Flowers hermaphrodite, irregular. Fruit a capsule or berry. Albumen 0 or scanty.

66. *Bignoniaceæ*.—Trees, rarely erect or climbing shrubs. Leaves opposite, often compound, exstipulate. Flowers irregular. Stamens 4 in pairs or 2 only. Ovary 2-celled; ovules many. Fruit a capsule, seeds winged.

67. *Acanthaceæ*.—Herbs or shrubs. Leaves opposite, simple. Stipules 0. Flowers irregular. Fruit a capsule. Seeds usually supported on hooks of the placenta, often elastically hairy when wetted.

24. LAMIALES. — Corolla usually 2-lipped, rarely regular, hypogynous. Stamens usually fewer than the corolla-lobes, 4, didynamous or 2. Ovary 2-4 celled; cells 1-ovuled, rarely 2-ovuled; style simple. Fruit an indehiscent drupe or consisting of 2-4, nuts.

68. *Verbenaceæ*.—Trees, shrubs or herbs. Leaves opposite. Flowers usually irregular. Calyx gomosepalous, often enlarged in fruit. Ovary 4-celled. Cells 1-ovuled.

69. *Labiataæ*.—Herbs or shrubs. Leaves opposite. Flowers irregular. Stamens fewer than corolla-lobes; 2 or 4 in pairs. Ovary deeply lobed. Style gynobasic. Albumen 0 or scanty.

### SUB-CLASS III. MONOCHLAMYDEÆ.

Perianth simple or 0 (double in some *Euphorbiaceæ*).

25. CHENAPODIALES.—Flowers often hermaphrodite. Perianth usually regular, green, or coloured. Ovary of 1 or several carpels, ovules 1-2, basal in each carpel. Embryo coiled or curved.

70. *Nyctaginaceæ*.—Herbs, shrubs or trees. Leaves usually opposite. Stipules 0. Flowers regular, hermaphrodite. Base of perianth persistent and enclosing the ovary and fruit. Seeds albuminous. Embryo curved.



71. *Polygonaceæ*.—Herbs or shrubs. Leaves simple, alternate with sheathing stipules. Flowers small, hermaphrodite or unisexual. Ovary superior, ovule 1, erect. Seeds albuminous. Embryo straight or slightly curved.

26. **ASARALES**.—Flowers unisexual or hermaphrodite. Perianth of 3-5 sepals, sometimes united and irregular, curved, tubular or free. Corolla 0. Stamens extrorse, adherent to the style or pistillode. Ovary of several carpels with axillary placentas and numerous ovules. Albumen fleshy or horny, embryo straight.

72. *Aristolochiaceæ*.—Erect shrubs or twiners. Leaves alternate. Usually simple. Flowers hermaphrodite, often large and dark lurid coloured, curved trumpet-shaped or perianth-lobes free. Seeds numerous. Albumen copious. Embryo small, straight.

27. **PIPERALES**.—Flowers often unisexual. Perianth 0. Stamens 2-6, hypogynous. Ovary sessile, ovule 1, erect. Fruit small, often a berry. Albumen copious. Embryo minute.

73. *Piperaceæ*.—Herbs or shrubs often aromatic and climbing. Leaves simple, alternate. Flowers minute, usually in leaf opposed spikes. Bracts often peltate, sessile or stalked.

28. **LAURALES**.—Flowers usually unisexual. Perianth green or coloured, regular. Ovary superior, (inferior in *Gyrocarpeæ*) 1-celled; ovule solitary; stigma 1. Albumen present or 0; embryo straight.

74. *Myristicaceæ*.—Trees or shrubs. Leaves alternate, entire. Flowers small, dioecious. Stamens united in a column. Albumen ruminant. Fruit fleshy, 2-valved. Seed arillate.

75. *Laurineæ*.—Trees or shrubs. (*Oassytha* a parasite.) Leaves simple, alternate or opposite. Flowers hermaphrodite or unisexual. Anther-cells opening by recurved valves. Ovary 1-celled, ovule 1, pendulous. Albumen 0.

29. **DAPHNALES**.—Flowers usually hermaphrodite. Perianth green or coloured, often tubular. Ovary 1, rarely 2-celled, superior, ovule solitary, pendulous or almost erect in each cell; stigma 1. Albumen 0; embryo straight.

76. *Thymelaceæ*.—Trees or shrubs with tenacious bark. Leaves alternate or opposite. Flowers hermaphrodite. Stamens definite. Ovary free, 1-celled, 1-ovuled. Ovule pendulous. Albumen fleshy or 0.

77. *Elæagnaceæ*.—Trees or shrubs, often scandent and covered more or less with silvery scales. Leaves alternate or opposite, entire. Flowers hermaphrodite. Base of perianth-tube persistent round the free 1-celled ovary. Ovule 1, erect.

30. **SANTALALES**.—Flowers hermaphrodite or diclinous. Perianth usually conspicuous, coloured, valvate. Ovary 1, many celled;

ovules 1, many in each cell, usually reduced to a naked nucleus. Fruit a drupe or berry usually 1-seeded.

78. *Loranthaceæ*.—Parasitic evergreen shrubs. Leaves coriaceous, entire, usually opposite; sometimes wanting. Flowers hermaphrodite. Ovary inferior. Ovule solitary, erect. Albumen green, fleshy.

79. *Santalaceæ*.—Trees, shrubs or herbs. Leaves entire, alternate or opposite. No stipules. Stamens opposite perianth-lobes. Ovary inferior, 1-celled. Fruit 1-seeded. Albumen fleshy.

31. EUPHORBIALES.—Flowers unisexual or rarely hermaphrodite. Perianth various or 0. Ovary superior 2, many celled; ovules 1, numerous, pendulous in each cell. Fruit often capsular, rarely a berry or drupe.

80. *Euphorbiaceæ*.—Trees, shrubs, or herbs often with milky juice. Leaves alternate or opposite. Flowers unisexual. Perianth various, rarely double. Ovary free, usually 3-celled. Cells with 1-2 suspended ovules in each. Fruit a capsule or drupe. Seeds oily.

32. URTICALES.—Flowers unisexual or hermaphrodite. Perianth usually regular, rarely 0. Stamens opposite the perianth-lobes. Ovary superior; 1 rarely 2-celled, ovule solitary in each cell; stigmas 1-2. Fruit an akene or samara; albumen 0 or present.

81. *Urticaceæ*.—Herbs, shrubs or trees, often with milky juice. Leaves simple, usually alternate. Stipules present. Flowers unisexual. Stamens opposite the perianth-segments. Ovary free, usually 1-celled. Fruit 1-seeded.

33. AMENTALES.—Flowers unisexual in catkins, cones or heads. Perianth 0 or calyx-like or consisting of 1 or more bristles, bracts or scales. Ovary superior, 1-2-celled; albumen 0.

82. *Casuarineæ*.—Trees with jointed branchlets. Leaves reduced to toothed sheaths at the nodes. Flowers monœcious, in spikes. Male flowers monandrous. Female flower without a perianth. Fruit a globose head of bracts, valvately opening.

83. *Salicineæ*.—Trees or shrubs. Leaves alternate. Flowers diœcious, in lateral catkins. Ovary free, 1-celled; ovules indefinite. Seeds numerous, minute, with a tuft of hairs.

## DIVISION 2. GYMNOSPERMS.

Ovules not enclosed in an ovary and fertilised by direct contact with the pollen. Cotyledons often more than 2.

84. *Gnetaceæ*.—Climbing shrubs with jointed stems. Leaves opposite, rarely 0. Flowers unisexual, enclosed in sheathing bracts.

## CLASS II. MONOCOTYLEDONS.

Pith, wood and bark not distinct. Bundles of fibres scattered in the cellular tissue of the stem. Bark firmly adherent on the outside. Embryo with 1 cotyledon. Root fibrous.

34. *PALMALES*. — Flowers usually unisexual on a spadix. Perianth of 6 coriaceous segments in 2 rows. Stamens 6, rarely more or fewer, hypogynous or perigynous. Ovary 3, rarely 1-celled or of 3 separate carpels; ovules 1-2 in each cell. Fruit various, never capsular.

85. *Palmæ*.—Trees or climbers. Leaves pinnately or palmately divided. Perianth 6-leaved. Ovary free of 3 distinct or united carpels.

35. *ARALES*.—Shrubs or trees, flowers unisexual or hermaphrodite, arranged in a spadix, enclosed in spathes. Perianth 0 or of distinct segments. Fruit a drupe, 1-many seeded, seed albuminous.

86. *Pandanaceæ*.—Stems woody, herbaceous. Leaves linear, sheathing. Flowers unisexual, sessile; perianth 0. Ovary 1-celled (screw-pines).

36. *GLUMALES*.—Flowers in the axils of scales, arranged in spikelets. Perianth 0 or of minute scales. Stamens 1-3, rarely 6 or numerous. Ovary superior 1-celled. Fruit a caryopsis; albumen fleshy or mealy. Grasses, rarely arboreus.

87. *Gramineæ*.—Herbs, rarely shrubs or trees. Leaves alternate, simple on long split sheaths. Flowers usually bisexual in the axils of the glumes. Embryo at the base of the farinaceous albumen.

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# THE TREES, SHRUBS AND WOODY CLIMBERS

## OF THE BOMBAY PRESIDENCY.

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### ORDER 1. **RANUNCULACEÆ.**

HERBS or climbing shrubs. Leaves alternate or opposite. Flowers regular, bisexual. Sepals 4 or more, deciduous, often petaloid. Petals many or 0. Stamens many. Carpels free; stigma simple; ovules anatropous, pendulous with a dorsal raphe (*Clematideæ*). Fruit a head of many 1-seeded achenes. Seeds albuminous; embryo minute.

Petals 0	...	...	...	...	1. CLEMATIS.
Petals many, linear	...	...	...	...	2. NARAVELIA.

#### 1. CLEMATIS, L.

Climbing shrubs. Leaves opposite, usually compound. Inflorescence, axillary or terminal. Sepals 4—8, petaloid, valvate. Petals 0. Stamens many. Carpels each with 1 ovule. Fruit a head of achenes usually with long feathery styles.

Filaments glabrous.

Connective of anthers not produced.

Leaves simple or trifoliolate.

Leaves large, entire or remotely

serrate ... .. 1. *C. smilacifolia*.

Leaves small, ternate, entire or

1—3-toothed or lobed ... .. 2. *C. triloba*.

Leaves pinnate, bipinnate or 2-ternate. 3. *C. Gouriana*.

Connective of anthers produced more or less.

Leaves simply pinnate, leaflets glabrous ... 4. *C. hedyсарifolia*.

Filaments hairy.

Leaves pinnate, leaflets densely villous ... 5. *C. Wightiana*.

1. *C. smilacifolia*, Wall. in *Asiat. Researches*, XIII. 414; *Fl. Br. I.* 1. 3; *Dalz. & Gibs. Bomb. Fl.* 1.

Stems glabrous, sulcate. Leaves large, purple beneath and with 3—6 strong basal-nerves. Flowers large, 1.5 in. across, in elongated panicles 6—12 in. long. Sepals brown, tomentose outside, purple within. Achenes pubescent with broad margins. This woody climber is found in the Himalaya from Sikkim eastwards, also in the Malay Archipelago, Java, Borneo and the Philippines, and from the Konkan to Travancore. It is

rare in N. Kánara. I have found it in the forests on the Nilkund ghát about 1,500 ft. elevation and in one or two other places. Fl. R. S. Fr. Dec.

2. *C. triloba*, Heyne in Roth. Nov. Sp. 251; Fl. Br. I. 1. 3; Dalz. & Gibs. Bomb. Fl. 1. Vern. *Morbel* or *ranjue*.

A silky tomentose shrub. Leaves with long twining petioles. Flowers large, white, 1.5—2 in. across, in axillary or terminal panicles. Sepals 4—6, membranous, silky outside, reticulately veined. Filaments glabrous; anthers with a broad connective. Mával; West Konkan. Dalz. Fl. Sept. Introduced and in hedges about Poona.

3. *C. Gouriana*, Roxb. Fl. Ind. 2. 670; Fl. Br. I. 1. 4; Wight Ic. 933; Dalz. & Gibs. Bomb. Fl. 1. Indian Travellers' Joy. *Moriel*, M.

Usually glabrous. Leaflets membranous, shining above. Flowers small, 3—5 in., white, in dense panicles. Hilly districts from the W. Himalaya to Ceylon, also in Java and the Philippines. Throughout the presidency in dry forests and along rivers and nálas. Fl. Oct. Fr. Dec.

4. *C. hedysarifolia*, DC. Syst. 1. 148; Fl. Br. I. 1. 4.

Glabrous, leaflets strongly reticulate, coriaceous. Flowers white, .75 in. in diameter, in leafy bracteate panicles. Anther-cells marginal. Achenes hairy, margins tubercled. Easily distinguished from the common *C. Gouriana*, by the larger flowers and the aristate or pointed anthers. Konkan; Belgaum; North Kánara, along banks of nálas and rivers. Fl. Oct.-Nov. Fr. Dec.

5. *C. Wightiana*, Wall. Cat. 4674; Fl. Br. I. 1. 5; Wight Ic. t. 935; Dalz. & Gibs. Bomb. Fl. 1.

Leaflets densely brown, hairy beneath. Flowers yellowish, large, in decomposed panicles. Anthers short. Sepals 4, brown-tomentose. Achenes silky. Hills of the Deccan, Konkan, Mahábaleshvar. Fl. Jan. Fr. H. S.

#### NARAVELIA, DC.

Climbing shrubs. Peduncles 1-flowered, axillary. Leaves trifoliate; terminal leaflet transformed into a tendril. Sepals 4-5. Petals 6—12, linear, longer than calyx. Achenes with long bearded styles.

*N. zeylanica*, DC. Syst. 1. 167; Fl. Br. I. 1. 7; Dalz. & Gibs. Bomb. Fl. 1. *Atragene zeylanica*, Linn. *Charchari balli*, H.; *Nakchitni*, K.

Leaflets sometimes cordate, entire or coarsely toothed, tomentose beneath and with 3—5 strong basal nerves. Sepals 4-5-ribbed, broad ovate. Petals linear, spatulate, longer than the sepals. Achenes twisted, hairy, situated on the small globose, hairy torus.

Tropical forests of the Himalaya eastwards from Nepal. Eastern and Western Peninsulas and Ceylon. Throughout the Presidency, common in the moist forests of North Kánara. Fl. Oct. Fr. Nov.-Dec.

## ORDER 2. DILLENIACEÆ.

Shrubs, herbs or trees with large penniveined leaves, distinctly alternate. Flowers yellow or white, often showy. Sepals inbricate, persistent. Petals 5-4. Stamens indefinite; anthers innate with lateral slits or terminal pores. Carpels 1 or more, free or cohering; styles always distinct; ovules amphitropous, solitary or few and ascending or many and attached to the ventral suture. Fruit of follicles or baccate. Seeds with or without an aril; albumen fleshy; embryo minute next the hilum.

## DILLENIA, Linn.

Trees. Leaves serrate. Flowers solitary or fascicled, yellow or white. Sepals 5. Petals 4-5, deciduous. Stamens numerous in many series, anthers, linear, dehiscing longitudinally or by terminal pores. Carpels 5-20; styles as many as ovaries. Fruit globose enclosed in the thickened calyx. Seeds exarillate, naked or immersed in pulp.

Leaves persistent. Flowers large, white ... 1. *D. indica*.

Leaves deciduous. Flowers much smaller, yellow ... 2. *D. pentagyna*.

*D. indica*, Linn.; Fl. Br. J. 1. 36; Brandis For. Fl. 1. *D. speciosa*, Thunb. Dalz. & Gibs. Bomb. Fl. 2; Bedd Fl. Sylv. t. 103. *Mota karmal*, M.; *Chalta*, H.

Himalayas from Nepal to Assam. Southern, Eastern and Western Peninsulas. Extends to Ceylon, Burma and the Malay Archipelago. Planted in various parts of India. Konkan (Sávantwádi); Kolába (Alibág); Belgaum, I think only cultivated. Fl. June. Fr. Feb.

A medium sized tree. Bark grey, rough, brown within. Wood red with white specks, close-grained, moderately hard and tough. Weighs 44 lbs. per cubic foot, durable under water. Used for gunstocks, firewood and charcoal. Ripe fruit eaten in native curries.

2. *D. pentagyna*, Roxb. Cor. Pl. 1. t. 20; Fl. Br. I. 1. 38; Brandis For. Fl. 2; Bedd. Fl. Sylv. t. 104; Dalz. & Gibs. Bomb. Fl. 2. *Karmal*, *karambel*, *kurweil*, M.; *Kanagola*, K.

Oudh, Bengal, Assam, Burma, Central, Southern and Western India, throughout the Presidency in deciduous forests, common. Fl. March-Apr. Fr. May.

A large deciduous tree. Bark grey, scaly; on quick-growing trees, scarcely any rhytidome, a little at the base. Green cells well developed. Inner bark: large patches of soft white bast mixed with bands and irregular patches of tissue. Wood reddish grey, strong, heavy, handsomely marked on a vertical section by the broad medullary rays. Pores small and moderate sized, some often filled with a white substance. Annual rings distinct. Weighs about 45 lbs. to the cub. ft. Used for firewood in North Kánara. Leaves lopped for leaf manure.

## ORDER 3. MAGNOLIACEÆ.

Trees or shrubs with convolute stipules. Sepals and petals usually similar, trimerous, imbricated. Stamens many, free on torus. Ovaries numerous, often spirally on torus. Seeds albuminous. Embryo minute.

## MICHELIA, Linn.

Trees. Leaves simple, alternate. Filaments flat. Gynophore stalked. Carpels numerous, each with 3 or more ovules. Fruit a spike of 2-valved, 1-12-seeded, dehiscent carpels. Seeds albuminous with a fleshy testa.

*M. Champaca*, Linn.; Fl. Br. I. 1. 42; Brandis For. Fl. 3. *Kud champā*, M.; *Kola sampige*, K.; *Champa*, Vern.; *Rae champo, champo*, Guz.

Nepal, Assam, Burma, and the Nilgiris. Western ghats of Kánara. A large evergreen tree commonly cultivated near temples, throughout the presidency. Flowers at various seasons. Ripe fruit in the cold season.

Wood olive-brown, soft and durable. Pores small, equally distributed. Med. rays moderately broad, short and wavy. Weighs 33 lbs. to the cubic foot. Seasons and takes a good polish. Used for planking, house-building and furniture. The scented flowers are used as an offering in Hindu temples. Bark, fruit, flowers and leaves are employed in native medicine. The flowers yield a yellow dye.

## ORDER 4. ANONACEÆ.

Trees or shrubs. Leaves alternate, entire, exstipulate. Flowers bisexual, rarely unisexual. Sepals and petals trimerous. Stamens usually indefinite, the connective often produced. Ovaries numerous, rarely solitary, free (in *Anona* connate); styles short or stigmas sessile; ovules 1 or more in each cell. Carpels 1 or more, sessile or stalked; 1 or more seeded. Seeds large. Albumen ruminant, often divided almost to the axis into series of horizontal plates; embryo small; cotyledons divaricating.

Anther-cells concealed by the overlapping or produced connectives.

Petals 2-seriate, imbricate in bud. Ovaries indefinite, ovules many, 2-seriate ... ..

1. UVARIA.

Petals valvate in bud, inner subsimilar or 0.

Ovaries many, 2-ovuled; peduncles woody, hooked ... ..

2. ARTABOTRYX.

Ovaries numerous, ovules 2-6, 1-seriate on the ventral suture ... ..

3. UNONA.

Ovaries many, ovules 1-2, basal ... ..

4. POLYALTHIA.

Petals 2-seriate, valvate in bud, inner dissimilar, conniving and arching over the stamens ... ..

5. GONIOTHALAMUS.

Petals valvate in bud, inner similar, but smaller ... ..

6. ANONA.

Anther-cells not concealed by the connectives.

Petals valvate, inner largest. Ovules indefinite ... ..

7. SACCOPE TALUM.

Petals valvate, inner shortest. Ovules 2-4 ... ..

8. OROPHEA.

Petals imbricate, subequal. Ovules 2-8 ... ..

9. SAGERÆA.



## 1. UVARIA, L.

Scandent shrubs. Leaves simple, stellately tomentose or glabrous. Flowers terminal or leaf-opposed, cymose fascicled or solitary, yellow, purple or brown. Sepals 3, valvate. Petals 6. Stamens indefinite, connective foliaceous or truncate-dilated. Ovaries indefinite, linear oblong, ovules many, 2-seriate. Ripe carpels many, few, or 1-seeded.

Carpels small.	Seeds in a single row.	Peduncles	
slender	...	...	1. <i>U. Narum</i> .
Carpels larger.	Seeds in a double row.	Peduncles	
thick, angular	...	...	2. <i>U. Hookeri</i> .

1. *U. Narum*, Wall. Cat. 6473; Fl. *U. lurida*, D. & G. Bomb. Fl. 3. *Naram panel*, Rheede Hort. Mal. 2. t. 10.

Western Peninsula on the ghâts from the Konkan southwards, Ceylon up to 4000 feet in the Central Provinces. A large woody climber. A greenish odorous oil is obtained from the roots, used in native medicine.

2. *U. Hookeri*, King. Ann. Calcutt. Bot. Gard. Vol. 4. p. 28. *U. Narum*, Wall. *Var. macrophylla*. Fl. Br. I. 1. 50, Dalz. & Gibs. Bo. Fl. 3.

A large climber. Leaves ovate-lanceolate, acute or long acuminate, 6-9 in. long, by 1.5—2.20 in. broad. Flowers similar but larger (2 in. across) than those of *U. Narum*. Carpels sausage-shaped, larger than those of *U. Narum* and on thicker, angular pedicels. Seeds in 2 rows of about 6 each. This species is united in the Fl. Br. I. to *U. Narum*, Wall., as *Var. macrophylla*, but Sir G. King in his 'Anonacæ of British India' considers it to be distinct and has named it *U. Hookeri*. It is rather common in some of the evergreen forests of the N. Kánara and Konkan Ghats. Fl. Fr. Mar.-May.

## 2. ARTABOTRYS, R. Brown.

Scandent shrubs. Leaves shining, evergreen. Flowers solitary or fascicled on woody hooked peduncles. Sepals 3, valvate. Petals 6, 2-seriate, bases concave connivent, limb spreading. Stamens numerous, connective truncate-dilated, produced beyond the anther cells. Torus plano-convex. Ovaries few or many, style oblong or columnar, ovules 2 in each, erect. Fruit a berry.

Flowers and fruit glabrous	...	...	1. <i>A. odoratissimus</i> .
Flowers and fruit tomentose	...	...	2. <i>A. zeylanicus</i> .

1. *A. odoratissimus*, R. Br. in Bot. Reg. 423; Fl. Br. I. 1. 54; Kz. For. Fl. Burm. 1. 31. Cultivated, but not indigenous, in the Bombay Presidency.

2. *A. zeylanicus* H. f. & T. Fl. Br. I. 1. 54; Bedd. Ic. Pl. Ind. Or. t. 48.

Evergreen forests of the W. Peninsula; also in Central and Southern Ceylon. North Kánara, towards the south, abundant in the forests near the Gairsoppah falls. Fl. Nov. Fruit remains two years on stem.

At once recognised by the flattened woody flowering peduncles, characteristically hooked. A lofty climber. Stems 3 in. in diameter. Bark dark-coloured, smooth; inner bark reddish, very fibrous. Branchlets circinate, thickened at the points of contact with other stems or branches.

### 3. UNONA, L.

Trees or shrubs, often climbing. Flowers usually solitary, axillary or terminal. Sepals 3, valvate. Petals 6, nearly equal, or the inner 3 absent. Torus flat or slightly concave. Stamens numerous, closely packed, 4-angled; top of connective truncate or globose. Ovaries numerous, style ovoid or oblong, recurved and grooved; ovules 2 or more, 1-seriate. Ripe carpels stalked, often moniliform, seeds few or many.

- Carpels not constricted between the seeds. A small tree. Flowers subsessile, villous ... .. 1. *U. pannosa*.  
 Carpels moniliform. An erect or spreading shrub.  
 Petals  $\frac{1}{2}$  in. broad. Flowering peduncles  $\frac{1}{2}$  in. long ... .. 2. *U. discolor*.  
 An erect or climbing shrub. Petals  $\frac{1}{4}$  in. across, very long. Flowering peduncles '5 to 1 in. long... 3. *U. Lawii*.

1. *U. pannosa*, Dalz. in Hook. Kew Jour. Bot. III. 207; Fl. Br. I. 1. 58; Bedd. Ic. Pl. Ind. Or. t. 52; *U. farinosa*, Dalz. & Gibs. Bomb. Fl. 3.

Western Ghát forests up to 3500 ft. Konkan, Párvár ghát and Tulawari. D. & G. Yields a strong fibre and possesses a tough wood. Bedd. Fl. Syl. 9.

2. *U. discolor*, Vahl. Symb. II. 63. t. 36; Var. *laevigata*, Fl. Br. I. 1. 59; Dalz. & Gibs. Bomb. Fl. 3. *U. Dunalii*, H. f. & T. Dalz. & Gibs. Bomb. Fl. 3.

Konkan (Sávantvádi). Closely allied to the next species. Dr. King says: "Perhaps cultivated only in India, common in the Archipelago and China." Annals Royal Bot. Gard. Calc. 4. p. 56. The Konkan is given as a habitat on the authority of the Bombay Flora of Dalzell.

3. *U. Lawii*, H. f. & T. Fl. Ind. 132; Fl. Br. I. 1. 59; Bedd. Ic. Pl. Ind. Or. t. 73.

W. Peninsula, N. Kánara and the Konkan, in evergreen forests, common in the forests near Goond, Supa sub-division of N. Kánara. Fl. Aug.-Jan. Fr. Jan.-Mar.

### 4. POLYALTHIA, Blume.

Trees or shrubs. Flowers solitary or fascicled, axillary or leaf-opposed. Sepals 3, usually valvate. Petals 6, 2-seriate, flat or the inner vaulted. Torus convex. Stamens cuneate; anther-cells ex-

trorse, remote. Ovaries indefinite; style usually oblong; ovules 1-2, basal and erect. Berries stalked, globose or oblong, 1-seeded.

Leaves glabrous, narrowly lanceolate, edges undulate. Flowers numerous, sub-umbelled. Petals very narrowly linear, .75 in. long ... .. 1. *P. longifolia*.

Leaves elliptic or ovate-acuminate, not glabrous or undulate on the margins.

Peduncles cymose, usually many-flowered. Petals linear, 1.5 in. long, .2 in. broad ... .. 2. *P. fragrans*.

Peduncles 1-3-flowered. Petals ovate-oblong, .5 in. long ... .. 3. *P. cerasoides*.

Leaves oblong-lanceolate, pellucid-dotted. Flowers solitary or fascicled. Petals broadly linear, 1-1.5 in. long ... .. 4. *P. coffeoides*.

1. *P. longifolia*, Benth. & Hook. f. Gen. Plant. 1. 25. Fl. Br. I. 1. 62; Brandis For. Fl. 5; King Anonaceæ Br. I. 72. *Guatteria longifolia*, Wall. Dalz. & Gibs. Bo. Fl. Suppl. 2. *Asoca*, *asupala*, Vern. Indian Fir or Mast Tree.

A handsome evergreen tree commonly planted about Poona and Bombay, indigenous in Ceylon. Yields a close-grained, yellowish, rather soft wood which weighs about 40 pounds to the cubic foot.

2. *P. fragrans*, Benth. & H. f. l. c. Fl. Br. I. 1. 63; Bedd. Ic. Pl. Ind. Or. t. 54. *Guatteria fragrans*, Dalz. & Gibs. Bomb. Fl. 4. *Gauri*, K.

A large gregarious tree with smooth bark in the W. Ghát forests from N. Kánara southwards, found in the Konkan (Sávantvádi); and common on the southern gháts of N. Kánara. Closely allied to if not the same as *P. coffeoides*, Benth. The sweetly scented flowers appear during the month of Nov. Fr. Hot season.

3. *P. cerasoides*, Benth. & H. f. l. c. Fl. Br. I. 1. 63; Bedd. Fl. Sylv. t. 1; Brandis For. Fl. 5. *Guatteria cerasoides*, W. & A. Prodr. 10; Dalz. & Gibs. Bomb. Fl. 3. *Hoom*, M.; *Vubbina*, K.

On the dry hills from Behar southward to Tinnively; in Burma, on the Prome and Shan hills; throughout the deciduous forests of the Bombay gháts. "Wood prized on the Western Gháts, where the Hoom is an important tree of the evergreen forests in the Sátára District." Brandis. Wood olive-grey, moderately hard, close-grained. Used for carpentry and boat building. Weighs 52 lbs. the cubic foot. Fl. Feb.-May. Fr. R. S.

4. *P. coffeoides*, Benth. & H. f. l. c. Fl. Br. I. 1. 62; Bedd. Fl. Syl. 10; Icones Pl. Ind. Or. t. 53; King. Anon. Br. I. 67. *Murgauri*, K.

A large gregarious, smooth-barked tree with a cylindrical trunk 100 feet high by 2.5 ft. in diam. Leaves membranous, pellucid-dotted. Flowers on articulate 1 in. peduncles, 2-4-fascicled on the old wood, fragrant. Fl. Feb. Fr. H. S.

Common in the moist evergreen forests of the Western Gháts from N. Kánara southwards and in Ceylon. Very common in the forests near Yellápore (in Kánara): in the Telgiri *kan* nearly half the trees are of this species. The young foliage of a brilliant red colour comes out in February.

Wood yellowish-white, light (31 lbs. to the cubic foot). Annual rings distinct. Pores numerous, small. Medullary rays numerous, very fine. The timber is not considered of any value as it decays on exposure. I have not observed the ammoniacal smell which is said to come from the freshly cut bark. This bark is made into a kind of rope by the Kurambars in the Wynaad.

*P. suberosa*, Benth. & Hook.; *Guatteria suberosa*, DC. *P. Korinti*, Benth. & Hook. *Guatteria Korinti*, Dunal, and *Guatteria sempervirens*, Dunal (an obscure species founded on Rheede's figure, Hort. Mal. v. t. 16, 18), are mentioned in Graham's list as having been found in the Konkan, but his observations have not been confirmed by subsequent authors.

#### 5. GONIOTHALAMUS, Blume.

Small trees or shrubs. Flowers solitary or fascicled, axillary. Sepals 3, valvate. Petals 6, outer thick, flat, inner smaller, shortly clawed. Stamens many, connective produced into an oblong process. Ovaries many; ovules solitary or 2 superposed in each; style elongate; stigmas 2-lobed. Berries 1-seeded.

*G. cardiopetalus*, H. f. & T. Fl. Ind. 107; Fl. Br. I. 1. 75; Bedd. Fl. Sylv. 8. *Polyalthia cardiopetala*, Dalz. in Hook. Kew Jour. Bot. II. 39. *P. wynaadensis*, Bedd. Mss. in Herb. Madras (*Atrategia*, Bedd.).

Southern India: in Kánara and N. Wynaad up to 3000 ft., North Kánara gháts in evergreen forests, common on the Ankola Gháts. Fl. March. Fr. R. & C. S.

#### 6. ANONA, L.

Trees or shrubs. Flowers solitary or fascicled. Sepals 3, valvate. Petals 3 or 6. Stamens indefinite, on a hemispherical torus, top of connective ovoid. Ovaries many, subconnate; ovule 1, erect. Carpels united into a large fleshy fruit; seeds numerous, imbedded in pulp.

Fruit tubercled. Flowers solitary ... ..	1. <i>A. squamosa</i> .
Fruit smooth. Flowers 2-3 together ... ..	2. <i>A. reticulata</i> .
Fruit very large, muricate ... ..	3. <i>A. muricata</i> .

1. *A. squamosa*, Linn. Fl. Br. I. 1. 78; Bedd. Fl. Sylv. 9; Brandis For. Fl. 6. Sweet Sop. Custard Apple. *Sita phul*, H. Naturalized throughout the presidency; usually cultivated. Fl. June-July.

2. *A. reticulata*, Linn. Fl. Br. I. 1. 78; Bedd. Fl. Sylv. 9. Bullock's-heart. *Rámphul*, H. Cultivated throughout the presidency.

3. *A. muricata*, DC. Syst. 467; Bedd. Fl. Sylv. 9; Dalz. & Gibs. Bomb. Fl. Suppl. 2. Sour Sop. Cultivated near Bombay.

#### 7. SACCOPETALUM, Bennet.

Trees. Flowers axillary, solitary or fascicled. Sepals 3, small, valvate. Petals 6, valvate, in 2 series, outer small, like the sepals,

inner much larger, erect, or conniving, base saccate. Stamens indefinite; connective produced into a conspicuous appendage. Ovaries indefinite, ovules 6 or more. Ripe carpels sub-globose.

*S. tomentosum*, H. f. & T. Fl. Ind. 152. Fl. Br. I. 1. 88; Bedd. Fl. Sylv. 10; Brandis For. Fl. 7; Dalz. & Gibs. Bomb. Fl. 4. *Hoom*, H.; *Wumb*, K.

Nepal Terai; Guzerat; Rajputana, Central India, Behar, Orissa, and evergreen forests of the Western Gháts from the Konkan to Travancore. A tall deciduous tree with thick brown, cracked and furrowed bark. Wood olive-brown, moderately hard, smooth and close-grained, mottled, no heart wood. Weighs 45 lbs. to the cubic foot. Used for building purposes. Leaves are shed in March. Flowers and young leaves in April. Fruit June.

#### 8. OROPHEA, Blume.

Trees or shrubs. Flowers small, axillary, solitary, fascicled or cymose. Sepals 3, valvate. Inner petals clawed, cohering into a mitriform cap. Stamens definite, 6-12, fleshy; anther-cells large, contiguous; connective pointed, not truncate. Ovaries 3-15; ovules 4. Ripe carpels often globose.

*O. zeylanica*, H. f. & T. Fl. Ind. III; Fl. Br. I. 1. 90; Bedd. Fl. Sylv. 11.

Western Peninsula from N. Kánara to Coorg, also in the Central Provinces of Ceylon. In N. Kánara it is abundant in the evergreen forests near the "Yena Rocks" (Kumpta sub-division), and is scarcely anything more than a small shrub, which flowers and fruits at different times throughout the year.

#### 9. SAGERAEA, Dalz.

Trees. Flowers small, terminal, axillary or fascicled on woody tubercles, 1-2 sexual. Sepals 3, ovate, imbricate. Petals 6 in 2 series, imbricate, nearly equal, usually concave. Stamens 6-21, imbricate in 2 or more series, thick, fleshy, connective produced. Ovaries 3-6; ovules 1 or 2—8 on the ventral suture. Ripe carpels globose, stalked.

In his Anonaceæ of British India, Dr. King has separated *Sageræa*, from *Bocagea*, St. Hilaire, to which genus it had been united in the Fl. Br. I. by Sir J. Hooker. The extreme imbrication of the sepals and petals in *Sageræa*, appears to Dr. King an insurmountable objection to its being included in *Bocagea*. Baillon also in his *Histoire Naturelle des Plantes* retains *Sageræa*, as a separate genus. It should therefore be included in the section of the tribe Uvarieæ with imbricating sepals. *Bocagea*, St. Hilaire, a tropical, Asian and S. American genus, has the sepals and petals valvate and belongs to the tribe Unoneæ.

*S. laurina*, Dalz. in Kew Jour. Bot. 3. 207; Dalz. & Gibs. Bomb. Fl. 2; King Anon. Br. I. 7. *S. Dalzellii*, Bedd. Ic. Pl. Ind. Or. *Bocagea*

*Dalzellii*, H. f. & T. Fl. Br. I. 1. 92. *Guatteria laurifolia*, Grah. Cat. Bo. Pl. 4. *Sageri*, *har-kinjal*, *undie*, M.

A moderate sized tree with a cylindrical stem and dark coloured scaly bark. Konkan and N. Kánara, in evergreen forests. Fl. Oct.-Nov.

#### ORDER 5. MENISPERMACEÆ.

Climbing shrubs. Leaves alternate, entire, usually palmi-nerved; stipules 0. Flowers small, usually trimerous, dicecious, sometimes 3-bracteolate. Sepals usually 6, free, the outer 3, often minute. Petals 6-0, free or connate. Male fl.: Stamens usually 6, opposite the petals, rarely fewer or more. Female fl.: Staminodes 6-0, carpels free, distinct, usually 3; style terminal, simple or divided; ovules solitary, usually amphitropous. Ripe carpels usually drupaceous; seed enclosed in the woody or coriaceous endocarp, usually curved or reniform, the radicle pointing towards the scar of the style which is either sub-terminal or sub-basal. Albumen equable, ruminant or 0, cotyledons flat or semiterete, foliaceous or fleshy, adpressed or spreading.

Flowers trimerous. Ovaries 3. Seed oblong or globose. Cotyledons foliaceous. Albumen scanty or copious. (Tinosporeæ.)

Filaments free. Drupes red, dorsally convex... 1. TINOSPORA.

Filaments connate. Drupes black, dorsally gibbous ... 2. ANAMIRTA.

Flowers trimerous. Ovaries usually 3. Seed horse-shoe shaped. Albumen copious. Cotyledons linear. (Cocculæ.)

Ovaries 3-12. Dry fruit obovoid-oblong, not tubercled. Anthers 2-lobed, dehiscent longitudinally ... 3. TILIACORA.

Ovaries 3-6. Dry fruit, circular, compressed, strongly, tubercled. Anthers 4-lobed, dehiscent transversely. ... 4. COCCULUS.

Flowers 3-5-merous. Ovaries usually 1. Seed horse-shoe shaped. Albumen scanty. Cotyledons slender, adpressed. (Cissampelidæ.)

Sepals 6-10, free, Petals of ♂ and ♀ 3-5, free ... 5. STEPHANIA.

Sepals 4, free. Petals of ♂ 4, connate, of ♀ 1. 6. CISSAMPELOS.

Sepals 4-8, connate. Petals of ♂ 4-8, connate. of ♀ 1 ... 7. CYCLEA.

#### 1. TINOSPORA Miers.

Climbing shrubs. Flowers in racemes or panicles. Sepals 6 in 2 series, inner larger, membranous. Petals 6, smaller. Male fl.: Stamens 6; filaments thickened at top. Female fl.: Staminodes 6, clavate. Ovaries 3; stigmas forked. Drupes 1-3, dorsally convex, ventrally flat. Putamen tubercled, dorsally keeled, intruding. Albumen ruminant; cotyledons leafy.

Leaves large, woolly beneath. Flowers green ... 1. *T. malabarica*.

Leaves smaller, glabrous. Flowers yellow ... 2. *T. cordifolia*.

1. *T. malabarica*, Miers Contrib. III. 32; Fl. Br. I. 1. 97; Dalz. & Gibs Bomb. Fl. 5.

Western Peninsula, Sikkim, Khasia hills and Chittagong. Moist forests of the Konkan and N. Kánara, but nowhere common. Branchlets clothed with white hairs.

2. *T. cordifolia*, Miers Contrib. III. 31; Fl. Br. I. 1. 97; Brandis For. Fl. 8; Dalz. & Gibs. Bomb. Fl. 5. *Gulaveli, gulbel, gulwail, giroli*, M.; *Gulo*, Vern.; *Amrubali*, K.

Throughout tropical India, common in hedges, also throughout the Konkan and N. Kánara forests. Stems thick. Bark corky, grey and very thin, scaly on branches. Aërial roots long, slender like whipcord. Stems used in native medicine, "Gulo" of the bazaars. Fl. C. & H. seasons. Fr. H. & R. seasons.

### 2. ANAMIRTA, Coleb.

A climbing shrub. Flowers paniced. Sepals 6, a little unequal with 2 adpressed bracts. Petals 0. Male fl.: Anthers sessile on a column. Female fl.: Staminodes 9, clavate, 1-seriate. Ovaries 3, on a short gynophore; stigma sub-capitate, reflexed. Drupes stalked on a 3-fid gynophore, obliquely ovoid, dorsally gibbous; style—scar sub-basal; putamen woody. Seed globose embracing the hollow intruded endocarp. Albumen almost ruminant, dense, of horny granules; embryo curved; cotyledons narrow-oblong, thin, spreading.

*A. Cocculus*, W. & A. Prodr. I. 446; Fl. Br. I. 1. 98; Brandis For. Fl. 8; Dalz. & Gibs. Bomb. Fl. 4; *Kakaphula, kakmari*, Vern.; *Garud phul*, Kon. The *Cocculus Indicus* of Pharmacy.

Eastern Bengal, Khasiya and Assam, Western and Southern India from the Konkan to Ceylon. In the moist forests of the Konkan and N. Kánara, but nowhere common. The white berries which turn black when ripe are used to poison fish and to adulterate beer. The seeds yield a fixed oil used in an ointment for skin diseases and for industrial purposes.

### 3. TILIACORA, Coleb.

A climbing shrub. Flowers in axillary panicles. Sepals 6, 2-seriate, outer much smaller. Petals 6, minute, cuneate. Male fl.: Stamens 6, free. Female fl.: Carpels 9-12; styles short, subulate. Drupes stalked; putamen sulcate. Albumen oily, ruminant; cotyledons linear, fleshy, plano-convex.

*T. racemosa*, Coleb. in Trans. Linn. Soc. XIII. 67; Fl. Br. I. 1. 99.

### 4. COCCULUS, DC.

Climbers. Sepals 6, inner 3 larger. Petals 6, shorter than the sepals, entire or 2-cleft. Male fl.: Stamens 6, free, embraced by the petals. Female fl.: Staminodes 6 or 0. Ovaries 3-6; styles usually cylindrical. Drupes laterally compressed, style scar nearly basal.

Endocarp tuberculate, horse-shoe-shaped, sides excavate; seed curved, albumen fleshy; embryo annular; cotyledons linear, flat, adpressed.

Leaves more or less glabrous, sub-orbicular, long petioled. Flowers in large panicles. Drupe 1 in. in diam. ... ..	1. <i>C. macrocarpus</i> .
Leaves ovate, villous. Flowers in short panicles. Drupe $\frac{1}{2}$ in. ... ..	2. <i>C. villosus</i> .
Leaves oblong or trapezoid, glabrate. Male flowers fascicled. Female flowers solitary. Drupe $\frac{1}{2}$ to $\frac{1}{3}$ in. ... ..	3. <i>C. Leæba</i> .

1. *C. macrocarpus*, W. & A. Prodr. 13; Fl. Br. I. 1. 101; Dalz. & Gibs. Bomb. Fl. 5. *Vatoli, vatyel, ramrick*, M.

Western Ghâts from the Konkan southwards; also in Ceylon. Konkan; North Kánara, along banks of rivers and nálas and in moist forests, locally abundant. Fl. Feb.-March. Fr. May.

2. *C. villosus*, DC. Prod. I. 98; Fl. Br. I. 1. 101; Dalz. & Gibs. Bomb. Fl. 5; Brandis For. Fl. 9. *Kursan, zamir*, Sind. *Vasanvel, parvel*, M.; *Vasandi*, Sans.

Dry and arid parts of India from Sind to Bengal and southwards to Madras; absent from Ceylon; also in the dry regions of Africa. Common in hedges throughout the dry parts of the Presidency and Sind. Fl. Feb.-March. Root a substitute for sarsaparilla. Juice of the leaves mixed with water coagulates into a green jelly.

3. *C. Leæba*, DC. Prod. I. 99; Fl. Br. I. 1. 102; Brandis For. Fl. 9. *Ullar-billar*, Sind.

Dry and arid regions of India, Punjab, Sind and the Carnatic; dry regions of Africa. Flowers throughout the year.

Used as a substitute for "Anamirta Cocculus" berries.

##### 5. STEPHANIA, Lour.

Climbing shrubs with peltate leaves. Flowers in axillary, cymose umbels, very deciduous. Male fl.: Sepals 6-10. Petals 3-5, fleshy. Anthers 6, connate at top of staminal column, transversely dehiscent. Female fl.: Sepals 3-5. Petals of the male. Ovary 1; style 3-6-divided; drupe ovoid, glabrous, red; endocarp compressed, horse-shoe-shaped, dorsally tubercled; sides perforated. Seed nearly annular; cotyledons long, slender, adpressed.

*S. hernandifolia*, Walp. Rep. 1. 96; Fl. Br. I. 1. 103; Dalz. & Gibs. Bomb. Fl. 6.

Nepal to Chittagong; Western Peninsula from the Konkan to Ceylon; Malay Peninsula; Tropical Australia and Africa; common throughout the Konkan and North Kánara in moist situations, often in hedges. Fl. Aug. Fr. Oct. Stems slender.



## 6. CISSAMPELOS, Linn.

Climbers. Leaves peltate. Male fl.: cymose. Sepals 4. Petals 4, connate, forming a 4-lobed cup. Stamens monadelphous, anthers united into a peltate disk, bursting transversely. Female fl.: racemed in the axils of leafy bracts. Perigonium of 2, 2-nerved sepals adnate to the bracts. Ovary 1; style short, 3-toothed. Drupe circular; style-scar near the base; endocarp horse-shoe-shaped, dorsally tubercled, sides excavated.

**C. Pareira**, Linn. Fl. Br. I. 1. 103; Dalz. & Gibs. Bomb. Fl. 5; Brandis For. Fl. 10. *Paharvel*, *paharmul*, M.; *Padavali*, K.

Throughout tropical and sub-tropical India, from Sind to Ceylon, not in the arid parts of Sind and Punjab, neither have I observed it in North Kánara; it is common on the Bababuden Hills of Mysore at about 3000 ft. elevation. Fl. Mar.-Oct. It furnishes the "Radix Pareiræ" of druggists. A tonic and diuretic medicine.

## 7. CYCLEA, Arnott.

Climbers. Leaves usually peltate. Flowers in axillary panicles. Male fl.: Sepals 4-8, connate into an inflated calyx. Petals 4-8, connate. Anthers 4-6, connate into a peltate disk, crowning the staminal column, bursting transversely. Female fl.: Sepal 1. Petal 1. Ovary 1; style short, 3-5-lobed, lobes radiating. Drupe ovoid, hairy; endocarp horse-shoe-shaped, dorsally tubercled, sides 2-locellate.

Calyx subglobose, 6-8-lobed. Corolla urceolate ... 1. *C. Burmanni*.

Calyx campanulate, 4-lobed. Corolla a 4-lobed cup ... 2. *C. peltata*.

1. **C. Burmanni**, Miers Contrib. III. 239. t. 121; Fl. Br. I. 1. 104; Dalz. & Gibs. Bomb. Fl. 6. *Pakur*, Vern.

Western Gháts and the Konkan. Flowers Jan. Stems slender.

2. **C. peltata**, H. f. & T. Fl. Ind. 201; Fl. Br. I. 1. 104; Dalz. & Gibs. Bomb. Fl. 6. *Paryel*, M.

From Assam and the Khasia Hills eastwards; Eastern and Western Peninsulas and Ceylon; common in the Konkan and North Kánara moist forests from the sea-level upwards. Fl. R. S. Fr. Jan. Stems slender.

## ORDER 6. VIOLACEÆ.

Herbs or shrubs. Leaves alternate, stipulate. Flowers regular or irregular, 2-bracteolate. Sepals 5, persistent, equal or unequal, imbricate. Petals as many, hypogynous, imbricate or twisted in bud. Stamens 5, filaments short, broad; anthers free or connate, connective broad and produced beyond the cells. Ovary sessile, 1-celled; ovules

many, anatropous, attached to the 3-parietal placentas; style simple; stigma capitate, truncate or cup-shaped, entire or lobed. Fruit a 3-valved capsule, rarely a berry. Albumen fleshy; embryo small; cotyledons flat.

An order of small importance to the forester in the Bombay Presidency. Hitherto only one small tree (*Alsodeia zeylanica*), has been found in the North Kánara district.

#### ALSODEIA. Thouars.

Shrubs or small trees. Leaves alternate, distichous; stipules rigid. Flowers small, axillary or terminal, solitary, fascicled cymose or racemose, regular; peduncles with many bracts. Sepals 5, almost equal. Petals as many, sessile. Stamens 5, inserted inside or on an annular and lobed disk; connective produced into a broad membranous appendage beyond the cells. Ovary 1-celled; ovules few or many; style straight; stigma terminal. Capsule 3-valved, few-seeded.

*A. zeylanica*, Thwaites Enum. 21; Fl. Br. I. l. 187; Bedd. Fl. Syl. t. 229.

This small tree has been only lately found in evergreen forest near Katgal in the Kumpta taluka of North Kánara and is reported to occur also on the Mulamune Ghát. Beddome says it is found in Travancore and in the Wynaad. It also occurs in Ceylon, and apparently flowers and is in fruit at different times throughout the year. A rare species of no economic importance.

#### ORDER 7. CAPPARIDEÆ.

Herbs, shrubs or trees, erect or climbing. Leaves alternate; simple or palmately 3-9 foliate. Flowers usually bisexual. Sepals 4, free or connate. Petals 4, rarely 2 or 0, hypogynous or seated on the disk, imbricate or open in bud. Stamens indefinite, 8, 6, or 4, at the base of or on a long or short gynophore. Disk 0 or tumid or lining the calyx-tube. Ovary sessile or stalked, 1-celled; style short or 0; stigma depressed; ovules indefinite, parietal. Fruit capsular or berried. Seeds angled or reniform, exalbuminous; embryo incurved.

Climbing, unarmed shrubs.

Fruit moniliform, a long fleshy berry .. 1. *MÆRUA*.

Fruit cylindric, debiscent ... 2. *CADABA*.

Mostly climbing shrubs, armed with stipular spines.

Fruit globose. Leaves simple ... 3. *CAPPARIS*.

An unarmed tree. Leaves digitately trifoliolate... 4. *CRATÆVA*.

##### 1. *MÆRUA*, Forsk.

Climbing shrubs. Leaves simple. Flowers corymbose. Calyx-tube lined by a disk; lobes 4, valvate. Petals 4. Stamens numer-

ous, inserted high on gynophore, filaments exserted. Ovary long-stalked, 1-celled; ovules many on 2-4 parietal placentas. Berry fleshy, moniliform, 1 or more seeded; cotyledons involute, fleshy.

*M. arenaria*, H. f. & T. Fl. Br. I. 1. 171. *Nieburia oblongifolia*, DC.; Dalz. & Gibs. Bomb. Fl. 8.

A woody climber, glabrous or pubescent. Leaves broadly ovate, apiculate, 5—2 in. long; petiole 25—5 in. Corymbs short, terminal or lateral. Flowers 1 in. across, white. Petals lanceolate, acute. Berry 2-5 in. long, deeply constricted between the seeds, usually many-seeded.

Western Himalaya and Central India abundant. Dhárwár, Guzerat and generally throughout the Deccan, in hedges; absent from the Konkan and North Kánara. Fl. and Fr. C. S.

## 2. CADABA, Forsk.

Shrubs. Leaves simple or trifoliolate. Flowers solitary, corymbose or racemed. Sepals 4, unequal. Petals 4-2-0, clawed, hypogynous. Disk spatulate with a tubular claw. Stamens 4-6, unilateral; filaments filiform, exserted, spreading. Ovary long-stalked, 1-celled; ovules many. Fruit fleshy, cylindric, indehiscent or tardily dehiscent.

Straggling shrubs.

Stamens 4. Fruit dehiscent ... .. 1. *C. indica*.

Stamens 5. Fruit indehiscent ... .. 2. *C. farinosa*.

A small rigid tree, Stamens 5. Fruit unknown ... 3. *C. heterotricha*.

1. *C. indica*, Lamk; DC. Prod. 1. 244; Fl. Br. I. 1. 172; Dalz. & Gibs. Bomb. Fl. 9.

Western Peninsula from Guzerat southwards, throughout the dry districts of the presidency, often in hedges, on old walls and barren places. Flowers throughout most of the year.

2. *C. farinosa*, Forsk.; DC. Prod. 1. 244; Fl. Br. I. 1. 173.

Dry places in the Punjab at Multan and in Sind. Brandis does not mention either this or the following species in his "Forest Flora." I have taken the descriptions of these two species from the Fl. Br. I. as I am personally unacquainted with either of them.

3. *C. heterotricha*, Stocks in Hook. Ic. Pl. t. 839; Fl. Br. I. 1. 173.

Sind; on rocks near Cape Monze, Stocks. A very rare species.

## 3. CAPPARIS, Linn.

Trees or shrubs, erect or climbing, usually armed with twin stipulary thorns. Leaves simple or 0. Flowers white or coloured, usually large. Sepals 4, free, imbricate in 2 series, or the 2 outer subvalvate. Petals 4, sessile, imbricate. Stamens indefinite, inserted at the base of

the long gynophore; filaments filiform. Ovary on gynophore; stigma sessile; ovules many. Fruit fleshy, many-seeded. Cotyledons convolute.

- Flowers solitary, axillary or 2-3-fascicled.
- Flowers 1-3 in. across, white, filaments purple ... 1. *C. spinosa*.  
 Flowers 2 in. across, with lower petals yellowish-brown ... .. 2. *C. zeylanica*.  
 Flowers 4-5 in. across, blue, lower petals with yellow basal spots ... .. 3. *C. Heyneana*.  
 Flowers 2·5 in. across, white or yellowish ... 4. *C. divaricata*.
- Flowers umbelled, racemed or panicked.
- Flowers 1 in. across, red or scarlet. A glabrous, erect tree or shrub ... .. 5. *C. aphylla*.  
 Flowers 5 in. across, white. A climber with glabrous branches ... .. 6. *C. Moonii*.  
 Flowers 7·5 in. across, white. An erect, pubescent tree ... .. 7. *C. grandis*.
- Flowers in simple umbels.
- Spines straight, acicular.
- Flowers 5—7·5 in. across, white ... 8. *C. longispina*.  
 Spines recurved.
- Flowers 3—5 in. across, white. Fruit pisiform, black ... .. 9. *C. sepiaria*.  
 Flowers white 5—7·5 in. across. Fruit size of a cherry, globose ... .. 10. *C. pedunculosa*.
- Flowers seriate in lines on the branches.
- Flowers 1·5—2 in. across. Petals white and stamens purple. A brown, tomentose climber .. 11. *C. horrida*.  
 Flowers 3—5 in. across, white. A glabrous climber ... .. 12. *C. tenera*.

*C. spinosa*, Linn. Fl. Br. I. 1. 173. Brandis For. Fl. 14. *O. Murrayana*, Grah. Cat. Bomb. Pl. 9; Dalz. & Gibs. Bomb. Fl. 9. Capers Plant. *Kalvari*, Sindhi.

Punjab, Sind, Guzerat, N.-W. Himalaya, ascending to 12,000 ft., Mahábaleshvar, and in nálas and rivers along the gháts as far north as Málsaj.—Dalzell. Sind and Guzerat, on dry rocks and stony hills. Fl. Apl.-June. Fr. Nov. The pickled buds are the Capers of Europe. The ripe fruits are used in India (Sind and the Punjab) raw or pickled. Leaves and ripe fruits are a favorite fodder of goats and sheep.

2. *C. zeylanica*, Linn. Fl. Br. I. 1. 174. *C. brevispina*, DC.; W. & A. Prod. 24; Dalz. & Gibs Bomb. Fl. 9. *Wagutty*, M.

Western Peninsula and drier parts of Ceylon. Western Deccan and Konkan, banks of nálas near Vingorla. Fl. Feb. Fr. R. S. Green fruit pickled.

3. *C. Heyneana*, Wall. Cat. 16985; Fl. Br. I. 1. 174. *C. formosa*, Dalz. & Gibs. Bomb. Fl. 9. *Ohayruka*, H.

Western gháts from the Konkan to Travancore in evergreen forests; also in Ceylon. A handsome, ornamental shrub. Fl. March-May. Fr. R. S. The leaves and flowers are used in native medicine. Wood

yellowish-pink, smooth, hard, close-grained. Pores small, single or in rows of 3 or 4. Medullary rays fine, very close together. Weighs about 45 lbs. to the cubic foot.

4. *C. divaricata*, Lamk. ; DC. Prod. 1. 252 ; Fl. Br. I. 1. 174. *C. stylosa*, DC. ; Wall. Cat. 6. 980 ; Dalz. & Gibs. Bomb. Fl. 10 ; Bedd. Fl. Sylv. 13. *Revdi*, K.

The Deccan and Carnatic, at Tanjore and Coimbatore. Common all over the Deccan both on stony ground and on the black soil in "bábul" forests. Fl. Feb.-March. Fr. ripe Aug., 2 in. in diameter with a red thick rough rind, breaking into irregular valves. Seeds numerous, 5 in. large, with a dark skin ; cotyledons fleshy.

5. *C. aphylla*, Roth. ; DC. Prod. 1. 246 ; Brandis For. Fl. 14 ; Bedd. Fl. Sylv. 13 ; Dalz. & Gibs. Bomb. Fl. 9 ; Fl. Br. I. 1. 174. *Shiprigidda*, K. ; *Kiral*, Sind. ; *Ker*, Guz. ; *Kera*, M.

Punjab ; Sind ; Guzerat ; Deccan, and generally throughout the driest parts of the Presidency. Fl. March.-Apl. Fr. Sept.-Oct. Generally a large, densely branched bush, sometimes a small tree 20 ft. high and 2 ft. in diam. Roots immense, spreading. Bark grey, corky. Wood light yellow, turning brown on exposure, hard and close-grained. Used for beams and rafters in roofs, for the knees of boats in Sind, also for oil-mills and agricultural implements. An excellent firewood, burns quickly with much ash. Not attacked by white ants. Ripe fruit and young buds pickled in Sind.

6. *C. Moonii*, Wight Ill. 35 ; Fl. Br. I. 1. 175.

Western gháts from the Konkan southwards, ascending from the sea-level to 2000 ft. in North Kánara, usually in moist, evergreen forests ; grows on laterite near Kumpta (coast of North Kánara). An ornamental plant with large white flowers. Flowers Dec.-March. Fr. Hot and Rainy seasons.

7. *C. Roxburghii*, DC. Prod. 1. 247 ; Dalz. & Gibs. Bomb. Fl. 9 ; Fl. Br. I. 1. 175. *Poorwi*, M.

On the gháts, Dalz. This species comes very close to *C. Moonii*, and seems to differ only in the size of the flowers. I am inclined to think that Dalzell could not have overlooked *C. Moonii*, a fairly common species along the gháts, whereas *C. Roxburghii*, as figured in Wight's Icones, is certainly not common if found at all in the Bombay Presidency. Wight says : "Found at the base of the Neilgherries near Metapollim, Coonor ghát road." Probably if these species are eventually kept distinct it will be found that *C. Moonii*, is the Bombay plant and not *C. Roxburghii*. Dalzell says that the colour of the fruit of *C. Roxburghii*, is scarlet. I have only seen green fruits on our ghát species which, however, may turn scarlet when quite ripe like the fruits of several others of the genus.

7. *C. grandis*, Linn. f. ; DC. Prod. 1. 248 ; Fl. Br. I. 1. 176 ; Dalz. & Gibs. *Kauntel*, M. ; *Torate*, K. ; *Puchownda*, Vern.

Hill forests of the Carnatic, Deccan and Ceylon. Sparingly found on the gháts and in the Deccan.—Dalz. In the forests of the Dhárwár district

bordering on North Kánara, fairly common. Fl. Oct. Fr. C. S. A small tree, sometimes with a rather thick trunk, but of no great height. The wood is white, moderately hard and durable, used by the natives in the Madras Presidency for agricultural implements and rafters. Weighs 46 lbs. to a cubic foot.

8. *C. longispina*, Hook. f. & T. Fl. Br. I. 1. 176.

Along the North Kánara gháts in open situations near evergreen forests. Fl. Feb.-March. Fr. R. S. A spreading, bushy shrub. In the Fl. Br. I. it is stated that this is probably a state of *C. pedunculosa*, differing in the thorns, leaf form and pubescence.

9. *C. sepiaria*, Linn; DC. Prod. 1. 247; var. *Vulgaris*; Fl. Br. I. 1. 176; Brandis For. Fl. 15; Dalz. & Gibs. Bomb. Fl. 10. *Kanthal*, Guz.; *Basingi*, K.

Dry places throughout India from Sind to Burma. The Carnatic and Ceylon. Throughout the dry parts of the Presidency, very common in hedges and open situations in deciduous forests. Fl. Feb.-May. Fr. R. S. A wiry branched, spreading shrub. Wood white, hard.

10. *C. pedunculosa*, Wall. Cat. 6. 993; Fl. Br. I. 1. 176; Dalz. & Gibs. Bomb. Fl. 9. *Kolisna*, M.

Western Peninsula and the Carnatic; Konkan gháts; at Mahábaleshvar and in the thickest jungles generally.—Dalz. A branched, spreading shrub.

11. *C. horrida*, Linn. f.; DC. Prod. 1. 246; Fl. Br. I. 1. 178; Dalz. & Gibs. Bomb. Fl. 10; Brandis For. Fl. 15. *Ardanda*, H.; *Wag, gowindi*, M.; *Totla balli*, K.

Plains and lower hills throughout most parts of India, Ceylon and Java. Throughout the Presidency and Sind; common in hedges and in open situations from the sea-level upwards. Fl. Nov.-Apl. Fr. R. S. Found in forests, climbing high and covered with its conspicuous and characteristic flowers, often when bare of leaves. Wood yellowish-white, moderately hard, light. Pores large, single, often filled with a pithy substance. Medullary rays broad, wavy, numerous. Annual rings distinct. Weighs 47 lbs. to the cubic foot. Used for fuel. Leaves and bark used medicinally. Fruits sometimes mixed in the native curries.

12. *C. tenera*, Dalz. in Hook. Kew Jour. Bot. II. 41; Dalz. & Gibs. Bomb. Fl. 9; Fl. Br. I. 1. 179. Var. *Dalzellii*.

Gháts from Assam to Burma and Tennaserim, Western gháts from North Kánara southwards. On the southern gháts of North Kánara, in evergreen forests. Fl. April-May. Fr. R. S. A large climber; branches glabrous, slender. Fruit pisiform, few-seeded.

4. CRATÆVA, L.

Trees. Leaves trifoliolate. Flowers large, yellow, in terminal corymbs. Sepals 4, cohering below with the convex disk. Petals 4, long-clawed. Stamens indefinite, filaments filiform, free. Ovary on a long gynophore with 2 placentas bearing numerous ovules; stigma sessile, depressed. Fruit a large berry. Seeds imbedded in pulp.

*C. religiosa*, Forst. ; DC. Prod. 1. 243 ; Fl. Br. I. 1. 172 ; Brandis For. Fl. 16. *C. Roxburghii*, Br. C. *Nurvala*, Ham., Dalz. & Gibs. Bomb. Fl. 8 ; Bedd. Fl. Sylv. 14. *Bitusi*, *hole lakki*, K. ; *Nirvala*, *kumla*, *karwan*, *hadwurna*, *waiwurna*, M. ; *Varrunna*, H.

From the Ravi eastward to Bengal, Assam, Central and Southern India and Burma. Throughout the Presidency, near the banks of rivers and nālas, in moist, shady places ; also planted near Mussulman tombs. Fl. Apl.-May. Fr. R. S. A very handsome tree when in blossom during the hot season. The young leaves appear with or sometimes before the flowers. Attains a height of 30 to 40 ft. with a girth of 6 ft. Bark dark grey, smooth. Wood yellowish-brown, turning light brown on exposure, moderately hard, even-grained. Weighs 42 lbs. to the cubic foot. Used for toys, models, boxes, etc. Useful in turnery as it is light and close-grained.

There are two varieties of this tree (*Nurvala*, and *Roxburghii*), which are considered as distinct species by Dalzell in the Bombay Flora. Var. *Nurvala*, with ovate lanceolate leaflets and ovoid fruit is the common form throughout the Presidency. Var. *Roxburghii*, has much smaller leaves which are broad and abruptly acuminate. Fruit globose. Warri country and banks of the Nerbudda near Chandode.

#### ORDER 8. RESEDACEÆ.

Herbs or shrubs. Leaves alternate. Stipules 0 or minute. Flowers spiked or racemose, bracteate, often polygamous. Calyx 4-7-divided ; sepals imbricate in bud. Petals 2-7, entire or lobed, open in bud. Disk often unilateral, conspicuous. Stamens numerous, equal or unequal, inserted on the disk. Ovary 1-celled of 2-6, connate carpels, often lobed at the top and open between the lobes which bear the sessile stigmas ; ovules many on 2-6 placentas. Fruit a capsule or berry. Seeds many, albumen 0 ; embryo curved or folded.

#### OCHRADENUS, Delile.

Branched shrubs. Leaves small, linear. Flowers minute. Calyx 5-partite. Petals 0. Disk unilateral. Stamens 10-20. Ovary ovoid, closed at the top, 3-beaked ; ovules many on 3 placentas. Berry many-seeded, or sometimes seeds few, large.

*Ochradenus baccatus*, Del. Fl. Æg. 15. t. 31. f. I. Fl. Br. I. 1. 182.

Sind. Branches bare of leaves when old. Berry small, white.

#### ORDER 9. BIXINEÆ.

Trees or shrubs. Leaves alternate ; stipules minute or 0. Inflorescence various. Flowers regular, 1-2-sexual. Stamens usually hypogynous ; anthers bursting by slits or pores. Disk thick, often glandular. Ovary 1 or few-celled ; style and stigmas free or united ;

ovules parietal. Fruit dry or fleshy. Seeds albuminous; embryo axile; cotyledons foliaceous, often cordate.

Flowers bisexual.			
Petals large, broad.			
Capsule 5-valved	...	...	1. COCHLOSPERMUM.
Capsule 2-valved	...	...	2. BIXA.
Petals small. Fruit a 2-4-seeded berry	...	...	3. SCOLOPIA.
Flowers dioecious.			
Petals 0. Fruit 2-8-celled and seeded	...	...	4. FLACOURTIA.
Petals 5, with a scale opposite each. Fruit many-seeded	...	...	5. HYDNOCARPUS.

### 1. COCHLOSPERMUM, Kunth.

Trees or shrubs. Leaves digitately lobed. Flowers large, yellow, bisexual. Sepals 5, deciduous. Petals 5, contorted in bud. Stamens indefinite, inserted on a disk, without glands. Ovary with numerous ovules on 3-5 parietal placentas. Capsule 3-5-valved. Seeds cochleate; testa hard, woolly; embryo curved.

*C. gossypium*, DC. Prod. 1. 527; Fl. Br. I. 1. 190; Brandis For. Fl. 17; Bedd. Fl. Sylv. 14. *Gunglay, gulgul*, M.; *Ganeri*, Bhil; *Bulauri*, K.

Dry stony hills along the foot of the North-West Hymalaya, Behar, Bundelkund, Orissa and the Deccan; common on the Khândesh Satpuras, also in the Belgaum District on the Kaládgi quartzites.

A small tree with soft wood and smooth, ash-coloured bark. Wood very soft; weighs 27 lbs. to the cubic foot.

The new leaves appear in May. Flowers February to April. Fruit ripe June-July. Old fruit on the tree as late as April, before the new leaves appear. Yields a gum valuable in book-binding (Marbling paper). Floss from the seeds used for stuffing cushions like that of *Bombax*.

### 2. BIXA, L.

A shrub or small tree. Leaves simple; stipules minute. Flowers in terminal panicles, bisexual. Sepals 5, deciduous. Petals 5, contorted in bud. Anthers opening by 2 terminal pores. Ovary 1-celled; style slender, curved; stigma notched; ovules many, on 2 parietal placentas. Capsule softly prickly, loculicidally 2-valved; placentas on the middle of each valve. Seeds many; testa pulpy, red; embryo large; cotyledons flat.

*B. Orellana*, Linn. Fl. Br. I. 1. 190; Brandis For. Fl. 17; Dalz. & Gibs. Bomb. Fl. Suppl. 5. *Arnotto, kisri, sendri*, Vern.; *Rudgamali*, K.

Cultivated throughout the presidency; indigenous in America. Fl. Sept. Fr. Jany. A small evergreen tree. Young shoots and inflorescence rusty-puberulous. Leaves cordate, acuminate, entire or angular, 3-8 in. in diameter. Flowers in terminal panicles, large, 2 in. across, purple or white. Capsule ovoid, reddish-brown, 1.5 in. long. The pulp



surrounding the seeds (Arnotto) is used to colour butter and as a dye for silk fabrics. Wood pinkish-white, soft.

### 3. SCOLOPIA, Schreber.

Spinous trees. Leaves alternate; entire. Flowers in axillary racemes, small. Sepals 4-6. Petals 4-6, imbricate in bud. Stamens many, connective produced. Ovary 1-celled; style erect; stigma entire or lobed; ovules few; on 3-4 parietal placentas. Berry 2-4-seeded. Seeds with long funicles; testa hard; cotyledons foliaceous.

*Scolopia crenata*, Clos. 1. c. 250; Fl. Br. I. 1. 191; Bedd. Fl. Sylv. 15. *Phoberus crenatus*, W. & A. Dalz. & Gibs. Bomb. Fl. 11.

Western Ghâts from the Konkan southwards and in Ceylon; common on the Nilkund and Dodmune Ghâts of North Kánara. Fl. March. Fr. ripe August. Bark rough with raised lenticels. Spines branched. Wood hard, dense, white.

### 4. FLACOURTIA, Commers.

Trees or shrubs, usually spinous. Leaves toothed or crenate. Flowers dioecious. Sepals 4-5, small, imbricate. Petals 0. Stamens numerous; anthers short, versatile. Ovary on a glandular disk; styles 2 or more; stigmas 2-notched or 2-lobed. Fruit a few-seeded berry. Seeds obovoid; testa coriaceous; cotyledons orbicular.

An evergreen tree. Leaves and racemes pubescent or tomentose. Fruit globose, size of a cherry ... 1. *F. montana*.

Deciduous small trees or shrubs. Racemes and leaves quite glabrous. Fruit size of a pea.

Flowers in short racemes or panicles, not on long axillary thorns. Stigmas 5-11, free or connate ... .. 2. *F. Ramontchi*.

Flowers solitary or twin, usually on long axillary thorns. Stigmas 3-4, usually free ... 3. *F. sepiaria*.

*F. montana*, Grah. Cat. Bomb. Pl. 10; Fl. Br. I. 1. 192; Dalz. & Gibs. Bomb. Fl. 10. *Han sampige, gudda*, K.; *Artak, champer, champari*, M.

Konkan, North Kánara, in evergreen forests. Fl. C. S. Fr. April. A small tree; spines 2-3 in. long. Bark thin, grey, smooth, with or without lenticels. Green parenchyma often distinctly developed; inner bark grey, more or less fibrous. Wood light brown, tough, compact, with a satin-like lustre, and a characteristic fetid smell. Pores small, often in lines of 2-3 together between the numerous very fine and short medullary rays. Weighs 50 lbs. to the cubic foot. Used for building purposes in North Kánara. The fruit is edible when perfectly ripe.

2. *F. Ramontchi*, L. Herit. Stirp. 59. t. 30, 31; Fl. Br. I. 1. 193; Erandis For. Fl. 18; Bedd. Fl. Sylv. 16; Dalz. & Gibs. Bomb. Fl. 10. *F. sapida*, Roxb. Fl. I. 3. 835. *Paker, kaker, bhokal*, M.; *Kanju*, H.; *Hunmunki, hanumanth, bhably*, K.

A variable species : three of the five varieties given in the Fl. Br. I. are found in this Presidency. Var. *sapida*, with coriaceous, nearly glabrous leaves and pubescent peduncles is common in the North Kánara forests. The tomentose variety (*occidentalis*) is found in the Deccan.

Throughout India on dry hills and in decituous forests, also in the Prome district of Burma, sometimes cultivated. Fl. Nov.-March. Fr. Feb.-Aug. Fruit and leaves are eaten; fruit either cooked or raw; leaves as cattle fodder. Bark grey, scaly, thin. Wood red, hard, close and even-grained, durable but splits. Weighs 53 lbs. to the cubic foot. Used for agricultural implements. The gum and powdered bark are employed in native medicine.

3. *F. sepiaria*, Roxb. Cor. Pl. I. 48. t. 68; Fl. Fr. I. 1. 194; Dalz. & Gibs. Bomb. Fl. 11; Brandis For. Fl. 18. Bedd. Fl. Sylv. 16. *Tambat*, Vern.

Dry jungles, throughout Bengal, the W. Peninsula and Ceylon; common in the Deccan towards the gháts; also on stony ground near the coast of North Kánara, where it is associated with *Canthium parviflorum*, and *Memecylon edule*. Fl. C. S. Fr. R. S.

*F. Cataphracta*, Roxb. in Willd. Sp. Pl. IV. 830; Fl. Br. I. 1. 193; Dalz. & Gibs. Bomb. Fl. 10. *Juggum*, Vern. This species, given on the authority of the Bombay Flora, is said to be found in the Warri country in the Konkan on the banks of rivers.

##### 5. HYDNOCARPUS, Gærtn.

Trees. Leaves alternate, entire or serrate; stipules foliaceous, deciduous. Flowers solitary or in small racemes, diœcious. Sepals 4-5, free, imbricate. Petals 5-9, each with a basal scale or the scales cohering in a cup. Male fl.: Stamens 5-8; anthers reniform, connective broad. Female fl.: Staminodes 5 or more; ovary 1-celled; stigmas 3-6, dilated, lobed; ovules many on 3-6, parietal placentas. Fruit globose with a hard rind, many-seeded. Albumen oily; cotyledons very broad, flat.

*H. Wightiana*, Blume, Rumph. IV. 22; Fl. Br. I. 1. 196; Dalz. & Gibs. Bomb. Fl. 11; Bedd. Fl. Sylv. 16. *Kastel, kantel, kiti, kabasale*, M.; *Toratti, surti*, K.; *Kudre sulte*, Vern.

Western Peninsula from the Konkan southwards; North Kánara, in evergreen forests. Fl. Feb.-Apl. Fr. R. S.

A large evergreen tree; stems often fluted. Wood yellowish-grey, hard, close-grained, smooth. Pores few, small, single or divided. Medullary rays numerous, fine or very fine, wavy, joined by many transverse irregular fine wavy lines of white tissue. Annual rings distinct. Weighs 61 lbs. to the cubic foot. Used for building purposes (beams and rafters) in North Kánara. Seeds yield a yellow oil used for burning and in native medicine for skin diseases; also taken internally.

## ORDER 10. PITTOSPOREÆ.

Trees or shrubs, erect or climbing. Leaves entire, alternate or subverticillate, exstipulate. Flowers small, hermaphrodite, terminal or axillary. Sepals and petals each 5, imbricate. Torus small. Stamens 5, opposite the sepals. Ovary 1-celled, with 2-5 parietal placentas, or 2-5-celled by the projection of the placentas, with many parietal or axile, anatropous ovules; style simple; stigma 2-5-lobed, terminal. Fruit a woody capsule or indehiscent, many-seeded; seeds in pulp. Albumen copious; embryo small, radicle next the hilum.

An unimportant order, containing two small arborescent species of the genus *Pittosporum*, indigenous in the Bombay Presidency along the Western Ghâts.

## PITTOSPORUM, Banks.

Erect trees or shrubs. Leaves quite entire, exstipulate. Sepals free or connate below. Petals connate at the base. Ovary sessile or shortly stalked, incompletely 2-3-celled; ovules 2 or more on each placenta. Capsule 1-celled, woody, usually 2-valved; placenta in the middle of each valve. Seeds smooth, imbedded in pulp.

Glabrous.	Flowers small.	Fruit pisiform	...	1.	<i>P. floribundum</i> .
Tomentose.	Flowers larger.	Fruit broad, com-			
	pressed	...	...	2.	<i>P. dasycaulon</i> .

1. *P. floribundum*, W. & A. Prod. 154; Fl. Br. I. 1. 199; Dalz. & Gibs. Bomb. Fl. 44; Bedd. Fl. Sylv. 17; Brandis For. Fl. 19; Grah. Cat. Bo. Pl. 38. *Celastrus verticellata*, Roxb. Fl. Ind. I. 624. *Yekkadi*, *vehkali*, *vehyenti*, M.

Himalaya from Sikkim to Garwal, ascending to 7000 feet near Darjeeling, Khasia Hills, W. Ghâts from the Konkan to the Neilgherries. Usually on dry rocky situations. Bark grey, rough with small lenticular specks. Wood light-coloured, strong and tough. Bark bitter and aromatic, used as a febrifuge and believed to be an antidote to snake poison. Fl. Apl.-Sept. Fr. C. S.

2. *P. dasycaulon*, Miquel in Herb. Hohenack, 775; Bedd. Fl. Sylv. 236. Fl. Br. I. 1. 199. *Gapsundi*, M.; *Boogri*, K.

Western Peninsula, Konkan; North Kánara; Belgaum; common in the evergreen ghát jungles.

This small tree appears to have a rather restricted habitat. It is not mentioned by Dalzell from the northern parts of the Bombay presidency, nor by Beddome from Madras: it replaces *P. floribundum*, in the moist forest zone of Kánara and Belgaum. Fl. cold season. Fr. Feb. to rainy season.

## ORDER 11. TAMARASCINEÆ.

Shrubs, bushes or small trees. Leaves scale-like, imbricating. Flowers racemose or paniculate, regular, bisexual. Sepals 5, free or connate at the base. Petals 5, free or united in a tube, imbricate. Stamens 5-10 or many, free or connate, inserted on a lobed disk, with 10 glands. Ovary syncarpous; styles 2-5, free or connate or stigmas 3-5, sessile; ovules numerous. Seeds crested, winged or covered with down. Albumen 0, or small; embryo straight.

## TAMARIX, Linn.

Bushes or small trees. Flowers white or red. Sepals and petals free. Stamens 5-10, free or connected at the base only. Ovary 1-celled; Styles 3-4, short, thick; ovules at bottom of the ovary. Seeds smooth, with a long coma; albumen 0.

## Stamens 5:

Flowers in large panicles	...	...	...	1.	<i>T. gallica</i> .
Flowers in close cylindrical spikes	...	...	...	2.	<i>T. dioica</i> .
Flowers in interrupted spikes	...	...	...	3.	<i>T. articulata</i> .

## Stamens 10:

Leaves not punctate, sheathing amplexicaul...	...	...	4.	<i>T. ericoides</i> .
Leaves punctate, closely sheathing	...	...	5.	<i>T. stricta</i> .

1. *T. gallica*, Linn. Fl. Br. I. 1. 248; Brandis For. Fl. 20; Bedd. Fl. Sylv. 20. *Lei, lai, jhaw*, Sind. The Tamarisk.

Throughout India, from the Punjab and Sind to Burma and southwards to Ceylon; it also is found along the west and south shores of Europe, Africa, Siberia, China and Japan. In India it is mostly found along the banks of rivers and near the sea-coast, where it grows gregariously, often associated with *Salvadora*, on salt-impregnated soil. I have never found it in North Kánara or Belgaum. Wood open, coarse-grained, useful for fuel. The astringent-galls are used as a mordant in dyeing; also for tanning and in medicine. The wood is in great demand as fuel for the steamers on the River Indus; it is also converted into agricultural implements in Sind. Fl. July-Aug. Fruit ripe Dec.-Feb.

2. *T. dioica*, Roxb. Hort. Beng. 22; Fl. Br. I. 1. 249; Brandis For. Fl. 21; Bedd. Fl. Sylv. 20. *Gaz, láo, jau*, Sind.

From Sind to Assam, Western Peninsula and Burma. Near rivers and near the sea-coast; abundant on the Hoogly in Bengal. Forms extensive forests along the Indus. Fl. May-July. Fr. C. S.

The new alluvium along the river banks is covered in early spring with a dense growth of Tamarisk seedlings mixed with *Populus euphratica*, and babul. *T. dioica*, being more abundant in these forests than *T. gallica*. Wood white, loose-grained—an important fuel.

3. *T. articulata*, Vahl. Symb. II. 48. t. 32; Fl. Br. I. 1. 249; Brandis For. Fl. 22; Bedd. Fl. Sylv. 2). *Asrelí*, Sind.; *Lil jhau*, H.

Upper and Middle Sind, eastwards to the Jumna. Often cultivated, extends westwards to Egypt and South Africa. Grows well on saline soils. The leaves and extremities of the branches are partly shed during the cold season. Flowers from May to July. Fr. September. The foliage of this species is much more grey and glaucous than that of the other species of tamarisk, which are also of a smaller, shrubby habit.

The bark and irregularly rounded galls (*Sakun*, Sind.) are used in tanning. Tamarisk manna (*misri lei*) produced on the twigs by the puncture of an insect is collected in the hot weather and used to adulterate sugar; also medicinally. Manna is also produced on the two other species, *T. gallica*, and *T. dioica*, in Sind.

Wood white, moderately hard, open and coarse-grained, fairly tough. Weighs 61 lbs. to the cubic foot. Used for agricultural implements, framework of native beds, &c.; it is converted into charcoal and is also a valuable firewood.

4. *T. ericoides*, Rottl. in Nov. Act. Nat. Cur. Berol. IV. 214. t. 4; Fl. Br. I. 1. 249. *Trichaurus ericoides*, W. & A.; Dalz. & Gibs. Bomb. Fl. 14. *Jao, sarub, sarata*, M.

Bengal, Central and Western India and Ceylon. Common in the beds of the Konkan and Deccan rivers; in the Kálánaddi of North Kánara near Sulgeri. Flowers during the cold weather, Nov. to Jan. Fr. Feb.

Wight and Arnott in the Prod. Fl. Penin. Ind. Or. 40. keep this species distinct from *Tamarix*, under the generic name *Trichaurus*, and make the following remarks with which I am disposed to agree. ["This genus, (*viz. Trichaurus*), is mostly allied to *Myricaria*, but differs from it by the distinct styles and stigmas and by the torus being only expanded into a tooth, instead of a connecting membrane, between the stamens. From *Tamarix*, the beaked seeds and other characters will readily distinguish it."] Sir W. Thiselton Dyer in the Fl. Br. I. 1. 249 restored to this species Rottler's name of *Tamarix ericoides*.

5. *T. stricta*, Boiss. Fl. Or. 1. 778; Fl. Br. I. 1. 249. Habit of *T. articulata*, Vahl., from which, according to Boissier, it is distinguished by the thicker branchlets, more remote leaves and sub-sessile stigmas, besides the different number of stamens. Sind and Beluchistan, Fl. Br. I.

## ORDER 12. GUTTIFERÆ.

Trees or shrubs, abounding in greenish or yellow resinous juice. Leaves simple, opposite, often coriaceous, rarely whorled or stipulate. Flowers axillary or terminal, solitary or clustered, in racemes or panicles, white, yellow or red, regular, unisexual, polygamous or hermaphrodite. Sepals 2-6, imbricate or in decussate pairs. Petals 2-6, rarely more, usually much imbricated and contorted. Male fl.: Stamens usually indefinite, hypogynous, filaments free, or variously connate, or in as many phalanges as petals; anthers various. Fem. fl.: Staminodes various. Ovary 1-2 or more celled; ovules 1 or

more in each cell; stigmas as many as ovary-cells or variously consolidated, sessile or on a longer or shorter style. Fruit an indehiscent berry or drupe with a fleshy or pulpy mesocarp or a capsule opening in as many valves as cells. Seeds large, albumen 0; embryo consisting of a large radicle (tigellus) with small or obsolete cotyledons, or of thick, free or consolidated cotyledons with a very short inferior radicle.

Embryo a solid tigellus with the cotyledons minute or 0.			
Calyx of 4 decussate or 5 sepals	...	1.	GARCINIA.
Calyx closed in bud, in flower bursting into 2 valves	... ..	2.	OCHROCARPUS.
Embryo of 2 fleshy cotyledons with a small radicle.			
Ovary 1-celled, 1-ovuled. Fruit indehiscent	... ..	3.	CALOPHYLLUM.
Ovary 2-celled, 4-ovuled. Fruit dehiscent	... ..	4.	MESUA.

### 1. GARCINIA. Linn.

Evergreen trees usually with yellow juice. Leaves coriaceous, rarely stipulate. Flowers axillary or terminal, solitary or fascicled, rarely paniculate. Sepals 4 and decussate or rarely 5-6 and imbricate. Petals 4-5, imbricate. Male fl.: Stamens indefinite, free or united in an entire or lobed fleshy mass or tetradelphous surrounding a rudimentary style; anthers sessile or on short, thick filaments, 2, rarely 4-celled, erect or peltate, dehiscent by slits or pores or circumsciss. Female or hermaphrodite fl.: Staminodes various, free or united. Ovary 2-many celled; stigma sessile lobed, smooth or tuberculate; ovules solitary in each cell attached to the inner angle of the cell. Fruit a berry; embryo an undivided thick radicle (tigellus).

Sepals and petals 4 each.			
Fruit globose, 4-8-celled, smooth, pulpy	...	1.	<i>G. indica</i> .
Fruit ovoid, somewhat curved, and with 6-8 longitudinal grooves	...	2.	<i>G. Cambogia</i> .
Fruit globose, 4-celled, not pulpy	...	3.	<i>G. Morella</i> .
Sepals and petals 5 each.			
Ovary not seated on disk. Stigmatic lobes 5-6.			
Leaves large, up to 20 in. long. Fruit large, 2 in. in diam., yellow	... ..	4.	<i>G. Xanthochymus</i> .
Leaves medium-sized, up to 5 in. long. Fruit 1 in. in diam., green	... ..	5.	<i>G. ovalifolia</i> .
Ovary seated on mamillated disk. Stigmatic lobes 3	... ..	6.	<i>G. malabarica</i> .

1. *G. indica*, Chois. in DC. Prod. 1. 561; Fl. Br. I. 1. 261. *G. purpurea*, Roxb. Dalz. & Gibs. Bomb. Fl. 31; Bedd. Fl. Sylv. 21; Grah. Cat. Bo. Pl. 25. *Murgal*, K.; *Bhirand*, *ratamba*, M.; *Kokum*, H. 'Wild mangosteen' of the English and 'Brindon' of the Portuguese.

North Kánara and South Konkan in evergreen forests; often planted. Fl. Dec.-Feb. Fr. ripe Apl.-May. A tall graceful tree, seldom more than 1 foot in diameter, usually buttressed at the base. Bark very dark

and almost tessellated by shallow fissures. Wood light brown or yellowish with darker irregular patches of tissue, moderately hard. Pores more numerous and larger than in that of *G. Cambogia*, and it is also lighter. Weighs 48 lbs. to the cubic foot.

The fruit is edible when perfectly ripe. The seeds yield the well known concrete oil (kokum).

2. *G. Cambogia*, Desrouss. in Lamk. Encycl. III. 701; Fl. Br. I. 1. 261; Bedd. Fl. Sylv. t. 85. *Oopagi mara*, *dharambe*, K.

Western Peninsula from the Konkan to Travancore and Ceylon. On the southern ghâts of North Kánara, in evergreen forests. Fl. Cold and Hot seasons. Fr. ripe R. S.

Wood grey, cross-grained, shining, hard. Pores small and very small, in short radial lines, between the numerous fine medullary rays. Weighs 54 lbs. to the cubic foot. This tree contains much yellow gum, insoluble in water, but soluble in spirits of turpentine with which it forms a beautiful yellow varnish.

The name "Dharambe," used by the natives near the rocks of Yena, N. Kánara, for this tree, is very like Dharambo, given in the Hortus Malabaricus more than 200 years ago. Reede says this tree flowers and fruits twice in the year. Dharambe is also a Konkani name for *G. Xanthochymus*.

3. *G. Morella*, Desrouss. in Lamk. Encycl. III. 701; Fl. Br. I. I. 264; Bedd. Fl. Sylv. t. 86. *G. pictoria*, Roxb. Bedd. Fl. Sylv. t. 87. *Arsina gurgi*, *hardala*, K. The Gamboge Tree.

Forests of Eastern Bengal; Khasia mountains. W. and E. Peninsulas, Ceylon and eastwards to Siam. In the Siddápur táluka evergreen forests of North Kánara. Fl. Nov. Fr. ripe Feb.-Mar.

This moderate sized tree produces the true gamboge of commerce, which is procured principally from Siam and is used in Europe as a pigment and in Burma for dyeing silken fabrics. The rind of the fruit may be used as a tan. The semi-solid yellow fatty oil obtained from the seeds is used in Mysore as a substitute for lamp-oil; also in cookery. Gamboge is also used in medicine. Bark generally smooth, exfoliating in grey shining patches or scales; inner bark yellowish-white with numerous gamboge-yielding glands. Wood yellow, hard, mottled. Weighs 56 lbs. to the cubic foot.

4. *G. Xanthochymus*, H. f. Fl. Br. I. 1. 269. *Xanthochymus pictorius*, Roxb. Bedd. Fl. Sylv. t. 88; Dalz. & Gibs. Bom. Fl. 31. *Janagi*, *javangi*, *davangi*, *gansargi*, *deavkai*, K.; *Dharambe*, Kon.

Eastern Himalaya, E. Bengal, Burma, E. Peninsula, W. Peninsula on the ghâts from Bombay southwards. Abundant in the evergreen forests of N. Kánara. Fl. Apl.-May. Fr. C. & H. seasons.

A large tree. Bark brown, smooth, lenticellate, inner bark white, 25 in. thick, without yellow glands. Wood light yellowish-brown, hard, moderately heavy. Medullary rays fine, more widely apart or close together;

transverse bars very numerous. Weighs 45 lbs. to the cubic foot. Fruit yellow, sweet, edible. An ornamental tree with beautiful dark green dense foliage, sometimes cultivated in gardens.

5. *G. ovalifolia*, Hook. f. Fl. Br. I. 1. 269. *Xanthochymus ovalifolius*, Roxb. Bedd. Fl. Sylv. 21; Dalz. & Gibs. Bomb. Fl. 31. *Haldi*, M.; *Tavir*, Vern.

Western Peninsula from the Konkan southwards along the ghâts, in evergreen forests; also in Ceylon. Evergreen forests of North Kánara and Konkan ghâts. Fl. H. S. Fr. C. S.

A small or moderate sized tree.

6. *G. malabarica*, Talb., sp. nov. Jour. Bomb. Nat. Hist. Soc. XI. 234. t. 1. *G. ovalifolius*, Hook., f. var. *macrantha*? Fl. Br. I. 1. 269. *G. spicata*, Kz. MSS. in Herb. Cal. Herb. No. 3713.

A small or medium sized tree with sulcate, angular branchlets. Leaves coriaceous, ovate or oblong lanceolate, acute or obtuse, glabrous, shining above and beneath; nerves numerous, anastomosing, distinct, midrib prominent beneath; blade 6—3 by 2.5—1 in.; petiole .5-.75 in. long, rugose, dilated at the base, so that the two opposite petioles clasp the branchlets. Flowers dicecious. Male flowers white, .5—-.75 in. across, numerous, sessile or shortly pedicelled, fascicled on short, axillary, thick peduncles; pedicels bracteolate at the base. Sepals 4-5, orbicular,  $\frac{1}{3}$  the orbicular white, concave petals. Staminal phalanges 5, thick, equalling the petals, surrounded at the base by and springing from a lobed mamillated disk; anthers 12 on each phalange, didymous, free part of filament short, stout. Female fl.: Sepals and petals of male. Staminodes in 5, thin, flattened phalanges surrounding the ovary and springing from a disk similar to that of the male flower, effete anthers 4-5 on each phalange, flat, didymous and on longer free filaments than those of the male flower. Ovary 3-celled, crowned with the 3-lobed spreading stigma.

On the Western Ghâts from North Kánara southwards. Common on the Gairsoppah Ghát in evergreen forests. Fl. C. S. Fr. (not seen) R. S.

## 2. OCHROCARPUS, Thouars.

Evergreen trees. Leaves simple, opposite or 3-verticillate, coriaceous. Flowers axillary, polygamous. Calyx closed before flowering, at length opening into 2, rarely 3, valves. Petals 4—7 or more. Stamens indefinite, filaments free or connate at the base. Ovary 2-celled; cells 2-ovuled; style short; stigma 2-lobed. Fruit a 1-4-seeded berry. Cotyledons minute or 0; radicle large and fleshy.

*O. longifolius*, Benth. & H. f. Gen. Plant. 1. 980; Bedd. Fl. Sylv. t. 89; Fl. Br. I. 1. 270. *Calysaccion longifolium*, Wgt. Ic. t. 1999; Dalz. & Gibs. Bom. Fl. 32. *Wundy*, *punay*, *surungi*, *suragi*, *phatapate*, K.; *gardundy*, Vern.



Konkan and Kánara Gháts, ascending to 2000 feet in evergreen forests; sometimes cultivated. There is a grove of these trees near Kumpta on the coast of N. Kánara on low-level laterite, probably the remains of an evergreen forest. Fl. Feb.-March. Fr. R. S.

Trees with a cylindrical trunk, 40-60 ft. high and 6 ft. in circumference, are met with in N. Kánara. Bark scaly, scales thick, often covered with small round black patches of lenticular-like markings; inner bark thick, red, with numerous small yellow gamboge glands.

Wood moderately hard, reddish grey, close-grained, smooth. Pores moderate-sized, equally distributed. Medullary rays numerous, fine. Weighs about 60 lbs. to the cubic foot. Annual rings distinct. The dried flower buds (Tambra Nagkesar) are used for dyeing silk; they are also used medicinally.

### 3. CALOPHYLLUM, Linn.

Evergreen trees. Leaves opposite, shining, coriaceous, with numerous parallel veins at right angles to the midrib. Flowers polygamous, in axillary or terminal panicles. Sepals and petals 4-12, imbricate in 2-3 series. Stamens numerous, filaments filiform, free or connate below; anthers erect, 2-celled. Ovary 1-celled; style slender; stigma peltate; ovule solitary, erect. Fruit an indehiscent, crustaceous drupe; seed erect.

#### Petals 4.

A medium sized, dark scaly-barked, quite glabrous tree. Leaves broad elliptic. Fruit 1 in. in diam., globose ... .. 1. *C. inophyllum*.

A very large tree; young parts rusty-tomentose. Bark yellowish, deeply fissured. Leaves narrow elliptic. Fruit ovoid, 1 in. long. ... .. 2. *C. tomentosum*.

#### Petals 3-0.

A moderate or large tree with characteristic yellow bark. Leaves obovate. Fruit ovoid, small, .25 in. long ... .. 3. *C. Wightianum*.

1. *C. inophyllum*. Linn. Fl. Br. I. 1. 273; Bedd. Fl. Syl. 22; Dalz. & Gibs. Bomb. Fl. 31. Grah. Cat. Bo. Pl. 26. The Alexandrian Laurel. *Undi, surangi*, M.; *Vuma, hona*, K.; *Udi*, Cutch.

Indigenous throughout the W. Peninsula, Orissa, Ceylon, Burma and the Andamans, particularly near the sea-coast; also cultivated as an ornamental tree and for its valuable fruit.

A short-stemmed tree with a thick cylindrical trunk. Bark dark coloured, scaly, fissured. Wood reddish-brown, moderately hard and close grained. Pores large and medium sized, arranged in groups and lines often filled with a gum-like material. Medullary rays very fine and numerous and crossed horizontally by wavy, continuous or broken narrow lines of deep red tissue. A cross section has broad lustrous patches. Average weight 42 lbs. to the cubic foot.

Oil from the seeds used in medicine, for burning and for painting wood work. Wood used in the construction of native pattimars and other craft. (Knees and bent timbers.)

2. *C. tomentosum*, Wgt. Ic. t. 110; Fl. Br. I. 1. 274; Bedd. Fl. Sylv. 22. *C. angustifolium*, Dalz. & Gibs. Bomb. Fl. 32; of Roxb. (?) *C. elatum*, Bedd. Fl. Sylv. 1. c. 22. Poon Spar, Sirpoon Tree. *Nagari* M.; *Shri honay, surhoni*, K.

Evergreen forests of the W. Peninsula from the Konkan southwards. Flowers during the cold season, January-February. Fruit ripe during June-July. This fine straight, cylindrical stemmed tree attains a great size in the forests near the Mulamune Ghát of N. Kánara. Trees 150 feet high with a girth of 15 feet at breast height are not uncommon. The bark is yellowish with long wavy vertical fissures which readily distinguishes the tree on the gháts, where it is common. Wood red, lustrous, coarse-grained. Pores large or medium sized in irregular lines or groups. Medullary rays exceedingly fine, crossed by irregular wavy broken lines of dark red tissue. Weighs about 35 lbs. to the cubic foot. Used for masts and spars of ships. In Kánara the Public Works Department use the wood in the construction of bridges, principally on the ghát roads leading to the coast (Gairsoppah Ghát). The seeds yield an oil used in Ceylon for burning in lamps.

3. *C. Wightianum*, Wall. Cat. 4847; Fl. Br. I. 1. 274; Bedd. Fl. Sylv. t. 90. *C. spurium*, Choisy; Dalz. & Gibs. Bomb. Fl. 32; *Bobbi*, M.; *Irai*, K.

Western Peninsula Gháts from the Konkan to Travancore. Common along the banks of North Kánara rivers. It has a very characteristic bark. Fl. Dec. Fr. March.

Bark very thick. Rhytidome deeply fissured, showing yellow plates of periderm; inner bark red with much juice. Wood red coloured, hard and heavy. Pores large and moderate sized. Medullary rays very fine, rather indistinct. Numerous bands of concentric and anastomosing lines of tissue. Weighs 54 lbs. to the cubic foot. Used by the natives of N. Kánara for building purposes. The edges of the leaves of this tree are often transformed into large hollow irregularly shaped, winged, galls. This disease is very common in the N. Kánara Bobbi trees.

#### 4. MESUA, L.

Trees. Leaves opposite, rigidly coriaceous, veins inconspicuous, very numerous. Flowers large, polygamous, or hermaphrodite, axillary, solitary. Sepals and petals 4 each, imbricate. Stamens numerous, free or connate at the base. Ovary 2-celled; style long; stigma peltate. Ovules 2 in each cell, erect. Fruit woody, 1-4-seeded; seeds with a thin fragile testa, exarillate.

*M. ferrea*, Linn., Fl. B. I. 1. 277; Dalz. & Gibs. Bomb. Fl. 31; Bedd. Fl. Syl. 23. *M. coromandelina*, Bedd. Fl. Sylv. t. 64. *M. speciosa*, Choisy, Bedd. Fl. Syl. 23. *M. Roxburghii*, Wgt., Bedd. Fl. Syl. 23. *M. sclerophylla*, Thw. Bedd. Fl. Syl. 23. *M. pulchella*, Planch. & Trian. Bedd. Fl. Syl. 23. *Nagchampa*, M.; *Nagasampige*, K.

Mountains of E. Bengal, E. Himalaya, E. and W. Peninsulas and the Andamans; throughout the evergreen forests of North Kánara and the South Konkan, often cultivated. Fl. March. Fr. May.

Isolated trees are sometimes covered with a mass of scented, white blossom; a dome or pyramid of white flowers, surrounded by myriads of winged insects. Very variable as regards the size of the flowers, width of the leaves and the amount of the white, mealy covering underneath.

Six different species have been made by different authors, all of which are accepted by Colonel Beddome in his Fl. Sylvatica. These have been reduced to *M. ferrea*, Linn., in the Fl. Br. I. by Dr. T. Anderson, which view has been accepted, as far as I know, by botanists of the present day.

Bark dark, scaly, red within, wounds exude a clear gum. Wood very hard with a dark red heartwood. Pores moderate sized, in groups and wavy patterns. Medullary rays very fine, crossed by close wavy lines of whitish tissue. Difficult to work. Weighs 62 lbs. to the cubic foot. The seeds yield a dark coloured oil used in medicine and for burning by the Haigas of North Kánara. The seed cases are very astringent.

### ORDER 13. TERNSTRŒMIACEÆ.

Shrubs or trees. Leaves simple, alternate, usually coriaceous, exstipulate. Flowers regular, hermaphrodite or rarely unisexual. Sepals 5, rarely 4-7, free or slightly connate. Petals 5, rarely 4-9. Stamens numerous, free or shortly connate at the base, usually adnate to the base of the deciduous corolla. Ovary free, sessile 3-5-celled; styles as many, free or connate; ovules 2 or many in each cell. Fruit baccate or capsular. Seeds few or numerous, placentas axile. Albumen scanty or 0. Embryo straight or variously bent; cotyledons large, sometimes plaited.

Fruit a berry; albumen fleshy. Anthers basifixed ... 1. EURYA.

Fruit a capsule; albumen 0. Anthers versatile ... 2. GORDONIA.

#### 1. EURYA. Thunb.

Shrubs. Leaves crenate-serrate. Flowers dicecious, in axillary fascicles; bracteoles persistent. Sepals 5. Petals 5, united at the base. Stamens 15 or less. Ovary usually 3-celled; styles 3, free or united; ovules many in the inner angle of each cell. Fruit a berry. Albumen fleshy.

*E. japonica*, Thunb. Fl. Jap. 191. t. 25; Bedd. Fl. Sylv. t. 92; Fl. Br. I. 1. 284.

Eastern Himalaya; Sikkim, alt. 5—10,000 ft., Khasia Mountains, alt. 3—6000 ft., E. and W. Peninsulas and Ceylon, ascending to 7000 feet. Beddome says it is found at low elevations on the W. side of the Madras Presidency. I have found it on the Bababuden Hills of Mysore at about 6000 ft., but have no account of it from any station in the Bombay Presidency except that given by Lisboa in his Useful Plants of Bombay and which requires confirmation. This tree flowers in Mysore during November. Fr. ripe January.

Wood brown, soft, close-grained, sometimes used for fuel.

## 2. GORDONIA, Ellis.

Evergreen trees. Leaves usually crenate. Flowers large, white, fragrant, solitary axillary or collected at the ends of the branches, 2-4 bracteolate. Sepals usually 5, unequal, graduating from the bracts to the petals. Petals free, the innermost larger. Stamens 5-adelphous or all connate, adnate to the petals. Ovary 8-5 celled; stigma stout, spreading; ovules 4-8 in each cell. Capsule oblong, woody, angled, dehiscent. Seeds flat, winged, albumen 0.

*G. obtusa*, Wall. Cat. 1459; Fl. Br. I. 1. 291; Bedd. Fl. Sylv. t. 83.

Western Peninsula from the Konkan southwards at an elevation of 2500—7000 ft. Common on the Nilgiris. I have found it on the Bababuden Hills of Mysore, in the evergreen sholas, at an elevation of 5000 ft., but it has not yet been found in the Bombay Presidency as far as I know. Lisboa mentions it in his Useful Plants of Bombay, but, similarly to *Eurya japonica*, this observation requires confirmation. Flowers May-June. Fr. Nov.-Jan.

## ORDER 14. DIPTEROCARPEÆ.

Trees abounding in resin, rarely climbing shrubs. Leaves entire, alternate, simple, with lateral parallel nerves; stipules deciduous, convolute. Flowers usually sweet-scented, regular, bisexual, in few or many-flowered axillary and terminal racemes or panicles. Bracts minute or 0, rarely larger and persistent. Calyx 5-lobed, tube free or very short and adnate to the base of the ovary, 2 or more lobes usually accrescent in fruit. Petals 5, contorted, connate at the base or free. Stamens 5-infinite, hypogynous, or sub-perygynous, free connate or adnate to the petals; filaments short, dilated at the base; anthers 2-celled, connective, often aristate or with an obtuse appendage. Ovary slightly immersed in the torus, 1-3 celled; ovules 2 in each cell, pendulous, laterally affixed or erect; style subulate or fleshy. Fruit usually winged; seeds 1-2, exalbuminous (albuminous

in *Ancistrocladus*). Cotyledons fleshy, equal or unequal, straight or more or less plaited and crumpled; radicle superior or rarely inferior, usually included between the cotyledons.

Calyx much enlarged in fruit.		
Calyx in fruit with a distinct tube. Large trees. Fruit with 2 erect wings ...	...	1. DIPTEROCARPUS.
Climbing shrubs. Fruit with 5 unequal spreading wings ...	...	2. ANCISTROCLADUS.
Calyx in fruit with an obscure tube.		
Fruit 3-5-winged ...	...	3. SHOREA.
Fruit 2-winged ...	...	4. HOPEA.
Calyx not winged in fruit ...	...	5. VATERIA.

### 1. DIPTEROCARPUS, Gaertn.

Lofty trees with cylindrical stems, stellately pubescent or more or less clothed with fascicled hairs. Leaves coriaceous, simple, entire or repand-crenate; stipules large, valvate, enclosing the terminal bud, deciduous. Flowers racemose or paniced, often large and showy. Calyx 5-lobed with a turbinate or urceolate, free tube, 2 of the lobes accrescent in fruit. Petals pubescent externally, spreading, slightly cohering at the base. Stamens numerous; anther-lobes equal; connective prolonged into a cuspidate point. Ovary 3-celled; style filiform; ovules 2 in each cell. Fruit free, enclosed in the enlarged calyx-tube, 1-seeded, 2-winged. Seed adnate to the base of the pericarp; cotyledons large, thick, unequal.

*D. turbinatus*, Gaertn. f. Fruct. III. 51. t. 188; Fl. Br. I. 1.295. *D. indicus*, Bedd. Fl. Sylv. t. 94; Brandis Jour. Linn. Soc. Vol. 31. p. 26. Wood Oil Tree. *Challane*, K.

Eastern Bengal and Eastern Peninsula, from Pegu to Singapore, Western Peninsula, in the ghát evergreen forests, locally distributed, from North Kánara southwards. Very abundant in South Kánara and on the southern gháts of North Kánara (Gairsoppah Ghát, etc.). I have not seen trees much over 100 ft. high. It is, however, known to attain much greater dimensions, 200 ft. high by 5 ft. in diameter, in the Chittagong forests. Sir D. Brandis keeps *D. turbinatus*, Gaertn., distinct from *D. indicus*, Bedd., on very slender grounds. Length of the petiole, size of the leaf and number of the lateral veins. Enumer. Dipterocarpeæ, Brandis. Jour. Linn. Soc. Vol. 31. p. 27. Fl. Dec.-Jan. Fr. ripe May. Wood smooth, moderately hard. Heartwood reddish brown, mottled with dark patches of tissue. Pores round, moderate-sized, included in and often joined by irregular bands of soft tissue. Medullary rays broad and fine. Weighs 57 lbs. to the cubic foot. Employed for house-building and canoes in Burma: not much used on the West Coast. The trunk yields a balsamic oil (Gurjun oil) used medicinally and for painting houses and ships.

### 2. ANCISTROCLADUS, Wall.

Climbing shrubs with circinately hooked branches. Leaves usually in terminal tufts, coriaceous, entire. Flowers in terminal or lateral

panicles. Calyx-tube short; lobes unequally enlarged. Stamens 5-10. Ovary 1-celled, inferior; styles 3, articulated to a rounded disk; ovule solitary. Fruit crowned with the accrescent spathulate, calyx wings. Seed sub-globose; albumen copious, fleshy, ruminated; embryo short, straight; cotyledons short, divergent.

A. Heyneanus, Wall. Cat. 7262; Fl. Br. I. 1. 229; Dalz. & Gibs. Bomb. Fl. 34. *Kardor*, *kurdul*, M.

Western Peninsula from the Konkan to Travancore. On the gháts of North Kánara, common in evergreen forests. Fl. March. Fr. April.

### 3. SHOREA, Roxb.

Resinous trees. Leaves entire, or sub-repand, feather-veined. Flowers bracteate, in lax cymose panicles; bracts persistent, caducous or 0. Calyx-tube short, adnate to the torus, segments ovate or lanceolate, imbricate, 3 or more, rarely all enlarged in fruit. Petals 5, twisted, imbricate. Stamens 15-20-100; anthers ovate or oblong, rarely linear; connective subulate-cuspidate; valves equal or the exterior slightly larger, obtuse, rarely cuspidate. Ovary 3-celled; cells 2-ovuled; style subulate, entire or 3-lobed at the apex. Fruit coriaceous, indehiscent, 1-seeded, enclosed in the winged, accrescent calyx; wings 10-veined, linear. Cotyledons fleshy, unequal, usually enclosing the superior radicle.

S. Talura, Roxb. Fl. Ind. II. 618; Fl. Br. I. 1. 304; *S. laccifera*, Heyne; Bedd. Fl. Sylv. 26. *Jhall mara*, K.; *Jhallanda*, Mysore.

Western Peninsula; forests of Mysore and Malabar. In the forests of the Sirsy taluka of North Kánara near the Mysore frontier, pretty common. Bark grey with longitudinal fissures. Wood hard, dark-yellowish, even-grained. Pores small, often in groups, enclosed in white tissue. Medullary rays moderately broad and fine, numerous, wavy, joined by transverse narrow bars of white tissue. Annual rings indistinct. Weighs 56 lbs. to the cubic foot. Used extensively for building purposes in North Kánara. As far as I can ascertain lac is not found on this tree in North Kánara. Fl. Jan. Fr. April.

### 4. HOPEA, Roxb.

Glabrous or tomentose, resinous trees. Leaves coriaceous, entire, firm; stipules small, deciduous. Flowers ebracteate, in lax panicles of unilateral racemes. Calyx-tube very short, segments obtuse, imbricate, 2, enlarging in fruit, wing-like and erect. Petals connate, deciduous. Stamens 15, rarely 10; anthers ovate; connective subulate-cuspidate; cells obtuse, equal-valved. Ovary 3-celled, cells 2-ovuled; style short, terete or subulate. Nut 1-seeded, 2-winged; seed ovoid; cotyledons fleshy, unequal. This genus is very closely allied to Shorea.

H. Wightiana, Wall. Cat. 6295; Fl. Br. I. 1. 309; Bedd. Fl. Sylv. t. 96. *Haiga*, *hiral bogi*, *kurihouga*, K.; *Kausi*, *kalthoni* M.

Evergreen forests of the Western Peninsula from the Konkan southwards. Common along the banks of the North Kánara ghát rivers and nálas. Fl. March-June. Fr. H. & R. S.

An ornamental tree when covered with its bright crimson-winged fruits during the hot season. Bark smooth, exfoliating in large rectangular plates: inner bark white or yellowish, .25 in. thick. Wood dark yellowish-grey, very hard and heavy. Pores, uniform, numerous, in small groups in the midst of the lighter coloured tissue. Medullary rays numerous, very fine. Weighs about 65 lbs. to the cubic foot. Is much used for building purposes in North Kánara.

#### 5. VATERIA, L.

Large evergreen, resinous trees, glabrous or stellately pubescent. Leaves coriaceous, entire. Stipules small, deciduous, or inconspicuous. Flowers large, pedicellate in axillary and terminal panicles. Calyx segments imbricate, scarcely accrescent in fruit, tube short, adnate to the torus. Stamens 40-80, the outer smaller; anthers sessile or on short filaments, linear; cells unequal, the outer longer and broader, dehiscing from apex to base. Ovary 3-celled; cells 2-ovuled; style long, filiform. Fruit large, supported by the small, persistent calyx. Cotyledons thick, fleshy, unequal, usually lobed, including the superior radicle.

*V. indica*, L., Fl. Br. I. 1. 313. *V. malabarica*, Blume; Bedd. Fl. Sylv. t. 84. The White Dammer of Southern India, Piney Varnish, or Indian Copal Tree. *Dhupada*, K.

Western Peninsula from North Kánara to Travancore and Ceylon, in evergreen forests. A large handsome tree with smooth grey bark and a cylindrical stem, sometimes 5 ft. in diameter. Wood white, heartwood grey, rough. Pores large, subdivided, few. Medullary rays moderately broad and fine, white, distinct. Weighs about 26 lbs. to the cubic foot. Not much in request. Sometimes made into canoes in North Kánara, but not often. Yields the Piney gum resin which exudes from wounds in the trunk, an excellent varnish, used for carriages and furniture. Fruit contains 25 per cent. of tannin. The bark is very astringent.

Colonel Beddome in his Fl. Syl. says: "*V. indica*, is only found in Ceylon. *V. malabarica*, is the Western Peninsular species." This latter has been reduced to *V. indica*, L., in the Fl. Br. I. by Sir W. T. Dyer. The larger fruit and double bristle-pointed anthers of the Ceylon plant not being considered specific characters. Sir D. Brandis in his recent work on the Dipterocarpeæ also adheres to this opinion.

In North Kánara this tree was formerly planted along avenues or roads by the Sonda kings. A fine avenue of old dhupada trees exists at the present day near Siddapore, evidently from this origin. The cohering petals cover the ground during the months of March and April, when they are accompanied by the yellow masses of equally deciduous anthers. The young leaves are bright red and appear during the cold season. The fruit is ripe during the rainy season.

## ORDER 15. MALVACEÆ.

Herbs, shrubs or soft-wooded trees. Leaves alternate, simple, rarely compound, stipulate, often palm-nerved. Flowers bracteolate, axillary or terminal, regular, hermaphrodite or unisexual; bracteoles 3 or more, sometimes combined and forming an epicalyx. Sepals 5, valvate, free or connate. Petals 5, twisted-imbricate. Stamens numerous, monadelphous; anthers 1-celled; pollen globose, muricate. Ovary syncarpous; carpels usually numerous, often whorled round a central axis; styles more or less connate; stigmas globose, peltate or linear; ovules 1 or more, curved, attached to the inner angle of each carpel. Fruit a dehiscent capsule or a number of distinct carpels. Seeds hairy, silky or woolly; albumen scanty, mucilaginous or 0; embryo curved; cotyledons leafy, usually folded or crumpled.

Staminal column tubular, entire.

Stigmas 10, spreading. Bracteoles 10. Ovary 10-celled ... .. 1. *DECASCHISTIA*.

Stigmas 5, spreading. Bracteoles 5 or more. Ovary 2-5-celled ... .. 2. *HIBISCUS*.

Stigmas coherent. Bracteoles 3-5 linear, deciduous. Ovary 4-5-celled ... 3. *THESPESIA*.

Bracteoles 3, large, cordate, not deciduous. Ovary 5-celled 4. *GOSSYPIUM*.

Staminal column tubular at base only. Filaments 5-adelphous or free.

Leaves simple ... .. 5. *KYDIA*.

Leaves digitate. Seeds glabrous ... .. 6. *ADANSONIA*.

Seeds woolly. Filaments with single anthers ... .. 7. *BOMBAX*.

Filaments with 2-3 anthers ... .. 8. *ERIODENDRON*.

1. *DECASCHISTIA*, W. & A.

Shrubs. Leaves entire or lobed. Flowers large. Bracteoles 10. Styles 10, connate below; stigmas capitate. Capsule loculicidally 10-valved, hispid. Seeds kidney-shaped.

*D. trilobata*, Wgt. Ic. t. 83; Fl. Br. I. 1. 332; Dalz. & Gibs. Bomb. Fl. 21.

Western Peninsula; Mysore, Konkan and the Deccan. On the Konkan and the Supa Gháts of North Kánara, in open situations, abundant locally. Fl. Oct.-Nov. Fr. C. S.

2. *HIBISCUS*, Medik.

Herbs, shrubs or trees. Leaves stipulate, usually more or less palmately lobed. Inflorescence axillary. Bracteoles 5 or more, rarely fewer or 0, free or connate at the base. Calyx 5-divided, valvate, sometimes spathaceous and circumciss. Petals 5, connate at the base with the staminal tube. Staminal tube truncate or 5-toothed at the summit. Ovary 5-celled, cells opposite to the sepals, each with 3 or



more ovules ; styles 5, connate below ; stigmas capitate or sub-spathulate. Capsule 5-valved or spuriously 10-celled. Seeds glabrous, hairy or woolly.

Climbing prickly shrub. Bracteoles distinct, forked at the apex.

Capsule 5-celled, seeds downy ... .. 1. *H. furcatus*.

An erect tree. Bracteoles connate at the base, not forked. Capsule spuriously 10-celled, seeds pilose ... .. 2. *H. tiliaceous*.

1. *H. furcatus*, Roxb. Fl. Ind. III. 204 ; Fl. Br. I. 1. 335 ; Dalz. & Gibs. Bomb. Fl. 19. *Huli gowri*, K.

Hotter parts of India from Bengal to Ceylon. Common in many of the North Kánara and Konkan moist forests. Fl. Jan.-Feb. Fr. H. S. Roots infused in water make a cooling drink in the hot weather.

2. *H. tiliaceous*, Linn. Fl. Br. I. 1. 343 ; Bedd. Fl. Sylv. 29. *Paritium tiliaceum*, W. & A. Dalz. & Gibs. Bom. Fl. 17. *Belli-pata*, Vern.

Coasts of both the Eastern and Western Peninsulas, Bengal, Sunderbunds and Ceylon. Konkan and North Kánara, along the sea-coast ; also along the banks of tidal rivers near the sea. Fl. Jan. Fr. Mch.-Apl. Wood light, white, porous, used only for fuel. Fibre strong, used for elephant timber-dragging ropes.

*H. collinus*, Roxb. Fl. Ind. III. 198 ; Fl. Br. I. 1. 338.

Konkan, Circars, Coromandel and Ceylon. I am not acquainted with this species, which is probably only found cultivated in this presidency. A tree. Fl. Br. I. Fl. R. S.

### 3. THESPESIA, Corr.

Trees or shrubs. Leaves entire or lobed. Inflorescence axillary. Bracteoles 5-8, deciduous. Calyx truncate, 5-toothed or 5-partite. Corolla large, yellow, centre purple. Staminal tube 5-toothed at apex. Ovary 4-5-celled ; style club-shaped, 5-furrowed ; ovules few in each cell. Capsule dehiscent or indehiscent. Seeds glabrous or tomentose ; cotyledons conduplicate, black dotted.

A shrub. Leaves lobed. Seeds glabrescent ... 1. *T. Lampas*.

A tree. Leaves entire. Seeds pilose or powdery... 2. *T. populnea*.

1. *T. Lampas*, Dalz. & Gibs. Bomb. Fl. 19 ; Fl. Br. I. 1. 345. *T. macrophylla*, Blume, Bijdr. 75. Cooke Fl. Pres. Bomb. 1. 114. *Rambhendy*, M.

Tropical Himalaya from Kumaon eastwards. Bengal, Western Peninsula, Burma and Ceylon ; common in the Konkan and North Kánara forests from the sea-level to 2000 ft. elevation. Usually a small shrub. Fl. Aug.-Oct. Fr. Nov.-Dec. This species is very variable in size (small shrub to small tree), amount of pubescence, size and shape of the leaves, size of the flowers and number of the valves of the fruit.

2. *T. populnea*, Corr. in Ann. Mus. IX. 290 ; Fl. Br. I. 1. 345 ; Dalz. & Gibs. Bom. Fl. 18 ; Bedd. Fl. Sylv. t. 63. *Bhendy*, Tulip or Portia Tree. *parascha jhad*, H. ; *Parascha pipla*, Guz.

Tropical shores of Bengal, Ceylon and both E. & W. Peninsulas. Along the sea-shores of the Konkan and North Kánara ; often cultivated as a roadside tree. Fl. C. S. Fr. R. S. A small or medium-sized evergreen tree with smooth, grey bark. Wood fine-grained, tough, durable, dark-coloured, sapwood soft, pale-reddish. Used for gun-stocks, wheels, and for boat-timber ; also for carts and furniture. Bark yields a good fibre and the capsules a yellow dye. The bark and wood contain tannin and a fine red colouring matter.

#### 4. GOSSYPIUM, L.

Herbs, shrubs or low trees. Leaves palmately lobed. Flowers large, yellow with a purple centre or all purplish. Bracteoles 3, large, leafy, cordate, black glandular dotted like the calyx. Calyx cup-shaped, truncate or 5-toothed. Petals convolute or spreading. Ovary 5-celled ; style clavate 5-grooved with 5 stigmas ; ovules many in each cell. Capsule 3-5-valved. Seeds clothed with woolly hairs ; cotyledons leafy, black-dotted, plicate.

*G. Stocksii*, Mast. Fl. Br. I. 1. 346.

Limestone rocks on the sea-coast of Sind, apparently common near Karáchi. Fl. Dec.-Jany. Fr. Feb.-Mar. An interesting plant, being probably the wild form of *G. herbaceum*, L., and therefore the parent of the different kinds of Indian cotton. *G. herbaceum*, Linn., *G. barbadense*, Linn., and *G. arboreum*, Linn., are cultivated species.

#### 5. KYDIA, Roxb.

Trees. Young leaves, branches, inflorescence, capsule, &c., covered with a grey or reddish stellate tomentum. Leaves palminerved, usually lobed, with a raised gland on the midrib, .75 in. from base. Flowers unisexual. Calyx 5-lobed, persistent, surrounded at the base with the 4-6 leafy bracteoles, which are accrescent in fruit. Petals 5, longer than calyx, attached to the base of the staminal column. Stamens monadelphous ; the tube divided into 5 divisions, each bearing 3 anthers, which are imperfect in the female flower. Ovary 2-3-celled ; style 3-cleft ; stigmas 3, peltate, imperfect in the male flower ; ovules 2 in each cell. Capsule subglobose, 3-valved. Seeds reniform, furrowed.

*K. calycina*, Roxb. Fl. Ind. III. 188 ; Fl. Br. I. 1. 348 ; Dalz. & Gibs. Bomb. Fl. 24 ; Bedd. Fl. Sylv. t. 3 ; Brandis For. Fl. 29. *Warung*, *iláya*, *bhendy*, M. ; *Bellaka*, *billu bhendy*, K.

Tropical Himalaya from Kumaon eastwards, Burma and the W. Peninsula along the gháts. Common in deciduous forests on the North Kánara and Konkan gháts. Attains a height of 30 to 40 ft. with a

diameter of over a foot. Bark thick, viscid, mucilaginous within, brown outside and wrinkled, scaly. Wood white or dark grey, soft; no heart-wood. Pores moderate sized, single or subdivided. Med. rays fine or medium broad, joined by distinct lines of white tissue. Weighs about 40 lbs. to the cubic foot. Used for house-building, agricultural implements and for carving. The inner bark is used for elephant timber-dragging ropes in N. Kánara. Flowers from July till Jany. Fruit Jany.-Feb., remains long on the tree.

#### 6. ADANSONIA, L.

Tree with a very thick trunk at the base. Leaves digitate, deciduous. Flowers axillary, large, pendulous, long peduncled. Calyx 5-cleft, 2-bracteolate. Petals 5. Staminal tube cylindrical, dividing above into numerous filaments. Ovary ovoid, silky-tomentose; style filiform, bent after flowering. Fruit a pendulous capsule with mealy pulp. Seeds reniform, testa thick; albumen thin; cotyledons contortuplicate.

*A. digitata*, Linn. Fl. Br. I. 1. 348; Brandis For. Fl. 30; Dalz. & Gibs. Bom. Fl. Suppl. 9. *Gonik chentz*, M.; *Goruk amla*, H. The Baobab, or Monkey Bread Tree of Africa.

Cultivated in various parts of the presidency and Ceylon. Fl. May-June. One of the largest trees in the world. Trunks 30 ft. in diameter, common in Africa (Senegal). Wood light, soft and porous. Large trees are supposed to be of great age, but the several trees I observed in the Dhárwár district were fairly large and not more than 30 or 40 years old.

#### 7. BOMBAX, L.

Trees. Leaves digitate, deciduous. Flowers axillary or subterminal. Calyx cup-shaped, truncate or 3-7-lobed. Petals large, scarlet, obovate. Stamens pentadelphous and divided into numerous filaments. Ovary 5-celled, stigmas 5; ovules many in each cell. Capsule 5-valved, woolly within. Seeds woolly; testa thin; albumen scanty; cotyledons much folded round the radicle.

Leaflets 5-7. Calyx not prickly. Ovary glabrous.			
Stamens 75	...	...	... 1. <i>B. malabaricum</i> .
Leaflets 7-9. Calyx prickly. Stamens about 400.			
Ovary tomentose	...	...	... 2. <i>B. insigne</i> .

1. *B. malabaricum*, DC. Prod. 1. 479; Fl. Br. I. 1. 349; Brandis For. Fl. 31; Bedd. Fl. Sylv. t. 32. *Salmalia malabarica*, Schott. Dalz. & Gibs. Bom. Fl. 22. The Silk Cotton Tree. *Burla, sauri*, K.; *Sayar*, M.

Throughout the hotter parts of India, Burma and Ceylon, often cultivated. Leafless from Nov. till April. Fl. Feb.-Mch. Fr. Apl.-May. A very large, buttressed tree with a cylindrical stem, sometimes 100 ft. to the first branch and 5-6 ft. in diameter 5 ft. from the ground.

The bark is covered with conical prickles when the tree is young; afterwards the trunk is without prickles. The bark is grey, corky, rather smooth between the deep longitudinal fissures and cross-cracks. Wood soft, white, turning dark on exposure, no heartwood, and without annual rings; fairly durable under water; decays rapidly on exposure. Used for planking, boxes, tea boxes, lining of wells, and is in good demand along the coast of Kánara and the Konkan for canoes which are hollowed out of the stems. Weighs about 25 lbs. to the cubic foot. A light brown gum, used in native medicine, exudes from wounds in the bark. The silky cotton which clothes the seeds is used for stuffing pillows and cushions.

2. *B. insigne*, Wall. Pl. Asiat. Rar. 1. 71. t. 79, 80; Fl. Br. I. 1. 349.

Burma, Pegu, and the Andamans; common on the gháts of the W. Peninsula from the Konkan southwards. This tree, which is very similar in appearance to *B. malabaricum*, has at least along the W. Coast been confounded with the latter. It is gregariously common in several situations in N. Kánara from the coast upwards to the crest of the gháts, but does not extend far inland. It appears to require a heavy rainfall and is quite as large a tree as *B. malabaricum*. It flowers and fruits at the same times as this latter species. Wood (from the Andamans) said to be more durable than that of *B. malabaricum*. Weighs 31 lbs. to the cubic foot.

### 8. ERIODENDRON, DC.

Trees. Leaves digitate. Flowers tufted at the ends of the branches or axillary, large, white or rose-coloured. Bracteoles 0. Calyx cup-shaped, truncate or 3-5-fid. Petals oblong. Staminal bundles 5, each bearing 2-3 sinuous or linear anthers. Ovary 5-celled; style cylindrical, dilated; stigma obscurely 5-lobed; ovules many in each cell. Capsule 5-valved, silky within. Seeds with silky hairs; albumen scanty; cotyledons much contorted.

*E. anfractuosum*, DC. Prod. 1. 479; Fl. Br. I. 1. 350; Dalz. & Gibs. Bom. Fl. 22; Bedd. Fl. Sylv. 30. *Shameula*, *katsavar*, Vern.

S. America and W. Indies. Forests of the hotter parts of India and Ceylon. Said to be wild in the Khándesh District of the Bombay Presidency, also in the Konkan, Guzerat, N. Kánara, Poona. etc. Planted about villages and temples in the Madras Presidency. Timber soft and useless. The floss around the seeds will probably turn out to be a valuable product (Kapok floss).

In the Dictionary of Economic Products, Dr. Watt, quoting the Bombay Gazetteer, Kánara Volume, states that he has my authority for the tree being indigenous in that district. I have never seen the tree in Kánara and the article in the Gazetteer was not written by me. A white-flowered variety of *Bombax malabaricum*, was probably considered by the writer of the article to be *Eriodendron*, an error into which several non-botanical writers have fallen.

## ORDER 16. STERCULIACEÆ.

Trees or shrubs. Leaves stipulate, alternate, simple or digitate. Flowers regular, uni or bisexual. Sepals 5, more or less connate. Petals 5 or 0. Stamens monadelphous, indefinite or definite, or free and definite, with or without alternating staminodes. Ovary free, 2-5-celled, rarely 1 carpel; ovules few or many, attached to the inner angles of the carpels; styles as many as ovary-cells, free or united; raphe ventral or lateral. Fruit dry or fleshy, dehiscent or indehiscent; seeds rarely arillate, with or without albumen; cotyledons leafy, flat, folded or convolute.

Flowers unisexual or polygamous. Petals 0. Anthers 2-celled in a ring at the top of the staminal column. (Sterculiæ.)

Anthers numerous. Fruit dehiscent, not keeled ... 1. STERCULIA.

Anthers 5. Fruit indehiscent, keeled ... 2. HERITIERA.

Flowers bisexual. Petals 5. Staminal column dilated above into a cup, on the edges of which are the anthers, alternating with staminodia. (Helicteræ.)

Capsule membranous, inflated ... 3. KLEINHOVIA.

Capsule woody, not inflated.

Fruit of 5 spirally twisted carpels ... 4. HELICTERES.

Fruit a loculicidally 5-valved capsule ... 5. PTEROSPERMUM.

Flowers bisexual. Petals 5. Staminal column tubular, antheriferous for nearly its whole length; no staminodes.

(Eriolænæ.) ... 6. ERIOLÆNA.

## 1. STERCULIA, Linn.

Trees. Leaves simple, palmately lobed or digitate. Flowers polygamous. Calyx tubular, 4-5-lobed or cleft, often coloured. Petals 0. Ovary of 4-5, sessile or stalked carpels; ovules 2 or more in each. Follicles sessile or stalked, woody or membranous. Seeds albuminous, rarely winged; albumen bipartite, flat or folded; cotyledons flat, thin, adhering to the albumen or thick and fleshy.

Follicles woody. Seeds not winged.

Leaves digitate. Leaflets 7-9 ... 1. *S. fetida*.

Leaves palmately lobed.

Carpels bristly ... 2. *S. urens*.

Carpels rusty villous ... 3. *S. villosa*.

Leaves simple, 1-nerved ... 4. *S. guttata*.

Follicles membranous ... 5. *S. colorata*.

Follicles woody, seeds winged ... 6. *S. alata*.

1. *S. fetida*, Linn.; DC. Prod. I. 483; Fl. Br. I. 1. 354; Bedd. Fl. Syl. 31; Dalz. & Gibs. Bomb. Fl. Suppl. 10; Grah. Cat. Bomb. Pl. 18; *Jungly badam*. Bastard Poon Tree. *Kua-mhad*, *virhoi*, *goldaru*, *nagal-kuda*, Vern.

Southern India, Malabar, Ceylon; cultivated in gardens near Bombay; doubtfully indigenous in the Bombay Presidency. Wood light-yellowish, tough, warps and splits. Seeds edible. Exudes a gum resembling tragacanth, Watt. Fl. Apl.-May. Fr. C. S.

2. *S. urens*, Roxb. Fl. Ind. III. 145; Fl. Br. I. 1. 355; Dalz. & Gibs. Bomb. Fl. 231; Bedd. Fl. Sylv. 32; Brandis For. Fl. 33. *Karai, kandol, saldawar*, M.; *Kurda, kalauri*, Vern; *Kud* in the Sâtpudâs of Khândesh; *Karai, kada*, Guz.

Tropical Himalayas from the Ganges eastwards, E. and W. Peninsulas, Southern India and Ceylon. In the Deccan districts, in dry deciduous forests, often associated with *Boswellia* in the Khândesh Sâtpudâs; near the coast on rocky soil in the Konkan and North Kânara. Fl. Jany. Fr. Apl.-May. A moderate sized tree, usually with an irregular, gnarled, short trunk. Bark smooth, shining, thick, greenish-white, the thin papery rhytidome scaling off like birch bark. Wood very soft, reddish brown, with an unpleasant smell. Pores large, oval, filled with gum. Medullary rays broad. Weighs about 40 lbs. to the cubic foot. A white gum exudes from the bark (katila gum), used medicinally by the natives as a substitute for gum tragacanth. The seeds are roasted and eaten by the Gonds of the Central Provinces.

3. *S. villosa*, Roxb. Fl. Ind. III. 153; Fl. Br. I. 1. 355; Brandis For. Fl. 32; Dalz. & Gibs. Bomb. Fl. 22. *Sarda, sarde*, M.; *Savaya, chawri*, K.

Tropical Himalaya, ascending to 2,500 ft. N.-W. India, Bengal, W. Peninsula from Gujârat southwards to N. Kânara and Malabar. Fl. Dec. Jany. Fr. H. & R. S. Wood grey, soft, light and spongy. Annual rings prominent. Pores large, in a line along the edge of the annual ring. Med. rays broad, harder than the white tissue between. Bark used for elephant timber-dragging ropes; also for sacks in S. India. A pellucid gum exudes from scars in the bark.

4. *S. guttata*, Roxb. Fl. Ind. III. 148; Fl. Br. I. 1. 355; Bedd. Fl. Sylv. t. 105; Dalz. & Gibs. Bomb. Fl. 23. *Kookur, goldar, koketi, chakro*, M.; *Happu savaga*, K.

Ghâts of the W. Peninsula from the Konkan to Malabar, E. Peninsula Malacca and the Andamans; Ceylon. Throughout the forests of the Konkan and North Kânara, usually in or near moist evergreens. New flowers and ripe fruit about Jan. and Feb. Bare of leaves from Jan. to May. Bark yields a strong fibre, adapted for cordage and the manufacture of paper.

5. *S. colorata*, Roxb. Fl. Ind. III. 146; Fl. Br. I. 1. 359; Bedd. Fl. Sylv. 32; Dalz. & Gibs. Bomb. Fl. 23. *Kowsey*, M.; *Bhaikoi, khavas, khanshi*, Vern.

Forests of E. Bengal, W. Peninsula, Burma and Ceylon; throughout the Presidency in deciduous forests, nowhere abundant. Fl. Mar.-May. Fr. May-June. Bark grey, scaly, thick; inner bark mottled white. Wood soft, whitish with concentric bands of lighter tissue. Med. rays broad, wavy. Bark yields a fibre.

6. *S. alata*, Roxb. Fl. Ind. III. 152; Fl. Br. I. 1. 360. *S. Hayni* Bedd. Fl. Sylv. t. 230. *Tattele* or *Talbe mara*, K.

Silhot and Chittagong, W. Peninsula from N. Kánara southwards. In N. Kánara I have found it in evergreen forests near Burboli at the base of the gháts on the Kálánaddi; also near Sonda at about 2000 ft. altitude. This tree, notwithstanding its seeds, admirably suited for dispersion by water, is not common in the N. Kánara evergreen forests as far as I have observed. Dalzell mentions two trees planted in a garden near Hewra from seed obtained in N. Kánara, at Koorsullee on the Kálánadi. Bo. Fl. Suppl. 10. Fl. Feb.-March. Fr. ripe C. S. Some of the trees near Sonda were over 100 ft. high to the first branch by 4 ft. in diameter at the base. Wood light, fibrous, dark grey with black lines on a section. Pores moderate sized, scattered and filled with a black substance. Med. rays moderately broad, joined by distinct bars of light tissue. Weighs 39 lbs. to the cubic foot. Seeds eaten in Burma.

## 2. HERITIERA, Ait.

Trees. Leaves coriaceous, simple, silvery scaly beneath. Flowers small, unisexual, in axillary panicles. Calyx 4-7 cleft. Petals 0. Staminal column slender, bearing a single ring of 5 anthers. Ovary; carpels 5; style short; stigmas 5, thick; 1 ovule in each cell. Fruit woody, indehiscent, keeled or winged on back.

*H. littoralis*, Dryand. in DC. Prod. 484; Fl. Br. I. 1. 363; Dalz. & Gibs. Bomb. Fl. 22; Bedd. Fl. Sylv. 33. Looking-glass Tree. *Sundri-chand*, M.

Tropical coasts of the old world, along the coasts and tidal rivers of the E. & W. Peninsulas, Bengal, Burma and the Andamans. Fl. R. S. Fr. Jan.; remains long on tree. Along the banks of the Kálánadi and near the coast of North Kánara at Kárwár, but nowhere abundant. Heartwood dark red, very hard and close-grained. Weighs about 65 lbs. to the cubic ft. It is the chief timber of the Sunderbuns forests. The bark contains tannin.

## 3. KLEINHOVIA, Linn.

Tree. Leaves entire, palminerved. Inflorescence terminal. Sepals deciduous. Petals 5, unequal, upper with longer claws, margins involute. Staminal column dilated into a 5-fid cup, divisions each with 3 extrorse, 2-celled anthers, cells divergent. Ovary 5-celled, inserted in the staminal cup; style slender, stigma 5-fid. Capsule membranous inflated, loculicidally 5-valved. Seeds tubercled; albumen scanty or 0; cotyledons convolute; radicle next the hilum.

*K. Hospita*, Linn.; DC. Prod. 1. 488; Fl. Br. I. 1. 364; Dalz. & Gibs. Bomb. Fl. 23; Bedd. Fl. Sylv. 33. Southern Konkan, Nimmo (a doubtful native, Dalz.). Planted throughout the presidency.

## 4. HELICTERES, Linn.

Trees or shrubs. Leaves simple. Flowers axillary, solitary or fascicled. Calyx tubular, 5-fid, often oblique. Petals 5, clawed, equal or unequal; claws elongated, red, fading to a lead colour. Staminal column adnate to gynophore. Anthers 5-10; cells divaricating, often

confluent into one. Ovary 5-lobed, 5-celled; cells several ovuled; styles 5, subulate, more or less connate. Carpels dehiscent, spirally twisted, opening along their inner edge. Seeds many; albumen scanty; cotyledons folded round the radicle.

H. *Isora*, Linn.; Roxb. Fl. Ind. III. 143; Fl. Br. I. 1. 365; Dalz. and Gibs. Bomb. Fl. 22; Bedd. Fl. Sylv. 33; Brandis For. Fl. 34. *Kevani*, *muradsing*, M.; *Kavargi*, *kempu kowri*, K.; *Murrori-ka-jhar*, H. East Indian Screw Tree.

Bengal, S. and Central India, Western Peninsula and Ceylon. Throughout the forests of the presidency; abundant in many of the North Kánara ghát forests. Yields a strong fibre. Fl. Aug.-Dec. Fr. ripe March. Wood light grey, smooth, rather soft. Pores numerous, small, in groups or lines. Medullary rays fine and very fine, wavy. Yields a valuable white fibre, made into cordage and canvas for gunny-bags.

### 5. PTEROSPERMUM, Schreb.

Trees or shrubs, scaly or stellate tomentose. Leaves leathery oblique, simple or lobed. Bracteoles entire or laciniate, persistent or caducous. Sepals and petals 5 each, deciduous. Staminal column short, adnate to the gynophore. Filamented anthers in threes between each pair of 5 ligulate staminodes; cells parallel; connective apiculate. Ovary sessile on the top of the column, 5-celled; cells each with several ovules, style entire, stigma 5-furrowed. Capsule loculicidally 5-valved. Seeds winged; albumen thin or 0; cotyledons wrinkled or folded, radicle inferior.

- Bracteoles linear, entire, caducous, Flowers 1.25 in.  
 across ... .. 1. *P. suberifolium*.  
 Bracteoles laciniate or palmately lobed, caducous.  
 Flowers very large, 5 in. across ... .. 2. *P. acerifolium*.  
 Bracteoles pinnatisect or deeply gashed, segments  
 linear, persistent, Flowers 2 in. in diameter... 3. *P. Heyneanum*.

1. *P. suberifolium*, Lam. Ill. t. 576, f. II.; Fl. Br. I. 1. 367; Dalz. & Gibs. Bomb. Fl. 24; Bedd. Fl. Sylv. 34. *Muchucuda*.

W. Peninsula, Madras, Cuddapah, N. Arcot, Godavery forests, Madura and in Ceylon. It is stated to occur in the "Konkans" by Nimmo—Grah. Cat. Bo. Pl. 19, and is called *Muchucuda* in the vernacular. Dalzell apparently follows Graham, as he simply says "Concans" and quotes the name "*Muchucuda*."—Bomb. Fl. 24. I do not know whether there are authentic specimens from the Bombay Konkan collected by either Nimmo or Dalzell. In the first edition of the list of Bombay Trees, &c., I stated that it was found in the evergreen forests of the N. Kánara gháts. There is a *Pterospermum* common on the southern gháts which I have not found in flower and which might be this species, but equally answers to the description of *P. Heyneanum*, as far as the leaves are concerned. I am doubtful whether *P. suberifolium*, occurs at all in the Bombay Presidency from the evidence I now have on the subject.

2. *P. acerifolium*, Willd.; DC. Prod. 1. 500; Bedd. Fl. Sylv. 35; Brandis For. Fl. 35. *Karm-kara*, *kanak champa*, *karnikar*, Vern.



Sub-Himalayan region from the Jumna to Bengal, Chittagong, Tenasserim, the Konkan and Burma, often planted for ornament. On the southern ghâts of North Kánara, in evergreen forests, abundant on the Devimone ghât. Fl. C. S. Fruit remains long on tree. Wood light red, firm, or soft. Pores scanty, oval. Med. ray, fine, numerous, undulating. Innumerable fine transverse lines. Average weight 47.5 lbs. per cubic foot.

3. *P. Heyneanum*, Wall. Cat. 1. 169; Fl. Br. I. 1. 369; Bedd. Fl. Sylv. 54. *P. Lawianum*, Nimmo. Dalz. & Gibs. Bomb. Fl. 24. *P. reticulatum*, W. & A. Prod. I. 69; Fl. Br. I. 1. 369; Bedd. Fl. Sylv. 34. *Kesali*, *oopin*, K.

Western Peninsula from the Konkan southwards in moist forests along the ghâts, abundant in North Kánara, on the Sirsi and Siddapore taluka ghâts. I have united *P. reticulatum*, W. & A., with *P. Heyneanum*, Wall., as they are undoubtedly the same, which view has been confirmed by Dr. Stapf at Kew and Dr. Prain at Calcutta. Flowers during April and May. Fruit Nov.-Jan. A large or small tree sometimes 100 ft. high by 3 ft. in diam. Bark rough, lenticellate, red within. Leaves on young shoots, and particularly on sucker shoots, are remarkably polymorphous, thin, very white beneath, deeply lobed and irregularly toothed, mostly peltate. They are very distinct from those of the parent plant. Wood reddish. Pores moderate, grouped in lines of twos or threes. Med. rays short, fine, numerous. Weighs about 30 lbs. to the cubic foot. Annual rings not distinct.

#### 6.—ERIOLOÆNA, DC.

Trees. Leaves simple or lobed, cordate, downy or stellately tomentose beneath. Flowers on axillary few-flowered peduncles. Bracteoles 3-5, often laciniate. Calyx at first spathaceous, ultimately deeply 5-cleft. Petals flat with broad tomentose claws. Stamens numerous, all fertile, monadelphous, in many rows, the outer gradually shorter. Ovary sessile, 5-10-celled; style 1, stigma 10-lobed. Capsule woody, 5-10-celled, loculicidal. Seeds numerous in each cell, winged above; albumen thin, cotyledons much contorted or plaited, radicle next the hilum.

Bracteoles pinnatisect.			
Peduncles 3 flowered.	Style pilose	...	1. <i>E. Stocksii</i> .
Peduncles many-flowered.			
Style pubescent	...	...	2. <i>E. Hookeriana</i> .
Style glabrous	...	...	3. <i>E. Candollei</i> .
Bracteoles entire	...	...	4. <i>E. quinquelocularis</i> .

All these four species are closely allied and will probably eventually be united into one.

1. *E. Stocksii*, H. f. & T. Mss. Fl. Br. I. 1. 370. Konkan, Stocks. Probably not distinct from *E. Hookeriana*.

2. *E. Hookeriana*, W. & A. Prod. 70; Fl. Br. I. 1. 370; Bedd. Fl. Sylv. 35; Brandis For. Fl. 36. *Bute*, *bother*, *botku*, *arang*, Vern.

Central and Southern India, Behar and the W. Peninsula. Konkan, and in the dry forests of the Sâtpudás. Fl. March-Apr. Fr. C. S. A

small tree with scaly bark. Wood light-red, tough. Annual rings marked by a line of pores. Pores small and medium sized, enclosed in rings of soft tissue. Medullary rays wavy, moderate sized.

3. *E. Candollei*, Wail. Pl. As. Rar. 1. 51. t. 64; Cat. 1175; Fl. Br. I. 1. 370; Dalz. & Gibs. Bomb. Fl. 24. *Bute*, Vern.

Bhutan, Burma and W. Peninsula. Throughout the deciduous forests of North Kánara. Belgaum and the Konkan. Fl. H. S. Fr. C. S. A small tree. Bark scaly. Wood brick-red with orange and brown streaks, hard, close-grained, shining, takes a fine polish and seasons well. Used for carpentry, rice-pounders, paddles, &c.

4. *E. quinquelocularis*, Wgt. Ic. t. 882; Fl. Br. I. 1. 371; Bedd. Fl. Sylv. 35. *Budjari-dha-mun, bothi*, Vern. Western Peninsula, Gháts of the Madras and Bombay Presidencies. In the forests of the Konkan and Belgaum gháts. Fl. July. A small tree. Wood dark grey or reddish mottled, hard, heavy, smooth. Pores small, divided, joined by wavy bands of white tissue. Med. rays medium or fine.

#### GUAZUMA, Plum.

A tree. Leaves simple, tomentose. Flowers in axillary cymes. Sepals 5, at first spathaceous. Petals 5, concave at the base, prolonged at apex into 2 narrow processes. Stamens 10, connate into a column, tubular below, above of 5 fertile 3-antheriferous filaments opposite the petals and 5 lanceolate staminodes opposite the sepals: anther lobes divergent. Ovary sessile, 5-lobed, 5-celled; ovules numerous in each cell. Capsule woody tubercled.

*G. tomentosa*, Kunth, DC. Prod. 1. 485; Fl. Br. I. 1; Fl. Sylv. t. 107; Dalz. & Gibs. Bomb. Fl. Suppl. 10. Cultivated in gardens throughout the presidency. Fl. July-Aug. Fr. C. S.

#### ORDER 17. TILIACEÆ.

Mostly trees or shrubs. Leaves alternate, simple or lobed. Stipules deciduous. Flowers regular, hermaphrodite or unisexual. Sepals 3-5, valvate. Petals free, equal in number to sepals. Stamens free or connate, numerous, rarely definite, springing from a dilated torus. Ovary free, 2-10-celled, placentation axile. Styles columnar or divided into as many divisions as there are cells to the ovary; stigmas usually distinct, rarely confluent or sessile; ovules attached to the inner angle of the cells, if few pendulous from the apex or ascending from the base, if more numerous disposed in several ranks, anatropous. Fruit fleshy or dry, 2-10 celled. Seeds 1 or many ascending pendulous or transverse, no arillus, testa leathery or crustaceous or pilose; albuminous or exalbuminous, embryo straight; radicle next the hilum.

Anthers opening by slits.			
Fruit not prickly ...	...	...	1. GREWIA.
Fruit prickly ...	...	...	2. ERINOCARPUS.
Anthers opening by a terminal pore			3. ELEOCARPUS.

## GREWIA, Linn.

Trees or shrubs. Leaves entire, 1-9, often 3-nerved. Flowers axillary or terminal; inflorescence cymose in umbels or panicles. Sepals 5, distinct. Petals clawed, glandular at base, sometimes wanting. Stamens numerous on a raised, often glandular torus. Ovary 2-4-celled; style subulate; stigma shortly 2-4 lobed. Fruit a drupe, fleshy or fibrous, entire or 2-4-lobed; stones one or more seeded. Cotyledons flat; albumen fleshy or horny.

- Inflorescence terminal or extra axillary, umbellate.  
 Scandent. Leaves rough, shining. 3-nerved.  
 Drupe glabrescent of 4, separate, flattened lobes ... .. 1. *G. umbellifera*.  
 Erect shrub. Leaves scabrous. Drupe 4-lobed, bristly ... .. 2. *G. columnaris*.  
 Scandent. Leaves glabrescent. Drupe large, depressed globose, scarcely lobed, yellow, pilose ... .. 3. *G. orientalis*.  
 Scandent. Leaves thinly stellate—hairy beneath. Drupe 1-4 celled, 1-seeded ... .. 4. *G. umbellata*.  
 Scandent. Leaves scabrous. Drupe deeply 4-lobed, lobes 1-seeded, reddish-yellow, glabrous ... .. 5. *G. heterotricha*.  
 A diffuse shrub. Leaves small, glabrous.  
 Drupe small, 2-lobed, orange-red ... .. 6. *G. populifolia*.  
 Inflorescence axillary, umbellate.  
 Leaves hoary beneath.  
 Scandent or erect. Leaves lanceolate.  
 Drupe globose, dark-coloured, 2-lobed... .. 7. *G. salvifolia*.  
 Shrub. Leaves pubescent on both sides, 5-nerved. Drupe slightly 2-lobed, grey. .. 8. *G. orbiculata*.  
 Tree. Leaves often lobed, 3-5-nerved, stipules falcate, auricled. Drupe 1-4-lobed, black ... .. 9. *G. tiliaefolia*.  
 Tree. Leaves roundish, tomentose, 5-nerved; stipules subacute. Drupes subturbinate, 1-2-celled ... .. 10. *G. asiatica*.  
 Leaves not hoary beneath.  
 Shrub. Leaves scabrous. Drupe globose, long pedicellate, hairy, rind crustaceous, 1-4-lobed, size of a pea, stones pitted ... .. 11. *G. pilosa*.  
 Shrub. Leaves 5-nerved, rugose above, villous beneath. Drupe globose, rind crustaceous, 1-4-lobed, size of a cherry, red pilose ... .. 12. *G. villosa*.  
 Drupe fleshy, 2-lobed, black, didymous.  
 Tree. Leaves glabrous, laecolate, serrate ... .. 13. *G. laevigata*.  
 Drupe fleshy, 1-4-lobed.  
 Climber. Leaves glabrescent. Drupe deeply 4-lobed, purplish ... .. 14. *G. Ritchiei*.  
 Tree or shrub. Leaves scabrous.  
 Drupes yellow, subglobose, obscurely 4-lobed, size of a pea ... .. 15. *G. abutilifolia*.  
 Shrub. Leaves glabrescent or pilose above, densely tomentose beneath.  
 Drupe glabrescent, size of a small cherry, 4-lobed ... .. 16. *G. hirsuta*.

Shrub.	Leaves velvety beneath.	
Drupe	4-lobed, hairy, brownish,	
$\frac{1}{2}$ in.	... ..	17. <i>G. polygama</i> .
Inflorescence	terminal, paniced. Leaves glabrescent.	
Drupe	entire, size of a pea, glabrous,	
3-celled	... ..	18. <i>G. Microcos</i> .

1. *G. umbellifera*, Bedd. Fl. Sylv. 37; Fl. Br. I. 1. 393. *G. capitata*, Dalz. Mss. *G. carpinifolia*, Wall. *Chinna bally*, K.

N. & S. Kánara. In the evergreen forests near the Arbail Ghát; also in the forests near Sonda, N. Kanara. My plant was named at Kew from fruiting specimens. I have since found the flowers. This species is closely allied to *G. heterotricha*, Mast. Flowers during the hot season March-May. Fruit ripe Aug.-Sept. A lofty climbing, scandent shrub; stem 4 in. in diameter at the base. Bark greenish, smooth, covered with raised horizontal or sometimes spiral bands of tissue which support numerous straight or hooked prickles which soon become blunt; inner bark thick, mottled white, soft. *G. Ritchiei*, Mast., is probably identical with the above species.

2. *G. columnaris*, Sm.; DC. Prod. 1. 510; Fl. Br. I. 1. 383; Dalz. & Gibs. Bomb. Fl. 26; Wight's Icones t. 44; Grah. Cat. Bo. Pl. 21.

W. Peninsula, Bengal and Ceylon, Bombay, Malabar Hill, Sálsette, &c. Grah. Bababuden Hills of Mysore about 5000 ft. elevation. North Kánara, in evergreen forests; mentioned in Dalz. & Gibs. Bomb. Fl., but no locality is given. It is also found on the Bababuden Hills of Mysore. Fl. H. S. Fr. Oct.

3. *G. orientalis*, Linn.; DC. Prod. 1. 50; Fl. Br. I. 1. 384; Dalz. & Gibs. Bomb. Fl. 26.

Southern Provinces of the W. Peninsula and Ceylon, S. gháts, Dalzell. This small tree I have found rather common in deciduous forests on the Bababuden Hills of Mysore at 3000 ft. elevation. Fl. May-June. Fr. Sept.-Oct. Doubtfully indigenous in the Bombay Presidency.

4. *G. umbellata*, Roxb. Fl. Ind. II. 591; Fl. Br. I. 1. 385.

W. Peninsula, Konkan and the Coromandel; E. Peninsula, Malacca, &c. I am unacquainted with this species which seems to be closely allied to *G. orientalis*. It is probably not found in the Bombay Presidency.

5. *G. heterotricha*, Mast. Fl. Br. I. 1. 385.

W. Peninsula from N. Kánara to Coorg; in the evergreen forests of North Kánara from Ainshi southwards: not a tree. Fl. C. S. Fr. H. S. Stem 2 in. in diameter and covered with large, blunt prickles like *G. umbellifera*, Bedd. Inner bark thick, dark brown. This fine lofty climber and distinct species is closely allied to *G. columnaris*, and to *G. umbellifera*.

6. *G. populifolia*, Vahl. DC. Prod. 1. 511; Fl. Br. I. 1. 385; Brandis For. Fl. 38. *Gingo*, Vern.; *Gungo*, Sind.; *Jijani*, K.

Sind and the Punjab, W. Peninsula, throughout the dry districts of the Bombay Presidency. In the Dhárwár District the flowers and fruit appear during the rainy season. A small tree, usually a large or small

shrub. Bark white, fissured, corky. Wood hard, yellow, close-grained. Fruit edible.

7. *G. salvifolia*, Heyne in Roth. Nov. Sp. 239; Fl. Br. I. 1. 386. Brandis For. Fl. 43. *Bihul*, Sind; *Ulpī*, K.

N. W. Himalaya from the Jholm to Nepal, W. Peninsula, dry forests near Bádámi, Bijápur District. Sind and the Punjab, S. India and the C. Provinces. Fl. hot season. Fr. Sept.-Oct. This species is perhaps not distinct from *G. excelsa*, Vahl. A small tree. Bark hard, dark coloured, fissured but not scaly, reddish layers within. Wood yellow-brown, hard, close-grained. The branches make excellent walking sticks.

8. *G. orbiculata*, Rottl. in Nov. Act. Nat. Cur. Berol. 1803, 205; Fl. Br. I. 1. 386.

Western Peninsula, Konkan and Malabar. I am unacquainted with this species.

9. *G. tiliæfolia*, Vahl. Symb. 1. 35; Fl. Br. I. 1. 386; Dalz. & Gibs. Bomb. Fl. 26; Bedd. Fl. Sylv. 37; Brandis For. Fl. 41. *Dadsal*, *butale*, K.; *Dhamani*, M.; *Dhamana*, Guz.

Sub-Himalayan region from the Jumna to Nepal, ascending to 4000 ft. C. & S. India, Burma and Ceylon; throughout the deciduous forests of the Bombay Presidency; common in N. Kánara, where it attains a large size. Fl. March-May. Fr. R. S. Wood reddish brown, compact, elastic, smooth. Annual rings distinct. Pores round, in rings of white tissue. Medullary rays broad and fine. Easily worked and durable. Useful for agricultural implements, shafts of carriages, &c. The Kánara wood weighs 50 lbs. to the cubic foot and the value of P. was found to be 650. Logs of  $\frac{1}{2}$ -1 ton were obtainable in some of the N. Kánara forests. Fruit edible. Inner bark yields cordage.

10. *G. asiatica*, L.; W. & A. Prod. 1. 79; Fl. Br. I. 1. 386; Dalz. & Gibs. Bomb. Fl. 26; Brandis For. Fl. 40; Bedd. Fl. Sylv. 37. *Dhamin phalsa*, H.

Generally cultivated in India, said to be indigenous in the forests of the Poona districts; also in Oudh and Ceylon. *G. vestita*, Wall., is made a variety of *G. asiatica*, by M. T. Masters in the Fl. Br. I. Sir D. Brandis keeps them provisionally distinct in his For. Fl. *G. vestita*, Wall., is found in the tropical Himalaya, from Garwal to Sikkim; also in Pegu. Specimens from Garwal collected by Mr. Gamble appear to me to be distinct from those sent from Poona. Bark rough, grey. Wood yellowish white, hard and close-grained. Fruit edible. Bark used for rope making. Fl. Feb.-Mar. Fr. May-June.

11. *G. pilosa*, Lam. Dict. III. 43; Fl. Br. I. 1. 388; Dalz. & Gibs. Bomb. Fl. 26; Brandis For. Fl. 39. *Kirkali*, K.

C. & S. India, from Guzerat to Behar. Throughout the drier districts of the Bombay Presidency, abundant in the deciduous forests near Bádámi, Bijápur. A climber with smooth black bark and flattened angular branches, used for making baskets. Fl. May-July Fr. Sept.-Oct.

12. *G. villosa*, Willd. in Nov. Act. Nat. Cur. Berol. 1803, 205; Fl. Br. I. 1. 388; Dalz. & Gibs. Bomb. Fl. 25; Brandis For. Fl. 39.

W. & S. India from Sind to Travancore, sparingly over the Deccan and Sind. I have specimens of this species from Ajmere, N.-W. Provinces. I have found it in the dry forests near Gokák, Belgaum District. Brandis says it is found in the Konkan. Fl. June-Sept. Fr. Oct.-Nov., edible.

13. *G. lævigata*, Vahl. Symb. 1. 34; Fl. Br. I. 1. 389; Brandis For. Fl. 42; Bedd. Fl. Sylv. 37. *Kaori, gurguri*, K.; *Gulgollop*, Kon.

E. Himalaya, Khasia hills, W. & S. India and Burma. North Kánara and Konkan near village sites and in deciduous forests, not common. Fl. R. S. Fr. R. & C. S. Wood rather heavy, fibrous, close-grained, soft, white, yellowish or brownish. Bark yields a fibre.

14. *G. Ritchiei*, Mast. Fl. Br. I. 1. 389. *Mudkarki*, K. A large climber. Stem covered with blunt thorns. Flowers rather large, white. Style long; stigma capitate. This species, which is very closely allied to *G. umbellifera*, Bedd., if not identical with it, is found on the Amboli Ghát near Poondre, Belgaum District. Fl. Fr. Feb.-Mch. Also found near the falls of Gairsoppah.

15. *G. abutilifolia*, Juss. in Ann. Mus. IV. 92; Fl. Br. I. 1. 390; Dalz. & Gibs. Bomb. Fl. 26; Bedd. Fl. Sylv. 37. *Karikawdi, kowri*, K.

W. Peninsula from N. Kánara to Malabár, in N. Kánara along nálas and moist shady places. A large shrub or small tree. Flowers during May and June. Fr. ripe Aug.-April. The Kánara plant which was named as above at Kew is closely allied to *G. pilosa*, Lamk. The leaves are not cordate, and the short, deflexed pedicels are characteristic. Wood grey, hard, tough, compact. Annual rings distinct. Pores medium sized, round, often divided or in small groups in narrow rings of white tissue. Medullary rays broad and fine, 4-5 fine between each pair of broad rays. Weighs 48 lbs. to the cubic foot.

16. *G. hirsuta*, Vahl. Symb. 1. 34; Fl. Br. I. 1. 391; W. & A. Prodr. 1. 78; Wight Icones t. 76; Roxb. Fl. Ind. II. 587.

Southern provinces of the Western Peninsula and Ceylon. A scandent shrub common in the dry parts of the Belgaum District (Gokák); also near Dhárwár, often in hedges, also found on the Bababuden Hills of Mysore. The penicillate stigma and shining coppery drupes are characteristic. Fl. R. S. Fr. C. S.

17. *G. polygama*, Roxb. Fl. Ind. II. 588; Fl. Br. I. 1. 391; Dalz. & Gibs. Bomb. Fl. 26; Brandis For. Fl. 42. *Gowli*, Vern.

N. W. India, along the Himalayas from the Salt range to Nepal, ascending to 4000 ft. Central Provinces, Konkan, Pegu and Ceylon, along the Western gháts from Bombay southwards. Fl. July-Aug. Fr. C. S.

18. *G. Microcos*, L.; DC. Prod. 1. 510; Fl. Br. I. 1. 392; Dalz. & Gibs. Bomb. Fl. 26. *Shirul, asolin*, M.

Eastern Bengal, Khasia Mountains, Burma, W. Peninsula from the Konkan southwards to Ceylon, common in N. Kánara from the sea-level up to 2,500 ft. either in evergreen forests, deciduous forests or open places; in waste places near Khanapore, Belgaum, on granitic soil; never more than a large shrub. Fl. R. S. Fr. C. S.

## 2. ERINOCARPUS, Nimmo.

A tree. Leaves large, cordate, toothed, 5-7-nerved; stipules deciduous. Flowers large, yellow, in terminal panicles. Sepals 5, long, narrow, ligulate, brown, glandular tomentose outside. Petals 5, clawed, glandular at the base. Stamens many on a raised torus, free, or united at the base. Ovary 3-celled, cells 2-ovuled, style filiform, stigma minute. Fruit woody, triangular, spiny, 1-celled, indehiscent. Seed pendulous; albumen fleshy; cotyledons ovate, flat.

*E. Nimmoanus*, Grah. Cat. Bomb. Pl. 21; Fl. Br. I. 1. 394; Dalz. & Gibs. Bomb. Fl. 27; Bedd. Fl. Sylv. t. 110. *Chor*, *choura*, *chira*, *haladi*, M.; *Adwi bhendy*, K.

Deccan, Konkan and N. Kánara, common in the forests of the Belgaum District. Fl. Aug.-Oct. Fr. C. & H. seasons. A small or moderate sized tree. Bark grey, smooth, scaly. Wood dark grey, moderately hard, smooth; annual rings distinct. Pores medium or small in groups surrounded with white tissue. Med. rays broad and fine, 4-5 fine between each pair of broad. Weighs above 50 lbs. to the cub. ft. Used for yokes and rafters. Watt. The obovoid, dark-brown flower buds are in threes enclosed in 3-4 deciduous bracts, and are crowned with 5 green, linear, stigma-like extensions of the sepals. The bark is said to yield an excellent fibre for ropes.

## 3. ELÆOCARPUS, Linn.

Trees. Leaves simple, alternate. Flowers in axillary racemes, generally bisexual. Sepals 5. Petals 5, fringed or lobed, inserted round the base of the thick glandular disk. Stamens numerous, inserted on the disk between the glands; anthers linear, opening by a terminal pore. Ovary sessile, 2-5 celled; style columnar. Fruit a drupe with a bony stone, 1-5 celled. Seeds pendulous, 1 in each cell, albumen fleshy; cotyledons flat.

- |   |                             |
|---|-----------------------------|
| Drupe 5-celled, 5-seeded (Sec. Ganitrus) ... ..   | 1. <i>E. Ganitrus</i> .     |
| Drupe 1-3-celled. Anthers not prolonged at the apex. (Sec. Dicera.)   |                             |
| Petiole glandular at the apex. Anthers tipped with a few hairs. Drupe oblong, sometimes slightly falcate ... ..   | 2. <i>E. serratus</i> .     |
| Petiole sometimes glandular at the apex. Anthers without hairs. Drupe ovoid, straight, 1-celled 1-2-seeded ... .. | 3. <i>E. oblongus</i> .     |
| Drupe 1-celled, 1-2-seeded. Anthers terminated with a long awn. (Sec. Monocera.)                                  |                             |
| Stamens 70-80. Awns erect ... ..  | 4. <i>E. tuberculatus</i> . |
| Stamens 20. Awns ultimately reflexed ... ..   | 5. <i>E. Munroii</i> .      |

1. *E. Ganitrus*, Roxb. Fl. Ind. 11. 592; Fl. Br. I. 1. 400; Dalz. & Gibs. Bomb. Fl. 27; Brandis For. Fl. 43; Bedd. Fl. Sylv. 38. *Rudrack*, H.; *Rudraksh*, M. The Utrasum Bead Tree.

Nepal, Assam and the higher Konkan Ghâts. Fl. C. S. The tubercled stones are polished and made into rosaries, usually worn by *fakirs*. Sir D. Brandis is of opinion that this species is probably not indigenous in the W. Peninsula.

2. *E. serratus*, L.; W. & A. Prod. 1. 82; Fl. Br. I. 1. 401; Bedd. Fl. Sylv. 38; Brandis For. Fl. 43. *Kumbanga*, *chungbale*, K.

Tropical Himalaya, Sikkim 2—3000 ft., E. Bengal, E. & W. Peninsula. Ceylon; common in the W. forests of the Madras Presidency; on the S. Ghâts of N. Kánara, from the sea-level upwards; common near the falls of Gairsoppah in evergreen forests. Fl. Nov.-Dec. Fr. Feb.-Apr. A large or moderate sized tree. Bark smooth, dark coloured; inner bark dark brown, fibrous, .75 in. thick. Wood grey, soft, light, almost spongy. Pores small, uniform. Med. rays moderately broad. Fruit said to be edible in Madras and in Bengal, where it is called *Julpai*. Brandis says that the Bengal tree has long petioles  $\frac{1}{2}$ - $\frac{1}{3}$  the length of the blade and the stone smooth, which is not the case in the W. Peninsular tree.

3. *E. oblongus*, Gaertn.; W. & A. Prod. 82; Fl. Br. I. 1. 403; Dalz. & Gibs. Bomb. Fl. 27; Bedd. Fl. Sylv. 38. *Khas*, *kassoo*, *gurmoot*, *wowuli*, M.

Burma, Tenasserim, W. Peninsula, in the ghát evergreen forests from the Konkan to Travancore, ascending to 2000 ft. in N. Kánara, 4000 in the Sátára District, and 5000 in Mysore and the Nilghiris. Fl. Mch.-May. Fr. Sept.-Oct. Wood white, strong and tough, adapted for the lathe. Bedd.

4. *E. tuberculatus*, Roxb. Fl. Ind. II. 594; Fl. Br. I. 1. 404; Bedd. Fl. Sylv. t. CXIII. *Monocera tuberculata*, W. & A. Dalz. & Gibs. Bomb. Fl. 27. *Bhutali*, K.

Western Peninsula on the Ghâts from N. Kánara southwards to Travancore; also in Burma and Java. A tall tree, 80 ft. high and 7 ft. in circumference, buttressed at the base. Bark dark coloured, rough outside, inner bark yellowish. Wood white or grey, compact, lustrous, smooth. Pores small, uniform in short radial lines or single. Med. rays broad and fine, numerous. Annual rings distinct. Weighs 42 lbs. to the cub. ft. Very handsome when in flower; common in the evergreen forests near Mulamune on the Gairsoppah ghát. The stones of the Kánara tree are much compressed and are, as far as I have observed, always 1-seeded. The separate tubercled valves are numerous under the trees, the fleshy epicarp decaying during the rainy season. Flowers and young leaves appear from November till February. Fruit ripe during the rainy season. The tubercled nuts are made into rosaries and worn by *fakirs* like those of *E. Ganitrus*.

*E. aristatus*, Roxb. Fl. Ind. II. 559; Fl. Br. I. 1. 405.



This species is not mentioned by Colonel Beddome from Madras, the Konkan is given in the Fl. Br. I. as one of the localities where it is found, but what part of the Konkan is not stated. I included it in my list of Bombay Trees, published in 1894, and erroneously stated it was found in N. Kánara. Bhotan, Silhet and Assam are the other localities given as its habitat.

5. *E. Munroii*, Mast. Fl. Br. I. 1. 407. *F. glandulifera*, Hook. f. Bedd. Fl. Sylv. 38.

This distinct and handsome tree is found on the Nilghiris; also on the Bababuden hills of Mysore at about 5000 ft. elevation. It has not, as far as I know, been recorded from the Bombay Presidency. The reflexed anther tails and the smooth olive-green fruit afford very good and distinctive characters of this species, which is common in the sholas above Santaveri on the Bababuden hills. Fl. C. S. Fr. R. S.

#### ORDER 18. LINEÆ.

Herbs or shrubs. Leaves alternate, simple, entire. Inflorescence various. Flowers regular, bisexual. Sepals 5, free or connate below, imbricate. Petals 5, usually caducous, often contorted. Stamens 4-5 with as many staminodes, or 8-10; filaments united at the base into a ring; anthers versatile. Glands 5, entire or 2-lobed, usually adnate to the staminal ring or obsolete. Ovary entire, 3-5-celled; styles 3-5, free or more or less connate, stigmas terminal; ovules 1-2 in each cell, inserted in the inner angle, pendulous. Fruit usually splitting into 3-5-cocci, rarely a drupe. Seeds 1-2 in each cell, testa sometimes winged; albumen fleshy or 0; embryo straight, rarely incurved; cotyledons broad, radicle superior.

#### HUGONIA, L.

Climbing, tomentose shrubs with woody tendrils. Leaves alternate, serrate, stipulate. Inflorescence of yellow flowers, lower peduncles converted into spiral hooks. Sepals 5. Petals 5. Stamens 10 with glandular swellings on the basal ring between the filaments. Ovary 5-celled; styles 5, filiform; stigmas capitate; ovules 2, collateral in each cell. Drupe globose. Seeds compressed, albuminous.

*H. Mystax*, Linn. Fl. Br. I. 1. 413; Dalz. & Gibs. Bomb. Fl. 17.

Western Peninsula from the Konkan to Travancore. In the Bombay Presidency between Malvan and Vengurla. Fl. & Fr. Aug. Root with a yellowish bark, possessing an aromatic odour, used in native medicine in Malabar: Reede. Hort. Mal. 2. 19.

*Erythroxylon monogynum*, Roxb. The Bastard Sandalwood tree or Red Cedar is common in the driest parts of the Madras Presidency. The leaves of this tree probably contain a certain amount of bitter and tonic principle which might allay the pangs of hunger. They were greedily eaten by the starving natives during the famine of 1877.

## ORDER 19. MALPIGHIACEÆ.

Trees or shrubs, often climbing. Leaves opposite, entire; stipules small or 0. Inflorescence axillary or terminal, pedicels articulate, usually 2-bracteolate. Calyx 5-partite, 1 or more segments, never all with sessile glands, rarely without glands (*Aspidopterys*). Petals clawed or not, often fimbriate, imbricate. Disk obscure. Stamens 10, rarely fewer, hypogynous, equal or 1-2 much longer than the others; filaments free or connate below, anthers 2-lobed. Ovary 3-lobed, consisting of 3 carpels, more or less combined; ovules 1 in each carpel; styles 3, distinct or united; stigmas capitate, punctiform or lateral. Fruit of one or more winged samaras (*Asiatic genera*). Seeds exalbuminous, embryo curved or straight, radicle short, next the hilum; cotyledons foliaceous.

Petals clawed, unequal. Calycine glands large. Samaras winged at the ends	...	...	...	1. HIPTAGE.
Petals not clawed, equal. No calycine glands. Samaras winged all round	...	...	...	2. ASPIDOPTERYS.

## 1. HIPTAGE, Gærtn.

Climbing or sub-erect shrubs. Leaves entire, opposite, coriaceous; stipules 0. Flowers white, fragrant, in terminal or axillary racemes, peduncles bracteate, articulate, with the 2-bracteolate pedicels. Calyx 5-partite, glands large, adnate to the pedicel. Petals 5, clawed, unequal, fimbriate, 5th coloured. Stamens 10, 1 much longer than the others; filaments connate at the base. Ovary 3-lobed, lobes appendiculate, styles 1-2, circinate, the others rudimentary. Fruit of 1-2. 2-3 winged samaras. Seed subglobose; cotyledons thick, unequal.

*H. Madablota*, Gærtn. *Fruct.* II. 169. t. 116; *Fl. Br.* I. 1. 418; Dalz. & Gibs. *Bomb. Fl.* 33; Brandis *For. Fl.* 44. *Bunisteria bengalensis*, Linn. *Gaertnera racemosa*, Roxb. *Fl. Ind.* 2. 368. *Haladwail*, M.; *Bokhi, uti-mukta*, Vern.

Throughout the hotter parts of India from Sind to Burma and southwards to Ceylon; throughout the Bombay Presidency, near water-courses and in moist places. *Fl. Fr.* Jany.-Feb.-Mch. Wood red in the centre, moderately hard. Bark bitter. Contains about 8 per cent. of tannic acid.

## 2. ASPIDOPTERYS, A. Juss.

Climbing shrubs. Leaves opposite, entire, without stipules. Flowers in simple or compound, axillary or terminal panicles, peduncles bracteate, jointed at the top, often minutely bracteolate, small, yellow or white. Calyx short, 5-partite, eglandular. Petals 5, equal, not clawed, quite entire. Stamens 10, all perfect, filaments connate or distinct at the base. Ovary 3-lobed, sides winged; styles 3, glabrous; stigmas capitate. Fruit of 1-3 samaras, nucleus sometimes winged or crested at the back, surrounded with the broad oblong or orbicular wing. Seeds oblong, subterete; embryo straight, cotyledons equal, radicle short.

- Panicles large, rusty-tomentose. Samaras without a winged keel opposite the nucleus. ... ..  
 Leaves glabrous beneath. Samaras linear, oblong ... 1. *A. Roxburghiana*.  
 Leaves white tomentose beneath. Samaras orbicular. 2. *A. cordata*.  
 Flowers axillary, few fascicled. Samaras dorsally winged, truncate or lobed at the apex ... .. 3. *A. canarensis*.

1. *A. Roxburghiana*, A. Juss. in Archiv. Mus. Hist. Nat. III. 511; Fl. Br. I. 1. 420; Dalz. & Gibs. Bomb. Fl. 33. *Hircea indica*, Roxb. Fl. I. 2. 44.

Sikkim Himalaya, Burma, W. Peninsula, Carnatic, Orissa and the Konkan (Khandalla Ghát and the Konkans), Dalz.; absent from N. Kánara.

2. *A. cordata*, A. Juss. Archiv. Mus. Nat. Hist. III. 513; Dalz. & Gibs. Bomb. Fl. 34; Fl. Br. I. 1. 421.

Western Peninsula, Konkan, Kánara and Mysore. Common throughout the Konkan and North Kánara in moist forests. Fl. Sept.-Oct. Fr. C. S.

3. *A. canarensis*, Dalz. in Hook. Kew Journ. Bot. III. 37; Fl. Br. I. 1. 420.

Sir J. Hooker united *A. glomerata*, Wgt., with this species. The plate No. 1986 of the Icones Plant. represents the inflorescence in many flowered fascicles on thick peduncles or without any peduncles at all; also without bracts or bracteoles. Western Peninsula from N. Kánara to Malabár. In N. Kánara I have found it along the Gháts in evergreen forests from Diggi to Gairsoppah, but nowhere abundant. Fl. March. Fr. May. A very distinct species.

## ORDER 20. GERANIACEÆ.

Herbs, rarely trees. Leaves opposite or alternate. Flowers hermaphrodite. Sepals 5, rarely 4 or more. Petals as many as the sepals or 0. Torus with 5 glands alternating with the petals. Stamens as many or double or treble the sepals. Ovary of 3-5 carpels united with the axis as far as the insertion of the ovules, sometimes lengthened into a style or styles, free or united; ovules 1-2, rarely more. Fruit capsular or berried. Seeds pendulous or horizontal; albumen 0, embryo straight or curved; cotyledons flat.

### AVERRHOA, Linn.

Trees. Leaves imparipinnate. Flowers small, regular. Sepals 5. Petals 5. Stamens 10 or 5 and 5 staminodes. Ovary 5-lobed, 5-celled, without a beak; styles 5, distinct, stigmas capitate, ovules many in the cells. Berry oblong, 5-lobed. Seed with or without an arillus, albumen scanty, embryo straight.

- Leaflets glabrous and glaucous beneath ... .. 1. *A. Carambola*.  
 Leaflets pubescent beneath ... .. 2. *A. Bilimbi*.

1. *A. Carambola*, Linn.; DC. Prod. I. 689; Fl. Br. I. 1. 439; Brandis.

For. Fl. 45; Bedd. Fl. Sylv. 39; Dalz. & Gibs. Bomb. Fl. Suppl. 16. *Camaranga*, Vern.

In gardens throughout India. Cultivated throughout the presidency; run wild in some of the forests near villages of North Kánara. Fl. H. and R. S. The unripe fruits are astringent and are used in dyeing.

2. *A. Bilimbi*, Linn.; DC. Prod. 1. 689; Fl. Br. I. 1. 439; Brandis For. Fl. 46; Bedd. Fl. Sylv. t. 117; Dalz. & Gibs. Bomb. Fl. Suppl. 16. *Bilimbi*, Vern.

In gardens throughout India. Cultivated in the Konkan and North Kánara. Fl. H. S. Fr. R. S.

### ORDER 21. **RUTACEÆ.**

Trees or shrubs. Leaves dotted with pellucid glands, opposite or alternate, simple or compound, exstipulate. Flowers in axillary cymes or panicles, regular, bisexual. Sepals and petals 4-5 each. Stamens 4-5 or 8-10; filaments usually free, anthers introrse; disk crenate or lobed cylindrical, annular or elongated between the stamens and the ovary. Ovary of 4-5 carpels; styles as many, free or united; ovules 2 or more in each cell. Fruit various. Albumen fleshy or 0; embryo large; cotyledons fleshy or foliaceous.

Flowers usually polygamous. Ovary deeply 2-5-lobed; styles more or less free, cells 2-ovuled. Fruit carpels dehiscent. (*Zanthoxyleæ*.)

Leaves opposite, trifoliolate. An unarmed tree ... 1. *EVODIA*.

Leaves alternate, trifoliolate or pinnate. Prickly trees or shrubs ... 2. *ZANTHOXYLUM*.

Flowers usually polygamous. Ovary entire; style single; cells 1-2-ovuled. Fruit not dehiscent, seed albuminous. (*Toddaliæ*.)

Leaves trifoliolate. Prickly climbers ... 3. *TODDALIA*.

Leaves simple. Unarmed erect trees or shrubs ... 4. *ACRONYCHIA*.

Flowers hermaphrodite. Ovary entire; style simple; cells 1, many-ovuled. Fruit a pulpy berry. Seed exalbuminous. (*Auranticeæ*.)

Ovules solitary or 2 in each cell.

Style very short, persistent ... 5. *GLYCOSMIS*.

Style deciduous, jointed at the base.

Leaves trifoliolate or pinnate.

Ovules 2 in each cell.

Unarmed erect shrubs or trees.

Filaments linear-subulate ... 6. *MURRAYA*.

Filaments dilated at the base ... 7. *CLAUSENA*.

Climbing shrubs, usually armed ... 8. *LUVUNGA*.

Ovules solitary in the cells.

Calyx 3-lobed. Stamens 6. Leaves trifoliolate, ... 9. *TRIPHASIA*.

Calyx 4-5-lobed or parted. Stamens 8-10. Leaves pinnate ... 10. *LIMONIA*.

Leaves 1-foliolate or simple.

Calyx cupular. Disk elongate ... 11. *PARAMIGNYA*.

Calyx 3-5-lobed or parted. Disk cupular. ... 12. *ATALANTIA*.

Ovules many in each cell.

Leaves 1 foliate. Fruit with a soft epicarp ... 13. *CITRUS*.

Leaves pinnate. Fruit with a woody epicarp ... 14. *FERONIA*,

Leaves trifoliolate. Fruit with a woody epicarp. 15. *ÆGLE*.

## 1. EVODIA Forst.

Trees. Leaves glabrous. Flowers small, unisexual, in axillary cymes. Sepals 4-5. Petals 4-5. Stamens 4-5 at base of disk. Disk sinuate. Ovary pubescent, 4-5 lobed, 4-5-celled; cells 2-ovuled. Stigma 4-lobed. Fruit capsular, consisting of 4 coriaceous, 3-valved, 1-seeded cocci, endocarp horny, elastically separable, 2-lobed. Seeds oblong, testa crustaceous. Albumen fleshy, embryo straight, cotyledons ovate.

*E. Roxburghiana*, Benth. Fl. Hongk. 59; Fl. Br. I. 1. 487; *E. triphylla*, Bedd. Fl. Sylv.; Anal. Gen. XLI. t. 6. f. 2. *Xanthoxylon triphyllum*, Dalz. & Gibs. Bomb. Fl. 45. *Kabale*, K.

Khasia mountains, E. & W. Peninsulas, and Ceylon, throughout the Konkan and N. Kánara gháts, in moist situations from the sea level up to 4000 feet elevation in both evergreen and deciduous forests. Flowers and fruits usually during the hot season about March; also during the rainy season, Sept. Wood greyish-brown, moderately hard, weighs 51 lbs. to the cubic ft.—Gamble. The size of the leaflets varies considerably, those of N. Kánara specimens being usually larger and on shorter petiolules than in Konkan Ghát and Malay Archipelagian specimens.

## 2. ZANTHOXYLUM, Linn.

Trees or scandent shrubs, often prickly. Leaves alternate with the leaflets, often oblique, punctate, entire or crenate. Flowers small, often unisexual, in axillary or terminal cymes. Calyx 3-8-fid. Petals 3-5. Stamens 3-5, hypogynous or reduced to scales in the fem. fl. Ovary rudimentary in the male, of 1-5 oblique carpels in the female flower; styles sublateral, free or connate above, stigma capitate; ovules 2 in each cell. Fruit of 1-5, globose 1-seeded, dehiscent carpels. Seed oblong or globose, often hanging out of the carpel; testa black, shining. Albumen fleshy; embryo axile; cotyledons flat, radicle very short.

Shrub. Leaves trifoliolate. Cymes axillary ... 1. *Z. ovalifolium*.  
Tree. Leaflets 8-20-pairs. Cymes terminal ... 2. *Z. Rhetsa*.

1. *Z. ovalifolium*, Wgt. Ill. 169; Fl. Br. I. 1. 492; Bedd. Fl. Sylv. Anal. Gen. 42. *Armadal*, *armadalu*, K.; *Armarlu*, Kon.

Khasia mountains, E. & W. Peninsulas; Assam and the Mishmi mountains, common in the evergreen forests of the Sirsi and Siddapore sub-divisions of N. Kánara. Flowers during Feb.-Mar. Fruit ripe cold season. A large erect shrub; branches covered with white lenticels. Bark smooth, brown, covered with scattered short prickles, springing from a broad base, inner bark whitish. Wood hard, white. Fruit used in curries.

2. *Z. Rhetsa*, DC. Prod. 1. 728; Fl. Br. I. 1. 495; Dalz. & Gibs. Bomb. Fl. 45; Bedd. Fl. Sylv. Anal. Gen. 41. *Tirphul*, *thriphal*, *tisul*, *cochli*, M.; *Jummina*, *sessal*, K.; *Pepuli*, H.

Western Peninsula from the Konkan southwards. In N. Kánara it is common in some of the evergreen forests from the coast inland and

up to 2000 feet elevation. Flowers from July till November. Fruit ripe during the cold season. In the Fl. Br. I. a doubtful species, *Z. Budrunga*, Wall., stated to be easily recognized by the raised glands in the crenulures, is given. The N. Kánara tree has the leaflets also crenate-glandular and is the same as the Belgaum and Konkan plant which has the leaflets often quite entire. Perhaps the two species should be united. Wood yellowish-white, often with dark irregular stained patches, light, soft. Woody tissue in concentric alternate rings of darker hard and lighter soft tissue. Pores large, equal, single or divided, few, regularly distributed. Medullary rays equal, fine, numerous.

The essential oil from the carpels is used in native medicine. The ripe seeds which taste like pepper are used in making pickle.

### 3. TODDALIA, Juss.

Rambling prickly shrubs or trees. Leaves alternate, 1-3-foliolate, leaflets sessile. Flowers small in axillary or terminal cymes or panicles, unisexual. Calyx 2-5-lobed. Petals 2-5. Stamens 2-4-5 (or interval 8 with the alternate imperfect). Ovary entire or 4-parted in the male flowers, in the female flowers 2-7, rarely 1-celled; ovules 2 in each cell. Fruit gland-dotted, 2-7-celled. Seeds angled, reniform; albumen fleshy; embryo curved; terete, cotyledons linear or oblong.

Prickly shrubs, leaves trifoliolate	...	... 1. <i>T. aculeata</i> .
Unarmed trees. Leaves with 6-10 leaflets	...	... 2. <i>T. bilocularis</i> .

1. *T. aculeata*, Pers.; DC. Prod. II. 83; Fl. Br. I. 1. 497; Dalz. & Gibs. Bomb. Fl. 46. Bedd. Fl. Sylv. 42. *Limonia oligandra*, Dalz. & Gibs. Bo. Fl. 28. *Jungly kali-mirchi*, *manger*, *limri*, M.; *Pargi balli*, K. The Lopez Root.

Sub-tropical Himalaya ascending to 5000 ft., Khasia mountains ascending to 6000 ft. Western Peninsula, common throughout the gháts of the Bombay Presidency in moist evergreen forests. Fl. Aug.-Jan. Fr. R. S. Stem 2.5-4 in. at the base. Bark yellowish, corky, but not fissured, covered with conical prickles 1 in. high, and from a broad base, consisting of alternate plates of corky periderm and woody phloem, crowned by a hard curved prickle (the original prickle) which falls off eventually; inner bark of red and yellow tissue in concentric layers; yellow thickest and hard. Wood porous, yellowish-white, soft. The ripe berries are pickled. A valuable medicinal product, equal in some cases to quinine, is obtained from the roots. Never an erect shrub as stated by Dalzell in the Bo. Fl. p. 46.

2. *T. bilocularis*, W. & A. Prod. 149; Fl. Br. I. 1. 497; Bedd. Fl. Sylv. 43. *Dipetalum biloculare*, Dalz. & Gibs. Bomb. Fl. 46.

Western Peninsula, Konkan, Kánara and the Anamullays from 2-4000 ft. in moist forests. Fl. March.

### 4. ACRONYCHIA, Forst.

Trees. Leaves subopposite, usually simple, entire. Flowers axillary, cymose. Calyx minute, 4-lobed. Petals 4, spreading, revolute. Stamens 8, alternate longer. Ovary tomentose, in the hollow tip of disk,

4-celled; style terminal; stigma 4-grooved; ovules 2, superposed in each cell. Fruit a 3-5-celled drupe, or a 4-valved, loculicidal capsule. Seeds often exserted, and pendulous from a slender funicle; testa black; albumen copious; embryo straight; cotyledons oblong, flat.

*A. laurifolia*, Bl. Bijdr. 245; Fl. Br. I. 1. 498. *A. pedunculata*, Bedd. Fl. Sylv. 42. *Oyminosma pedunculata*, DC.; Dalz. & Gibs. Bomb. Fl. Suppl. 17; Grah. Cat. Bo. Pl. 36. *Olausena simplicifolia*, Dalz. & Gibs. Bomb. Fl. 30. *Bhutali*, *sonemau*, K.

Widely spread throughout the tropics of the old world, ascending to 4000 ft. in the Himalayas. In moist forests on the North Kánara gháts; common on the hills near Kárwár at about 1000 feet elevation. Flowers during August. Fruit ripe in Nov.-Jan.

A small or moderate sized tree. Bark grey, smooth, with a thin outer corky layer; inner bark brown with lines of white tissue.

#### 5. GLYCOSMIS, Correa.

Shrubs or trees. Leaves alternate, 1-5-foliolate, leaflets polymorphous, alternate. Flowers small, usually in axillary panicles. Calyx 4-5-partite. Petals 4-5, imbricate. Stamens 8-10, free, inserted round a disk; anthers often with an apical or dorsal gland. Ovary 2-5-celled; style short, persistent. Berry white, fleshy, 1-3-seeded. Seeds oblong; testa membranous; cotyledons equal; radicle very short.

*G. pentaphylla*, Corr. in Ann. Mus. VI. 384; Fl. Br. I. 1. 499; Dalz. & Gibs. Bomb. Fl. 29; Brandis For. Fl. 49; Bedd. Fl. Sylv. 43. *Kirmira*, Vern.; *Manikyan*, K.

Tropical and sub-tropical Himalaya, ascending to 7000 ft. Assam, E and W. Peninsulas, Malacca, China and Ceylon; extends to the Malay Archipelago and Australia; very common throughout the moist forests of the Konkan and N. Kánara; often near streams and water-courses; never arborescent in N. Kánara. Flowers throughout the year. Wood hard, close-grained. Fruit edible.

#### 6. MURRAYA, Linn.

Shrubs or small trees. Leaves alternate, pinnate. Flowers solitary or in terminal corymbs or axillary cymes. Calyx 5-divided. Petals 5, imbricate, free. Stamens 10, inserted around an elongated disk. Filaments alternately shorter. Ovary 2-5-celled; ovules solitary or 2, superimposed or collateral in each cell; style elongate, deciduous; stigma capitate. Berry 1-2-seeded. Seeds with a woolly or glabrous testa, exalbuminous; cotyledons equal.

Leaves 3-8-foliolate. Corymbs few-flowered ... 1. *M. exotica*.  
Leaves 10-20-foliolate. Corymbs many-flowered ... 2. *M. Koenigii*.

1. *M. exotica*, Linn.; Fl. Br. I. 1. 502; Bedd. Fl. Sylv. 44; Brandis For. Fl. 48. *M. paniculata*, Jack. Dalz. and Gibs. Bomb. Fl. 29. *Kunti*, *chalañuti*, *marchulañuti*, Vern.; *Pandry*, K.

Throughout the hotter parts of India, Ceylon, China, Australia and the Pacific Islands. In the evergreen forests of the Konkan and N. Kánara gháts. Three varieties are given in the Fl. Br. 1. : of these Var. 1 with many-flowered corymbs is usually cultivated in gardens on the Bombay side: it is common in N. India. Var. 2. is arboreous and has few-flowered corymbs, or the flowers subsolitary: this is the W. Peninsular form, gregarious in some of the N. Kánara evergreen forests. Var. 3 has the ovary 4-5-celled as a distinguishing character, varieties 1 and 2 having the ovaries 2-celled in Ceylon.

Wood light yellow, close-grained, very hard; resembles boxwood. Weighs 62 lbs. to the cubic foot. Used for walking sticks.

2. *M. Kœnigii*, Spreng. Syst. Veg. II. 315; Fl. Br. I. 1. 502. Bedd. Fl. Sylv. 44; Brandis For. Fl. 48. *Bergera Kœnigii*, Dalz. & Gibs. Bomb. Fl. 29. *Karhi-nimb, kudia nim, poospala, M.*; *Karhepah, gandla*, Vern. *Kuri bevu*, K. The Curry Leaf Tree.

Himalayas ascending to 5000 ft., Bengal, Ceylon; not common in Central India. W. Peninsula from the Konkan southwards, often cultivated; common in the moist evergreen forests of the Konkan and North Kánara; forms a large proportion of the undergrowth in some of the high timber deciduous forests of the Supa sub-division of North Kánara. Flowers during the hot season. Fruit ripens during the rainy season.

Wood yellowish-white, hard, close-grained. Pores small in groups or lines between the fine medullary rays. Weighs about 50 lbs. to the cub. ft. Leaves used for flavouring curries, and the bark and root, as well as the leaves, are used in native medicine.

#### 7. *CLAUSENA*, Burm.

Unarmed shrubs and trees. Leaves alternate, imparipinnate. Flowers small, bisexual. Calyx 4-5-toothed or lobed. Petals 4-5, membranous, slightly imbricate. Stamens 8-10, free, inserted round the disk, alternate shorter; filaments dilated or arched and concave below the subulate tip. Ovary stipitate, 4-5-celled; cells 2-ovuled; style at length deciduous. Fruit a small, 1-5-celled and seeded berry.

Inflorescence in terminal panicles ... .. 1. *C. indica*.  
 Inflorescence in axillary, cymose panicles or racemes . 2. *C. Willdenovii*.

1. *C. indica*, Oliv. in Jour. Linn. Soc. V. Suppl. II. 36; Fl. Br. I. 1. 505; Bedd. Fl. Sylv. 45. *Piptostylis indica*, Dalz. & Gibs. Bomb. Fl. 29.

Westera Peninsula from the Konkan to the Anamullays, Ceylon; common in evergreen forests on the gháts of North Kánara from Ainshi southwards (Párwár Ghát, Dalz.). Flowers April-May. Fruit ripens during the rainy season. A small tree with smooth bark. Wood close-grained and hard, adapted for the lathe.—Gamble.

2. *C. Willdenovii*, W. & A. Prod. 96; Fl. Br. I. 1. 506; Bedd. Fl. Sylv. 44; Dalz. & Gibs. Bomb. Fl. 30. *Cookia dulcis*, Bedd. in Madras Jour. 1861.

Sikkim Himalaya, 1—2000 ft., W. Peninsula from the Konkan southwards; abundant on some of the Belgaum and N. Kánara gháts in



evergreen forests. Fl. Feb.-May. Fr. ripe from June onwards. Beddome describes the fruit "As large as a cherry, as succulent as a grape, and somewhat of the flavour of the black currant."

#### 8. LUVUNGA, Hamilt.

Climbing spinous shrubs. Leaves trifoliolate. Flowers in axillary, fasciated or paniced racemes. Calyx cupular. Petals 4-5, free, thick. Stamens 8-10, inserted around a cupular disk. Filaments free or connate. Ovary 2-4-celled; ovules 2 in each cell; style deciduous; stigma capitate. Berry large, ellipsoid; rind thick, tubercled. Seeds large, ovoid; testa membranous, nerved; cotyledons equal, oblong, fleshy.

*L. eleutherandra*, Dalz. in Hook. Kew Journ. Bot. II. 258. Fl. Br. I. 1. 509; Dalz. & Gibs. Bomb. Fl. 30.

Western Peninsula from the Konkan southwards, Ceylon, 3-5000 ft. Flowers Dec.-Jany. Fruit ripe hot season.

#### 9. TRIPHASIA, Lour.

A spiny, glabrous, evergreen shrub. Leaves alternate, sessile, trifoliolate; leaflets crenate. Flowers solitary or in 3-flowered cymes. Calyx 3-divided. Petals 3. Stamens 6, inserted around a fleshy disk; filaments dilated at the base. Ovary 3-celled, ovoid, narrowed into a slender deciduous style; stigma obtuse or capitate, 3-lobed; cells 1-ovuled. Berry small, 1-3-seeded. Seeds immersed in mucilage; testa coriaceous; cotyledons plano-convex, often unequal or lobed.

*T. trifoliata*, DC. Prod. 1. 536; Fl. Br. I. 1. 507; Dalz. & Gibs. Bomb. Fl. Suppl. 12. *China limbu*. Cultivated in gardens throughout the Presidency.

#### 10. LIMONIA, Linn.

Shrubs or small trees. Leaves 3-foliolate or imparipinnate, petiole and rachis winged. Calyx 4-5 divided. Petals 4-5. Stamens 8-10, inserted around an annular or stipitate disk. Ovary oblong, 4-5-celled; ovules 1-2 in each cell; style short, stout, deciduous; stigma obtuse or capitate. Berry globose. Seeds imbedded in mucilage; cotyledons fleshy; albumen 0.

*L. acidissima*, Linn.; Fl. Br. I. 1. 507; Dalz. & Gibs. Bomb. Fl. 29; Bedd. For. Fl. 45; Brandis For. Fl. 47. *Naibullal*, K.; *Tondsha*, M.

Dry hills in various parts of India, N.-W. Himalaya, Assam, Behar, W. Peninsula, Bombay and Madras, in the dry districts; common in the Belgaum District on the Lower Cuddapah series of rocks (Gokák, Suttetec); also in the dry plains at the foot of the Bababuden hills of Mysore. Fl. April-May. Fruit Aug.-Sept. A small spinous tree. Bark corky, cinerous, rugose. Wood hard, close-grained, suitable for the lathe. Fruit black, very bitter, exported to Arabia, where it is used as a condiment; said to be used in Sind as a remedy for diabetes.

## 11. PARAMIGNYA, Wgt.

Erect shrubs or often armed climbers. Leaves 1-foliolate, quite entire, coriaceous. Flowers rather large, axillary, solitary or fascicled. Calyx cupular, lobed. Petals 4-5, usually free, imbricate. Stamens 8-10, filaments equal or nearly so, inserted around a columnar disk. Ovary 3-5-celled, cells 1-2-ovuled; style elongate, deciduous. Berry ovoid, contracted at the base, 1-5-seeded; seeds large, compressed; testa membranous; cotyledons fleshy, equal.

*P. monophylla*, Wgt. Ill. I. 109; Fl. Br. I. 1. 510; Dalz. & Gibs. Bomb. Fl. 30. *Kurwa-wagutti*, M.; *Ranyeed*, Vern.; *Kan-nimbe Kankanchi-bally*, K.

Sikkim Himalaya, ascending to 5000 ft., Malay Peninsula, W. Peninsula from the Konkan to Ceylon. Very common throughout the evergreen forests of the Konkan and North Kánara. Fl. H. S. Fr. R. & C. S. Stems 3 in. in diameter. Bark grey, corky and scaly; inner bark white, fibrous. Wood yellow, soft or moderately hard, sometimes with dark irregular patches. Pores large, numerous in short lines on a radial section. Medullary rays fine, numerous. Annual rings distinct. Weighs about 42 lbs. to the cubic ft. The root and bark are used in native medicine.

## 12. ATALANTIA, Corr.

Spinous shrubs or trees. Leaves simple, coriaceous. Flowers axillary or terminal. Calyx 5-lobed or irregularly split. Petals 3-5. Stamens 6-8, rarely 15-20; anthers broad or linear-oblong; filaments usually connate. Disk annular or cupular. Ovary sessile or stipitate, 2-5-celled; style deciduous; stigma capitate. Berry globose, rind leathery; seeds oblong; cotyledons fleshy, plano-convex.

Calyx irregularly split to the base on one side.

Flowers fascicled or racemose; pedicels long.

... 1. *A. monophylla*.

Calyx regularly or sub-regularly 4-5-lobed. Pedicels short.

Spines short. Racemes 1-3 in. Fruit ½ in. in diam. 2. *A. racemosa*.

Spines long. Racemes very short. Fruit 75 in. in diam. 3. *A. ceylanica*.

1. *A. monophylla*, Correa DC. Prod. 1. 535; Fl. Br. I. 1. 511; Dalz. & Gibs. Bomb. Fl. 28. *Ran* or *Makur limbu*, M.; *Adwi-nimbe*, K. The Wild Lime.

Silhet at the foot of the Khasia Mountains, W. Peninsula from the Konkan southwards to Ceylon. Flowers Oct.-Feb. Fr. April-June. A large shrub or small tree. Wood yellow, hard, close-grained, with numerous white concentric lines; weighs 66 lbs. to the cubic ft.; recommended as a substitute for boxwood. Very like the next species, but differs in the fascicled, long pedicelled flowers and the split calyx.

2. *A. racemosa*, W. & A. Prod. 91; Fl. Br. I. 1. 512; Bedd. Fl. Sylv. 46. *Sclerostylis atalantioides*, Wgt.; Dalz. & Gibs. Bomb. Fl. 29. *Kan limbu* or *Ran limbu*, Vern.

Western Peninsula from the Konkan to Ceylon. A large shrub or small tree, common in some of the N. Kánara forests; gregarious in the evergreen forests near the Ainshi Ghát. Flowers in the cold season from Nov. Fruit ripe in April. Fruit globose, size of a cherry, deeply pitted, pedicels  $\frac{1}{3}$  in.

3. *A. ceylanica*, Oliv. in Jour. Linn. Soc. V. Suppl. II. 25; Fl. Br. I. 1. 512; Bedd. Fl. Sylv. 46.

Western Peninsula from the Konkan southwards, Nilghiris, Ceylon and Malacca. A large spinescent shrub, common in the N. Kánara and Belgaum evergreen ghát forests. Flowers during the cold and hot seasons. Fruit hot and rainy seasons. The larger leaves and fruits, the longer and more slender spines and some slight differences in the flowers, separate this species from *A. racemosa*, W. & A.

13. CITRUS, Linn.

Evergreen spinous shrubs or trees. Leaves simple, 1-foliolate coriaceous; petiole often winged. Flowers white or tinged with red, sweet scented. Calyx cup-shaped, 4-5 cleft. Petals 4-5, thick, with glandular dots; imbricate in bud. Stamens 20-60; filaments more or less connate. Ovary many-celled on a large annular or cup-shaped disk; style terete, deciduous with a capitate, lobed stigma; ovules axile, biseriate, 4-8 in each cell. Berry globose, fleshy, many-celled, with membranous septa filled with fusiform, distended vesicles. Seeds few in each cell; testa leathery; albumen 0; embryo straight; radicle short; cotyledons thick, fleshy, oily, often unequal; often 2-3 embryos in one seed.

All parts glabrous. Fruit vesicles concrete.

Petals coloured. Flowers often unisexual .. 1. *C. medica*.

Petals white. Flowers bisexual ... .. 2. *C. Aurantium*.

Young shoots and nerves of leaves beneath pubes-

cent. Fruit vesicles distinct ... .. 3. *C. decumana*.

1. *C. medica*, Linn.; Fl. Br. I. 1. 514; Brandis For. Fl. 52; Dalz. & Gibs. Bomb. Fl. Suppl. 13. Citron, Lemon, Sour Lime, Sweet Lime. *Nimbu*, *mitha nimbu*, *bijapara*, *mahalunga*, *bijori*, Vern.

Universally cultivated in tropical and sub-tropical regions.

For a full account of the origin of the cultivated oranges and lemons see DeCandolle's Origin of Cultivated Plants, pp. 176—188.

2. *C. Aurantium*, Linn.; Fl. Br. I. 1. 515; Brandis For. Fl. 53; Dalz. & Gibs. Bomb. Fl. Suppl. 12. Sweet Orange. *Narangi*, H. Cultivated in the Deccan.

3. *C. decumana*, L.; Fl. Br. I. 1. 516; Brandis For. Fl. 55; Dalz. & Gibs. Bomb. Fl. Suppl. 12. Shaddock, Pumelo. Indigenous in Java. Cultivated throughout the Presidency. The fruit arrives at great perfection along the coast of North Kánara and Konkan.

## 14. FERONIA, Gaertn.

A spinous tree. Leaves alternate, imparipinnate; leaflets 5-7; petiole winged or not. Flowers polygamous, in panicles or racemes. Calyx small, 5-toothed, deciduous. Petals usually 5, imbricate. Stamens 10-12, filaments dilated, villous at the base. Ovary 5-celled; ovules numerous in several series; style 0; stigma fusiform, deciduous. Fruit globose, 1-celled, filled with pulp; rind hard; seeds numerous; cotyledons thick, fleshy.

**F. Elephantum**, Correa, Roxb. Fl. Ind. II. 411; Fl. Br. I. 1. 516; Dalz. & Gibs. Bomb. Fl. 30; Brandis For. Fl. 56; Bedd. Fl. Sylv. t. 121. Elephant or Wood Apple. *Cawtha*, Vern.; *Katori*, *kavatha*, Sind; *Kawat*, *kovit*, M.; *Balat*, *byala*, *belada*, *bel*, K.

Throughout India in dry situations, often cultivated. Fl. H. S. Fr. Nov.-Jan. Bark dark grey, very rough, thick, wrinkled, with longitudinal shallow furrows. Wood hard, yellowish-white. Annual rings distinct, marked by a white line. Pores small, joined by bands of white tissue. Medullary rays short, white, prominent, numerous, wavy. Weighs about 50 lbs. to the cubic ft. P. equals 623 (Cunningham); 645 (Skinner). The wood is used for house-building, agricultural implements, etc., and is well adapted for ornamental carving. The trunk yields a white transparent gum like gum arabic and the acid pulp of the fruit is made into a jelly.

## 15. ÆGLE, Corr.

Spinous trees. Leaves alternate, trifoliolate, pellucid punctate. Flowers large, white, bisexual, in axillary panicles. Calyx small, 4-5 dentate, deciduous. Petals 4-5, imbricate. Stamens numerous, filaments short, subulate. Disk inconspicuous. Ovary ovoid, axis broad; cells 8-20 near the circumference; ovules many, 2-seriate; stigma capitate, obtuse, deciduous. Fruit globose with a hard rind. Seeds many; testa woolly and mucous.

**A. Marmelos**, Corr.; Fl. Ind. II. 579; Dalz. & Gibs. Bomb. Fl. 31; Fl. Br. I. 1. 516; Brandis For. Fl. 57; Bedd. Fl. Sylv. t. 161. Bael Tree; Bengal Quince. *Baelputri*, K.

Wild in the sub-Himalayan forests, ascending to 4000 ft. Throughout India in dry places, wild or cultivated; one of the sacred trees of India, often cultivated near temples. Leaves shed Mch.-Apl. Fl. about May. Fruit ripe Oct.-Nov. Bark .5 in. thick; rhytidome exfoliating in irregular flakes, soft, corky, light cinerous grey. Wood yellowish-white, hard, with a strong aromatic scent when freshly cut; not durable. Pores small, uniformly distributed. Med. rays wavy, fine, short, numerous, uniform and equi-distant. Annual rings distinct, often marked by a continuous belt of pores. Weighs about 50 lbs. to the cubic ft. The wood is used in house building, for sugar mills, carts and agricultural implements. The pulp of the fruit is used medicinally and is a valuable product.

## ORDER 22. SIMARUBEÆ.

Shrubs or trees with bitter bark. Leaves alternate, simple or pinnate. Flowers small, regular, diclinous. Calyx 3-5-lobed. Petals 3-5, rarely 0, valvate or imbricate. Stamens as many or twice as many as petals, inserted at the base of the disk. Ovary free, 1-6-celled, usually deeply lobed; styles 2-5, free or united; ovules usually solitary in each cell. Fruit drupaceous, capsular or samaroid, of 2-6 distinct carpels. Seed usually solitary, albuminous; embryo straight or curved; radicle superior.

Ovary deeply divided.

Leaves pinnate; fruit samaroid ... .. 1. AILANTUS.

Leaves simple; fruit drupaceous, winged ... .. 2. SAMADEBA.

Ovary entire. Leaves 2-foliate ... .. 3. BALANITES.

## 1. AILANTUS, Desf.

Large trees. Leaves very large, alternate, unequally pinnate. Flowers small, polygamous, in large axillary panicles. Calyx 5-fid. Petals 5, valvate. Disk 10-lobed. Stamens 10, inserted at base of disk; in hermaphrodite flowers stamens 2-3. Ovary 2-5-partite; styles connate; ovules 1 in each cell. Fruit of 1-5, 1-seeded samaras; wing large, membranous. Seed pendulous; albumen scanty; cotyledons orbicular, foliaceous; radicle superior.

Leaflets toothed, glandular-hairy. Samara twisted... 1. *A. excelsa*.

Leaflets entire, glabrous. Samara not twisted ... 2. *A. malabarica*.

1. *A. excelsa*, Roxb. Fl. Ind. II. p. 450; Fl. Br. I. 1. 518; Dalz. & Gibs. Bomb. Fl. 46; Brandis For. Fl. 58; Bedd. Fl. Sylv. t. 122. *Maharuk, varul*, Vern. *Moto-aduso*, Guz.; *Maha nimb, limbado*, M.; *Helbeva*, K.

Indigenous in C. & S. India, Behar and the W. Peninsula; occasionally met with in Rajputana, on the Coromandel Coast and Ceylon; common about the Broach District, Baroda, the Deccan (Bijapur district) and Guzerat. A large tree, somewhat resembles the ash in appearance. Leafless during the cold season. New leaves appear during March and April. Fl. Apl. & May. Wood soft, white, weighs 28 lbs. to the cub. ft.; used for fishing floats, sword handles, native boats, &c. Bark intensely bitter, used as a febrifuge and tonic; it contains large, stony cells, also many conglomerate raphides, but no tannin.

2. *A. malabarica*, DC. Prod. II. 89; Fl. Br. I. 1. 518; Dalz. & Gibs. Bomb. Fl. 46; Brandis For. Fl. 58; Bedd. Fl. Sylv. t. 122. *Guggul-dhup, muddhedhup*, K.

Western Peninsula from the Konkan southwards. Pegu, met with in the valley of the Tsit-toung; often planted in Southern India.

Throughout the Konkan and North Kánara in evergreen forests, from the sea-level upwards. Flowers in February and March. Fruit ripe in May.

A large tree, 100 ft. high by 4 ft. in diameter. Bark grey, smooth, with a very thin corky layer outside; inner bark hard, mottled yellow, fibrous, .5 in. thick. Wood soft, white, spongy; weighs 23 lbs. to the cub. ft.; worthless as timber. Yields a soft, dark brown, fragrant resin (Mutipal), used in native medicine, and burnt as an incense in native temples.

## 2. SAMADERA, Gærtn.

Trees. Leaves alternate, simple. Flowers large, hermaphrodite, in axillary or terminal umbels. Calyx 3-5-partite. Petals 3-5. Disk large, conical. Stamens 8-10; a small scale at the base. Carpels 4-5; styles free at base, more or less united above. Fruit of 1-5, compressed, 1-seeded drupes, each with a narrow wing.

*S. indica*, Gærtn. Frut. II. t. 156; Fl. Br. I. 1. 519; Bedd. For. Sylv. 49; Grah. Cat. Bom. Pl. 37.

A small tree, with pale yellow bark and stout branches. Leaves elliptic, lanceolate, fleshy, 8 by 3 in., 2-glandular near the petiole, nearly glabrous. Umbels dense, many-flowered, long peduncled. Petals oblong. Fruit oval, 1.5 by 1 in. Seed brown, curved.

This tree is indigenous on the Malabár coast; it is stated to have been found in Goanese territory. I have never met with it in N. Kánara. Yields the Niepa bark of commerce which contains the bitter principle called Samaderin used in native medicine. Wood light, yellow, soft. Weighs 26 lbs. to the cub. ft.

## 3. BALANITES, Delile.

Spiny shrubs or trees. Leaves 2-foliolate, entire. Flowers green, in small axillary cymes. Calyx segments 5. Petals 5, imbricate. Stamens 10, inserted at the base of the disk. Disk thick, conical, entire. Ovary 1-celled; ovules solitary, pendulous. Fruit a woody 1-seeded drupe. Seed pendulous, exalbuminous.

*B. Roxburghii*, Planch. in Ann. Sc. Nat. Ser. 4. II. 258; Fl. Br. I. 1. 522; Brandis For. Fl. 59; Bedd. Fl. Sylv. 50; Grah. Cat. Bomb. Pl. 23. *Hingu*, *hinganbet*, Vern.

Common in many of the drier parts of India. Sikkin; C. Provinces; Behar; N. Circars; Deccan and S. India; throughout the driest parts of the Bombay Presidency in open situations. Flowers in April and May. Fruit ripe December.

New leaves in March. Under favourable circumstances attains a height of 30 feet with a trunk 2 feet in girth. Bark yellow or cinerous. Wood yellowish-white, moderately hard; no heartwood, no annual rings; weighs 48 lbs. to the cubic ft. Used for fuel and walking sticks. The woody fruit with the seed extracted is used as a kind of bomb in native fireworks. This species differs very slightly from *B. ægyptiaca*, Del., of N. and Tropical Africa.

## ORDER 23. OCHNACEÆ.

Trees or shrubs. Leaves alternate, simple, coriaceous; stipules 2. Inflorescence paniced or umbellate, bracteate. Sepals 4-5, imbricate, persistent. Petals 5, rarely 4 or 10, free, deciduous. Disk enlarged after flowering. Stamens 4-10 or indefinite, inserted on the disk, dehiscing longitudinally or by apical pores. Ovary short, 1-2-celled or elongate and 1-10-celled. Fruit indehiscent, compound, each drupe or pyrene 1-4-seeded; or capsular and 1-5-celled. Albumen fleshy or 0; embryo straight or rarely curved; radicle superior or inferior.

Shrub. Stamens indefinite. Fruit of 3-10 drupes ... 1. OCHNA.

Tree. Stamens 10. Fruit of 5 or fewer drupes ... 2. GOMPHIA.

## 1. OCHNA, L.

Shrubs. Leaves serrate, glabrous, shining. Flowers large, yellow. Sepals 5, coloured, persistent. Petals 5-12, deciduous. Disk thick, lobed. Stamens numerous, shorter than the petals; anthers dehiscing longitudinally. Ovary 3-10-lobed; lobes 1-celled; ovules solitary in each cell. Fruit of 3-10 drupes seated on the broad disk. Seed erect, exalbuminous.

*O. squarrosa*, L.; Fl. Br. I. 1. 523; Dalz. & Gibs. Bomb. Fl. Suppl. 17; Bedd. Fl. Sylv. 50; Brandis For. Fl. 60. *Mudah, narole*, K.

Silhet, Burma, Pegu, Ceylon and the Madras Presidency. Common in the moist forests of the Konkan and North Kánara on the hills near the sea, but also found inland at elevations up to 2000 feet. It never attains, as far as I have seen, to be anything more than a small shrub. Fl. Feb.-March. Fr. ripe in May and June. Wood reddish-brown, close-grained, moderately hard; weighs 58 lbs. to the cub. ft. I imagine the *O. nana*, referred to by Dalz. in the Bo. Fl. is simply *O. squarrosa*, L., as this species could scarcely have escaped the notice of such an observer as Dalzell; whereas *O. nana*, Hamilt., reduced to *O. pumila*, Ham. in the Fl. Br. I., has not been recorded from the Bombay Presidency since Dalzell's Bo. Fl. was published in 1861, and the description on page 46 of the Bo. Fl. would equally answer for either of the two species. Dalzell however mentions the arborescent form of *O. squarrosa*, on page 17 of the supplement of introduced trees added to the Bo. Fl.

## 2. GOMPHIA, Schreb.

Glabrous trees or shrubs. Flowers yellow. Sepals and petals 5 each. Disk thick-lobed. Stamens 10, filaments very short. Ovary deeply 5-6-lobed; styles connate; stigma simple. Drupes 5 or fewer, seated on a broad disk, 1-seeded. Seed erect, exalbuminous.

*G. angustifolia*, Vahl. Symb. II. 49; Fl. Br. I. 1. 525; Grah. Cat. Bomb. Pl. 38; Bedd. Fl. Sylv. 51.

The W. Peninsula from the S. Konkan to Travancore; common in Ceylon. Apparently not seen by any one except Nimmo in the Bombay Konkan. A plant very doubtfully indigenous in the Bombay Presidency. Boddome says that the wood is hard and useful for building purposes.

ORDER 24. **BURSERACEÆ.**

Balsamiferous trees or shrubs. Leaves alternate, generally compound, stipulate or exstipulate. Flowers small, regular, hermaphrodite, polygamous. Calyx 3-6-lobed. Petals 3-6, imbricate or valvate. Disk annular, usually conspicuous, free or adnate to the base of the calyx. Stamens equal to or twice the number of petals, inserted at the base or margin of the disk, equal or unequal; filaments free. Ovary free, 1-5-celled; style simple; stigma undivided or 2-5-lobed; ovules 2 in each cell, axile. Fruit drupaceous, rarely capsular and dehiscent. Seeds one or few, pendulous, exalbuminous; cotyledons usually twisted or crumpled; radicle superior.

Fruit a 3-valved capsule, pyrenes separating from the axis	...	...	...	1. BOSWELLIA.
Fruit indehiscent, drupaceous—				
Calyx 5-fid, bell-shaped	...	...	...	2. GARUGA.
Calyx 4-toothed, urceolate	...	...	...	3. BALSAMODENDRON.
Calyx 3-fid, campanulate	...	...	...	4. CANARIUM.

1. **BOSWELLIA**, Roxb.

Resinous trees with white, thin bark. Leaves imparipinnate, deciduous, leaflets opposite, sessile, serrate. Flowers small, white, hermaphrodite. Calyx 5-toothed. Petals 5. Disk annular, crenate. Stamens 10, alternately longer and shorter, inserted at the base of the disk. Ovary 3-celled; ovules 2 in each cell, pendulous. Fruit a 3-valved capsule, opening septifragally, the dissepiments remaining attached to the axis and bearing 3 seeds, pendulous from the top of the inner angle and enclosed in a hard bony shell with a broad membranous wing, the endocarp of the fruit separated from the pericarp. Seed exalbuminous; cotyledons trifid, lobes lacinate; radicle superior.

**B. serrata**, Roxb., ex Coleb. in *Asiat. Res.* IX. 379. t. 5; *Fl. Br. I.* 1. 528. **B. thurifera**, Roxb.; Brandis *For. Fl.* 61; *Bedd. Fl. Sylv.* 52. *Salai*, *salphullie*, Vern.

Forests at the foot of the Himalaya as far west as the Sutlej, Central India from Behar to Rajputana, the Deccan to within 20 miles of the W. gháts; very abundant on the Satpuras; nearly pure but sometimes mixed with *Sterculia urens*, and other species in the Khándesh forests. Belgaum Collectorate, Padshapore. The old leaves fall about March-Apr. fl. Feb.-June. Fresh foliage appears in June. Bark ½ in. thick, greenish ash-coloured, scaling off in thin papery flakes; inner bark brown. Wood light-coloured, becomes dark on exposure, soft, not durable, coarse and open-grained; weighs about 36 lbs. to the cub. ft. Used for fuel and charcoal. Along with other species yields frankincense or olibanum which is used medicinally and is sold in the bazárs under the name of *Labanu*, *Kundur*: the principal source of supply of frankincense is from other species of *Boswellia* growing in Somaliland.



## 2. GARUGA, Roxb.

Trees. Leaves alternate, imparipinnate crowded at the ends of the branches; leaflets opposite, subsessile, crenate. Flowers polygamous. Calyx campanulate, 5-cleft, valvate. Disk large, crenate, lining the calyx. Petals 5, inserted in the calyx-tube above the middle. Stamens 10, equal, inserted below the petals. Ovary ovoid, 4-5-celled; stigma capitate, 4-5-lobed, 2 collateral ovules in each cell. Drupe globose, fleshy, containing 1-5 1-seeded pyrenes. Seeds solitary in each pyrene; cotyledons thin, twisted.

*G. pinnata*, Roxb. Cor. Pl. III. t. 208; Fl. Br. I. 1. 528; Brandis For. Fl. 62; Bedd. Fl. Sylv. t. 118. *Kulak, kakad*, M.; *Halabalagi, arnelly*, *balagi, khandergai*, K.; *Kurak, kangkur*, Vern.

Throughout the dry forests of India from the Jumna to Burma and southwards to the Nilghiris; extends into the moist forest zone along the W. ghâts. Flowers from Feb. till May. Fruit ripens during the rainy season. Bark thick, about 1 in., grey or brown outside, exfoliating in large, irregularly angled flakes, inner bark reddish. Sapwood large, whitish; heartwood dark, reddish-brown, moderately hard, seasons well but is not durable. Pores moderate sized, single or in short rows. Medullary rays moderately broad and close together; easily attacked by insects. Weighs about 40 lbs. to the cub. ft. Used for house building and fuel. Bark used for tanning, exudes a copious white gum of no value. Fruit sometimes eaten.

## 3. BALSAMODENDRON, Kunth.

Armed or unarmed balsamiferous trees or shrubs. Leaves compound, leaflets sessile, oblique, crenate or serrate. Flowers small, polygamous. Calyx urceolate, tubular, campanulate, 3-4-toothed, persistent. Petals 3-4, valvate. Disk erect, cupular. Stamens 6-8, alternate shorter, inserted on the margin of the disk. Ovary sessile, 4-celled, surrounded by the disk. Drupe ovoid, containing 1-3, bony, 1-seeded pyrenes. Seeds exalbuminous.

Leaves usually 1-foliolate	...	...	...	...	1. <i>B. Mukul</i> .
Leaves trifoliolate,					
Unarmed...	...	...	...	...	2. <i>B. pubescens</i> .
Thorny ...	...	...	...	...	3. <i>B. Berryi</i> .

1. *B. Mukul*, Hook. ex Stocks in Hook. Kew Jour. Bot. I. 259. t. 8. Fl. Br. I. 1. 529; Brandis For. Fl. 64; Dalz. & Gibs. Bomb. Fl. Suppl. 19. *Gugal*. Sind Gum Gugal.

Sind, Rajputana, Khândesh, Behar, Beluchistan and Arabia. A small tree, usually a stunted bush. Bark ash-coloured, exfoliating in rough flakes; under-bark bright, shining, peeling off in thin papery rolls. Wood even-grained, soft, light. Yields the gum resin known as Gugal or Indian Bdellium, which when heated has a disagreeable odour and is used in native medicine.

2. *B. pubescens*, Stocks in Bomb. Trans. 1847; Fl. Br. I. 1. 529; Brandis For. Fl. 64. *Bayisa-gugul*, M.

A small tree of Beluchistan, on the dry hills of Sind as far south as Karáchi. Fl. March-Apr. Yields a small quantity of a tasteless inodorous gum, soluble in water.

3. *B. Berryi*, Arn. in Ann. Nat. Hist. III. 86; Fl. Br. I. 1. 529; Brandis For. Fl. 65; Bedd. Fl. Sylv. t. 126. *B. gileadense*, Don. Grah. Cat. Bomb. Pl. 43.

A small tree, indigenous on the east side of the Nilghiris, cultivated in the Bombay Presidency. The whole tree has a grateful fragrance.—Brandis.

#### 4. CANARIUM, Linn.

Large resinous trees. Leaves alternate, imparipinnate, stipulate or exstipulate. Flowers small or medium sized, hermaphrodite or polygamous in terminal or axillary panicles. Calyx urceolate or cup-shaped, 3, rarely 2-5 cleft, persistent, valvate. Petals 3-5, imbricate below or valvate, usually exceeding the calyx. Stamens 6 (10 in the sec. *Scutinanthæ*), inserted on the margin or outer side of a fleshy, entire or lobed disk; filaments free, or confluent below and distinct from the disk. Ovary 3, rarely 2-4-celled, cells 2-ovuled; style various; stigma sessile. Drupe more or less 3-angled, containing a single bony 1-seeded nut. Testa of seed membranous; cotyledons often partite, contortuplicate. "It is probable that this genus will be eventually split up into two or three distinct genera." Fl. Br. I. 1. 531. Engler in his Monograph published in 1883 retains the genus intact for about 80 species.

*C. strictum*, Roxb. Fl. Ind. III. 138; Fl. Br. I. 1. 534; Dalz. & Gibs. Bomb. Fl. 52; Bedd. Fl. Sylv. t. 128. Black Dammer Tree. *Raldhup*, K.; *Gugul*, Vern.

Western Peninsula in evergreen forests from the Konkan hills southwards. Common on some of the N. Kánara gháts. The leaves on the young shoots are very large and of a characteristic metallic red colour. The young fruits are very resinous, and wounds in the bark exude large quantities of black dammer. Flowers during the hot weather. Fruit ripe next cold season—January. A very large tree with smooth bark. Wood, soft, grey, light, shining, on cross section smooth. Pores large or moderate, unequally distributed. Medullary rays fine, very short, readily attacked by boring insects. Weighs 41 lbs. to the cub. ft.

#### ORDER 25. MELIACEÆ.

Trees or shrubs. Leaves alternate, exstipulate, usually pinnate. Flowers usually small, regular, paniculate, hermaphrodite or polygamo-dicecious. Calyx 3-6-lobed or sepals distinct. Petals 3-6, free or connate at base. Stamens 5-20 outside base of disk; filaments connate in a tube, rarely free. Disk hypogynous, tubular, annular or obsolete, free or connate with the ovary. Ovary 2-5-celled, cells

usually 2-ovuled; style single; stigma capitate or disciform. Fruit capsular, drupaceous or berried. Seeds exalbuminous, or sometimes with fleshy albumen, often enclosed in an arillus.

- Leaflets often toothed. Stamens united into a tube. Ovary-cells 1-2-ovuled. Seeds not winged, albumen thin, fleshy; cotyledons thin, foliaceous. (Meliaceæ.)
- Leaves simple ... .. 1. TURREA.
- Leaves pinnate.
- Flowers elongated. Disk annular. Style long ... .. 2. MELIA.
- Flowers globose. Disk shortly cup-shaped. Style short ... .. 3. CIPADESSA.
- Leaflets entire. Stamens united into a tube. Ovary-cells 1-2-ovuled, (2-5-ovuled in Carapa). Seeds not winged; albumen 0; cotyledons thick. (Trichilieæ.)
- Staminal-column tubular or tubular-urceolate. Disk tubular, crenulate or entire. Style elongated ... 4. DYSOXYLUM.
- Staminal-column globose or turbinate. Disk various. Style short or 0.
- Disk inconspicuous or obsolete. Anthers included in the staminal column or nearly so.
- Anthers 5 ... .. 5. AGLAJA.
- Anthers 6-10.
- Berry indehiscent ... .. 6. LANSIUM.
- Capsule loculicidal ... .. 7. AMOORA.
- Disk fleshy, annular or cup-shaped. Anthers exerted or included.
- Anthers exerted.
- Berry indehiscent ... .. 8. WALSURA.
- Capsule loculicidal ... .. 9. HEYNEA.
- Anthers included ... .. 10. CARAPA.
- Stamens united into a tube. Ovary cells with numerous ovules. Seeds winged. (Swietenieæ.)
- Staminal tube cup-shaped. Disk flat. Ovary 5-celled ... .. 11. SOYMIDA.
- Staminal tube cylindrical. Disk 0. Ovary 3-4-celled ... .. 12. CHICKRASSIA.
- Stamens distinct. Ovary-cells with 8-12 ovules. Seeds winged. (Cedreleæ.)
- Stamens 4-6, alternating with staminodes. Disk thick, 4-6-lobed.
- Capsule 5-celled, 5-valved, seeds with fleshy albumen, cotyledons sub-foliaceous ... .. 13. CEDRELA.
- Stamens 10. No staminodes, Disk thick, 10-lobed. Capsule 3-lobed, 3-valved, albumen 0; cotyledons plano-convex ... .. 14. CHLOROXYLON.

1. **TURRÆA**, Linn.

Trees or shrubs. Leaves entire or obtusely lobed. Flowers elongated white or yellow, axillary; peduncles bracteate at the base. Calyx campanulate, 4-5-fid. Petals 4-5, spathulate, elongated, spreading in flower. Staminal tube long; anthers 10-8, within mouth of tube, alternating with the teeth. Disk annular or obsolete. Ovary 5 or more celled; ovules 2 in each cell. Capsule 4 or more celled; loculicidal, valves woody, separating from the winged axis. Seeds with a broad ventral hilum; albumen fleshy; cotyledons foliaceous.

Leaves glabrate, shining. Fruit 2 in. long ... 1. *T. virens*.

Leaves pubescent. Fruit 5 in. long ... 2. *T. villosa*.

1. **T. virens**, Linn., Fl. Br. I. 1. 541; Dalz. & Gibs. Bom. Fl. 36; Grah. Cat. Bo. Pl. 31.

Western Peninsula; common on the Khândalla and other ghâts, not observed on the ghâts of N. Kânara. In the Fl. Br. I. this shrub is said to be evergreen. However, Graham in Cat. Bo. Pl. states that the plant is destitute of leaves when in flower during April and May.

2. **T. villosa**, Benn. Pl. Jav. Rar. 182; Fl. Br. I. 1. 542. *Euonymus* sp. Bedd. Fl. Sylv. 64; Wight Ic. t. 1593.

Western Peninsula on the ghâts from the Konkan southwards. On the Mahâbaleshvar hills; in Guzerat; common in the moist forests of the Supa sub-division of North Kânara in open situations. Flowers during April and May. A small shrub.

2. **MELIA**, Linn.

Trees. Leaves alternate, 1-3-pinnate; leaflets toothed or entire. Flowers often showy, in axillary panicles. Calyx 5-6 lobed. Petals 5-6, free, twisted in bud. Staminal-tube cylindrical with 10-30 teeth; anthers 10-12, inserted near apex. Disk annular. Ovary 3-6-celled; style slender; stigma capitate, deciduous; ovules 2, superposed. Fruit a drupe containing a 1-5-celled stone. Seeds pendulous albuminous; cotyledons foliaceous.

Leaves 1-pinnate ... .. 1. *M. Azadirachta*.

Leaves 2-3-pinnate.

Leaflets serrate. Flowers lilac, not mealy-pubescent ... .. 2. *M. Azedarach*.

Leaflets crenate. Flowers white-mealy-pubescent ... .. 3. *M. dubia*.

1. **M. Azadirachta**, Linn.; Fl. Br. I. 1. 544; Bedd. Fl. Sylv. t. 13; *Melia indica*, Brandis For. Fl. 67. *Azadirachta indica*, Adr. Juss. Dalz. & Gibs. Bomb. Fl. 36. *Nim*, *nimuri*, *bal nim*, *baka-yan*, *limba*, *kadukhajur*, *limacha-jhada*, M.; *Kai bevu*, K. The Nim or Margosa Tree.

A common tree throughout India, usually planted along roadsides ; also self-sown throughout India and Burma. Brandis says "nowhere really wild in N. W. India," neither have I seen it wild in the W. Peninsula. Bark .5 in. thick, dark grey outside with longitudinal and oblique wrinkled furrows ; inner bark reddish-brown. Never leafless. The young leaves come out at the beginning of the hot season. Flowers during the cold and hot seasons. Fruit ripe July. Produces abundant coppice shoots when cut ; growth fairly quick, 3-4 rings per inch of radius. Wood red or brown, hard, compact ; sapwood yellowish-white. Average weight per cub. ft. about 53 lbs. Used for the construction of carts and for agricultural implements. In S. India is in good demand for furniture as it takes a fine polish and owing to its containing a bitter principle is not attacked by white ants, is used by the Hindoos for making idols. The bark exudes a clear amber-coloured gum which is collected in small tears and fragments, used as a stimulant. A fixed acrid oil of a disagreeable flavour (Nim or Margosa oil) is extracted from the seeds. This oil is extensively exported from Madras to Ceylon, where it is used by the poorer classes for burning purposes, but it smokes offensively ; also used in native medicine as an anthelmintic and antiseptic. The bark, particularly that of the root, is a valuable febrifuge. The leaves preserve paper from the attacks of insects. The above are some of the principal uses of this widely-spread and valuable tree.

2. *M. Azedarach*, Linn. ; Fl. Br. I. 1. 544 ; Brandis For. Fl. 68 ; Bedd. Fl. Sylv. t. 14. *M. sempervirens*, Sw. Prod. 67 ; Dalz. & Gibs. Bomb. Fl. Suppl. 15. Bastard Cedar, Bead Tree, Persian Lilac, *Pejri, padrai*, M. ; *Mullanim*, H. ; *Bakayun, drek*, Sind. ; *Vilayati nim*, Vern. ; *Bakam limbodo*, Guz.

Commonly cultivated throughout India ; wild in the sub-Himalayan tract ; said to be wild also in Beluchistan. Bare of leaves for 3-4 months in the cold season ; in full leaf and bloom from March till May. The yellow fruit ripens in the rainy season and remains on the tree whilst it is leafless. Coppices vigorously. Bark .25 in. thick, grey, smooth. Sapwood yellowish-white, heartwood soft, red. Weighs about 35 lbs. to the cub. ft. Used for furniture, but is said to warp and split to a certain extent ; handsomely marked and polishes well. The bark is very bitter and is used in native medicine as an anthelmintic. The fruit yields an oil similar to that obtained from the nim. Strings of the stones are suspended over doors and verandahs during epidemics to avert the disease ; this is the practice in Bombay. The strings of the stones are used all over India for rosaries and necklaces and as charms against disease.

3. *M. dubia*, Cav. Diss. (VII) 364 (1789) ; Fl. Br. I. 1. 545. *M. composita*, Dalz. & Gibs Bomb. Fl. 36 ; Brandis For. Fl. 69 ; Bedd. Fl. Sylv. t. 12. *Karibevan*, K. ; *Nimbarra*, Vern. ; *Kadu kajar*, Guz. ; *Kuriaput*, M.

Eastern and Western Peninsulas, Burma, often cultivated. In the evergreen and deciduous forests of the North Kánara and Konkan gháts ; common on the Supa gháts. Flowers during March-April. Fruit ripe during the rainy and cold seasons—October till January. A hand-

some tree of rapid growth. Bark dark-brown, thin, rough, scaly, exfoliating in thin, narrow strips, with broad, shallow, longitudinal cracks; inner bark reddish Sapwood grey; heartwood reddish, soft, lustrous. Pores large, simple or divided. Medullary rays medium breadth, light red, not close together. Weighs 26 to 33 lbs. to the cub. ft. Used for building purposes in Southern India. Gamble says "will probably be found useful for tea boxes and similar purposes and the tree should be cultivated for its rapid growth." Used for making musical instruments in N. Kánara (Mundgod).

### 3. CIPADESSA, Blume.

Shrubs or small trees. Leaves odd-pinnate. Flowers subglobose, in axillary peduncled panicles. Calyx cup-shaped, 5-toothed. Petals 5, oblong, spreading, valvate in bud. Staminal tube deeply 10-lobed, lobes linear, bifid; anthers short, subapiculate. Disk cup-shaped, adnate to the base of the staminal tube. Ovary 5-celled; ovules 2, collateral, pendulous in each cell; style short; stigma clavate, capitate. Fruit a slightly fleshy drupe, 5-ribbed, 5-celled; cells 1-2-seeded. Seeds albuminous; embryo sub-foliaceous.

*C. fruticosa*, Blume Bijl. 162; Fl. Br. I. 1. 545. *Mallea Rothii*, ADR. Juss. Dalz. & Gibs. Bomb. Fl. 37; Bedd. Fl. Sylv. 54. *Nal bila*, H.

Western Peninsula from the Konkan to Ceylon in moist forests; ascend to 4000 feet on the Bababuden Hills in Mysore. Dry parts of the Belgaum District. "Common on the Katruj Ghát, near Poona;" Gráh. Fl. & Fr. during the rainy season and apparently at other times throughout the year. Wood only used for fuel.

### 4. DYSOXYLUM, Blume.

Trees. Leaves pinnate; leaflets entire, opposite, subopposite or alternate, oblique at the base, coriaceous. Flowers hermaphrodite, in panicles. Calyx 4-5-fid, caducous. Petals 4-5, oblong, spreading. Staminal tube cylindrical; anthers short, 6-10, included or half exerted. Disk tubular, equal to or twice as long as the ovary. Ovary 3-4-celled; ovules 2 in each cell; style equalling the staminal tube. Capsule 1-4-celled, loculicidally dehiscent. Seeds arillate or 0, exalbuminous.

Leaflets without glands in the nerve-axils. Calyx cup-shaped,  $\frac{1}{2}$  the length of the flower, subentire.

Fruit smooth, reddish-brown ... 1. *D. binectariferum*.

Leaflets glandular in the nerve-axils. Calyx short, deeply 4-5 divided. Fruit verrucose, tubercled, bright yellow ... 2. *D. glandulosum*.

1. *D. binectariferum*, Hook, f. ex Bedd. in Trans. Linn. Soc. XXV. 212; Fl. Br. I. 1. 546. *D. macrocarpum*, Bedd. Fl. Sylv. 150. *Epicharis exarillata*, Arn.; Dalz. & Gibs. Bomb. Fl. 37. *Guarea binectarifera*, Roxb. Fl. Ind. II. 240; Graham Cat. Bo. Pl. 31. *Yerindi*, *devdaru*, Vern.

Khasia Mountains and Assam, W. Peninsula from the Konkan southwards, from Khandála to Mysore; common in the evergreen forests of N. Kánara near the Gairsoppa falls; also in the Belgaum District near Amboli. A moderate sized tree. Fruit globose, 2 in. in diam., 4-valved, smooth, bright yellow. Seeds brown; cotyledons green. Fl. R. S. Fr. C. S. Wood reddish-grey, rough, close-grained, hard.

2. *D. glandulosum*, Talb. Syst. List of Trees &c., p. 39. Jour. Nat. Hist. Soc. Bomb. XI 690. t. 11. *Bili devdari*, *bili bullige*, K.

A very large tree. Leaves 12 in.; petioles angled, 4-6 in.; leaflets, about 9, sub-opposite or alternate, ovate, elliptic-lanceolate, shortly acuminate, sometimes slightly falcate, coriaceous, puberulous when young, glabrescent in age, pale and strongly nerved beneath, lateral nerves 10-20 pairs, with hollow, ciliate glands in the axils; blade 2-9 by 1.5-3 in.; petiolules short, .25 in. Inflorescence in axillary, 4-8 in. long, puberulous panicles, often crowded near the ends of the branches, upper branches very short, lower much longer. Flowers small, .25 in. long, white, sweetly scented, hermaphrodite, shortly pedicelled, pedicels .10-.25 in., slender. Calyx 4-lobed nearly to the base, lobes acute or obtuse. Petals 4, broad, reflexed in flower, slightly imbricate in the 4-angled bud, .25 in. long, pubescent on the outside. Staminal column tubular-urceolate, somewhat 4-angled, mouth crenulate; anthers 8, included. Disk cup-shaped, equalling or  $\frac{1}{2}$  the ovary, crenulate and ciliate on the margin. Ovary 4-celled, white, tomentose; style equalling the staminal column; stigma capitate, just exerted. Fruit globose, or obovoid, 2.5 in. in diameter, bright yellow, tubercled, verrucose, and with the 4 sutural lines distinct; seeds 3-4, large, angular, with a dark-brown, smooth testa and green cotyledons.

North Kánara and probably the Konkan in evergreen forests from the sea-level upwards to 2000 ft.; common in many of the "kans" near Yellapore. A large or very large tree with a cylindrical stem. Trunks which yielded over 350 cubic feet of timber were not uncommon near Yellapore in North Kánara. Flowers during the latter end of January and in February. Fruit ripe during May and June.

Bark light coloured, exfoliating in large scales, mostly breaking off from below, exposing underneath a peridermic layer covered with isolated groups of corky tissue; inner bark of alternate layers of yellow (hard bast) and thin white (soft bast) tissue. Green and reddish parenchyma are present in old trees. Wood moderately hard, yellowish. Pores medium and small, equally distributed. Med. rays fine, numerous. Annual rings distinct. Wood possesses a strong cedarlike smell when freshly cut, and polishes with a fine satin lustre. Weight 40 lbs. to the cub. ft. Logs decay rather slowly on exposure. Wood used for building purposes in North Kánara, but is not in great demand. Has been lately supplied to the Southern Marátha Railway Company for carriage construction; would do for cigar boxes, tea cases, &c., but the supply is limited.

5. *AGLAIIA*, Lour.

Trees or shrubs. Leaves pinnate or trifoliolate, scaly or pubescent. Flowers polygamo-dicœious, minute, subglobose, paniculate. Calyx 5-lobed, lobes imbricate in bud. Petals 5, concave, imbricated. Staminal tube urceolate or subglobose, 5-toothed at the apex or entire; anthers 5, erect, included or half exerted. Disk minute. Ovary 1-3-celled; style very short; cells 1-2-ovuled. Fruit a dry berry, 1-2-celled and seeded. Seeds with a fleshy, arillate covering.

A large tree. Panicles shorter than the leaves.  
Fruit sub-globose, top depressed, ferruginous  
lepidote           ...           ...           ...           ... 1. *A. Roxburghiana*.

A shrub. Panicles often longer than the leaves.  
Fruit ovoid, yellow-lepidote           ...           ... 2. *A. littoralis*.

1. *A. Roxburghiana*, Miq. Ann. Mus. Ludg-Bat. IV. 41; Fl. Br. I. 1. 555; Bedd. Fl. Sylv. t. 130. *Milnea Roxburghiana*, Wgt. Ic. 166.

Western Peninsula from the Konkan southwards ascending to 6000 ft. in Ceylon, Singapore, Burma and the Malay Peninsula. In the evergreen forests of the ghâts of North Kánara from Ainshi southwards. Fl. Nov.-Dec. Fr. ripe May-July. A large tree with smooth grey bark. Wood light, brownish yellow, very soft, lustrous. Pores medium sized, numerous. Med. rays broad and fine, light coloured. Weighs about 30 lbs. to the cub. ft.

2. *A. littoralis*, Talb. sp. nov. Syst. List of Trees &c., p. 40. (*A. Roxburghiana*, Miq. var.)

A shrub, sometimes a small tree. Leaves 5-foliolate, 3-7 in.; leaflets ovate or obovate, obtuse, thinly coriaceous; lateral nerves about 10 pairs; blade 1.5-4.5 by .75-2 in., petiolules short .15 in. Flowers in axillary, many-flowered, yellow panicles, often longer than the leaves, smaller and more shortly pedicelled than those of *A. Roxburghiana*, Miq. Fruit ovoid, .5 in. long, 2-seeded. Seeds surrounded by a thick, white, transparent, veined, arillate pulp; epicarp thin, leathery, lepidote of a bright yellow colour; radicle pilose.

Very common along the coasts of the Konkan and N. Kánara and probably extending further south. Flowers and fruits during the rainy and cold seasons. Differs from *A. Roxburghiana*, Miq., in habit, shape of leaves and distinct fruit. I do not think it can fairly be considered a variety of *A. Roxburghiana*, Miq., which is the opinion of Dr. Stapf at Kew. Beddome in the Fl. Syl., p. 55, mentions a small shrub from the S. Kánara plains which he is inclined to consider distinct. It may be the above species.

6. *LANSIUM*, Rumph.

Trees. Leaves oddpinnate. Flowers polygamo-dicœious, 5-merous, in axillary panicles or racemes. Sepals and petals rounded, imbricated. Staminal tube globose, crenulated; anthers 10, in 2 rows.



Disk obsolete. Ovary globose, 3-5-celled; cells 1-2-ovuled; style short, thick; stigma 3-5-lobed. Fruit a berry, 1-5-celled; cells 1-2-seeded. Seeds enclosed in a pulpy aril, exalbuminous.

*L. anamallayanum*, Bedd. Fl. Sylv. t. 131; Fl. Br. I. 1. 558. Western peninsula from N. Kánara southwards; common in the evergreen forests near the Gairsoppah, Dodmune and other southern gháts of N. Kánara, at about 2000 ft. elevation. A moderate sized tree with smooth, grey bark. Fl. from March till May. Fruit ripe during the rainy season.

#### 7. AMOORA, Roxb.

Trees. Leaves unequally pinnate; leaflets oblique. Flowers axillary, paniculate or racemose. Calyx 3-5-divided. Petals 3-5, thick, concave. Staminal-tube subglobose 6-10-crenate; anthers 6-10, included. Disk obsolete. Ovary sessile, 3 5-celled; stigma sessile, cells 1-2-ovuled. Fruit a subglobose capsule, 3-4-celled and seeded, usually loculicidally dehiscent. Seeds with a fleshy arillus.

Leaflets usually very oblique at the base. Petals usually 3. Fruit dehiscent.

Leaflets 9-15, opposite. Panicles spicate ... 1. *A. Rohituka*.

Leaflets 4-6, alternate. Male panicles dense, pyramidal, erect ... 2. *A. canarana*.

Leaflets opposite, 3-13, terminal one often hooded. Male panicles drooping ... 3. *A. cucculata*.

Leaflets 3-5, usually not so oblique at the base, alternate. Petals 3-4. Fruit pear-shaped, indehiscent ... 4. *A. Lawii*.

1. *A. Rohituka*, W. & A. Prod. I. 119; Fl. Br. I. 1. 559.; (Bedd. Fl. Sylv. t. 132). Brandis For. Fl. 69. *Amoora macrophylla*, Nimmo, in Grah. Cat. Bomb. Pl. 31.

Western Peninsula from N. Kánara southwards to the Anamallays. Fl. during the hot season in the Goond forests of N. Kánara, where it is fairly common in some of the evergreen kans. Fruit 3-celled, globose 1.5-2 in. in diam. Seeds covered with a bright red, thick arillus, testa dark chestnut. Fl. and ripe fruit hot season (May). A moderate sized tree with rough, grey bark. Wood reddish, close and even-grained, hard. Pores small, joined by reddish, concentric wavy lines. Med. rays fine, uniform. Weighs about 40 lbs. to the cub. ft. The bark is a useful astringent.

2. *A. canarana*, Benth. and Hook. f. Gen. Plant. I. 335; Fl. Br. I. 1. 560.

Assam, Eastern Bengal, Silhet, Southern and Western India and Ceylon, Konkan and N. Kánara gháts in evergreen forests. Fl. May-July. Fr. Jan.-May. A medium sized, smooth-barked tree. Wood reddish, smooth, very hard and close-grained. Pores small, joined by short lines in the autumn wood and by more continuous fine white

lines in the spring wood. Med. rays very fine and close. Annual rings visible. Weighs about 61 lbs. to the cub. ft. A strong timber, apparently not much used in N. Kánara.

3. *A. cucculata*, Roxb. Cor. Plant. III. 54. t. 258; Fl. Br. I. 1. 560; Dalz. and Gibs. Bomb. Fl. 37; Bedd. Fl. Sylv. 55.

Coasts of Bengal and Burma, Nepal and the Andamans. Parwar ghát, Bombay, Dalz.; not seen by me. Bark thin, grey. Wood red, hard, closed-grained, apt to split. Weighs 44 lbs. to the cub. ft. Gamble.

4. *A. Lawii*, Benth. Hook. f. Gen. Plant. 1. 335; Fl. Br. I. 1. 561; Bedd. Fl. Sylv. t. 133. *Nemadra Nimmonii*, Dalz. and Gibs. Bomb. Fl. 37. *Madrasada*, K.; *Buramb*, M.

Western Peninsula from the Konkan southwards; common on the N. Kánara gháts in evergreen forests; sometimes a fairly large tree with smooth bark. Fl. cold season. Fr. ripe rainy season.

#### 8. WALSURA, Roxb.

Trees. Leaves 1—5-foliolate; leaflets opposite, entire. Flowers small, in axillary or terminal panicles. Calyx 5-divided, imbricate. Petals 5, free, spreading, imbricate or subvalvate. Filaments 8-10, free or connate into a tube; anthers 8-10 erect, exserted. Disk usually annular, fleshy. Ovary 2-3-celled, immersed in the disk; style short; stigma, turbinate, capitate; cells with 2 collateral ovules in each. Fruit a fleshy berry, 1-seeded. Seed enclosed in a fleshy aril, exalbuminous.

*W. piscidia*, Roxb. Fl. Ind. II. 387; Fl. Br. I. 1. 564; Bedd. Fl. Sylv. 56; Dalz. & Gibs. Bomb. Fl. 37. *Walasura*, *waltursi*, Vern.

Western Peninsula from N. Kánara southwards to Travancore and Ceylon. On the North Kánara and Belgaum gháts in evergreen forests. Fl. Nov.-Dec. Fr. May-June.

Wood heavy and strong. Bark used to intoxicate fish. Contains much tannin.

#### 9. HEYNEA, Roxb.

Trees. Leaves 5-11-foliolate, imparipinnate; leaflets opposite, entire. Panicles terminal, and axillary, corymbose, long peduncled; peduncles and pedicels articulate. Flowers hermaphrodite. Calyx 4-5-fid. Corolla of 4-5 oblong petals. Staminal tube 8-10-fid, divisions linear, bidentate at apex; anthers between the linear teeth. Disk annular, fleshy. Ovary immersed in the disk, 2-3-celled; ovules 2 in each cell; stigma with a thickened ring at the base. Fruit capsular, 1-celled, 2-valved, 1-seeded. Seed enclosed in an arillus, exalbuminous; cotyledons hemispherical thin, white.

*H. trijuga*, Roxb. Fl. Ind. II. 390; Fl. Br. I. 1. 565; Dalz. & Gibs. Bomb. Fl. 38; Brandis For. Fl. 70. *H. affinis*, Juss. Bedd. Fl. Sylv. t. 134. *Kora*, *kuriya*, *tural*, *doddagli maddu*, K.; *Gundira*, M.; *Limbara*, Vern.

Widely spread throughout the moist forests of India from the Himalayas southwards to Ceylon, throughout the Western ghát forests of the Bombay Presidency ; common along the banks of rivers in North Kánara ; also in evergreen forests. Fl. Feb.-March. Fr. ripe in the cold season Oct.-Feb.

Bark dark, ash-coloured. Wood yellowish-white, smooth, moderately hard. Pores medium sized, often divided or in small groups, joined by broken irregular bands of white tissue. Med. rays medium, numerous. Weighs 42 lbs. to the cub. ft. Col. Peyton in the Bombay Gazetteer, N. Kánara, Vol. 2, says that the wood is useless. Bark and leaves contain a bitter astringent substance.

#### 10. CARAPA, Aubl.

Trees. Leaves 2-6-foliolate ; leaflets opposite, entire. Panicles axillary, lax. Calyx 4-fid. Petals 4, reflexed. Staminal tube urceolate, globose, 8-dentate at apex, teeth bipartite ; anthers 8, 2-celled, included, sessile. Disk fleshy, cup-shaped, at the base of the ovary and adherent to it. Ovary 4-celled, 4-sulcate ; cells 2-8-ovuled ; style short ; stigma discoid. Fruit a globose capsule (3-4-in. in diameter), 6-12-seeded. Seeds large, angular, exarillate ; testa hard, spongy ; hilum large, ventral ; cotyledons amygdaloid.

*C. moluccensis*, Lam. Encycl. Meth. 1. 621 ; Fl. Br. I. 1. 567 ; Bedd. Fl. Sylv. t. 136. *C. obovata*, Blume. Bijdr. 179. Sea coasts of Bengal, Malabar, Burma and Ceylon. Yields a brown, bitter gum resin. Bark bitter and astringent contains much tannin. Used in native medicine. Wood white, turning red on exposure, hard. Weighs 45—50 lbs. to the cub. foot. Sir D. Brandis is of opinion that *C. moluccensis*, Ham., is distinct from *C. obovata*, Bl., and that the latter is probably the W. Peninsular species, the former being confined to Malaya, Australia and East Africa.

#### 11. SOYMIDA, Adr. Juss.

A tree. Leaves paripinnate ; leaflets opposite, entire. Flowers greenish-white, in axillary or terminal panicles. Sepals 5, imbricate. Petals 5, free, spreading, unguiculate. Staminal-tube short, cup-shaped, 10-lobed, lobes bidentate ; anthers sessile between the teeth, short. Disk flat. Ovary 5-celled ; cells many-ovuled ; style short ; stigma broad, fleshy. Capsule woody, 5-valved. Seeds numerous, winged at both ends, albuminous ; cotyledons foliaceous.

*S. febrifuga*, Adr. Juss. in Mem. Mus. XIX. 251. t. 22. f. 26 ; Fl. Br. I. 1. 567 ; Brandis For. Fl. 71 ; Bedd. Fl. Sylv. t. 8 ; Dalz. & Gibs. Bomb. Fl. 38. Bastard Cedar ; Indian Redwood. *Rohan, lál chundan, rainyi*, Vern. ; *Palara, M. ; Suami*, K.

N.-W., Central and Southern India, Western Peninsula and Ceylon, Guzerat, Khándesh, Belgaum and Dhárwár, usually on dry stony hills. Young foliage and flowers appear during April and May before the old leaves have all fallen. Fruit during July and August. Bark dark,

rough, exfoliating in large plates or scales. Wood: sapwood small, whitish; heartwood very hard, close-grained, dark red coloured, durable. Weighs about 74 lbs. to the cubic ft. Used for building purposes, well-work, ploughshares, &c. Takes a fine polish, and is adapted for ornamental furniture. The bitter bark is sometimes used for tanning also and by the natives as a febrifuge. Yields a transparent gum like gum arabic from wounds in the trunk.

#### 12. CHICKRASSIA, Adr. Juss.

A large tree. Leaves paripinnate; leaflets acuminate, oblique. Flowers in terminal panicles. Calyx 5-divided. Corolla of 5, free, contorted petals. Staminal tube cylindrical, 10-crenate; anthers 10, erect, between the crenatures. Disk 0. Ovary 3-celled; cells multi-ovulate; ovules biseriate. Fruit a 3-4-celled, septicidally 3-4-valved capsule, valves consisting of 2 plates, separating from the 3-winged axis. Seeds numerous, winged below, exalbuminous; cotyledons orbicular.

*C. tabularis*, Adr. Juss. in Mem. Mus. XIX. 251. t. 22. f. 27; Fl. Br. I. 1. 568; Bedd. Fl. Sylv. t. 9. *C. Nimmonii*, Grah.; Dalz. & Gibs. Bomb. Fl. 38. Chittagong Wood Tree. *Lál devdari, pabba*, M.

Western Peninsula from the Konkan southwards, Ceylon, E. Bengal, and Burma. Both the glabrous and villous varieties of this tree are common in the evergreen forests of N. Kánara and the Konkan. The villous variety (*C. velutina*, Roem.) has the capsule usually 4-valved. Fl. Mch.-Apl. Fr. Aug.-Sept. A fine tree with a cylindrical trunk 60—80 ft. to the first branch and 14 feet in circumference. Bark dark coloured, narrowly longitudinally fissured with short, horizontal cracks and a scaly rhytidome about .25 in. thick; inner bark .5 in. thick, reddish, fibrous, in concentric rings. Wood scented, hard, yellowish-brown, with a satiny lustre. Pores moderate sized, uniformly distributed. Med. rays fine, numerous. Annual rings distinct. Weighs about 50 lbs. to the cubic ft. Takes a fine polish and is suitable for furniture, woodwork of railway carriages, building purposes and for carving. It is much sought after in parts of N. Kánara for the houses of the Haigas living in the vicinity of the evergreen forests, where this tree is found. Yields a transparent, yellow gum, the very astringent bark is used medicinally and the flowers yield a red and yellow dye.

#### 13. CEDRELA, Linn.

Large trees. Leaves pinnate; leaflets numerous, opposite, oblique, entire or serrate. Panicles terminal. Calyx short, 5-cleft. Petals ovate, imbricated, free. Stamens 4-6, inserted on the top of the disk, alternating with staminodes. Disk 4-6-lobed. Ovary sessile on the disk, 5-celled, cells with 8-12, biseriate ovules; style filiform; stigma discoid. Capsule 5-celled, seeds winged. cotyledons flat, sub-foliaceous.

*C. Toona*, Roxb. Fl. Ind. I. 635; Fl. Br. I. 1. 568; Bedd. Fl. Sylv. t. 10; Dalz. & Gibs, Bomb. Fl. 38; Brandis For. Sylv. 72. Toon Tree. *Todu, maha nim, tuni, huruk*, M.; *Tundu, devdari*, K.

Sub-Himalayan forests, Burma, Bengal, Oudh, Southern and Western India; more or less abundant in the evergreen forests of the Konkan and N. Kánara. Fl. Jan. Fr. March-Apr. Bark dark grey, about .5 in. thick, exfoliating when old in irregular, woody scales; inner bark red. Wood brickred, soft, shining, open-grained, fragrant, readily seasons, does not warp or split. Annual rings marked by a ring of large pores. Med. rays red, fine and broad. Suitable and much used for tea boxes in Bengal; also used for furniture, carving and building purposes (door panels), makes excellent cigar boxes. Possesses a fragrant odour, particularly when freshly cut. Yields a resinous gum. A red and yellow dye obtained from the flowers is apparently adapted for colouring silken fabrics.

### CHLOROXYLON, DC.

A tree. Leaves abruptly pinnate; leaflets many, unequal-sided. Flowers small, bisexual, in terminal or axillary panicles. Calyx 5-divided. Petals 5, clawed, imbricate. Stamens 10, alternately longer and shorter, inserted outside base of disk; filaments filiform; anthers versatile. Disk thick, 10-lobed, pubescent. Ovary pubescent, immersed in disk, 3-lobed and celled; ovules 8 in each cell; style short, slender; stigma capitate. Capsule 3-celled, loculicidally 3-valved. Seeds imbricate, winged; albumen 0; cotyledons plano-convex.

**C. Swietenia**, DC. Prod. I. 625; Fl. Br. I. 1. 569; Bedd. Fl. Sylv. t. 11; Dalz. & Gibs. Bomb. Fl. 39; Brandis For. Fl. 74. *Mashwal*, K.; *Halda, billu*, M. Satinwood.

Central, Southern India and Ceylon; common on the Sátpurás and the drier parts of the Bombay Presidency; abundant on the sandstone formation both in the Kaládgi and Belgaum districts. The fresh foliage appears in May. Fl. Mar.-Apr. Fr. Apr.-Oct. Bark yellow, fissured, soft, corky, about .5 in. thick. Wood hard, yellowish-brown, fragrant, with a fine satiny lustre. Annual rings distinct. Seasons well. Weighs about 60 lbs. to the cubic foot, very strong, P. varying between 600 and 1,059. An excellent wood for turning. Used for agricultural implements, carts, furniture and picture-frames; exported to England for cabinet work and backs of brushes.

Yields a yellow dye; also a wood oil. Not a good firewood, smokes too much.

### ORDER 26. CHAILLETIACEÆ.

Trees or shrubs. Leaves alternate, entire. Stipules 2, petiolar, deciduous. Flowers small, hermaphrodite or unisexual, in axillary, corymbose cymes. Sepals 5, free or connate. Petals 5, free, equal or unequal, notched or 2-fid, often with an inflexed lamina, adnate to the limb of the petal, usually open in æstivation. Stamens 5, free or adnate to the corolla. Disk of 5 glands or scales or a glandular or lobed cup. Ovary free, 2-3-celled; ovules 2 in each cell, pendulous

from the top; styles 1-2-3, free or more or less connate; stigmas simple or capitate. Drupe pubescent, 2-celled, compressed. Seeds solitary; albumen 0; embryo large; cotyledons thick; radicle small, superior.

*Chailletia gelonioides*, Hook. f. in Gen. Plant. 1. 341; Fl. Br. I. 1. 570; Bedd. Fl. Sylv. 59. *Moacurra gelonioides*, Roxb. Dalz. & Gibs. *Boddingin gidda*, K.

Eastern Bengal at the foot of the Khasia Mts., Silhet and Chittagong, Western Peninsula on the gháts from the Konkan southwards. Ceylon ascending to 3000 feet. Abundant in the evergreen forests of N. Kánara, near the falls of Gairsoppa. Usually a small shrub. Fruit dehiscent; mesocarp bright red. Fl. Dec.-June. Fr. Aug.-Dec.

### ORDER 27. OLACINÆÆ.

Trees or shrubs, sometimes climbing. Leaves simple, usually alternate, exstipulate. Inflorescence cymose. Flowers regular, hermaphrodite or unisexual, usually small. Calyx 4-5-toothed, sometimes accrescent. Petals 4-6, free or more or less coherent. Stamens equal to or twice as many as the petals, all fertile or some without anthers. Disk cup-shaped, free or adnate to the ovary or to the calyx. Ovary free or immersed in the disk, 2-3-celled; ovules 1-5, pendulous from the apex of a central placenta or from the side or apex of the ovary; funicle often dilated above the ovule. Fruit usually an indehiscent drupe. Seed pendulous; albumen fleshy or 0; radicle superior; cotyledons leafy, flat or folded, rarely fleshy.

Stamens and petals unequal in number (anisomerous).

- |   |                  |
|---|------------------|
| Fertile stamens 10. Calyx not enlarged in fruit ... ..                        | 1. XIMENIA.      |
| Fertile stamens 3-5. Calyx enlarged in fruit.                                 | 2. OLAX.         |
| Stamens equal and opposite to petals (isomerous).                             |                  |
| Calyx and corolla present (flowers dichlamydeous). Ovules 1-5, embryo minute. |                  |
| Corolla dialypetalous.  |                  |
| Cirrhose shrubs. Epicarp separating from fruit in reflexed valves ... ..      | 3. ERYTHROPALUM. |
| A large tree. Epicarp not separating from fruit ... ..                        | 4. STROMBOSIA.   |
| Calyx 0 (flowers monochlamydeous).  |                  |
| Climbing shrubs, sometimes spiny.   |                  |
| Corolla gamopetalous. Embryo with 2 long cotyledons ... ..                    | 5. CANSJERA.     |
| Stamens equal to petals and alternate with them (isomerous).                  |                  |
| Flowers not foetid, petals usually glabrous.                                  |                  |
| Erect shrubs or trees.  |                  |
| Anthers pendulous, not sagittate.   |                  |
| Ovary centric, stigma discoid ... ..  | 6. GOMPHANDRA.   |
| Anthers basifixed, sagittate. Ovary oblique, stigma small ... ..              | 7. APODYTES.     |
| Climbing shrubs. Anthers erect. Stigmas sessile ... ..                        | 8. SARCOSTIGMA.  |
| Flowers foetid. Petals hairy within ... ..                                    | 9. MAPPIA.       |

## 1. XIMENIA, Linn.

A shrub or low tree, often spiny. Leaves alternate, simple. Flowers racemose, bisexual or polygamous. Calyx cupular, 4-5-toothed, persistent. Petals 4-5, revolute, bearded within. Stamens twice the number of the petals; staminodes 0. Ovary sessile, 3-celled at base; ovules 1 in each cell, pendulous. Drupe ovoid with a fleshy sarcocarp, 1-seeded.

*X. americana*, Willd. Sp. Pl. II. 230; Fl. Br. I. 1. 574. False Sandalwood. *Nekri*, K.

Eastern and Western Peninsulas, Andamans, Ceylon and the Malay Archipelago. In the dry parts of the Belgaum and Dhárwár Districts of the Bombay Presidency; common on the sandstone formation near Sutguttee, Belgaum. Fl. and fruits at different times apparently. I have found it flowering and fruiting both in January and during May.

A species of variable habit, either an erect or climbing scandent shrub. Stems 6 in. in diameter are not uncommon. Bark rough, blackish, or dark-grey, 5 in thick; inner bark bright-red, consisting principally of soft bast. Wood yellow, like sandalwood, and used as a substitute for true sandalwood by the natives on the Coromandel Coast.—Gamble. Wood (from Belgaum district) yellowish-brown; heartwood much darker, smooth, close-grained, hard, moderately heavy. Pores very small and numerous. Weighs about 50 lbs. to the cubic foot. The ripe fruit is edible.

## 2. OLAX, Linn.

Shrubs or small trees, sometimes scandent. Leaves alternate, simple. Flowers small in axillary racemes. Bracts minute. Calyx cup-shaped, often enlarging after flowering. Petals 5-6, valvate, more or less cohering. Fertile stamens usually 3, rarely 4-5, staminodes 5-6, bifid; anthers versatile. Ovary half immersed in the disk, 3-celled at the base, 1-celled above; style simple, terminal; stigma 3-lobed; ovules 3, linear, pendulous from the apex of the central placenta. Fruit more or less covered by the accrescent calyx; stone crustaceous, 1-celled, 1-seeded. Seed inverse, albuminous; embryo minute, in the apex of the albumen; radicle superior.

Fruit nearly completely covered by the accrescent calyx	...	...	...	...	1. <i>O. Wightiana</i> .
Fruit $\frac{2}{3}$ ths covered by the accrescent calyx	...	...	...	...	2. <i>O. scandens</i> .

1. *O. Wightiana*, Wall. Cat. 6779; Fl. Br. I. 1. 575; Dalz. & Gibs. Bomb. Fl. 27; Bedd. Fl. Sylv. 60. *Gendgisa*, K.

Western Peninsula from the Konkan southwards, Malacca and Ceylon. The var. *bracteata*, is common in the evergreen forests of North Kánara from Ainshi southwards. Fl. Jan.-Feb. Fr. ripe April and May. A large scandent shrub. Fruit ovoid, nearly covered by the truncate, yellow calyx. Bracts and petals very caducous. Wood

white with a yellowish tinge, medium hard, even-grained. Pores large, numerous, smaller and less numerous towards the centre of the stem. Med. rays fine, wavy, numerous. Weighs 45 lbs. to the cubic foot.

2. *O. scandens*, Roxb. Fl. Ind. I. 163; Fl. Br. I. 1. 575; Brandis For. Fl. 75. *Harduli, urchirri*, M.

S. India, Ceylon, Burma and the W. Himalaya; in the Satpuras, near rivers and nálas.—Brandis. I can find no record of this climber having been found in the Bombay Presidency, and never observed it myself in the Bombay Satpuras. It flowers during the cold season, and possesses a white, soft, porous wood which weighs 36—40 lbs. to the cubic foot.

### 3. ERYTHROPALUM, Bl.

Climbing cirrhose shrubs. Leaves simple, alternate, palminerved. Tendrils axillary. Peduncles axillary, ultimate pedicels umbellate. Flowers hermaphrodite. Calyx-limb 4-5-lobed. Corolla rotate, campanulate, 5-lobed; lobes valvate. Stamens 5, opposite the petals; anthers incurved; connective thick; staminodes 5. Ovary obconic, superior or partly inferior, 1-celled; ovules 1—3, pendulous, naked. Disk epigynous. Stigma minute, 3-lobed. Fruit fleshy, epicarp separating in reflexed valves. Seed 1, pendulous; albumen firm; embryo minute.

*E. populifolium*, Mast. Fl. Br. I. 1. 578.

Western Peninsula from the Dodmune ghát of North Kánara southwards to Travancore. I have only seen it in the evergreen forests near the Dodmune ghát, where it is abundant. The pendant fruits with their reflexed valves, slender pedicels, thickened at the tops, and the bright blue arillate covering to the seeds are very ornamental. Fl. Nov.-Dec. Fr. Mar.-May.

### 4. STROMBOSIA, Blume.

Trees or shrubs. Leaves simple, alternate. Inflorescence in short cymes. Flowers small, regular, hermaphrodite. Calyx cup-shaped, inferior or partly superior. Petals 5, valvate, hairy within. Stamens 5, opposite to the petals and adnate to their base. Ovary half immersed in the disk, 3-5-celled; ovules 4-5, pendulous from a central placenta; style simple. Disk 5-lobed, perigynous. Fruit a drupe with a crustaceous stone. Seed pendulous; embryo minute; albumen fleshy.

*Strombosia leprosa*, Talb., sp. nov. Herb. No. 3641; Jour. Bo. Nat. Hist. Soc. XI. 225. *Sphærocarya leprosa*, Dalz. & Gibs. Bomb. Fl. 223.

A medium sized or large evergreen tree with white, scaly bark. Leaves glabrous, shining, thinly coriaceous, pale beneath, ovate, rounded at the tip, sometimes oblique at the base; blade 3-6 by 1.5-3 in.; petiole .5-.75 in. long; lateral nerves 4-6 pairs, distinct beneath. Flowers



small, white, pentamerous, in axillary fascicles or on woody tubercles; buds globose. Calyx lobes more or less indistinct, ciliate. Petals valvate, hairy within at the tips, .12 in. Stamens adnate to the petals. Disk epigynous, red. Ovary 5-celled; style short. Fruit globose, green, glabrous or scaly, .75 in. in diameter. Seed globose, .5 in., finely rugose; albumen firm.

This tree sometimes attains a considerable size. I have measured one near Sonda (North Kánara) which was 100 ft. high by 3.5 ft. in diameter near the base and possessing a straight cylindrical trunk.

Branches pendulous. Bark smooth, white or grey, scaly; inner bark brown, fibrous. Wood reddish, hard, smooth and close-grained. Pores very small, single or in lines between the very fine, close medullary rays, the diameter of the pores equalling the distance between the rays. Annual rings distinct. Weighs 60 lbs. to the cubic foot. Distinct from *S. ceylanica*, Gardn., to which species it is united in the Fl. Br. I. on the authority of Beddome (Fl. Syl. t. 137), who states that he has only poor specimens of the Kánara plant. Ripe fruits of *S. ceylanica*, are about half as large as those of the Kánara tree, which has also shining leaves. The leaves of *S. ceylanica*, Gardn., are dull like those of *Lepionurus*.

On the Konkan and North Kánara gháts, in evergreen forests. Flowers in December. Fruit ripe May.

#### 5. CANSJERA, Juss.

Climbing spiny shrubs. Leaves simple, 1-nerved. Flowers bracteate in dense, axillary spikes. Perianth urceolate, 4-lobed. Fertile stamens 4, opposite the perianth lobes; staminodes 4-5, triangular glands, alternate with the stamens. Ovary 1-celled; style cylindrical; stigma capitate, exserted, ovule 1, pendulous. Fruit a drupe; albumen fleshy; radicle superior; cotyledons 2-3, very long, planoconvex.

This genus is placed by many authors in the Thymelacææ.

C. *Rheedii*, Gmel. Syst. I. 280; Fl. Br. I. 1. 582; Bedd. Fl. Sylv. Anal. Gen. t. XXVI; Brandis For. Fl. 75. *Bodbakka*, K.

Upper Gangetic plain; in the forests of Oudh, Eastern and Western Peninsulas, N. Australia, on the Konkan and North Kánara gháts, in evergreen moist forests. Fl. Nov.-Dec. Fruit ripe in May.

#### 6. GOMPHANDRA, Wall.

Small trees or shrubs. Leaves alternate, simple. Flowers polygamo-dicecious or hermaphrodite, in axillary cymes. Calyx minute, 4-5-lobed. Corolla campanulate, 4-5-lobed; lobes with a prominent rib within. Stamens 5; filaments thick, hollowed in front to contain the anthers, hairy at back. Disk hypogynous, thick, annular or 0. Ovary 1-celled; ovules 2, collateral; funicle dilated into an obturator. Fruit a drupe; stone crustaceous; albumen fleshy, bipartite; embryo minute.

*G. axillaris*, Wall. Cat. 3718; Fl. Br. I. 1. 586; Bedd. Fl. Sylv. 61. *Platea axillaris*, Dalz. & Gibs. Bomb. Fl. 28.

Western Peninsula from the Konkan southwards, Ceylon. Common in the evergreen forests of the Konkan and North Kánara gháts. Fl. April-May. Fr. Nov.

#### 7. APODYTES, E. Meyer.

Trees or shrubs. Leaves simple, alternate, coriaceous or membranous, drying black. Flowers small, in terminal or axillary corymbose cymes. Calyx minute, cup-shaped, 5-toothed. Petals 5, free, valvate. Stamens 5, alternate with the petals; anthers basifixed, bilobed, sagittate. Ovary gibbous; style excentric; ovules 2, superposed. Drupe obliquely ovoid, compressed; embryo small, in the apex of the fleshy albumen.

*A. Beddomei*, Mast. Fl. Br. I. 1. 588. *A. Benthamiana*, Var.  $\beta$ , Bedd. Fl. Syl. 140.

On the Dodmune ghát of North Kánara, in evergreen forests. Fl. March. Fr. R. S. A tree 50 ft. high by 1.5 ft. in diameter at the base. Bark .5 in. thick, rhytidome dark, rough, scaly with short gaping fissures in the corky layer, reddish white just under the rhytidome. Wood whitish, hard and tough.

#### 8. SARCOSTIGMA, W. & A.

Climbing shrubs. Leaves simple, coriaceous. Flowers dioecious, minute, in long interrupted spikes. Calyx cup-shaped. Petals 4-5, cohering in a short tube, free upwards, valvate. Males: Stamens 4-5. Females: Staminodes 4-5. Ovary 1-celled; ovules 2, pendulous. Funicle expanded into an obturator. Drupes with a woody nut; albumen 0; cotyledons fleshy, wrapping round the short radicle.

*S. Kleinii*, W. & A. in Edin. New Phil. Jour. XIV. 299; Fl. Br. I. 1. 594; Dalz. & Gibs. Bomb. Fl. 221.

Eastern and Western Peninsula, in the evergreen forests along the Konkan, North Kánara and Belgaum gháts; common in the forests near the falls of Gairsoppah. Fl. Nov. Fr. ripe during May.

#### 9. MAPPIA, Jacq.

Trees. Leaves alternate, simple. Flowers fœtid in corymbose cymes. Calyx 5-toothed. Petals 5, usually hairy within. Stamens 5, alternate with the petals. Disk hypogynous, cup-shaped. Ovary superior, 1-celled; ovules 2, pendulous. Fruit a drupe; albumen fleshy; cotyledons leafy; radicle superior.

*M. oblonga*, Miers Contrib. I. 65; Fl. Br. I. 1. 589; Dalz. & Gibs. Bomb. Fl. 28. *Gur, kalgur, M.; Kodsá, hedare, K.*

Western Peninsula from the Konkan southwards; common on the North Kánara and Konkan gháts, mostly in moist evergreen forests. A large

shrub or small tree easily recognised when in flower by the strong foetid smell. I have specimens of both *M. ovata*, Miers, and *M. foetida*, Miers, but cannot find that they differ much from *M. oblonga*, Miers. I am inclined to think that there is only one species and not three. Flowers at different times, usually during August. Fruit  $\frac{1}{2}$  in. ovoid, purple, 1-2-seeded, endocarp brittle, rugose or tuberculate; ripe two months after flowering. Leaves used medicinally in cattle disease.

#### ORDER 28. ILICINEÆ.

Trees or shrubs usually evergreen. Leaves alternate, simple, exstipulate or with two minute stipules. Flowers small, in axillary cymes, fascicles or umbellules, usually dioecious. Male with imperfect ovary and female with imperfect stamens. Calyx 3-6-lobed. Petals 4-5, connate at the base, sometimes free in the females, deciduous, imbricate in bud. Stamens as many as petals, alternating with them, hypogynous, free or adhering to the petals. Disk 0. Ovary free, 3-5-celled, with a short style or sessile stigma; ovules 1-2 in each cell, pendulous. Drupe with two or more 1-seeded free, rarely connate, stones. Seed with a membranous testa, fleshy albumen and minute embryo.

#### ILEX, L.

Calyx 4-5-lobed or partite. Corolla rotate, petals free or connate at the base. Stamens 4-5, adhering to the base of the corolla in the male, sometimes hypogynous in the female. Ovary 2-12-celled; styles 0; stigmas free or confluent on the top of the ovary. Drupe globose, with 2-16 stones.

*I. malabarica*, Bedd. Fl. Sylv. t. 143; Fl. Br. I. 1. 600. *I. Wightiana*, Dalz. & Gibs. Bomb. Fl. 143; not of Wall.

Western Peninsula from the Konkan southwards. On the Belgaum and North Kánara gháts, in evergreen forests; along the banks of streams near Anmode, Supa sub-division of North Kánara. Fl. Feb.-Apl. Fr. R. S.

A large glabrous tree. Wood hard, yellowish-white.

#### ORDER 29. CELASTRACEÆ.

Shrubs or trees erect or climbing, branches sometimes spinescent. Leaves simple, opposite or alternate. Stipules caducous or 0. Flowers small, hermaphrodite or polygamous. Calyx 4-5-lobed. Petals 4-5, inserted below the disk or continuous with its margin. Stamens 3-5, alternate with petals. Disk usually conspicuous pulvinate or flattened, lobed or entire, rarely 0. Ovary 3-5-celled, more or less immersed in the disk; ovules 2, erect, 1 pendulous, or many in each cell; style short or 0; stigma triangular, rarely 3-partite. Fruit various. Albumen fleshy or 0; embryo usually large; cotyledons foliaceous, flat.

Leaves opposite or alternate. Stamens 4-5, inserted on or beneath the margin of the disk. Seed usually albuminous. (Celastree.)

Leaves opposite.

Fruit a capsule, 1-5-celled.

Ovary-cells 2-ovuled. Seeds not winged.

Petals free, capsule 3-5 celled, loculicidal. 1. EUONYMUS.

Petals connate, capsule 1-celled ... 2. MICROTROPIS.

Ovary-cells each 4-ovuled, seeds winged. ...

Capsule 3-celled ... 3. LOPHOPETALUM.

Fruit indehiscent, coriaceous, 1-2-celled.

Stigma broad, peltate. A shrub ... 4. PLEUROSTILIA.

Fruit indehiscent woolly, 1-3-celled. Stigma not

peltate. A small or large tree ... 5. ELEODENDRON.

Leaves alternate.

Flowers paniculate. Ovary free. Scandent

unarmed shrubs ... 6. CELASTRUS.

Flowers in small axillary cymes. Ovary con-

fluent with the disk. Erect shrubs or small

spinous trees ... 7. GYMNOSPORA.

Leaves usually opposite. Stamens 3, rarely more or less, inserted on the face of the disk. Seed exalbuminous. (Hippocrateæ.)

Fruit of 3, flattened carpels, usually dehiscent.

Seeds winged ... 8. HIPPOCRATEA.

Fruit a berry ... 9. SALACIA.

### 1. EUONYMUS, Linn.

Trees or shrubs. Leaves with caducous stipules. Flowers in axillary cymes. Calyx 4-5-fid. Petals 4-5. Stamens 4-5, inserted on the disk. Disk fleshy, 4-5-lobed. Ovary immersed in the disk and confluent with it, 3-5-celled; stigma 3-5-lobed; ovules 2 in each cell. Capsule loculicidally dehiscent, 3-5-celled, cells 1-2-seeded. Seeds covered with an arillus, albuminous; embryo orthotropous; cotyledons foliaceous, radicle inferior.

*E. indicus*, Heyne, in Roxb. Fl. Ind. II. 409; Fl. Br. I. 1. 608. *E. Goughii*, Wight; Dalz. & Gibs. Bomb. Fl. 47; Bedd. Fl. Sylv. 63.

Western Peninsula from the Konkan southwards. Throughout the evergreen forests of the Konkan and North Kánara gháts; common on the southern gháts of North Kánara. Flowers, and is in fruit from December till May. A shrub or small tree.

Bark 2½ in. thick, smooth, lenticular, periderm bright yellow, inner bark reddish-white.

### 2. MICROTROPIS, Wall.

Trees or shrubs. Leaves opposite, extipulate. Flowers in sessile clusters or peduncled cymes axillary or supra-axillary, sometimes unisexual. Sepals 5. Petals 5, connate at the base into a short ring. Stamens 5, inserted on the disk or on the tube of the corolla. Disk 0 or annular. Ovary free, 2-3-celled; style very short; stigma minutely

2-4-lobed ; ovules 2 in each cell. Capsule oblong, coriaceous, 2-valved, 1-seeded. Seed erect, with a red testa ; albumen fleshy ; cotyledons foliaceous.

Flowers sessile, clustered on the branches ... 1. *M. latifolia*.  
Flowers in axillary cymes ... 2. *M. microcarpa*.

1. *M. latifolia*, Wight MSS. Fl. Br. I. 1. 613. Western Peninsula, from the Konkan to the Nilghiris ; fairly common on the Bababuden Hills in the evergreen sholas at about 5000 ft. alt. Fl. C. S. Not observed by me in the Bombay Presidency.

2. *M. microcarpa*, Wight Ic. t. 975 ; Fl. Br. I. 1. 614. Western Peninsula from the Konkan and Mysore southwards. Not observed by me in the Bombay Presidency.

### 3. LOPHOPETALUM, Wight.

Trees and shrubs. Leaves opposite or alternate, exstipulate. Calyx 5-lobed. Petals 5, continuous with the disk ; crested or lamellate. Stamens 5, inserted on the disk. Disk thick, lobed. Ovary immersed in disk, trigonal, 3-4-celled, contracted into a short style ; stigma capitate ; ovules 4 or more in each cell in 2 series. Capsule 3-celled, opening loculicidally in 3 valves. Seeds winged ; albumen fleshy.

*L. Wightianum*, Arn. in Ann. Nat. Hist. III. 151 ; Fl. Br. I. 1. 615 ; Bedd. Fl. Sylv. t. 145 ; Dalz. & Gibs. Bomb. Fl. 48. *Balpale, banate*, K.

Western Peninsula from the Konkan southwards, in the evergreen forests of North Kánara and Konkan gháts ; common on the southern gháts, where it attains a very large size. Fl. from Jan. till April. Fruit ripe at the beginning of the rainy season. Wood reddish grey, light, lustrous, close-grained, moderately hard. Pores sinuous, moderate sized, simple or divided. Medullary rays fine and close together, traversed by continuous concentric lines of white tissue some distance apart. Weighs 23 lbs. to the cub. ft. The sinuous pores are visible in wavy lines and give the grain a curled appearance on a longitudinal section.

### 4. PLEUROSTYLIA, Wight.

A shrub. Leaves opposite, exstipulate. Flowers small, in short, axillary cymes. Calyx 4-lobed. Petals 5, larger than the calyx. Stamens 5, inserted below the disk ; connective dilated at the back. Disk thick, crenulate. Ovary 1-2-celled,  $\frac{1}{2}$  immersed in the disk ; stigma peltate, on a short style ; ovules 2 in each cell. Fruit indehiscent, 1-2-celled. Seeds albuminous ; cotyledons orbicular.

*P. Wightii*, W. & A. Prod. 157 ; Fl. Br. I. 1. 617 ; Dalz. & Gibs. Bomb. Fl. 47 ; Bedd. Fl. Sylv. 66.

Western Peninsula from the Konkan southwards ; common in the sub-alpine forests of the Madras Presidency ; not observed by me in N. Kánara. Dalzell states in the Bo. Fl. that it is found in the Konkan, but does not give any locality. Fl. and fruit during the cold season.

## 5. ELÆODENDRON, Jacq. f.

Trees or shrubs. Leaves opposite, often crenate. Flowers in axillary cymes, often polygamous. Calyx 5-cleft. Petals 5, spreading. Disk thick, angled. Stamens 5, inserted under the edge of the disk; anthers nearly globose. Ovary continuous with the disk, conical, 2-5-celled; ovules 2 in each cell; style very short. Fruit an indehiscent drupe; cells usually 1-seeded. Seeds exarillate, albuminous.

*E. glaucum*, Pers. Synops, 1. 241; Fl. Br. I. 1. 623; Bedd. Fl. Sylv. 67. *E. Roxburghii*, W. & A. Dalz. & Gibs. Bomb. Fl. 48; Brandis For. Fl. 82. *Neerija dichotoma*, Roxb. Fl. Ind. I. 646. *Tamruj, bilur, buta pala, aran, burkas*, M.; *Alan*, Guz.; *Mukarki*, K.

Outer Himalaya up to 6000 ft., Oudh, Central Provinces and the peninsula. Throughout the Bombay Presidency in deciduous forests. A small tree. On the ghâts of North Kánara and Belgaum in evergreen forests attains considerable dimensions. A very large tree, common in the Goond forests of North Kánara. Fl. Feb.-June. Fruit ripe in May. Was also found in full bloom in the Dhárwár forests in Sept.-Oct. Bark thin, grey or dark-coloured, exfoliating in small 4-sided scales. Wood reddish-brown, close-grained, compact, light, durable. No distinct sapwood or annual rings. Numerous wavy concentric bands of light coloured tissue. Pores small, numerous. Med. rays fine, wavy, very numerous. Weighs 40—50 lbs. to the cub. ft. The wood is often beautifully curled and flaked. Used for cabinet work, picture frames, &c. Bark said to be poisonous, contains 8 per cent. of tannin.

## 6. CELASTRUS, Linn.

Scandent shrubs. Leaves alternate; stipules minute or 0. Flowers small, usually unisexual in terminal or axillary panicles. Calyx 5-divided. Petals 5. Disk cup-shaped. Stamens 5, inserted on the margin of the disk. Ovary 2-4-celled; stigma generally lobed; ovules 2 in each cell. Capsule loculicidally dehiscent, 1-3-celled, 1-6-seeded. Seeds arillate, albumen fleshy. Cotyledons foliaceous.

*C. paniculata*, Willd. Sp. Pl. 1. 1125; Fl. Br. I. 1. 617; Brandis For. Fl. 82; Dalz. & Gibs. Bomb. Fl. 47; Bedd. Fl. Sylv. 66. Black Oil, Oleum Nigrum Plant. *Pigavi, kanguni*, M.; *Kariganne, kangli*, K.

Throughout the hilly districts of India from the Himalayas southwards to Ceylon. Throughout the presidency, often in hedges and along river and nála banks. Fl. March. Fr. June-Sept. Stems 3 in. in diameter. Bark rough, grey or yellow, corky. Wood pinkish-yellow, soft. Annual rings distinctly marked by large pores in the spring wood. Med. rays very broad. The oil from the seeds and the leaves are used in native medicine in cases of gout. It is also used for burning purposes in the Belgaum District. A decoction of the wood is used in stomach disorders. Large quantities of the fruit are brought into Belgaum city bazaar during the months of July and August.

## 7. GYMNOSPORA, W. &amp; A.

Shrubs or small trees, often spinous. Leaves alternate, exstipulate. Flowers in axillary cymes. Calyx 4-5-divided. Petals 4-5, spreading. Stamens as many as petals, inserted beneath the disk. Disk sinuate, or lobed. Ovary 2-3-celled, immersed in the disk; ovules 2 in each cell. Fruit a capsule. Seeds arillate, albuminous. Cotyledons fleshy.

Leaves membranous, puberulous. An unarmed shrub... 1. *G. puberula*.

Leaves coriaceous, glabrous. Spinous shrubs.

Spines not leaf and flower bearing. Leaves minutely crenate-serrate. Fruit .5 in., obovoid 3-celled; cells 3-seeded ... .. 2. *G. Rothiana*.

Spines flower and leaf bearing.

Leaves entire. Fruit turbinate, .25 in. 3-celled, 1-seeded ... .. 3. *G. emarginata*.

Leaves crenulate. Fruit globose. Size of a small pea, 1-3-celled, cells 1-2-seeded ... 4. *G. montana*.

1. *G. puberula*, Laws. Fl. Br. I. 1. 618. Ghát forests of N. Kánara. Fl. R. S. Fr. C. S. A small shrub. The meagre description of this species in the Fl. Br. I. is quite insufficient for correctly determining the plant. My specimens were named at Calcutta.

2. *G. Rothiana*, *Celastrus Rothiana*, Laws; Fl. Br. I. 1. 620; Dalz. & Gibs. Bomb. Fl. 47; W. & A. Prod. 159. *Gawlin, moti yekkadi*, M.; *Dutle, chably*, K.

Western Peninsula, Konkan and N. Kánara in evergreen forests from the sea level upwards. Fl. March-Apr. and other times. Fr. at different times. A large shrub. Seeds with a white basal arillus. Wood reddish grey, smooth, moderately hard. Pores small, in radial lines between the fine and very fine medullary rays. Annual rings distinct. Weighs about 42 lbs. to the cub. ft. The description of this species in the Fl. Br. I. is very short and meagre.

3. *G. emarginata*, Grah. Cat. Bomb. Pl. 39 (*not of Roth.*). Fl. Br. I. 1. 621. *Yenkul, ingli, ikari*, M. Stated by Graham to be common on the gháts; also at Mahábaleshwar; not mentioned by Dalz. & Gibs. in the Bombay Flora. Dr. T. Cooke reduces this species to *G. Rothiana*, in his Fl. Pres. Bomb. p. 232.

4. *G. montana*, Roxb. Fl. Ind. 1. 620 (*Celastrus*); Fl. Br. I. 1. 621. *Celastrus montana*, W. & A. Prod. 159; Bedd. Fl. Sylv. 66; Dalz. & Gibs. Bomb. Fl. 48. *C. senegalensis*, Lam. Brandis, For. Fl. 81. *Hurmachá*, Vern.; *Mal kanguni*, K.; *Tondarsai jhad*, H.; *Yekkadi, bharrati*, M.

Widely distributed from the Mediterranean to tropical Africa and India; common throughout the Deccan districts, the drier parts of N. Kánara, Guzerat and Sind. Flowers at various times throughout the year. Attains a height of 15—20 ft. Bark moderately thick; outer bark grey, scaly; inner bright red with distinct white tissue in broad or narrow irregular longi-

tudinal veins. Wood reddish-white, durable. Pores small, very numerous between the many fine medullary rays. No distinct annual rings, but there are numerous narrow concentric indistinct rings of white tissue. Weighs about 45 lbs. to the cub. ft.

### 8. HIPPOCRATEA, Linn.

Climbing shrubs or small trees. Leaves opposite, entire or serrate; stipules small, caducous. Flowers cymose, bisexual. Calyx 5-divided. Petals 5, spreading. Stamens 3, recurved, lying in the grooves of the ovary. Disk conical or cupular. Ovary 3-celled, surrounded by the disk; ovules 2—10 in each cell, in 2 series, inserted on the inner angle; style very short; stigmas 1—3. Fruit of 3 flattened carpels, distinct, 2-valved. Seeds compressed, winged below, exalbuminous.

Flowers small, .25 in. across, in large cymes.

Calyx-lobes entire. Petals flat, triangular, from a broad base. Fruit 1.5 in. long ... 1. *H. obtusifolia*.

Calyx-lobes sharply crenate. Petals cucullate, shortly clawed. Fruit 3 in. long ... 2. *H. Grahami*.

Flowers minute, in short, much divided cymes ... 3. *H. indica*.

1. *H. obtusifolia*, Roxb. Fl. Ind. 1. 166; Fl. Br. I. 1. 623; W. & A. Prod. 104. *Daushir*, M.

The N. Kánara plant agrees well with Plate 963 of Wight's Icones. Eastern and Western Peninsulas, from Tennasserim and the Konkan southwards. In the moist forests of the Konkan and North Kánara gháts. Fl. C. S. Fruit ripe Apl.-May.

2. *H. Grahami*, Wight Ic. t. 380; Fl. Br. I. 1. 624; Dalz. & Gibs. Bomb. Fl. 32. *Yesti*, M.

Western Peninsula from the Konkan southwards on the gháts of the Konkan and North Kánara, in evergreen forests. Fl. H. S. Fruit ripe Nov.-Dec.

3. *H. indica*, Willd. Sp. Pl. 1. 193; Fl. Br. I. 1. 624; Dalz. & Gibs. 32; Brandis For. Fl. 83. *Kazurati*, *turruli*, Vern.; *Kangna bally*, K.

Southern India, Bengal, Behar, Burma, Ceylon and the Indian Archipelago, throughout the moist forests of the Konkan and N. Kánara. Fl. C. S. Fr. Apl.-June. Stems very slender.

### 9. SALACIA, Linn.

Climbing or straggling shrubs. Leaves opposite, exstipulate. Flowers small, usually fasciculate in the axils of the leaves; rarely terminal. Calyx 5-divided. Petals 5, imbricate. Stamens 3, rarely 2 or 4, continuous with the disk recurved. Ovary conical, immersed in the disk, 3-celled; ovules 2 or more in each cell; style very short;



stigma simple or 3-lobed. Fruit a berry. Seeds large, angular; cotyledons thick; radicle short, inferior.

Flowers 1-6 from an axillary tubercle.

Flowers 3-6 from each tubercle. Fruit size of a small cherry, bright red or black ... 1. *S. prinoides*.

Flowers 1-2 from each axil ... 2. *S. Brunoniana*.

Flowers numerous from an axillary tubercle.

Flowers fascicled. Fruit globose, 1 in. in diameter, rugulose, orange coloured ... 3. *S. macrosperma*.

Flowers usually in threes on a common peduncle, sometimes in short axillary cymes. Fruit 2-5 in. in diameter ... 4. *S. oblonga*.

1. *S. prinoides*, DC. Prod. 1. 571; Fl. Br. I. 1. 626; Dalz. & Gibs. Bomb. Fl. 33; Bedd. Fl. Sylv. 67. *Nisul-bondi*, M.

Silhet and the Khasia mountains, Eastern and Western Peninsulas and Ceylon, on the Konkan and North Kánara gháts from the sea-level upwards. The scandent form is often found along the banks of rivers (Kálánadi, &c.). The erect shrubby form is abundant in the evergreen forests of the southern gháts of North Kánara. Fl. & Fr. at different times throughout the year.

2. *S. Brunoniana*, W. & A. Prod. 105; Fl. Br. I. 1. 626; Dalz. & Gibs. Bomb. Fl. 33. Fl. H. S. Fr. R. S.

Western Peninsula, Rámghát.—Dalz. and Gibs. A scandent shrub with black divaricating branches, rough with minute reddish warts.

3. *S. macrosperma*, Wight Ic. t. 962; Fl. Br. I. 1. 628; Bedd. Fl. Sylv. 67.

Western Peninsula from the Konkan southwards; common in the forests near the Ainshi Ghát of N. Kánara. Fl. C. S. Fr. June. Specimens of this plant were named at Kew *S. macrosperma*, Wight, var. *angustifolia*.

4. *S. oblonga*, Wall. Cat. 4226; Fl. Br. I. 1. 628; Dalz. & Gibs. Bomb. Fl. 23; Bedd. Fl. Sylv. 67.

Western Peninsula from the Konkan southwards, Ceylon; common in some of the N. Kánara Ghát evergreen forests. Fl. C. S. Fr. ripe during the rains. The plate No. 97 of Wight's Icones exactly represents the N. Kánara plant, whereas Beddome's Dissections on Anal. Gen. 67. t. 10. 4. do not give a good idea of the species either as regards the flower or the fruit. I doubt whether it is the same plant as that represented by Wight.

5. *S. Roxburghii*, Wall., is a doubtful native of the Western Peninsula. Dalzell & Gibson's plant referred to in the Bomb. Fl. p. 33. is probably *S. macrosperma*, Wgt.

#### ORDER 30. RHAMNEÆ.

Shrubs or trees, erect or scandent, prickly, spinous or unarmed. Leaves simple, alternate or opposite, often 3-5-nerved. Flowers small greenish, hermaphrodite or polygamous in axillary cymes, spikate,

paniculate or solitary. Calyx 4-5-cleft, lobes triangular, valvate in bud. Petals 4-5, rarely 0, inserted on the throat of the calyx-tube, cucullate or involute. Stamens 4-5, opposite the petals, often enclosed by them. Disk fleshy, filling the calyx-tube or thin and lining it. Ovary sessile, free or immersed in the disk, more or less adherent to the calyx-tube, 2-3-celled; cells 1-ovuled. Fruit various, sometimes winged. Seed generally albuminous; embryo large, erect.

Fruit dry, 1-celled, 1-winged	... ..	1. VENTILAGO.
Fruit dry or fleshy with a 1-3-celled stone, not winged	... ..	2. ZIZYPHUS.
Fruit dry or fleshy of 3 pyrenes or cocci. Disk lining the calyx-tube or fleshy and filling it.	... ..	3. RHAMNUS.
Disk thin, lining the calyx-tube	... ..	4. SCUTIA.
Disk fleshy, filling the calyx-tube.	... ..	5. SAGERETIA.
Flowers pedicelled, in axillary fascicles or sub-umbellate. Leaves opposite	... ..	6. COLUBRINA.
Flowers sessile, in terminal panicles. Leaves opposite	... ..	7. GOUANIA.
Flowers in short axillary cymes. Leaves alternate	... ..	
Fruit dry, 3-celled, 3-winged	... ..	

### 1. VENTILAGO, Gærtn.

Scandent shrubs. Leaves alternate. Flowers small in axillary and terminal panicles. Calyx 5-cleft, lobes keeled within. Petals 5, hooded, deflexed. Stamens 5, adnate to the base of the petals. Disk 5-lobed, filling the calyx-tube. Ovary immersed in the disk, 2-celled; style very short; fruit 1-celled, 1-seeded, produced at the summit into a long wing. Seed sub-globose, exalbuminous.

Flowers in simple or paniced spikes.

Nut girt at the base. Ovary with a few white hairs at the base. Calyx glabrous within. 1. *V. madraspatana*.

Nut girt round the middle. Ovary densely pubescent. Calyx also densely pubescent within ... .. 2. *V. calyculata*.

Flowers, in axillary fascicles ... .. 3. *V. bombaensis*.

1. *V. madraspatana*, Gærtn. Fruct. 1223. t. 49. f. 2; Fl. Br. I. 1. 631; Dalz. & Gibs. Bom. Fl. 48; Brandis For. Fl. 96. *Locundie, kan-wail*, M.; *Sakal-yel*, M.

Western Peninsula from the Konkan southwards, Tenasserim, Ceylon and Java. Throughout the moist forests of the Konkan and N. Kánara. Fl. Dec.-Jan. Fr. March-May. A large climber, stems 4 in. in diameter, covered spirally with knobs which develop fine roots at base of stem. Bark smooth, thin, dark-grey, vertically, shallow fissured. Wood greyish-yellow, porous, soft. A red dye is obtained from the root and a cordage is made from the bark.—Gamble.

2. *V. calyculata*, Tulasne in Ann. Sc. Nat. Ser. 4. VIII. 124; Fl. Br. I. 1. 631; Brandis For. Fl. 96. *Papri*, Vern.; *Kuriyadi, gapsundi bally*, K.

Throughout the hotter parts of India from Nepal to Tennasserim, Western Peninsula; very common in the deciduous forests of the Konkan and Deccan; is found also in the moist forests of North Kánara. Flowers during the rainy season. Fruit ripe February in North Kánara. Stems 6 in. to 1 ft. in diameter; branchlets green, angled and fluted. Bark sometimes nearly smooth, in old stems rough at base, very characteristic, the fissures showing a vermilion tissue, more or less developed; inner bark yellowish-brown, said to yield a good cordage. An oil is obtained from the seeds. Wood yellowish, fibrous and moderately hard. Pores large, oval, simple or divided; very numerous between the moderately broad medullary rays. Annual rings not distinct.

3. *V. bombaiensis*, Dalz. in Hook. Kew Jour. Bot. III. 36; Fl. Br. I. 1. 631; Dalz. and Gibs. Bomb. Fl. 48; Cooke Fl. Pres. Bomb. 239. A large climbing shrub from the moist forests of the Belgaum and N. Kánara Gháts. Fl. C. S. A distinct species, which I think should not be confounded with the large tree *Zizyphus wynaadensis*, described by Beddome in the Ic. Pl. Ind. Or. t. 114.

2. ZIZYPHUS, Juss.

Trees or shrubs, sometimes climbing, usually armed with stipular sharp prickles. Leaves alternate, often oblique at the base, palmately 3-5-nerved. Flowers fascicled or in axillary cymes. Calyx 5-fid, lobes keeled within, tube broadly obconic. Petals 5, hooded. Disk flat, filling the short calyx-tube. Ovary immersed in the disk, 2-4-celled; styles 2-4, free or more or less united. Fruit fleshy or dry, containing a woody or bony 1-3-seeded stone. Seed plano-convex; albumen 0 or very scanty.

Flowers in sessile cymes or fascicled in the axils of the leaves. Ovary 2-celled.

A tree. Fruit globose  $\frac{1}{2}$ — $\frac{3}{8}$  in. in diameter, brown, orange or red when ripe. ... 1. *Z. Jujuba*.

A straggling or bushy shrub. Fruit globose, 3 in. in diameter, red, shining when ripe ... 2. *Z. nummularia*.

A climbing, scandent shrub. Fruit globose,  $\frac{1}{4}$  in. in diameter, yellow, turning black when quite ripe ... 3. *Z. Ænoplia*.

Flowers in pedunculate, axillary cymes. Ovary 3-celled.

A small tree or straggling shrub. Fruit globose, 1 in. in diameter, green glabrous when ripe, very hard, woody ... 4. *Z. xylopyra*.

Flowers in peduncled, cymose, terminal panicles. Ovary 2-celled.

A straggling shrub. Fruit  $\frac{1}{3}$  in. in diameter, white, mealy when ripe; stone crustaceous ... 5. *Z. rugosa*.

1. *Z. Jujuba*, Lamk. Dict. III. 318; Fl. Br. I. 1. 632; Dalz. & Gibs. Bomb. Fl. 49; Bedd. Fl. Sylv. t. 149; Brandis For. Fl. 86. *Ilanji*, K.; *Bor, ber*, M.

Wild in some parts of the Siwalik forests, east of the Ganges, Southern India and probably in N. Kánara below the Gháts in some of the drier forests. I have found trees growing in jungles near Santgal far away from present habitations; they may however only be escapes. Throughout the Bombay Presidency and Sind, usually planted, thrives in dry situations. Fl. March-June. Fr. ripe Nov.-Jan. Bark thick, dark grey, nearly black, with long deep irregular furrows. Wood hard, reddish. Sapwood  $\frac{1}{4}$  of the radius, of a lighter colour. Pores small or moderate sized, scanty, often oval and sub-divided. Med. rays fine, numerous, equidistant. Pores frequently joined by wavy, interrupted, concentric lines. Weighs about 48 lbs. to the cub. ft. Used for agricultural implements, oil mills, &c. Fruit edible. Bark contains tannin. Leaves used as fodder.

2. *Z. nummularia*, W. & A. Prod. 162; Fl. Br. I. 1. 633; Brandis For. Fl. 88; Bedd. Fl. Sylv. 69; Dalz. & Gibs. Bomb. Fl. 49. *Gangr, jangra*, Sind.

N. W. India, Guzerat, W. Peninsula, Deccan, Koukan, Sind, throughout the Bombay Presidency and Sind in the driest situations; absent from the moist zone near the coast. Fl. March-June. Fr. Nov.-Jan. Used for dry fences round fields and gardens. The fruit is edible and sometimes during times of famine furnishes food for starving people.

3. *Z. Cœnoplia*, Mill. Gard. Dict. No. 3; Fl. Br. I. 1. 634; Dalz. & Gibs. Bomb. Fl.; Brandis For. Fl. 86; Bedd. Fl. 49; Sylv. 69. *Makai, H.*; *Purgi, K.*; *Kaner balli, M.*

Throughout the hotter parts of India from the Himalayas to Ceylon; throughout the moist forests of the Deccan, Konkan and N. Kánara, where it is particularly abundant in the deciduous forests of the Yellapore sub-division. Fl. Sept.-Oct. Fr. Feb.-March. A large and extensive climber. Stem 4—8 in. in diameter. Bark rough, dark grey; rhytidome in thick irregular, small plates, often in distinct prominent patches close to the rings of pyramidal prickles. These prickles are made up of brown plates of hard tissue and crowned with the original hooked point. Inner bark red, fibrous,  $\frac{1}{2}$  in. thick. Wood reddish, smooth, close-grained, moderately hard. Pores numerous, small or moderate sized, single or in short radial lines of 3—5. Medullary rays very fine and numerous. Annual rings distinct. Weighs 42 lbs. to the cub. ft. Roots mixed with lemon juice are used in native medicine (for black-tongued remittent fevers). Fruit edible. The branches are in common use for temporary fences.

4. *Z. xylopyra*, Willd. Sp. Pl. 1104; Fl. Br. I. 1. 634; Dalz. & Gibs' Bomb. Fl. 49; Brandis For. Fl. 90; Bedd. Fl. Sylv. 68. *Mullu kare' gorwi, gorchi, godachi, K.*; *Bori, ghát, kanta gotti, M.*; *Guti, Vern.*

N. W. India, Central Provinces, Behar and Oudh, W. Peninsula from the Konkan southwards; common in the moist forests of North Kánara and Konkan. A straggling shrub throughout the drier parts of the presidency. Fl. May. Fr. ripe end of rainy season. In N. Kánara usually a small tree, 20—30 ft. high. Bark grey or brownish. Wood yellowish-brown,

hard, heavy, dense. Pores large and small, surrounded by a white tissue, which forms wavy, concentric, irregular, confluent bands. Medullary rays fine, equidistant, numerous. Weighs 60 lbs. to the cub. ft.; easily worked and durable. Used for carts, &c. Makes excellent torches. "The charred fruit is used for dyeing leather black."—Brandis.

**Z. horrida**, Roth. Nov. Sp. 159; Fl. Br. I. 1. 636; DC. Prod. II. 20.

Western Peninsula, Wgt.; the Konkan, Stocks. I know nothing of this apparently doubtfully indigenous species.

5. **Z. rugosa**. Lamk. Dict. III. 319; Fl. Br. I. 1. 663; Dalz. & Gibs. Bomb. Fl. 49; Brandis For. Fl. 89; Bedd. Fl. Sylv. 68. *Turan*, M.; *Suna boorli*, K.

Tropical Himalaya, Assam, Burma and the Western Peninsula from the Konkan southwards, Ceylon. Very common in open places on the North Kánara gháts and elsewhere throughout the presidency. Fl. Nov.-Mch. Fr. May. Bark dark brown, scaly. Wood reddish, tough, hard. Pores large, oval, simple or subdivided. Med. rays fine, distinct and very numerous. Weighs about 40 lbs. to the cub. ft. Fruit edible. The mealy pulp surrounding the crustaceous stone is very palatable and in my opinion not at all mawkish. Large quantities of this fruit are eaten by the Ghát population during the hot season.

### 3. RHAMNUS, L.

Shrubs or trees. Leaves alternate. Flowers hermaphrodite or polygamous. Calyx-tube urceolate, limb 4-5-lobed, lobes keeled within. Petals 4-5, or 0, inserted on the calyx-tube above the ovary, hood-shaped or flat. Stamens 4-5. Disk thin, lining the calyx-tube. Ovary free, 3-4-celled, narrowed into a 3-4-cleft style. Fruit a berry-like drupe, girt at the base by the small calyx-tube, 2-4-seeded.

**R. Wightii**, W. & A. Prod. 164; Fl. Br. I. 1. 639; Bedd. Fl. Sylv. 70; Dalz. & Gibs. Bomb. Fl. 50. *Rugt rorar*, Vern.

A large glabrous shrub. Western Peninsula; from the highest hills of the Konkan southwards to the Nilghiris, Ceylon. I have specimens of *R. triqueter*, Wall., collected in the "Koriacha Kila," 11 miles south of Lanowli at an alt. of 3100 ft. It is very like *R. Wightii*, but differs in the pubescence; it may have been cultivated. Fr. March-April.

### 4. SCUTIA, Comm.

A scandent, glabrous, prickly shrub, prickles sub-opposite, recurved. Leaves opposite or alternate, coriaceous, penninerved. Flowers hermaphrodite, in axillary fascicles or subumbellate. Calyx 5-fid; tube hemispherical or turbinate. Petals 5, emarginate, clawed, flat or hooded. Disk filling the calyx-tube. Stamens 5. Ovary sunk in the disk, 2-4-celled, narrowed into a short 2-3-cleft style. Fruit ovoid or subglobose, girt at the base by the calyx; pyrenes 2-4.

**S. indica**, Brogn. in Ann. Sc. Nat. X. 363; Dalz. & Gibs. Bomb. Fl. 50; Fl. Br. I. 1. 640; Bedd. Fl. Sylv. 70. *Chimat*, Vern.

Burma, Western Peninsula from the Konkan southwards; Ceylon; on the gháts of the Konkan and North Kánara, common in evergreen forests near the Tinai ghát of N. Kanara at about 2000 ft. elevation. Fl. Sept.-Oct. and at other times. Fr. June. Stems 4 in. in diameter without thorns or prickles. Bark corky, brown, inner bark red.

#### 5. SAGERATIA, Brogn.

Unarmed or spinous shrubs. Leaves sub-opposite with deciduous stipules. Flowers small, pentamerous, bisexual, in sessile clusters. Calyx 5-fid. Petals 5, clawed, hooded. Stamens 5. Disk cup-shaped, lining the calyx-tube, margin free, 5-lobed. Ovary sunk in the disk but free from it, 3-celled; style short, 3-grooved. Fruit globose, 3-seeded, coriaceous, indehiscent.

*S. oppositifolia*, Brogn. in Ann. Nat. Sc. Ser. 1. X. 360; Fl. Br. I. 1. 641; Brandis For. Fl. 95.

North-West India and sub-tropical Himalaya. Western Peninsula from the Konkan southwards. A large shrub or small tree doubtfully indigenous in the Bombay Presidency. Flowers in large terminal panicles. Fruit small, turbinate black, succulent. Fl. R. S. Fr. C. S.

#### 6. COLUBRINA, Rich.

Erect unarmed shrubs. Leaves alternate. Flowers in short axillary cymes. Calyx 5-fid, tube hemispherical. Petals 5, hooded, inserted on the margin of the disk. Disk fleshy, filling the calyx-tube. Ovary immersed in the disk, 3-celled; stigmas reflexed. Fruit obsoletely 3-lobed, surrounded at the base by calyx-tube, 3-celled, cells 1-seeded, tardily dehiscent.

*C. asiatica*, Brogn. in Ann. Sc. Nat. Ser. 1. X. 369; Fl. Br. I. 1. 642; Dalz. & Gibs. 50; Bedd. Fl. Sylv. 69. *Guti*, M.

Eastern and Western Peninsulas from the Konkan and Tenasserim southwards. Ceylon. Elephanta and the gháts, plentiful near the sea at Ratnágiri. Dalz. & Gibs.

#### 7. GOUANIA, Linn.

Unarmed climbing shrubs. Leaves alternate. Flowers in axillary or terminal spikes, polygamous. Calyx 5-lobed, the tube adherent to the ovary. Petals 5, hooded. Stamens 5. Disk filling the calyx-tube, 5-angled or stellate. Ovary immersed in the disk, 3-celled, style 3-cleft. Fruit inferior, coriaceous. 3-winged. The flowering rachis is often cirrhose.

Flowers sessile, densely pubescent	...	...	1. <i>G. microcarpa</i> .
Flowers shortly pedicelled, glabrous	...	...	2. <i>G. leptostachya</i> .

1. *G. microcarpa*, DC. Prod. II. 40; Fl. Br. I. 1. 643. W. & A. Prodr. 167. *Shingar balli*, K.

Western Peninsula from the Konkan southwards, common on the North Kánara gháts in evergreen forests. Fl. and Fr. cold season. Wood yellowish, rather hard, very similar to that of *Ventilago calyculata*. The diameter of the large oval simple or divided pores is greater than the distance between the rays and causing them to present a wavy appearance. Annual rings distinct. Weighs about 40 lbs. to the cub. ft.

2. *G. leptostachya*, DC. Prodr. II. 40; Fl. Br. I. 1. 643; Dalz. & Gibs. Bomb. Fl. 50. Himalaya, Assam and the Khasya Mountains, Tenasserim and the Malay Archipelago. Konkan, Dalz. In the Prodr. Fl. Pen. I. Or. W. & A. state that this is a northern species. It is included in this work on the authority of Dalz., who states that it is found in the Warri country at Banda. *G. tiliaefolia*, Heyne, Roxb. Fl. Ind. I. 632, is a synonym. Fl. Aug. Fr. C. S.

### ORDER 31. AMPELIDÆ.

Erect shrubs or small trees with jointed branches, sometimes herbaceous or woody climbers furnished with simple or branched tendrils. Juice copious, watery. Leaves alternate or the lower opposite, simple or compound. Flowers small, regular, hermaphrodite, rarely unisexual, in cymose panicles, spikes or racemes. Calyx small, entire, 4-5-dentate or lobed. Petals 4-5, hypogynous, valvate, free or variously cohering. Stamens as many as the petals and opposed to them on the outside of the disk; anthers free and distinct or connate. Disk free or connate with the petals stamens or ovary. Ovary 2-6-celled; ovules 1-2 in each cell, erect, anatropous. Style simple, short or 0; stigma minute or flat and lobed. Fruit a 1-6-seeded berry; cells 1-2-seeded. Seeds erect, often rugulose; albumen copious, cartilaginous; embryo short, basal; cotyledons ovate.

Scandent shrubs usually with tendrils. Ovary 2-6-celled,	
cells 2-ovuled ... ..	1. VITIS.
Erect shrubs, no tendrils. Ovary 3-6-celled, cells 1-	
ovuled ... ..	2. LEEA.

#### 1. VITIS, Linn.

Shrubs climbing by means of leaf-opposed tendrils. Leaves simple pedately or digitately 3-9-foliolate. Flowers variously cymose, hermaphrodite, unisexual or polygamous, usually without bracts. Calyx short, entire, 4-5-lobed. Petals 4-5, free or covering at the apex. Stamens 4-5, inserted below the margin of the disk. Ovary 2, rarely 3-4-celled; style 0 or short, ovules 2 in each cell. Fruit a 1-4-seeded berry.

Leaves simple. Cymes umbellate.

Flowers tetramerous.

Stems and branches acutely winged ... 1. *V. quadrangularis*.

Stems cylindrical or obscurely winged.

Leaves glabrous.

Branches terete, mealy-white ... 2. *V. repens*.

Branches 6-angled, bright red ... 3. *V. discolor*.

- Branches thick, fleshy, hollow ... 4. *V. pallida*.  
 Branches cylindric, glaucous, faintly striate ... 5. *V. glauca*.  
 Leaves more or less hairy pubescent beneath.  
 Leaves subtomentose beneath ... 6. *V. gigantea*.  
 Leaves adpressed, woolly tomentose beneath ... 7. *V. repanda*.  
 Leaves rusty, pubescent beneath ... 8. *V. adnata*.  
 Flowers pentamerous. Cymes umbellate, paniculate or spikate  
 Cymes umbellate, woolly ... 9. *V. tomentosa*.  
 Cymes paniculate.  
 Flowers glabrous; peduncles with a forked tendril ... 10. *V. latifolia*.  
 Flowers tomentose; peduncles without tendrils ... 11. *V. vinifera*.  
 Cymes spikate, densely red, woolly tomentose ... 12. *V. indica*.  
 Leaves trifoliolate.  
 Flowers tetramerous.  
 Stems and Leaves fleshy.  
 Plant quite glabrous. Fruit 1-seeded, seed quite smooth ... 13. *V. Rheedii*.  
 Plant covered with glandular bristly hairs. Fruit 1-seeded; seed nearly smooth ... 14. *V. setosa*.  
 Plant covered with dense short pubescence. Fruit black, 4-seeded, seeds tubercled ... 15. *V. carnosa*.  
 Flowers pentamerous.  
 Stems woody. Leaves not fleshy.  
 Fruit globose or ovoid ... 16. *V. canarensis*.  
 Stems slender, Leaves membranous.  
 Fruit oblong, subfalcate ... 17. *V. araneosus*.  
 Leaves 5-foliolate, digitate.  
 Plant quite glabrous. Leaflets nearly sessile. Fruit black ... 18. *V. sp.*  
 Plant with the young parts softly pubescent. Leaflets long-stalked. Fruit red, turning dark purple ... 19. *V. auriculata*.  
 Leaves pedately 5-foliolate.  
 Leaves membranous. Stigma large subpeltate ... 20. *V. tenuifolia*.  
 Leaves coriaceous. Stigma 4-lobed ... 21. *V. lanceolaria*.  
 Leaves pedately 7-9-lobed, membranous.  
 Stigma simple ... 22. *V. pedata*.

1. *V. quadrangularis*, Wall. Cat. 5992; Fl. Br. I. 1. 645; Wight Ic. t. 51; Brandis For. Fl. 100. *Cissus quadrangularis*, Linn.; Planch. Suites au Prodr. v. 509; Dalz. & Gibs. Bomb. Fl. 39. *C. edulis*, Dalz. & Gibs. Bomb. Fl. 40. *Hursanker, nallar; Chodhari, harjora, kandawel*, Vern.; *Hïressa*, Sind. The Edible-stemmed Vine.

Throughout the driest districts of the presidency from Guzerat to Dhárwár. Fl. R. S. Fr. C. S. Tropical and subtropical India. Eastern Africa and the Malay Archipelago. The winged variety found in Guzerat (*C. edulis*, of Dalzell's Bomb. Fl.). Dalzell keeps *C. edulis*, with lunate



stipules and fibrous roots separate from *C. quadrangularis*, which has tuberous roots and auricled stipules. The leaves and young shoots are eaten in curries.

2. *V. repens*, W. & A. Prod. 125; Fl. Br. I. 1. 646. *Cissus repens*, Lam. Planch. Suites au Prodr. v. 504; Dalz. & Gibs. Bom. Fl. 39. *C. cordata*, Roxb. Fl. Ind. I. 407; Grah. Cat. Bomb. Fl. 32.

Eastern tropical Himalaya, Khasia, Assam and Silhet, and the Malay Archipelago. Very common on the North Kánara and Konkan Gháts. Fl. March. Fr. May. A stout glabrous climber. Tendrils leaf-opposed, forked. Leaves membranous, cordate, glaucous. Fruit black, pulpy (size of a small cherry), edible. Seed pyriform, rugose on the sides. Flowering panicles appear before the leaves in March.

3. *V. discolor*, Dalz. in Hook. Kew Jour. Bot. II. 39; Fl. Br. I. 1. 647. *Cissus discolor*, Dalz. & Gibs. Bom. Fl. 40. Planch. Suites au Prodr. v. 496. *Telitsayel*, M.

Throughout the moist forests of the Konkan and North Kánara. Fl. Aug. Fr. Oct.-Nov. Tropical Himalaya, Khasia and Silhet, Malay Peninsula and Java. Much cultivated in gardens throughout the tropics. A very ornamental plant easily and readily distinguished from the other species of Indian Vitis.

4. *V. pallida*, W. & A. Prod. 125; Fl. Br. I. 1. 647. *Cissus pallida*, Planch. Suites au Prodr. v. 477. *V. Linnæi*, Wall? *Cissus vitiginea*, Dalz. & Gibs. Bom. Fl. 40. This is, I think, the common Deccan and Bombay Karnatic species referred to in Dalzell's Bomb. Fl. Usually an erect, glabrous glaucous shrub. I have a climber, collected near Sut-tuttee in the Belgaum District, bearing leaf-opposed tendrils and with scaly pubescence on the calyx and pedicels which is very near and probably connects *V. Heyneana*, Wall. with *V. pallida*. Fl. H. S. Fr. Aug. *V. Woodrowii*, Stapf. Mss. Cooke Fl. Pres. Bomb. 248. Vern. *Girnul*, is I think identical with *V. pallida*, W. & A.

5. *V. glauca*, W. & A. Prod. 126; Fl. Br. I. 1. 648.

Western Peninsula from the Konkan southwards. In the evergreen forests of the Konkan and North Kánara, not common. Fl. Fr. Apl.-May. This species has been united with *C. repens*, Lamk., and the *Vitis repens*, of the Fl. Br. I. by Planchon in his Suites au Prodr. Syst. Nat. Sir G. King is apparently of the same opinion: vide his materials for a Flora of the Malay Peninsula, p. 400. The North Kánara specimens of *V. glauca*, appear to me to be distinct from those of *C. repens*, Lamk. *V. repens*, is found in the more open deciduous forests, whereas the slender stemmed *V. glauca*, is, as far as I have seen, entirely confined to the dense, evergreens.

6. *V. gigantea*, Bedd. in Trans. Linn. Soc. XXV. 212; Fl. Br. I. 1. 648. *Cissus gigantea*, Planch. in DC. Mon. Phan. 5. 622. Common throughout the moist forests of North Kánara from the sea-level upwards, also probably in the Konkan. Fl. Fr. Aug.

7. *V. repanda*, W. & A. Prodr. 125; Fl. Br. I. 1. 648. *Cissus repanda*, Vahl.; Dalz. & Gibs. Bomb. Fl. 39; Planch. Suites au Prodr. v. 474. Sir G. King says that this common Bombay forest species is *V. Wightiana*, Wall., closely allied to *V. repanda*, W. & A. Wight and Arnot in their Prodr. Fl. Penin. I. reduce *V. Wightiana*, Wall., to their *V. repanda*. Lawson in the Fl. Br. I. does not refer to *V. Wightiana*, at all. At any rate *V. repanda*, is a well defined species and *V. Wightiana*, a rather doubtful one. I therefore keep the name *V. repanda*, intact. Common throughout the presidency along the border of the heavy rainfall zone, also in some of the heavy, high timber forests of N. Kánara. A large, thick-stemmed climber with corky fissured bark, doing considerable damage to the teak and other trees. Fl. Mch.-Apl. Fr. Apl.-May.

8. *V. adnata*, Roxb. Fl. Ind. 1. 405; Dalz. & Gibs. Bom. Fl. 32; Brandis For. Fl. 100. *Cissus adnata*, Roxb. Fl. Ind. 405; Planch in DC. Mon. Phan. 5. 494. *Kole-zan*, Vern.

Tropical Asia, Peninsular India, Malay Peninsula, Ceylon, Phillipine Islands. Throughout the Western Peninsula of India, N. Kánara in the moist forests from Kadra to Goond, but nowhere common. Flowers and fruits during the cold season in N. Kánara.

*V. Linnæi*, Wall. Cat. 5987, Fl. Br. I. 1. 649; W. & A. Prodr. 126. *Cissus vitiginea*, L. Planch. in DC. Prodr. (Suites au) v. 472.

Western Peninsula from the Konkan southwards. I have specimens of a small tree with a thick trunk and deeply fissured, corky bark, collected near Bádámi in the Bijápur Collectorate of the Bombay Presidency, which I think is this species. Fl. Sept.-Oct. Fr. C. S.

9. *V. tomentosa*, Heyne in Roth. Nov. Sp. 157; Fl. Br. I. 1. 650. W. & A. Prodr. 130. *V. triloba*, Heyne l. c. 157, DC. Prodr. 1. 634. *Ampelocissus tomentosa*, Planch. Mon. Phan. DC. Prodr. (Suites au) v. 376.

Western Peninsula from the Konkan to the Nilgherries, Burma. Throughout the dry forests on the North Kánara border; common in the forests of the Dhárwár districts along the banks of streams and rivers. Fl. Mch. Fr. May. A densely white-woolly climber.

10. *V. latifolia*, Roxb. Fl. Ind. 1. 661; Fl. Br. I. 1. 652; Brandis For. Fl. 99. W. & A. Prodr. 130. *Ampelocissus latifolia*, Planch, DC. Prodr. (Suites au) v. 370. *Nádána*, M.

N. W. India, Assam, Silhet, W. Peninsula from the Konkan southwards; common in the N. Kánara forests near Kárwár, also on the gháts. Flowers from June to Aug. Fr. Oct. The fruits of this species are edible but rather tasteless.

11. *V. vinifera*, Linn. Sp. Fl. 202; Fl. Br. I. 1. 652; Brandis For. Fl. 98; Dalz. & Gibs. Bomb. Fl. Suppl. 15. The Grape Vine. *Draksha*, Vern. Cultivated in the drier districts of the presidency.

12. *V. indica*, Linn. Sp. Pl. 202; Fl. Br. I. 1. 653; Dalz. & Gibs. Bomb. Fl. 41.; Brandis For. Fl. 100. W. & A. Prodr. 131. *Ampelo-*

*cissus Arnottiana*, Planch. DC. Prodr. (Suites au) v. 379. The Indian Wild Vine. *Randraksha, kolejan, M.*; *Huttige bali, K.*

Western Peninsula from the Konkan southward, Central India and Bengal. In the evergreen forests of the North Kánara and Konkan gháts. Fl. and Fr. from Aug. till Jan. A slender tomentose species with a black, globose, 2-4-seeded fruit. The tuberous root is used in native medicine. Hort. Mal. VII. II. Grapes eaten, sweet, palatable.

13. *V. Rheedii*, W. & A. Prodr. 127; Fl. Br. I. 1. 653. *Cissus trilobata* Lamk.; Dalz. & Gibs. Bomb. Fl. 39; W. & A. Prodr. 126; Planch. DC. Prodr. (Suites au) v. 503. Western Peninsula, Malabar and Travancore Konkan. Dalzell and Graham both give the Konkan as a habitat of this species; I have not found it myself.

14. *V. setosa*, Wall. Cat. 6009; Fl. Br. I. 1. 654. *Cissus setosa*, Dalz. & Gibs. Bomb. Fl. 41; Planch, DC. Prodr. (Suites au) v. 608. *Harmal, H.*; *Yek-gisam-ka-bachla, Dec.*; *Khaj-goli-ka-vel, M.*

Western Peninsula in the dry districts from Poona southwards. Dalzell only found it near Jooneer. It is fairly common along the dry stony hills of the Dhárwár collectorate, also near Gokák in the Belgaum district. Sometimes on the black soil plains. Flowers and fruits at different times throughout the year. An acrid succulent, flaccid stemmed plant, used in native medicine for poultices to hasten suppuration.

15. *V. carnososa*, Wall. Cat. 6018; Fl. Br. I. 1. 654; Brandis For. Fl. 101. *Cissus carnososa*, Roxb. Dalz. & Gibs. Bomb. Fl. 40; Planch. DC.; Prodr. Suites au v. 570. *Odi, ambat-bel, M.*; *Khat, khatumdre, tamanya, Guz.*

Throughout tropical India from the Punjab to Ceylon and Malacca. On the Konkan and North Kánara gháts, common in the Dhárwár district bordering on North Kánara. Fl. and Fr. May-Oct. Leaves, roots, and seeds are very acrid and are used in native medicine.

16. *V. canarensis*, Dalz. in Hook. Kew Jour. Bot. III. 123; Fl. Br. I. 1. 655. *C. (Cayratia) canarensis*, Planch. DC. Prodr. (Suites au) v. 620.

A distinct species, found in the evergreen forests of N. Kánara from the Ainshi southwards to the Nilkund ghát, locally abundant. Fl. cold season. Fr. ripe Apl.-May. Stems much flattened and covered with broad, thin wings of corky bark. Fruit globose, size of a small cherry, yellow, turning red and pulpy when ripe, one-seeded. Seed with a crustaceous episperm and a white, horny, ruminant albumen. Leaves always trifoliate. Flowers dioicous. Fl. C. S. Fr. Apl.-May.

17. *V. araneosa*, Dalz. & Gibs. Bomb. Fl. 41; Fl. Br. I. 1. 657; Planch. Suites au Prodr. v. 405. *Bendri-benderwel, ghorwel, Vern.*

Western Peninsula, highest gháts of the Konkan, about Jooneer, Dalz. Pulneys. I am unacquainted with this species. Planchon considers it from the description of the seeds to belong to his genus *Ampelocissus*.

18. *Vitis* sp. aff. *V. elongata*; Wall. Cat. 6016; Fl. Br. I. 1. 658; Planch. Suites au Prodr. v. 621.

A spreading climbing shrub with stout glabrous branches, digitate, 5-foliolate leaves and black, succulent, globose fruit, common in the moist forests of North Kánara near the sea coast and along the Konkan gháts. Flowers during the rainy season. Fruit Nov.-Jan. Sir G. King did not venture to name it when doing the Malay Peninsular species of the genus *Vitis*. It is closely allied to *V. elongata*, Wall.

19. *V. auriculata*, Roxb. Fl. I. 1. 412; Fl. Br. I. 1. 658. *Cissus auriculata*, DC. Dalz. and Gibs. Bomb. Fl. 40; Planch, Suites au Prodr. v. 564. *Pundi baili*, K.

Sikkim Himalaya, alt. 3—3500 ft., Chittagong, Bengal and Burma; Western Peninsula from the Konkan southwards. Common in the dry forests along the Dhárwár frontier of the North Kánara and Belgaum Districts, and in other parts of the Presidency. Fl. May-June. Fr. Nov. Stems 6 in. in diameter at the base scarcely corky, branches with the corky bark much more developed, very soft and red within. Wood very soft. Leaves fall off in the cold season. The leaves are sometimes pedately 5-foliolate and the cherry-like fruit turns purple-black when quite ripe: it is then edible and agreeably acid. The young leaves and tendrils are eaten in curries. The seeds are large, ovoid, .35 in. long by .20 in. broad with a flat, rough dorsal side.

20. *V. tenuifolia*, W. & A. Prodr. 129; Fl. Br. I. 1. 660. *Cissus tenuifolia*, Planch. Suites au Prodr. v. 563.

Western Peninsula from the Konkan southwards. In the moist forests of the North Kánara District from A'inshi southwards. A distinct species. Sir G. King remarks that in his opinion this is only a glabrous form of *V. japonica*, Thunb. (*V. mollis*, Wall.)

21. *V. lanceolaria*, Roxb. Fl. Ind. 412; Fl. Br. I. 1. 660; Brandis For. Fl. 101. *Cissus muricata*, Dalz. and Gibs. Bomb. Fl. 40. *Tetrasigma lanceolarium*, Planch. Suites au Prodr. v. 423. *Kajolitsayel*, M.

Assam, Pegu and the Eastern Peninsula, Western Peninsula from the Konkan southwards, on the N. Kánara gháts in evergreen forests. Fl. Nov.-Dec. Fr. May. Branches fluted, covered with hard, small, raised dots. Tendrils forked. Fruit globose (size of a cherry), white, pulpy. Seeds 1-2, rough, pear-shaped.

22. *V. pedata*, Vahl. in Herb. Madr. ex-Wall. Cat. 6027. Fl. Br. I. 1. 661. *Cissus pedata*, Dalz. & Gibs. Bomb. Fl. 40; Grah. Cat. Bomb. Pl. 33. *Cayratia pedata*, (Lamk.) Planch. Suites au Prodr. v. 558. *Gorpad-wel*, M.; *Mediya-wel*, Sind.

Bengal, Burma, Assam, Khasia, Western Peninsula from the Konkan and Kánara southwards to Ceylon. A large weak climber. Sir G. King says that the Kánara plant is the true *V. japonica*, Thunb.

#### LEEA, Linn.

Small trees or erect shrubs. Leaves simple or compound, petiole dilated at base into a sheath. Inflorescence leaf opposed, corymbose. No tendrils. Calyx 5-toothed. Petals 5, united at base with sta-

minal tube. Stamens 5, united at base into a 5-lobed tube; filaments inserted between the lobes on the outside, inflexed; anthers free and exserted or connate and included in tube. Ovary on disk, 3-6-celled; Style short, stigma enlarged; ovules 1 in each cell. Berry 3-6-celled, succulent, flattened at the top. Seeds erect, embryo small; albumen cartilaginous.

Leaves simple, very large. Shrub ... ..	1. <i>L. macrophylla</i> .
Leaves pinnate, shrubs.	
Stems, petioles, &c., with crisped wings ...	2. <i>L. crispa</i> .
Stems without wings. Cymes small ...	3. <i>L. aspera</i> .
Leaves bi-tripinnate.	
A glabrous small tree ... ..	4. <i>L. sambucina</i> .

***L. macrophylla***.—Roxb. Fl. Ind. 1. 653; Fl. Br. I. 1. 664; Brandis. For. Fl. 102; Dalz. and Gibs. Bomb. Fl. 41. *Dinda*, M.

Throughout the hotter parts of India from the Himalaya (Kumaon) to Bengal, Assam and Tenasserim. Western peninsular forests of North Kánara and the Konkan; common in the moist forests near Yellápur, North Kánara. Fl. and Fr. R. S.

2. ***L. crispa***, Willd. Sp. Pl. I. 1. 177; Fl. Br. I. 1. 665.

Sikkim, Himalaya and the Khasia mountains, 1—4000 ft. alt., Assam, Chittagong, Western peninsula from the Konkan southwards. Throughout the Konkan and North Kánara from the sea-level upwards in moist forests. Testa smooth; albumen ruminant. Fl. Aug. Fr. Oct.

3. ***L. aspera***, Wall. in Roxb. Fl. Ind. II. 468; Fl. Br. I. 1. 665; Brandis For. Fl. 102.

Western Tropical Himalaya from Jamu to Nepal ascending to 6,000 ft. Oudh, Western peninsula from the Konkan southwards. Throughout North Kánara in moist forests; common near Kárwár, also in the Sátputás of Khándesh. Fl. Aug. Fr. Oct.

Young stems sulcate, red-dotted.

4. ***L. sambucina***, Willd. Sp. Pl. I. 1. 177; Fl. Br. I. 1. 666; Brandis For. Fl. 102. *L. Staphylea*, Roxb. Dalz. & Gibs. Bomb. Fl. 41. *Kurkunnie*, Vern.; *Dino*, Kon.; *Rai dinda*, M.; *Nurcho*, *totmudki*, *midichi*, *jini*, K.

Hotter parts of India from the Himalaya (Kumaon) to Burma and southwards to Ceylon and Malacca. Throughout the presidency. In the moist forests of North Kánara. Fl. Fr. throughout the year.

A large shrub or small tree (stems 30 ft. high and 4 in. in diam.). Bark smooth outside, inside with long, soft, reddish fibres anastomosing or free; young branches green. Wood pink, lustrous. Annual rings distinct. Med. rays broad and fine. Pores small, numerous. Weighs about 40 lbs. to the cub. ft.

Where there is a heavy rainfall, this species develops short aërial roots abundantly from the branches.

***L. latifolia***, Wall. Cat. 6821; C. B. Clarke in Trim. Jour. Bot. (1881), 138. *L. coriacea*, Laws.; *L. cinerea*, Laws., is a pinnate leafed

shrub, doubtfully indigenous in the Bombay Presidency; represented in Kew by one specimen marked "Konkan, Stocks."

*L. robusta*, Roxb. Hort. Beng. 18; C. B. Clarke in Trim. Jour. Bot. (1881), 64. *L. diffusa*, Laws. Fl. Br. I. A small shrub found in the Konkan and N. Kánara; very rare.

*L. aequata*, Linn. Mantiss. 1 (1767) 124. C. B. Clarke in Trim. Jour. Bot. (1881). *L. hirta*, Roxb.; Laws. Fl. Br. I. 1. 668, is not, I think, found within the limits of Bombay, and was given erroneously in the 1894 edition of this list.

### ORDER 32. SAPINDACEÆ.

Trees or shrubs rarely herbs. Leaves alternate or opposite, simple or pinnate. Flowers small, polygamo-dioecious, often irregular or unsymmetrical. Sepals 4-5, free or united. Petals 4-5, free, often squamate at the base. Disk complete or 1-sided, rarely deficient in the male flowers. Stamens free, 5-10, inserted inside the disk at the base of the ovary or outside or on the disk sometimes unilateral; anthers 2-celled; filaments often pubescent. Ovary centric or ex-centric, entire or lobed or sometimes divided to near the base, 1-4-celled; style simple or divided, stigma usually simple; ovules 1 or 2 in each cell on axile placentas. Fruit capsular or indehiscent. Seeds arillate or naked, albuminous or exalbuminous; embryo thick, sometimes plicate or spirally convolute.

Flowers regular or irregular. Stamens inserted inside the disk. Seeds exalbuminous. (Sapindæ)

Flowers irregular. Disk unilateral. Leaves pinnate or trifoliolate.

Leaves pinnate. Flowers not minute.

Fruit indehiscent, not lobed ... .. 1. HEMIGYROSA.

Fruit indehiscent, 3-lobed to the base ... .. 2. ERIOGLOSSUM.

Leaves trifoliolate. Flowers very minute ... .. 3. ALLOPHYLLUS.

Flowers regular. Disk annular.

Petals 0. Fruit 1-seeded, ovoidu ... .. 4. SCHLEICHERA.

Petals usually present. Fruit deeply 1-3-lobed,

Sepals imbricated ... .. 5. SAPINDUS.

Calyx divisions valvate.

Fruit tubercled, indehiscent ... .. 6. NEPHELIUM.

Fruit an orange coloured, inflated

capsule ... .. 7. HARPULLIA.

Flowers regular. Stamens inserted outside the disk.

Seeds exalbuminous. Leaves alternate (Dodonææ).

Leaves simple. Fruit a winged capsule ... .. 8. DODONÆA.

Flowers regular. Stamens inserted outside the disk.

Seeds albuminous. Leaves opposite. (Staphylcæ).

Leaves pinnate. Fruit globose, indehiscent. 9. TURPINIA.

#### 1. HEMIGYROSA, Blume.

Trees. Leaves coriaceous, abruptly pinnate. Flowers irregular, in axillary panicles, polygamo-monoecious. Sepals 5, erect, concave, the two outer smaller. Petals 4-5, with a scale at base of the claw. Disk unilateral, cushion-shaped. Stamens 6-8; in male

flowers 6-10; filaments pilose, somewhat unilateral; anthers not or scarcely exerted. Ovary excentric, trigonous, 3-celled; stigma trigonous, blunt; ovule solitary. Fruit woody, tomentose, yellow. Seeds exalbuminous and exarillate; cotyledons fleshy, equal.

*H. canescens*, Thwaites Enum. 56, 408; Fl. Br. I. 1. 671; Bedd. Fl. Sylv. t. 151. *Opuntia canescens*, Pers.; Dalz. & Gibs. Bom. Fl. 35. *Kurpa, lakhandi*, M.; *Kurpah, mooltagu*, K.

Western Peninsula from the Konkan southwards, Tenasserim, Burma, eastern side of the Madras Presidency and Ceylon.

A fairly large and straight tree in North Kánara. Fl. Feb.-May. Fruit ripe in June and July. Bark ash-coloured, slightly scabrous. Wood whitish or grey, smooth, shining; no distinct heartwood. Pores small, uniformly distributed. Med. rays fine, at unequal distances apart. Weighs 45 lbs. to the cub. ft. Readily attacked by boring insects.

## 2. ERIOGLOSSUM, Blume.

Trees or shrubs. Leaves alternate, pinnate, exstipulate; leaflets opposite, entire. Flowers in terminal erect panicles, polygamo-dicœcious. Sepals 5, unequal, imbricated, 2 outer smaller. Petals 4, unequal, clawed; scale hairy, hooded, with an appendage at the tip. Disk 1-sided, lobed. Stamens 8, unequal; filaments hairy. Ovary stipitate, obcordate, 3-lobed, 3-celled; style slender, stigma obscurely 3-lobed, cells 1-ovuled. Fruit lobed to the base, indehiscent. Seeds oblong, exarillate, exalbuminous; embryo straight, cotyledons thick.

*E. edule*, Bl. Bijdr. 299; Fl. Br. I. 1. 672. *E. rubiginosum*, Brandis For. Fl. 103. *Sapindus rubiginosa*, Roxb. Fl. Ind. II. 282; Grah. Cat. Bo. Pl. 29; Dalz. & Gibs. Bom. Fl. Suppl. 14; Bedd. Fl. Sylv. 73.

Sikkim Himalaya, Assam, Eastern Peninsula, Burma to Penang and Malacca and the Andamans, planted near Bombay, very doubtfully indigenous in the Bombay Presidency. Col. Beddome is of opinion that this large tree is not indigenous on the Western coast. Dalzell says, "In the woods of Girgaum, but certainly planted."

Wood strong, durable, with chocolate-coloured heart-wood.

## 3. ALLOPHYLUS, Linn.

Small trees or climbing shrubs. Leaves 1-3-foliolate. Flowers small, white, in simple spikes. Sepals 4. Petals 4, with a scale above the claw. Stamens 8. Inserted on the receptacle inside the disk. Ovary usually 2-lobed and 2-celled. Disk 1-sided, usually with 4 glands, opposite the petals. Fruit small, red, indehiscent, shining. Seeds usually with a short fleshy arillus, embryo curved; cotyledons plicate.

*A. Cobbe*, Bl. Rumph. III. 131; Fl. Br. I. 1. 673. *Schmidelia Cobbe*, Grah. Cat. Bomb. Pl. 29; Bedd. Fl. Sylv. 72. *Titwi*, M.; *Kasubally, murele bhendly*, K.

Eastern Bengal, Assam, Burma, Eastern and Western Peninsulas and the Andamans, common throughout the Konkan and N. Kánara in moist forests and along the banks of rivers and nálas. Fl. April-Aug. Fr. C. S. An exceedingly variable species, no less than 30 synonyms being quoted in the Fl. Br. I. by Hiern, who divides the species into 8 varieties. The commonest, the W. Peninsular form, he calls *var. Rheedii*, which differs principally from the others by its branched inflorescence.

Scandent. Trunk 6-8 in. in diameter, irregular, fluted. Bark thin, sealy; inner bark thin, reddish, fibrous. Green cells developed. Wood grey, soft. Pores moderate sized, numerous. Med. rays fine, short, crossed by white, parallel, wavy, equidistant, concentric lines. Weighs about 40 lbs. to the cub. ft. Ripe fruit said to be edible. Roots used in native medicine for rheumatic pains.

#### 4. SCHLEICHERA, Willd.

Trees. Leaves alternate, exstipulate, pinnate. Flowers regular, fascicled, polygamous. Calyx 4-8 cleft. Petals 0. Stamens 6-8, on centre of the complete, glabrous, wavy disk. Ovary ovoid, 3-4-celled, narrowed into a rigid style; stigma 3-4-cleft. Fruit dry, indehiscent, 1-3-celled, spinous or smooth. Seeds arillate; embryo conduplicate; cotyledons unequal and closely coherent.

*S. trijuga*, Willd. Sp. Pl. IV. 1096; Dalz. & Gibs. Bomb. Fl. 35; Bedd. Fl. Sylv. t. 119; Brandis For. Fl. 105. *Kusumb, koon, kohan, M.; Sagada, K.*

From the N. W. Himalaya to C. & S. India and Ceylon, cultivated in gardens in Sind, common throughout the Bombay Presidency in both dry and moist forests. A large tree with a deeply furrowed trunk, 60-70 ft. high by 2 ft. in diameter. Bark ½ in. thick, greyish, with exfoliating scales. Wood red, heavy, close-grained, hard. Pores scanty, small, in short radial lines or groups. Medullary rays very fine and numerous. Weighs 60-70 lbs. to the cub. ft. Much in demand for sugarcane mills; also for agricultural implements, carts, &c. The flowers and young foliage, which appear together early in March, are purple at first but soon change to a light green. Oil is extracted from the seeds which ripen during the hot season or at the beginning of the rains. The bark contains about 9 per cent. of tannin.

#### 5. SAPINDUS, Linn.

Trees or shrubs. Leaves alternate, exstipulate, usually paripinnate. Inflorescence terminal or axillary. Flowers regular, polygamous. Calyx of 5, somewhat unequal sepals, connate at the base, imbricate in bud, deciduous. Petals 4-5, nearly equal, alternate with the sepals, claw thickened and with or without scales on the inside. Disk complete, annular, fleshy, glabrous and lobed. Stamens 8-10, inserted within the disk. Ovary entire or lobed, 2-4-celled; style terminal; stigma 2-4-lobed; ovules solitary. Fruit 1-3-lobed, sometimes rusty-tomentose. Seeds with a crustaceous or membranous testa; cotyledons thick, radicle short.



*S. trifoliatus*, Linn. Sp. Pl. ed. 1. 367; Fl. Br. I. 1. 682. *S. laurifolia*, Vahl.; Dalz. & Gibs. Bom. Fl. 34; Bedd. Fl. Sylv. 73; Brandis For. Fl. 106. *S. emarginata*, Roxb.; Bedd. Fl. Sylv. t. 154; Dalz. & Gibs. Bomb. Fl. 35; Brandis l. c. 107. *Aratala, kantalkai mara*, K.; *Rita, ardal, pitha*, M. Soapnut Tree of Southern India.

Common about villages in Southern India and Ceylon, cultivated in Bengal, where it is doubtfully indigenous. Throughout the presidency; usually planted about villages. Both the varieties are found in North Kánara. Var. *laurifolia*, is indigenous on the gháts, in evergreen forests. Fl. Oct.-Dec. Fr. Feb.-Apl.

A large tree. Wood hard, yellow, heavy. Pores moderate sized, joined by wavy bands of light tissue. Medullary rays very fine, indistinct. Weighs about 56 lbs. to the cub. ft. Used for building purposes, carts, &c. The fruit is largely used in Southern India as a substitute for soap, and in native medicine as a tonic.

#### 6. NEPHELIUM, Linn.

Trees or shrubs. Leaves pinnate, alternate, exstipulate, rarely simple; leaflets entire, glaucous beneath, flowers regular, polygamous. Calyx 4-8-lobed, usually cup-shaped, subvalvate or slightly imbricating in bud. Petals 0 or 4-6, villous or with 2 scales. Stamens 5-10, inserted within the fleshy, glabrous or pubescent disk, exserted; filaments filiform, glabrous or hairy. Ovary short, 2-3-lobed, often verrucose, lobes 1-celled, 1-ovuled; stigma subsessile, 3-4-lobed. Fruit 1-4-lobed, indehiscent, globose or oblong, echinate, tubercled or smooth. Seeds globose, enclosed in a pulpy arillus.

*N. Longana*, Camb. in Mem. Mus. Par. XVIII. 30; Fl. Br. I. 1. 689; Dalz. & Gibs. Bom. Fl. 35. *Euphoria Longana*, Lamk. Bedd. Fl. Sylv. t. 156. *Wumb*, M.; *Kanakindali*, K. The Longan.

Burmah, Pegu, Western Peninsula from the Konkan southwards, Ceylon. In the evergreen forests of the Konkan and North Kánara; common in the forests near the Ainshi ghát. Fl. Mch. Fr. R. S. A very large tree.

Wood red, moderately hard. Pores small, numerous. Med. rays fine and very fine, crossed by prominent wavy, concentric bands, liable to split, not much used in North Kánara. Fruit edible, very like a small litchi.

*N. Litchi*, Camb. Fl. Br. I. 1. 687. *Litchi*, Vern., is cultivated near Bombay.

This tree was introduced into India from South China. The fruit ripens in May.

#### 7. HARPULLIA, Roxb.

Trees, leaves. Leaves alternate, exstipulate, imparipinnate, leaflets alternate, ovate, glabrous. Flowers regular, dioecious, paniculate. Sepals 4-5, equal, erect, imbricate. Petals 4-5, obovate, clawed, without glands or scales. Stamens 5-8, elongate. Ovary oblong, 2-lobed, 2-celled, ovules 2 in each cell, superposed; style elongated

stigma linear twisted. Fruit a 2-lobed inflated, loculicidally 2-valved capsule, valves 1-2-seeded. Seeds subglobose, arillate; embryo thick, cotyledons hemispheric.

*H. cupanoides*, Roxb. Fl. Ind. II. 442; Fl. Br. I. 1. 692. *H. imbricata*, Bedd. Fl. Sylv. t. 158. *Bidsale*, K.

Eastern Bengal, Burma, the Andamans, Western Peninsula from the Konkan, southwards Ceylon.

In the evergreen forests of the Konkan and North Kánara, very common in the forests near Goond. Fl. Dec.-Jan. Fr. Mch.-April. A moderate sized tree. Bark smooth. Wood yellowish grey, smooth, compact, moderately hard. Annual rings distinct. Pores small, equally distributed. Medullary rays fine, white wavy and very fine. Weighs 46 lbs. to the cub. ft.

Beddome remarks that the stigma is much more twisted in the Ceylon specimens than in those from the Western Peninsula. In the North Kánara tree the stigma seems to be usually entire and not at all twisted. The orange coloured, inflated fruit is conspicuous in many of the Kánara evergreens.

#### 8. DODONÆA, Linn.

Usually erect shrubs. Leaves alternate, exstipulate, usually simple. Flowers small, polygamous, or unisexual. Inflorescence various, terminal or axillary. Sepals 5-2, imbricated or valvate. Petals 0. Stamens 10-5, usually 8, on the outer side of the disk. Disk small or inconspicuous. Ovary 3-6-sided and celled; style 3-6-sided, 3-3-cleft at the apex. Capsule membranous, septicidally 2-6-valved, valves winged at the back, cells 1-2-seeded. Seeds with a thickened funicle, exarillate; embryo spirally involute.

*D. viscosa*, Linn. Mant. Pl. Alt. 228; Fl. Br. I. 1. 697; Brandis For. Fl. 113; Bedd. Fl. Sylv. 75. *D. Burmanniana*, Dalz. & Gibs. Bomb. Fl. 36. *Lutchmi*, *paorki*, M.; *Bundurgi*, K.

Throughout the drier parts of India, very common and gregarious over large areas of the Deccan, common in the dry districts of the Bombay Presidency and Sind; outside India it is found in Africa, Australia, America, China, Polynesia, &c.

Fl. R. S. Fr. R. & C. S. Wood hard, yellowish-brown, close-grained. Distinct rings of growth marked by fine white lines. Med. rays fine, white, numerous. Used for engraving, tool handles and walking sticks.

#### 9. TURPINIA, Vont.

Glabrous trees or shrubs. Leaves opposite, oddpinnate, leaflets stipulate, serrulate, subcoriaceous. Flowers small, in terminal or axillary panicles, regular, hermaphrodite. Calyx 5-partite, imbricated. Petals 5, imbricated. Stamens 5, inserted outside the disk. Disk lobed or granulate. Ovary sessile, 3-lobed and 3-celled; styles 3,

distinct or united; ovules 2 in each cell or many in 2 series, anatropal. Fruit subglobose, indehiscent, 3-celled. Seeds angular, exarillate, testa hard, shining, albumen fleshy, embryo straight.

*T. pomifera*, DC. Prod. II. 3; Fl. Br. I. 1. 698. *T. nepalensis*, Wall. Bedd. Fl. Sylv. t. 159. Gamble Ind. Timbers. 102.

Himalayas from Nepal eastwards, Assam, Cachar and Burma; Western Peninsula from the Konkan southwards. In the evergreen forests of the North Kánara gháts, abundant near Sirsi. Fl. Dec.-Jany. Fr. H. S. Flowers white, sweet-scented.

A large tree with thin, grey, smooth bark. Wood grey, soft, even-grained; weighs about 30 lbs. to the cub. ft.

### ORDER 33. SABIACEÆ.

Shrubs or trees, rarely climbers. Leaves alternate, simple or pinnate. Flowers small, hermaphrodite or polygamous; inflorescence usually a panicle. Calyx 4-5-partite, imbricate. Petals 4-5, equal or unequal, opposite to or alternating with the sepals. Disk small, annular. Stamens 4-5, opposite the petals, inserted at the base of or on the disk, usually 2 only perfect and 3 without anthers. Ovary 2-3-celled, compressed or 2-3-lobed; styles 2-3, free or connate or 0, stigmas punctiform; ovules 1-2 in each cell. Ripe carpels 1-2, drupaceous or dry, endocarp crustaceous or bony, albumen 0 or scanty.

#### MELIOSMA, Blume.

Trees or shrubs, usually pubescent or tomentose. Flowers minute, in large thyrsoid panicles. Sepals 4-5. Petals as many, very unequal, the 2 smaller, interior, behind the fertile stamens, sometimes 2-cleft. Stamens 2, fertile and 3, deformed, broad, opposite the larger petals, 2-fid with 2 empty cells. Disk annular, toothed. Ovary sessile, 2, rarely 3-celled, surrounded at the base by the cup-shaped, membranous disk, with 2 horizontal or pendulous ovules in each cell. Drupe obliquely globular, stone bony or crustaceous, 1 rarely 2-celled.

*M. Wightii*, Planch. in Herb. Hook. ; Fl. Br. I. 2. 4 ; Brandis For. Fl. 116. *M. pungens*, Wall. ; Bedd. Fl. Sylv. 77. Hill Mango.

A large tree of the W. Gháts, above 5000 ft. elevation, not indigenous in the Bombay Presidency. Leaves hard, coriaceous, lanceolate, distantly toothed.

### ORDER 34. ANACARDIACEÆ.

Trees or shrubs. Leaves simple or compound, usually alternate exstipulate. Flowers usually regular, unisexual or hermaphrodite. Calyx 3-5-partite. Petals as many as calyx divisions. Disk usually annular. Stamens as many, often twice as many, as the petals, inserted under the base of the disk, all perfect or variously imperfect. Ovary unilocular (in *Spondias* 5-celled), superior or half inferior; ovules solitary in the cells, pendulous from the top or wall or from an

ascending basal funicle; styles 1-4. Fruit a drupe, 1-5-celled and seeded. Seeds exalbuminous. Cotyledons usually plano-convex, fleshy, radicle short, straight or incurved, superior or inferior.

Fruit 1-celled, 1-seeded.

Ovules pendulous from an ascending basal funicle.

Leaves palmately trifoliolate or compound ... 1. RHUS.

Leaves simple, alternate.

Peduncle not enlarged in fruit.

Stamens 1-5. Fruit a large fleshy drupe with a compressed fibrous stone ... 2. MANGIFERA.

Stamens 10. Fruit a small drupe with a crustaceous or bony stone ... 3. BUCHANANIA.

Peduncle enlarged in fruit ... 4. ANACARDIUM.

Ovules pendulous from the top of the cell or from the walls of the ovary above the middle.

Leaves pinnate.

Petals valvate. Stamens 10, style 1 ... 5. SOLENOCARPUS.

Petals imbricate. Stamens 8-10, styles 3-4. 6. ODINA.

Leaves simple.

Stamens 5.

Petals imbricate. Styles 3. Disk broad, annular ... 7. SEMECARPUS.

Petals valvate. Styles 3-5. Disk lining the calyx-tube ... 8. HOLIGARNA.

Stamens 4.

Style 1, short. Disk annular, 4-5-lobed ... 9. NOTHOPEGIA.

Fruit 2-5-celled, 2-5-seeded.

Ovules pendulous in the cells. Leaves alternate,

oddpinnate ... 10. SPONDIAS.

### 1. RHUS, Linn.

Trees or shrubs with resinous, often acrid juice. Leaves alternate, pinnate or 1-3-foliolate, rarely simple, exstipulate. Flowers small, white or greenish, generally dioecious, in axillary or terminal panicles. Calyx small, 4-6-partite, persistent, imbricate. Petals as many as the sepal-lobes, deciduous, equal, inserted on the base of the calyx, outside the disk. Disk fleshy, annular or 5-lobed, adnate to the base of the calyx. Stamens 5, free, inserted on or under the edge of the disk; anthers imperfect in the fem. flowers. Ovary sessile, ovoid or globose, 1-celled; styles 3, short or long; ovule solitary, anatropous, suspended from a long, filiform basal funicle. Drupe small, dry, compressed, stone bony or crustaceous; albumen 0; cotyledons flat, radicle curved, short, superior.

*R. mysorensis*, Hayne; W. & A. Prod. 172; Fl. Br. I. 2. 9; Brandis For. Fl. 119; Bedd. Fl. Sylv. 78.

N. W. India, Sind, Punjab, W. Peninsula, throughout the dry Deccan districts, Mysore, common in the small forest at the base of the Bababuden Hills. Fl. Feb., Fr. April. Bark thin, brownish. Wood hard, yellowish, close-grained, heavy. Pores moderate sized, evenly distributed. Med. rays fine, numerous, wavy. The bark contains 15 per cent. of the tannic acid. Gives a fine brown colour to leather.

## 2. MANGIFERA, Linn.

Trees. Leaves alternate, coriaceous, entire. Flowers small, polygamous, in terminal panicles. Calyx 4-5-partite, segments imbricate, deciduous. Petals 4-5, free or adnate to the disk, imbricate. Stamens 4-5, inserted on the disk, one only perfect, much larger than the others. Ovary sessile, 1-celled, oblique; style simple, lateral, ovule 1, pendulous, attached to the side of the cell above the base. Fruit a large fleshy drupe; stone compressed, fibrous, testa papery; cotyledons plano-convex often unequal and lobed; radicle inferior.

*M. indica*, Linn. Fl. Br. I. 2. 13; Dalz. & Gibs. Bomb. Fl. 51; Brandis For. Fl. 125; Bedd. Fl. Sylv. t. 162. The Mango Tree. *Mavina mara*, K.; *Amba*, M.

Tropical Himalaya alt. 1—3000 ft. from Kumaon to Bhutan, Behar, Khasia Mts., Burma, Oudh and the Western Peninsula from Khândesh southwards. In the evergreen forests of the Konkan and N. Kánara gháts, usually cultivated throughout the Presidency and Sind for its fruit. Bark thick, brown or blackish, rough. Wood dull-grey, with darker patches, soft, open grained. Weighs 38—44 lbs. to the cub. ft. Used for planking, canoes &c. The bark, leaves and seeds are astringent and contain tannin, used in native medicine.

## 3. BUCHANANIA, Roxb.

Trees. Leaves simple, coriaceous, villous or glaucous. Panicles terminal. Flowers small, hermaphrodite. Calyx 3-5-lobed, persistent. Petals 4-5, oblong, imbricate in bud. Disk between the ovaries and the stamens, orbicular, 5-lobed. Stamens 10, inserted outside the disk at its base; anthers basi-fixed. Carpels 5-6, distinct, in cavity of disk, only 1 fertile, 1-celled, 1 ovule, attached to a funicle proceeding from the base of the ovary. Drupe with a bony stone, 2-valved.

Leaves and panicles villous	...	...	1. <i>B. latifolia</i> .
Leaves and panicles glabrous	...	...	2. <i>B. angustifolia</i> .

1. *B. latifolia*, Roxb. Fl. Ind. II. 385; Fl. Br. I. 2. 23; Bedd. Fl. Sylv. t. 165; Brandis For. Fl. 127; Dalz. & Gibs. Bomb. Fl. 52. *Char. chirauli*, M.; *Nurkal*, K.; *Payal*, Vern.

Dry forests throughout India and Burma, Central and Southern India and the Western Peninsula. Fl. Jan.-Mch. Fr. Apl.-May. A moderate-sized tree. Trunk straight. Bark black, rough, tessellated with deeper regular cracks. Wood greyish-brown, even-grained, moderately hard, seasons well. Weighs about 33 lbs. to the cub. ft. Used for boxes, door and window frames, tables, and other furniture. The bark is used for tanning. The fruit is edible and the kernels resemble pistachio nuts and are used extensively in the manufacture of sweetmeats.

2. *B. angustifolia*, Roxb. Fl. Ind. II. 386; Fl. Br. I. 2. 23; Grah. Cat. Bomb. Pl. 41.; Wight Ic. t. 101.

Western Peninsula, Konkan from the Adjunta jungles, southwards to Ceylon. This seems to be a distinct species, but does not appear to

have been found in Bombay by any botanist since Graham. The flowers are described as quite glabrous in the Fl. Br. I. The ovaries are, however, represented as hairy in Wight's Icones, t. 101. Specimens collected by Mr. J. S. Gamble near Cuddapah, Madras Presidency, in July, have the flowers quite glabrous. The small leaves have slender petioles.

#### 4. ANACARDIUM, Rottl.

Trees or shrubs. Leaves petioled, simple. Panicle terminal, bracteate. Calyx 5-partite, segments erect, imbricate, deciduous. Petals 5, linear-lanceolate recurved, imbricate. Disk erect. Stamens 8-10; filaments connate and adnate to disk, all or some fertile. Ovary obovoid; style filiform excentric; stigma minute, ovule 1. Nut kidney-shaped, on enlarged disk and peduncle; pericarp cellular and full of oil. Seed kidney-shaped, testa membranous, adherent; cotyledons semi-lunar; radicle short, hooked.

*A. occidentale*, Linn. Fl. Br. I. 2: 20; Dalz. & Gibs. Bomb. Fl. Suppl. 18; Bedd. Fl. Sylv. t. 163. *Godámbe*. K.; *Kaju*, M.; *Geru mavu* in Dhárwár; *Hijuli-badam* or Cashewnut.

Naturalized throughout the Presidency; very common near the seashore in open situations. A native of S. America.

Wood red, moderately hard, shining, close-grained. Pores large. Med. rays indistinct. Weighs 38 lbs. to the cub. ft. Used for boat building, &c. A light yellow bland oil is extracted from the kernels of the seed and is considered superior to olive oil. From the pericarp or shell a black, acrid oil, used to colour fishing nets, is prepared. These oils are used in native medicine. Yields the edible cashewnut. The fleshy stalk is also eaten as fruit. The bark is astringent.

#### 5. SOLENOCARPUS, Wt. & Arn.

A tree. Leaves oddpinnate, leaflets opposite, glabrous, crenulate. Flowers small, hermaphrodite in terminal panicles. Calyx minute, 5-toothed, at length deciduous. Petals 5, oblong, valvate. Stamens 10, inserted at the base of the annular disk; filaments elongated, filiform; anthers versatile. Ovary oblong-ovoid, unilocular, sessile, ovule pendulous from near the top of the cell; style thick, clavate, obliquely truncate at the apex. Fruit a small, compressed, obliquely-oblong, truncate drupe, pericarp cellular, full of oil; endocarp bony; cotyledons linear, planoconvex; radicle short, thick, superior.

*S. indica*, Wt. & Arn. Prod. l. 171; Fl. Br. I. 2: 27; Bedd. Fl. Sylv. t. 233.

Western Peninsula from N. Kánara southwards to Malabar, Travancore and the Anamullays ascending to 2,500 ft. in the evergreen forests near Yellapore, N. Kánara, rare. Flowers in Nov. Fruit Jany.-Feb.

## 6. ODINA, Roxb.

Trees. Leaves oddpinnate, deciduous, leaflets opposite, quite entire. Flowers small, shortly pedicelled, monœcious or diœcious, fascicled, in terminal panicles. Calyx 4-5-lobed, persistent. Petals 4-5, imbricate. Disk annular, lobed. Male fl. Stamens 8-10, inserted within the disk. Ovary 4-5 parted. Fem. fl. Ovary sessile, oblong, 1-celled; styles 3-4, stout, stigmas simple, ovule pendulous from near the top of the cell. Drupe small, red; stone hard. Seed compressed; embryo curved; cotyledons flat, fleshy; radicle superior.

O. Wodier, Roxb. Fl. Ind. II. 293; Fl. Br. I. 2. 29; Bedd. Fl. Sylv. t. 123; Dalz. & Gibs Bomb. Fl. 51; Brandis For. Fl. 123. *Gugul*, K.; *Moce*, *shembat*, *shimti*, M.; *Moina*, Vern.

Throughout the hotter parts of India, Assam, Burma, Andamans and Ceylon, common throughout the Presidency in deciduous forests, Fl. Feb.-Apl., Fr. July-Aug. A moderate-sized tree. Bark ash-coloured, thick, scaly, inner bark red, mucilaginous. Wood (heartwood) red, heavy; sapwood large, white. Pores moderate-sized, equally distributed. Med. rays fine, equal, short, distinct. Annual rings visible. Weighs 60 lbs. to the cub. ft. Used for sugarcane presses, &c. Yields a yellowish gum used in medicine. Bark contains 9 per cent. of tannin.

## 7. SEMECARPUS, Linn. F.

Trees. Leaves simple, entire, coriaceous. Flowers small, polygamous or diœcious, in terminal panicles. Calyx 5-6-fid, segments deciduous. Petals 5-6, imbricate. Disk broad, annular. Stamens 5-6, inserted at the base of the disk, imperfect in the fem. flowers. Ovary 1-celled; styles 3; ovule pendulous from a basal funicle. Drupe fleshy, seated on thickened disk and calyx base; pericarp filled with acrid resin. Seed pendulous, testa coriaceous, inner coat somewhat fleshy; embryo thick; cotyledons plano-convex; radicle superior.

S. *Anacardium*, Linn. f. Fl. Br. I. 2. 30; Dalz. & Gibs. Bomb. Fl. 52; Bedd. Fl. Sylv. t. 166; Brandis For. Fl. 124; Wight Icones. t. 558. Marking Nut Tree. *Bibha*, M.; *Gero*, *oor-gero*, *ger*, K.

Sub-Himalayan tract from the Sutlej eastwards ascending to 3500 ft.; throughout the hotter parts of India, absent from Burma. Throughout the Presidency in dry forests, locally abundant. Flowers at various times. Fruit Nov. to Feb. The variety *cuneifolia*, DC. *Bibu*, M., is found on the ghâts near Khandala. Fl. Dec. Grah. Cat. Bomb. Pl. 41. A moderate-sized tree. Bark rough, dark-coloured, exfoliating in irregular patches; inner bark fibrous. Wood greyish-brown, often with yellow streaks, soft. Pores scanty, subdivided. Med. rays numerous, moderately broad, reddish. Average weight per cub. ft. 37 lbs. The woodcutters object to felling this tree owing to the acrid juice it contains. The fleshy hypocarp of the fruit is eaten. The acrid juice of the pericarp is used in native medicine and for making marking ink.

## 8. HOLIGARNA, Ham.

Large trees. Leaves simple, alternate, entire, coriaceous; petiole with 2-4, deciduous appendages. Panicles axillary or terminal. Flowers small, crowded, diœcious. Calyx 5-toothed, tube cup-shaped. Petals 5, villous in front. Disk lining the calyx-tube. Stamens 5, on the edge of the disk. Ovary inferior, 1-celled; styles 3-5, terminal; ovule pendulous from the top of the cell. Drupe ovoid with resinous, acrid pulp, stone coriaceous. Seed with a membranous testa; cotyledons planoconvex; radicle minute, next the hilum.

Leaves large or medium-sized; quite glabrous, stipular appendages 2. Fruit altogether included in the torus.

Leaves cuneate-obovate, usually acute, about 9 in. long, nerves about 18 pairs. Disk conspicuous in the male fl., lobed ... 1. *H. Arnottiana*.

Leaves obovate, usually obtuse, about 6 in. long, nerves about 10 pairs. Disk in male fl. inconspicuous ... 2. *H. ferruginea*.

Leaves very large, pubescent beneath, stipular appendages usually 4. Fruit nearly included in the torus, 1/6th free ... 3. *H. Grahamii*.

1. *H. Arnottiana*, Hook. f. Fl. Br. I. 2. 36; Dalz. & Gibs. Bomb. Fl. 51; Bedd. Fl. Sylv. t. 167. *Holigar*, *hoolgeri*, K.; *Sudrabilo*, M.

Western Peninsula from the Konkan southwards. In the evergreen forests of the Konkan and North Kánara, common. Fl. Jan.-Feb. Fr. June-July.

A large evergreen tree. Wood grey, with large yellow patches rather lustrous and satiny, soft. Pores large and medium, scattered, appearing as long dark lines on the longitudinal section. Med. rays medium-sized, rather short, close and numerous. Weighs 32 lbs. to the cub. ft. Used in N. Kánara for native boats, and would do well for light packing cases, cigar boxes and such like uses. The structure of the wood is very similar to that of *H. longifolia*, Roxb. Described by Gamble in his Indian Timbers.

2. *H. ferruginea*, Marchand Rev. Anacard. 171; Fl. Br. I. 2. 37; Monogr. Phaner. Prod. DC. Anacard. Eng. 499.

Western Peninsula from the Konkan southwards, common along the coast, where it takes the place of *H. Arnottiana*, with which species it has often been confounded. Fl. March-May. Fr. Rainy season. It has the same native names as the foregoing species. In my specimens the flowers are, if anything, smaller than those of *H. Arnottiana*, and the buds not so ferruginous as in that species.

3. *F. Grahamii*, Hook. f. Fl. Br. I. 2. 37. *Semecarpus Grahamii*, Dalz. & Gibs. Bomb. Fl. 52. *Bipte*, *balwuli*, M.

Western Peninsula, Konkan and N. Kánara, common in the evergreen forests of the Belgaum Gháts. Fl. Jan.-Feb. Fr. May-June.



Attains a considerable size, Trees 100 ft. high and 3-4 ft. in diameter are not uncommon in the N. Kánara evergreen forests.

Bark smooth, thin, grey (no rhytidome), covered with scattered, raised lenticular corky cells; inner bark reddish, hard, often fibrous. Green parenchyma soon disappearing. Wood very similar in structure to that of *H. Arnottiana*.

#### 9. NOTHOPEGIA, Blume.

Trees. Leaves alternate or opposite, subcoriaceous or coriaceous, petioled, entire. Flowers polygamous, small, shortly pedicelled or sessile, in axillary panicles, shorter than the leaves. Calyx 4-5-fid, persistent. Petals 4-5, imbricate, longer than the calyx, inserted at the base of the disk. Disk annular, 4-5-lobed. Stamens 4-5, filaments hairy. Ovary sessile, ovoid, 1-celled; ovule pendulous from near the top of the cell; style very short; stigma indistinctly 3-lobed. Drupe fleshy, striate; seed oblong, pendulous, testa membranous; embryo exalbuminous; cotyledons plano-convex; radicle superior.

N. *Colebrookiana*, Blume Mus. Bot. 1. 203; Fl. Br. I. 2. 40; Bedd. Fl. Sylv. t. 164. *Glycycaarpus racemosus*, Dalz. & Gibs. Bomb. Fl. 51. *Amberi*, Vern.; *Sonemau*, M.; *Ambatti*, *ulagera*, *mattingar*, K.

Western Peninsula from the Konkan and N. Kánara southwards to Ceylon. Common in the evergreen forests of the Konkan and N. Kánara gháts. Fl. Jan.-Mch. Fr. Mch.-May. A small or moderate sized tree.

Wood grey or reddish grey, hard, compact, smooth. Pores small, uniform, single or 2 or 3 in a radial row. Med. rays fine, close, white, distinct. Annual rings marked by concentric fine white continuous lines of white tissue. Weighs about 47 lbs. to the cub. ft.

#### 10. SPONDIAS, Linn.

Trees. Leaves oddpinnate, leaflets usually caudate acuminate. Flowers polygamous, small, in terminal panicles. Calyx 4-5-fid. Petals 4-5, spreading. Disk cupular, crenate. Stamens 8-10, inserted beneath the disk. Ovary free, 4-5-celled; ovules solitary, pendulous in the cells; styles 4-5, conniving; stigmas shortly spatulate. Drupe fleshy with a hard thick stone, 1-5-celled. Seeds pendulous; testa membranous; embryo straight, cotyledons elongate, plano-convex; radicle short, superior.

Leaflets 4-6 pairs, entire, not caudate. Fruit	
rough, fibrous ... ..	... 1. <i>S. mangifera</i> .
Leaflets 5-8 pairs, crenate-serrate, caudate-acuminate. Fruit smooth ... ..	... 2. <i>S. acuminata</i> .

1. *S. mangifera*, Willd.; DC. Prod. II. 75. Bedd. Fl. Sylv. t. 169; Dalz. & Gibs. Bomb. Fl. Suppl. 19; Brandis For. Fl. 128. Hog Plum. *Ambada*, M.; *Amate*, K.

Common in many parts of India, usually in dry forests, often planted; throughout the Presidency, usually in dry forests; common in North Kánara from the sea-coast inland. Fl. Feb.-Apr. Fr. ripe next Nov.-Dec.

A moderate sized tree, sheds its leaves early in the year. The flowers appear when the trees are quite bare, during the hot season. They are then conspicuous objects near villages both in N. Kánara and the Konkan. The fruit ripens during the next cold season. Bark smooth, grey, thick. Wood soft, light-grey, coarse-grained; weighs about 30 lbs. to the cub. ft. Yields a mild, tasteless gum which exudes from wounds made in the bark. During the cold and hot seasons the fruit is greedily eaten by squirrels, monkeys and deer. The ripe fruit has an acid and astringent flavour, it is sometimes pickled. The bark is used for tanning.

2. *S. acuminata*, Roxb. Fl. Ind. II. 453; Fl. Br. I. 2. 42; Grah. Cat. Bomb. Pl. 42. *Ambut, ambada*, M.; *Kodambada*, K.

Western Peninsula from the Konkan southwards, common in some of the N. Kánara evergreen forests. A moderate sized tree, does not shed its leaves until March or April. The young leaves and panicles of flowers, which are not so large or spreading as those of *S. mangifera*, appear together during March and Apr. Fruit ripe next Jan.-Feb. Bark rough, grey. Rhytidome in broad, flat, plates; inner bark thick, red, soft, fleshy. Wood grey soft, light. Pores large, simple or subdivided. Med. rays fine or medium, short. Weighs 37 lbs. to the cub. ft. The young leaves when crushed have a peculiar smell.

#### ORDER 35. MORINGEÆ.

Trees. Leaves alternate, impari, bi or tripinnate; pinnæ and leaflets opposite. Flowers bisexual, in axillary panicles. Calyx cup-shaped, 5-cleft; segments unequal, petaloid. Petals 5, unequal. Stamens inserted on the edge of the disk, declinate, 5, perfect, opposite the petals, alternating with 5-7 filaments without anthers; anthers 1-celled. Disk lining the calyx-tube. Ovary stipitate, lanceolate, 1-celled, with 3 parietal placentas; style simple, slender; stigma perforated; ovules numerous. Capsule pod-shaped, rostrate, 3-6-angled, torulose, 1-celled, 3-valved, corky and pitted within. Seeds many, in pits of the valves, testa corky, winged or 0; albumen 0; embryo with a many-leaved plumule.

#### MORINGA, Lamk.

Only genus, with characters those of the order.

Leaflets small, nerves obscure. Petals white ..1. *M. pterygosperma*.  
 Leaflets large, nerves 4-6 pairs, distinct. Petals  
 streaked with pink ... ..2. *M. concanensis*.

1. *M. pterygosperma*, Gært. DC. Prod. II. 478; Fl. Br. I. 2. 45; Brandis For. Fl. 129; Bedd. Fl. Sylv. t. 80; Dalz. & Gibs. Bomb. Fl. 314. *Shevgi*, M.; *Nuggi mara*, K.; *Shivaga, shegla, segavas, egata*, Vern. Horse Radish Tree.

Forests of the Western Himalaya and Oudh, cultivated elsewhere throughout India. Fl. Jany.-Apl. Fr. Apl. onwards. Bark grey, corky, with longitudinal cracks. Wood soft, white, spongy. Fruit used as a vegetable. The root is used as a substitute for horse-radish.

2. *M. concanensis*, Nimmo in Grah. Cat. Bomb. Pl. 43; Fl. Br. I. 2. 45; Brandis For. Fl. 130; Dalz. & Gibs. Bomb. Fl. 311. *Mhúa*, Sindhi.

Rajputana, Sind, and the Konkan (Thána District). Fl. Nov.-Dec. Fr. Dec. onwards. A tree with thick, soft, corky bark. Wood white, soft, useless as a timber.

### ORDER 36. CONNARACEÆ.

Shrubs or trees, climbing or erect. Leaves alternate, exstipulate, 1-3-foliolate or odd-pinnate. Flowers bisexual, in racemes or panicles. Calyx 5-divided, usually persistent, imbricate or valvate. Petals 5. Stamens 5-10, sometimes declinate, those opposite the petals often shorter and imperfect; filaments frequently connate at the base. Carpels 5, rarely more or less, hairy, 1-celled; styles subulate or filiform; stigmas capitellate, simple or lobed; ovules 2, collateral. Fruit of 1, rarely 2-3, sessile or stalked, usually 1-seeded follicles. Seed arillate or not, aril various; cotyledons fleshy in the exalbuminous, leafy in the albuminous seeds, radicle superior.

Calyx accrescent.	Capsule sessile	...	...	1. ROUREA.
Calyx not accrescent.	Capsule pedicellate	...	...	2. CONNARUS.

#### 1. ROUREA, Aubl.

Trees or shrubs. Leaves odd-pinnate. Panicles axillary. Sepals 5, orbicular, imbricate, accrescent in fruit. Petals 5. Stamens 10; filaments connate at the base. Ovaries 5-4, usually imperfect; styles 4-5 slender. Fruit a sessile, apiculate capsule. Seed erect, arillate, exalbuminous.

*R. santaloides*, W. & A. Prod. 144; Fl. Br. I. 2. 47; Dalz. & Gibs. Bom. Fl. 53. *Huleshadla balli*, K.

Western Peninsula from the Konkan to Travancore, Ceylon. In the forests of the Konkan and North Kánara. Fl. Dec.-Mch. Fr. Feb.-July.

A large climbing shrub, branches sometimes developed into stout tendrils. Seed surrounded with a transparent fleshy arillus. Wood of abnormal structure. Central cylinder of reddish, tough, moderately hard wood, surrounded with a moderately thick red bark. Pores small and scanty near the pith, large and numerous near the edge. Outside the central cylinder are woody bodies of similar structure surrounded also with bark. Resembles the structure of *Sergania*, (*Sapindacæe*) figured by Duchatre in his *Elements de Botanique*, p. 240.

#### 2. CONNARUS, L.

Trees or shrubs. Leaves odd-pinnate; leaflets usually 5. Flowers small in axillary and terminal branched panicles. Sepals 5, not

acrescent, imbricate. Petals 5, ligulate, slightly dilated upwards. Stamens 10, five shorter and sometimes without anthers. Ovaries 5, densely pubescent, four usually imperfect or obsolete, the fifth with a slender style, stigma capitellate. Capsule oblique, inflated, broader upwards; valves glabrous or pubescent within; seeds arillate, albumen 0, testa shining.

*C. monocarpus*, Linn.; Fl. Br. I. 2. 50. *C. pinnatus*, Lamk. W. & A. Prodr. 143; Grah. Cat. Bo. Pl. 35; Dalz. & Gibs. Bomb. Fl. 53. *Sundar*, M.

From the Konkan to Travancore, Ceylon, Dalzell says "common on the southern gháts." The following two species are common on the Konkan and N. Kánara gháts, and in my opinion are very closely allied if not the same species. I don't know *C. monocarpus*, if different from *C. Wightii*, and *C. Ritchiei*.

*C. Wightii*, Hook. f. Fl. Br. I. 2. 51. *Kokani*, *kutkuta*, M.

Western Peninsula from the Konkan southwards. Usually an erect shrub, with a pink and yellow capsule ribbed along the dorsal suture, valves sparsely hairy within, shining, 1-seeded.

*C. Ritchiei*, Hook. f. Fl. Br. I. 2. 51.

Western gháts of the Konkan, N. Kánara and Belgaum districts, common on the Rám ghát.

A fine climber with stems about 4 in. in diameter at the base. Bark smooth, lenticellate,  $\frac{1}{4}$  in. thick; inner bark very red with much red juice like that of *Myristica attenuata*. Common in many of the evergreen forests of North Kánara. Capsule yellowish-pink, 1-2-seeded, turns brown, dorsal suture scarcely ribbed, valves shining glabrous. I cannot see much difference in the shape of the capsule of this species as compared with that of *C. Wightii*.

Both these species flower abundantly from Feb.-Apl. Fr. May-June.

#### ORDER 37. LEGUMINOSÆ.

Herbs, shrubs or trees. Leaves usually alternate, stipulate, simple or compound. Inflorescence racemose or paniced. Flowers bracteate, regular or irregular, hermaphrodite or polygamous. Sepals 5. Petals 5. Stamens 10 or numerous; filaments free or combined. Ovary free, consisting of a single carpel; style simple, ovules 1 or more on the ventral suture. Fruit a pod, dehiscent or indehiscent. Seeds usually exalbuminous; cotyledons large; radicle short.

A large family of great importance to the forester, yielding many excellent timbers and other valuable commercial products.

PAPILIONACEÆ. Corolla papilionaceous. Petals irregular, imbricated, the upper or standard outermost, the four others in opposite pairs. Stamens definite.

*Genisteæ*.—Stamens monadelphous. Pod dehiscent, not jointed. Leaves simple or digitately trifoliolate.

Anthers dimorphous ... .. 1. CROTALARIA.

*Galegeæ*.—Stamens diadelphous. Pod not jointed. Leaves imparipinnate, leaflets entire.

Hairs fixed by the centre. Anthers apiculate ... .. 2. INDIGOFERA.

Hairs basifixed. Anthers obtuse.

Pod few-seeded.

Filaments filiform ... .. 3. MILLETTIA.

Filaments dilated ... .. 4. MUNDULEA.

Pod many-seeded ... .. 5. SESBANIA.

*Hedysareæ*.—Stamens diadelphous or monadelphous. Pod jointed if more than 1-seeded. Leaves oddpinnate.

Leaves exstipellate.

Stamens diadelphous, 9-1 ... .. 6. ALHAGI.

Stamens monadelphous ... .. 7. STYLOSANTHES.

Leaves stipellate.

Racemes in fascicles from the old wood ... .. 8. OUGEINIA.

Racemes simple or paniced from the year's shoots ... .. 9. DESMODIUM.

*Vicieæ*.—Stamens diadelphous (the tenth abortive in *Abrus*). Pod dehiscent, not jointed. Leaves equally pinnate, petiole ending in a bristle or tendril.

Stamens 9. Leaflets numerous ... .. 10. ABRUS.

*Phaseoleæ*.—Stamens monadelphous or diadelphous. Pod dehiscent, not jointed. Leaves usually pinnately trifoliolate, stipellate. Usually climbers, rarely trees.

Leaves not gland-dotted.

Pod usually several seeded, not samaroid. Petals very unequal.

Keel longest. Anthers dimorphous. Climbers with irritating bristles ... .. 11. MUCUNA.

Standard longest. Anthers uniform. Prickly trees ... .. 12. ERYTHRINA.

Petals equal.

Calyx 2-lipped, glabrous. Glabrous climbers ... .. 13. CANAVALLIA.

Calyx campanulate, not lipped, silky. Pubescent climbers ... .. 14. PUERARIA.

Pod 1-seeded, like a reversed samara.

Flowers small, paniced. Large climbers ... .. 15. SPATHOLOBUS.

Flowers large, racemose. Erect tree or climbers ... .. 16. BUTEA.

Leaves gland-dotted beneath. Stamens diadelphous.

Ovules 3 or more.

Seeds arillate ... .. 17. ATYLOSIA.

Seeds not arillate ... .. 18. CAJANUS.

- Ovules 1-2.
- Calyx teeth accrescent ... 19. CYLISTA.
- Calyx teeth not accrescent.
- Leaves pinnate ... 20. RYNCHOSIA.
- Leaves digitately trifoliolate or simple ... 21. FLEMINGIA.
- Dalbergiææ.* — Stamens monadelphous or diadelphous. Pod continuous, indehiscent.
- Leaves oddpinnate.
- Leaflets alternate.
- Flowers small, usually white ... 22. DALBERGIA.
- Flowers large, yellow ... 23. PTEROCARPUS.
- Leaflets opposite.
- Pod compressed, not winged ... 24. PONGAMIA.
- Pod thin, winged ... 25. DERRIS.
- Sophorææ.* — Stamens free. Pod not jointed.
- Leaves oddpinnate, rarely simple.
- Leaves oddpinnate. Pod moniliform. 26. SOPHORA.
- CÆSALPINIÆÆ.** Petals imbricate, slightly unequal, the upper innermost in bud. Stamens definite.
- Eucasalpiniaææ.* — Leaves ample, abruptly bipinnate. Calyx-disk sub-basal.
- Sepals imbricate.
- Sutures of pod not winged ... 27. CÆSALPINIA.
- Upper suture of pod winged ... 28. MEZONEURON.
- Sepals valvate.
- Unarmed trees. Pod thin, flat ... 29. POINCIANA.
- Spinous tree. Pod turgid ... 30. PARKINSONIA.
- Prickly climber. Pod sub-torulose ... 31. WAGATEA.
- Cassiaææ.* — Leaves simply pinnate. Calyx-tube short; disk sub-basal.
- Petals 5.
- Pod variable, usually many-seeded.
- Seeds exalbuminous ... 32. CASSIA.
- Pod thick, turgid, 1-seeded ... 33. CYNOMETRA.
- Petals 0.
- Pod samaroid, 1-seeded ... 34. HARDWICKIA.
- Amherstiaææ.* — Leaves equally pinnate. Calyx-disk at the top of a prolonged calyx-tube.
- Petals 0 ... 35. SARACA.
- Petals 3-5 ... 36. TAMARINDUS.
- Bauhiniaææ.* — Leaves simple, more or less 2-lobed ... 37. BAUHINIA.
- MIMOSÆÆ.** Petals regular, valvate, usually united above the base. Stamens definite or indefinite.
- Mimosaææ.* — Stamens usually 10.
- Anthers gland-crested.
- Flowers in globose heads. A tree. 38. XYLIA.
- Flowers in slender spikes.
- A climber with tendrils ... 39. ENTADA.
- An erect, unarmed tree ... 40. ADENANTHERA.
- Prickly trees. Pod turgid ... 41. PROSOPIS.
- Spinous trees. Pod thin ... 42. DICHROSTACHYS.
- Anthers not gland-crested.
- Pod continuous ... 43. LEUCENA.
- Pod jointed ... 44. MIMOSA.
- Acaciaææ.* — Stamens indefinite.
- Stamens free ... 45. ACACIA.
- Stamens monadelphous.
- Pod thin, ligulate ... 46. ALBIZZIA.
- Pod circinate ... 47. PITHECOLOBIUM.

1. CROTALARIA, Linn.

Herbs or shrubs. Leaves simple or 3-5-foliolate. Flowers racemose, often showy. Calyx with a short tube, teeth free or somewhat connate into 2 lips. Corolla included or exerted; keel incurved, distinctly beaked. Stamens monadelphous in a sheath, split dorsally; anthers dimorphous, alternately on short filaments versatile and on longer basifixed. Ovary usually sessile, style long, abruptly incurved at the base, bearded above, stigma oblique, small. Pod usually sessile, turgid or inflated, continuous within, 2-many-seeded.

Leaves simple.

A firm-branched under-shrub with rigid, small, scattered leaves. Pod oblong, slightly exerted ... 1. *C. Burhia*.  
Under-shrubs with silky or pubescent foliage.

Stipules 0 or small. Racemes terminal. Pods glabrous, exerted.

Stipules subulate, very minute. Bracts subulate ... 2. *C. retusa*.

Stipules leafy, persistent. Bracts ovate, foliaceous ... 3. *C. sericea*.

Stipules lanceolate, minute. Bracts ovate, persistent ... 4. *C. Leschenaultii*.

Erect shrubs. Leaves silky or pubescent. Flowers in terminal or lateral racemes or panicles. Pod silky or velvety, exerted or not.

Flowers racemed. Pods exerted.

Stipules small, 1-2, lunate. Bracts minute, subulate. Pod clothed with fine deciduous pubescence ... 5. *C. Heyneana*.

Stipules 0 or minute, subulate. Bracts lanceolate, very minute. Pod densely velvety ... 6. *C. leptostachya*.

Stipules 0 or minute, subulate. Bracts minute, linear. Pod clothed with short spreading, persistent, silky hairs ... 7. *C. juncea*.

Flowers panicked.

Stipules 0 or minute, subulate. Bracts ovate, cuspidate. Pod small, silky, included ... 8. *C. fulva*.

Leaves trifoliolate.

Stipules and bracts minute, setaceous. Pod glabrous, exerted ... 9. *C. striata*.

1. *C. Burhia*, Hamilt. in Wall. Cat. 5386; Fl. Br. I. 2. 66; Brandis For. Fl. 144. *Ghagri*, M.; *Ghugharo*, Guz.; *Drunnu*, Sind.; *Sis, sissai*, Vern.

Punjab, Rajputana and Cambay ascending to 4000 ft. Common in the plains of Sind in dry sandy places. Fl. Nov.-Mch.

Yields a fibre suitable for cordage.

2. *C. retusa*, L. Fl. Br. I. 2. 75. *Gagri*, M.

Tropical India from the Himalayas to Ceylon. Fl. Feb.-Mch.

A robust under-shrub.

3. *C. sericea*, Retz. Fl. Br. I. 2. 75.

Same habitat as *C. retusa*, L., cultivated in Punjab gardens. Throughout the deciduous forests of N. Kánara. Fl. & Fr. C. S.

4. *C. Leschenaultii*, DC. Fl. Br. I. 2. 76. *Dyli, dingala*, M.

Mahábaleshwar and the higher western gháts. Said to be used in Sátára for paper making.

5. *C. Heyneana*, Grah. in Wall. Cat. 5414; Fl. Br. I. 2. 78.

An under-shrub in the ghát forests of the Western Peninsula from the Konkan to Travancore.

6. *C. leptostachya*, Benth. in Hook. Lond. Journ. 2. 562; Fl. Br. I. 2. 78.

Western Peninsula, Konkan.

7. *C. juncea*, L.; Fl. Br. I. 2. 79. *C. tenuifolia*, Roxb. Fl. Ind. 546. *Santaag*, Bomb. *Sini, tagsan*, Sind. *Sanabu, pundi*, K. *Sunn* or Indian Hemp; Bombay or Sálsette Hemp.

Doubtfully indigenous in India; cultivated throughout North Kánara; also in the Deccan, Konkan and Sind. Yields a valuable fibre, made into cordage, coarse cloth and paper.

8. *C. fulva*, Roxb. Fl. Ind. 3. 266; Fl. Br. I. 2. 80.

Western Peninsula, in the ghát forests from the Konkan southwards. A tall bushy species, densely clothed with brown silky hairs, abundant in the moist forests along the gháts of North Kánara. Fl. Fr. C. S.

9. *C. striata*, DC. Prodr. II. 131; Fl. Br. I. 2. 84.

Himalayas to Ceylon and Malacca; common in open places near Sirsi, North Kánara. Fl. Fr. C. S. Scarcely a forest species.

## 2. INDIGOFERA, Linn.

Herbs or shrubs, more or less clothed with hairs fixed by the centre, often silvery-canescens. Flowers in axillary racemes. Calyx campanulate, small. Corolla with an obovate standard and a straight keel, spurred on each side near the base. Stamens diadelphous; anthers apiculate. Style short, incurved, stigma capitate, usually penicillate. Pod usually linear, cylindrical, more or less turgid.

Leaflets 3-5, alternate.

Pod 6-8, seeded, glaucous, torulose ... 1. *I. paucifolia*.

Leaflets many, opposite.

Flowers small.

Pod torulose, 3-4, seeded ... 2. *I. argentea*.

Pod not torulose, 8-12, seeded ... 3. *I. tinctoria*.

Pod torulose, tetraquetrous, 4-6, seeded ... 4. *I. constricta*.

Pod cylindrical stout, 8-12, seeded ... 5. *I. Wightii*.

Flowers larger.

Pod turgid, glabrous, 8-12, seeded ... 6. *I. pulchella*.



1. *I. paucifolia*, Delile; DC. Prod. II. 224; Fl. Br. I. 2. 97; Dalz. & Gibs. Bomb. Fl. 59.

Upper Gangetic basin; Arabia; Tropical Africa and Java. Throughout the dry plains of the presidency and Sind. Fl. & Fr. Sept.-Oct.

2. *I. argentea*, Linn.; DC. Prod. II. 224; Fl. Br. I. 2. 98. Var. *cœrulea*. *I. cœrulea*, Roxb. Fl. I. III. 377; Dalz. & Gibs. Bomb. Fl. 59. Sp. Brandis For. Fl. 136. Often called Wild Indigo; *Karu-nili*, K. Burma, Merwara and Sind. The var. *cœrulea*, is common in the dry plains of the Dhárwár district and generally throughout the dry plains of the presidency. Fl. June. Fr. Aug.-Sept. A shrub from which indigo may be extracted.

3. *I. tinctoria*, Linn.; DC. Prod. II. 224; Fl. Br. I. 2. 99; Dalz. & Gibs. Bomb. Fl. 59; Brandis For. Fl. 135. The Indigo Plant. *Nil*, Vern.; *Nili*, M.; *Gali*, Guz.; *Jil*, *nir*, Sind.

In open places near villages throughout the Konkan and North Kánara, Belgaum, &c.; doubtfully indigenous. Cultivated in Sind and Guzerat. Fl. Fr. Oct.-Jany. Yields the valuable Indigo dye, which has been supplied to commerce from India from time immemorial.

4. *I. constricta*, Trim. Syst. Cat. Fl. Pl. Ceylon. *I. flaccida*, var. *constricta*, Thw. Enum. 411; Fl. Br. I. 2. 99. Ceylon (Thwaites). In the moist forests of North Kánara; common on the Supa gháts. Fl. Oct.-Nov. Fr. Dec.-Jany. A large bushy shrub similar in habit to *I. pulchella*.

5. *I. Wightii*, Grah. in Wall. Cat. 5458; Fl. Br. I. 2. 99; Dalz. & Gibs. Bomb. Fl. 59. Western Peninsula, Ceylon, plains of the Deccan, Belgaum. A small gregarious, but very local shrub. Fl. Fr. Sept.-Oct.

6. *I. pulchella*, Roxb. Hort. Beng. 57; Fl. Ind. III. 382; Fl. Br. I. 2. 101; Dalz. & Gibs. Bomb. Fl. 60; Bedd. Fl. Sylv. 85. *Chinnati*, Vern.

Throughout the Himalayas and hills of India proper, ascending to 5000 feet in Kumaun. Throughout the Konkan and North Kánara from the sea-level upwards, usually in moist forests along the gháts. Fl. Dec.-Jan. Fr. ripe Feb.-Mch. A large, much-branched shrub; branches angled. Flowers bright-red or purplish. Pod linear, cylindrical, sharp pointed, deflexed. This species is common in deciduous forests, sometimes gregarious.

### 3. MILLETTIA, Wt. & Arn.

Usually climbing shrubs. Leaves imparipinnate. Flowers showy, in axillary racemes. Calyx campanulate with short teeth. Corolla much exerted, with long clawed petals and a broad standard. Stamens monadelphous or diadelphous with uniform anthers. Style filiform, incurved, with a capitate stigma. Pod few-seeded, turgid, sometimes torulose.

*M. racemosa*, Benth. Pl. Jung. 249; Fl. Br. I. 2. 105. *Wisteria pallida*, Dalz. & Gibs. Bomb. Fl. 61. *W. racemosa*, Dalz. & Gibs. Bomb. Fl. 61.

Tropical forests of the Western Peninsula from the Konkan southwards; Orissa; throughout the deciduous forests of the Konkan and North Kánara. Fl. Apl.-May. Fr. ripe next cold season. A large woody climber with red flowers. Pod late in dehiscing and breaking up into 1-seeded articles.

#### 4. MUNDULEA, DC.

Shrubs with thick, corky bark. Leaves imparipinnate. Flowers in dense terminal racemes. Calyx campanulate, teeth short. Corolla much exerted, standard with a long claw, keel incurved, obtusely pointed. Stamens monadelphous, alternate filaments slightly dilated; anthers uniform. Style filiform, stigma capitate. Pod large, linear, with thickened sutures.

*M. suberosa*, Benth. Pl. Jung. 248; Fl. Br. I. 2. 110; Bedd. Fl. Sylv. 85. *Tephrosia suberosa*, Dalz. & Gibs. Bomb. Fl. 60. *Supti*, Vern.; *Men bundati*, K.

Dry forests of the Western Peninsula, Ceylon, on the rocky hills east of Belgaum, common in the forests near Bádámi. Fl. July-Sept. Fr. Oct.-Nov. A large shrub or small tree with corky bark. Sapwood white or yellowish. Heartwood dark-yellowish-brown, hard, heavy and smooth. Pores few, small. Wavy bands of white tissue in concentric lines close together. Medullary rays many, fine, short. Weighs 60 lbs. to the cub. ft. Too small to be of much economic use.

#### 5. SESBANIA, Pers.

Shrubs, herbs or soft-wooded trees. Leaves long, abruptly pinnate, leaflets mucronate. Flowers showy, in axillary racemes. Calyx campanulate. Corolla much exerted; petals with long claws. Stamens diadelphous, anthers uniform. Style filiform, incurved, stigma capitate. Pod very long, narrow, with septa between the numerous seeds.

Flowers small. Pod weak, torulose	...	1. <i>S. ægyptiaca</i> .
Flowers very large. Pod falcate firm, not torulose	...	2. <i>S. grandiflora</i> .

1. *S. ægyptiaca*, Pers.; DC. Prod. II. 264; Fl. Br. I. 2. 114; Brandis For. Fl. 137; Bedd. Fl. Sylv. 86. *Shewarie*, M.

Plains from the Himalayas to Ceylon and Siam. Rare along nálas and water-courses in North Kánara, but not indigenous; commonly planted in gardens. Fl. R. & C. S. In the Sátára District grown in thickets 20 ft. high to support the pepper vines. In the drier parts of the Deccan grown as a substitute for bamboos. Wood white, extremely soft; weighs 27 lbs. to the cub. ft. (Gamble). Rope is made from the bark. The leaves and branches are used for fodder.

2. *S. grandiflora*, Pers. Syn. II. 316; Fl. Br. I. 2. 115; Bedd. Fl. Sylv. 86; Brandis For. Fl. 137. *Agati grandiflora*, Dalz. & Gibs. Bom. Fl. Suppl. 22. *Augusta*, Vern.

A doubtful native of the Western Peninsula; commonly planted throughout the presidency; often as a support for the betel pepper vine. A small ornamental tree. Fl. Fr. at various times throughout the year. Wood white, soft; weighs 32 lbs. to the cub. ft.

#### 6. ALHAGI, Desv.

Spinous shrub. Leaves simple. Flowers axillary. Calyx campanulate, teeth minute. Corolla exserted; standard broad, keel obtuse. Stamens diadelphous. Anthers uniform. Style filiform; stigma minute, capitate. Pod linear, moniliform, falcate or straight.

*A. maurorum*, Desv.; DC. Prod. III. 352; Fl. Br. I. 2. 145; Dalz. & Gibs. Bomb. Fl. 67; Brandis For. Fl. 144. The Camelthorn; the Persian Manna Plant. *Kas*, Sind. *Jowassi*, Vern.

N.-W. Provinces; very common near Delhi. Throughout the dry plains of Guzerat and Sind, rare in the Deccan. Fl. Mch.-Apl. Fr. Aug. A low desert shrub.

*Taverniera nummularia*, DC. Prodr. II. 339; Fl. Br. I. 2. 140. *T. cuneifolia*, Arn., Dalz. & Gibs. Bomb. Fl. 67. A low copiously-branched under-shrub, with shortly pedicelled, 3-foliolate, small leaves. Racemes few, flowered. Flowers small. Calyx thinly silky. Corolla red, glabrous. Pod of 1-4, flattened, muricated, rounded joints. Plains of Sind and the Punjáb. Fl. Feb. This is also a small desert species and is allied to *Alhagi*.

#### 7. STYLOSANTHES, Sw.

Shrub. Leaves rigid, pinnately trifoliolate. Flowers inconspicuous in dense heads. Calyx with an elongated, filiform tube. Corolla not exserted, keel subrostrate. Stamens monadelphous, anthers dimorphous. Style long, filiform, the lower part persistent; stigma minute, capitate. Pod flattened, 1-2-jointed, joints rugose.

*S. mucronata*, Willd.; DC. Prod. II. 318; Fl. Br. I. 2. 148.

Common on the dry hills near Dhárwár; shores of the Western peninsula, Fl. Br. I. Fl. Fr. R. S. A low diffuse under-shrub. Flowers small. Not a forest species, and scarcely worth including in this list.

#### 8. OUGEINIA, Benth.

A tree. Leaves pinnately trifoliolate. Flowers in fascicled axillary racemes. Calyx-tube campanulate; teeth small, upper 2 sub-connate. Corolla much exserted; standard broad, keel obtuse. Stamens diadelphous, anthers uniform. Style filiform, incurved, stigma minute, capitate. Pod linear, flat, smooth, 2-5-jointed; joints more or less distinct.

*O. dalbergioides*, Benth. Pl. Jungh. 216; Fl. Br. I. 2. 161; Bedd. Fl. Sylv. t. 36; Brandis For. Fl. 146. *Dalbergia oojeinensis*, Roxb.;

Dalz. & Gibs. Bomb. Fl. 78. *Kuri mutal*, K.; *Tewas*, M.; *Kala phulas*, Hind.; *Telus*, Khándesh Dángs. *Tunuj*, *sandan*, *timsa*, Vern.

Sub-Himalayan zone from the Sutlej to the Teesta, ascending to 5000 ft.; Central India; throughout the Bombay presidency in deciduous forests; fairly common in the forests of the Yellapore sub-division of N. Kánara, where comparatively large trees are to be found, yielding from 25 to 40 cub. ft. of timber. A small or moderate sized tree. Bark light-brown, with longitudinal and horizontal cracks, scaling off in regular pieces. Wood mottled, light-brown, hard, elastic. Pores large or medium sized in irregular patches of white tissue. Med. rays fine and prominent. Not attacked by white-ants, close-grained, takes a fine polish and weighs 55 to 60 lbs. to the cub. ft. A valuable timber, used for carriage shafts, wheels of carts, furniture, &c. Yields a red astringent gum similar to Dragon's Blood. The timber is sold for about the same price as teak in some parts of Bombay. Fl. Mch.-May. Fr. June.

### 9. DESMODIUM, Desv.

Shrubs or herbs. Leaves simple or trifoliolate, stipellate. Flowers small, red, in copious dense racemes. Calyx campanulate or turbinate, teeth longer or shorter than the tube. Corolla exerted, standard broad, keel obtuse. Stamens usually diadelphous. Style incurved, stigma capitate. Pod of several 1-seeded, compressed, usually indehiscent joints.

Leaves trifoliolate. Umbels axillary, bracts minute, deciduous.		
Branches terete. Joints of pods large ...	1. <i>D. umbellatum</i> .	
Branches triquetrous. Joints of pod small ...	2. <i>D. Cephalotes</i> .	
Leaves trifoliolate. Umbels in continuous rows, bracts large, persistent ...	3. <i>D. pulchellum</i> .	
Leaves unifoliolate, petiole winged ...	4. <i>D. triquetrum</i> .	
Leaves 1-3-foliolate. Flowers in simple or paniced racemes.		
Joints of pod indehiscent.		
Leaves trifoliolate ...	5. <i>D. laxiflorum</i> .	
Leaves unifoliolate.		
Leaflet glabrescent above ...	6. <i>D. gangeticum</i> .	
Leaflet scabrous above ...	7. <i>D. latifolium</i> .	
Joints of pod dehiscent ...	8. <i>D. polycarpum</i> .	
Pod dehiscent, not jointed ...	9. <i>D. gyrans</i> .	

1. *D. umbellatum*, DC. Prod. II. 325; Fl. Br. I. 2. 161; Bedd. Fl. Sylv. 87. Dalz. & Gibs. Bomb. Fl. 66. Tropical zone, Penang, Malacca, Ceylon. South-east of Surat; near Belgaum, Dalz.

2. *D. Cephalotes*, Wall. Cat. 5721; Fl. Br. I. 2. 161; Bedd. Fl. Sylv. 87. *D. congestum*, Dalz. & Gibs. 66. E. Himalayas, S. India, Burma. Common in the moist forests of North Kánara and the Konkan. Fl. July-Sept. Fr. C. S. Wood yellowish. Gamble.

3. *D. pulchellum*, Benth. MSS.; Fl. Br. I. 2. 162. *Chikti*, K. Throughout India to Burma and Ceylon, E. Himalaya. Throughout the presidency in moist places along nálas and water-courses, common in North Kánara, as undergrowth in the high timber deciduous forests of

the Yellápur gháts. Fl. Fr. R. S. The segments of the pod catch on and adhere strongly to clothing.

4. *D. triquetrum*, DC. Prod. II. 326; Fl. Br. I. 2. 163; Dalz. & Gibs. Bomb. Fl. 66. *Antbarlu*, K. Central and Eastern Himalayas, throughout India proper to Ceylon, China, Philippines. Common in the moist forests of the Konkan and North Kánara from the coast inwards; a very distinct species. Fl. Sept.-Jany. Fr. C. S. The reddish winged petioles and the triquetrous branches are characteristic. Throughout tropical India ascending to 6000 ft. in Sikkim; Western Peninsula.

5. *D. laxiflorum*, DC. Prod. II. 335; Fl. Br. I. 2. 164. *Jungly ganga*, Vern. Common in the forests along the Supa gháts of North Kánara. Fl. Fr. R. & C. S.

6. *D. gangeticum*, DC. Prod. II. 327; Fl. Br. I. 2. 168; Dalz. & Gibs. Bomb. Fl. 66. *Salparni*, *Salwan daye*, Bomb. Lower hills and plains of India; ascends to 5000 ft. on the Himalayas and eastwards to Pegu. Throughout the presidency both in the plains and in the moist forests of the Konkan and North Kánara. Fl. May-June. Fr. July-Aug.

7. *D. latifolium*, DC. Prod. II. 327; Fl. Br. I. 2. 168; Dalz. & Gibs. Bomb. Fl. 66. Eastern Himalayas to Burma, Siam and Ceylon. In the moist forests of the Konkan and North Kánara. Fl. Fr. R. S. Yields a strong fibre useful for paper making.

8. *D. polycarpum*, DC. Prod. II. 334; Fl. Br. I. 2. 171; Dalz. & Gibs. Bomb. Fl. 66. Himalayá to Ceylon, China, Japan and Polynesia. Common throughout the presidency, scarcely worth including in the present list. Fl. R. S. Fr. C. S. An erect or sub-erect small shrub.

9. *D. gyrans*, DC. Prod. II. 326; Fl. Br. I. 2. 174. The Sema-phore Plant. Along the Himalayas from Hazara to Assam ascending to 7000 ft. Western Peninsula, Ceylon, Ava, Pegu. Throughout the moist forests of the Konkan and North Kánara, very common. Fl. R. S. Fr. Oct.-Nov. A small shrub with dehiscent pods. The peculiar jerky motion of the lateral leaflets has been much commented on by botanists.

The species of *Desmodium*, although mostly small under-shrubs, are included in this list, as they are common in the undergrowth of many of the forests of the Konkan and North Kánara.

#### 10. ABRUS, Linn.

Climbers. Leaves pinnate; leaflets deciduous. Flowers small in racemes on axillary peduncles or short branches. Calyx campanulate, teeth short. Corolla exserted, keel ovate. Stamens 9, united in a tube, the 10th absent; anthers uniform; Style short, incurved. Stigma capitate. Pod thin or turgid, septate.

Pod turgid, 3-5-seeded ...	...	...	1. <i>A. precatorius</i> .
Pod thin, flat, 6-8-seeded	...	...	2. <i>A. pulchellus</i> .

1. *A. precatorius*, Linn.; DC. Prod. II. 381; Fl. Br. I. 2. 175; Dalz. & Gibs. Bomb. Fl. 76; Brandis For. Fl. 139. Indian or Wild

Liquorice Root. *Gunchi*, Vern.; *Kati, kutch, gulgunji*, K.; *Gunja*, Sans. Himalayas, ascending to 3000 ft. and throughout tropical India to Ceylon.

Throughout the presidency; common in the moist forests of the Konkan and North Kánara. Fl. R. S. Fr. Jany.

The seeds are used as weights by goldsmiths, also to poison cattle and in native medicine. The root is said to be a substitute for liquorice; an extract is also made from the leaves which is used in native medicine.

2. *A. pulchellus*, Wall. Cat. 5819; Fl. Br. I. 2. 175. In the moist forests of North Kánara; very common near Kárwár and along the coast southwards. Fl. R. S. Fr. Nov.-Jany.

## 11. MUCUNA, Adans.

Twining plants. Leaves trifoliate, stipellate. Flowers large, showy, in racemes, often pendulous, turning black when dry. Calyx tube companulate; 2 upper teeth connate. Corolla exserted; keel rostrate, exceeding the wings. Stamens diadelphous, anthers dimorphous. Style incurved, stigma capitate. Pod clothed with irritating bristles.

Pod obliquely plaited, 1-seeded ... 1. *M. monosperma*.  
Pod without plaits, several seeded ... 2. *M. pruriens*.

1. *M. monosperma*, DC. Prod. II. 406; Fl. Br. I. 2. 185; Dalz. & Gibs. Bomb. Fl. 70. The Negro Bean.

E. Himalayas, Khasia Hills, Assam, Pegu and Ceylon. In the moist forests along the Konkan and North Kánara gháts; locally common. Fl. C. S. Fr. H. & R. S. *Sonagaravi*; *mothi-kuhili*, Vern. The seed is used as a vegetable, also in native medicine.

2. *M. pruriens*, DC. Prod. II. 405; Fl. Br. I. 2. 187; *M. prurita*, Dalz. & Gibs. Bomb. Fl. 70. The Cowitch. *Hasaguni gidda, turach gidda*, K.; *Kivanch*, Guz.; *Kuhila*, Vern.

Tropical forests of America, Africa and India. Throughout the presidency from the coast inland, common in hedges, sometimes cultivated. Fl. Oct.-Nov. Fr. Dec.-Feb. A large climber with dark purple flowers. The seeds and hairs of the pod are used in native medicine, the former as an aphrodisiac and the latter as a vermifuge.

*M. atropurpurea*, DC. Prod. 2. 406; Fl. Br. I. 2. 186; with broad 2-seeded, plaited, bristly pods, and *M. gigantea*, DC. Prod. 2. 405; Fl. Br. I. 2. 186, with broad, winged, 2-6-seeded pods, not plaited, are stated by Nimmo to be found in the Konkan, Grah. Cat. Bo. Pl. 53.

## 12. ERYTHRINA, Linn.

Prickly trees. Leaves trifoliate, stipules small, stipels glanduliform. Flowers large, coral red, in dense racemes, usually appearing before the development of the leaves. Calyx oblique, spathaceous, splitting to the base or campanulate, bilabiate. Petals unequal, standard much exserted and exceeding the keel. Stamens

diadelphous, anthers uniform. Style incurved, stigma capitate. Pod turgid, torulose.

Calyx spathaceous, not 2-lipped. Pod thick.

Calyx 5-c'eft at the tip. Pod 6-8 seeded ... 1. *E. indica*.

Calyx entire at tip. Pod 2-3 seeded .. ... 2. *E. stricta*.

Calyx campanulate, 2-lipped. Pod terete, 4-5 seeded . 3. *E. suberosa*.

1. *E. indica*, Lam.; DC. Prod. II. 412; Fl. Br. I. 2. 188; Bodd. Fl. Sylv. 87; Dalz. & Gibs. Bomb. Fl. 70; Brandis For. Fl. 139. Indian Coral Tree. Mochi Wood. *Pangara*, M.; *Mullu mutala*, K.; *Panarvo*, *panarweo*, Guz.

Throughout India from the Himalayas, also in Burma. In the deciduous forests of the Konkan and North Kánara; commonly planted throughout the presidency as a support for pepper vines. Fl. Apl.-May. Fr. June. A medium sized, deciduous tree. Bark greenish-yellow, smooth and shining, exfoliating in papery flakes; young branches and stems prickly; prickles black. Wood soft, white, light, rather durable, weighs about 20 lbs. to the cub. ft.; used for boxes, toys, scabbards, etc. Pod thick, constricted between the seeds, 6 in. long.

2. *E. stricta*, Roxb. Fl. Ind. III. 251; Fl. Br. I. 2. 189; Dalz. & Gibs. Bomb. Fl. 70; Bodd. Fl. Sylv. t. 175.

Burma and the W. peninsula. In the deciduous forests of North Kánara and the Konkan. Fl. May. Fr. June. A moderate sized tree. Stems with a rougher bark than *E. indica*, and more numerous white prickles. Wood grey, soft, light and spongy. Annual rings distinct. Pores large, scanty. Med. rays short and broad. The tissue between the rays consists of narrow bars of harder dark tissue with broad bars of white spongy tissue, forming wavy concentric alternate bands.

3. *E. suberosa*, Roxb. Fl. Ind. III. 253; Fl. Br. I. 2. 189; Bodd. Fl. Sylv. 87; Dalz. & Gibs. Bomb. Fl. 70. *Pangra*, *pangara*, Vern.

From the Himalayas to S. India and Burma. Throughout the dry forests of the presidency, does not extend into the heavy rainfall zone. Fl. May. Fr. June. A small or moderate sized tree. Bark light-grey, corky, fissured. Wood white, soft, spongy; used for planking, scabbards, &c.

### 13. CANAVALIA, DC.

Large, twining shrubs. Leaves 3-foliolate, stipellate. Flowers large, showy, in racemes. Calyx 2-lipped, the upper projecting, entire, the lower shortly 3-toothed. Corolla exserted, standard large, keel short, incurved. Stamens monadelphous, anthers uniform. Style incurved, stigma terminal. Pod large, ribbed along upper suture.

Racemes many-flowered. Pod many-seeded ... 1. *C. ensiformis*.

Racemes few-flowered. Pod few-seeded ... 2. *C. obtusifolia*.

*C. ensiformis*, DC. Prod. 2. 404; Fl. Br. I. 2. 195. *C. virosa*, Dalz. & Gibs. Bomb. Fl. 69. *Gowara*, *arsambal*, Vern. In hedges throughout the presidency, common. Fl. Feb. Fr. June.

2. *C. obtusifolia*, DC. Prod. 2. 404; Fl. Br. I. 2. 196. *C. lineata*, DC. Prodr. v. 2. 404; Cooke Fl. Pres. Bomb. 373. Along the coast of North Kánara and the Konkan. Fl. Mch. Fr. June-July.

*C. Stocksii*, Dalz. and Gibs. Bomb. Fl. 69; Cooke Fl. Pres. Bomb. 372. *C. ensiformis*, var. *turgida*, Baker, Fl. Br. I. 2. 196. A twining shrub with large stipules and bracteoles is considered to be a species distinct from *C. ensiformis*, DC., by Dr. T. Cooke in his Fl. Pres. Bomb. Deccan and Konkan hills, very rare.

#### 14. PUERARIA, DC.

Herbs or twining shrubs. Leaves trifoliate, stipellate. Flowers large or small, densely fascicled, in long racemes. Calyx-teeth long or short, the upper two connate. Corolla exserted; standard spurred at base, equalling in length the keel and wings. Stamens monadelphous, anthers uniform. Style filiform incurved, stigma capitate. Pod linear, flattish. Root immense, tuberous, in *P. tuberosa*.

*P. tuberosa*, DC. Prod. II. 240; Fl. Br. I. 2. 197; Dalz. & Gibs. Bomb. Fl. 67. Brandis For. Fl. 141. *Dari*. Vern.; *Karwi-nai*, Guz.

Western tropical Himalaya, hills of S. India and Orissa. Throughout the Konkan and North Kánara, in open situations. Fl. Mch.-Apl.; leafless when in flower. Fr. May.

#### 15. SPATHOLOBUS, Hassk.

Large woody climbers. Leaves trifoliate, stipellate. Flowers small, in large terminal panicles, pedicels densely fascicled at the tumid nodes. Calyx campanulate, teeth slender. Corolla exserted, keel straight. Stamens diadelphous, anthers uniform. Style incurved, stigma capitate. Pod 1-seeded, winged, like that of *Butea*.

Pod broad, rusty tomentose	...	...	1. <i>S. Roxburghii</i> .
Pod glabrescent, narrower	...	...	2. <i>S. purpureus</i> .

1. *S. Roxburghii*, Benth. Pl. Jungh. 238; Fl. Br. I. 2. 193; Brandis For. Fl. 143; *Butea parviflora*, Dalz. & Gibs. Bomb. Fl. 71. *Phulsun*, M.

From the Himalayas to Ceylon. Throughout the forests of the Konkan and North Kánara. This lofty, soft-wooded climber does great damage to the teak and other timber trees in North Kánara. Fl. C. S. Fr. April.

2. *S. purpureus*, Benth. MSS. Fl. Br. I. 2. 194.

Evergreen forests of North Kánara on the Supa gháts, rare; also found in the Konkan, Stocks. Fl. C. S. Fr. Apl., May. A lofty climber. Fruit like the samara of the sycamore reversed, narrow, glabrescent.

#### 16. BUTEA, Roxb.

Trees or climbing shrubs. Leaves large, trifoliate, stipellate. Flowers densely fascicled, large, showy, in racemes or panicles.



Calyx broadly campanulate; teeth short, deltoid. Corolla exserted; keel semicircular. Stamens diadelphous, anthers uniform. Style filiform; stigma capitate. Pod stalked, compressed, thin, membranous, 1-seeded.

Erect tree	...	...	...	...	1. <i>B. frondosa</i> .
Climbing shrub	...	...	...	...	2. <i>B. superba</i> .

1. *B. frondosa*, Roxb. Fl. Ind. III. 244; Dalz. & Gibs. Bomb. Fl. 71; Fl. Br. I. 2. 194; Brandis For. Fl. 142; Bedd. Fl. Sylv. 176. Bengal Kino. Butea Gum. Bastard Teak. *Tésú-ká-jhar*, H.; *Muttala*, *muttugal*, K.; *Phulas*, M.; *Phullas kakria*, Guz.

Throughout India and Burma, extends as far north as the Jhelum in the N.-W. Himalaya. Throughout the Presidency, common in deciduous forests. Fl. March. Fr. June, July. A moderate sized tree. Bark rough, undulated, inner bark fibrous, and spongy. Wood dirty-white, soft, not durable, except under water; weighs 35 lbs. to the cub. ft. Yields a gum, sold as Bengal kino and used as a dye and tan. The fibre from the inner bark is strong and useful. The leaves are used as plates and also for native umbrellas. The seeds are used in native medicine as an anthelmintic and purgative.

2. *B. superba*, Roxb. Fl. Ind. III. 247; Fl. Br. I 2. 195; Dalz. & Gibs. Bomb. Fl. 71; Brandis For. Fl. 143. *Palasvél*, *beltivas*, M.

Central Provinces, Central India, Bengal, Burma. In the moist forests of the North Konkan. Fl. Mch. Differs from *B. frondosa*, only in its scandent climbing habit.

17. ATYLOSIA, W. & A.

Erect or twining shrubs. Leaves trifoliate, gland-dotted beneath. Flowers axillary or racemed. Calyx-teeth distinct, longer or shorter than the tube. Corolla more or less exserted, keel not beaked. Stamens diadelphous; anthers uniform. Style filiform, glabrous; stigma capitate. Pod linear or oblong, turgid; seeds with a divided strophiole.

Petals marcescent. ( <i>Atylia</i> .)					
Erect shrubs.	Flowers in sessile pairs.	Pod not lineate between the seeds.			
	Pod thinly pilose	...	...	1. <i>A. lineata</i> .	
	Pod densely pilose	...	...	2. <i>A. sericea</i> .	
Twining.	Flowers in peduncled racemes.	Pod lineate between the seeds.			
	Pod grey canescent	...	...	3. <i>A. mollis</i> .	
	Pod densely hairy	...	...	4. <i>A. kulnensis</i> .	
Petals caducous. ( <i>Cantharospermum</i> .)					
	Pod bristly, recurved	...	..	5. <i>A. rostrata</i> .	
	Pod pilose, straight	...	...	6. <i>A. barbata</i> .	

1. *A. lineata*, W. & A. Prod. 258; Fl. Br. I. 2. 213. *Oajanus lineatus*, Grah. *Atylosia Lawii*, Wgt.; Dalz. & Gibs. Bomb. Fl. 74. *Ran-toor*, Vern.

Hills of the Western Peninsula, from the Konkan southwards, ascending to 6,000 ft. on the Bababuden Hills of Mysore. Very common in the moist forests along the Konkan and North Kánara gháts. Fl. Nov.-Dec. Fr. Jany. A shrub with long, sulcate branches.

2. *A. sericea*, Benth. MSS. Fl. Br. I. 2. 213. Moist forests of the Konkan. Himalayas from Garwal, Kumaon to Nepal. An erect shrub. I haven't found this.

3. *A. mollis*, Benth. Pl. Jungh. 243; Fl. Br. I. 213. *Oajanus glandulosus*, Dalz. & Gibs. Bomb. Fl. 73. *A. crassa*, Prain; Cooke Fl. Pres. Bomb 383. South Konkan, Fl. Br. I. A densely grey pubescent climber with foliage resembling that of *Cylista scariosa*.

4. *A. kulnensis*, Dalz. in Jour. Linn. Soc. XIII. 186; Fl. Br. I. 2. 214. *Oajanus kulnensis*, Dalz. & Gibs. Bomb. Fl. 72. In the moist evergreen forests of the Konkan and North Kánara, common. Fl. Fr. Dec., Mch. A slender climbing shrub.

5. *A. rostrata*, Baker. Fl. Br. I. 2. 216. Konkan, Stocks. A woody climber.

6. *A. barbata*, Baker. Fl. Br. I. 2. 216; *A. goensis*, Dalz. & Gibs. Bomb. Fl. 73. Konkan gháts, Belgaum Collectorate, Dalz. A woody climber.

### 18. CAJANUS, DC.

Erect shrub. Leaves trifoliolate. Flowers racemed. Calyx-tube campanulate, teeth short. Corolla exserted, keel truncate. Stamens diadelphous, anthers uniform. Style long filiform, upcurved, stigma capitate. Pod linear, torulose with oblique, linear depressions between the non-strophiolate seeds.

*C. indicus*, Spreng. Syst. III. 248; Fl. Br. I. 2. 217; Dalz. & Gibs. Bomb. Fl. Suppl. 24. Pigeon Pea. *Toor*; *dhal*, Vern.

Cultivated throughout the Presidency. A doubtful native of India. De Candolle in his Origin of cultivated Plants thinks it is a native of tropical Africa introduced 3000 years ago into India.

### 19. CYLISTA, Ait.

Climber. Leaves trifoliolate. Flowers racemed. Calyx-tube campanulate, scariosa. Corolla not exserted, keel much incurved. Stamens diadelphous; anthers uniform. Style long filiform, stigma capitate. Pod small, oblique, enclosed in the calyx.

*C. scariosa*, Ait.; DC. Prod. II. 410; Fl. Br. I. 2. 219; Dalz. & Gibs. Bomb. Fl. 74. *Ranguera*, Vern.

Western Peninsula from the Konkan southwards; Deccan and Orissa. Throughout the Presidency in open places in deciduous forests, often in hedges. Fl. Fr. cold season.

## 20. RYNCHOSIA, Lour.

Erect or twining shrubs. Leaves pinnately trifoliolate, gland-dotted. Flowers axillary or racemed. Calyx-tube short, teeth sometimes broad foliaceous. Corolla included, or exerted; keel incurved. Stamens diadelphous; anthers uniform. Style long filiform, stigma capitate. Pod usually continuous between the seeds, deeply torulose, flat, turgid; seeds arillate.

*R. cyanosperma*, Benth. in Oliv. Fl. Trop. Africa. II. 218; Fl. Br. I. 2. 222. *Cyanospermum tomentosum*, W. & A. Dalz. & Gibs. Bomb. Fl. 75.

Forests of the Western Peninsula and Ceylon. Evergreen forests of the South Konkan and North Kánara, nowhere abundant. Fl. Fr. C. S.

## 21. FLEMINGIA, Roxb.

Shrubs. Leaves simple or trifoliolate, gland-dotted beneath. Inflorescence various, pedicels short not bracteolate. Calyx-tube short. Corolla usually not exerted, keel obtuse or slightly rostrate. Stamens diadelphous, anthers uniform. Style filiform, stigma capitate. Pod small, turgid, usually 2-seeded; seeds without a strophiole.

Leaves simple.

Flowers in small cymes, each in the axil of a large folded persistent bract ... .. 1. *F. strobilifera*.

Leaves digitately trifoliolate.

Flowers in dense sub-spicate axillary racemes, bracts linear, caducous ... .. 2. *F. congesta*.

Flowers in globose heads, bracts large, persistent ... 3. *F. involucrata*.

1. *F. strobilifera*, R. Br. in Ait. Hort. Kew Ed. 2. IV. 350; Fl. Br. I. 2. 227; Dalz. & Gibs. Bom. Fl. 75. *Kankuti*, Vern.

Himalayas from Simla to Assam, Khasia, Siam, Malacca and Ceylon. Throughout the moist forests of the Konkan and North Kánara, common. Bracts often with sterile flowers. Fl. Fr. R. and C. S. A small shrub.

2. *F. congesta*, Roxb. Hort. Beng. 56; Fl. Ind. III. 340; Fl. Br. I. 2. 228; Dalz. & Gibs. Bomb. Fl. 75; Var. *nana*. *F. procumbens*, Roxb.; Dalz. & Gibs. Bomb. Fl. 75. *Dow dowla*, Vern.

Central Himalayas to Ceylon and Malacca. Throughout the Presidency the var. *semialata*, is very common in the moist forests of the Konkan and North Kánara. Flowers throughout the year. A low diffuse under-shrub.

3. *F. involucrata*, Benth. Pl. Jungh. 246; Fl. Br. I. 2. 229.

Eastern Himalayas, Assam and Sikhim. In the deciduous forests of the Konkan and North Kánara: a gregarious shrub growing in the open glades. Fl. R. S. Fr. Nov.-Feb.

## 22. DALBERGIA, Linn. f.

Trees or climbers. Leaves imparipinnate, leaflets alternate. Flowers copious, small, in terminal or lateral panicles. Calyx cam-

panulate, teeth 5, distinct. Corolla exerted, keel obtuse. Stamens 9-10, monadelphous or in 2 bundles of 5 each. Style short, incurved, stigma capitate. Pod thin flat, indehiscent few seeded. Seeds kidney-shaped.

Stamens 9 in one bundle, sheath of filaments only split at the top. Pod straight, thin 1-4-seeded. (Sissoo.)

Trees with large leaflets.

Leaflets 3-5, acuminate, cuspidate ... 1. *D. Sissoo*.

Leaflets 5-7, obtuse ... 2. *D. latifolia*.

Scandent shrub with unequal sized leaflets ... 3. *D. rubiginosa*.

Scandent shrubs with many small leaflets.

Pod thin, oblong, long-stalked, usually 1-seeded. 4. *D. Stocksii*.

Pod thin, oblong, short-stalked, 1-3-seeded ... 5. *D. sympathetica*.

Pod strap-shaped, long-stalked, 1-3 seeded. Stamens 10 ... 6. *D. tamarindifolia*.

Stamens in 2 bundles of 5 each. Pod thin, straight, 1-3-seeded (*Dalbergaria*).

Trees.

Leaflets with prominent parallel nerves. Standard with a callosity at base ... 7. *D. lanceolaria*.

Leaflets with reticulate venation. Standard without a callosity ... 8. *D. paniculata*.

Climbers.

Pod straight, thin, 1-2-seeded ... 9. *D. volubilis*.

Stamens in 2 bundles of 5 each. Pod obliquely orbicular-oblong, rather recurved, usually 1-seeded. (Selenolobium.)

Twining shrub, unarmed. Pod crescent-shaped ... 10. *D. monosperma*.

A spinous erect shrub. Pod reniform, flat ... 11. *D. spinosa*.

1. *D. Sissoo*, Roxb. Fl. Ind. III. 223; Fl. Br. I. 2. 231; Bedd. Fl. Sylv. 25; Brandis For. Fl. 149; Dalz. & Gibs. Bomb. Fl. Suppl. 24. The Sissoo tree. *Sissu, tali*, Sind; *Tanach, sisam*, Guz.

Sub-Himalayan tract from the Indus to Assam. Planted throughout the Presidency; believed to be indigenous in Guzerat, Beluchistan and Central India, Fl. Mch.-June. Fr. Nov.-Feb. A large deciduous tree. Bark grey, exfoliating in strips; Sapwood small white. Heartwood brown with darker veins, close-grained, very hard. Weighs about 45 lbs. to the cubic ft., elastic, seasons well. Used for boat building, gun carriages, furniture, etc. Young twigs and leaves for cattle-fodder. Suitable for railway sleepers.

2. *D. latifolia*, Roxb. Cor. Pl. II. 7, t. 113; Fl. Ind. III. 221; Fl. Br. I. 2. 231; Bedd. Fl. Sylv. t. 24; Dalz. & Gibs. Bomb. Fl. 77. The Blackwood or Rosewood Tree of Southern India. *Biti*, K.; *Shisham, sisu*, M.; *Sisali, kalaruk*, Kon.

Oudh, E. Bengal and Central India. Throughout the deciduous forests of the Presidency, associated with teak in the high timber forests of North Kánara. Fl. Aug. Fr. Dec.-Jany. in North Kánara. A large deciduous tree. Bark. 1.5—1 in. thick, cinerous. Sapwood yellow, small. Heartwood dark purple with black streaks, very hard. No distinct annual rings. Pores moderate sized, distinct or joined by white, interrupted, wavy, concentric lines. Med. rays fine, light coloured, numerous. Weighs from 48 to 60 lbs. to the cub. ft. P=837. for the N. Kánara

wood. Used for gun carriages, veneering, furniture, carving, agricultural implements, etc. Young twigs and leaves are much esteemed as cattle-fodder in N. Kánara.

3. *D. rubiginosa*, Roxb. Fl. Ind. III 231; Fl. Br. I. 2. 232.

Western Peninsula. In the evergreen forests of North Kánara from the Aínshi ghát southwards. Leaflets unequal, largest  $2\frac{1}{2}$  in. by  $1\frac{1}{3}$  in. Pod strongly veined, 1-2-seeded. Fl. and Fr. at different times throughout the year.

*D. confertiflora*, Benth. Pl. Jungh. I. 255; Fl. Br. I. 2. 233. Oudh and Silhet. Noted by Dr. Stocks from the Konkan, but not found by any subsequent botanist.

4. *D. Stocksii*, Benth. in Jour. Linn. Soc. IV. Suppl. 42. Fl. Br. I. 2. 234.

W. Peninsula from the Konkan southwards on the gháts; Konkan; N. Kánara. Fl. Fr. C. and H. seasons. *Dalbergia melanoxyton*, Guill. and Perr.—Chinese Blackwood (Dhárwár). An erect small tree, closely allied to the above (if not the same species) is a native of tropical Africa and is commonly planted along roadsides and in gardens throughout the presidency.

5. *D. sympathetica*, Nimmo in Grah. Cat. Bomb. Pl. 55; Fl. Br. I. 2. 234; Dalz. & Gibs. Bomb. Fl. 78. *Pendguliyeel*, *yekyel*, M.; *Tilabli*. Kon.; *Muldi*, K.

Gháts of the W. Peninsula. Throughout the Konkan and North Kánara from the coast inland in deciduous forests. Fl. and Fr. Jany.-Feb. A dense branched climber. Trunk 4 inches in diameter, armed with great hooked and twisted spines often 3-5 together from thickened parts of the stem. Bark smooth, inner bark red, juicy, .25 inch thick. Wood white, fibrous.

6. *D. tamarindifolia*, Roxb. Fl. Ind. III. 233; Fl. Br. I. 2. 234.

Eastern Himalayas, Nepal, Sikkim, etc., ascending to 4000 ft. and southwards to Malacca; W. Peninsula; in evergreen forests on the southern gháts of North Kánara, common. Fl. and Fr. Mch.-May.

7. *D. lanceolaria*, Linn., DC. Prod. II. 417; Fl. Br. I. 2. 235; Dalz. & Gibs. Bomb. Fl. 78; Bedd. Fl. Sylv. 88; Brandis For. Fl. 151. *Dandous*, *dandoshi*, M.; *Harráni*, *gengri*, Vern.

Plains from the W. Himalayas to Ceylon. In the deciduous forests of North Kánara from Mundgod to Siddápur, common. Konkan and Khándesh, Dalz. Panicles large, diffuse. Fl. Mch.-May. Fr. ripe next cold season and remains long on tree. A deciduous tree. Bark grey, smooth, exfoliating in thin rounded patches. Wood white or grey, moderately hard. Pores large or moderate sized enclosed in and joined by concentric irregular bars of white tissue. Medullary rays fine, short, white, distinct, not durable. Weighs about 50 lbs. to the cub. ft.

8. *D. paniculata*, Roxb. Fl. Ind. III. 227; Fl. Br. I. 2. 236; Dalz. & Gibs. Bomb. Fl. 78; Brandis For. Fl. 151; Bedd. Fl. Sylv. 88. *Passi*, *padri*, Vern.; *Phansa*, M.; *Hasrgurgia*, *kusrani*, K.

N.-W. Himalaya from the Jumna to Oudh, C. and S. India; common in the plains and subalpine dry forests of the Madras Presidency, W. Peninsula. In the deciduous forests of the Konkan and North Kánara, common in the forests of the Kalghatgi táluka of Dhárwár. Panicles terminal, congested. Bark grey, smooth. Wood of an abnormal structure. Annual rings separated by concentric layers of soft tissue. Rejected as firewood by the villagers in the Belgaum and Kánara Districts. Fl. April-May, simultaneously with the new foliage. The name "padri" is from the Mahratti for layer.

9. *D. volubilis*, Roxb. Fl. Ind. III. 231; Fl. Br. I. 2. 235; Dalz. & Gibs. Bomb. Fl. 78; Brandis For. Fl. 152. *Alei*, Vern.; *Mardiballi*, *kabali*, K.

Throughout the forests of the presidency; common. Fl. Feb.-Mar. Fr. Apl.-May. Quite distinct from *D. sympathetica*, often grows gregariously as an erect shrub. Stems unarmed, fluted, 3-8 inches in diameter with circinate green branches. Bark smooth, inner yellowish, turns reddish brown on exposure. Wood yellowish or reddish grey, smooth, compact. Annual rings distinct. Pores small uniform, scanty. Med. rays very fine and close, crossed by concentric, continuous rather broad lines of light coloured tissue.

10. *D. monosperma*. Dalz. in Kew Jour. Bot. II. 36; Fl. Br. I. 2. 237; Dalz. & Gibs. Bomb. Fl. 78. *D. torta*, Grah.; Karin—Tagera, Rheede Hort. Mal. VI. t. 55. Hills of the Konkan, Málvan, Dalz. Fl. June.

11. *D. spinosa*, Roxb. Fl. Ind. III. 233; Fl. Br. I. 2. 238. Branches spine-tipped, frequent on the shores of the Eastern and Western Peninsulas and at Chittagong, Watt. Coast of the Konkan.

### 23. PTEROCARPUS, Linn.

Trees. Leaflets alternate coriaceous, exstipellate. Flowers yellow in racemes or lax panicles; pedicels articulated at the apex. Calyx turbinate, teeth short. Petals exerted, with long claws, those of keel free. Stamens 5-5, anthers versatile. Style incurved, stigma terminal. Pod orbicular winged, 1-seeded.

*P. Marsupium*, Roxb. Fl. Ind. III. 234; Fl. Br. I. 2. 239; Bedd. Fl. Sylv. t. 21; Dalz. & Gibs. Bomb. Fl. 76; Brandis For. Fl. 152. *Bijasal*, *netra*, *hond*, *honne*, K.; *Asan*, *bibla*, M. There are two varieties of this species. Var. A.—Leaves elliptic, 2-lobed. Fruits rarely over 2 inches across. Var. B.—Leaves cuspidate or acuminate. *Forma acuta*, and *forma acuminata*, to which belongs our W. peninsular tree.

Western Peninsula from the Konkan southwards, Ceylon. Throughout the presidency in deciduous forests; common in North Kánara. Yields a valuable timber which contains a gum resin, the kino of commerce. Fl. May-June. Fr. Dec.-March. A large deciduous tree. Bark grey, exfoliating in small irregular sized pieces. Wood brown, hard, durable. Pores moderate sized and large. Med. rays very fine and numerous,

crossed by numerous close wavy, light coloured, concentric lines. Weighs about 50 lbs. to the cub. ft. ; seasons well ; full of gum resin which stains the wood when damp. Used for many purposes.

## 24. PONGAMIA, Vent.

Tree. Leaves imparipinnate, leaflets opposite. Flowers racemed. Calyx campanulate, nearly truncate. Corolla exserted, standard broad, keel obtuse. Stamens monadelphous, anthers oblong, versatile. Style incurved, stigma capitate. Pod woody, indehiscent, 1-seeded ; seed reniform, thick.

*P. glabra*, Vent. Jard. Malm. t. 28 ; Fl. Br. I. 2. 240 ; Dalz. & Gibs. Bomb. Fl. 77 ; Bedd. Fl. Sylv. t. 177 ; Brandis For. Fl. 153. *Koorangal*, *kanagu*, *hongu*, K. ; *Karanj*, M.

From the Himalayas to Ceylon and Malacca. Throughout the presidency in moist situations along rivers and nalás ; often planted as a roadside tree ; very common near the sea coast. Fl. May-June. Fr. next April. A moderate sized tree. Bark soft, grey. Wood moderately hard, white, turning yellow on exposure, not durable. Pores medium sized in irregular concentric bands of white tissue. Med. rays fine, conspicuous. Weighs about 40 lbs. to the cub ft. Used for oil mills, fuel, etc. The seeds yield a red-brown oil used for burning and native medicinal purposes.

## 25. DERRIS, Lour.

Usually robust climbing shrubs or trees. Leaves imparipinnate, exstipellate. Flowers showy, copious, in axillary or terminal racemes. Calyx campanulate, nearly truncate. Corolla much exserted, standard broad, keel petals slightly cohering. Stamens usually monadelphous. Style filiform, stigma capitate. Pod indehiscent, winged along one or both sutures.

Flowers in axillary racemes.

Pod thin, strap-shaped, several seeded.

Climber. Pod winged along the upper suture ... 1. *D. scandens*.

Pod broad, flat, 1-2-seeded.

Leaflets few. Standard not callose at the base ... 2. *D. uliginosa*.

Leaflets many. Standard with 2 callosities at

the base of the limb ... .. 3. *D. oblonga*.

Flowers paniculate.

Leaflets 5, obtuse. Pod winged down both sutures ... .. 4. *D. Heyneana*.

Leaflets 15-21, small, pod winged down the lower suture ... .. 5. *D. canarensis*.

Leaflets 5-7, large. Pod broadly winged down the lower suture ... .. 6. *D. platyptera*.

1. *D. scandens*, Benth. in Jour. Linn. Soc. IV. Suppl. 103 ; Fl. Br. I. 2. 240 ; Brandis For. Fl. 154. *Brachypterum scandens*, Dalz. & Gibs. Bomb. Fl. 76.

Eastern Himalayas, Bengal, Western Peninsula from the Konkan southwards to Ceylon. Throughout the Konkan and North Kánara from the sea-coast inland, nowhere common. Fl. R. S. June-Aug. Fr. Sept. A handsome climber. The bark yields a coarse rope fibre.

2. *D. uliginosa*, Benth. Pl. Jungh. I. 252; Fl. Br. I. 2. 241; Dalz. & Gibs. Bomb. Fl. 77.

Eastern Himalayas, Western Peninsula and Ceylon. Common in North Kánara and the Konkan, along the banks of tidal rivers and near the coast. Fl. C. S.

3. *D. oblonga*, Benth. in Jour. Linn. Soc. IV. Suppl. 112; Fl. Br. I. 2. 242. Konkan, Stocks. Dr. Prain remarks about specimens of *D. canarensis*, sent to him. "Exactly equal Ritchie's 1,720, which is *D. canarensis*, but apparently also equal Thwaites' 1,493 and Stock's 19, which are both *D. oblonga*, Benth."

4. *D. Heyneana*, Benth. Pl. Jungh. I. 252; Fl. Br. I. 2. 244; Dalz. & Gibs. Bomb. Fl. 77.

Moist forests of the Konkan and North Kánara; in the Supa ghát forests at 3000 feet elevation. Fl. and Fr. C. S. I have the variety "*paniculata*" from N. Kánara, and it certainly differs specifically from *D. Heyneanu*. It is *D. paniculata*, Wgt. Herb, No. 920, and has quite glabrous petals, also the leaflets are certainly not smaller than those of *D. Heyneana*. Fl. Jany.-March.

5. *D. canarensis*, Baker. Fl. Br. I. 2. 246; *Brachypterum canarense*, Dalz. & Gibs. Bomb. Fl. 76.

Along the gháts of North Kánara from the Ainshi ghát to the Mysore frontier in moist forests, locally common. Fl. H. S. Apl.-May. Fr. R. S.; remains long on the stem. See note under *D. oblonga*, Benth. A fine stout climber with rusty-pubescent branches. Leaflets 15-21, glabrous above, glaucous beneath. Flowers pink in terminal leafy panicles, consisting of racemes shorter than the leaves; pedicels fascicled in threes. Fruit flat, elliptic, glabrous, narrowly winged down both sutures.

6. *D. platyptera*, Baker. Fl. Br. I. 2. 245; *D. thyrsiflora*, Benth. Talb. List of Trees, p. 77, 1st Ed.

Southern gháts of North Kánara, in evergreen forests. Fl. Dec. Fr. Feb. Dr. Prain at Calcutta and Sir D. Brandis at Kew are of opinion that the Kánara plant is *D. platyptera*, and not *D. thyrsiflora*.

*D. robusta*, Benth. in Jour. Linn. Soc. IV. Suppl. 104; Fl. Br. I. 2. 241; *Brachypterum robustum*, Dalz. & Gibs. Bomb. Fl. 77.

A deciduous tree of the outer Himalaya, from the Ganges eastwards to Assam, Eastern Bengal and Pegu. Given by Dalzell as indigenous in the Bombay Presidency, as it was found in Dr. Stock's herbarium. This tree has not been found in this presidency as far as I know since Dr. Stock's time.

## 26. SOPHORA, Linn.

Trees or shrubs. Leaves odd-pinnate. Flowers showy, racemed or paniced. Calyx oblique, broadly campanulate; teeth deltoid, short. Corolla much exserted, petals equal with long claws. Stamens free or obscurely connate at the base. Style incurved, stigma capitate. Pod moniliform with turgid joints.



*S. Wightii*, Baker. Fl. Br. I. 2. 250. *S. heptaphylla*, Dalz. & Gibs. Bomb. Fl. 79; Bedd. Fl. Sylv. 89. Hills of the Western Peninsula, Mysore. Konkan gháts, hills east of Belgaum. Dalz.

### 27. CÆSALPINIA, Dinn.

Trees or woody climbers, armed with prickles. Leaves large, abruptly bipinnate. Flowers showy, yellow, in axillary racemes. Calyx deeply cleft, the lowest lobe cucullate. Petals spreading, orbicular, clawed. Stamens 10, free, declinate. Style filiform, sometimes clubbed at the tip. Pod oblong or ligulate, armed or smooth.

Pod dry, armed with prickles	...	... 1. <i>C. Bonducella</i> .
Pod dry, unarmed.		
Pod broad, glabrous, 1-seeded	...	... 2. <i>C. Nuga</i> .
Pod ligulate, glabrous 4-8-seeded	...	... 3. <i>C. sepiaria</i> .
Pod inflated, bristly, 2-seeded	...	... 4. <i>C. mimosoides</i> .

1. *C. Bonducella*, Fleming in Asiat. Res. XI. 159; Fl. Br. I. 2. 254 *Guilandina Bonducella*, Linn. *G. Bonduc*, Dalz. & Gibs. Bomb. Fl. 79 in part. Fever Nut; Physic Nut; Nickar. *Sagurgota, gaja, gutchka kachki, gajkai*, Vern.; *Karbat* in Sind.

Throughout tropical India. Throughout the presidency in hedges and waste places, common in the forests near Kárwár, Fl. R. S. Fr. C. S. All parts of the plant are used medicinally in Ceylon, principally by natives, as a substitute for quinine.

2. *C. Nuga*, Ait. Hort. Kew. III. 32; Fl. Br. I. 2. 255; *C. paniculata*, Roxb.; Dalz. & Gibs. Bomb. Fl. 79. *Kaku-mulla*, Rheede. Hort. Mal.

Eastern Bengal, Western Peninsula and Ceylon. Common along the banks of tidal rivers and creeks near the coast of the Konkan and North Kánara. Fl. C. & R. S. Fr. remains long on plant. A very prickly climber. Fruit rhomboid, cuspidate, 1-seeded.

3. *C. sepiaria*, Roxb. Hort. Beng. 32.; Fl. Ind. II. 360; Fl. Br. I. 2. 256; Dalz. & Gibs. Bomb. Fl. 80; Brandis For. Fl. 156. The Mysore Thorn. *Chillur, chillari*, M.; *Hotsige*, K.

From the Himalayas to Burma and Ceylon. In hedges throughout the dry districts of the presidency, very common in the Southern Marátha Country. Fl. Feb.-May. Fr. Dec.-Jan. The bark is used for tanning. Makes impenetrable, dense fences.

4. *C. mimosoides*, Lam. Ill. t. 335. fig. 2; Fl. Br. I. 2. 256; Dalz. & Gibs. Bomb. Fl. 80. *Kenchigi bally*, K.

Burma, Western Peninsula and Ceylon. Throughout the moist forests of North Kánara and the Konkan, not found in the dry zone. Fl. cold season. Fr. May.

*C. coriaria*, Willd., the Dividivi or American Sumach tree, is cultivated throughout the presidency in plantations; along road-sides and in gardens. *C. Sappan, L.* The Sappan Wood. A small thorny tree of Southern India, Pegu, &c., yields the valuable red dye used for colouring silk. The heartwood is red, lustrous and takes a fine polish. The dye is obtained from the pods and also from the heartwood cut into chips.

## 28. MEZONEURON, Desf.

Robust prickly climbers. Leaves abruptly bipinnate. Flowers in large panicles, yellow. Calyx very oblique, lowest lobe cucullate. Petals spreading, subequal, obovate. Stamens free, exserted. Style filiform incurved with the stamens, stigma small, capitate. Pod large, flat, thin, winged down the upper suture, indehiscent.

*M. cucullatum*, W. & A. Prod. 283; Fl. Br. I. 2. 258; Dalz. & Gibs. Bomb. Fl. 80. *Ragi*, Vern.

Eastern Himalayas from Nepal, ascending to 4000 ft. to the Khasia hills, Behar and the Western Peninsula. In the moist evergreen forests of the Konkan and North Kánara, abundant in the extreme south of North Kánara. Fl. Nov-Feb. Fr. March.

## 29. POINCIANA, Linn.

Trees. Leaves bipinnate. Flowers in corymbose racemes, large. Calyx deeply cleft with the disk a little above the base, the segments valvate, subequal. Petals orbicular, clawed, margin of blade fimbriate-crisped. Stamens 10, free, exserted. Style very long, filiform, stigma minute, capitate. Pod large, flat, ligulate.

Flowers bright scarlet	...	...	...	1. <i>P. regia</i> .
Flowers yellow	...	...	...	2. <i>P. elata</i> .

1. *P. regia*, Bojer. Bot. Mag. t. 2884; Fl. Br. I. 2. 260; Dalz. & Gibs. Bomb. Fl. Suppl. 27. Goolmohr Tree. Cultivated in gardens throughout the presidency, very ornamental, a native of Madagascar. Fl. H. S. Fr. remains long on tree. Wood white, soft, open-grained.

2. *P. elata*, Linn.; DC. Prod. II. 484; Fl. Br. I. 2. 260; Bedd. Fl. Sylv. t. 178; Brandis For. Fl. 157; Dalz. & Gibs. Bomb. Fl. Suppl. 28. *Vayni*, *sankásúra*, Vern. Said to be indigenous in the forests on the Western coast as far north as Guzerat, Brandis. Cultivated in gardens throughout the presidency. Fl. rainy season. Fr. cold season. Wood yellow, close and even-grained. Probably only indigenous in Southern India.

## 30. PARKINSONIA, Linn.

Spinous trees. Leaves bipinnate, pinnae with a flattened rachis, leaflets very small, often absent. Flowers yellow. Calyx deeply cleft with a sub-basal disk. Petals exserted, broad, with long claws. Stamens 10, villous, included. Style filiform, stigma terminal. Pod turgid, dry, moniliform.

*P. aculeata*, Linn. DC. Prod. II. 486; Fl. Br. I. 2. 260; Bedd. Fl. Sylv. 91; Brandis For. Fl. 158; Dalz. & Gibs. Bomb. Fl. Suppl. 28. The Jerusalem Thorn. *Vilayati kikar*, Sind.

Cultivated as a hedge plant or as a roadside tree throughout the presidency, a native of the West Indies. Fl. throughout the year. Wood whitish, close-grained; used for fuel and charcoal; makes good fences.

## 31. WAGATEA, Dalz.

Prickly climber. Leaves abruptly bipinnate. Flowers in simple or paniced spikes, orange and red coloured. Calyx cleft half way down into 5, obtuse teeth, the disk high up, in the tube. Corolla little exserted. Stamens 10, filaments naked. Ovary sessile, style slightly clubbed, stigma oblique. Pod red, tomentose, ligulate sub-torulose oblong, indehiscent, few seeded, sutures thickened.

*W. spicata*, Dalz. in Kew Jour. III. 90; Fl. Br. I. 2. 260; Dalz. & Gibs. Bomb. Fl. 80. *Wagati, wakeri, kuldgajga*, M.; *Hooliganji, vagati*, K.

Common throughout the presidency both in dry and moist forests. Fl. C. S. Fr. H. S. Wood yellowish-grey, smooth, hard. Pores small or moderate-sized, joined by irregular wavy bands of white tissue. Med. rays fine, white, uniform. Weighs 36 lbs. to the cub. ft. The pods (Tere pods) contain a large proportion of tannic acid. Roots used in cases of pneumonia. Bark yields a dye material.

## 32. CASSIA, Linn.

Trees, shrubs or rarely herbs. Leaves simple, abruptly pinnate. Flowers usually large and showy, often yellow, in axillary racemes and terminal panicles. Calyx-tube very short; sepals imbricated. Petals 5, nearly equal, imbricate. Stamens 10, all perfect or 3-5 more or less abortive. Ovary sessile or stalked; style incurved, stigma terminal. Pod indehiscent or 2-valved, usually septate.

Pod large cylindrical; seeds compressed parallel with the dissepiments.

Stamens all anther-bearing, 2-3 lowest with larger anthers and longer filaments than the others ... 1. *C. fistula*.

Pod compressed; seeds flattened parallel with the valves.

Perfect stamens 7, anthers usually subequal.

The 3 posterior filaments without anthers.

Leaves with interpetiolar glands. Stipules large, lunate, foliaceous ... 2. *C. auriculata*.

Leaves without interpetiolar glands.

Stipules minute, caducous ... 3. *C. montana*.

Stipules large, persistent, foliaceous ... 4. *C. timoriensis*.

Perfect stamens 10, anthers subequal ... 5. *C. glauca*.

1. *C. fistula*, Linn.; DC. Prod. II. 490; Fl. Br. I. 2. 261; Bedd. Fl. Sylv. 91; Dalz. & Gibs. Bomb. Fl. 80; Brandis For. Fl. 164. The Indian Laburnum or Purging Cassia. *Boya, bahawa*, M.; *Kakkai*, K.; *Chimkani*, Sind.; *Girmala*, Guz.

From the Himalaya to Ceylon and Malacca. Throughout the presidency in deciduous forests. Fl. Apl.-May. Fr. C. S. Bark used in tanning and from which also a light red dye is extracted in Bengal. The pulp of the fruit and the bark of the root are used medicinally. Heartwood yellowish to brick-red, very hard and durable. Pores moderate-sized, enclosed in and joined by wavy concentric bands of white soft tissue. Med. rays fine, equidistant, not prominent or distinct. Used for carts, agricultural implements, &c.

2. *C. auriculata*, Linn.; DC. Prod. II. 496; Fl. Br. I. 2. 263; Bedd. Fl. Sylv. 92; Dalz. & Gibs. Bomb. Fl. 81; Brandis For. Fl. 165. The Tanner's *Cassia*. *Turwar, tarvar, arsul*, Vern. *Tangadi gidda*, K.

Central Provinces, Western Peninsula, Southern India and Ceylon. Common in the dry zone throughout the presidency. Fl. throughout the year. The bark yields a very valuable tan.

3. *C. montana*, Heyne; DC. Prod. II. 499; Fl. Br. I. 2. 264; Dalz. & Gibs. Bomb. Fl. 265.

Hills of the Western Peninsula. Moist forests of the Belgaum gháts. ("At Virdee and Chorlaghát," Dalz.) Fl. July-Aug. Fr. C. S. A rare local species.

4. *C. timoriensis*, DC. Prod. II. 499; Fl. Br. I. 2. 265; Bedd. Fl. Sylv. 92.

Burma to Ceylon. Indigenous in the forests of North Kánara from the gháts in Goa southwards, common in the moist forests of the Ankola and Kumta talukas. Fl. Oct. Fr. ripe C. S. (a small tree or large shrub). Wood dark-brown, nearly black, Gamble.

5. *C. glauca*, Lam.; DC. Prod. II. 495; Fl. Br. I. 2. 265; Bedd. Fl. Sylv. 91; Dalz. & Gibs. Bom. Fl. Suppl. 30. *Betta davare*, K.

Himalayas to Ceylon and Malacca. In the forests of the Deccan and North Kánara. Common in the forests of the Dhárwár district near the North Kánara border at Devikope. Fl. Fr. Oct.-Nov.

*C. marginata*, Roxb. Is cultivated in gardens. A small tree with red flowers and pods like those of *C. fistula*. Heartwood light-brown, very hard. Fl. R. S.

*C. siamea*, Lam.; DC. Prod. II. 499; Fl. Br. I. 2. 264. *C. florida*, Vahl. Bedd. Fl. Sylv. t. 179. *C. sumatrana*, W. & A. Dalz. & Gibs. Bom. Fl. Suppl. 29. *Kassod*, M. Southern India, Burma and Ceylon. Introduced, common throughout the presidency, often planted along roadsides.

*C. alata*, Linn.; DC. Prod. II. 492; Fl. Br. I. 2. 264; Dalz. & Gibs. Bom. Fl. Suppl. 29; Bedd. Fl. Sylv. 92. Introduced from the West Indies into the Deccan and Konkan.

*C. Goensis*, Dalz.; Bedd. Fl. Sylv. 92. A large shrub; foot of the Bombay gháts and several cultivated species (*C. lanceolata*, W. & A., *C. grandis*, *C. bicapsularis*, W. & A.) I am unacquainted with; see Dalz. & Gibs. Bom. Fl. Suppl. 29.

### 33. CYNOMETRA, Linn.

Trees or shrubs. Leaves odd-pinnate, leaflets few. Flowers copious, minute, axillary. Calyx-tube short, disk sub-basal. Petals 5, equal, not exerted. Stamens 10, filaments free, erect. Ovary sessile, 2-ovuled; style filiform, stigma capitate. Pod turgid, indehiscent, fleshy, rugose, 1-seeded; seed exalbuminous.

*C. ramiflora*, Linn.; DC. Prod. II. 509; Dalz. and Gibs. Bom. Fl. 83; Bedd. Fl. Sylv. t. 315; Fl. Br. I. 2. 267.

Western Peninsula and Ceylon. In the forests of the Konkan and North Kánara. The characteristic fruit of this species is carried down the Kálánadi during the rainy season and thrown up on the sea-shore near Kárwár. Fl. H. S. Fr. ripe Aug.-Sept. A large evergreen tree. Wood red, hard, heavy and close-grained. Numerous wavy bands of soft light-coloured tissue alternate with bands of firmer tissue in which are visible the fine medullary rays.

#### 34. HARDWICKIA, Roxb.

Trees. Leaves abruptly pinnate, leaflets few. Flowers small, abundant in racemose panicles. Sepals 5, petaloid; disk subbasal. Petals 0. Stamens 10, included or exerted, alternately shorter. Ovary sessile, 2-ovuled; style filiform, stigma capitate. Pod dry, 1-seeded near top.

*H. binata*, Roxb. Fl. Ind. II. 423; Fl. Br. I. 270; Dalz. & Gibs. Bomb. Fl. 83; Bedd. Fl. Sylv. t. 26; Brandis For. Fl. 162. *Anjan*, M. *Kamra*, *karáchi*, K.

In the dry forests of the presidency; a gregarious tree, but very local, common on the trap of the Sátputás in Khándesh; also in the Belgaum district. A small forest of this species is found in the Ránebennur táluka of Dhárwár. Fl. C. S. Fr. Apl.-May. Bark dark-coloured rough with irregular cracks. Sapwood small, white; heartwood extremely hard, dark-red, cross and close-grained. Pores moderate-sized filled with resin. Med. rays fine, numerous, undulating, crossed by scanty, fine, concentric lines. Weighs 82 lbs. to the cub. ft. Perhaps the hardest and heaviest wood in India; used for building and ornamental work. The bark yields a strong fibre. The leaves are in great request as cattle fodder.

#### 35. SARACA, Linn.

Trees. Leaves abruptly pinnate, coriaceous. Flowers in dense corymbose axillary panicles. Calyx-tube long, cylindrical with a disk at the summit, limb 4-cleft. Petals 0. Stamens 3-8, exerted. Ovary many ovuled with a stalk produced beyond the disk; style long filiform, stigma capitate. Pod oblong, woody 2-valved.

*S. indica*, Linn. Mant. 98; Fl. Br. I. 2. 271; Bedd. Fl. Sylv. t. 57; Brandis For. Fl. 166. *Jonesia Asoca*, Roxb. Fl. Ind. II. 218; Dalz. & Gibs. Bomb. Fl. 82. *Ashok*, *jassundie*, Vern. *Ashoka*, *kusge*, *akshath*, K.

From the Central and Eastern Himalayas to Ceylon and Malacca. In the evergreen forests of the Konkan and North Kánara, common, sometimes planted. Fl. Mch.-Apl. Fr. Aug.-Sept. A moderate-sized tree. One of the sacred trees of the Hindus; its flowers are much used in decorating temples. Bark dark-coloured, rough with raised horizontal lines of lenticels, inner bark thick, deep red. Wood light, reddish brown, soft. Pores moderate-sized in radial and oblique lines. Med. rays indistinct, crossed by fine wavy concentric lines. Weighs 58 lbs. to the cub. ft.

## 36. TAMARINDUS, Linn.

Tree. Leaves abruptly pinnate, stipules caducous. Flowers racemed. Calyx-tube turbinate, divisions 4, membranous. Petals 3. Stamens monadelphous, 3 perfect, united in a sheath; remaining stamens reduced to staminodes at top of the sheath. Ovary many-styled with a stalk adnate to the calyx-tube; style filiform, stigma capitate. Pod 3-10-seeded, mesocarp fleshy, seeds exalbuminous.

*T. indica*, Linn. DC. Prod. II. 488; Fl. Br. I. 2. 273; Dalz. & Gibs. Bomb. Fl. 82; Bedd. Fl. Sylv. t. 184; Brandis For. Fl. 163. The Tamarind. *Hunase*, K.; *Ohinch*, M.; *Amlî*, Vern.

Throughout India and the Tropics generally. Self-sown near villages and in waste lands; also cultivated throughout the presidency, probably indigenous in tropical Africa. Fl. May-June. Fr. ripe Feb.-Mch. Heartwood dark purplish-brown, extremely hard, heavy and durable. Pores moderate-sized, single or in groups surrounded by rings of light coloured tissue sometimes confluent. Med. rays very fine, numerous, distinct. Weighs nearly 80 lbs. to the cub. ft. Used for wheels, furniture, rice-pounders, &c. Very difficult to work. Fruit is laxative. The leaves are used in curries. The ground seeds mixed with gum furnish a strong cement.

## 37. BAUHINIA, Linn.

Trees, shrubs or climbers with circinate tendrils. Leaves simple, cleft at tip into two more or less connate leaflets. Flowers showy, in paniculate racemes. Calyx-tube short, limb spathaceous or 2-5 cleft. Petals 5, sub-equal, usually clawed. Stamens 10, 3-5 or all perfect. Ovary stalked, many ovuled; style long or short, stigma small or large and peltate. Pod linear, indehiscent or 2-valved, seeds albuminous.

Trees. Perfect stamens 10.

Calyx spathaceous or 5-cleft. Pod glabrous or tomentose.

Pod glabrous.

Calyx spathaceous. Pod turgid, not veined. 1. *B. racemosa*.

Calyx 5-cleft. Pod reticulate, veined ... 2. *B. malabarica*.

Pod red tomentose, turgid ... 3. *B. Lawii*.

Twining shrubs with circinate tendrils.

Leaflets distinct. Perfect stamens 10 ... 4. *B. diphylla*.

Leaflets connate. Perfect stamens 3 ... 5. *B. Vahlîi*.

Trees. Perfect stamens 3-5.

Calyx 2-cleft to the base. Perfect stamens 3 ... 6. *B. purpurea*.

Calyx spathaceous. Perfect stamens 5 ... 7. *B. variegata*.

1. *B. racemosa*. Lam. Dict. I. 390; Dalz. & Gibs. Bomb. Fl. 82; Bedd. Fl. Sylv. t. 182; Brandis For. Fl. 159. *Apta*, M.; *Banne*, K.; *Wannurajah*, Vern.

From the Punjab to Ceylon and Burma in dry forests. Throughout the presidency in deciduous forests. Fl. Mch.-June. Fr. Nov.-Mch. Wood light-brown, hard, with an irregularly shaped darker and harder

heartwood. Pores moderate-sized, often in short radial lines. Medullary rays fine, uniform, equidistant, crossed by alternate narrow wavy bands of light and dark-coloured tissue. Weighs about 40 lbs. to the cub. ft.

2. *B. malabarica*, Roxb. Fl. Ind. II. 321; Fl. Br. I. 2. 277; Dalz. & Gibs. Bomb. Fl. 82; Brandis For. Fl. 159; Bedd. Fl. Sylv. 92. *Ambi*, Vern.; *Shadloo*, K.

Western and Central Himalayas to Burma and generally throughout tropical India. Throughout the moist forests of the Konkan and North Kánara, common. Fl. Oct.-Nov. Fr. Apl.-May. Wood light reddish-brown with a small dark-brown heartwood, moderately hard. Similar in structure to that of *B. racemosa*. Weighs about 45 lbs. to the cub. ft.

3. *B. Lawii*, Benth. MSS. Fl. Br. I. 277. *B. foveolata*, Dalz. in Jour. Linn. Soc. 13. p. 188. *Buswanpad*, K.; *Kanchin*, M.

Throughout the moist forests of the Konkan and North Kánara, common. This large, diœcious tree has sweetly scented white flowers. Pods 1 foot long, twisted, turgid, madder-brown coloured, tomentose. Fl. Oct.-Nov. Fr. ripe Jany. Male and female flowers on separate stems. This I have also found to be usually the case in *B. malabarica*, in North Kánara. Bark smooth. Wood pinkish-white, soft, moderately heavy. Pores large, simple or divided. The wavy concentric bands are nearly continuous and broader than the pores. Med. rays very fine, numerous. Weighs about 42 lbs. to the cub. ft. Not used in North Kánara.

4. *B. diphylla*, Hamilt. in Symes It. Avens. t. 24; Fl. Br. I. 2. 273. Konkan, Stocks.

5. *B. VahlII*, W. & A. Prod. 297; Fl. Br. I. 2. 279; Dalz. & Gibs. Bomb. Fl. 83; Brandis For. Fl. 161. *Chambuli*, *chambil*, M. All along the Lower Himalayas from the Chenab eastwards. Northern and Central India, Assam and Behar. In the moist forests of the Konkan gháts. A gigantic climber. Fl. Apl. Fr. ripe next Apl. Wood porous, in broad broken concentric layers, alternating with red juicy bark-like tissue. Yields a useful and strong fibre.

6. *B. purpurea*, Linn.; Roxb. Fl. Ind. II. 320; Fl. Br. I. 2. 284; Bedd. Fl. Sylv. 92; Brandis For. Fl. 160; Dalz. & Gibs. Bomb. Fl. 30. *Dewa-kunchun*, *ragtahanchun*, *atmatti*, Vern.

Sub-Himalayan tract from the Ravi eastwards, ascending to 5000 feet. Bengal, Burma, Central and Southern India. Cultivated throughout the presidency, also wild in the dry forests of the Deccan and Konkan. Fl. Sept.-Nov. Fr. Jan.-April. Wood light-brown, hard with an irregularly shaped harder and darker coloured heartwood; not much used.

7. *B. variegata*, Linn.; DC. Prod. II. 514; Bedd. Fl. Sylv. 92; Brandis For. Fl. 160; Fl. Br. I. 2. 284; Dalz. & Gibs. Bomb. Fl. Suppl. 30. *Kanaraj*, *kovidara*, *kanchan*, Vern. Sub-Himalayan tract from the Indus eastwards and throughout the forests of India and Burma. Cultivated throughout the presidency, often as a road-side tree. Fl. Feb.-April. Fr. Nov. Wood grey, moderately hard, with an irregular darker heartwood.

38. **XYLIA**, Benth.

A large unarmed tree. Leaves bipinnate, pinnæ 1 pair. Flowers sweet-scented in globose, tomentose heads. Calyx tubular, 5-cleft. Petals linear, valvate. Stamens 10, free; exserted, anthers with deciduous, stipitate glands. Ovary sessile; style filiform, stigma minute, terminal. Pod large, woody, falcate, dehiscent, septate between the compressed seeds.

*X. dolabriformis*, Benth. in Hook. Jour. Bot. IV. 417; Fl. Br. I. 2. 286; Brandis For. Fl. 171; Bedd. Fl. Sylv. t. 186; Dalz. & Gibs. Bom. Fl. 85. The Iron Wood of Pegu and Arracan. *Pynkado*, Burm.; *Jamba, yerul, suria*, M.; *Jambe, tiruwa*, K.

Central Provinces, Southern India, Burma. Throughout the deciduous forests of the presidency. Fl. Mch.-April. Fr. C. S. Bark smooth, scaling off in great, thick, irregular patches. Periderm thin with a well developed layer of green cells, under-bark reddish. Sapwood of mature trees about 75 in. thick; heartwood reddish-brown, hard. Annual rings visible, but sometimes indistinct. Pores small and moderate sized, often subdivided, enclosed in irregular patches of white tissue, often joined in short zig-zag lines. Medullary rays very fine, uniform, distinct in the tissue. Weighs 55-75 lbs. to the cubic foot. Yields a hard, durable, reddish-brown timber, which resists the attacks of white-ants and is liable to split and crack. Suitable for railway sleepers, wood pavements, &c.

39. **ENTADA**, Linn.

Woody-climbers with tendrils. Leaves bipinnate. Flowers minute, yellow, in long slender spikes. Calyx minute, campanulate, 5-toothed. Corolla oblong in bud, lobes 5, narrow, falcate. Stamens 10, free, exserted; anthers glandular. Ovary sub-sessile, ovules many, style filiform, stigma concave, terminal. Pod very large, constricted between the seeds; seeds flat, ovate, brown, shining.

*E. scandens*, Benth. in Hook. Jour. Bot. IV. 332; Fl. Br. I. 2. 287; Brandis For. Fl. 167. *E. pusætha*, DC.; Dalz. & Gibs. Bomb. Fl. 83. *Dodda ganpi*, K.; *Gardul*, Vern.; *Gárambi, garbe*, M.

Central and Eastern Himalayas ascending to 4000 feet in Sikkim. W. Peninsula, Burma and Ceylon. Throughout the forests of the North Kánara and Konkan gháts, often along river banks. Fl. Mch.-May. Fr. Dec.-Jan. The great seeds contain an oil used as an emetic. They are often hollowed out and made into small boxes.

40. **ADENANTHERA**, Linn.

Trees. Leaves abruptly bipinnate. Flowers minute, in slender axillary or paniculate racemes. Calyx campanulate, equally toothed. Petals free or connate at the base. Stamens 10, free, anther cells with a deciduous gland at top. Ovary sessile; style filiform, stigma minute. Pod linear, 2-valved, seeds with a red or bi-coloured testa.



*A. pavonina*, Linn.; DC. Prod. II. 446; Fl. Br. I. 2. 287; Bedd. Fl. Sylv. t. 46; Brandis For. Fl. 168. Red Wood. *Munjuti*, K.; *Val, thorlagunj*, M.; *Bari-gunchi*, Guz.

Bengal, Southern India and Burma. In the moist forests of the Konkan and North Kánara, nowhere abundant. Fl. Mch.-May. Fr. Aug.-Oct. Wood with a hard, red, durable, close-grained, strong heartwood, used for house building and cabinet making. Scarlet seeds used for jeweller's weights and strung into necklaces.

#### 41. PROSOPIS, Linn.

Prickly trees. Leaves bipinnate, pinnæ usually 2 pairs, leaflets 7-10 pairs obliquely oblong, cuspidate, 3-nerved. Flowers in slender paniced spikes, small, yellow, in the axils of ovate membranous bracts. Calyx campanulate with 5 short teeth. Corolla with 5 ligulate petals, free or connate below. Stamens 10, free, anthers tipped with a gland. Ovary stalked, ovules numerous; style filiform, stigma minute. Pod coriaceous, indehiscent, linear, pendulous, mesocarp spongy, septate between the seeds.

*P. spicigera*, Linn.; DC. Prod. II. 446; Fl. Br. I. 2. 288; Bedd. Fl. Sylv. t. 56; Brandis For. Fl. 169; Dalz. & Gibs. Bomb. Fl. 84. *Sumri, hamra*, Guz.; *Shema, saunder, savandal*, Deccan.; *Kandi*, Sind.

Punjab, Sind and the Western Peninsula. In the dry forests of the Deccan and Guzerat, and in Sind near the Indus river. Fl. Feb.-Apl. Fr. May-Aug. A moderate sized thorny tree. Bark grey, rough, with deep fissures. Sapwood large; heartwood purplish-brown, very hard. Pores small to moderate, included in narrow concentric bands of resinous tissue. Medullary rays short, fine, wavy. One of the sacred trees of the Hindus. Pods largely consumed as food in the Punjab, Gujarát and the Deccan. A valuable fuel with great heating power.

#### 42. DICHROSTACHYS, DC.

A spinous shrub or small tree. Leaves bipinnate, pinnæ 8-10 pairs, with stipitate glands at the base of each pair. Flowers minute in axillary, pedunculate spikes, upper flowers of spike bisexual, yellow, lower white, purple or rose-coloured, neuter, with long exserted filiform staminodes. Calyx minute, campanulate, 5-toothed. Corolla oblong, with 5 strap-shaped petals. Stamens 10, free, exserted anthers tipped with a globose stipitate gland. Ovary sessile, many ovuled; style filiform, stigma capitate. Pod linear, twisted, indehiscent or irregularly opening.

*D. cinerea*, W. & A. Prod. 271; Fl. Br. I. 2. 283; Bedd. Fl. Sylv. t. 185; Brandis For. Fl. 171; Dalz. & Gibs. Bomb. Fl. 84. *Vurtuli*, Vern.; *Sigamkati*, M.

Common on the dry stony hills of the Deccan, cultivated in North Kánara and the Konkan, North-Western Provinces, W. Peninsula S. and C. India and Ceylon. Fl. hot season. Heartwood red, very hard

and heavy. Pores moderate sized, enclosed in rings of soft tissue. Medullary rays moderately broad, equidistant. Weighs about 70 lbs. to the cub. ft.

43. **LEUCÆNA**, Benth.

Trees. Leaves bipinnate. Flowers in dense, globose heads. Stamens 10, free, exserted; calyx cylindrical, campanulate, shortly toothed. Petals valvate, free, anthers not gland-crested. Ovary stalked, many ovuled; style filiform, stigma minute. Pod flat, strap-shaped, dehiscent, many seeded.

*L. glauca*, Benth. in Hook. Jour. Bot. IV. 416; Fl. Br. I. 2. 290; Brandis For. Fl. 172. Naturalised and common throughout the presidency from the coast inland. Fl. June-Aug. Fr. remains long on tree. A tropical American species.

44. **MIMOSA**, Linn.

Shrubs or herbs, prickly or not. Leaves in the indigenous species bipinnate, leaflets small, often sensitive. Flowers minute, in globose heads or cylindrical spikes. Calyx campanulate, shortly toothed. Petals connate towards the base. Stamens twice the number of petals, exserted, free. Ovary stalked, many ovuled; style filiform, stigma minute. Pod oblong or linear, valves membranous or coriaceous, made up of 1-seeded joints that separate when mature from the sutures.

Pod small, sutures prickly ... ..1. *M. pudica*.  
 Pod large, sutures without prickles ... ..2. *M. rubicaulis*.  
 Pod large, sutures armed with large hooked prickles. 3. *M. hamata*.

*M. pudica*, Linn.; DC. Prod. II. 426; Fl. Br. I. 2. 291; Dalz. & Gibs. Bomb. Fl. Suppl. 25. *Lajalu*, M. Sensitive Plant. Native of Brazil. Run wild in the Konkan and North Kánara; usually cultivated in gardens. Fl. rainy and cold seasons.

2. *M. rubicaulis*, Lam.; DC. Prod. II. 429; Fl. Br. I. 2. 291; Dalz. & Gibs. Bomb. Fl. 85; Brandis For. Fl. 172. *Hajeru*, Sind.

Western Himalayas, ascending to 5000 feet in Kumaun, throughout India. In the dry districts of the presidency and Sind, in open jungles and plains. Fl. Aug.-Sept. Fr. Nov.-Jan.

3. *M. hamata*, Willd.; DC. Prod. II. 427; Fl. Br. I. 2. 291; Dalz. & Gibs. Bomb. Fl. 85. *Arkur*, Vern. Western Peninsula. Throughout the dry Deccan districts in open jungles, common on the Kuput range of hills in the Dhárwár district. Fl. R. S. Fr. C. S.

45. **ACACIA**, Willd.

Erect or climbing, spinose, prickly shrubs or trees. Leaves bipinnate, leaflets minute. Flowers in globose heads or cylindrical spikes, usually pentamerous. Calyx campanulate, shortly toothed,

Petals exerted, united in the lower half. Stamens free, indefinite, exerted. Ovary stalked or sessile, many ovuled; style filiform, stigma minute. Pod ligulate or oblong, dehiscent or indehiscent.

**Erect shrubs or trees.**

Stipular spines long, straight. Flowers in globose heads.

Pod straight.

Pod thick, short, cylindrical glabrous, marked with fine close striæ ... 1. *A. Farnesiana*.

Pod thick, strap-shaped, densely grey-downy ... 2. *A. arabica*.

Pod thin, narrow, ligulate, edges slightly repand, glabrous ... 3. *A. eburnea*.

Pod thin flat, broad-ligulate, edges straight; glabrous... 4. *A. Jacquemontii*.

Pod ligulate-falcate.

Pod thin, flat, edges straight, thinly grey-downy, dry, dehiscent ... 5. *A. tomentosa*.

Pod thin, flat, edges straight, tomentose ... 6. *A. leucophaea*.

Stipular spines short, hooked. Flowers in spikes.

Spines short, hooked. Pod straight, not winged.

Rachis pubescent. Pinnæ 10-20 pairs, leaflets 30-50 pairs. Calyx long, tomentose. White-barked tree ... 7. *A. Suma*.

Rachis downy, pinnæ 20-40 pairs, leaflets 30-58 pairs. Calyx short, downy ... 8. *A. Catechu*.

Rachis dark, shining, glabrous. Pinnæ 15-20 pairs, leaflets 30-40 pairs. Calyx short, glabrous ... 9. *A. Sundra*.

Spines short, hooked, rarely unarmed. Pod straight, narrowly winged along the upper edge ... 10. *A. ferruginea*.

Spines short, hooked, often in 3s. Pod straight, not winged ... 11. *A. Senegal*.

Stipular spines long, straight, of different sizes, the larger conical, white, and hollow inside. Pod slightly falcate ... 12. *A. Latronum*.

**Climbing shrubs armed copiously with scattered prickles.**

Flowers in globose heads distributed in large panicles.

Stipules and bracts cordate, ovate. Pod red, thick, fleshy, shrivelled and rugose when dry... 13. *A. concinna*.

Stipules and bracts minute, lanceolate. Pod thin, smooth, dry.

Leaflets sub-falcate, pale beneath, 16-60 ... 14. *A. Intsia*.

Leaflets linear, not pale beneath, 80-100 ... 15. *A. pennata*.

1. *A. Farnesiana*, Willd. DC. Prod. II. 461; Fl. Br. 2. 292; Brandis For. Fl. 180; Bedd. Fl. Sylv. 52. *Vachellia Farnesiana*, W. & A. Dalz. & Gibs. Bomb. Fl. Suppl. 26. The Cassie Flower. *Viláyati babul*, *gukikar*, *iri-babul*, Vern.; *Jalli*, K.; *Kankar*, M. Cosmopolitan in the tropics, but usually cultivated. Run wild near villages and in moist situations throughout the presidency and Sind; indigenous in Central America. Fl. Feb.-Mch. Wood white, close-grained, hard and tough; weighs about 50 lbs. to the cub. ft. The flowers, which are very strongly scented, yield an essence on distillation, much used in European perfumery. A gum exudes from the trunk and is collected in Sind. The bark is used in medicine and contains about 2 per cent of tannin.

2. *A. arabica*, Willd. ; W. & A. Prod. 277 ; Fl. Br. I. 2. 293 ; Bedd. Fl. Sylv. 95 ; Dalz. & Gibs. Bomb. Fl. 86 ; Brandis For. Fl. 180. Indian Gum Arabic Tree. *Jali*, K. ; *Babul*, M., *Kikar*, *ramakanta*, Vern. ; *Babbar*, *kálíkikar*, Sind.

Punjab to Behar, Western Peninsula and Ceylon. Throughout the dry districts of the presidency, forms extensive forests along the Indus in Sind and also in the black soil country of the presidency proper. It is an excellent roadside tree wherever there is a scanty rainfall. Fl. R. S. Fr. C. S. The bark yields one of the most extensively used tans in India. Wood reddish-brown, hard, mottled, with dark streaks ; weighs about 54 lbs. to the cubic foot. The timber is very valuable for many purposes. In Sind it is used for boat building, rafters and fuel ; elsewhere for oil presses, wheels, agricultural implements, etc.

3. *A. eburnea*, Willd. ; DC. Prod. II. 461 ; Fl. Br. I. 2. 293 ; Dalz. & Gibs. Bomb. Fl. 85 ; Bedd. Fl. Sylv. 95 ; Brandis For. Fl. 183. *Marmat*, M.

Eastern Himalayas to W. Peninsula and Ceylon. Throughout the dry Deccan districts and Sind, common in the Southern Mahratta Country in stony places. Fl. Nov.-Jan. Fr. May-June. A small tree. Wood hard, yellowish : weighs 52 lbs. to the cubic foot. Gamble.

4. *A. Jacquemontii*, Benth. in Hook. Jour. Bot. 1. 490 ; Fl. Br. I. 2. 293 ; Brandis For. Fl. 183. *Ratobauli*, Guz.

N. W. Provinces and Punjab. Plains of Sind, Guzerat and Rajputana. Fl. Feb.-May. A small, bushy, thorny shrub with polished stems and straight polished slender spines. The bark gives a brown or black colour, also used as a tan.

5. *A. tomentosa*, Willd. ; DC. Prod. II. 462 ; Fl. Br. I. 2. 294 ; Dalz. & Gibs. Bomb. Fl. 86 ; Bedd. Fl. Sylv. t. 48. *Anjar*, Vern.

Western Peninsula and Ceylon, common in the Panch Máhals and Guzerat, rare in the Deccan and Khándesh jungles, Dalz.

6. *A. leucophlœa*, Willd. ; DC. Prod. II. 462 : Fl. Br. I. 2. 294 ; Dalz. & Gibs. Bomb. Fl. 86 ; Bedd. Fl. Sylv. t. 49. *Hewar*, Vern. ; *Haribával*, Guz. ; *Panharya*, M. ; *Bili-jali*, *bellada*, K.

Plains of the Punjab and North-West Provinces to Ceylon and Burma. Throughout the dry Deccan districts, common in the Southern Marátha Country in dry open forests. Fl. Aug.-Sept. Fr. C. S. A moderate sized, deciduous tree. The inflorescence in large terminal panicles is very characteristic. Bark white. Heartwood reddish-brown, very hard, strong and tough. An excellent fuel.

7. *A. Suma*, Kurz. in Brandis For. Fl. 187 ; Fl. Br. I. 2. 294. *Kamtiya*, M. ; *Banni mara*, *mugli*, K.

Bengal, Behar, Western Peninsula and Ceylon. In North Kánara near the Dhárwar frontier and in the Southern Marátha Country ; usually in moist places, along nálas ; not common. Fl. H. S. Fr. Sept.-Oct. A moderate sized tree with white bark. Spines hooked, short, in pairs. The wood is very similar to that of *Acacia Catechu*, with more numerous pores and finer medullary rays. Bark used as a tan.

8. *A. Catechu*, Willd. Sp. Pl. IV. 1070; Fl. Br. I. 2. 295; Bedd. Fl. Sylv. t. 49; Dalz. & Gibs. Bomb. Fl. 86. *Catechu*, Cutch *Catechu Nigrum*, Pegu *Catechu*. *Khair, kaderi*, M.

Himalayas ascending to 5000 feet in Sikkim, Burma and Pegu, Central Provinces and the Madras Presidency. In the Bombay Presidency is abundant in the Ahmedabad, Broach, Panch Maháls and Surat Districts, is common along the coasts of the Konkan and North Kánara, often on laterite; also scattered throughout the presidency in dry or moist forests. Fl. July-Sept. Fr. C. S. A moderate sized, deciduous tree. Bark dark-brown, fissured. Stipulary spines short, hooked in pairs. Sapwood yellow, heartwood usually bright-red, smooth, extremely hard. Weighs about 70 lbs. to the cubic foot. Yields the catechu of commerce.

9. *A. Sundra*, DC. Prod. II. 458; Fl. Br. I. 2. 295; Dalz. & Gibs. Bomb. Fl. 86; Bedd. Fl. Sylv. t. 50. *A. Catechu*, Brandis For. Fl. 186. *Khair, lálkhair*, M.; *Shemi*, K.

W. Peninsula, Ceylon and Burma, throughout the driest parts of the presidency. Also yields catechu. Fl. Aug.-Sept. Fr. Dec. Wood dark-red, close-grained, durable, scarcely more than a variety of *A. Catechu*, from which it differs by the total absence of pubescence and fewer leaflets and pinnae.

10. *A. ferruginea*, DC. Prod. II. 458; Bedd. Fl. Sylv. t. 51; Brandis For. Fl. 185. *Pándhra khair*, M.; *Kaiger*, Vern.

Western Peninsula, North Bengal and Central India, Panch Maháls, Konkan, and Guzerat. Fl. R. S. Fr. Jany.-Feb. A large deciduous tree. Bark rough. Heartwood olive brown, extremely hard, weighs about 70 lbs. to the cubic foot. Yields a gum similar to gum arabic.

11. *A. Senegal*, Willd. DC. Prod. II. 459; Fl. Br. I. 2. 295. *A. rupestris*, Stocks. Brandis For. Fl. 184. *Khor*, Sind.

Sind and Ajmere, Western Africa, north of the river Senegal. Dry rocky hills of Sind. Fl. Fr. Dec. Bark grey. Spines short, sharp, hooked. One of the principal sources of the commercial gum arabic.

12. *A. Latronum*, Willd.; DC. Prod. II. 460; Fl. Br. I. 2. 296; Bedd. Fl. Sylv. 95; Dalz. & Gibs. Bomb. Fl. 87; Brandis For. Fl. 180. *Donn mullina, hod jali*, K.; *Dev babul, bhes*, M.; *Tumbuti* in Dhárwár.

Western Peninsula and Southern India. Common in the dry plains of the Deccan. Fl. Jany.-Mch. A small tree with a flattened umbrella-like top, often gregarious. The spines are of two kinds, one large, white, conical and hollow, the other slender and shorter.

13. *A. concinna*, DC. Prod. II. 464; Fl. Br. I. 2. 296; Dalz. & Gibs. Bomb. Fl. 87; Brandis For. Fl. 188. *Sigekai, shige*, K.

Tropical jungles throughout India. Common in the Konkan and North Kánara moist forests. Fl. Mch.-July. Fr. ripe C. S. The stems are very prickly when young, but most of the sharp prickles soon disappear. Stems sometimes somewhat angled and 8 in. or more in diameter. Bark smooth, grey, mottled, reddish within, 25 in. thick. Wood reddish-grey, smooth,

moderately hard. Pores large or medium sized, often subdivided, scattered. Medullary rays moderately broad, crossed obliquely by continuous wavy, close lines of light coloured tissue. Weighs about 52 lbs. to the cubic foot. The fruit is used as a substitute for soap and is exported in considerable quantities from the North Kánara and Belgaum Districts.

14. *A. Intsia*, Willd. in DC. Prod. II. 464; Fl. Br. I. 2. 297; Dalz. & Gibs. Bomb. Fl. 88. *A. casia*, W. & A. Prod. 1. 278; Dalz. & Gibs. Bomb. Fl. 87; Brandis For. Fl. 189. *Chilar*, M.

Throughout tropical India and Burma, also in Sikkim up to 5000 ft. Common throughout the presidency from the coast inland in deciduous forests. Fl. Apl.-Aug. Fr. C. & H. S. A large climber with grey bark. Wood white, soft, porous.

15. *A. pennata*, Willd.; Sp. Pl. IV. 1090; Fl. Br. I. 2. 297; Brandis For. Fl. 189; *A. pinnata*, Dalz. & Gibs. Bomb. Fl. 87. *Shembi*, *shemberti*, M.

Oudh, Kumaun, Nepal, East Bengal, Burma, Western and Southern India. Throughout the presidency, common in the Konkan and North Kánara forests. Fl. June-Aug. Wood reddish, porous, moderately hard. The bark is used for tanning in North Kánara.

#### 46. **ALBIZZIA**, Durazz-

Unarmed trees or shrubs. Leaves bipinnate. Flowers in the Indian species in large globose heads. Calyx toothed. Petals 4-5, united below, valvate. Stamens indefinite, exserted; filaments united at the base. Ovary sessile, or shortly stalked; style filiform, stigma capitate. Pod flat, broad, indehiscent or 2-valved; seeds compressed.

Pinnæ 2-8 pairs. Leaflets large or medium sized.  $\frac{1}{2}$ -2 in. long, midrib in the middle of the leaflet or near the upper margin.

Flower-heads in short, corymbose cymes, not paniced. Pinnæ 2-4 pairs, leaflets 3-9 pairs midrib usually nearer to the upper margin than centre. 1. *A. Lebbek*.

Flower-heads copiously paniced.

Rusty or grey tomentose. Pinnæ 3-8 pairs, leaflets 10-25 pairs, midrib near upper margin. 2. *A. odoratissima*.

Glabrous or pubescent. Pinnæ 3-4 pairs, leaflets 6-8 pairs, midrib usually nearly central ... 3. *A. procera*.

Pinnæ 6-15 pairs, leaflets small,  $\frac{1}{2}$ - $\frac{1}{4}$  in., midrib lateral.

Stipules broad, cordate ... 4. *A. stipulata*.

Pinnæ 6-15 pairs, leaflets  $\frac{1}{4}$  in., midrib central.

Stipules minute ... 5. *A. amara*.

1. *A. Lebbek*, Benth. in Hook. Lond. Jour. 1844, 87; Fl. Br. I. 2. 298; Dalz. & Gibs. Bomb. Fl. 88; Bedd. Fl. Sylv. t. 53; Brandis For. Fl. 176. The Siris Tree. *Sirsul*, K.; *Chichola*, M.; *Siris*, *harrerri*, Vern.

Sub-Himalayan region from the Indus eastwards. Bengal, Burma, Southern, Central and Western India. Throughout the presidency in dry and moist forests. Commonly planted along roadsides. Fl. Apl.-May. Fr. Sept.-Jan. A large deciduous tree. Bark grey or brown, rough. Wood: sapwood large, white; heartwood dark-brown, mottled, hard, shining, with longitudinal streaks. Weighs about 55 lbs. to the cub. ft. Similar in

structure to the wood of *A. procera*. Yields an excellent timber used for furniture, picture frames, house building, canoes, &c.

2. *A. odoratissima*. Benth. in Hook. Jour. Bot. 1844, 88; Fl. Br. I. 2. 299; Dalz. & Gibs. Bomb. Fl. 83; Bedd. Fl. Sylv. t. 54; Brandis For. Fl. 175. *Godhunchi, bilkumbi*, K.; *Siris*, M.; *Kalo-surasio* Guz.; *Kali saras* or *harrerri*, Panch Maháls.

Sub-Himalayan region from the Indus eastwards, ascending to 3000 ft.; Burma, Assam, Central and Southern India. Common in the moist forests of North Kánara and the Konkan, also in the dry Deccan. Fl. Apl.-June. Fr. C. S. A large deciduous tree. Bark rough, grey, with irregular cracks, inner bark purple, fibrous, 5 in. thick. Pores containing a dark gum, large, single or double, surrounded with a very narrow ring of white tissue. Medullary rays fine. Wood: sapwood large, white; heartwood dark-brown, very hard. Weighs about 50 lbs. to the cub. foot. Yields a fairly durable timber which is in considerable request in North Kánara for oil-mills, wheels and furniture.

3. *A. procera*. Benth. in Hook. Jour. 1844. 89; Fl. Br. I. 2. 229; Bedd. Fl. Sylv. 98. *Acacia procera*, Willd.; Dalz & Gibs. Bomb. Fl. 87; Brandis For. Fl. 175. *Bellati, billi baage*, K.; *Kinhai*, M.; *Karalla, kilai, tihiri, gurar*, Vern.

Central and Eastern Himalayas, Burma, Western Peninsula, and Malay Archipelago. Throughout the presidency; common in the North Kánara and Konkan moist forests. In the dry districts along ravines and nálas. Fl. May. Fr. Jan.-Feb. A large tree with white, smooth bark. Sapwood large, yellowish-white; heartwood dark-brown, shining, hard, with alternate bands of darker and lighter coloured tissue. Pores equally distributed, of different sizes, large and medium, single or in groups of 2 each, surrounded by a ring of soft tissue. Medullary rays fine, numerous. weighs about 45 lbs. to the cub. foot. Yields a timber much used in North Kánara for house-posts, &c.

4. *A. stipulata*, Boiv., Benth. in Hook. Jour. Bot. 1844. 92; Fl. Br. I. 2. 300; Brandis For. Fl. 178; Bedd. Fl. Sylv. t. 55; Dalz. & Gibs. Bomb. Fl. 88. *Bagana, kalbage*, K.; *Laeli, udul, kasir*, M.; *P'halari*, Thána; *Shambar*, Panch Máhals.

Tropical Himalayas ascending to 5000 feet in Sikkim, to Ceylon and Burma. Common in the evergreen forests of the Konkan and North Kánara gháts. Fl. Apl.-June. Fr. C. S. A large deciduous tree. Bark grey, rough. Wood: sapwood large, white; heartwood brown, soft, shining, not durable. Weighs about 35 lbs. to the cub. ft.

5. *A. amara*, Boiv., Benth. in Hook. Jour. Bot. 1844, 90; Fl. Br. I. 2. 301; Brandis For. Fl. 178; Bedd. Fl. Sylv. t. 61.; Dalz. & Gibs. Bomb. Fl. 88. *Tugli*, K.; *Lullei*, Vern.

Southern and Western India and Ceylon. Throughout the presidency in dry forests. Fl. Apl.-June. Fr. cold season. A moderate sized deciduous tree. Bark dark coloured, smooth, thin, scaly. Green cell layer close to surface. Sapwood large; heartwood purplish-brown, mottled, extremely hard, with alternate, concentric light and dark bands. Weighs about 60 lbs. to the cubic foot. Used for carts, house-building, ploughs, etc, also for fuel.

## 47. PITHECOLOBIUM, Mart.

Trees. Leaves bipinnate. Flowers in globose heads or cylindrical spikes, pentamerous, bisexual. Calyx campanulate, with short teeth. Corolla segments valvate. Stamens indefinite, much exserted, ovary sessile or stalked; style filiform, stigma minute. Pod flat, circinate or falcate, 2-valved; usually dehiscent and much twisted when perfectly ripe. Seeds in a scanty pulp.

*P. bigeminum*, Benth. in Hook. Lond. Jour. 1844, 206; Dalz. & Gibs. Bomb. Fl. 89; Fl. Br. I. 2. 303; Bedd. Fl. Sylv. 96. Iron Wood. *Kan karinje*, K.; *Kachlora*, Vern.

Eastern Himalayas, Western Peninsula and Ceylon. Common in the evergreen forests of the Konkan and North Kánara. Fl. C. S. Fr. ripe June-July. A large tree. Wood dark coloured, heavy. The circinate flattened pods with the black seeds hanging from long slender fanicles have a fœtid odour when ripe.

*P. dulce*, Benth. in Hook. Lond. Jour. 1844, 199; Fl. Br. I. 2. 302; Bedd. Fl. Sylv. t. 188. Manilla Tamarind. *Vilayti amlī*, Hind. A cultivated species introduced from Mexico. Fl. R. S. Fr. C. S. Bark smooth, lenticellate, with horizontal raised ridges, often crowned with a prickly wood. Largely grown for fuel in Southern India. Commonly planted in the Belgaum fort. Seeds edible.

*P. Saman*, L., Uango or Rain Tree. Introduced into North Kánara. Fl. C. S. Fr. R. S. Planted along roadsides in the Belgaum District and near Belgaum itself. There was a thriving plantation of this tree near Kadra in the Kánara District.

## ORDER 38. ROSACEÆ.

Herbs, shrubs or trees. Leaves stipulate, alternate, simple or compound. Flowers bisexual, regular. Calyx superior or inferior gamosepalous. Petals 5, rarely 0, inserted under the margin of the disk, imbricate. Disk lining the calyx-tube or forming a ring at its base. Stamens perigynous, indefinite, rarely 1-5 or 10 inserted with the petals, or on the disk. Carpels 1 or more, free or connate or adnate to the calyx-tube; styles free or connate; ovules 1 or more in each carpel. Fruit variable, of achenes, berries or drupes.

Leaves simple. Carpel 1	...	...	... 1. PYGEUM.
Leaves compound. Carpels many		...	... 2. RUBUS.

## 1. PYGEUM, Gærtn.

Evergreen trees or shrubs. Leaves alternate persistent; basal glands 2 or 0. Flowers small, bracteolate, racemose. Calyx-tube obconic, urceolate, deciduous; limb 5-15-toothed, often unequally. Petals minute, 5-6 or 0, villous or tomentose, rarely glabrous. Stamens 10-50, at mouth of calyx-tube. Carpel 1, basal in the calyx-tube; style terminal, slender, exserted from the bud, stigma



capitate; ovules 2, collateral, pendulous. Fruit a transversely oblong drupe. Cotyledons very thick, hemispheric.

Leaf basal glands 2, large, Petals 5-6 tomentose. Ovary glabrous .1. *P. Wightianum*.  
Leaf basal glands 0, Petals 0. Ovary hirsute ... .. 2. *P. Gardneri*.

1. *P. Wightianum*, Bl. Melanges Bot. 1855. Av. 2 (ex Walp. Ann. IV. 642); Fl. Br. I. 2. 319. *P. ceylanicum*, Bedd. Fl. Sylv. t. 59. excl. synonym. *Sugnigari*, K.

Western Peninsula, Anamallays, Pulneys and Tinnevely ranges.

Common on the southern ghâts of North Kánara, in evergreen forests. Fl. Nov. Dec. Fr. H. S.

Branches glabrous, lenticellate. Racemes short; flowers bracteolate. Leaves with or without the basal glands, and differ in shape from Wight's Ic. t. 256, but agree with Ic. t. 993, which is *P. Gardneri*. The two species are closely allied.

2. *P. Gardneri*, Hook. f. Fl. Br. I. 2. 321. *P. zeylanicum*, Dalz. & Gibs. Bomb. Fl. 891. *Dacca, kaula*, Vern. Western Peninsula, Nilgherries, ghâts of Bombay, Konkán ghâts (Mahábaleshvar, Munohur and Parwár), Dalz.

Specimens of this tree (in fruit) from Mahábaleshwar have the leaves very like those of *P. Wightianum*, with basal glands. Fr. C. S.

## 2. RUBUS, Linn.

Prickly, trailing shrubs or creeping herbs. Leaves alternate, simple or compound; stipules adnate to petiole. Flowers usually in terminal or axillary panicles. Calyx cleft into 5 persistent lobes. Petals 5. Stamens numerous. Disk coating the broad calyx-tube. Carpels many, on a convex receptacle; ovules 2, collateral, pendulous. Drupes many 1-seeded, crowded upon a dry or spongy, receptacle.

Leaves simple, palmately lobed	...	... 1. <i>R. moluccanus</i> .
Leaves trifoliolate. A suberect bush	...	... 2. <i>R. ellipticus</i> .
Leaves 5-9-foliolate	...	... 3. <i>R. lasiocarpus</i> .

1. *R. moluccanus*, Linn.; DC. Prod. II. 566; Fl. Br. I. 2. 330. *R. rugosus*, Dalz. & Gibs. Bomb. Fl. 89.

Central and Eastern tropical and temperate Himalaya, Eastern and Western Peninsulas, Ceylon.

Along the higher ghâts from Mahábaleshvar southwards; also on the Nilkund and southern ghâts of North Kánara at 1800 to 2000 ft. elevation. Fl. & Fr. C. & R. S.

2. *R. ellipticus*, Smith in Rees' Cyclop. XXX., Rubus 16; Fl. Br. I. 2. 336. *R. flavus*, Brandis For. Fl. 197. *R. Wallichianus*, Dalz. & Gibs. Bomb. Fl. 89.

Temperate and sub-tropical Himalaya, Khasia mountains, Burma, Western Peninsula and Ceylon. From Mahábaleshvar southwards along

the highest ghâts; 4—5000 ft. Fl. Fr. R. S. Neither this nor the next species are found in North Kánara.

3. *R. lasiocarpus*, Smith Fl. Br. I. 2. 339; Dalz. & Gibs. Bomb. Fl. 89. *Gariphul*, M. Highest ghâts to the southwards, Dalz. Common on the Bababuden hills of Mysore above 5000 ft. Fl. Fr. R. S.

### ORDER 39. RHIZOPHORACEÆ.

Trees or shrubs. Leaves entire, opposite, coriaceous; stipules very caducous. Flowers axillary, regular, bisexual. Calyx adherent to ovary, persistent, 4-14-toothed. Petals as many as calyx-lobes, entire, emarginate, or lacerate. Stamens twice the number of petals, in pairs, opposite and embraced by them or indefinite. Ovary 2-5-celled; ovules geminate, pendulous. Fruit coriaceous, 1-celled, 1-seeded. Seed pendulous, arillate or not; albumen fleshy or 0; embryo small if albuminous, elongated if exalbuminous; radicle in *Rhizophoreæ*, perforating the apex of the pericarp and germinating on the tree.

Ovary inferior. Seed germinating on tree with a long, exerted radicle.		
Petals 4. Stamens 8. Ovary 2-celled	... ..	1. RHIZOPHORA.
Petals 5-6. Stamens 10-12. Ovary 3-celled	... ..	2. CERIOPS.
Petals 5-6. Stamens indefinite. Ovary 1-celled	... ..	3. KANDELIA.
Petals 8-14, bifid. Stamens 16-28. Ovary 2-4-celled	... ..	4. BRUGUIERA.
Ovary $\frac{1}{2}$ inferior. Seed not germinating on tree	... ..	5. CARALLIA.

#### 1. RHIZOPHORA, Linn.

Trees. Leaves leathery, ovate, mucronate. Flowers rather large in dichotomous cymes. Calyx 4-lobed, subtended by the united bractlets. Corolla of 4 entire petals, inserted at the base of a fleshy disk. Stamens 8-12, filaments short, anthers multilocellate. Ovary 2-celled, produced in a fleshy cone; cells 2-ovuled beyond the calyx. Fruit 1-celled, 1-seeded. Radicle elongated, clavate; albumen 0.

Peduncles longer than the petioles. Flowers pedicellate	... ..	1. <i>R. mucronata</i> .
Peduncles shorter than the petioles. Flowers sessile	... ..	2. <i>R. conjugata</i> .

1. *R. mucronata*, Lam. Dict. IV. 169; Fl. Br. I. 2. 436; Bedd. Fl. Sylv. Anal. Gen. t. XIII. fig. 4; Dalz. & Gibs. Bomb. Fl. 95; Brandis For. Fl. 217. Mangrove. *Kamo, kunro*, Sind. *Kandal*, M.

Tidal shores from the Indus to Malacca and Ceylon. On the muddy, tidal flats of the West Coast, also the coast of Sind. Fl. R. S. Fr. Aug.-Sept.

Sapwood light red; heartwood dark red, very hard and durable. Pores small, numerous, each in a ring of white tissue. Med. rays fine, close, wavy. Weighs about 70 lbs. to the cub. ft. Splits and warps in seasoning. Bark used for tanning.

2. *R. conjugata*, Linn.; DC. Prod. III. 33; Fl. Br. I. 2. 436; Brandis For. Fl. 218.

Tidal shores from the Indus to Ceylon. Along the West Coast in tidal marshes. Fl. R. S. Fr. Oct.-Nov. Fruit as in *R. mucronata*, but the radicle is smaller.

## 2. CERIOPS, Arn.

Trees or shrubs. Leaves simple, coriaceous. Flowers subcapitate, on axillary peduncles. Calyx 5-6-divided, surrounded by the connate bracts. Petals 5-6, inserted at the base of the 10-12-lobed disk; lobes of the petals with clavate bristles. Stamens 10-12, in pairs, opposite the petals. Ovary  $\frac{1}{2}$ -inferior, 3-celled; cells 2-ovuled. Fruit 1-celled, 1-seeded. Radicle as in *Rhizophora*.

*C. Candolleana*, Arn. in Ann. Nat. Hist. 1. 363; Fl. Br. I. 2. 436; Bedd. Fl. Sylv. 99; Brandis For. Fl. 218. *Kirrari, chauri*, Sind.

Tidal forests from the Indus to Ceylon, Australia, tidal swamps along the West Coast. Fl. June-July. Fr. Aug.-Sept.

A small tree. Bark dark red. Wood hard, red, durable. Pores very small. Medullary rays fine, slightly wavy, crossed by interrupted, concentric bands of light tissue. Used for knees of boats in Sind. Fruit turbinate, crowned with the accrescent 5-divided calyx; radicle slender, club-shaped 6 in. long by  $\frac{1}{4}$  in. in diameter at the thickest part.

## 3. KANDELIA, Wight & Arnott.

A small tree. Leaves simple, coriaceous. Flowers in axillary cymes, large, white. Calyx 5-6-divided, subtended by the united bractlets. Petals 5-6, bifid; lobes multifid, segments capillary. Ovary  $\frac{1}{2}$ -inferior, 1-celled; ovules 6, in pairs on a central column. Fruit 1-celled, 1-seeded. Radicle fusiform, very acuminate.

*K. Rheedii*, W. & A. Prod. 1. 310; Fl. Br. I. 2. 437; Brandis For. Fl. 218; Bedd. Fl. Sylv. 100. *Kandal*, M.

Sunderbunds and tidal shores of both peninsulas, also in Burma and Bengal. Tidal swamps along the West Coast. Fl. June-July. Fr. Sept.-Oct.

A large shrub or small tree. Wood grey with a tinge of red, soft, close-grained. Pores very small, numerous. Medullary rays short and fine. Weighs about 40 lbs. to the cub. ft. The flower buds resemble those of *Alangium Lamarkii*, in size and shape.

## 4. BRUGUIERA, Lam.

Trees. Leaves shining, coriaceous. Flowers rather large, solitary or few on recurved peduncles. Calyx 8-14-divided, without bracts or bracteoles. Petals 8-14, inserted on the margin of the calyx 2-cleft, embracing the stamens. Stamens 16-28, in pairs opposite the

petals, springing elastically from them when mature. Ovary 2-4-celled, included in the calyx-tube; style filiform with 2-4 minute, stigmatic lobes; cells 2-ovuled. Fruit turbinate, 1-celled, 1-seeded. Germination as in *Rhizophora*.

Peduncles 1-flowered.	Radicle angled	...	1. <i>B. gymnorrhiza</i> .
Peduncles 3-flowered.	Radicle subacute, sub-clavate	... ..	2. <i>B. caryophylloides</i> .
Peduncles many-flowered.	Radicle subcylindric, truncated	... ..	3. <i>B. parviflora</i> .

1. *B. gymnorrhiza*, Lamk. Ill. t. 397; Fl. Br. I. 2. 437; Brandis For. Fl. 219. *B. Rheedii*, Dalz. & Gibs. Bomb. Fl. 95; Bedd. Fl. Sylv. 110.

Sind, Coasts of the peninsula, Indian Archipelago and N. Australia, in littoral swamps and along creeks and tidal rivers. Fl. Fr. R. S.

A large tree. Wood yellowish-brown, very hard and durable. Pores small, oval, subdivided. Medullary rays moderately broad, very numerous. Weighs 54 lbs. to the cub. ft. Fruit turbinate, the calyx accrescent. Radicle brown, slightly channelled, nearly cylindrical, 8 in. long by  $\frac{1}{2}$  in. thick.

2. *B. caryophylloides*, Blume. Mus. Bot. 1. 141; Fl. Br. I. 2. 438; Bedd. F. Sylv. 101; Brandis For. Fl. 219.

Tidal swamps along the coast from Malabar to Malacca and Ceylon. Fl. and Fr. R. S. A small tree. Calyx tube not ribbed urceolate, yellow in fruit. Radicle same shape as that of *B. gymnorrhiza*, but much more slender and curved, brown when ripe, from 6-8 in. long and  $\frac{1}{4}$  in. thick.

3. *B. parviflora*, W. & A. Prod. 1. 311; Fl. Br. I. 2. 438; Bedd. Fl. Sylv. 101. *Kanilia parviflora*, Dalz. & Gibs. Bomb. Fl. 95. Sunderbuns to Malacca. Tidal swamps along the coast. Fl. Fr. R. S.

A small tree or large shrub. Calyx tube-ribbed, lobes short and rigid.

##### 5. CARALLIA, Roxb.

Trees or shrubs. Leaves simple, ovate. Flowers small, in short branching cymes, often crowded. Calyx with minute bracts at the base, shortly 5-8-lobed. Petals 5-8, inserted round the thin disk. Disk 10-16-lobed. Stamens usually twice as many as petals. Ovary inferior; style subulate or filiform. Fruit globose, 1-celled, 1-2-seeded. Seeds albuminous, testa fibrous; embryo curved.

*C. integerrima*, DC. Prodr. III. 33; Fl. Br. I. 2. 439; Bedd. Fl. Sylv. t. 193; Brandis For. Fl. 219; Dalz. & Gibs. Bomb. Fl. 95. *Shengali*, *panasi*, *punschi*, M.; *Andi*, *anda-murgal*, *makad bhirand*, K.

Forests of the outer Sikkim Himalayas, Bengal, Assam, Burma, E. & W. Peninsulas and Ceylon. Throughout the evergreen forests of the Konkan and North Kánara. Flowers in bud appear during August, but do not open until Dec. to Feb. Fr. H. S. The inflorescence is covered with resinous scales. A moderate sized evergreen tree. Bark thin. Sapwood grey or reddish grey; heartwood red, very hard, durable. Pores

large or moderate sized, often subdivided. Med. rays both very broad and fine, numerous fine between each pair of broad rays. Weighs about 45 lbs. to the cub. ft. Bars of soft tissue and closed pores numerous and close between the broad rays. The fruit is globose, flattened and crowned with the calyx. Epicarp red, pulpy. Seeds 1-2, enclosed in a membranous sac and attached ventrally to it, narrow, horse-shoe shaped; episperm thin, brown, very rugose; albumen white, copious; embryo green, slender curved, (usually 2 seeds in each fruit).

#### ORDER 40. COMBRETACEÆ.

Trees or shrubs. Leaves alternate, sub-opposite or opposite, petiolate, entire. Flowers bracteate, usually bisexual, spicate or racemose, the racemes often paniced. Calyx-tube adnate to the ovary, limb 4-5 divided. Petals 4-5 or 0. Stamens 4-5 or twice as many, inserted on the calyx. Ovary inferior, 1-celled; style simple, stigma usually simple; ovules 1-7, pendulous from the apex of the cell. Fruit 1-celled, 1-seeded, often winged, crowned by the enlarged calyx in *Calycopteris*, and *Gyrocarpus*; cotyledons convolute or plano-convex; seeds exalbuminous.

Flowers racemose or capitate. Anthers opening by longitudinal slits.

Petals 0. Calyx-limb deciduous or accrescent.

Flowers spiked. Calyx-limb deciduous

... 1. TERMINALIA.

Flowers spiked. Calyx-limb accrescent

... 2. CALYCOPTERIS.

Flowers capitate. Calyx-limb deciduous

... 3. ANOGEISSUS.

Petals 4-5.

Tree.

Leaves alternate. Calyx-limb persistent

... 4. LUMNITZERA.

Climbing shrubs.

Calyx-tube short

... 5. COMBRETUM.

Calyx-tube long, produced beyond ovary

... 6. QUISQUALIS.

Flowers cymose. Anthers opening by lateral valves ... 7. GYROCARPUS.

#### TERMINALIA, Linn.

Trees or shrubs, sometimes climbers. Leaves entire, petiolate, without stipules. Flowers usually bisexual, bracteolate. Calyx-tube adnate to the ovary; limb 4-5 cleft, segments valvate. Petals 4-5 or 0. Stamens, 4-5 or 8-10, on the calyx. Ovary inferior 1-celled; ovules 2-3, pendulous from the apex of the cell; style simple, stigma usually simple. Fruit ovoid, angular or winged, usually indehiscent.

Fruit not winged, ovoid, obovoid or globose.

Fruit globular, tomentose

... 1. *T. belerica*.

Fruit ellipsoid or ovoid, glabrous, obscurely ridged

... 2. *T. Chebula*.

Fruit with 3-7 longitudinal wings.

Wings of fruit subequal.

Bark whit, smooth. Fruit with 5-7, narrow, subequal wings

... 3. *T. Arjuna*.

Bark black, rough. Fruit with 5 subequal, broad wings

... 4. *T. tomentosa*.

Wings of fruit unequal.

Fruit 3-winged, wings 1 large and 2 small

... 5. *T. paniculata*.

1. *T. belerica*, Roxb. Fl. Ind. II. 431; Fl. Br. I. 2. 445; Bedd. Fl. Sylv. t. 19; Dalz. & Gibs. Bomb. Fl. 91; Brandis For. Fl. 222. *Tare*, K.; *Goting*, *bherda*, *hela*, *yela*, *balra*, *balda*, M.

Sub-Himalayan tract from near the Indus, eastwards throughout India and Ceylon. Common in the deciduous mixed forests throughout the presidency, not in Sind. Fl. F. May. Fr. next cold season. A large tree. Bark dark grey, exfoliating in corky scales. Wood (no heartwood) yellowish grey, hard. Annual rings indistinct. Pores large and small in broad, wavy bands of light tissue, alternating with darker tissue in which are the fine, uniform and distinct medullary rays. Not durable, liable to be attacked by insects. Weighs about 45 lbs. to the cub. ft. Used for packing cases, native boats, coffee boxes, etc. I have never found any glands on the blade of the leaf.

2. *T. Chebula*, Retz. Obs. V. 31; Fl. Br. I. 2. 446; Brandis For. Fl. 223; Bedd. Fl. Sylv. t. 27; Dalz. & Gibs. Bomb. Fl. 91. *Anale*, K.; *Hirda*, *halra*, M. The Chebulic Myrobalan Tree.

Sub-Himalayan tract from the Sutlej eastwards, Bengal, Assam, Central and Southern India. Throughout the presidency in deciduous forests; abundant on the laterite of North Kánara. Fl. Apl.-May. Fr. Dec.-Mch. Yields the myrobalan of commerce.

A moderate sized or large tree. Bark grey, rough, exfoliating in thick scales, .75 in. thick; inner bark reddish brown, soft: close to wood then is white tissue. Wood (no regular heartwood), brownish grey, masses of purple wood near the centre very hard, smooth, close-grained, takes a good polish and is fairly durable. Pores small, included in wavy interrupted lines of whitish tissue. Med. rays very fine, uniform. Weighs about 70 lbs. to the cub. ft. Used for furniture, carts, house-building, etc.

3. *T. Arjuna*, Bedd. Fl. Sylv. t. 28; Fl. Br. I. 2. 447; Dalz. & Gibs. Bomb. Fl. 91; Brandis For. Fl. 224. *T. Berryji*, Dalz. & Gibs. Bomb. Fl. 92. *Holematti*, K.; *Savimadat*, M.; *Kahu*, *arjun*, (*arjuna sadra* in Guzerat), Vern.

Bengal, Burma, Central and Southern India. Planted along roadsides in the Belgaum district. Along banks of rivers throughout the presidency. Fl. Apl.-May. Fr. C. S. A large deciduous tree. Bark thick, smooth, pinkish grey, exfoliating in thin plates or scales; inner bark yellow, fibrous .75 in. thick. Heartwood brown, very hard. Pores moderate sized and large, surrounded by rings of whitish tissue. Med. rays very fine, distinct and numerous, crossed by concentric anastomosing lines of light coloured tissue. Weighs about 50 lbs. to the cub. ft. Used for carts and boat-building purposes.

4. *T. tomentosa*, Bedd. Fl. Sylv. t. 17; Fl. Br. I. 2. 447; Dalz. & Gibs. Bomb. Fl. 91; Brandis For. Fl. 225. *Kari matti*, *madati* K.; *Ain*, M.; *Sadri*, *hadri*, Guz.

Sub-Himalayan tracts of the N. W. Provinces, Deccan, Nepal, Sikkim, W. Peninsula from the Konkan southwards. Common throughout the presidency in mixed deciduous forests. Fl. Apl. Fr. next year Feb.-Apl.

A large tree with a characteristic dark coloured, deeply fissured bark. Sapwood reddish white: heartwood dark brown, hard, variegated with darker streaks of colour. Pores moderate sized, enclosed in light coloured tissue, distinct or joined by lines. Med. rays very fine, equally distributed, crossed by fine concentric lines at unequal distances. Weighs about 64 lbs. to the cub. ft. Durable; seasons well; decays slowly on exposure to the weather in open depôt. Used for house building, ships and boats. A valuable and well known timber: yields an excellent fuel.

5. *T. paniculata*, Roth. Nov. Sp. 383; Fl. Br. I. 2. 448; Dalz. & Gibs. Bomb. Fl. 92; Bedd. Fl. Sylv. t. 20; Brandis For. Fl. 226. *Kin-dal*, *kinjal*, M.; *Honal*, *ulvi*, *hongal*, *hunab*, *bili matti*, K.; *Kirijul*, Vern.

Western peninsula from Bombay southwards. Throughout the presidency in mixed deciduous forests: one of the most common trees in North Kánara. Fl. Aug.-Sept. Fr. ripe Dec.-May.

A large tree. Bark rough, brownish black, with numerous shallow longitudinal and transverse fissures; inner bark red, mottled, .25 in. thick; very distinct from that of *kari matti*. Heartwood light brown, smooth, very hard. Pores moderate sized and small, enclosed in whitish tissue, sometimes joined by concentric broken lines of light tissue somewhat faint. Med. rays fine, uniform, distinct. Weighs 60 lbs. to the cub. ft., fairly durable. Makes good planking and might be tried for railway sleepers in damp localities. Bark contains much tannin.

*T. Catappa*, Linn.; Willd. Sp. Pl. IV. 967; Fl. Br. I. 2. 444; Bedd. Fl. Sylv. t. 18; Dalz. & Gibs. Bomb. Fl. Suppl. 33. *Bengali badam*, H. Planted in the Konkan and North Kánara, a native of the Mollucas. Fl. C. S. Fr. R. S.

## 2. CALYCOPTERIS, Lamk.

A large diffuse or scandent shrub. Leaves opposite, ovate, entire. Racemes dense, forming large panicles. Flowers small, greenish, bracteate. Calyx-tube 5-striate, constricted above the ovary, limb 5-fid, much enlarged in fruit. Petals 0. Stamens 10. Ovary 1-celled, inferior; ovules 3, pendulous from the top of the cell. Fruit 5-ribbed, villous, 1-seeded, crowned by the enlarged calyx.

*C. floribunda*, Lam. Dict. Supp. II. 41; Fl. Br. I. 2. 449; Brandis For. Fl. 220. *Getonia floribunda*, Roxb.; Dalz. & Gibs. Bomb. Fl. 91. *Ukshi*, M.; *Wuksey*, *baguli*, Vern.; *Biliyadi*, K. Central and Southern India. Throughout the presidency in deciduous forests. Fl. Mch.-Apl. Fr. Apl.-May.

Stems 6—12 in. in diam. Bark grey with a thin layer of corky tissue, nearly smooth; inner bark white, not fibrous. Wood yellowish, light, moderately hard. Pores small or large, numerous. Medullary rays very fine, numerous. Numerous small medullary masses of soft tissue, appearing crescent-shaped on a cross section, afford a very distinctive character. Weighs 30 lbs. to the cub. ft. Used for making tool-handles. Bark used in native medicine.

## 3. ANOGEISSUS, Wall.

Trees or shrubs. Leaves alternate, entire. Flowers small, bisexual, in globose heads on slender peduncles. Calyx-tube compressed, 2-winged at the base, long attenuated above the ovary; limb small, deciduous. Petals 0. Stamens 10 in two series; filaments exerted; anthers small, cordate, versatile. Ovary inferior, 1-celled; ovules 2, pendulous from the top of the cell. Fruit small, 2-winged, in dense, globose heads. Seed 1; cotyledons convolute.

*A. latifolia*, Wall.; Bedd. Fl. Sylv. t. 15; Fl. Br. I. 2. 450; Brandis For. Fl. 227. *Conocarpus latifolia*, DC.; Dalz. & Gibs. Bomb. Fl. 91. *Dindal, dinduga*, K.; *Dhaura, dandua, dhaori*, M.; *Dabria*, Vern.

From the Himalayas to Ceylon, very common throughout the presidency, usually in dry forests, sometimes gregarious. Fl. May-June. Fr. Nov.-Feb. A large or moderate sized, deciduous tree. Bark white, scaly, smooth, exfoliating in irregular scales; inner bark purple, compact-Sapwood yellowish; heartwood small, dark brown, very hard. Pores small, numerous, often divided, included in light tissue. Medullary rays very fine and numerous, uniform, equidistant. Annual rings visible, marked by rings of darker tissue. Weighs about 60 lbs. to the cub. ft. Used for furniture, carts, agricultural implements, ship building, &c. The timber is not durable, except when kept dry, is liable to warp and split in seasoning, but is much in demand; is converted into charcoal. The stems yield an excellent hard gum employed in cloth printing.

## 4. LUMNITZERA, Willd.

Trees or shrubs, growing in salt marshes along with mangroves. Leaves fleshy, simple, alternate, clustered towards the ends of the branches. Flowers in racemes. Calyx-tube elongate, bracteolate; limb bell-shaped, 5-lobed, persistent. Petals 5, spreading. Stamens 5-10; anthers cordate. Ovary 1-celled; ovules 2-5, pendulous. Fruit woody, obtusely angular, 1-seeded.

*L. racemosa*, Willd.; DC. Prod. III. 22; Fl. Br. I. 2. 452; Dalz. & Gibs. Bomb. Fl. 90; Bedd. Fl. Sylv. 103; Brandis For. Fl. 221.

Coasts of India, Ceylon, Tropical Africa and the tropics generally in mangrove swamps. South Konkan, along salt-water creeks and backwaters. Fl. Mch.-Apl. A small tree or large shrub. Wood said to be strong and durable, used for fuel.

## 5. COMBRETUM, Linn.

Shrubs, usually climbing. Leaves opposite, seldom alternate, simple. Flowers polygamo-dioecious, often in paniced spikes or racemes, bracteolate. Calyx-tube adnate to the ovary, limb 4-5 divided, segments valvate. Petals 4-5 or 0. Stamens as many or twice as many as calyx-segments. Ovary inferior, 1-celled; ovules 2-5, pendulous. Fruit 4-5-winged or angled. Seed 1; cotyledons plaited, flat or convoluted.



Tube of calyx equalling the ovary. Fruit with 4 papery wings ... 1. *C. ovalifolium*.  
 Tube of calyx 2-3 times as long as the ovary. Fruit with 4 membranous wings ... 2. *C. extensum*.

1. *C. ovalifolium*, Roxb. Fl. Ind. 2. 256; Fl. Br. I. 2. 458; Dalz. & Gibs. Bomb. Fl. 90. *Zelloosey, mudbel*, Vern. The Deccan peninsula and Ceylon. Throughout the presidency in deciduous forests. Fl. Feb. Fr. May.

2. *C. extensum*, Roxb. Fl. Ind. 2. 229; Fl. Br. I. 2. 458; *C. Wightianum*, Wall.; Dalz. and Gibs. Bomb. Fl. 458. *Piloka*, Vern.

Deccan peninsula, Ceylon, Trans-Gangetic peninsula, from Silhet to Singapore. Throughout the moist forests of the Konkan and North Kánara. Fl. Feb. Fr. May.

6 **QUISQUALIS**, Linn.

Rambling shrubs. Leaves opposite. Flowers white or red, axillary and terminal in short spikes, calyx-tube long produced. Petals 5. Stamens 10. Ovary 1-celled. Fruit 5-angled or winged, dry.

*Q. indica*, Linn. Sp. Pl. 556; Fl. Br. I. 2. 459; Brandis For. Fl. 220; Dalz. & Gibs. Bomb. Fl. Suppl. 33. Rangoon Creeper. Indigenous in the Mal'ay Archipelago. Cultivated in gardens throughout the presidency. Fl. May-Sept.

7. **GYROCARPUS**, Jacq.

Tree. Leaves alternate, long petioled. Flowers small, unisexual, males numerous. Male fl: Calyx 4-7-divided. Petals 0. Stamens 4-7, inserted at the base of the calyx with alternate, clavate glands; anthers opening by lateral valves. Ovary 0. Female fl. Calyx-limb 2-divided, accrescent. Petals and stamens 0. Ovary 1-celled, ovule 1, pendulous. Nut bony, crowned with the 2-winged calyx-lobes; cotyledons convolute.

*G. Jacquini*, Roxb. Fl. Ind. 1. 445; Fl. Br. I. 2. 461; Kz. For. Fl. Br. Burm. 1. 470; Grah. Cat. Bomb. Pl. 250. *Zaitun*, Hind.

South India, Tenasserim and the Andaman Islands, Deccan banks of the Krishna near Nalutwar, Grah. Belgaum District, in dry forests. Fl. R. S. Fr. C. S. A deciduous tree. Wood (grey) soft. Pores large and moderate sized. Med. rays short, moderately broad. Used in S. India for boxes and toys and for catamarans.

ORDER 41. **MYRTACEÆ**.

Trees or shrubs. Leaves opposite, simple, usually coriaceous and pellucid gland-dotted, with an intramarginal vein. Flowers regular, usually hermaphrodite. Calyx 4-5 or more divided. Petals as many as calyx-lobes, on disk surrounding cavity of calyx. Stamens usually many. Ovary inferior or  $\frac{1}{2}$  inferior, crowned by the fleshy disk, 1-celled, 1-ovuled or 2-many-celled with many ovules on axile placentas.

Fruit crowned with the calyx-limb, dehiscent or indehiscent. Seeds angular; albumen 0; embryo straight, curved or spirally twisted; cotyledons rarely leafy, usually short and obtuse.

Leaves usually opposite and dotted with pellucid glands. Fruit a berry or drupe.

Berry many-seeded ... ..	1. PSIDIUM.
Berry few-seeded .. ..	2. EUGENIA.
Leaves alternate, not gland-dotted. Fruit angular fibrous, or globose fleshy.	
Fruit angular fibrous, one-seeded ...	3. BARRINGTONIA.
Fruit globose fleshy, many-seeded ...	4. CAREYA.

### 1. PSIDIUM, Linn.

Trees or shrubs. Leaves opposite, entire, not gland-dotted. Flowers on axillary peduncles, large, white. Calyx-tube ovate; limb valvately 4-5-lobed. Petals 4-5. Stamens many. Ovary 2 or more celled; ovules many. Fruit a many-seeded berry.

*P. Guyava*, Linn. Benth. Fl. Hongk. 120; Fl. Br. I. 2. 468; Brandis For. Fl. 232. *P. pyriferum*, W. & A. Dalz. & Gibs. Bomb. Fl. Suppl. 34. The Guava Tree. *Jam, peru*, Vern.

Indigenous in Mexico, cultivated throughout the presidency, naturalised in many places. Fl. Apl.-May. Fr. R. S. A small tree with smooth grey bark exfoliating in thin flakes. Wood reddish white, moderately hard and even-grained. Pores small, numerous, single or in short rows. Med. rays fine, numerous. Annual rings distinct. Weighs about 40 lbs. to the cub. ft. Used for wood engraving, spear handles and instruments (Gamble).

### 2. EUGENIA, Linn.

Evergreen trees or shrubs. Leaves opposite, coriaceous or membranous, pinnate-nerved. Flowers in lateral or terminal trichotomous cymes or panicles. Calyx-tube globose or more or less elongate: lobes 4, rarely 5. Petals usually 4, free and spreading or united in a calyptra. Stamens many, in several series, free or slightly collected in four bundles. Ovary 2, rarely 3-celled; style filiform, stigma small, ovules several in each cell. Fruit a berry, 1 or several seeded, crowned with the persistent calyx-limb. Seeds few, globose, testa membranous or cartilaginous; embryo thick and fleshy, radicle short; cotyledons thick, more or less united or distinct.

Trees. Flowers large, showy, 4-merous. Calyx with a thickened disk.

Petals spreading.

Flowers red, in dense lateral, short peduncled racemes ... ..	1. <i>E. malaccensis</i> .
Flowers terminal and axillary, white,	
Calyx-tube broadly turbinate ... ..	2. <i>E. Jambois</i> .
Calyx-tube hemispherical .. ..	3. <i>E. hemispherica</i> .
Calyx-tube slender. Stamens crimson ...	4. <i>E. laeta</i> .

Trees. Flowers small, in compact cymes. Calyx without a disk. Petals calyptrate or free.

Petals free.

- Calyx elongate. Flowers axillary, racemose .. 5. *E. Wightiana*.  
 Calyx shorter. Flowers in corymbs ... 6. *E. zeylanica*.  
 Petals calyptrate.  
 Calyx-tube shortly turbinate.  
 Branches 4-angled. Leaves lanceolate ... 7. *E. lissophylla*.  
 Branches terete. Leaves ovate, acuminate or obtuse.  
 Flowers sessile.  
 Cymes longer than the leaves ... 8. *E. caryophylleæ*.  
 Cymes shorter than the leaves ... 9. *E. utilis*.  
 Flowers pedicelled. Calyx broadly turbinate ... 10. *E. kanarensis*.  
 Calyx-tube slender and tapering, limb 4-5 lobed.  
 Leaves indistinctly nerved, dots not pellucid . 11. *E. Stocksii*.  
 Leaves distinctly nerved, dots pellucid.  
 Cymes short, compact, below the leaves . 12. *E. Jambolana*.  
 Cymes lateral, lax from the scars of fallen leaves, much branched ... 13. *E. Heyneana*.  
 Small trees or shrubs. Flowers solitary or fasciated.  
 Petals distinct.  
 Branchlets &c. pubescent. Staminal disk broad. 14. *E. macrosepala*.  
 Glabrous. Staminal disk not enlarged.  
 Flowers peduncled. Fruit small ... 15. *E. Mooniana*.  
 Flowers sessile. Fruit large ... 16. *E. memecylifolia*.

*E. malaccensis*, Linn.; Lam. Dict. III. 196; Fl. Br. I. 2. 471; Bedd. Fl. Sylv. 110. *Jambosa malaccensis*, DC.; Dalz. & Gibs. Bomb. Fl. Suppl. 35. Malay Apple or Kavika Tree. *Malacca jambul*, Vern.; *Jamb neerl*, K.

Native of the Malay Archipelago. Cultivated in the supári palm gardens of the Haigas in North Kánara, also near and in Bombay. Fl. Apl.-May. A large evergreen tree. Wood reddish-grey, rough, soft. Pores moderate sized and large. Med. rays broad. Weighs 38 lbs. to the cub. ft. Produces a juicy insipid fruit.

2. *E. Jambos*, Linn. Fl. Br. I. 2. 474; Brandis For. Fl. 233; Bedd. Fl. Sylv. 110. *Jambosa vulgaris*, W. & A. Dalz. & Gibs. Bomb. Fl. 35. Rose Apple. *Guláb-jaman*, *sakarajambha*, Vern.; *Pun neerl*, K.

A moderate sized or small tree. Planted throughout the presidency. Run wild and planted near villages in North Kánara. Fl. Jany. to Mch. Fr. July-Aug.; also at other times during the year. Fruit scented, edible. Seed 1-2, large, loose in the pericarp, testa thin, rough, brown; cotyledons unequal, green.

3. *E. hemispherica*, Wight. III. II. 14; Fl. Br. I. 2. 477; Bedd. Fl. Sylv. t. 203. *Jambosa lanceolaria*, Wgt.; Dalz. & Gibs. Bomb. Fl. 94.

Southern India and Ceylon. On the Konkan and North Kánara gháts, in evergreen forests, common on the Nilkund, Ram and Ainshi gháts, and throughout the Siddápore sub-division evergreen forests; often along river banks. Fl. Mch.-April. Fr. R. S.

A large or moderate-sized tree. Bark smooth, scaly, inner red. Wood light brown, hard. Pores small, numerous, single or in rows. Med. rays

fine not distinct, crossed by fine wavy lines of light tissue, also rather indistinct. Weighs 46 lbs. to the cub. ft. Colonel Beddome is of opinion that *E. hemispherica*, Wgt., and *E. lanceolaria*, Roxb., are identical.

4. *E. læta*, Ham. in Trans. Wern. Soc. V. 338; Fl. Br. I. 2. 479. *Jambosa pauciflora*, Wgt., Dalz. & Gibs. Bomb. Fl. 94. *E. Wightii*, Bedd. Fl. Sylv. 109. *Kan jamb*, H.

Western peninsula in the ghát forests from Bombay southwards. In evergreen forests, on the higher gháts of North Kánara; common on the Gairsoppah ghát. Fl. C. S. Fr. H. and R. S.

A large shrub or small tree with handsome crimson tassel-like flowers. Fruit 1 in. on slender peduncles, ovoid, and constricted above into a narrow neck; crowned with the broad, spreading calyx lobes.

5. *E. Wightiana*, Wight. III. II. 15; Ic. t. 529; Fl. Br. I. 2. 485. *E. lanceolata*, Bedd. Fl. Sylv. 110.

Konkan, Nilgherry and Dindigul mountains. Konkan, near rivers and along water-courses, rare. Fl. Feb.-Mch.

6. *E. zeylanica*, Wgt. Ic. I. 73; Fl. Br. I. 2. 485. *E. spicata*, Bedd. Fl. Sylv. t. 202. *Syzygium zeylanicum*, DC. Dalz. & Gibs. Bomb. Fl. 94. *Pituli*, *bhedas*, M.; *Nerkal*, *hole lucky*, K.

Western peninsula, Silhet, Malay peninsula to Singapore, also in the Andamans. Throughout the Konkan and North Kánara gháts along rivers and nálas, common in North Kánara. Fl. Feb.-Apl. Fr. R. S.

A moderate sized tree. Bark scaly, inner bark thick, red or brown. Wood grey, hard, close grained. Used for building purposes and agricultural implements. A showy tree when in flower. Fruit size of a pea, white.

7. *E. lissophylla*, Thw. Enum. 117 (*Syzygium*); Fl. Br. I. 2. 488; Bedd. Fl. Sylv. 108. Nilgherry mountains and Ceylon. Konkan, Stocks.

*E. rubicunda*, Wgt. Ic. t. 538; Fl. Br. I. 2. 49; Bedd. Fl. Sylv. 108. *Syzygium rubicundum*, W. & A. Dalz. & Gibs. Bomb. Fl. 94.

On the higher gháts, along streams, Dalz. The leaves are narrower and more prominently nerved than in *E. lissophylla*, from which Col. Beddome believes it is not specifically distinct. Fl. Br. I. I have not met with either of those species up to the present in N. Kánara.

8. *E. caryophyllæa*, Wgt. Ic. t. 540; Fl. Br. I. 2. 490; Bedd. Fl. Sylv. 108. *Syzygium caryophyllæum*, Gætn. Dalz. & Gibs. Bomb. Fl. 93. *Ranlavang*, M.; *Kunti neerl*, *bhelsee*, K.

Western peninsula, South India and Ceylon. Throughout the Konkan and North Kánara; in moist forests, very common near the sea coast, often on laterite in clumps associated with *Memecylon edule*, *Canthium parviflorum*, *Flacourtia sepziaria*, *Ixora coccinea*, &c. Fl. Mch.-May. Fr. R. S. A small or moderate sized tree.

Bark grey, smooth, scaly. Wood light brown, smooth, soft. Pores small, uniformly distributed. Med. rays fine, indistinct. Annual rings not very clear. Weighs 54 lbs. to the cub. ft. Fruit black, edible.

9. *E. utilis*, Talb., sp. nov. Herb. No. 3644; Jour. Bo. Nat. Hist. Soc. Vol. XI. 235. t. 3. *Hennerl*, K.

A large, quite glabrous tree, branches terete. Leaves coriaceous, elliptic, abruptly and shortly acuminate, acute at the base, conspicuously gland-dotted; blade 3-2 by 1.5—1 in.; petiole .3 in. long; lateral nerves close, rather inconspicuous. Flowers small, in axillary or terminal corymbose, paniced cymes shorter than the leaves, sessile, usually fasciated in threes on the cyme branches; buds globose or pear-shaped, .1 in. in diameter. Calyx shortly turbinate, scarcely lobed or truncate. Petals separate or slightly cohering. Fruit small, black, succulent.

A fine tree with a straight, cylindrical trunk, and grey, scaly bark. Wood tough of a reddish brown colour. Pores moderate sized, subdivided and in short rows. Medullary rays moderately broad, indistinct. Weighs 42 lbs. to the cub. ft. Greatly in demand throughout the Sirsi sub-division of North Kánara for building purposes. This tree is pretty common in evergreen or on the borders of evergreen forests in the southern parts of North Kánara. It comes near *E. lissophylla*, Thw., and could not be matched at Kew.

10. *E. kanarensis*, Talb., sp. nov. Herb. No. 3552; Jour. Bo. Nat. Hist. Soc. Vol. XI. 236. t. 4.

A very large, glabrous, evergreen tree with smooth, white, terete branchlets. Leaves ovate, long or shortly acuminate, acute at the base, thin, shining, minutely gland-dotted; blade 4-2 by .75—1.5 in.; petiole .5 in. long, nerves numerous, fine, distinct, anastomosing just within the margin in a fine line. Flowers small, in open, spreading, axillary or terminal corymbs, shorter than the leaves, cyme branches slender. Buds small, .09 in. in diameter, globose. Calyx elongate, turbinate, broad at the top, narrowed at the base into a short pedicel, scarcely 4-5-lobed or truncate. Petals free or slightly cohering, orbicular. Fruit not seen.

A smooth-barked tree, found on the Gairsoppah Ghát above Mulafmune at an elevation of about 2000 ft. The following note about this tree was received from Kew. "This is not *E. cymosa*, Lam., but is probably identical with a specimen collected by Bourdillon in Travancore and named *Eugenia* sp. near *E. Gardneri*."

11. *E. Stocksii*, Duthie. Fl. Br. I. 2. 498. Konkan, Stocks; Wynaad, Bedd. A lofty tree with acutely 4-angled branches. I am unacquainted with this species and give it on the authority of the Fl. Br. I. as having been found in the Konkan by Dr. Stocks.

12. *E. Jambolana*, Lam. Dict. III. 198; Fl. Br. I. 2. 499; Bedd. Fl. Sylv. t. 197; Brandis For. Fl. 233. *Syz. Jambolanum*, DC.; Dalz. & Gibs. Bomb. Fl. 93. Black Plum. *Jambul*, M.; *Nerlu*, K.

Throughout India and Ceylon, from the plains up to 4—5000 feet altitude, Malay Archipelago to Australia. Throughout the presidency both wild and cultivated, common in the moist forests of North Kánara and the Konkan. Fl. Mch.-Apl. Fr. July-Aug.

A large tree with smooth whitish bark, 1 in. thick ; inner bark rather soft, dark brown, fibrous.

Wood reddish grey, moderately hard. Pores moderate sized and small, elongated and subdivided. Med. rays fine, numerous, crossed by faint concentric bands of soft tissue. Weighs 45 lbs. to the cub. ft. Fairly durable. Used for building purposes and agricultural implements, also for the construction of wells. The fruit is an article of food, eaten by all classes of natives.

13. *E. Heyneana*, Wall. Cat. 3599 (*Syzygium*) ; Fl. Br. I. 2. 500 ; *Syz. salicifolium*, Dalz. & Gibs. Bomb. Fl. 94, not of Wall. *E. salicifolia*, Grah. Bedd. Fl. Sylv. 109 ; Wight. Icones, t. 539. *Pan jambul*, *bedas*, M.

Western peninsula, Berars and the Central Provinces. In the beds of streams and rivers ; common throughout the Konkan and North Kánara. Fl. Mch.-April. Fr. ripe June.

A small tree, sometimes only a large shrub. Wood similar to that of *E. Jambolana*, but pores smaller. Gamble.

14. *E. macrosepala*, Duthie. Fl. Br. I. 2. 501. Locally on the North Kánara gháts, in evergreen forests.

A large shrub or small tree, very abundant on the Dodmunc ghát of N. Kánara. Fl. Jan.-Apl. Fr. Aug.

15. *E. Mooniana*, Wgt. Ic. II. 551 ; Fl. Br. I. 2. 505 ; var. *gracilis*, Bedd. Fl. Sylv. 110. Nilghiris, Sivaghiris, Konkan and Ceylon. Evergreen forests of the Konkan and North Kánara, common in the forests near Kárwár on the coast. Fl. Feb.-Mch. Fr. Aug.-Jany.

An erect or prostrate shrub with a red succulent fruit.

Dalz. and Gibs. mention a tree from the Phoonda ghát. *E. Wildenovii*, DC., which may be *E. uniflora*, Linn., a cultivated species native of S. America.

16. *E. memecylifolia*, Talb., sp. nov. Herb. No. 3127 ; Jour. Nat. Hist. Soc. Bomb. Vol. XI. 236. t. v.

A small evergreen tree, leaves ovate, bluntly acuminate, coriaceous, glandular dotted, shortly petioled ; blade 1·5—2 by 1—1·5 in. ; petiole ·2—5·4 in. long. Flowers white, sessile or subsessile, ·5 in. across solitary or 2-several fascicled in the leaf axils. Bracts 2, broad-ovate, small, thick, leathery, tomentose when young. Calyx lobes 4, ovate, imbricate, tomentose, ciliate on the margins, glandular dotted. Petals 4, spreading. Staminal disk broad, enlarged. Style simple. Fruit white, succulent, irregularly globose, ·75-1 in. in diameter. Seeds 1-2, globose, flattened on one side, ·5 in. in diameter, glabrous ; episperm crustaceous, mottled. In quite ripe fruits the seeds lie loose in the swollen, succulent, white pericarp.

A small tree or large shrub with smooth bark and leaves like those of some forms of *Memecylon edule*, gregarious in the sholas of the higher Supa gháts of North Kánara at an elevation of about 3400 feet. This species is allied to *B. Mooniana*, Wgt., but differs in habit, larger flowers and the quite distinct fruit.

### 3. BARRINGTONIA, Forst.

Trees. Leaves alternate, crowded towards the ends of the branches. Flowers bracteate, in elongated spikes or racemes. Calyx-tube ovoid or turbinate. Petals 4-5. Stamens indefinite. Ovary inferior. Disk annular. Berry fibrous, fleshy, crowned with the calyx-limb, usually 1-seeded. Embryo consisting of 2 concentric masses, one a woody rind and the other a medulla; cotyledons nearly obsolete.

Calyx valvate. Fruit ovoid, large ... 1. *B. racemosa*.  
Calyx imbricate. Fruit quadrangular, small ... 2. *B. acutangula*.

1. *B. racemosa*, Bl. DC. Prod. III. 238; Fl. Br. I. 2. 507; Dalz. & Gibs. Bomb. Fl. 94. *Nívar*, M.

Western coast, Andaman Islands and Ceylon. Along rivers and nálas near the coast of the Konkan and North Kánara. Fl. H. S. Fr. R. S.

A moderate sized evergreen tree. Wood white, soft, porous. Pores small and moderate sized. Med. rays moderately broad, crossed by transverse bars. Weighs 27 lbs. to the cub. ft.

2. *B. acutangula*, Gaertn. Fruct. II. 97. t. 101; Fl. Br. I. 2. 508; Brandis For. Fl. 235; Dalz. & Gibs. Bomb. Fl. 95; Bedd. Fl. Sylv. t. 204. Indian Oak. *Tivar*, *piwar ingli*, *datte-phal*, M.; *Hole kauva*, *mavin kumbia*, K.

Throughout India from the Himalayas to Ceylon, very common in Bengal. Banks of rivers and streams throughout North Kánara and the Konkan, common near the coast. Fl. Apl.-May. Fr. Sept.-Oct.

A moderate sized tree. Bark dark-coloured, rough. Wood white, shining, moderately hard, beautifully mottled on a cross section. Pores small, uniform, often in short, radial lines. Medullary rays broad or moderately broad, closely packed, crossed by fine bars of light coloured tissue. Concentric rings of dark coloured and lighter tissue alternate, probably marking the annual growth. Weighs 40 lbs. to the cub. ft. Used for boat building, well-work, carts, &c. Turns black when buried in the mud. Bark used to intoxicate fish. Very rich in tannin. Leaves and fruit used in native medicine.

### 4. CAREYA, Roxb.

Trees or shrubs. Leaves alternate, simple, crowded towards the ends of the branches. Flowers large, showy, in racemes or interrupted spikes. Calyx adnate to the ovary; limb 4-divided. Petals 4-5. Stamens numerous, free. Ovary inferior, 4-5-celled; style elongate

with a capitate or 4-lobed stigma. Fruit globose, fleshy, crowned with the calyx-limb, many seeded. Seeds in a fleshy pulp; cotyledons 0.

*C. arborea*, Roxb. Fl. Br. Ind. II. 638; Fl. I. 2. 511; Brandis For. Fl. 236; Dalz. & Gibs. Bomb. Fl. 95; Bedd. Fl. Sylv. 205. *Kaval*, K.; *Kumbia*, *kuba*, M.

Sub-Himalayan tract from the Jumna eastwards, Bengal, Burma, Central, Western and Southern India. Very common throughout the presidency in deciduous forests. Fl. March-April. Fr. ripe July.

A large deciduous tree. Bark rough, dark coloured with vertical and diagonal splits, inner bark red, fibrous. Heartwood dull red, even-grained, smooth and mottled. Pores small, few. Med. rays fine, numerous, short, wavy. Weighs about 50 lbs. to the cub. ft. Seasons well; durable. Used for agricultural implements.

#### ORDER 42. MELASTOMACEÆ.

Herbs, shrubs or trees. Leaves opposite, entire, often 3-7-nerved. Flowers regular, hermaphrodite. Calyx-tube united by vertical walls to the ovary, rarely nearly free; limb 4-6 lobed. Petals 3—6, imbricate. Stamens as many or twice as many as the petals, inserted with them; anthers opening by pores, rarely by slits; connective often appendaged near the base by bristles, tubercles or a spur. Ovary 4-5-1-celled; style simple filiform rarely short; ovules several, rarely only 2 to each placenta. Fruit included in the calyx-tube, capsular or berried, breaking up irregularly or by slits through the top of the cells. Seeds minute, many (in *Memecylon* only 1); albumen 0.

A villous shrub. Stamens dimorphous. Seeds many.

Leaves 3-7 palmately nerved ... 1. MELASTOMA.

Glabrous shrubs or trees. Stamens equal, similar.

Berry 1-seeded. Leaves pinnate-nerved ... 2. MEMECYLON.

#### 1.—MELASTOMA, L.

Strigose or villous shrubs. Leaves petioled, entire, 3-7-nerved. Flowers terminal, showy, purple, 5-merous. Calyx clothed with bristles, tube bell-shaped; lobes 5. Petals usually 5. Stamens twice as many as the calyx-lobes; anthers opening by a single apical pore, very unequal, 5 larger with the connective produced below in a long appendage, and 5 smaller with the basal appendage shorter or wanting. Ovary 5-7-celled more or less united to the calyx-tube, apex bristly; style simple filiform. Fruit bursting irregularly. Seeds minute, very many, minutely punctate, albumen 0.

*M. malabathricum*, L. DC. Prod. III. 145; Fl. Br. I. 2. 523; Dalz. & Gibs. Bomb. Fl. 92. Indian *Rhododendron*. *Paloré*, M.; *Ankerki*, *liakeri*, K.; *Nankeri*, Kon.



Throughout India from the sea level to 6000 feet altitude. Throughout the Konkan and North Kánara in moist forests, often along the banks of nálas near evergreen forests. Fl. and Fr. throughout the year. A large shrub. Fruit globose, strigose with broad hairs, red when ripe, 5 in. in diameter. Epicarp breaks off transversely from near the base disclosing the minute, white, curved seeds imbedded in the surfaces of the 5 black, succulent placentas.

## 2. MEMECYLON, L.

Leaves coriaceous, short-petioled. Flowers usually small, in axillary cymes, clusters or umbellets. Calyx-tube campanulate; limb dilated, truncate or shortly 4-lobed. Petals 4, blue or white, rarely reddish. Stamens 8, equal, anthers opening by slits in front, connective ending in a horn behind. Ovary inferior, 1-celled, apex glabrous, surmounted by a convex or depressed disk with 8 radiating grooves; ovules 6-12, whorled, on a free central placenta. Berry globose, crowned with the calyx-margin, 1-seeded. Seed large, cotyledons convolute or variously folded.

Trees. Peduncles 0; pedicels under  $\frac{1}{2}$  inch.

Flowers clustered.

Branchlets acutely quadrangular. Leaves cordate, sessile ... .. 1. *M. Wightii*.

Branchlets round. Leaves amplexicaul ... .. 2. *M. amplexicaule*.

Trees or shrubs. Flowers in peduncled cymes; pedicels short or long. Branchlets round.

Small shrub. Peduncles long, 1-3 from same axil; pedicels umbelled ... .. 3. *M. terminale*.

Tree. Flowers in a compact cyme; peduncles short; pedicels very short, slender ... .. 4. *M. edule*.

### 1. *M. Wightii*, Thw. Enum. 113; Fl. Br. I. 2. 554.

Western Peninsula and Ceylon. Alt. 3—4000 feet. North Kánara in evergreen forests, common in the forests near the Dodmune ghát. Fl. C. and H. S. A small tree. Bark same as that of *M. edule*. Wood light or dark grey, hard, smooth, heavy, close-grained. Annual rings distinctly marked by a layer of dark tissue. Pores very small in patches of white tissue. Medullary rays fine, uniform, numerous. Weighs 60 lbs. to the cubic ft.

2. *M. amplexicaule*, Roxb. Fl. Ind. II. 260; Fl. Br. I. 2. 559; Wight. Ic. t. 279. Var. *malabarica*. *M. depressum*, Benth. *Limba*, M.; *Locundi*, *limbtoli*, K.

Nilghiris, mountains of Coorg, etc. In the evergreen forests of North Kánara on the Yellápur gháts. Fl. C. S. Fr. H. S. A small tree. Specimens sent to Kew in 1882 from N. Kánara were named as above by Prof. Oliver.

3. *M. terminale*, Dalz. in Hook. Kew Jour. III. 121; Fl. Br. I. 2. 558; Dalz. & Gibs. Bomb. Fl. 93.

Southern gháts of the Deccan peninsula. Fl. Br. I. In the evergreen forests of North Kánara, from Aínshi southwards. Fl. Dec.-Feb. Fr. ripe March.-May. A shrub 2-8 feet high. Flowers in umbels of a beautiful blue colour.

4. *M. edule*, Roxb. Cor. Pl. t. 82; Fl. Br. I. 2. 563; Dalz. & Gibs. Bomb. Fl. 93; Bedd. Fl. Sylv. 113. Iron-wood Tree. *Anjun, anjuni kurpa*, Vern. *Harchari, archeti, lakhonde*, K.

E., W. and S. India, Ceylon, Tenasserim, and the Andamans. Very common in the Konkan and North Kánara, in moist evergreen forests, and along the coast. Fl. C. S. Fr. Apl.-May, black. A small tree or large shrub. Wood hard, close-grained, durable, difficult to work, resembles boxwood; similar in structure to that of *M. Wightii*, and weighs about the same. See Appendix for note on *Memecylon* by Sir D. Brandis.

#### ORDER 43. LYTHRACEÆ.

Trees, shrubs or herbs; branches often quadrangular. Leaves simple, opposite. Stipules 0. Flowers regular, hermaphrodite. Calyx 3-6 lobed. Petals as many as calyx-lobes, rarely 0, inserted near the top of the calyx-tube. Stamens definite or indefinite, on the calyx-tube. Ovary free, 2-6-celled; style long, stigma capitate or 2-lobed; ovules many, placentas axile. Fruit a capsule, 1-2-4 or many celled. Seeds numerous, exalbuminous.

Ovary superior.

Calyx curved. Flowers secund ... .. 1. WOODFORDIA.

Calyx straight. Flowers symmetric.

Flowers 4-fid. Capsule irregularly breaking

up ... .. 2. LAWSONIA.

Flowers 6-fid. Capsule 3-6-valved ... .. 3. LAGERSTREEMIA.

Berry subglobose ... .. 4. SONNERATIA.

Ovary inferior ... .. 5. PUNICA.

##### 1. WOODFORDIA, Salisb.

A shrub. Leaves opposite, subsessile, lanceolate, usually cordate, black glandular—dotted beneath. Flowers scarlet in axillary, pedunculate cymes. Calyx long, tubular, curved, mouth oblique. Petals 6, small or 0, at the top of the calyx-tube. Stamens 12. Ovary free, sessile, 2-celled; style filiform, stigma small, ovules many. Capsule membranous, included in the calyx-tube. Seeds many, smooth.

*W. floribunda*, Salisb. Parad. Lond. t. 42; Brandis For. Fl. 238. *W. tomentosa*, Bedd. Fl. Sylv. 117. *Grislea tomentosa*, Roxb., Dalz. & Gibs. Bomb. Fl. 97. *Dayti, dhaiphai, phusati*, M.; *Dhauri, dowari*, Vern.; *Dhai*, Sind.; *Dhavadina*, Guz.

Common throughout India, ascending to 5000 ft. in the Himalayas. Throughout the presidency, common in the Konkan and North Kánara near the sea-coast. Fl. Dec.-Apl. A large shrub with smooth bark. Wood reddish-white, close-grained, hard, used for fuel. The flowers yield a dye, and the leaves one of the most commonly employed tans.

## 2. LAWSONIA, Linn.

An erect, sometimes spinous, shrub. Leaves opposite, entire. Flowers in terminal, paniced cymes. Calyx-tube very short; lobes 4, ovate. Petals 4, wrinkled. Stamens usually 8. Ovary free, 4-celled; style very long; stigma capitate, ovules many, placentas axile. Seeds many, smooth, on a central placenta.

*L. alba*, Lamk. Ill. t. 296. fig. 2; DC. Prod. III. 91; Fl. Br. I. 2. 573; Dalz. & Gibs. Bomb. Fl. 97; Bedd. Fl. Sylv. 118; Brandis For. Fl. 238. The Henna Plant. *Henne, mendie*, Vern.; *Gorantlu*, K.

Wild in Beluchistan, on the Coromandel Coast and perhaps in Central India; cultivated throughout the presidency in hedges, near the sea-coast common. Fl. C. S. Fr. C. S. A large, smooth-barked shrub. Wood grey, hard, close-grained. Yields the Henna dye.

## 3. LAGERSTREEMIA, Linn.

Trees and shrubs. Leaves opposite (or the uppermost alternate), entire. Flowers in axillary or terminal panicles, bracteate. Calyx-tube funnel-shaped, cleft into 6 ovate lobes. Petals 6, clawed. Stamens numerous; filaments long exerted. Ovary sessile, 3-6-celled; style long, bent, stigma capitate, ovules numerous on axile placentas. Fruit a coriaceous capsule, 3-6-celled, loculicidally dehiscent. Seeds winged.

Calyx-tube smooth, lobes adpressed. Fruit  $\frac{1}{2}$ -1 in. . . 1. *L. parviflora*.

Calyx-tube smooth, lobes patent or reflexed. Fruit small,  $\frac{1}{2}$  in. . . . . 2. *L. microcarpa*.

Calyx-tube ribbed, tomentose, lobes spreading .. 3. *L. Flos-Régina*.

1. *L. parviflora*, Roxb. Fl. Ind. II. 505; Bedd. Fl. Sylv. t. 31; Gamble Ind. Timbers, 200. *L. lanceolata*, Dalz. & Gibs. Bomb. Fl. 98; Gamble Ind. Timbers, 201; Brandis For. Fl. 239; Bedd. Fl. Sylv. to XXXII. (var. *majuscula*, Fl. Br. I.) *Chunungi, sokutia, bondareh*, Vern.; *Lende, bondga*, M.

Throughout the presidency in deciduous forests from the coast inland. I follow the Fl. of Br. I. in making only two species out of the 3 figured by Beddome in the Fl. Sylv. t. 30, 31, 32. *L. parviflora*, is a well-defined species with leaves glaucous beneath and a large capsule with adpressed calyx-lobes. The variety *majuscula*, of C. B. Clarke in Fl. Br. I. p. 575, is found in the northern parts of the presidency and is called *Sokutia* in the vernacular.

A small tree with a scaly bark like the Teak, but not so smooth, inner bark light-red. Wood grey, elastic, hard, compact. Annual rings sometimes distinct. Pores small or medium sized, enclosed in and connected by irregular, short, concentric bands of light coloured tissue. Weighs about 54 lbs. to the cub. ft. Med. rays fine, numerous, equidistant.

2. *L. microcarpa*, Wgt. Bedd. Fl. Sylv. t. 30. *L. lanceolata*, Wall., Fl. Br. I. 2. 576; Brandis For. Fl. 240. *L. parviflora*; Dalz. & Gibs. Bomb. Fl. 98. Benteak. *Bili nandi*, K.; *Nana*, M.

Western peninsula from Bombay southwards to Travancore. Throughout the presidency in deciduous forests, common, attains a large size in North Kánara. I have retained Wight's and Beddome's name for our Nana tree, which has invariably a small capsule with patent calyx-lobes and is otherwise a very distinct species. Fl. Mch.-Apl. Fr. Nov.-Jany.

A large tree with smooth, white bark, peeling off in large strips; inner bark white, fibrous .25 in. thick, in concentric rings; the layer nearest the cambium turns black on exposure. Wood reddish, moderately hard, strong, tenacious and elastic. Pores large to small, often crowded in the spring wood, showing the annual growth, enclosed in and sometimes connected by white tissue. Medullary rays fine, numerous, equidistant. Weighs about 46 lbs. to the cub. ft. Used for building purposes, coffee-cases, boxes, etc. Soon decays on exposure.

3. *L. Flos-Reginæ*, Retz. Obs. V. p. 25; Fl. Br. I. 2. 577; *L. reginæ*, Bedd. Fl. Sylv. t. 29; Dalz. & Gibs. Bomb. Fl. 98; Brandis. For. Fl. 240; Gamble Ind. Timb. 202. *Hole dásál*, K.; *Bondara, taman*, M.

E. Bengal, Assam, Burma, and the West Coast. On the North Kánara and Southern Konkan gháts along the banks of nálas and rivers, sometimes planted as an ornamental tree. Fl. H. S. Fr. R. S.

A large tree. Bark smooth, white, scaling off in thin plates, inner white, fibrous. Cambium soon turning dark coloured. Wood shining, light red, hard. Annual rings marked by a belt of large pores. Pores of all sizes connected by wavy lines of light coloured tissue. Medullary rays fine, an extremely fine. Weighs about 45 lbs. to the cub. ft. An excellent timber, used for gun carriages, ship building, carts, &c.

*L. indica*, Linn. DC. Prod. III. 93; Fl. Br. I. 2. 575. Cultivated for its flowers in gardens throughout the presidency, a native of China.

#### 4. SONNERATIA. Linn. f.

Trees growing near the sea. Leaves opposite, entire, thick. Flowers large, solitary or in 3-flowered cymes. Calyx thick, coriaceous, the tube adnate to the base of the ovary, lobes 4-8, valvate. Petals 4-8 or 0. Stamens many, on the calyx-tube, inflected in bud. Ovary nearly free, 10-15-celled; style long, stigma, capitate. Fruit large, supported by the persistent calyx. Seeds many, curved, angular.

Calyx-lobes 4.	Petals 0	...	...	...	...	1.	<i>S. apetala</i> .
Calyx-lobes 6.	Petals 6	...	...	...	...	2.	<i>S. acida</i> .

2. *S. acida*, Linn. f. Suppl. 252; Fl. Br. I. 2. 579; Dalz. & Gibs. Bomb. Fl. 98; Brandis For. Fl. 242; Bedd. Fl. Sylv. 118. *Ohipi*, K.

Coasts of India, Burma and the Andamans. In the salt marshes and creeks of the Konkan and North Kánara. Fl. Mch.-July. Fr. Oct.-Nov. A small evergreen tree. Wood reddish-grey, soft, even-grained. Pores small, numerous. Medullary rays fine, numerous, not very distinct. Weighs 36 lbs. to the cub. ft.

1. *S. apetala*, Ham. in Syme Emb. Ava. III. 313. t. 25; Fl. Br. I. 2. 579. Stigma umbrella-shaped, large. Tidal forests of Bengal and Burma. Konkan, Law. A moderate sized evergreen tree. Heartwood reddish-brown, moderately hard. Used for house building, packing cases, &c.

*Punica granatum*, Linn., Roxb. Fl. Ind. II. 499; Brandis For. Fl. 241. The Pomegranate. Is cultivated in gardens throughout the presidency. Wild in Kashmir and the N. W. Himalayas. Fl. Apl.-May. Fr. July-Sept. A shrub or small tree. Wood light yellow, and might be tried as a substitute for boxwood. The flowers afford a light red dye. The bark and rind of the fruit are used for tanning and dyeing morocco leather. The root bark is used in medicine.

ORDER 44. **SAMYDACEÆ.**

Trees or shrubs. Leaves simple, alternate; stipules small, deciduous. Flowers regular, small, axillary, shortly pedicelled, fascicled or in long racemes, simple or paniced. Calyx coriaceous, persistent; tube short, free, or adnate to the ovary, limb 3-7-fid. Petals as many as calyx-lobes or 0, imbricate. Stamens definite or indefinite, usually opposite the petals, and alternating with small glands. Ovary superior or more or less inferior, 1-celled; style 1, capitate or 3-fid at the apex, or styles 2-5; ovules on usually 2-5 parietal placentas. Fruit loculicidally 2-5-valved; seeds several, usually drilled, albuminous.

- Petals 0, flowers in axillary fascicles ... .. 1. CASEARIA.
- Petals present, flowers in axillary or terminal racemes ... .. 2. HOMALIUM.

1. **CASEARIA**, Jacq.

Shrubs or small trees. Leaves alternate, distichous, often slightly serrate and transparently dotted. Flowers small, yellow, in axillary fascicles. Calyx-tube short, limb 4-5-lobed. Petals 0. Stamens 6-15, or rarely more, alternating with as many scales or staminodes. Ovary superior, 1-celled; stigma capitate or shortly 3-lobed; ovules many, parietal. Fruit fleshy, opening into valves; seeds many, angular, often with a red arillus; embryo straight.

- Trees. Leaves glabrous.
  - Pedice's glabrous.
    - Calyx pubescent. Carpels usually 3. Leaves thin. 1. *C. graveolens*.
    - Calyx glabrous. Carpels usually 2. Leaves thick. 2. *C. esculenta*.
  - Shrub. Pedicels pubescent. Leaves coriaceous ... 3. *C. rubescens*.
  - Trec. Leaves tomentosa ... .. 4. *C. tomentosa*.

1. *C. graveolens*, Dalz. in Hook. Jour. Bot. IV. 107; Dalz. & Gibs. Bomb. Fl. 11; Fl. Br. I. 2. 592; Brandis For. Fl. 243. *Bohkara*, M.

Sub-Himalayan tract from the Chenab eastwards, in Oudh and Central India. In the South Konkan, in open situations on the gháts. Fl. R. S. Small tree. Wood light yellow, moderately hard, even-grained; not used. Gamble.

2. *C. esculenta*, Roxb. Fl. Ind. II. 422; Fl. Br. I. 2. 592; Bedd. Fl. Sylv. 119. *C. lævigata*, Dalz. & Gibs. Bomb. Fl. 11. *C. varians* Thw. Bedd. Fl. Sylv. t. 208. *Mori*, *kulkulta*, M.

Western Peninsula from Bombay to Coorg. Throughout the moist forests of the Konkan and North Kánara, common on the hills near Kárwár. Fl. June. Fr. Aug.-Sept. Small tree.

3. *C. rubescens*, Dalz. & Gibs. Bomb. Fl. 11; Fl. Br. I. 2. 593.

Bombay gháts, Konkan and Coorg. On the gháts to the south, Dalz. In the forests near the Nilkund ghát of North Kánara. Fl. C. S. Fr. H. S. The leaves in the North Kánara plant are sometimes very large, up to 10 in. long. A large shrub or small tree.

4. *C. tomentosa*, Roxb. Fl. Ind. II. 421; Brandis For. Fl. 243; Bedd. Fl. Sylv. 119. *C. Anavinga*, Dalz. & Gibs. Bomb. Fl. 11. *Bairi*, *chillara*, Vern.; *Modi*, *modgi*, M.

Sub-Himalayan tract from the Indus eastwards, Oudh, E. Bengal, Central, Southern and Western India. Throughout the presidency in deciduous forests, common. Fl. Jan.-May. Fr. H. & R. S. Small or moderate sized tree. Wood yellowish-white, close-grained, moderately hard. Annual rings usually indistinct. Pores small, single or in radial lines. Medullary rays fine, numerous, wavy, distinct. Weighs 45 lbs. to the cub. ft. "Used for making combs." Gamble.

## 2. HOMALIUM, Jacq.

Shrubs or trees. Leaves alternate, crenate. Flowers hairy, in slender, simple or paniced racemes; pedicels bracteate at the base. Calyx-tube adnate to the base of the ovary; lobes 5-7, narrow, persistent. Petals 5-7, inserted on the throat of the calyx, persistent. Disk tomentose. Stamens 1 or 1-7, fascicled, opposite the petals, with alternating glands. Ovary  $\frac{1}{2}$  superior, 1-celled; styles 2-5, filiform; ovules many or several, placentas parietal. Capsule  $\frac{1}{2}$  superior, coriaceous, 2-5-valved at the apex. Seeds few, angular or oblong.

*H. zeylanicum*, Benth. in Jour. Linn. Soc. IV. 35; Fl. Br. 2. 596; Bedd. Fl. Sylv. t. 210.

Malabar up to 4000 ft., Ceylon, moister parts up to 3000 ft. In the evergreen forests of the northern ghâts of North Kánara from Diggi to Ainshi. Fl. April-May. Fr. R. S. A moderate sized tree, 2 ft. 6 in. in diameter and 60 ft. high. Bark smooth, grey, lenticellate, mealy; inner bark white, .75 in. thick, strips off easily from the wood. Wood strong and valuable for building purposes. Bedd.

#### ORDER 45. DATISCACEÆ.

Trees or herbs. Leaves simple or pinnate. Flowers small, diœcious, clustered, racemed or paniced. Male calyx-tube short, teeth 3-9; petals 0; stamens 4-25. Female calyx-tube adnate to the ovary, lobes 3-8; petals 0; ovary 1-celled, open or closed at the vertex; styles lateral; placentas parietal; ovules many. Capsule coriaceous or membranous, opening at the vertex between the styles. Seeds many, small, albuminous, embryo straight; radicle next the hilum.

#### TETrameLES, R. Br.

Large trees. Leaves pubescent, serrate. Flowers diœcious. Petals 0. Males: calyx-tube short; lobes 4, unequal or equal. Stamens 4, round a depressed disk; filaments elongate. Ovary rudimentary, 4-angled or 0. Female: calyx-tube almost 4-angled; lobes 4, short. Staminodes 0. Ovary open at apex; ovules inserted in 3-4 rows on the parietal placentas; styles 4, short. Capsule membranous, open at the summit and crowned by the four styles. Seeds very many, flattened, ellipsoid, testa very lax and extending beyond the nucleus as a loose reticulated membrane.

*T. nudiflora*, R. Br. in Benn. Pl. Jav. Rar. 79. t. 17; Fl. Br. I. 2. 657; Bedd. Fl. Sylv. t. 212; Brandis For. Fl. 245. *Jermala, bondale*, K.; *Ugad, kapsin, bondsa*, M.

Sikkim, Western ghâts from Bombay to Ceylon, Burma and Tenasserim. Common in the evergreen forests of the ghâts of North Kánara and the Konkan. An immense, deciduous tree with great wall-like buttresses at the base, overtopping the regular evergreen canopy. Fl. Feb.-Mch. Fr. April-May. Bark shining, smooth, lenticellate. Wood white, soft. Pores large, single or divided, equally distributed. Med. rays fine to moderately broad. Weighs 27 lbs. to the cub. ft. "May be found suitable for tea boxes." Gamble.

#### ORDER 46. CACTEÆ.

Herbs, shrubs or trees. Leaves reduced to tufts of spines, prickles or small tubercles. Flowers sessile, solitary, hermaphrodite, regular. Calyx-tube adnate to ovary, lobes 3 to many, small, imbricate. Petals many, imbricate. Stamens many, free or adnate to the base of the petals. Ovary 2-celled; ovules many on parietal placentas, horizontal. Berry 1-celled, placentas pulpy. Seeds numerous.

## OPUNTIA, Mill.

Branches jointed, joints ovate flat, bearing tufts of unequal spines and bristles. Flowers arising from the tufts or margins of the joints, yellow or reddish. Calyx-tube not produced beyond the ovary; lobes numerous. Petals numerous, connate at the base, spreading. Stamens indefinite, in many series. Style cylindric, thicker below, constricted at the base; stigma with 2-7 thick, erect branches. Fruit pyriform, fleshy, often with spines. Seeds with a hard testa. Albumen scanty or copious.

*O. Dillenii*, Haw. Fl. Br. I. 2. 657; Brandis For. Fl. 245; Dalz. & Gibs. Bomb. F. Suppl. 39. Prickly-pear. *Chappal send*, Vern. Naturalized throughout the presidency in dry waste places. Fl. throughout the year. Several introduced species are included under the name *O. Dillenii*, which is said to be rather rare in India.

## ORDER 47. ARALIACEÆ.

Trees or shrubs, sometimes scandent. Leaves alternate, simple or compound, long-petioled. Stipules adnate to the petiole, or 0. Flowers regular, sometimes polygamous in umbels, racemes or paniced heads; pedicels continuous with the base of the calyx or there jointed; bracts and bracteoles small or conspicuous. Calyx-tube adnate to ovary; limb truncate, obsolete or with small teeth. Petals 5, rarely more, valvate, expanding or deciduous in a cap. Stamens as many as and alternate with the petals, inserted round an epigynous disk. Ovary inferior, 2-celled, or cells as many as the stamens; styles distinct or united; ovules solitary and pendulous in each cell. Fruit small, seed pendulous, albumen uniform or ruminant.

## 1. HEPTAPLEURUM, Gærtn.

Trees or shrubs, sometimes climbing. Leaves digitate; leaflets coriaceous, usually entire; stipules connate within the petiole and prominent. Umbels paniced or in compound racemes; bracts woolly; pedicels not jointed; bracteoles few or 0. Calyx-margin toothed or truncate. Petals 5-6 or many, valvate. Stamens as many as petals. Ovary cells as many as petals, disk large or small; styles small, separate or combined in a column. Fruit subglobose, 5-6-angled; albumen uniform.

Leaflets with prominent nervures on the upper surface ... ..

1. *H. venulosum*.

Leaflets with nervures not prominent above.

2. *H. Wallichianum*.

1. *H. venulosum*, Seem. Rev. Heder. 44; Fl. Br. I. 2. 729; Brandis For. Fl. 249; Bedd. Fl. Sylv. 122. *Rawanito*, M.; *Tengar balli*, *huli pachki balli*, K.



Throughout tropical and sub-tropical India from the N. W. Himalayas to the South Deccan. Common in the evergreen forests of the Konkan and North Kánara. Usually climbing scandent. Fl. March-June. Fr. June-Aug.

Wood light brown, smooth, soft. Annual rings indistinct. Pores small, single or in short radial lines. Medullary rays fine to moderately broad, sometimes very long and somewhat far apart. Weighs 40 lbs. to the cub. ft.

2. *H. Wallichianum*, C. B. Clarke. Fl. Br. I. 2. 730; Bedd. Fl. Sylv. 122. *Hedera Wallichiana*, Dalz. & Gibs. Bomb. Fl. 108.

Konkan gháts, pretty common, Dalz. The above species is given on the authority of Dalzell. I have not yet met with it in the Bombay presidency.

#### ORDER 48. CORNACEÆ.

Shrubs or trees. Leaves opposite or alternate, often unequal at the base; stipules 0. Flowers regular, hermaphrodite or unisexual, in axillary or terminal cymes, panicles or heads. Calyx-tube adnate to ovary; limb truncate or 4-5-toothed, persistent. Petals 0 or 4-5. Stamens inserted with the petals and equal to them in number. Ovary inferior, 1-4-celled; crowned by the disk; style single, stigma capitate or branched; ovule solitary, pendulous. Fruit usually succulent, 1-4-celled, less often with 2 pyrenes. Seed oblong, pendulous, albumen copious, fleshy.

Petals long, narrow.	Stamens 20-30	...	...	1. ALANGIUM.
Petals short.	Stamens 5-4	...	...	2. MASTIXIA.

##### 1. ALANGIUM, Lamk.

Shrubs or small trees, armed or 0. Leaves alternate, 3-nerved at the base, persistent. Flowers hermaphrodite, in axillary fascicles or condensed cymes, jointed on the pedicel. Calyx-tube adnate to the ovary, limb 5-10 toothed or truncate. Petals 5-10, linear-oblong, valvate, then reflexed. Stamens twice as many as petals or more; hairy at base. Ovary inferior, 1-celled, surmounted by a disk; style long; stigma large, capitate; ovule pendulous. Fruit a berry, crowned by the enlarged calyx-limb. Seed oblong, albumen ruminant; cotyledons leafy, crumpled.

*A. Lamarkii*, Thw. Enum. 133. Fl. Br. I. 2. 741; Dalz. & Gibs. Bom. Fl. 109; Brandis For. Fl. 250; Bedd. Fl. Sylv. 215. *Ankul*, M.; *Lucki*, *ansroli*, K.

Throughout India from the N. W. Himalaya to Ceylon. Throughout the presidency in dry places, often along the banks of nálas in North Kánara. Fl. Feb.-Apl. Fr. May-Aug.; sometimes at other seasons. Erect or scandent, spinous. A large shrub or small tree up to 2 ft. in diam. with long scandent branches. Bark smooth, grey, thin. Heartwood brown, hard, tough, close-grained. A valuable fuel. Used for pestles to crush oil-seeds. Fruit astringent, acid.

2. **MASTIXIA**, Blume.

Trees. Leaves alternate or opposite, entire. Flowers hermaphrodite, 2-bracteolate, in terminal panicles; pedicels jointed under the flower. Calyx-tube campanulate; limb 4-5-toothed. Petals 4-5, ovate, valvate, silky. Stamens 5-4. Ovary 1-celled; disk fleshy; ovule 1, pendulous. Drupe ovoid, crowned by the calyx teeth; putamen grooved; endocarp protruded inwards down one side. Seed ellipsoid; albumen fleshy.

*M. pentandra*. Blume Mus. Bot. 1. 256; Fl. Br. I. 2. 746. *Bursinopetalum arboreum*, Dalz. & Gibs. Bomb. Fl. 28.

Western gháts from Bombay southwards. Konkan and North Kánara in evergreen forests; also along nálas in North Kánara. Dhárwár, Dalz. Fl. Jan.-Mar. Fr. May. A moderate-sized tree with smooth bark. Wood unknown.

ORDER 49. **CAPRIFOLIACEÆ.**

Shrubs, small trees or herbs. Leaves opposite, simple or pinnate. Flowers hermaphrodite, regular or irregular. Calyx-tube adnate to the ovary, limb 3-5-divided. Corolla gamopetalous, limb often 2-lipped, 5-lobed, lobes imbricate in bud. Stamens 5, on the corolla. Ovary 1-6-celled; ovules solitary, pendulous, or several on axile placenta. Fruit a drupe with 1-8 cartilaginous pyrenes, or a many-seeded berry. Albumen copious; fleshy; embryo minute.

**VIBURNUM**, Linn.

Shrubs or small trees. Leaves opposite. Flowers in terminal panicles or corybose cymes. Calyx-limb short, 5-toothed. Corolla 5-lobed. Stamens 5. Ovary 1-3-celled, with 1 pendulous ovule in each cell. Fruit a dry or fleshy drupe, 1-celled, 1-seeded.

*V. punctatum*, Ham. in Don Prodr. 142; Fl. Br. I. 3. 5; Bedd. Fl. Sylv. t. 217.

Outer Himalayas, Kumaon and Nepal (5000 ft.), Nilghiris, Anamallays, Western gháts and Kánara.

Brandis says this is found in Kánara (North Kánara?); Beddome says "common in subalpine jungles." *Var. acuminata*, Wall., I have found common on the Bababuden hills of Mysore at 4-6000 ft. alt. Fl. Sept.-Oct. Fr. C. S.

ORDER 50. **RUBIACEÆ.**

Trees, shrubs or herbs, erect or climbing, sometimes spinous. Leaves opposite or whorled, entire, stipulate; stipules free or connate. Inflorescence various. Calyx-tube adnate to the ovary, limb entire or toothed. Corolla gamopetalous, usually 4-5-lobed, lobes imbricate, contorted or valvate. Stamens as many as corolla lobes, alternating with them; anthers 2-celled. Ovary inferior, 2 or more celled rarely

1-celled. Fruit berried, capsular or drupaceous or of dehiscent or indehiscent cocci, 2-10-celled. Seeds with a fleshy or horny albumen.

Seeds numerous. (Except in some species of *Webera* and in *Diplospora*.)

Flowers collected into dense globose heads.

Ovaries confluent. Corolla lobes imbricate in bud.

Ovary 4-celled below, 2-celled above ... 1. ANTHOCEPHALUS.

Ovaries free or nearly so.

Corolla lobes valvate.

Leaves cordate. Calyx 5-lobed ... 2. ADINA.

Leaves ovate or obovate. Calyx truncate ... 3. STEPHEGYNE.

Corolla-lobes imbricate.

Calyx-tube turbinate or obconic ... 4. NAUCLEA.

Flowers in leafy, bracteate, paniced spikes.

Corolla-lobes valvate. Fruit capsular; seeds winged. 5. HYMENODICTYON.

Flowers simply paniced.

Corolla-lobes twisted in bud. Fruit capsular; seeds

angled, not winged ... 6. WENDLANDIA.

Flowers paniced or corymbose.

Calyx with 1 large coloured leafy lobe. Corolla-lobes valvate in bud. Fruit indehiscent, fleshy ... 7. MUSSAENDA.

Flowers in terminal corymbiform cymes.

Corolla-lobes twisted in bud. Fruit a 1-many seeded berry ... 8. WEBERA.

Flowers in axillary cymes, solitary or fascicled.

Corolla-lobes 5, twisted in bud. Stigma fusiform.

Ovary 2-celled, seeds numerous ... 9. RANDIA.

Corolla-lobes 5-12, twisted in bud. Stigma fusiform.

Ovary 1-celled, seeds numerous ... 10. GARDENIA.

Corolla-lobes 5, twisted in bud. Ovary usually 2-celled; style branches linear or oblong. Berry

few-seeded ... 11. DIPLOSPORA.

Seeds few, 2-5.

Flowers axillary, fascicled or in peduncled corymbose cymes.

Corolla-lobes valvate, in bud.

Fruit a 2-seeded drupe with 2 pyrenes or a

2-celled putamen ... 12. CANTHIUM.

Fruit a 5-seeded drupe with 5 pyrenes ... 13. VANGUERIA.

Flowers in trichotomous panicles.

Corolla-lobes twisted in bud.

Style short-exserted 2-fid. Fruit with 2 plano-convex, usually ventrally concave coriaceous pyrenes ... 14. IXORA.

Style long-exserted, undivided. Fruit with 2 dorsally compressed, ventrally concave, coriaceous pyrenes ... 15. PAVETTA.

Flowers in axillary fascicles.

Corolla-lobes twisted in bud. Fruit with 2 plano-convex, ventrally-grooved coriaceous pyrenes ... 16. COFFEA.

Flowers sessile on a globose receptacle.

Corolla-lobes valvate in bud. Fruit a fleshy syncarpium of 1-seeded pyrenes ... 17. MORINDA.

Flowers in terminal corymbose or paniced, rarely capitate cymes.

Corolla-lobes valvate in bud.

Corolla-tube short, straight. Drupe of 2 pyrenes not concave ... 18. *PSYCHOTRIA*.

Corolla-tube long, curved. Drupe with 2 dorsally compressed, ventrally concave pyrenes ... 19. *CHASALIA*.

Flowers in axillary, bracteate clusters or axillary and terminal, solitary or few.

Corolla-lobes valvate in bud.

Style arms or stigmas 3-9. Drupes with 1-seeded, triquetrous pyrenes ... 20. *LASIANTHUS*.

Style filiform with 2 short arms. Fruit with 1-2, crustaceous pyrenes ... 21. *SAPROSMA*.

Flowers in trichotomous panicles.

Corolla-lobes valvate in bud. Style 5-fid.

Fruit a capsule 5-valved at top, 5-seeded .. 22. *HAMILTONIA*.

### 1. *ANTHOCEPHALUS*, A. Rich.

A large tree. Leaves opposite, coriaceous; interpetiolar stipules caducous. Flowers in large globose heads. Calyx-tubes confluent, limb 5-lobed. Corolla-tube long, funnel-shaped. Stamens 5, on throat of corolla. Ovary 2-celled below, 4-celled above; ovules many on the 2, bifid placentas. Fruit a fleshy globose mass of few-seeded pyrenes. Seeds minute, embryo clavate, albumen fleshy.

*A. Cadamba*, Miq. Fl. Ind. Bat. II. 135; Fl. Br. I. 3. 23; Brandis For. Fl. 261; Bedd. Fl. Sylv. 127. t. 35. *Kaddam, nhyu*, Vern.; *Kad-wal*, K.

Northern and Eastern Bengal, Pegu and the Western Peninsula, cultivated in Northern India. North Kánara, in evergreen forests, rare. Fl. Dec.-Mch. Fr. R. S. A large deciduous tree. Bark grey, fissured. Wood white, soft, evengrained, brittle. Pores large and subdivided. Med. rays fine, numerous and close. Weighs about 40 lbs. to the cub. ft. Used for building purposes and tea boxes.

### 2. *ADINA*, Salisb.

Trees. Leaves opposite with large interpetiolar stipules. Flowers bracteate, in solitary or paniced globose heads. Receptacle pilose. Calyx-tube angled, lobes 5. Corolla-tube elongate, lobes 5. Stamens 5, on mouth of corolla, filaments short. Capsule of 2, dehiscent cocci, many-seeded. Seeds with a winged testa.

*A. cordifolia*, Hook. f. in Gen. Plant. II. 30; Fl. Br. I. 3. 24; Brandis For. Fl. 263. *Nauclea cordifolia*, Bedd. Fl. Sylv. t. 33; Dalz. & Gibs. Bomb. Fl. 118. *Heddi, honangi, hedu*, M.; *Yettagal, arun santigi*, K.; *Haladwan*, Guz.

Sub-Himalayan tract from the Jumna eastwards, ascending to 3000 ft. altitude. Throughout India, Burma and Ceylon, common throughout the presidency in deciduous forests. Fl. June-July. Fr. Dec.-Mch.

A large deciduous tree. Bark grey, smooth, with great horizontal wrinkles, exfoliating in thick scales; inner bark mottled red, 1 in. thick. Wood yellow, moderately hard, evengrained and durable. Pores small, very numerous. Medullary rays fine, very numerous, uniform, and close together. Annual rings indistinct. Weighs about 42 lbs. to the cub. ft. Much used for house construction, gun-stocks, canoes, &c. A well known and useful timber.

### 3. STEPHEGYNE, Korth.

Shrubs or trees with petioled leaves; stipules large, caducous. Flower heads globose, solitary or paniculate often subumbelled, usually subtended by two large bracts. Flowers surrounded with paleaceous bracteoles. Calyx-tube short, limb truncate or 5-toothed. Corolla funnel-shaped, tube long, throat hairy. Fruit of 2 dehiscent cocci, many-seeded. Seeds small, testa winged, albumen fleshy.

*S. parvifolia*, Korth. in Verh. Gesch. Nat. Bot. 161; Fl. Br. I. 3. 25; Brandis For. Fl. 262. *Nauclea parvifolia*, Bedd. Fl. Sylv. t. 34; Dalz. & Gibs. Bomb. Fl. 118. *Kalamb, kaddam, M.; Kadawar, kannu, yetega, kudwal, K.*

Throughout India and Burma, Ceylon. Throughout the presidency in deciduous forests. Fl. May-July. Fr. Nov.-Dec. A large deciduous tree. Wood light pinkish-brown, moderately hard, close-grained, smooth. Annual rings more or less distinct. Pores small, numerous. Med. rays fine, very numerous, varying in width. Weighs about 45 lbs. to the cub. ft. Used for furniture, agricultural implements, carving, house building purposes, turning, &c.

### 4. NAUCLEA, L.

Trees or shrubs. Leaves large, sessile or petioled; stipules large, caducous or subsistent. Flowers in globose, solitary or subpanicled heads, ebracteolate. Calyx-tube turbinate or obconic, lobes 5. Corolla-tube elongate, lobes imbricate. Stamens 5, on throat of corolla. Fruit of 2, dehiscent, many-seeded cocci. Seeds imbricate, testa winged.

Stigma capitate. Stipules flat, deciduous.

Heads 1-3. Corolla-lobes spreading, not ridged .. 1. *N. purpurea*.

Heads solitary. Corolla-lobes ridged and horned

near apex ... .. 2. *N. elliptica*.

Stigma elongate, acute. Stipules subsistent ... 3. *N. missionis*.

1. *N. purpurea*, Roxb. Fl. Ind. I. 515; Fl. Br. I. 3. 26; Bedd. Fl. Sylv. 129.

Western peninsula from the Konkan to the Circars and southwards. A moderate-sized tree. There seems to be very little difference between this and the next species, *N. elliptica*, Dalz. Good specimens sent by me of true *N. elliptica*, Dalz., having been named *N. purpurea*, Roxb., at Kew. Both *N. purpurea* and *N. elliptica* are quite distinct from *N. missionis*, Wall., which has the stigma mitre-shaped and not globose, as is the case in the two former species.

2. *N. elliptica*, Dalz. & Gibs. Bomb. Fl. 118; Bedd. Fl. Sylv. 129. *Phuga, biloor*, M.

On the Konkan and the Supa gháts of North Kánara along streams and water-courses. Fl. Feb.-Mch. Fr. May-June.

A small or moderate-sized tree, 1-2 ft. 6 in. in diameter and 50 ft. high. Bark grey, exfoliating in scales like *Adina cordifolia*, but smaller; inner bark yellow, fibrous, rapidly turning black on exposure. Wood yellow, smooth, moderately hard. Pores small, equally distributed, sometimes filled with resin. Medullary rays fine, short, wavy, close together. Weighs 46 lbs. to the cub. ft. Not used in Kánara. Would make a handsome furniture timber.

3. *N. missionis*, Wall. Cat. 6099; Fl. Br. I. 3. 27.

Western peninsula from the Konkan to Travancore. Konkan and North Kánara, along rivers and water-courses, common near Yellápur and in several other localities. Fl. Apl.-May. Fr. R. S. An ornamental small tree when in flower. Wood unknown.

#### 5. HYMENODICTIYON, Wall.

Deciduous trees or shrubs with thick branches and bitter bark. Leaves simple, petioled. Stipules glandular, serrate, deciduous. Flowers small, spikate; spikes in axillary and terminal often drooping, panicles with 1-2, large leafy reticular, persistent, bracts. Calyx-tube short, lobes 5-6, deciduous. Corolla funnel-shaped, lobes 5, short, valvate. Stamens 5. Stigma spindle-shaped; ovules numerous. Fruit a dehiscent capsule. Seeds numerous, imbricating, broadly winged; embryo small, in a fleshy albumen.

Flowers paniculate, spikes erect. Capsule deflexed ... 1. *H. excelsum*.  
Flower-spikes drooping. Capsule erect ... ... 2. *H. obovatum*.

1. *H. excelsum*, Wall.; Roxb.; Fl. Ind. II. 149; Fl. Br. I. 3. 35; Dalz. & Gibs. Bomb. Fl. 117; Brandis For. Fl. 267; Bedd. Fl. Sylv. 130. *H. utile*, Bedd. Fl. Sylv. 130. *Kala kurwah*, Vern.; *Dondru, dandelo, bhorsal*, M.

Dry hills at the base of the Western Himalayas, and throughout the gháts of the Deccan and Konkan, Panch Maháls. Fl. June-July. Fr. Oct. A large deciduous tree. Wood brownish grey, soft. Used for toys, scabbards, palanquins, &c.

2. *H. obovatum*, Wall., in Roxb. Fl. Ind. II. 153; Fl. Br. I. 3. 36; Dalz. & Gibs. Bomb. Fl. 17; Bedd. Fl. Sylv. 219; Brandis For. Fl. 268. *Kurwei, sirid*, Vern.; *Bogi, hire mara*, K.

Western peninsula from Bombay to Travancore. Throughout the moist forests of the Konkan and North Kánara. Fl. Aug.-Sept. Fr. Nov.-Dec. There are two varieties of this species, one with large obovate pubescent leaves and capsules 1 in.; the other with small ovate, nearly glabrous leaves and capsules,  $\frac{1}{2}$  inch.

A moderate-sized tree. Bark grey, shining, scaly, brown within; inner bark white with yellowish bands of soft tissue. Wood grey, soft. Annual rings indistinct. Pores small, often in pairs. Medullary rays fine, short and not close together. Weighs about 36 lbs. to the cub. ft. Bark bitter, contains alkaloids like quinine.

#### 6. WENDLANDIA, Bartl.

Shrubs or small trees. Leaves opposite or ternately whorled; stipules entire or 2-fid. Flowers small, white or rose-coloured in terminal paniced cymes, 2-3 bracteolate. Calyx-lobes 4-5, sub-equal, small. Corolla-lobes imbricate in bud. Stamens 4-5, between the corolla-lobes; filaments 0. Ovary 2-celled; style filiform. Capsule small, dehiscent, many-seeded. Seeds obscurely winged.

Leaves opposite	...	...	1. <i>W. exserta</i> ,
Leaves whorled in threes	...	...	2. <i>W. Notoniana</i> .

1. *W. exserta*, DC. Prod. IV. 411; Fl. Br. I. 3. 37; Brandis For. Fl. 268; Bedd. Fl. Sylv. 130.

Dry forests of the tropical Himalaya, Orissa and Central India, in the deciduous forests of North Deccan and Konkan. Fl. Mch.-Apl. Fr. May-June. A small deciduous tree with brown, rough bark. Wood reddish-brown, hard, close-grained. Used for building purposes and agricultural implements.

2. *W. Notoniana*, Wall., in W. & A. Prod. 403; Fl. Br. I. 3. 40; Dalz. & Gibs. 117; Bedd. Fl. Sylv. t. 224. *Showla, talung, parwi*, M.; *Taligi, thilge*, K.

Western and Southern India and Ceylon. In the moist forests of the Konkan and North Kánara, very common on the Supa gháts, growing on laterite. Fl. Jan.-Feb. Fr. Apl. A small tree with an ornamental and scented inflorescence. Wood reddish. Annual rings visible. Pores small, numerous. Med. rays fine and moderately broad, numerous. Weighs about 44 lbs. to the cub. ft. Similar in structure to that of *W. exserta*.

#### 7. MUSSÆNDA, L.

Shrubs. Leaves simple, sessile or petioled. Flowers yellow in terminal cymes. Calyx-lobes 5, 1 frequently developed into a white or coloured leaf. Corolla tubular with a villous throat; lobes 5, valvate in bud. Stamens 5. Ovary 2-celled, ovules numerous on fleshy placentas. Berry fleshy, areolate at the top, many-seeded. Seeds minute, testa pitted.

*M. frondosa*, Linn. DC. Prod. IV. 370; Fl. Br. I. 3. 89; Dalz. & Gibs. Bomb. Fl. 111; Bedd. Fl. Sylv. 131. *Bhútkes, lavasat, sherwod*, M.; *Bebana*, Vern.; *Belloothi, pathri, hasthy gidda*, K.; *Daspathry*, Kon.

North-east Himalayas, Bengal, Southern and Western India and Ceylon, often cultivated in gardens. Throughout the moist forests of North Kánara and the Konkau where there is a heavy rainfall. Fl. Fr. Aug.-Sept.-Oct.

A handsome ornamental shrub. Wood grey, soft, smooth. Annual rings distinct. Pores small, a line of them to mark the annual ring, otherwise equally distributed. Medullary rays fine or very fine, numerous. Weighs 36 lbs. to the cub. ft.

#### 8. WEBERA, Schreb.

Trees or shrubs. Leaves entire, glabrous; stipules deciduous. Flowers in terminal corymbose cymes. Calyx-tube ovoid or turbinate, limb short, 4-5 partite. Corolla-tube cylindrical, lobes 5, spreading or reflexed, imbricate and usually twisted in bud. Ovary 2-celled; style stout, stigma long and spindle-shaped, grooved, usually far exerted; ovules 2 or more in each cell on fleshy, peltate placentas. Berry globose, 2-celled, cells 1-many-seeded. Seeds plano-convex or cupped, rarely angled; albumen fleshy or horny; embryo small; cotyledons leafy, radicle pointing variously.

*W. corymbosa*, Willd.; Roxb. Fl. Ind. 1. 696; Fl. Br. 1. 3. 102. *W. asiatica*, Bedd. Fl. Sylv. 133; Gamble. Ind. Timbers, 226. *Stylo coryne Webera*, A. Rich., Dalz. & Gibs. Bomb. Fl. 119. *Kâré*, M.

Western peninsula from the Konkan southwards and Ceylon. South Konkan and North Kánara, in moist forests on the gháts, common in the evergreen forests near the Ainshi ghát of North Kánara. Fl. at different times from December till July. Fr. R. S. A large shrub or small tree. Bark dark-coloured, smooth. Wood yellowish white, hard, close-grained. Pores small, numerous. Med. rays short, fine and very fine. Weighs 57 lbs. to the cub. ft.

#### 9. RANDIA, L.

Small trees or shrubs, usually spinous. Leaves opposite, entire; stipules short, free or connate. Flowers large or small, in axillary cymes or clusters, white or yellowish. Calyx-tube various. Corolla from salver-shaped to nearly rotate, limb 5-lobed, lobes twisted in bud. Stamens 5, anthers subsessile. Disk annular or cushion-shaped. Ovary 2-celled, stigma fusiform, entire or 2-fid; ovules many, attached to a fleshy, peltate placenta. Berry globose, 2-celled, many-seeded, usually crowned by the calyx-limb. Seeds angled, immersed in pulp, testa thin, albumen horny; cotyledons orbicular.

Spinous shrubs or trees.

Flowers large, white, solitary. Berry  
smooth, yellow, 2 in. long. Spines  
short, decussate, terminal ... 1. *R. uliginosa*.

Flowers small, white, yellow. Fruit 1  
in. long. Spines long, axillary ... 2. *R. dumentorum*.

Climbing unarmed shrubs. Berry small ... 3. *R. rugulosa*.

1. *R. uliginosa*, DC. Prod. IV. 386; Fl. Br. I. 3. 110; Brandis For. Fl. 273; Dalz. & Gibs. Bomb. Fl. 119; Bedd. Fl. Sylv. 132. *Pandri*, *banbugri*, *karé*, K.; *Kantha goting*, Vern.; *Kaurio*, Panch Maháls; *Pin-dara*, Kon.



Sub-Himalayan tract from the Jumna eastwards, Oudh, Bengal, Burma, Central, Southern and Western India. Throughout the presidency, often in abandoned rice fields, common in deciduous forests. Fl. May-June. Fr. Dec.-Feb.

A small deciduous tree. Bark brown, scaly. Wood whitish-grey or light-brown, close-grained, hard, smooth. Pores small, numerous. Med. rays fine and very fine. Weighs about 45 lbs. to the cub. ft. Fruit sometimes eaten.

2. *R. dumentorum*, Lamk. Ill. t. 156, f. 4; Fl. Br. I. 3. 110; Dalz. & Gibs. Bomb. Fl. 119; Brandis For. Fl. 273; Bedd. Fl. Sylv. 132; *R. nutans*, DC. *R. longispina*, DC. Dalz. & Gibs. Bomb. Fl. 119. *Ghela*, *peralu*, *mindhal*, *monigeli*, M.; *Karigidda*, *mangari*, *kat mangri*, K.

Throughout India. Common throughout the presidency in deciduous forests. Fl. Mch.-May. Fr. Nov.-March. A small, deciduous, often gregarious, tree. Bark grey, scaly. Wood brownish, compact, hard, smooth. Annual rings distinct. Pores very small, numerous. Medullary rays fine, short, equally distributed. Weighs 54 lbs. to the cub. ft. Used for agricultural implements, fences and fuel. The fruit is used to poison fish, and in native medicine. Seeds 15 in. long, ovoid, flattened; episperm smooth, yellow, hard, bony, transparent.

3. *R. rugulosa*, Thw. Enum. 159; Fl. Br. I. 3. 113; Bedd. Fl. Sylv. 133. *Var. speciosa*, Bedd. Fl. Sylv. 133. *Tengar balli*, K.

Western peninsula on the ghâts from the Konkan southwards, Ceylon. On the Konkan and North Kánara ghâts, in evergreen forests, common in the forests near the Tinai and Gairsoppah ghâts. Fl. Jan.-Feb. Fr. Nov.-Dec.

A lofty, unarmed climber. Stems 4 in. in diameter, with a rough lenticellate bark. Wood grey, soft, light. Pores large and medium, numerous between the broad, numerous medullary rays. Weighs about 40 lbs. to the cub. ft.

#### 10. GARDENIA, L.

Shrubs or trees, spinous or 0. Leaves simple, rarely ternately whorled. Flowers often dimorphic, showy. Calyx-limb variously cleft or lobed. Corolla-lobes 5-12, twisted in bud. Stamens as many as corolla-lobes, not exserted, anthers sessile, linear, inserted in the tube. Ovary 1-celled, style stout, stigma clavate, fusiform or 2-cleft; ovules numerous, 2-seriate on 2-6 parietal placentas. Fruit fleshy, or coriaceous, indehiscent; seeds numerous, immersed in the placenta, embryo small in horny albumen.

Unarmed shrubs or small trees.. Flowers not dimorphic.

Calyx-lobes 5, long-subulate. Placentas 2. 1. *G. lucida*.

Calyx-lobes 5-6, short, ovate, acute. Placentas 4-5 ... .. 2. *G. gummifera*.

Calyx-lobes 5-9, subulate, lanceolate, unequal. Placentas 4-5 ... .. 3. *G. latifolia*.

Small spinous tree. Flowers dimorphic.

Calyx with 5, short teeth in male flower, in female flower teeth oblong, foliaceous. Placentas 5-6 ... .. 4. *G. turpida*.

1. *G. lucida*, Roxb. Fl. Ind. 1. 707; Fl. Br. I. 3. 115; Dalz. & Gibs. Bomb. Fl. 120; Bedd. Fl. Sylv. 134; Brandis For. Fl. 271. *Decamali*, Vern. Burma, Southern India, and Central Provinces, Western peninsula, common from the Konkan southwards. Belgaum. Fl. Mch.-June. Fr. C. S.

A small tree. Bark smooth, grey, scaly. Wood yellowish-grey, close-grained, moderately hard, compact, smooth. No annual rings. Pores very small and numerous. Medullary rays fine and very fine, distinct. Weighs about 50 lbs. to the cub. ft. Made into combs. Yields the "Dikamali" resin. The flower buds open in the evening about 6 o'clock, turn from white to yellow in a short time, and die.

2. *G. gummifera*, Linn. f. DC. Prod. IV. 381; Fl. Br. I. 3. 116; Dalz. & Gibs. Bomb. Fl. 120; Bedd. Fl. Sylv. 134. I.; Brand. For. Fl. 270. *Dickmali*, Vern.; *Kamarri*, Guz.; *Yerbhicky*, *dicky* or *bhicky gidda*, K.

Western peninsula from the Sâtpura range southwards. In the moist forests of North Kânara and the Konkan, in open situations, common on the laterite plains from Kumta southwards, also near Siddâpur. Fl. Mch.-May. Fr. Mch.-May.

Usually a small shrub. Wood yellowish-white, hard, close-grained, Yields the "dikamali" or cumbi resin which has an offensive odour and is bright yellow in colour.

3. *G. latifolia*, Ait. Hort. Kew I. 294; Fl. Br. I. 3. 116; Dalz. & Gibs. Bomb. Fl. 120; Brandis For. Fl. 271; Bedd. Fl. Sylv. 134-4. *Pandru*, *ghogari*, *papur*, M.

Dry forests of Western, Central and Southern India, Garhwal, ascending to 3000 ft. Behar and Western Bengal. Common in the dry forests of the presidency. Fl. Apl.-May. Fr. next cold season.

A small tree. Bark grey, smooth, rather like Dindal bark; inner bark thick, white, soft. Wood yellowish-white, close-grained, mottled, moderately hard and smooth. Annual rings distinct. Pores very small, numerous. Medullary rays fine, short and close. Weighs about 60 lbs. to the cub. ft. Recommended as a substitute for boxwood. Used for making combs.

4. *G. turgida*, Roxb. Fl. Ind. 1. 711; Fl. Br. I. 3. 118; Brandis For. Fl. 270; Bedd. Fl. Sylv. 134-1. Var. *montana*, Roxb., Dalz. & Gibs. Bomb. Fl. 120. *Kurphendra*, M.; *Pendra*, Vern.; *Bongeri*, *boothbangari*, *boodbagari*, *bonnagavi*, K.

Sub-Himalayan tract from Nepal to the Jumna, ascending to 4000 ft. Southern, Western and Central India and Burma. In dry forests throughout the presidency, common in Dhârwar and North Kânara jungles. Fl. H. S. Fr. R. & C. S. Foliage of young plants distinct from that of mature trees.

A small deciduous tree. Bark smooth, grey, mealy. Wood white with a purplish tinge, smooth, close-grained, moderately hard and durable.

Annual rings visible, but not distinct. Pores very small and numerous. Medullary rays fine and very fine, distinct, numerous. Weighs about 46 lbs. to the cub. ft.

### 11. DIPLOSPORA, DC.

Shrubs or trees, evergreen. Leaves simple, shortly petioled; stipules triangular, acuminate. Flowers in axillary fascicles or cymes, polygamo-dioecious, white; bracts free or connate in a cup. Calyx-tube short; limb truncate. Corolla-tube short, lobes 4-5, spreading, twisted in bud. Stamens 4-5, filaments short or long, anthers often recurved. Ovary 2-3-celled; style 2-armed; ovules 2-3 in each cell. Berry ovoid or globose. Seeds few, imbricate.

Fruit sessile, ellipsoid ...	...	...	1. <i>D. apiocarpa</i> .
Fruit pedicelled, globose	...	...	2. <i>D. sphærocarpa</i> .

These two species of medium-sized trees are found in the Bombay Presidency forests about the latitude of Vengurla.

1. *D. apiocarpa*, Dalz. in Hook. Kew Jour. II. 257; Fl. Br. I. 3. 123. *Dicospermum apiocarpum*, Dalz. & Gibs. Bomb. Fl. 120; Bedd. Fl. Sylv. t. 223.

Western peninsula on the ghâts from the Konkan southwards. Evergreen forests on the higher ghâts of the Konkan and probably North Kánara. Fl. R. S.

2. *D. sphærocarpa*, Dalz. in Hook. Kew Jour. II. 257; Fl. Br. I. 3. 123. *Dicospermum sphærocarpa*, Dalz. and Gibs. Bomb. Fl. 120; Bedd. Fl. Sylv. 134.

Western peninsula on the ghâts from Bombay southwards. On the ghâts from the Konkan southwards. Fl. Oct. Fr. May.

### 12. CANTHIUM, Lam.

Unarmed or spinous trees or shrubs. Leaves simple; stipules interpetiolar, pointed, with a broad base. Flowers small, axillary, fascicled or cymose. Calyx-tube short, limb 4-5 toothed. Corolla-tube with a ring of deflexed hairs within; throat villous; lobes valvate in bud. Ovary 2-celled; stigma large; ovules 1 in each cell. Drupe didymous with 1-2 pyrenes. Seeds with fleshy albumen; embryo long; cotyledons short.

Unarmed tree. Flowers umbellate on a short peduncle.	...	...	...	1. <i>C. umbellatum</i> .
Spinous shrubs, scandent or rigid-rambling. Flowers fascicled.				
Scandent. Spines short, recurved. Leaves shining above	...	...	...	2. <i>C. Rheedii</i> .
Rigid-rambling. Spines long, straight. Leaves not shining	...	...	...	3. <i>C. parviflorum</i> .

1. *C. umbellatum*, Wgt. Ic. t. 1034; Fl. Br. I. 3. 132; Dalz. & Gibs. Bomb. Fl. 113; *C. didymum*, Bedd. Fl. Sylv. t. 221. *Plectronia didyma*, Brandis For. Fl. 276. *Tupa, arsul*, M.; *Yellal, humnagere, hani-gigari*, K.

Sikkim Himalaya, Western Peninsula from the Konkan southwards, Ceylon.

Common in the evergreen forests of the Konkan and North Kánara. Fl. Nov.-Jany. Fr. Apl.-June. A large shrub or small tree.

Wood grey or reddish-grey, hard, close-grained. Annual rings very distinct. Pores very small, numerous. Medullary rays fine and very fine, numerous. Weighs 42 lbs. to the cub. ft. Young branches sometimes sharply 4-angled. Used for making combs by the Siddapore Goodegars in North Kánara.

2. *C. Rheedii*, DC. Prod. IV. 474; Fl. Br. I. 3. 134; Dalz. & Gibs. Bomb. Fl. 113. *Plectronia Rheedii*, DC. Bedd. Fl. Sylv. 134-5. (*C. angustifolium*, Roxb. Fl. Br. I. 3, 135. *C. Leschenaultii*, W. & A. Dalz. Gibs. Bomb. Fl. 113. *Chapyel*, M.; *Ambgari, ambgani*, K.

Western Peninsula from the Konkan southwards. Common in the evergreen forests of the Konkan and North Kánara. A scandent shrub with a slender stem 1 in. in diameter, spinous to near the base. Bark smooth, shining. Fl. & Fr. at different times throughout the year. I am unacquainted with *C. angustifolium*, W. & A., if it is distinct from *C. Rheedii*, DC. Sir J. Hooker in the Fl. Br. I. says *C. angustifolium* is probably only a glabrous variety of *C. Rheedii*, DC.

3. *C. parviflorum*, Lamk. Dict. I. 602; Fl. Br. I. 3. 136; Dalz. & Gibs. Bomb. Fl. 113. *Plectronia parviflora*, Roxb.; Bedd. Fl. Sylv. 134-5; Gamble Ind. Timbers. 230. *Kirna*, M.; *Kari*, K.

Western Peninsula from the Konkan southwards. Very common in dry, open situations throughout the presidency, also along and near the coast. A shrub sometimes semiscandent in hedges. Fl. Fr. at different times throughout the year. Fr. yellow, edible, not palatable. Wood hard and used for turning, and leaves eaten in curries.—Gamble.

### 13. VANGUERIA, Juss.

A spinous tree. Leaves and flowers as in *Canthium*, but ovary, usually 5-celled. Drupe large, globose, 1 inch in diameter, smooth; pyrenes, 4-5 woody, smooth.

*V. spinosa*, Roxb. Fl. Ind. 1. 537; Fl. Br. I. 3. 136. *Malla kare, gober gally, gund kare*, K.; *Alu, huloo, halawni*, M.

Northern Bengal to Kánara, Burma, Pegu and Tenasserim. Common in the deciduous forests of the North Kánara and Belgaum districts. Fl. Mch.-Apl. Fr. R. S.

A small or moderate sized tree. Bark dark coloured, nearly smooth or with shallow fissures; inner bark with 5 or 6 alternate layers of white and red tissue.

Wood pinkish brown or white, close-grained, moderately hard and heavy. Annual rings distinct. Pores small, numerous. Medullary rays numerous, fine and very fine. Weighs 55 lbs. to the cub. ft. Fruit globose, smooth, 1-2 in. in diameter, on slender peduncles, turns yellow when ripe, edible, but not palatable.

#### 14. IXORA, L.

Shrubs or small trees. Leaves with interpetiolar stipules. Flowers often showy, in axillary and terminal corymbose cymes. Calyx 4-5-toothed or lobed. Corolla-tube long slender, lobes 4, spreading. Ovary 2-celled; style filiform, exserted; stigma slender, fusiform, or 2-lobed; 1 ovule in each cell, peltately attached to the septum. Fruit a small berry or drupe with 2, plano-convex, ventrally concave coriaceous pyrenes. Seeds peltate, testa membranous, albumen sometimes horny.

Leaves green when dry. Flowers white or pink. Fruit red or dark-coloured.

Shrubs.

- Calyx-teeth linear, much longer than the ovary.
- Corolla-tube very slender. Fruit glabrous; calyx-teeth persistent ... 1. *I. lanceolaria*.
- Calyx-teeth longer and broader than the ovary.
- Fruit red, hairy, striate ... 2. *I. polyantha*.
- Calyx-teeth shorter than the ovary. Fruit smooth, black ... 3. *I. elongata*.

Trees with flowers in brachiate cymes,

- Cyme branches long. Flower-buds globose; corolla-tube  $\frac{1}{2}$  in. ... 4. *I. brachiata*.
- Cyme branches short. Flower-buds ovoid; corolla-tube  $\frac{1}{2}$ - $\frac{1}{4}$  in. ... 5. *I. parviflora*.

Shrub with scarlet flowers in sessile corymbiform cymes. Fruit red ... 6. *I. coccinea*.

Leaves black when dry. Flowers white. Fruit black.

- Shrub with flowers in broad sessile or peduncled brachiate cymes ... 7. *I. nigricans*.

*I. lanceolaria*, Colebr. in Roxb. Fl. Ind. I. 387; Fl. Br. I. 3. 138.

Western Peninsula from Belgaum southwards. Common in the evergreen forests of North Kánara, particularly on the southern gháts. Fl. R. and C. S. Fr. Aug. A small shrub.

2. *I. polyantha*, Wgt. Ic. t. 1066; Fl. Br. I. 3. 140; Bedd. Fl. Sylv. 134-7.

Western Peninsula from the Konkan to Cochin. Common on the southern gháts of North Kánara, in evergreen forests. Fruit  $\frac{1}{2}$  in. ovoid, striate, sparsely hairy, crowned with the calyx-lobes 1-2-seeded; pedi-

cels  $\frac{1}{2}$  in. densely hairy. Fl. Mch. Fr. ripe Nov.-Feb. A small ornamental shrub. Fruit not known to Sir J. Hooker when writing the Rubiaceæ for the Fl. of Br. I.

3. *I. elongata*, Heyne. in Wall. Cat. 6181; Fl. Br. I. 3. 141; *I. pendunculata*, Dalz. & Gibs. Bomb. Fl. 113.

The Konkan and Kánara; from Bombay to Kurg. Fl. Br. I. Konkan and North Kánara on the gháts. Fl. Feb. Fr. H. S. A small shrub.

4. *I. brachiata*, Roxb. Fl. Ind. I. 381; Fl. Br. I. 3. 142. *Gorbale*, K.

Western Peninsula from the Konkan southwards. From the Konkan southwards in evergreen forests, common on the North Kánara gháts. Fl. C. S. Fr. Apl.-May.

A small tree. Bark smooth, grey with a thin hard corky layer; inner bark  $\cdot 25$  in. thick, dark purple, with a few white veins. Wood reddish grey, hard, smooth, compact. Annual rings indistinct. Pores small, numerous, equally distributed. Medullary rays fine and very fine, the latter indistinct. Weighs 52 lbs. to the cub. ft. Flowers very small; buds globose. The black succulent pulp of the fruit has a sweet taste.

5. *I. parviflora*, Vahl. Symb. III. 11. t. 52; Fl. Br. I. 3. 142; Bedd. Fl. Sylv. t. 222; Dalz. & Gibs. Bomb. Fl. 113; Brandis For. Fl. 275. The Torch Tree. *Kurat, kura*, M.; *Hennu, gorvi*, K.; *Makrichijhar*, Hind.

Western Bengal, Behar, Burma, Western, Central and Southern India from the Satpuras southwards, Ceylon. Throughout the presidency, in deciduous forests. Fl. Mch.-Apl. Fr. May-June. Small evergreen tree. Bark dark coloured, covered with raised dots, inner bark brown. Wood light-brown, smooth, very hard and close-grained. Annual rings visible but not distinct. Medullary rays fine. Suitable for turning. Used for furniture and building purposes in Madras. One of my specimens is yellow in colour with the annual rings distinct and weighs 72 lbs. to the cub. ft.

6. *I. coccinea*, Linn. Roxb. Fl. Ind. I. 375; Fl. Br. I. 3. 145; Dalz. & Gibs. Bomb. Fl. 112; Brandis For. Fl. 275; Bedd. Fl. Sylv. 134-7. The Flame Tree of the Woods. *Bakora, pendgul*, M.; *Gudde dasal*, K.; *Patkali*, Kon.

Western Peninsula from Bombay southwards, often cultivated. Very common in the Konkan and North Kánara moist forests near the sea coast, also on the gháts along river banks. Fl. and Fr. throughout the year. Seeds rough, scaly.

An ornamental shrub. Wood grey, smooth, rather soft, pores small, unequally distributed in radial lines. Medullary rays fine, very numerous and close together, crossed by close, fine, wavy lines of light coloured tissue. Weighs 40 lbs. to the cub. ft. Flowers sacred to Siva and Vishnu. Used in native medicine for ophthalmia,

7. *I. nigricans*, Br. in Wall. Cat. 6154; Fl. Br. I. 3. 148; Dalz. & Gibs Bomb. Fl. 113. *Lokhandi, kalkura*, M.

Western Peninsula from the Konkan southwards; Eastern Peninsula from Pegu to Malacca. Very common in the evergreen forests of North Kánara, also in the Konkan. Fl. apparently throughout the year. Fruit glabrous, size of a pea. Seeds 2, deeply ventrally concave. A large shrub.

#### 15. PAVETTA, L.

Shrubs and small trees. Leaves usually membranous; stipules deciduous, usually connate into a sheath. Flowers in trichotomous corymbs. Corolla-tube slender, lobes 4-5. Ovary 2-celled, style long exserted; stigma fusiform or 2-dentate; ovule 1 in each cell, attached to a prominent placenta. Fruit a 2-seeded berry. Albumen horny, embryo incurved at the back of the seed.

Corolla white, tube  $\frac{1}{2}$  inch. Leaves green when dry. 1. *P. indica*.

Corolla yellowish, tube more than 1 inch. Leaves turning black when dry ... 2. *P. hispidula*.

1. *P. indica*, Linn.; DC. Prod. IV. 490; Fl. Br. I. 3. 150; Var. *indica proper*; leaves glabrous. Dalz. & Gibs Bomb. Fl. 112; Brandis For. Fl. 275; Bedd. Fl. Sylv. 134-7. Var. *tomentosa*, Roxb. Leaves and cymes tomentose or villous. Brandis For. Fl. 275; Bedd. Fl. Sylv. 134-7. *P. Brunonis*, Dalz. & Gibs. Bomb. Fl. 112. *Pavuti, pappadi*, K.; *Papadi*, M.

Throughout India from the Western Himalaya to Burma and southwards to Ceylon, Malacca and Penang. Common throughout the presidency. Fl. Mch.-May. Fr. R. S. A stout bushy shrub. Gamble describes the wood of *P. tomentosa*, as light brown, hard, close-grained. Pores extremely small. Med. rays short, numerous, fine and very fine.

2. *P. hispidula*, W. & A. Prod. 431; Fl. Br. I. 3. 151; *P. siphonantha*, Dalz. & Gibs. Bomb. Fl. 112.; Bedd. Fl. Sylv. 134-8.

Western Peninsula on the gháts from the Konkan southwards. In the evergreen forests of the Supa gháts of North Kánara, rare. Fl. May. Fr. R. S. A slender branched shrub.

#### 16. COFFEA, L.

Shrubs. Leaves simple, opposite, rarely in whorls of 3; stipules broad. Flowers white, in axillary fascicles or cymes. Calyx-tube short with a truncate or dentate limb. Corolla-lobes 4-7, spreading, twisted in bud. Ovary 2-celled, style bifid at the top, ovule 1 in each cell peltately attached. Fruit with two plano-convex, ventrally grooved seeds. Albumen horny; cotyledons foliaceous.

*C. arabica*, L. Fl. Br. I. 3. 153; Brandis For. Fl. 276; Bedd. Fl. Sylv. 13-48; Dalz. & Gibs Bomb. Fl. Suppl. 44. Coffee. *Boon*, M.; *Kawa*, Vern.

Indigenous in Abyssinia and the Soudan. Cultivated throughout the presidency, but nowhere on a large scale. Fl. March. Fr. Oct-Jan. In Mysore thrives well at an altitude of 4000 ft. and under a rainfall of 100 inches. Wood white, moderately hard and close-grained.

#### 17. MORINDA, L.

Shrubs or trees, usually erect. Leaves usually membranous; stipules connate, sheathing. Flowers white, sessile, on a globose receptacle, more or less connate by the calyces. Calyx-tube short, limb short or 0. Corolla tubular, lobes 4-7, valvate in bud. Stamens inserted in the mouth of the corolla, filaments short. Ovary 2 or spuriously 4-celled, cells 1-ovuled. Fruit a compound succulent berry, containing a number of hard pyrenes, 2-4 from each flower. Seeds obovoid or reniform; albumen fleshy or horny.

Leaves pubescent, tomentose or glabrous, not shining. 1. *M. citrifolia*.  
Leaves glabrous, shining ... .. 2. *M. tinctoria*.

1. *M. citrifolia*, Linn.; DC. Prod. IV. 446; Fl. Br. I. 3. 155; Dalz. & Gibs. Bomb. Fl. 114; Brandis For. Fl. 277; Bedd. Fl. Sylv. t. 220. *Anal, bartundi*, Vern.; *Aak*, M.; *Ainshi, mulgul*, K.

Throughout the hotter parts of India and Ceylon, cultivated and wild. Fl. Br. I.

Var. 1, *citrifolia* proper. Cultivated. Var. 2, *bracteata*, is common along the coast of the Konkan quite near the sea, and certainly indigenous. Fruit a white syncarpium. Fl. and Fr. R. S. Var. 3, *elliptica*, Konkan, Stocks.

2. *M. tinctoria*, Roxb. Fl. Br. I. 3. 156; Brandis For. Fl. 277. *M. citrifolia*, Bedd. Fl. Sylv. t. 220. *M. tomentosa*, Dalz. & Gibs. Bomb. Fl. 114. *M. multiflora*, Roxb., Brandis For. Fl. 227. *M. exserta*, Brandis For. Fl. 276. *Al, ack, alleri, alladi, ainshi*, Vern.; *Mulgal*, K.

Bengal, Burma, Guzerat and Southern India.

Var. 1, *tinctoria* proper, is cultivated. Var. 2, *tomentosa*, common in the deciduous forests of the presidency. Fl. May. Fruit ripe June-July. Var. 4, *forma exserta*, Panch Mahals. Brandis. ]

Wood red, often yellow, moderately hard, close-grained. Pores small, scanty, generally in radial lines between the numerous fine and moderately broad medullary rays. Gamble.

#### 18. PSYCHOTRIA, L.

Erect shrubs or small trees, rarely climbers. Leaves petioled, attenuated at the base. Stipules solitary or in pairs, often with glandular hairs. Flowers in terminal corymbose cymes, bracteate or not. Calyx-tube short, limb often deciduous. Corolla-tube short, straight; throat hairy or glabrous. Anthers included or 0. Ovary 2-celled, cells 1-ovuled. Fruit small, ovoid, globose or oblong, rarely



didymous. Seeds plano-convex, ventrally flat or grooved; albumen hard, sometimes ruminant, embryo small, basal, cotyledons broad; radicle inferior.

Seeds plano-convex. Albumen ruminated.

Cyme branches mostly whorled.

Flowers mixed with rufous hairs. Stipules small ... 1. *P. Thwaitesii*.

Flowers not mixed with rufous hairs. Stipules large.

Cymes congested, branches short. Fruit not crowned with the enlarged calyx ... 2. *P. truncata*.

Cymes with long stout, white branches. Fruit crowned with the enlarged calyx. Seeds with 1 dorsal ridge ... 3. *P. Dalzellii*.

Cyme branches mostly opposite, bright yellow in fruit. Seeds with 1 or 0 dorsal ridges ... 4. *P. flavida*.

Seeds sharply dorsally ridged. Albumen equable.

Cyme branches opposite or whorled. Seeds dorsally 1-ridged ... 5. *P. canarensis*.

Cyme branches opposite. Seeds dorsally 4-ridged ... 6. *P. octosulcata*.

1. *P. Thwaitesii*. Hook. f. Fl. Br. I. 3. 162.

Western Peninsula on the gháts from the Konkan southwards, Ceylon, 36,000 ft., common. On the southern gháts of North Kánara, in evergreen forests, common near the Nilkund and Gairsoppah gháts at about 2000 feet elevation. Fl. Mch.-Apl. Fr. ripe Nov.-Dec. A large gregarious shrub.

2. *P. truncata*, Wall. in Roxb. Fl. Ind. II. 162; Fl. Br. I. 3. 163. *Grumilea vaginans*, DC.; Dalz. & Gibs. Bomb. Fl. 111.

Western Peninsula on the gháts from the Konkan southwards. In the evergreen forests of the Konkan and North Kánara gháts; common in the forests near the Tinai ghát. Fl. Jany. Fr. ripe Oct. A shrub. Branches of the inflorescence and flowers have a white, waxy appearance.

3. *P. Dalzellii*, Hook. f. Fl. Br. I. 3. 163. *Shivan yallaki*, fat-pate, dutiyale, K.

Western Peninsula from N. Kánara southwards.

Throughout the evergreen forests of North Kánara; very common, often gregarious on the gháts near Yellápur. A large shrub. Stem 2 in. in diam. at the base and 20 ft. high, not much branched. Branchlets green, somewhat flattened. Bark smooth, inner bark soft, white. Green cells developed. Wood white, tough. Fl. June-July. Fr. Jany.-Mch. Fruit black, succulent, edible, crowned with the calyx-tube. Albumen ruminant.

4. *P. flavida*, Talb. List of Trees, 1894, p. 113. *Shivan yallaki*, K.

A small shrub, common in the evergreen forests of the southern gháts of N. Kánara. Fl. May-July. Fr. Jany.-Mch. The bright yellow fruiting cymes are characteristic.

5. *P. canarensis*, Talb. Syst. List Bomb. Trees etc., p. 113. Jour. Bomb. Nat. Hist. Soc. XI. 691. t. 12.

A small erect shrub with smooth branches. Leaves ovate, obovate, or lanceolate, acute, attenuate at the base, thin, nearly glabrous, minutely punctate and pale beneath; lateral nerves 8 pairs, distinctly looping within the margin; blade 2—5 by .5—1.75 in.; petiole 0.25 in. long. Stipules short, acute, caducous. Cymes few or many flowered, mostly terminal, 1—3 in. long, branches opposite or verticillate, slender, as long as or longer than the peduncle. Flowers small, sessile. Bracts and bracteoles minute, linear, caducous. Calyx short, tubular, 4-toothed. Corolla white, tubular or slightly funnel-shaped, about .12 in. long, limb with 4 spreading or reflexed lobes, mouth of the corolla hairy within. Stamens at the mouth of the tube; filaments very short. Ovary 4-lobed; style as long as the corolla tube. Fruit ovoid, curved, black, shining, ridged, about .5 in. long, crowned with the toothed calyx. Seeds ridged along the back, ventrally flat; albumen equable.

Fairly common in the forests near the falls of Gairsoppah in North Kánara. Flowers during the rainy season. Fruit ripe during December and January.

6. *P. octosulcata*, Talb., sp. nov. Herb. No. 3556. Jour. Bomb. Nat. Hist. Soc. XI. 237. t. 7.

An erect, stout, smooth-barked shrub with green, glabrous branches. Leaves obovate or oblanceolate, abruptly acuminate, shining above, pale beneath, thin; blade 3—6 by 1—2 in.; petiole .2—.5 in. long; lateral nerves 7—10 pairs, prominent, parallel, usually with small, saccate glands in the axils. Stipules connate at the base, long or shortly acuminate, deciduous. Flowers white in short terminal corymbose cymes 1—2 in. long, branches opposite. Calyx minute, cup-shaped, 5-toothed. Corolla .1 in., tube hairy at the mouth. Fruit obovoid, straight or slightly curved, 8-ridged, black and succulent when ripe, but soon drying and becoming regularly ridged with a flattened top. Seeds 2, black, rough, dorsally 4-ridged, ventrally flat, .5 in. long; albumen equable, horny.

A large, gregarious, branched shrub 10—20 feet high with a stem 1—2 in. in diameter at the base. Common in some of the evergreen forests of the Siddapore and Sirey sub-divisions of North Kánara. Fl. R. S. Fr. C. S.

#### 19. CHASALIA, Comms.

Shrubs with the general characters of *Psychotria*. Leaves membranous. Corolla-tube slender and curved. Fruit globose, didymous seeds orbicular, dorsally much compressed, ventrally deeply concave; albumen equable.

*C. curviflora*, Thw. Enum. 150, 421; Fl. Br. I. 3. 176. *Psychotria longifolia*, Dalz. in Hook. Lond. Jour. Bot. II. 133. *Kan millige gidda*, K.

Eastern tropical Himalaya; Sikkim 2—6000 ft., Assam, Cachar, Malay Peninsula, also the Western Peninsula from Bombay southwards.

In the evergreen forests of North Kánara and the Konkan, common. Fl. May-Aug. Usually a small shrub. The waxy white slender curved tubular flowers with a yellow throat are characteristic.

*C. virgata*, Talb. Syst. List of Trees etc. Bomb. 1st Ed. 114. Herb. No. 337 is not a new species and is therefore excluded from this list.

## 20. LASIANTHUS, Jack.

Shrubs or small trees. Leaves distichous. Stipules broad. Flowers in axillary bracteate clusters, cymes or heads. Calyx-tube short, limb 3-7-toothed. Corolla throat villous; lobes 3-7, valvate in bud. Stamens 4-6, filaments short. Ovary 4-9-celled with 1 erect basal ovule in each cell, style short or long, arms 3-9, short, obtuse. Drupe small, pyrenes triquetrous, 1-seeded. Seeds narrow, testa membranous, embryo terete, radicle inferior, slender.

Cymes sessile. Corolla hairy without. Drupe  $\frac{1}{2}$  in. black ... 1. *L. sessilis*.  
Cymes peduncled. Corolla glabrous without. Drupe  $\frac{1}{2}$  in. blue. 2. *L. venulosus*.

**L. sessilis**, Talb. Syst. List Trees etc., 1894, p. 114.

A stout gregarious evergreen shrub usually branched from the base, nearly allied to *L. strigosus*, Wight., but differing in the calyx-teeth and nervation of leaves. In the evergreen forests of North Kánara from Yellápur southwards to Gairsoppah, common in the undergrowth of some of the *kans*. Fl. Aug.-Sept. Fr. Oct.-Feb.

**L. venulosus**. Wight. in Calc. Jour. Nat. Hist. VI. 508; Fl. Br. I. 3. 190. *Santia venulosa*, W. & A. Dalz. & Gibs. Bomb. Fl. 114.

A shrub with glabrous shoots. Flowers few, in peduncled cymes. On the gháts, but very rare. Dalz. I have not seen this species.

## 21. SAPROSMA, Blume.

Fœtid shrubs, often with bristles at the ends of the branches. Leaves opposite or whorled, membranous. Stipules connate, 1-3, cuspidate, deciduous. Flowers small, axillary or terminal. Calyx tube obconic; limb 4-6-divided, persistent. Corolla with a villous throat; lobes 4-5, valvate. Stamens 4-5. Ovary 2-celled; style filiform with two short arms; ovules 1, erect, basal in each cell. Drupe with 1-2, crustaceous pyrenes. Seeds ellipsoid and solitary or 2, plano-convex, testa membranous; radicle slender, inferior; cotyledons small.

**S. indicum**, Dalz. & Gibs. Bomb. Fl. 112; Fl. Br. I. 3. 192.

Western Peninsula; on the gháts from Bombay southwards. In the evergreen forests of the Konkan and North Kánara. Common on the southern gháts of North Kánara. Fruit bright blue, fœtid. Seed solitary. Fl. C. S. Fr. ripe March. A large shrub.

## 22. HAMILTONIA, Roxb.

A hispid pubescent or glabrate, trichotomously branched under-shrub. Leaves petioled, many-nerved. Flowers in large trichotomous panicles. Calyx-tube ovoid, limb 5-divided. Corolla funnel-

shaped; tube long, lobes 5, valvate. Stamens 5, inserted in the throat of the corolla. Ovary 5-celled and furrowed; style filiform, arms 5, linear. Capsule 1-celled, 5-seeded. Seeds triquetrous, outer coat of testa reticulate, 3-valved at the base; inner thick; cotyledons foliaceous, cordate, radicle inferior.

*H. suaveolens*, Roxb. Hort. Beng. 15; Fl. Ind. I. 554; Fl. Br. I. 3. 197; Brandis For. Fl. 278; Bedd. Fl. Sylv. 134. 12. *H. mysorensis*, Dalz. & Gibs. Bomb. Fl. 115. *Gidesa*, Vern.

Tropical and sub-tropical Himalaya, alt. 2—5000 ft. from Kashmir to Bhotan, Central and Western India, Behar to Mysore. On the higher gháts of the Konkan, also in North Kánara on the highest hills of the Supa táluka. Fl. Oct.-Feb. A small shrub.

#### ORDER 51. COMPOSITÆ.

Herbs or shrubs, rarely trees. Leaves alternate, rarely opposite or whorled; stipules 0. Inflorescence capitata, bracteate on the receptacle which is either naked or clothed with hairs, scales or bristles between the flowers. Flowers all tubular (head discoid), or the outer or all ligulate (head rayed), all 2-sexual, or the inner 2-sexual or male, the outer female or neuter, sometimes dioecious. Calyx superior; limb 0, or of hairs (pappus) or scales. Corolla of two forms: 1st, tubular or campanulate, 4-5-lobed, lobes valvate; 2ndly, ligulate, lobes elongate and connate. Disk epigynous. Stamens 4-5, filaments usually free: anthers connate; connective produced; cells simple or tailed at the base. Ovary 1-celled; style slender 2-fid; ovule solitary, basal, erect. Fruit a dry achene usually crowned with the calyx (pappus); albumen 0.

#### VERNONIA, Schreb.

Herbs, shrubs, climbers or small trees. Leaves alternate. Heads homogamous, solitary, cymose or paniced. Involucre equalling or shorter than the flowers; bracts in many series. Corollas equal, tubular, slender. Anther bases obtuse. Style-arms subulate. Achenes usually ribbed or angled; pappus of many hairs, often with an outer row of flattened shorter hairs.

*V. arborea*, Ham. in Trans. Linn. Soc.; Fl. Br. I. 3. 239. *V. javanica*, DC.; Bedd. Fl. Sylv. 135.

Assam, Silhet, Burma, Tenasserim, Malacca, Western Peninsula from the Konkan southwards, Ceylon ascending to 5000 ft. On the gháts from the Konkan southwards. (Fl. Br. I.) I have not met with this tree in the North Kánara or Konkan forests; it is cultivated in gardens near Bombay. (Graham.) *V. divergens*, Benth. (*Bundar*, M.) and *V. indica*, C.B.C., are common under-shrubs in the Konkan and North Kánara moist forests. Fl. Fr. C. S.

ORDER 52. **GOODENOVIEÆ.**

Shrubs or herbs. Leaves alternate or radical ; stipules 0. Flowers axillary or terminal, racemed or paniced, irregular or regular. Calyx-tube adnate to the ovary ; limb 5-fid or nearly obsolete. Corolla-lobes 5, valvate in bud. Stamens 5 ; anthers free or connate in a ring round the style. Ovary 1-2-celled ; style simple, with a cup-shaped indusium including the stigma ; ovules in each cell one or many, on the dissepiment. Fruit a drupe or capsule. Seeds albuminous.

**SCÆVOLA**, Linn.

Shrubs. Leaves entire or toothed. Flowers axillary, in short cymes or solitary. Corolla oblique, split at the base behind. Anthers free. Ovary 1-2-celled, with two erect ovules. Fruit a drupe.

Calyx-lobes linear-lanceolate, enlarged in fruit ... 1. *S. Kœnigii*.  
 Calyx-lobes very short, obtuse or subobsolete ... 2. *S. Lobelia*.

1. **S. Kœnigii**, Vahl. Symb. III. 36 ; Fl. Br. I. 3. 421. *S. Taccada*, Dalz. & Gibs. Bomb. Fl. 134. *Bhadrah*, M. Sea shores of India from Sind to Ceylon, Burma, Malacca. On the sea-coast of the Konkan near Ratnágiri ; cultivated in gardens, Bombay.

Wood soft, coarse, milky, fibrous, useless. Fruit a small white spherical drupe.

2. **S. Lobelia**, Linn. ; Fl. Br. I. 3. 420 ; *S. uvifera*, Stocks. ; Wight. Ic. 1613. Sea shores of India from Sind to Ceylon. Sea-coast of Sind and South Deccan. Fl. Br. I. Mouths of the Indus near Karáchi.

Closely resembles *S. Kœnigii*. The leaves are smaller. Drupe purple.

ORDER 53. **MYRSINEÆ.**

Trees or shrubs. Leaves alternate, entire or serrate, usually gland-dotted. Flowers small, regular, in axillary clusters, racemes or panicles, rarely terminal. Calyx free (in *Mesa*, adnate to the ovary) ; limb 4-6-lobed, lobes persistent, often enlarged in fruit. Corolla regular, tube short or 0, lobes 3-7, contorted or imbricate. Stamens epipetalous, as many as divisions of the corolla and opposite to them. Ovary 1-celled, narrowed into the filiform or columnar style ; ovules few or many, inserted on the free central placenta. Fruit an indehiscent berry or drupe (dehiscent in *Ægiceras*), 1-several seeded. Seeds often with more than one embryo ; albumen pitted or ruminant ; embryo transverse.

Fruit a many-seeded berry. Calyx adnate to the ovary. 1. **MESA**.

Fruit 1-seeded, indehiscent. Calyx free.

Flowers in axillary fascicles. Corolla with a short tube ... .. 2. **MYRSINE**.

Flowers racemed or paniced. Petals free, imbricate. 3. **EMBELIA**.

Flowers in umbels, corymbs or panicles. Petals free, contorted in bud ... .. 4. **ARDISIA**.

Fruit cylindric, curved, dehiscing longitudinally ... 5. **ÆGICERAS**.

1. *MÆSA*, Forsk.

Trees or shrubs. Leaves entire or serrate. Flowers in simple or compound axillary racemes, small, 2-bracteolate, 1-2-sexual, 4-5-merous. Calyx  $\frac{1}{2}$ -inferior, in fruit  $\frac{1}{2}$ -adnate, teeth small. Corolla gamopetalous, campanulate, lobes imbricate. Stamens 5. Ovary with numerous ovules on a globose placenta; style short, stigma capitate. Berry globose.

Leaves and branchlets glabrous ... .. 1. *M. indica*.  
 Leaves and branchlets rusty tomentose ... .. 2. *M. dubia*.

1. *M. indica*, Roxb. Fl. Ind. I. 558 (*Bæobotrys*); Fl. Br. I. 3. 509; Dalz. & Gibs. Bomb. Fl. 136; Brandis For. Fl. 283; Bedd. Fl. Sylv. 137. *Atki*, Vern.; *Gudde hargi*, K.

Throughout India from the Himalayas to Ceylon, common. In the moist forests of the Konkan and North Kánara along the gháts, abundant in the evergreen forests of the Sirsi and Siddápur tálukas of North Kánara. Fl. at different times throughout the year.

A small or large shrub. Wood soft, used for fuel and rough houseposts. (Gamble.) Leaves used in curries in North Kánara.

2. *M. dubia*, Wall. in Roxb. Fl. Ind. ed. Carey & Wall. II. 235; *M. indica*, var., Bedd. Fl. Sylv. 137. t. XVIII. 4. fig. I. only.

Western gháts from the Konkan to Mysore. Throughout the evergreen forests of the Konkan and North Kánara. Fl. C.S. Fr. ripe Mch.-Apl. A small shrub.

2. *MYRSINE*, Linn.

Trees or shrubs. Leaves coriaceous. Flowers polygamous, in dense clusters, from the axils of the fallen leaves. Calyx 4-5-lobed. Corolla white, deeply 4-5-lobed. Stamens 4-5. Ovary free, globose; style cylindric, stigmas 2-5, small sub-combined or spatulate. Fruit small, globose, red or purple. Seed solitary, albumen pitted; embryo often curved, horizontal.

*M. capitellata*, Wall. in Roxb. Fl. Ind. ed. Carey & Wall. II. 295; Fl. Br. I. 3. 512; Brandis For. Fl. 286; Bedd. Fl. Sylv. t. 234.

Nepal, Bhutan, Assam and the Khasia mountains, Western and Southern India to Ceylon. In the evergreen forests of North Kánara from the Ainshi southwards, not common. Fl. Oct.-Nov. Fr. Feb.-Mch.

A small tree with hard and durable timber. Bedd.

3. *EMBELIA*, Burm.

Shrubs or woody climbers. Leaves entire or toothed, petiole often glandular. Flowers small, in simple or branched racemes. Calyx free, deeply 5-lobed, persistent. Petals usually 5, distinct, spreading. Stamens 5, filaments more or less adnate to the petals. Ovary ovoid

or globose ; style cylindric. Fruit small, globose, 1-2-seeded, albumen pitted ; embryo curved, transverse.

Inflorescence in terminal panicles.	Lateral leaf nerves	
indistinct ... ..	indistinct ... ..	1. <i>E. Ribes.</i>
Inflorescence in axillary racemes.	Lateral leaf nerves	
distinct and prominent ... ..	distinct and prominent ... ..	2. <i>E. robusta.</i>

1. *E. Ribes*, Burm. Fl. Ind. 62. t. 23 ; Fl. Br. I. 3. 513 ; Dalz. & Gibs. Bomb. Fl. 137 ; Brandis For. Fl. 284. *E. glandulifera*, Dalz. & Gibs. Bomb. Fl. 137. *Waiwarung, karkannie*, Vern. ; *Varading*, Guz.

Throughout India from the Central Himalaya to Ceylon, alt. 0—5000 ft. Throughout the Konkan and North Kánara. It is rare in the latter district, but fairly common in the evergreen forests near the Gairsoppah ghat. Fl. C. S. Fr. May.

Seeds used in native medicine as an anthelmintic, also to adulterate black pepper. A large scandent shrub.

2. *E. robusta*, Roxb. Fl. Ind. I. 587 ; Fl. Br. I. 3. 515 ; Bedd. Fl. Sylv. 137 ; Brandis For. Fl. 284 ; *E. Basaal*, Dalz. & Gibs. Bomb. Fl. 136. *Kokla, carbati, ambati, waiwarung*, M. ; *Byebering*, Vern. ; *Wayuwalingi balli*, Kon. ; *Vaivaling anti, jolad hanna*, K.

Throughout India from the Himalayas to Ceylon and Tenasserim. Throughout the presidency, common in the moist forests of the Konkan and North Kánara. Fr. Fl. Apl.-June.

A large climbing, scandent or erect shrub. Stems as much as 1 ft. in diameter at the base, usually much branched. Bark grey, smooth with irregular cup-like depressions from fallen scales ; inner bark thick, dark purple, fibrous, lighter coloured in the smaller stems. Wood soft reddish. Medullary rays very broad, dotted brown, extending into bark. Pores moderate sized, crowded in the spring wood, or small and few in the rest of the annual ring. Weighs 45 lbs. to the cub. ft. Fruit small, red, sweet, edible. Bark and fruits used in native medicine.

4. **ARDISIA**, Swartz.

Shrubs or small trees. Leaves coriaceous. Flowers small, hermaphrodite, in compound or simple umbels or racemes ; bracts small, deciduous. Calyx 4-5-lobed, sometimes enlarged in fruit. Corolla red, white or spotted, deeply 4-5-lobed. Stamens 4-5 ; filaments very short, anthers free. Ovary free, globose ; style cylindric, stigma punctiform, ovules few. Fruit globose. Seed solitary, albumen pitted or ruminated.

Leaves large, opaque, entire. Flowers .75 in. across, usually in umbelliferous racemes, often compound.

Corolla spotted, pink. Fruit black ... .. 1. *B. humilis.*

Leaves smaller, glandular-dotted, margin crenate.

Flowers small, white, .5 inch across, in simple umbels.

Fruit red ... .. 2. *A. parviflora.*

1. *A. humilis*, Vahl. Symb. III. 40; Fl. Br. I. III. 529; Dalz. & Gibs. Bomb. Fl. 137; Brandis For. Fl. 287. *A. elliptica*, Bedd. Fl. Syl. 138. *Dikna*, Vern.; *Bugri*, M.; *Chitmitlmune gidda*, *havalad*, K.

Throughout India from the Himalayas to Ceylon.

In the evergreen forests, throughout the Konkan and North Kánara, usually along the banks of nálás and streams, common. Fl. Apl.-May. Fr. ripe Aug.

A large shrub or small tree, 4-6 in. in diam. at base, 30 ft. high, much branched. Bark grey, thin, corky, underneath the green cell layer is a white cellular tissue with glands filled with a red gum; inner bark alternate thin layers of lighter and darker brown tissue. Wood reddish-grey, moderately hard. Pores very small, equally distributed. Medullary rays broad or moderately broad, wavy. Weighs about 55 lbs. to the cub. ft. "Used as fuel" (Gamble). Albumen white horny.

*A. parviflora*, Talb. sp. nov. A small, erect, branched shrub. Leaves obovate, acute, base cuneate, distantly crenate, pellucid-punctate, coriaceous, blade 4.5-3 by 1.75-1 in.; petiole .25 in. Flowers small,  $\frac{1}{3}$ - $\frac{1}{2}$  in. across, in simple, peduncled, axillary or terminal umbels, about half the length of the leaves. Corolla small, white, not pink or spotted. Fruit red, size of a pea, globose, not striate. This species was said to be exactly like *A. polycephala*, Wall. in Herb. Wight., which species was reduced to *A. humilis*, in the Fl. Br. I. by C. B. Clarke. The two plants (when seen growing) look very different and are in my opinion specifically distinct.

In the evergreen scrub jungles near the coast in the Kárwár sub-division of North Kánara, Fl. R. S. Fr. C. S.

##### 5. *ÆGICERAS*, Gærtn.

A shrub or small tree. Leaves obovate, coriaceous, 1-nerved. Flowers hermaphrodite, white, in sessile umbels. Calyx-lobes 5 imbricate. Corolla segments 5, acute, twisted to the right in bud. Stamens 5; filaments linear, hairy at the base. Ovary oblong, narrowed into a filiform style; stigma small; ovules many, immersed in a central globose placenta. Fruit cylindric, curved 1-seeded, dehiscent. Seed exalbuminous, germinating within the pericarp; radicle inferior, long, enlarged at the base; cotyledons very short.

*Æ. majus*, Gærtn. Fruct. 1. 216. t. 46. fig. 1; Fl. Br. I. 3. 533; Dalz. & Gibs. Bomb. Fl. 137; Bedd. Fl. Sylv. 139. *Kanjala*, M.; *chawir*, Snd.

Sea coasts of India from Sind to Singapore. Common near the sea coast of Kánara and the Konkan on marshy ground and along creeks. Fl. C. S. Fr. R. S.

A small, evergreen tree or large shrub. Bark grey. Wood hard, close-grained. No annual rings. Pores small, uniformly distributed. Med. rays short, scanty, broad and moderately broad.



ORDER 54. **SAPOTACEÆ.**

Trees or shrubs. Leaves alternate, coriaceous, simple; stipules 0 or very caducous. Flowers axillary, solitary or clustered; bracts small or 0. Calyx-lobes 4-8, 2-3-seriate, the outer series valvate, when 4, decussate, imbricate when 5; 2-3 exterior imbricate. Corolla-lobes as many or twice as many as calyx-segments, imbricate in bud. Stamens on the corolla-tube as many as the corolla-lobes and opposite to them or 2-3-times as many, 1-3-seriate, filaments short, connective often produced, staminodes when present, alternating with the stamens. Ovary superior, 2-8-celled; style linear, stigma a point, cells 1-ovuled; ovule usually attached to the inner angle. Fruit a drupe or berry, usually indehiscent, 1-8-seeded. Seeds ellipsoid, testa bony or crustaceous. Albumen fleshy, or oily, or 0.

Calyx-lobes 1-seriate, imbricated. Stamens 5-6.

Leaves with numerous, close set, parallel, prominent

nerves. Staminodes 0 ... .. 1. **CHRYSOPHYLLUM.**

Leaf nerves not close set. Staminodes 5 ... .. 2. **SIDEROXYLON.**

Calyx-lobed 2-seriate, outer valvate. Stamens 6, numerous.

Calyx-segments 4.

Corolla deeply 4-lobed. Stamens 8, no staminodes... 3. **ISONANDRA.**

Corolla 6-12-lobed. Stamens 16-20, no staminodes... 4. **BASSIA.**

Calyx-segments 6-8.

Corolla-lobes 6. Stamens 12-18, no staminodes ... 5. **DICHOPSIS.**

Corolla-lobes 18-24, in several series. Stamens 6-8,

staminodes as many as stamens ... .. 6. **MIMUSOPS.**

1. **CHRYSOPHYLLUM**, Linn.

Trees. Leaves coriaceous, exstipulate. Flowers small, in axillary fascicles. Calyx-lobes 5-6, entire, imbricate. Corolla-lobes 5-6, entire, imbricate. Stamens 5-6; staminodes 0. Ovary 5-6-celled, villous; style cylindrical. Berry fleshy, globose. Seeds 5-6; hilum elongate; albumen copious or scanty.

**C. Roxburghii**, G. Don. Gen. Syst. IV. 33; Fl. Br. I. 3. 535; Dalz. & Gibs. Bomb. Fl. 139; Bedd. Fl. Sylv. t. 236. *Hale, bokly*, K.; *Tursiphul, dongrimaphul*, Vern. The Star Apple.

Bengal, Burma, Western gháts and Ceylon. In the evergreen forests of the Konkan and North Kánara, common. Fl. Apl.-May. Fr. Nov.-Dec. Fruit edible. Wood white, close-grained, moderately hard. Pores small, in radial lines. Medullary rays very fine and indistinct. Weighs about 40 lbs. to the cub. ft. Used for building purposes.

2. **SIDEROXYLON**, Linn.

Trees. Leaves alternate, exstipulate. Flowers small, in axillary fascicles, shortly pedicelled; pedicels pubescent or tomentose. Calyx-segments 5, much imbricated, subequal. Corolla-tube campanulate,

lobes 5, imbricated. Stamens 5, staminodes 5, lanceolate. Ovary villous, usually 5-celled; style short or long, cylindric, berry 1-5-seeded. Seeds albuminous.

*S. tomentosum*, Roxb. Fl. Ind. I. 602; Fl. Br. 1. 3. 538. *Sapota tomentosa*, Dalz. & Gibs. Bomb. Fl. 139. *Achras elengoides*, Bedd. Fl. Sylv. t. 235. *Kumpoli, gomale, gwabale, suna hale*, K.; *Kumbul, kanta-kumla*, Vern.

Western Peninsula from the Konkan to Ceylon, Burma. Common in the evergreen forests of the North Kánara and Konkan gháts. Fl. C. S. Fr. Oct.-Jany.

A small or large spinous tree. Wood reddish grey, hard, smooth, close-grained. Annual rings distinct. Pores very small, in short lines between the fine and close medullary rays, which are also joined by minute transverse bars of white tissue. Weighs about 58 lbs. to the cub. ft.

### 3. ISONANDRA, Wight.

Trees. Leaves alternate, coriaceous, glabrous. Flowers small, villous, in axillary clusters, shortly pedicelled. Calyx-segments 4, subequal, imbricated. Corolla deeply 4-lobed, longer than calyx. Stamens 8, all perfect; staminodes 0. Ovary villous, 4-celled; style linear. Berry 1-seeded, flattened, smooth; albumen fleshy.

*I. Candolliana*, Wght. Ic. t. 1220; Dalz. & Gibs. Bomb. Fl. 139. "A tree on the gháts not uncommon," Dalz. Common about Ootacamund. Flowers in the hot season. I have not met with this species in North Kánara.

*I. Stocksii*, Clarke; Fl. Br. I. 3. 539. Konkan; Stocks. This species has not as far as I know been found in this presidency.

### 4. BASSIA, Linn.

Trees. Leaves petioled, coriaceous; stipules caducous. Flowers on axillary, generally fasciculate pedicels. Calyx deeply 4-lobed, lobes biseriate, outer subvalvate, inner subimbricate in bud. Corolla-tube fleshy or not; limb of 5-14 divisions. Stamens numerous, fertile, in 1-3 series; anthers erect, cordatè, cuspidate or aristate, 2-celled. Ovary villous, 4-12-celled. Berry globose or ellipsoid, 1-3-seeded; albumen 0.

Leaves elliptic. Anthers 20-30, 3-seriate, hairy  
 acuminate ... .. 1. *B. latifolia*.

Leaves lanceolate. Anthers 15, 2-seriate; tips 2-  
 toothed. Young fruit densely hirsute ... .. 2. *B. longifolia*.

Leaves oblong-obtuse. Stamens 16, 2-seriate; connec-  
 tive lanceolate-linear. Young fruit glabrous ... 3. *B. malabarica*.

1. *B. latifolia*, Roxb. Fl. Ind. II. 526; Fl. Br. I. 3. 544; Brandis For. Fl. 289; Bedd. Fl. Sylv. t. 41; Dalz. & Gibs. Bomb. Fl. 139. The Butter or Mahuá Tree, *Mohwa*, M.; *Pokka, oodlu, ippi*, K.

Forests of Central India 1—4000 ft. altitude ; from West Bengal to the Western gháts and Kumaon Terai. Common in the dry forests throughout the presidency, also in the Konkan and North Kánara forests, but nowhere abundant in them. Fl. Mch.-Apl. Fr. June-July.

A large tree. Bark thick, dark-coloured, fissured and cracked ; inner bark red, milky. Wood reddish-brown, moderately hard, annual rings indistinct. Pores moderate sized, in short radial lines. Medullary rays fine, numerous and joined by very fine bars of white tissue. Weighs about 66 lbs. to the cub. ft. Not much in demand. The flowers are an important article of food and are much employed in the manufacture of spirits in Central India.

2. *B. longifolia*, Linn. Mant. 563 ; Fl. Br. I. 3. 544 ; Dalz. & Gibs. Bomb. Fl. 139 ; Bedd. Fl. Sylv. t. 42 ; Brandis For. Fl. 290. The Mowa tree of South India. *Ippi, moraro*, K. ; *Moha*, M.

Western Peninsula, on the gháts from the Konkan southwards to Ceylon. Common in the moist forests of the Konkan and North Kánara ; often along the banks of rivers and nálás ; takes the place of *B. latifolia*, in the moist forests of the southern parts of the presidency. Fl. Nov.-Dec. Fr. ripe May-June.

A large or moderate sized tree. Bark dark-brown, scaly ; inner bark red, milky. Wood red, moderately hard, close-grained. Pores, medullary rays and cross-bars of white tissue similar to those of *B. latifolia*. Weighs 61 lbs. to the cub. ft. Used for carts, furniture and boat building. A useful timber.

3. *B. malabarica*, Bedd. Fl. Sylv. 140 ; Fl. Br. I. 3. 544. *Udlu*, K. North Kánara, Malabar and the Anamallays up to 4000 ft. alt.

Common in the southern parts of North Kánara along the banks of rivers and in moist forests from near the sea-level to 2000 ft. elevation. Fl. Nov.-Dec. Fr. ripe May-June.

A moderate sized tree. Bark dark-coloured, scaly. Wood light red, moderately hard, smooth, similar in structure to the woods of the two foregoing species. The pores, rays and cross-bars are, however, smaller and finer. Weighs 42 lbs. to the cub. ft.

##### 5. DICHOPSIS, Thw.

Trees ; shoots rusty-tomentose. Leaves petioled, coriaceous. Flowers fascicled, axillary. Calyx-lobes 6, 2-seriate, outer 3, valvate, inner 3, imbricate. Corolla-lobes 6. Stamens 12-18, 1-seriate or the alternate a little higher up ; anthers lanceolate, connective produced, acute or bifid ; staminodes 0. Ovary villous, usually 6-celled. Berry 1-2-seeded. Seed exalbuminous.

*D. elliptica*, Benth. in Gen. Plant. II. 658 ; Fl. Br. I. 3. 542. *Bassia elliptica*, Dalz. & Gibs. Bomb. Fl. 139 ; Bedd. Fl. Sylv. t. 43. Indian Gutta-percha Tree. *Panchoti, palla*, M.

Western gháts from Bombay southwards, ascending to 4,000 ft. alt. Common in the Wynaad, Coorg and Travancore. "Wood hard, takes a good polish; much used by planters for building purposes." Bedd.

#### 6. MIMUSOPS, Linn.

Tree. Leaves coriaceous; nervures numerous, parallel. Flowers axillary, clustered or solitary. Calyx-segments 6-10, in 2 series, outer valvate in bud. Corolla-tube short; lobes 18-24, 2-3-seriate. Stamens 6-8; anthers lanceolate, connective excurrent; staminodes as many as the stamens, bifid or lancinate. Ovary 6-8-celled. Seeds compressed, albuminous; cotyledons flat.

Calyx-lobes 8, stamens 8, staminodes, lanceolate, hairy. 1. *M. Elengi*.

Calyx-lobes 6, stamens 6, staminodes bifid, glabrous. 2. *M. hexandra*.

1. *M. Elengi*, Linn.; Roxb. Fl. Ind. II. 236; Fl. Br. I. 3. 548; Dalz. & Gibs. Bomb. Fl. 140; Bedd. Fl. Sylv. t. 40; Brandis For. Fl. 293. *Buckhal, ranjal*, K.; *Borsali*, Guz.; *Owli, wovali*, M.

Western Peninsula on the gháts from Bombay southwards to Ceylon. Burma and the Malay Peninsula, often cultivated. Common in the evergreen forests of North Kánara, also in the Konkan. A very large tree. Fl. Jan.-Mch. Fr. ripe C. and R. S.

A large or very large evergreen tree. Bark smooth, scaly. Heart-wood red, hard, even-grained. Pores small, in short, radial lines. Medullary rays fine, crossed by broader and more widely separated wavy lines of lighter coloured tissue. Weighs about 62 lbs. to the cub. ft. Takes a good polish. Used for house building, cabinet work, etc. The sweet-scented star-like flowers are made into necklaces. The fruit is edible. An oil is extracted from the seeds.

2. *M. hexandra*, Roxb. Fl. Ind. II. 238; Dalz. & Gibs. Bomb. Fl. 140; Bedd. Fl. Sylv. 142; *M. indica*, Brandis For. Fl. 291. *Khirmi*, H.; *Ranjana, ráini*, M.

Deccan Peninsula and Southern India.

In the dry forests of the Deccan, Khándesh and Gujzerat. Not observed by me in North Kánara or the Konkan. Fl. Nov.-Dec. Fr. ripe March.

Wood red, very hard, tough, even-grained and durable. Pores small, in wavy radial lines. Med. rays fine, uniform, very numerous, crossed by concentric, wavy lines of light coloured tissue. Weighs 70 lbs. to the cub. ft. Used for sugar mills, oil presses, etc.; also useful for turning.

#### ORDER 55. EBENACEÆ.

Trees or shrubs. Leaves alternate, entire, usually coriaceous. Flowers usually diœcious, regular, axillary; pedicels articulated under the flower. Calyx inferior, gamosepalous, often accrescent in fruit. Corolla gamopetalous, often hairy without. Stamens as many or 2-3-times as many as the corolla-lobes; filaments free, paired or other-

wise united. Staminodes in the female flower resembling stamens or 0. Ovary superior; styles 2-8; cells as many or twice as many as the styles, imperfectly septate; ovules usually 1 in each cell, attached to the inner angle of the cells, pendulous. Fruit coriaceous or fleshy, indehiscent, several or few seeded. Seeds pendulous, longitudinally furrowed, albumen equable or ruminated; embryo axile, radicle superior.

- Flowers 3-merous. Ovary 3-6-celled ... .. 1. MABA.  
 Flowers 4-5-merous. Ovary 4-5-or 8-10-celled ... .. 3. DIOSPYROS.

1. MABA, J. R. & G. Forst.

Trees or shrubs. Leaves alternate. Flowers diœcious, axillary. Calyx 3-partite or 3-fid, enlarged in fruit. Corolla-tube longer than calyx, lobes 3, twisted to the right. Male fl.: stamens 3-22; filaments distinct or united; ovary rudimentary. Female fl.: staminodes 0-12; ovary 3-celled; ovules 6. Fruit 1-6-celled, 1-6 seeded. Albumen not ruminated.

- Ovary densely hairy ... .. 1. *M. nigrescens*.  
 Ovary glabrous ... .. 2. *M. micrantha*.

1. *M. nigrescens*, Dalz. & Gibs. Bomb. Fl. 142; Fl. Br. I. 3. 551. *Raktarohida*, *raktarora*, M.; *Kulajhad*, *kari*, Kon.; *Hole kuncha*, K.

Western ghâts from the Konkan to Mysore.

In the evergreen forests of the Konkan and North Kánara, common on the North Kánara ghâts near Nilkund and the falls of Gairsoppah. Fl. Dec.-Feb. Fr. Apl.-May. A small tree or large shrub.

2. *M. micrantha*, Hiern. in Trans. Camb. Phil. Soc. XII. 133; Fl. Br. I. 3. 552. *Holochilus micranthus*, Dalz. & Gibs. Bomb. Fl. 142; Bedd. Fl. Sylv. 147.

A small tree found on the southern ghâts. Flowers in Feb. & Mch.

2. DIOSPYROS, L.

Trees. Leaves entire, usually alternate. Flowers diœcious, axillary, usually 4-5-merous. Calyx lobed, lobes often accrescent in fruit. Corolla tubular or urceolate, lobed, lobes twisted to the right. Male fl.: stamens 4-64 often 16; ovary rudimentary. Female fl.: staminodes 0-16; ovary 4-5-celled, cells 1-ovuled; stigmas 1-4. Fruit globose ellipsoid or ovoid, 1-10-seeded, often supported by the enlarged calyx. Albumen equable or ruminated; cotyledons foliaceous.

Calyx sub-similar in both sexes. Corolla narrowly tubular in bud. Albumen equable.

Corolla pubescent without.

Calyx divided to the base. Fruit clothed with stinging hairs.

Corolla yellow fulvous-tomentose. Stamens

- 12-16 ... .. 1. *D. pruriens*.

- Calyx tube truncate. Fruit not clothed with stinging hairs. Corolla white tomentose. Stamens 9-12 ... .. 2. *D. oocarpa*.  
 Corolla glabrous without.  
 Corolla angled and usually curved in bud. Stamens 16-24-32, in 8 bundles of 2-3 or 4 each ... .. 3. *D. assimilis*.  
 Corolla straight in bud, not angled. Stamens 16, glabrous. A spinous tree. 4. *D. montana*.  
 Stamens 40, pilose. An unarmed tree. 5. *D. Embryopteris*.  
 Calyx sub-similar in both sexes, larger in the female flower. Corolla small, sub-globose in bud, urceolate when expanded. Albumen ruminated or equable.  
 Corolla glabrate without. Stamens 13-22. Albumen ruminated. Male flowers in small, congested, many-flowered cymes ... .. 6. *D. sylvatica*.  
 Corolla-lobes ciliate on the margins. Stamens 16. Albumen equable. Male flowers in small 3-flowered cymes. Fruit 1-seeded ... .. 7. *D. microphylla*.  
 Corolla glabrous without. Stamens 16. Albumen equable. Flowers sub-sessile, fascicled. 4-10 together. Fruit 2-3-seeded ... .. 8. *D. Chloroxylon*.  
 Calyx dissimilar in the 2 sexes, larger in the female.  
 Corolla ovoid-tubular in bud. Albumen ruminated. Male flowers in short peduncled cymes.  
 Corolla yellow, lanate without. Stamens 12-16. Fruit about 1 in. in diameter ... .. 9. *D. melanoxyton*.  
 Corolla fulvous-silky without. Stamens 12. Fruit about 2 in. in diameter ... .. 10. *D. crumenata*.  
 Male flowers fascicled.  
 Corolla yellow tomentose without. Stamens 10 ... .. 11. *D. Candolleana*.  
 Male flowers panicled.  
 Corolla black velvety without. Stamens 20 ... .. 12. *D. paniculata*.

1. *D. pruriens*, Dalz. in Hook. Kew Jour. IV. 110; Fl. Br. I. 3. 558; Dalz. & Gibs. Bomb. Fl. 141; Bedd. Fl. Sylv. 144. Western gháts from Kánara to\* the Bababuden hills in Mysore. In the evergreen forests of the southern gháts of North Kánara, common. Fl. Nov.-Feb. Fr. H. & R. S. A small tree. Bark dark-coloured, scaly.

2. *D. oocarpa*, Thwaites Enum. 180; Fl. Br. I. 3. 560.

Konkan, Mysore and Ceylon. In the evergreen forests of North Kánara and Konkan; common on the gháts from Kárwár to Ainshi. Fl. Jan., Mch. Fr. ripe June. A small or moderate sized tree. Bark dark-coloured, thin, smooth. Wood purplish-brown with black streaks moderately hard, handsome. Pores moderate-sized. Med. rays very fine and numerous. Numerous fine wavy concentric lines. Weighs 45 lbs. to the cub. ft. Gamble.

3. *D. assimilis*, Bedd. in Mad. For. Rep. 1866-67. 20. t. 1; Fl. Br. I. 3. 558; *D. nigricans*, Dalz. & Gibs. Bomb. Fl. 141. Ebony. Kare, K.; *Abnus, malia*, M.

Western Gháts from North Kánara to Malabar. In the evergreen forests of the Konkan and North Kánara. Fl. Feb., Mch. Fr. H. S.

Bark very thin, rather smooth or rough, lenticular, cinerous. Only old trees produce any ebony. Sapwood white compact, heavy; heartwood ebony black, sometimes a little streaky. Pores small, in a few scattered radial lines. Medullary rays wavy, very fine, numerous, crossed by fine wavy lines of light tissue, not distinct in the ebony. Weighs 60 lbs. to the cub. ft. Wounds in growing trees turn quickly an ebony colour. This moderate-sized tree yields the ebony used for wood-carving in Kumta and Honávar, North Kánara District. The quality of the North Kánara ebony is good, but large pieces are rare.

4. *D. montana*, Roxb. Fl. Ind. II. 538; Dalz. & Gibs. Bomb. Fl. 142; Brandis For. Fl. 296; Bedd. Fl. Sylv. 143; *D. cordifolia*, Willd. Bedd. Fl. Sylv. 143; *D. Goindu*, Dalz. & Gibs. Bomb. Fl. 141. *Tendu*, *bulguni*, *kalagunda*, K.; *Temburni*, *govindu*, *lohari*, M.; *Hadru*, Vern.; *Temra*, Panch Maháls.

From the Himalayas to Ceylon and Tenasserim, common. Throughout the deciduous forests of the presidency, common on the North Kánara gháts. Fl. Mch.-Apl. Fr. ripe R. S. A small or moderate-sized very thorny tree. Spines branched or simple. Periderm smooth or scaly at base of stem. Liber turning bright yellow on exposure. Wood yellowish-grey smooth, moderately hard, durable. Pores small, in short radial lines. Medullary rays very fine, numerous, equidistant; with white streaks parallel. Weighs about 54 lbs. to the cub. ft. Timber not much used in North Kánara. Fruit yellow. Calyx 4-lobed, lobes flat, enlarged, foliaceous in fruit.

5. *D. Embryopteris*, Pers. Syn. II. 624; Fl. Br. I. 3. 556; Brandis For. Fl. 298; Bedd. Fl. Sylv. t. 69. *Timburi*, *temburni*, M.; *Gab*, *kusi*, *tendu*, *zeeberwo*, Vern.; *Kusharta*, *hagna*, *huli tumri*, *gavandu*, K.

India from the Himalayas to Ceylon and Tenasserim, common in Bengal. Near creeks and back-waters along the coast of North Kánara and the Konkan, also in the evergreen forests of the gháts and in the beds of rivers and streams. Fl. Mch.-May. Fr. Dec. A small tree. Bark smooth, dark-coloured. Wood grey or brown, moderately hard, compact, close-grained. Pores small, scanty. Medullary rays very fine; distinct, numerous, equidistant. Weighs 54 lbs. to the cub. ft. Used for building purposes in Madras and for masts and yards of country vessels in Ceylon. An excellent glue is obtained from the fruit. Leaves very coriaceous. Fruit globose, with deciduous, rusty tomentum; seeds 8, in viscid pulp. Calyx lobes large accrescent, cup-shaped.

6. *D. sylvatica*, Roxb. Fl. Ind. II. 537; Fl. Br. I. 3. 559; Bedd. Fl. Syl. 143. *Kurnal*, K.

Western gháts from Bombay to Ceylon, ascending to 3,000 ft. altitude. In the evergreen forests of the Konkan and North Kánara, common in the evergreen forests of the Yellápur and Siddapore sub-divisions. Fl. Jany.-Feb. Fr. ripe Sept.-Oct. A medium-sized tree, 60 ft. high by  $1\frac{1}{2}$  ft. in diam., sometimes buttressed, with dark-coloured thin, smooth-bark, inner bark yellow. Wood white, with a small black heart-

wood in old trees. Fruit globose  $\frac{3}{4}$  in. in diameter, calyx with 4 spreading, almost woody lobes. Seeds rugose, shining, brown; albumen ruminant.

7. *D. microphylla*, Bedd. Fl. Sylv. 145; Fl. Br. I. 3. 559. *Dula, kuri koonchal*, K.

Western gháts, from North Kánara to the Mysore and Anamallay hills. In the evergreen forests of North Kánara; common on the Yellápur gháts. Fl. H. S. Fr. C. S. Large tree 80—100 ft. high, and 3 ft. in diam., buttressed at the base. The leaves have a strong resemblance to those of boxwood. Bark dark, scaly; inner red, fibrous, soft. Wood reddish grey, moderately hard and smooth. Pores moderate sized, sometimes in radial lines with intervals between the pores. Medullary rays very fine and indistinct, cross bars also indistinct. Weighs 46 lbs. to the cub. ft. Timber not used in North Kánara: quickly decays on exposure.

8. *D. Chloroxylon*, Roxb. Fl. Ind. II. 538; Fl. Br. I. 3. 560<sup>3</sup> Dalz. & Gibs. Bomb. Fl. 140; Brandis For. Fl. 297; Bedd. Fl. Sylv. 143. *Nensi*, Vern. (Surat, Násik); *Ninai*, M.

Deccan peninsula to Orissa, common about Surat and in the Násik district, not observed in the Konkan or North Kánara. Fl. June. Fr. Jan.-Feb. Fruit small, globose,  $\frac{1}{2}$  in. in diameter. A small tree, sometimes spinescent. Wood hard, durable and yellow-coloured. Brandis.

9. *D. melanoxylon*, Roxb. Fl. Ind. II. 530; Fl. Br. I. 3. 564; Brandis For. Fl. 294; Bedd. Fl. Sylv. t. 67. *D. exsculpta*, Ham. Dalz. & Gibs. Bomb. Fl. 142; Bedd. Fl. Sylv. t. 66. *D. Tupru*, Buch. Ham. Jour. 1. 183; Fl. Br. I. 3. 563; *Balai*, K.; *Timburni, Tendu*, M.; *temru*, Vern.; *Tamrug*. Guz. Coromandel Ebony.

Deccan peninsula to Ceylon. Common in the dry deciduous forests of the presidency. Fl. Apl.-May. Fr. ripe December. Fruit when quite ripe with an edible pulp. A moderate-sized tree. Rhytidome formed of thick plates of hard, black, cinerous tissue, separated by thin whitish, corky layers. I have found trees 16 inches in diameter giving 8 in. of ebony. Sapwood reddish, tough and durable. Pores few, small, in short radial lines. Medullary rays very fine, equidistant with wavy cross bars of lighter coloured tissue. Weighs 54 lbs. to the cub. ft. The ebony is in irregular jet black masses, sometimes with purple streaks. Used for carving, &c., the white wood for building purposes, carriage shafts, &c.

10. *D. crumenata*, Thw. Enum. 179. Bedd. Ic. Pl. Ind. Or. T. 162, For. Man. 145. Talb. Jour. Bo. Nat. Hist. Soc. XI. 693. t. 14. *Kan tumri*, K.

A very large tree with a cylindrical trunk 100—150 ft. high, and 4—5 ft. in diameter at the base. Bark thin, scaly, cinerous. Wood reddish, close-grained, tough, hard. Pores few, medium-sized. Medullary rays



numerous, very fine, transverse bars indistinct. No ebony heart-wood, even in the largest trees. Weighs 54 lbs. to the cubic foot. Wounds in the trunk caused by broken branches or cutting instruments rapidly turn very black. *D. pruriens*, and some other species of *Diospyros* act in a similar manner, locally forming a kind of black ebony-like wood.

This tree is common in North Kánara in the evergreen forests between the Gairsoppah and Dodmune Gháts. It flowers and fruits during the hot season, March-May. Flowering specimens sent to Kew were doubtfully referred to *D. crumenata*, Thw.; but specimens sent to Dr. Prain in Calcutta were declared to be exactly similar to those of *D. crumenata*, from Ceylon.

11. *D. Candolleana*, Wight Ic. tt. 1221-2; Fl. Br. I. 3. 566; Dalz. & Gibs. Bomb. Fl. 142; Bedd. Fl. Sylv. 144; *D. canarica*, Bedd. Fl. Sylv. 145. *Karigidda*, K.

Western gháts from the Konkan to Quilon. Throughout the Konkan and North Kánara, in evergreen forests, common near the coast at Kárwár. Fl. Apl., July. A small tree in the scrub forests near the coast of Kánara, often associated with *Eugenia caryophyllæa*. Wood olive-green or yellowish, soft, light, smooth. Pores small not numerous, equally distributed. Medullary rays moderately broad and fine crossed by very distinct, wavy, continuous close lines of light-coloured tissue. Weighs about 40 lbs. to the cub. ft. The rays are much broader than in any of the other species of *Diospyros* I have examined. Fruit ripe Nov.; 3-4 seeded; calyx-lobes reflexed, coriaceous; seeds with a brown, thin skin; albumen horny in centre.

12. *D. paniculata*, Dalz. & Gibs. Bomb. Fl. 141; Fl. Br. I. 3. 570; Bedd. Fl. Sylv. 114. *Kuri koomar*, K.

In the evergreen forests of the Konkan and North Kánara, frequent in the forests near the Nilkund and Gairsoppah gháts. Fl. Nov.-Dec. Fr. size of a pigeon's egg, seated on the auricled foliaceous calyx. Apl.-June. Seeds ovoid; albumen equable, horny; cotyledons foliaceous. A tree with a cylindrical tall stem. Bark smooth, dark coloured; inner hard, reddish-brown, 20 in. thick. Young parts, fruit, &c., covered with sooty hairs.

*D. Kaki*, Linn. f. Suppl. 434; Fl. Br. I. 3. 555; Grah. Cat. Bomb. Pl. 107. Chinese Fig and Plum or the Keg Fig of Japan. Cultivated near Bombay. Fruit yellow, globose, size of an orange, edible. A native of the Khasia mountains, Upper Assam and Burma.

*D. qucesita*, Thw. Enum. Pl. Zeyl. 179. A large tree from South India and Ceylon, furnishes the valuable and ornamental "Calamander" wood.

#### ORDER 56. STYRACEÆ'

Trees or shrubs. Leaves alternate. Flowers hermaphrodite, regular. Calyx-tube superior or inferior; limb 4-5-toothed or trun-

cate, persistent. Petals 4-5, free or united into a short tube. Stamens attached to the corolla-tube, in one or more series, 8-10 or many. Ovary inferior or superior, 2-5-celled with two or more ovules in each cell, pendulous or erect; style undivided; stigma capitate entire or lobed; fruit drupaceous, usually 1-seeded. Seeds albuminous; embryo straight or curved.

### SYMPLOCOS, Linn.

Trees or shrubs. Leaves alternate, toothed or entire; often drying yellow. Flowers in simple or compound racemes or spikes, usually yellow or white. Calyx 5-lobed, lobes imbricate. Petals 5, imbricate, free or connate. Stamens numerous in several series, adnate to the corolla-tube. Ovary inferior 2-4-celled; ovules 2 in each cell, pendulous from the inner angle of each cell. Fruit a berry, crowned with the calyx-lobes, 1-3-seeded, seeds albuminous; embryo straight or curved; cotyledons shorter than the radicle.

Fruit urceolate, blue black; seeds fluted	... 1. <i>S. spicata</i> .
Fruit ovoid, yellow; seeds ridged or not.	
Fruit 3 in.; seed not ridged	... 2. <i>S. Beddomei</i> .
Fruit 1.25 in.; seed narrowly 6-ridged	... 3. <i>S. kanarana</i> .

1. *S. spicata*, Roxb. Fl. Ind. II. 541; Fl. Br. I. 3. 573; Brandis For. Fl. 300; Bedd. Fl. Sylv. 149. *Hopea spicata*, Dalz. & Gibs. Bomb. Fl. 140. Var. *laurina*. *Mirjoli*, *gowuli*, M.

North and Eastern India up to 4,000 ft. altitude, Western peninsula and Ceylon. In the evergreen forests of the Konkan and North Kánara gháts; common. Fl. Aug.-Dec. Fr. Meh.-Apl. A moderate sized tree with sweetly scented small flowers. The fluted seeds are strung into necklaces.

2. *S. Beddomei*, C. B. C. Fl. Br. I. 3. 582; *Hopea racemosa*, Dalz. & Gibs. Bomb. Fl. 140. *Lodhra*, *hura*, *sukaila*, M.; *Manithristi*, K.

Western peninsula, on the gháts from the Konkan to Kurg. Along the borders of evergreen forests and in moist places near nálas, throughout the Konkan and North Kánara. Fl. and Fr. at different times throughout the year. A moderate sized tree.

3. *S. kanarana*, Talb., sp. nov. Herb. No. 3673; Jour. Nat. Hist. Soc. Bomb. XI. 238. t. 12. A small tree. Leaves ovate, long acuminate, crenate-serrate, chartaceous, glabrous, shining above, blade 3-6 by 1-2.5 in.; petiole .3 in. long; lateral nerves 5 pairs. Flowers in short axillary spikes. Fruit ovoid, smooth, yellow, ridged, 1.25 in. long by .5 in. broad; stone 1 in. long with 6 very deep longitudinal furrows and sharp narrow ridges between, rough, surrounded by a copious olive-green pulp, when dry the fruit turns yellow and becomes obtusely angled. N. Kánara in the Sirey sub-division in evergreen forest, closely allied to *S. macrocarpa*, Wgt. MSS.

ORDER 57. **OLEACEÆ.**

Erect or scandent shrubs or trees. Leaves opposite, trifoliate, pinnate or simple, exstipulate. Inflorescence in terminal or axillary, cymose panicles. Flowers regular, bracteate. Calyx free, limb 4-5-toothed, lobed or truncate. Corolla gamopetalous, 4-5, or more lobed. Stamens 2, inserted on the corolla, alternating with the carpels; filaments usually short. Ovary free, 2-celled; stigma simple or 2-lobed; ovules 1-2 (rarely 3-4) in each cell. Fruit succulent or dry. Seeds solitary or 2 in each cell; albumen fleshy, horny or 0; embryo straight.

- Corolla-lobes imbricate.
  - Scandent shrubs. Fruit a 2-lobed berry (1 lobe sometimes wanting) ... .. 1. **JASMINUM.**
  - Small tree. Fruit a 2-celled, flat, chartaceous capsule, cells each 1-seeded ... .. 2. **NYCTANTHES.**
  - A moderate sized tree. Fruit a pear-shaped, woody 2-valved, 8-seeded capsule ... .. 3. **SCHREBERA.**
- Corolla-lobes valvate or petals distinct in pairs or 0.
  - Inflorescence axillary. Fruit a drupe.
    - Petals 4, in distinct pairs ... .. 4. **LINOCIERA.**
    - Corolla tubular or 0 ... .. 5. **OLEA.**
  - Inflorescence in terminal panicles. Fruit a berry. 6. **LIGUSTRUM.**

1. **JASMINUM, L.**

Shrubs, usually scandent. Leaves simple, 3-foliate or unequally pinnate; petiole usually articulated. Inflorescence cymose; flowers bracteate. Calyx 4-9-fid, tube funnel-shaped, teeth linear, long or short. Corolla-tube narrow, lobes 4-10, spreading. Stamens 2, included, filaments short, anthers oblong, connective usually shortly produced. Ovary 2-celled; style cylindric, stigmas linear; ovules 2 in each cell, basal. Berry 2-lobed, or entire by the failure of 1 carpel. Seed usually 1 in each lobe, exalbuminous.

- Leaves simple, ovate.
  - Calyx pubescent.
    - Bracts small.
      - Erect or scandent shrub. Cymes lax, few flowered.
        - Calyx-teeth subulate, pubescent ... 1. *J. Sambac.*
        - Scandent, hairy shrub. Cymes dense, many-flowered.
          - Calyx-teeth subulate, densely villous ... 2. *J. pubescens.*
          - Bracts leafy, white. Calyx-teeth linear, hairy. 3. *J. Rottlerianum.*
  - Leaves simple, mostly sub-cordate and broad at the base.
    - Calyx pubescent.
      - Scandent shrub. Calyx-teeth acute, hairy, reflexed ... .. 4. *J. malabaricum.*
      - Erect or scandent shrub or tree. Calyx-teeth linear, sub-clavate ... .. 5. *J. arborescens.*
      - Hairy scandent, shrub. Calyx-teeth minute, triangular, villous ... .. 6. *J. Roxburghianum.*
    - Calyx glabrous, ribbed.
      - Scandent, nearly glabrous shrub. Calyx-teeth linear, short ... .. 7. *J. Ritchiei.*

Leaves often compound, opposite.

Leaves simple or trifoliate, lateral leaflets very small	...	...	8.	<i>J. auriculatum</i> .
Leaves trifoliate, lateral leaflets large	...	...	9.	<i>J. flexile</i> .
Leaves trifoliate or pinnate, alternate	...	...	10.	<i>J. humile</i> .

1. *J. Sambac*, Ait. Hort. Kew I. 8; Fl. Br. I. 3. 591; Dalz. & Gibs. Bomb. Fl. 137; Brandis For. Fl. 311. The Arabian Jasmine. *Mugra*, *bhut-mogra*, M.; *Mullige*, K.; *Mogro*, Guz.

Throughout India, Burma and Ceylon, extensively cultivated in both hemispheres for its fragrant flowers. Throughout the presidency, wild or cultivated, often in waste places near villages in North Kánara and the Konkan. Fl. throughout the year.

2. *J. pubescens*, Willd. Sp. Pl. I. 37; Fl. Br. I. 3. 592; Dalz. & Gibs. Bom. Fl. 138. *J. hirsutum*, Brandis For. Fl. 312. *J. bracteatum*, Wgt.; Dalz. & Gibs. Bomb. Fl. 138. *Kunda*, Vern.

Throughout India, up to an altitude of 3000 ft., Burma and China. Throughout the presidency; in the moist forests of North Kánara and the Konkan. Fl. Dec., Feb. Branchlets and calyx-teeth densely hairy.

3. *J. Rottlerianum*, Wall. Cat. 2865; Fl. Br. I. 3. 593; Dalz. & Gibs. Bomb. Fl. 138.

Western peninsula from the Konkan to Travancore at 2—5000 ft. altitude. A climbing shrub common in the evergreen forests of North Kánara and the Konkan. Fl. Jan., Mch. Fr. June, Aug. The terminal flower-heads have characteristic white, prominent bracts.

4. *J. malabaricum*, Wgt. Ic. t. 1250; Fl. Br. I. 3. 594. Deccan peninsula, on the gháts from the Konkan southwards (Fl. Br. I.) Calyx-teeth acute, hairy, reflexed.

5. *J. arborescens*, Roxb. Fl. Ind. Ed. Carey & Wall. 1. 94; Fl. Br. I. 3. 594; Brandis For. Fl. 311; Var. *latifolia*, Roxb.; Dalz. & Gibs. Bomb. Fl. 311. *Dolle kusdi balli*, *tirgal*, K.; *Kundi*, *kusuri*, M.; *Ranjai*, *jungly chumbeli*, Vern. Himalayas from Kumaon to Bengal, Western peninsula on the gháts. Throughout the presidency, very common in the moist forests of the Konkan and North Kánara. Fl. Feb., Mch. Fr. May, June. A scandent shrub with linear, pubescent, divaricated calyx-teeth. Stems unarmed, 8 in. in diameter at the base, sometimes developed aerial roots. Bark white, scaly, inner bark white.

6. *J. Roxburghianum*, Wall. Cat. 2870; Fl. Br. I. 3. 595.

Malabar gháts and the Bababuden hills of Mysore. In the deciduous forests of North Kánara near Sambrani, Haliyál taluka. Fl. Fr. H. S. Probably only a villous variety of *J. arborescens*, Roxb.

7. *J. Ritchiei*, Clarke, Fl. Br. I. 598.

Western peninsula from the Konkan southwards ascending to 5000 ft. on the Bababuden hills. In the evergreen forests of the Konkan

and North Kánara gháts, common on the gháts from Ainsli southwards. Fl. Aug.-Sept. Fr. Dec.-Jan. Calyx-teeth short. Fruit-carpels accurately spherical on slender pedicels, thickened at the apex.

8. *J. auriculatum*, Vahl. Symb. III. 1; Fl. Br. I. 3. 600. *J. affine*, and *J. ovalifolium*, Wgt. Ic. tt. 1255, 1256. *Jai*, Vern. *Dongr ke chumbeli*, H.

Deccan peninsula and Ceylon, common; cultivated in Sind. Throughout the dry forests of the presidency, often in hedges, absent from the Konkan and North Kánara, usually scandent, sometimes a bush. Fl. Aug.-Sept. Fr. Dec.-Feb. Lateral leaflets very small, when present.

9. *J. flexile*, Vahl. Symb. III. 1; Fl. Br. I. 3. 601.

Deccan peninsula and Ceylon. Fl. Br. I. In the evergreen forests of the southern gháts of North Kánara, common. Fl. Nov.-Jany. A scandent, trifoliolate shrub.

10. *J. humile*, Linn.; DC. Prod. VIII. 313; Fl. Br. I. 3. 602; *J. revolutum*, Brandis For. Fl. 313. Commonly cultivated in gardens. Indigenous in Kashmir and the N. W. Himalaya.

## 2. NYCTANTHES, Linn.

A small tree. Leaves opposite, scabrous. Flowers bracteate, in fascicles of three, disposed in terminal trichotomous cymes. Calyx sub-truncate, teeth inconspicuous. Corolla-tube cylindrical, orange; limb of 5-8-lobes, white. Anthers 2. Ovary 2-celled; ovule 1 in each cell, erect. Capsule flat, splitting into 2 subdiscoid carpels. Seed erect orbicular, flattened, testa thin, albumen 0; cotyledons flat, radicle inferior.

*N. Arbor-tristis*, Linn.; Roxb. Fl. Ind I. 86; Fl. Br. I. 3. 603; Bedd. Fl. Sylv. t. 240; Brandis For. Fl. 314; Dalz. & Gibs. Bomb. Fl. Suppl. 51. *Sephalí*, Sans.; *Hursing*, K.; *Parjital*, M.; *Har, singahar, shiuli* Vern.

Cultivated in gardens throughout the presidency, indigenous in the sub-Himalayan and Terai tracts, Central India, Burma and Ceylon. Fl. throughout the year. A large shrub or small tree. Wood brown, close-grained; splits when drying; a useful fuel. The flowers yield a dye used for colouring Tussah silk; they fall off during the night, hence the name arbor-tristis. The leaves are used for polishing wood.

## 3. SCHREBERA, Roxb.

A deciduous tree. Leaves imparipinnate; leaflets 3-4-pairs. Flowers in trichotomous, terminal cymes. Calyx 4-7-lobed. Corolla hypocrateriform; limb 5-7-lobed, lobes patent, imbricate in bud. Stamens 2. Ovary 2-celled, stigma bifid, 4 ovules in each cell, pendulous from its apex. Fruit a pear-shaped, 2-valved capsule, thick, woody, loculicidally dehiscent. Seeds 8, pendulous, winged, albumen 0, cotyledons plano-convex or contorted; radicle superior.

*S. swietenoides*, Roxb. Fl. Ind. Ed. Carey & Wall. 109; Fl. Br. I. 3. 604; Bedd. Fl. Sylv. t. 248; Brandis For. Fl. 305; Dalz. & Gibs. Bomb. Fl. 138. *Moka, mokari*, Vern.; *Popti, gphant*, Guz.

Kumaun, Burma, Central, Southern and Western India. Throughout the presidency in deciduous forests, common locally in North Kánara. Fl. Apl.-May. Fr. ripe next cold or hot season. A moderate sized tree 40-50 ft. high. Bark grey, scabrous. Wood hard, purplish-brown, veined, durable, with irregular masses of dark coloured wood in the centre. Pores small, often in radial groups. Medullary rays fine, uniform, at equal distances. Weighs 50 lbs. per cub. ft. Used for turning.

#### 4. LINOCIERA, Swartz.

Shrubs or trees. Leaves opposite, entire. Flowers in axillary panicles or cymes often in small terminal fascicles. Calyx small, 4-fid. Petals 4, often cohering in pairs. Stamens 2. Ovary 2-celled; style short, stigma obscurely bifid or entire; ovules 2 in each cell, pendulous from its apex. Fruit an ellipsoid drupe, usually 1-seeded. Seed pendulous, testa thin, albumen fleshy or 0, radicle superior.

Seeds albuminous. Petals $\frac{1}{4}$ inch	...	...	1. <i>L. malabarica</i> .
Seeds exalbuminous. Petals $\frac{1}{8}$ inch	...	...	2. <i>L. intermedia</i> .

1. *L. malabarica*, Wall. Cat. 2823; Fl. Br. I. 3. 607; Dalz. & Gibs. Bom. Fl. 159. *Chionanthus malabarica*, Bedd. Fl. Sylv. t. 239. *Akerkal, kunta-akerkal, yellum, lavanty, maniki mara*, K.

Deccan peninsula. Throughout the evergreen forests of the Konkan and North Kánara. Fl. Nov.-Jan. Fr. Feb.-June. A small tree. Bark smooth, shining, grey, covered with raised corky dots; inner bark  $\frac{1}{5}$  in. thick, white with yellow fibres, quickly turns dark-coloured on exposure. Wood reddish-grey, hard, compact, smooth. Annual rings indistinct. Pores small, numerous, sometimes forming irregular patterns. Medullary rays fine, reddish, short, distinct. Weighs about 52 to lbs. to the cub. ft. Flowers have the odour of ripe apples in the early morning. Fruit sessile, ellipsoid,  $\frac{1}{5}$  in. long; cotyledons flat, in fleshy albumen.

2. *L. intermedia*, Wgt. Ic. t. 1245; Fl. Br. I. 3. 609; Var. *Roaxburghii*. *Olea Roaxburghiana*, Dalz. & Gibs. Bomb. Fl. 159. *Chionanthus intermedia*, Bedd. Fl. Sylv. t. 237.

Orissa and the Circars, Chota Nagpore, Western peninsula on the gháts Anamallays, and Neilgherries. A small tree. Beddome says the timber is esteemed by the natives.

#### 5. OLEA, Linn.

Trees or shrubs. Leaves opposite, entire or toothed. Flowers small, in axillary or terminal panicles, often diœcious; bracts minute. Calyx 4-toothed or lobed. Corolla-tube short, lobes 4 or 0. Stamens 2. Ovary 2-celled; ovules 2 in each cell. Drupe ellipsoid or globose, 1-seeded. Seed pendulous; albumen fleshy, radicle superior.

*O. dioica*, Roxb. Fl. Ind. Ed. Carey & Wall. I. 105; Fl. Br. I. 3. 612; Dalz. & Gibs. Bomb. Fl. 159; Bedd. Fl. Sylv. 154. Indian Olive. *Parr jamb*, *karamba*, Vern.; *Hejje aherkal*, *akki*, K.; *Lauki*, M.

Lower hills in Assam and Bengal, throughout the Deccan peninsula. In the evergreen ghát forests of the Konkan and North Kánara, common. Fl. Feb.-Apl. Fr. R. S. Flowers dicecious. A small or moderate sized tree. Bark 5 in. thick, grey, smooth outside, yellow fibrous within. The heartwood of old trees is dark yellowish-brown, streaked and mottled, hard, shining. Pores small, numerous, simple or divided. Med rays fine, numerous, wavy; concentric wavy lines of light coloured tissue cross the medullary rays parallel at unequal distances. Weighs about 54 lbs. to the cub. ft.; sweetly scented; called in N. Kánara *Pun werl gund*, or Rose Sandalwood. Wood adapted for carving and cabinet work. The sapwood is reddish-grey in colour, hard and smooth, and weighs nearly as much as the heartwood.

#### 6. LIGUSTRUM, Linn.

Shrubs or small trees. Leaves opposite, entire. Flowers small, white, bisexual, in terminal trichotomous panicles, sometimes with foliaceous bracts in the lower part. Calyx small, 4-toothed. Corolla funnel-shaped, 4-lobed. Stamens 2 on the corolla tube. Ovary 2-celled with 2 ovules in each cell; style long, stigma subclavate, hardly 2-fid. Fruit a berry. Seeds 4, albuminous.

*L. neilgherrense*, Wgt. Ic. t. 1243; Fl. Br. I. 3. 615; Dalz. & Gibs. Bomb. Fl. 159. *L. robustum*, Bedd. Fl. Sylv. 153. Brandis For. Fl. 310. *Kungin*, M.

Western peninsula, on the gháts from Bombay southwards. On the higher gháts of the Konkan and North Kánara, common in the moist forests near the Tinai ghát. Fl. Aug.-Sept. Fr. ripe January. A large shrub or small tree. Bark rough, warty. Wood light brown, rather close-grained and durable. "Used for the construction of huts and fuel at Mahábaleshvar." Lisboa.

#### ORDER 58. SALVADORACEÆ.

Trees or shrubs, unarmed or spinous. Leaves opposite, entire. Flowers small, regular, tetramerous, clustered or paniced, dicecious or polygamo-dimorphic. Calyx free, 3-5-fid. Corolla shortly campanulate or petals free, 4-merous, imbricate in bud. Stamens 4, filaments free or connate into a tube. Ovary free, 1-2 or imperfectly 4-celled; style short, stigma 2-fid or subentire; ovules 1-2 in each cell, erect from the base. Berry or drupe mostly 1-seeded; seed erect, exalbuminous, embryo with fleshy, plano-convex cotyledons.

Petals free. Stamens monadelphous. Ovary 1-celled,	
1-ovuled ... ..	... 1. DOBERA.
Corolla gamopetalous. Stamens on corolla-tube. Ovary	
1-celled, 1-ovuled ... ..	... 2. SALVADOBA.
Petals free. Stamens free. Ovary 2 (or falsely 4-cel-	
cd) ... ..	... 3. AZIMA.

## 1. DOBERA, Juss.

A glabrous tree. Leaves elliptic-acute, coriaceous. Flowers polygamo-diceious, clustered on the branches of an axillary inflorescence, trichotomous in the male flowers, subsessile in the female. Calyx 3-5-toothed. Petals 4-5, free, imbricate. Stamens 4-5, filaments connate into a tube; anthers lanceolate, dehiscing laterally. Scales 4-5 outside the staminal-tube, alternate with the stamens. Ovary 1-5-celled, according to various authorities; ovule solitary, erect. Fruit subglobose.

*D. Roxburghii*, Planch. in Ann. Sc. Nat. 3, X. 191. Fl. Br. I. 3. 619. *Blackburnia monadelphæ*, Roxb. Fl. Ind. I. 415. Found in Arabia and Abyssinia. A native of the mountains of the Circars, Roxb.; also found in Bombay. Fl. Br. I. I do not know this tree. It is said to flower at the beginning of the hot season.

## 2. SALVADORA, Linn.

Shrubs or trees. Leaves opposite, entire. Flowers hermaphrodite or (mostly) functionally unisexual, in terminal or axillary panicles; bracts minute. Calyx 4-lobed, lobes imbricate. Corolla 4-lobed. Stamens 4, alternating with the corolla-lobes. Ovary 1-celled, ovule 1, erect, basal. Drupe globose, supported by the slightly enlarged calyx. Seed erect, exalbuminous.

Leaves ovate. Panicles compound. Drupes scattered ... 1. *S. persica*.  
Leaves lanceolate acute, Panicles reduced to axillary  
fascicles of short spikes. Drupes clustered ... 2. *S. oleoides*.

1. *S. persica*, Linn.; A. DC. Prod. XVII. 28; Fl. Br. I. 3. 619; Dalz. & Gibs. Bomb. Fl. 312; Brandis For. Fl. 315. *S. Wightiana*, Bedd. Fl. Sylv. t. 247. Mustard Tree of Scripture. Toothbrush Tree. *Khabbar*, *pilu*, Sind.; *Khákhin*, M.

In the drier climates of India from the Punjab and Sind to Patna, Circars and North Ceylon. In the dry districts of the presidency and Sind; in the Dhárwár or Belgaum districts, often on the bunds of tanks and in open places near villages of the black soil country, also found near the coasts of Guzerat, the Konkan and North Kánara. Fl. Nov.-May. Fr. Jan.-June, often on saline soils. A small evergreen tree with thin grey bark. Wood white and soft. Pores small, in short radial lines, but enclosed in oval patches of soft tissue. Numerous concentric bands of soft tissue. Medullary rays fine, numerous. Weighs 45 lbs. to the cub. ft. Easy to work; much employed in the manufacture of native tooth-brushes. The root bark is very acrid. Shoots used as fodder for camels. The fruit is used medicinally.

2. *S. oleoides*, Dcne. in Jacq. Voy. Bot. 140. t. 144; Fl. Br. I. 3. 620; Brandis For. Fl. 316. t. 39. *S. Stocksii*, Wgt. III. II. 229. *Kabbar jhár*, *diar*, Sind.; *Kinkanela*, M.; *Khakanamutela*, Guz.

Punjab and Rajputana in the desert regions. In the dry deserts of Sind on arid and saline soils, often associated with *S. persica*. Fl. Mch.-



April. Fr. June. A large evergreen shrub or small tree. Wood red, moderately hard, with a small purple heartwood. Used for building purposes, agricultural implements, &c. Makes a bad fuel. Seeds yield a green oil. Fruit edible.

### 3. AZIMA, Lamk.

Spinous rambling shrubs. Leaves opposite, entire. Flowers small, dioecious, axillary; bracts 0 or leaflike; bracteoles linear, small. Calyx campanulate 2-4-divided. Petals 4, imbricate in bud. Stamens 4. Ovary 2-celled; stigma large, 2-fid.; ovules 2-1 in each cell, erect. Berry globose, 2-1-seeded. Seed globose, exalbuminous.

**A. tetracantha**, Lamk. Dict. I 343; Fl. Br. I. 3. 620; Dalz. & Gibs. Bomb. Fl. 143. Deccan peninsula and Ceylon. *Kantagur-kamai*, H.

Common throughout the dry districts of the presidency; often in hedges. Fl. Dec.-Mch. Fr. H. S. Fruit white, edible.

## ORDER 59. APOCYNACEÆ.

Trees or shrubs, often climbing, rarely herbs. Leaves opposite or whorled, entire. Flowers regular, hermaphrodite. Calyx free, 5-divided, often glandular at base. Corolla 5-lobed, lobes spreading, often twisted-imbricate in bud, rarely valvate. Stamens 5, on the throat or mouth of corolla; filaments short, anthers conniving in a cone round the stigma or free; pollen granular. Disk annular or lobed or 0. Ovary 1-celled with two parietal placentas or 2-celled with axile placentas or of two distinct or connate carpels; ovules in each cell 2-many, rarely solitary. Fruit a drupe or berry or of two follicles opening along the inner edge. Seeds pendulous, rarely ascending or peltately attached, often winged or with a terminal coma of long silky hairs; albumen present or 0.

Anthers free from the stigma.

Fruit indehiscent; seeds without coma or wings.

Leaves opposite. Ovary of 2, combined carpels.

Fruit a many-seeded berry. Spinous shrubs... 1. *CARISSA*.

Leaves whorled. Ovary of 2 distinct carpels.

Fruit of 2, 1-seeded drupes ... 2. *RAUWOLFIA*.

Leaves alternate. Fruit of 1, fibrous, woody

carpel ... 3. *CERBERA*.

Fruit of 2 follicles; seeds winged or comose.

Ovules 2-seriate.

Leaves alternate. Seeds winged. Leafless

shrub ... 4. *RHAZYA*.

Ovules many seriate.

Leaves whorled. Seeds winged. Climbing

shrub ... 5. *ELLERTONIA*.

Leaves alternate. Seeds winged. Tree ... 6. *PLUMERIA*.

Leaves whorled. Seeds comose, ciliate  
along the edges. Trees or shrubs ... 7. *ALSTONIA*.

Leaves opposite. Seeds with a coma at the  
apex. Trees or shrubs ... 8. *HOLABRIENA*.

Fruit more or less fleshy, deliscent; seeds without  
a coma, immersed in pulp ... 9. *TABERNAMONTANA*.

Anthers conniving in a cone round the stigma, included or exerted.

Anthers more or less exerted.

Filaments twisted. Carpels connate in flower ... 10. PARSONSIA.

Filaments not twisted. Ovary of 2 distinct carpels.

Corolla rotate, throat naked. Climbers ... 11. VALLARIS.

Corolla salver-shaped, throat with fimbriate scales. Trees ... 12. WRIGHTIA.

Anthers included.

Leaves whorled. Corolla throat with 5 broad scales, ... 13. NERIUM.

Leaves opposite. Corolla throat without scales.

Corolla large; lobes overlapping to the right.

Corolla bell-shaped. Disk deeply 5 lobed, ... 14. BEAUMONTIA.

Corolla salver-shaped. Disk thick, annular or cupular ... 15. CHONEMORPHA.

Corolla small, lobes overlapping to the right and nearly straight in bud. Seeds glabrous ... 16. AGANOSMA.

Corolla small, lobes sharply twisted to the left; seeds comose.

Corolla-lobes with the tips not deflected.

Disk cupular ... 17. ANODENDRON.

Corolla-lobes with the tips deflected. Disk

free, 5-lobed ... 18. ICHNOCARPUS.

### 1. *CARISSA*, L.

Shrubs erect or climbing, armed with axillary spines. Leaves opposite, coriaceous. Flowers in peduncled, trichotomous cymes. Calyx 5-partite. Corolla-tube cylindrical, lobes spreading. Stamens included. Ovary 2-celled; ovules several in each cell; style filiform; stigma minutely 2-fid. Fruit a globose or ovoid berry. Seeds usually 2, peltately attached to the septum: albumen fleshy.

Spines straight.

Leaves glabrous. Berry size of cherry ... 1. *C. Carandas*.

Leaves small, densely and finely pubescent. Fruit size of a pea. A small tree or spreading shrub ... 2. *C. spinarum*.

Spines decurved.

An erect shrub. Cymes puberulous ... 3. *C. macrophylla*.

A climbing shrub. Cymes quite glabrous ... 4. *C. suavissima*.

1. *C. Carandas*, Linn.; A. DC. Prod. VIII. 332; Fl. Br. I. 3. 630; Brandis For. Fl. 320; Dalz. & Gibs. Bomb. Fl. 143; Bedd. Fl. Sylv. 156. *Karunda*, *corinda*, *carwand*, *hartundi*, Vern.; *Kawli balli*, *karekai*, K.

Throughout India, common from the Punjab to Ceylon, Burma and Malacca, often cultivated. Throughout the presidency, common in the Konkan and North Kánara. Fl. Jan.-Apl. Fr. ripe May-June. Bark light grey, scaly. A large evergreen shrub. Wood yellowish-grey, hard, smooth, close-grained. Pores very small, equally distributed. Medullary rays very fine and numerous. Weighs 45 lbs. to the cub. ft. Makes excellent impassable fences.

2. *C. spinarum*, A. DC. Prod. VIII. 332; Fl. Br. I. 3. 631. *C. diffusa*, Roxb.; Brandis For. Fl. 321; Bedd. Fl. Sylv. t. 157. *C. hirsuta*, Roth. Dalz. & Gibs. Bomb. Fl. 143.

Wild in most parts of India in the drier zones, from the Himalayas to Ceylon, on the dry hills of the Deccan. Common in the Dhárwár and Belgaum districts, on dry stony ground. Fl. C. S. Fr. Aug.-Sept. A small thorny, evergreen sometimes prostrate shrub. Wood hard, smooth, close grained. Annual rings distinct. Used for turning and combs. Fruit smaller and much sweeter when ripe than that of *O. Carandas*.

3. *C. macrophylla*, Wall. Cat. 1679; Br. I. 3. 631. *C. lanceolata*, Dalz. & Gibs. Bomb. Fl. 143. *C. Dalzellii*, Bedd. Fl. Sylv. 156. Western gháts from the Konkan southwards to Courtallum. Common in the evergreen forests along the Konkan and North Kánara gháts, abundant near the coast on the hills about Kárwár. Fl. Jany.-Feb. Fr. ripe June. The large plum-like fruit is very palatable.

4. *C. suavissima*, Bedd. MSS. Fl. Br. I. 3. 632.

North Kánara and Konkan gháts, in evergreen forests: a fine lofty climber. I am of opinion that this species is the same as *C. macrophylla*, and differs only in the glabrous cymes and climbing habit. Fl. and Fr. at the same time as *C. macrophylla*, Wall. Fruit 1 inch in diameter, black when ripe, sweet tasted, contains much milky juice.

## 2. RAUWOLFIA, Linn.

Glabrous shrubs. Leaves whorled, rarely opposite. Calyx 5-divided. Corolla salver-shaped, tube inflated above the middle, pilose within. Stamens included in the inflated part of the corolla-tube. Disk large, cup-shaped or annular. Ovary 2-celled, ovules 2, collateral in each cell. Fruit a didymous drupe, usually 1-seeded.

A small shrub, corolla tube slender	...	...	1. <i>R. serpentina</i> .
Large shrub or small tree. Corolla-tube broad, inflated at the top	...	...	2. <i>R. densiflora</i> .

1. *R. serpentina*, Benth. in Gen. Plant. II. 695; Fl. Br. I. 3. 632. *Ophioxylon serpentinum*, Linn.; Dalz. & Gibs. Bomb. Fl. 143; Bedd. Fl. Sylv. 156. *Harki*, M.

Tropical Himalaya, Sikkim, Assam, Pegu and along the gháts from the Konkan to Ceylon. Throughout the moist forests of the Konkan and North Kánara. Fl. May. Fr. June. An under-shrub: drupes often didymous, endocarp rugose.

2. *R. densiflora*, Benth. in Gen. Pl. II. 697; Fl. Br. I. 3. 263. *R. decurva*, Hook. f. Fl. Br. I. 3. 633. *Ophioxylon neilgherrense*, Dalz. & Gibs. Bomb. Fl. 144. *O. densiflorum*, Bedd. Fl. Sylv. 156. Fl. H. S., also in Sept. Fr. R. S.

Khasia Mountains, 1—4000 ft. altitude, Western gháts from the Konkan southwards. Ceylon up to 6000 ft. In the moist forests of the gháts from the Konkan southwards, common in the forests of the Supa sub-division of North Kánara. *R. decurva*, Hook. f., is in my opinion, only a variety of *R. densiflora*, Benth. Fruiting specimens

of both being exactly similar. The decurved, short peduncles seem, however, to be a constant character of the form *decurva*. A large shrub or small tree.

### 3. CERBERA, Linn.

Tree. Leaves alternate. Flowers large, white or red, in terminal cymes. Calyx 5-partite segments long. Corolla funnel-shaped, tube short, throat ribbed or scaly; lobes broad. Stamens inserted at the middle of the tube, included. Ovaries 2, distinct; style filiform, stigma 2-lobed; ovules 4, in each ovary or carpel. Fruit an ellipsoid drupe with a woody, fibrous mesocarp. Seeds broad, compressed, peltately attached to the placenta; albumen 0.

*C. Odollam*, Gærtn. Fruct. II. 193, t. 124; Fl. Br. I. 3. 638; Brandis For. Fl. 322; Bedd. Fl. Sylv. 157; Wight Ic. t. 441. *Sukanu*, M.

Salt swamps of the sea coasts of India and Ceylon, salt swamps of the South Konkan and North Kánara, planted in hedges near the sea coast at Murdeshwur. Fl. at different times throughout the year. Bark white with much milky juice. Wood grey soft, spongy. Annual rings distinct. Pores small, in short radial lines. Med. rays indistinct. Flowers white, sweet-scented.

### 4. RHAZYA, Dcnc.

Shrubs. Leaves alternate, thick, glabrous. Flowers in large terminal or axillary cymes. Calyx short, 5-divided. Corolla-tube long, throat constricted, hairy; lobes 5, overlapping to the left. Stamens included. Disk obscure. Carpels 2, distinct; style filiform, top broad, thickened, stigma sometimes furnished with a reflexed membrane; ovules many. Follicles 2, erect, slender. Seeds winged at both extremities; albumen ruminant.

*R. stricta*, Decaisne in Ann. Nat. Sc. Ser. 2. IV. 81; Fl. Br. I. 3. 640; Brandis For. Fl. 322. *Sewar, sihar, ishawarg*, Sind.

Trans-Indus territory, Salt range and at Peshawar. On the dry plains of Sind and Afghanistan. Fl. April. Wood used for fuel and the dried fruit for coagulating milk in the manufacture of cheese. The fruit and leaves are used in native medicine.

### 5. ELLERTONIA, Wight.

Climbing shrubs. Leaves opposite or ternately whorled. Flowers in terminal cymes. Calyx 5-fid. Corolla-tube cylindric; lobes 5, overlapping to the left. Stamens with ciliate filaments. Carpels 2, distinct; ovules many. Follicles 2, linear, spreading. Seeds 2-seriate, winged above and below; albumen scanty; cotyledons thin; radicle superior.

*E. Rheedii*, Wgt. Ic. t. 1295; Fl. Br. I. 3, 641; Rheede Hort. Mal. IX. t. 14.

Western coast on the ghâts from the Konkan southwards to Malabár. On the ghâts of the Konkan and North Kánara in evergreen forests, in the forests near the Ainshi ghât at about 1000 feet elevation. Fl. C. S. Fr. H. S.

6. PLUMERIA, Linn.

Shrubs or trees. Leaves elongate, crowded at the ends of the branches; nerves numerous, parallel, joined by a strong intramarginal vein. Flowers large, in terminal cymes. Calyx 5-fid, eglandular within. Corolla with spreading lobes, contorted in bud. Anthers at the base of the corolla-tube near the ovary. Carpels 2, distinct. Fruit of 2, linear oblong follicles. Seeds winged, albumen fleshy.

*P. acutifolia* Poir; A. DC. Prod. VIII. 392; Fl. Br. I. 3. 641; Brandis For. Fl. 323; Dalz. & Gibs. Bomb. Fl. Suppl. 52. *Khair chunpa, son champa, chameli*, Vern.; *Rhadachampo*, Guz.; *Go sampige*, K.

Native of tropical America. Cultivated and naturalized throughout the presidency near temples and villages. Fl. at different times throughout the year. A moderate sized tree. Bark grey, smooth scaly, inner bark full of white sticky juice. Wood light brown, soft. Pores few, small, in short radial lines. Medullary rays fine, at unequal distance, apart, distinct. Annual rings distinct. Weighs about 42 lbs. to the cub. ft. Sap mixed with cocoanut is used as a remedy for itch.

7. ALSTONIA, R. Brown.

Trees or shrubs. Leaves whorled or opposite. Flowers in corymbose cymes. Calyx short, 5-lobed. Corolla-tube cylindrical, lobes spreading. Stamens included. Disk annular, lobed or truncate or 0. Ovary of 2, distinct carpels; style filiform, top ovoid or oblong, stigma minute or 2-toothed; ovules many, multiseriate in each carpel. Fruits of 2, long follicles. Seeds peltately attached, densely ciliate on the margins. Albumen scanty.

A large tree. Leaves obtuse. Disk 0	...	...	1. <i>A. scholaris</i> .
A shrub. Leaves lanceolate, acuminate. Disk of	...	...	2. <i>A. venenatus</i> .
2 ligulate glands	...	...	

1. *A. scholaris*, Brown in Mem. Wern. Soc. I. 75; Fl. Br. I. 3. 642; Dalz. & Gibs. Bom. Fl. 145; Bedd. Fl. Sylv. t. 242; Brandis For. Fl. 325. *Mudhol, kodale, madale, kadusale hale*, K.; *Satwin, saptaparni*, M.; *Saitanka jhad*, H.

Drier forests of India from the Western Himalaya to Assam and southwards to Ceylon and Penang. Throughout the presidency, usually in deciduous forests; common in the evergreen forests of North Kánara. Fl. Dec.-Mch. Fr. June. A very large tree. Bark rather rough, inner bark yellow, with much milky juice. It is known in commerce as Dita bark and is used in medicine. Wood white, soft, evengrained, not durable. Pores medium-sized, in short radial lines. Medullary rays fine, white, distinct, crossed by parallel wavy lines of white tissue. Weighs 30 lbs. to the cub. ft. Used for boxes, furniture, scabbards, &c.

2. *A. venenatus*, Brown in Mem. Wern. Soc. 1.75; Fl. Br. I. 3. 642; Dalz. & Gibs. Bomb. Fl. S. ppl. 52; Bedd. Fl. Sylv. 160.

Deccan peninsula from N. Kánara to the Neilgherries, 2—4500 ft., Courtallum, Dindigal on high hills. In the evergreen forests of N. Kánara near the Nilkund and Devimone gháts. A shrub, sometimes a small tree 20 ft. high. Fl. R. S. Fr. Nov.-Jany.

### 8. HOLARRHENA, Br.

Trees or shrubs. Leaves opposite, entire. Flowers white, usually in terminal cymes. Calyx 5-lobed; lobes small, glandular within. Corolla-tube swollen at its base round the anthers, lobes spreading, twisted to the left. Stamens included. Disk 0. Carpels 2, distinct; style short, filiform, stigma oblong, fusiform, top entire; ovules numerous. Fruit of 2 long slender follicles. Seeds with a deciduous coma; albumen 0; cotyledons broad, complicate, radicle superior.

*H. antidysenterica*, Wall. Cat. 1672; Fl. Br. I. 3. 644; Brandis For. Fl. 326; Bedd. Fl. Sylv. 160; Dalz. & Gibs. Bomb. Fl. 145. *Dowla, kura, indrajav*, Vern.; *Koodsaloo, korchu*, K.; *Kuda*, M.

Tropical Himalaya from the Chenab westwards and throughout India to Travancore and Malacca. Throughout the presidency, common in deciduous forests. Fl. Mch.-June. Fr. next March. A small tree. Bark dark coloured, furrowed and scaly. Wood white or grey, soft, close-grained, smooth; annual rings visible, but not distinct. Pores small, in radial lines. Med. rays fine and very fine, numerous. Weighs 46 lbs. to the cub. ft. Used for carving. Leaves, fruit and seeds employed in native medicine.

### 9. TABERNÆMONTANA, Linn.

Trees or shrubs. Leaves opposite. Flowers white, in axillary cymes. Calyx glandular within. Corolla-tube cylindrical, slender; lobes overlapping to the left. Stamens inserted about the middle of the tube. Disk 0. Carpels two, distinct; style short or long, top urceolate, ovoid or clavate; stigma short; ovules many. Fruit of two, smooth or ribbed 1-many-seeded, dry or fleshy follicles. Seeds in pulp, albumen fleshy.

*T. Heyneana*, Wall. in Bot. Beg. t. 1273; Fl. Br. I. 3. 646. *T. crispa*, Roxb.; Dalz. & Gibs. Bomb. Fl. 144. *Naglkudo, pandra-kura*, M.; *Bili kodsaloo, nagarkooda, halmeti, maddarsa*, K.

Western gháts from the Konkan southwards. Throughout the Konkan and North Kánara, in evergreen forests, common. Fl. Mch.-Apl. Fr. July-Aug. Small tree, bark grey, rough, corky, longitudinally fissured and with horizontal cracks; inner bark white or yellowish with much milky juice. Wood grey, smooth, very soft. Annual rings distinct. Pores small, numerous, in radial lines. Medullary rays fine, numerous. Weighs about 28 lbs. to the cub. ft. Timber not used in North Kánara. Corolla

deciduous. Styles 2, free to the base. Follicles yellow, smooth, curved, usually with 2 sharp side ribs; pulp surrounding the seeds red.

*T. coronaria*, Br. (*Taggar*, Vern.), is a shrub commonly cultivated in gardens throughout the presidency, not indigenous in Western India. Flowers rainy season.

#### 10. PARSONSIA, Br.

Twining shrubs. Leaves opposite. Flowers small, white, in terminal or axillary, dichotomous cymes. Calyx 5-partite, glandular or 0, or with 5 scales. Corolla-tube short; lobes overlapping to the right. Stamens with twisted filaments; anthers conniving over the stigma. Disk of 5 lobes or scales. Ovary of 2 cells; style filiform, top dilated, truncate, stigma columnar; cells many-ovuled. Fruit cylindrical, carpels at length separating from the placentas. Seeds tufted; albumen scanty.

*P. spiralis*, Wall. Cat. 1631; Fl. Br. I. 3. 650. *Heligme javanica*, A. DC.; Dalz. & Gibs. Bomb. Fl. 146.

Silhet, Pegu, Tenasserim, Malacca, Singapore, Western gháts, in evergreen forests from the Konkan southwards. Common on the southern gháts of North Kánara. A twining glabrous shrub. Fl. at different times throughout the year.

#### 11. VALLARIS, Burm.

Climbers. Leaves minutely gland-dotted. Flowers white, in axillary dichotomous cymes or fascicled. Calyx 5-partite. Corolla tube short, lobes overlapping to the right. Stamens at the top of the tube; anthers exserted, conniving in a cone, connective with a dorsal gland, cells spurred at the base. Disk various. Carpels 2, connate, many-ovuled, style filiform, stigma thick. Fruit oblong. Seeds compressed, tip comose, albumen scanty.

*V. Heynei*, Spreng. Syst. I. 635; Fl. Br. I. 3. 650; Dalz. & Gibs. Bomb. Fl. 144. *V. dichotoma*, Wall.; Brandis For. Fl. 327.

Tropical Himalaya, Western Peninsula from the Konkan southwards. Throughout the dry districts of the presidency, also in the Konkan and North Kánara, often in hedges. Fl. Dec.-Apl.

#### 12. WRIGHTIA, Br.

Trees or shrubs. Leaves opposite. Flowers red, white or yellow, in corymbose cymes. Calyx short, with 5-10 scales inside at base. Corolla salver-shaped, tube short, throat with 1-2 series of fimbriate scales, distinct or united in a ring, lobes overlapping to the left. Stamens with 5 exserted, conniving anthers, cells spurred at the base. Carpels 2, many-ovuled, style filiform, stigma ovoid, with a toothed, basal ring; ovules on axile placentas. Fruit of 2, linear follicles; seeds numerous, tufted at the lower end, albumen 0.

Leaves glabrous. Coronal scales fimbriate ... 1. *W. tinctoria*.  
 Leaves tomentose. Coronal scales short, obtuse ... 2. *W. tomentosa*.

1. *W. tinctoria*, Br. in Mem. Wern. Soc. 1. 73; Fl. Br. I. 3. 653; Dalz. & Gibs. Bomb. Fl. 145; Brandis For. Fl. 324; Bedd. Fl. Sylv. t. 241. *Kodmurki, kuda, K.*; *Kala-kura, M.*; *Bhurcuri, Vern.*

Central India, Western Peninsula and Burma. Throughout the presidency in deciduous forests. Fl. Mch.-Apl. Fr. Jan.-Feb. A small deciduous tree. Bark scaly, smooth. Wood yellowish, white, close-grained, moderately hard. Annual rings marked by a line of pores. Pores small, in short radial lines. Med. rays fine and very fine, very numerous. Weighs about 50 lbs. to the cubic ft. Used for carving, turnery and building purposes. Would not do as a substitute for boxwood as has been suggested. The leaves yield a blue dye and a kind of indigo and are used as wrappers for native cigarettes.

2. *W. tomentosa*, Roem & Schultes Syst. IV. 114; Fl. Br. I. 3. 653; Dalz. & Gibs. Bomb. Fl. 145; Brandis For. Fl. 323; Bedd. Fl. Sylv. 159. *W. Wallichii*, Dalz. & Gibs. Bomb. Fl. 145; Bedd. Fl. Sylv. 160. *Kala inderjow, tambara-kura, Vern.*; *Bile kude gidda, K.*

Throughout India from the Indus eastwards and southwards to Ceylon, Burma and Penang. Throughout the presidency, common in the moist forests of the Konkan, rare in North Kánara, on the Supa gháts. Fl. Apl.-June. Fr. Jan.-Feb. A small deciduous tree. Wood yellowish, white, moderately hard, close-grained. Pores very small, in short radial lines. Med. rays very fine and numerous. Weighs 30 lbs. to the cub. ft. Used for turnery and carving. A red-coloured medicinal oil is obtained from the seeds.

### 13. NERIUM, Linn.

Shrubs. Leaves narrow, opposite or whorled. Flowers large, in terminal cymes. Calyx-lobes with fleshy glands at the base inside. Corolla funnel-shaped, lobes spreading, unequal-sided; throat with 5-toothed scales opposite the lobes. Anthers included, conniving round the stigma; tips filiform; cells with long twisted, hairy appendages. Ovary of 2 carpels, many ovuled. Follicles adpressed, separating when ripe. Seeds villous, coma terminal, albumen fleshy.

*N. odorum*, Soland. in Hort. Kew Ed. I. V. 1. 297; Fl. Br. I. 3. 655; Brandis For. Fl. 328; Grah. Cat. Bomb. Pl. 114. *Kunher, Vern.*

Sind, Western Himalaya, Kashmir, Central India, Sind. Graham says "grows wild by the banks of Deccan rivers." Perhaps only a variety of *N. oleander*, L., which is cultivated in gardens throughout the presidency. Fl. Apl.-June, and nearly throughout the year. Brandis.

### 14. BEAUMONTIA, Wall.

Evergreen climbers. Leaves opposite. Flowers large, white, in terminal cymes; bracts leafy. Calyx 5-divided, glandular inside at the base. Corolla bell-shaped with a short tube, lobes overlapping



to the right. Stamens included, anthers horny, sagittate, cells spurred at the base. Disk deeply 5-lobed. Ovary 2-celled; style filiform, top clavate, stigma fusiform; cells many-ovuled. Fruit of 2 connate follicles, separating when ripe. Seeds with a crown of silky hairs at the hilum.

**B. Jerdoniana**, Wgt. Icones. t. 1314. 5; Fl. Br. I. 3. 661.

On the Western gháts from the Konkan southwards in the evergreen forests of the Konkan and North Kánara gháts. Sir J. Hooker says, "probably will have to be ranked as a variety of *B. grandiflora*, Wall." Fl. Nov.-Dec. Fr. ripe following Nov.-Dec. An ornamental climber.

#### 15. CHONEMORPHA, G. Don.

Climbing shrubs. Leaves broad, opposite. Flowers large, white, in terminal, peduncled cymes. Calyx 5-cleft, with a ring of glands at the bottom of the tube. Corolla salver-shaped, lobes twisted in bud, throat naked. Stamens at the top of the tube, filaments short, broad, villous; anthers sagittate, connate, pungent, cells spurred. Disk thick, annular. Ovaries 2, oblong, style filiform, base cleft, stigma sub-clavate, many-ovuled. Follicles straight, hard, trigonous. Seeds with a crown of long silky hairs.

**C. macrophylla**, G. Don. Gen. Syst. IV. 76; Fl. Br. I. 3. 661; Brandis For. Fl. 328. *Echites grandis*, Wall.; Dalz. & Gibs. Bomb. Fl. 147.

Throughout the moist forests of India from the Himalayas to Travancore, Ceylon, Malacca, and the Andamans. Throughout the evergreen forests of the Konkan and North Kánara. Common in the Supa forests. Fl. Apl.-Sept. Fr. C. S. A large climber with handsome flowers.

#### 16. AGANOSMA, G. Don.

Evergreen climbers. Leaves opposite. Flowers in terminal cymes. Calyx 5-divided, glandular at the base. Corolla salver shaped with bearded, longitudinal bands behind the anthers; lobes overlapping to the right. Stamens included; anthers sagittate, rigid, connate. Disk 5-lobed, cupular. Carpels 2, many-ovuled. Style short, urnshaped, stigma columnar. Follicles woody, coriaceous. Seeds glabrous, albumen scanty.

**A. cymosa**, G. Don. Gen. Syst. IV. 77; Fl. Br. I. 3. 665; var. 4, *elegans*. *Aganosma Doniana*, Wight., Dalz. & Gibs. Bomb. Fl. 146.

Silhet, Western Peninsula from Bombay to Travancore. Throughout the evergreen forests of the Konkan and North Kánara. Fl. Apl.-June. Fr. next C. S. *A. caryophyllata*, G. Don. Fl. Br. I. 3. 664, is cultivated in gardens. The lax cymes and linear calyx-lobes distinguish it from the indigenous species.

## 17. ANODENDRON, A. DC.

Lofty climbers. Leaves opposite. Flowers small in corymbose panicles or cymes. Calyx 5-cleft, eglandular. Corolla salver-shaped, mouth contracted, lobes narrow, twisted to the left. Stamens with connate, sagittate anthers, cells shortly spurred at the base. Disk cupular, obscurely 5-crenate. Ovaries 2, many-ovuled. Style short, top cupular; stigmas thick connate. Follicles divaricate, woody. Seeds with a crown of long silky hairs.

*A. paniculatum*, A. DC. Prod. VIII. 444; Fl. Br. I. 3. 668; Dalz. & Gibs. Bomb. Fl. 147. *Lamtani*, Vern.

From Silhet to Martaban, Western Peninsula from the Konkan southwards to Ceylon. Common in the evergreen forests of the Konkan and North Kánara. Fl. Jany.-Mch. Fr. May. A very large climber with a thick fluted stem. The dense cymes of small flowers and the beaked seed with the long white umbrella-like coma are characteristic.

## 18. ICHNOCARPUS, Br.

Climbers. Leaves opposite. Flowers small, in long terminal and axillary paniculate cymes. Calyx 5-divided, glandular within. Corolla hypocrateriform; throat contracted or villous; lobes hairy inside. Stamens at or below the middle of the tube; anthers conniving over the stigma, cells spurred at the base. Disk free, 5-lobed. Carpels 2, distinct, many-ovuled, hairy; style short, stigma columnar. Fruit of 2, very slender terete follicles. Seeds with a slender coma at the hilum.

*I. frutescens*, Br. in Hort. Kew Ed. 2. II. 69; Fl. Br. I. 3. 669; Brandis For. Fl. 327; Dalz. & Gibs. Bomb. Fl. 147. *Krishnasarwa*, *kantebhourí*, M.; *Gorwi balli*, K.

Western Himalaya from Sirmur to Nepal, Bengal, Assam, Western and Southern India to Ceylon. Throughout the presidency in deciduous forests; common in North Kánara and the Konkan. Fl. Nov.-Dec. Fr. Mch.-Apl. A twining shrub, yields a good fibre. Brandis (For. Fl. 527) states that the root has been used as a substitute for sarsaparilla.

## ORDER 60. ASCLEPIADEÆ.

Herbs or shrubs, often twining. Leaves opposite, flowers regular, pentamerous. Calyx 5-divided, segments imbricate in bud. Corolla-tube short, often with a corona of hairs, scales, or processes; (outer or corolline corona). Stamens at the base of the corolla, filaments connate or rarely free). The fleshy staminal column usually bears attached to the filaments or back of the anthers a ring or series of scales or processes (inner or staminal corona); anthers crowning the column, connate or free, adnate to the stigma by the connective; tip often

produced into an inflexed membrane; pollen in 1-2 granular or waxy masses in each cell, masses united in pairs or fours to a gland (the corpuscle) which lies on the stigma. Ovary of two distinct carpels within the staminal column; styles 2, short, united by the stigma, which is 5-angled. Fruit of 2 follicles. Seeds usually winged and plumose; albumen copious, dense.

**Periploceæ.**—Filaments usually free. Anthers acuminate, pollen-masses granular in pairs in each cell.

Corona of 5, free, short, thick, not aristate, scales.

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|---|-----------------|
| Corolla-lobes valvate ... ..                    | 1. HEMIDESMUS.  |
| Corolla-lobes imbricate ... ..                  | 2. CRYPTOLEPIS. |
| Coronal scales connate into a lobed ring ... .. | 3. PERIFLOCA.   |

**Euasclepiadæe.** Filaments connate. Pollen-masses waxy.

Anthers with a membranous, inflexed tip. Pollen-masses in pairs in each cell, 20 in all, in fours on the corpuscle, pendulous, sessile.

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|--|----------------|
| Corolla-lobes imbricate, glabrous ... ..                 | 4. TOXOCARPUS. |
| Corolla-lobes villous, on the inner face, valvate ... .. | 5. GENIANTHUS. |

Anthers with a membranous inflexed tip; Pollen-masses solitary in each cell (10 in all), sessile or in pairs on the corpuscle, pendulous.

Corona staminal of 5, laterally compressed processes adnate to the anthers. Corolla campanulate or funnel-shaped.

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|---|----------------|
| Corolla broadly campanulate, lobes valvate. Erect shrubs ... .. | 6. CALOTROPIS. |
| Corolla funnel-shaped, lobes imbricate. Twining shrubs ... ..   | 7. DÆMIA.      |

Corona staminal, cupular or annular. Corolla rotate.

Flowers large, purple. Corona annular, 10-lobed, fleshy. Stigma 5-winged. Twining shrub ...

Flowers small, greenish or purplish. Corona cupular or campanulate, toothed or lobed. Stigma flat, umbonate. Twining shrub ...

- |  |                  |
|--|------------------|
| Flowers small, white. Corona membranous, cup-shaped, lobed, alternate lobes with large fleshy processes, adnate to the back of the anthers. Stigma conical. Leafless trailing shrubs ... | 8. HOLOSTEMMA.   |
| ...  | 9. CYNANCHUM.    |
| ...  | 10. SARCOSTEMMA. |

Anthers with a membranous, inflexed tip. Pollen-masses solitary in each cell (10 in all), sessile or pedicelled, in pairs on the corpuscle, erect.

Corona on the corolla-tube (corolline).

Flowers small, rotate or urceolate. Corolla-lobes thick, sub-valvate or overlapping ... ..

Coronal-processes on the staminal-column (staminal).

Corolla-lobes overlapping.

Flowers rather large, greenish. Corolla salver-shaped. Coronal-scales on the back of the anthers, flat, notched ... ..

Flowers small, greenish. Corolla rotate. Coronal-scales broad, membranous, adnate to the base of the anthers ... ..

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|--|------------------|
| ...  | 11. GYMNEMA.     |
| ...  | 12. PERGULARIA.  |
| ...  | 13. COSMOSTIGMA. |
| Flowers medium-sized, green. Corolla rotate. Coronal-scales 5, fleshy, adnate to the column, inner angle cuspidate, incumbent on the anthers .. .. | 14. DREGEA.      |

Coronal-processes adnate to the staminal-column.  
Corolla lobes valvate.

Flowers small, purplish. Corolla rotate. Corona of 5, large lobes, spreading from the column. Corolla-lobes valvate ... .. 15. HETEROSTEMMA.

Flowers large, purple. Corolla urceolate. Corona cupular, spreading, fleshy, toothed ... .. 16. OIANTHUS.

Flowers medium-sized, rotate. Corolla usually white, waxy. Corona large, stellate of 5-scales, usually recurved and enclosing a hollow space. 17. HOYA.

Anthers without a membranous inflexed tip. Pollen-masses 1 in each cell (10 in all), in pairs on the corpuscle, erect. Corolla-lobes valvate.

Corona double, corolline, lining the corolla-tube and forming minute processes in the sinus of its lobes, staminal annular.

Corolla rotate. Flowers white, small, in axillary umbels, lobes bearded. Pubescent twiners ... 18. LEPTADENIA.

Flowers large, solitary or in pairs. Corolla rotate, lobes broad acute. Erect shrub ... .. 19. FREREA.

### 1. HEMIDESMUS, Br.

Twiners. Leaves elliptic-linear. Flowers small, greenish-purple, in axillary, subsessile cymes. Sepals glandular within. Corolla rotate, reddish, lobes thick valvate. Coronal-scales 5, on the corolla-throat, thick. Stamens with the filaments distinct; tips of the anthers connate, inflexed, membranous. Appendages of the corpuscles dilated. Follicles slender, divaricate, smooth. Seeds tufted.

*H. indicus*, Br. in Mem. Wern. Sos. 1. 57; Fl. Br. I. 4. 5; Dalz. & Gibs. Bomb. Fl. 147. *Nannari*, Vern.; *Uparsal*, *sariva*, *anantamul*, M. Indian Sarsaparilla. *Sugankha-palada-gidda*.

Northern India from Banda to Oudh and south to Travancore and Ceylon. Throughout the presidency, common in hedges. Fl. throughout the year. The root is used as a substitute for sarsaparilla in Southern India.

### 2. CRYPTOLEPIS, Br.

Twiners. Leaves pale, glaucous beneath. Corolla-lobes yellow, linear, throat naked, tube short, inflated at the middle, lobes twisted to the left. Corona of five, fleshy scales, included within the tube. Stamens included, sagittate, with a tuft of hairs at the back. Pollen granular; appendages oblong. Follicles lanceolate, divaricate smooth. Seeds comose.

*C. Buchanani*, Roem. & Sch. Syst. IV. 409; Fl. Br. I. 4. 5; Brandis For. Fl. 330; Dalz. & Gibs. Bomb. Fl. 148. *Karanta*, Vern. *Kurbuntun balli*, K.

Throughout India from Kashmir to Assam and Burma and southwards to Ceylon. Common in hedges throughout the presidency. Fl. June-Aug. Fr. C. S. Bracts small, persistent. Outer bark dark-brown

papery, exfoliating in large or small sheets; inner bark white, with much milky juice. The leafy stems are tied on poles near threshing floors before the paddy is brought home from the rice stacks in North Kánara.

### 3. PERIPLOCA, Linn.

Erect or twining shrubs. Leaves lanceolate, minute or wanting. Flowers greenish externally, purplish within, in lax cymes. Corolla rotate; lobes bearded within, longer than the tube. Corona of five thick scales, connate into a 10-lobed ring, often produced in a long filiform arista. Filaments short, flat, free; anthers with a tuft of hairs at the back. Pollen grains in 4s; appendages of the corpuscles dilated. Follicles cylindric, smooth. Seeds comose.

*P. aphylla*. Dene. in Jacq. Voy. Bot. 109. t. 116; Fl. Br. I. 4. 12; Brandis For. Fl. 330. *Barrara, ransher, barai*, Vern.

South Persia, Arabia, Egypt, Afghanistan. Dry zone of the Western Punjab and Sind, outer Himalayas ascending to 3500 ft. altitude. Fl. Mch.-Apl. A leafless shrub common in Sind, where it is used for fuel and fodder for goats. The flower buds are eaten as a vegetable.

### 4. TOXOCARPUS, W. & A.

Woody climbers. Leaves opposite. Flowers small, in axillary cymes. Corolla-lobes overlapping to the left, tube short. Coronal-scales minute, adnate to the column. Anthers small, often inappendingulate. Pollen-masses minute, waxy. Stigma produced in a long beak. Follicles spreading, smooth. Seeds comose.

*T. Kleinii*, Wgt. & Arn. Contrib. 61; Fl. Br. I. 4. 14. Hills of the Deccan peninsula from the Konkan southwards. Fl. Br. I.

### 5. GENIANTHUS, Hook. f.

Climbers. Leaves opposite. Flowers small, in axillary cymes. Calyx minute. Corolla-lobes valvate, spreading and recurved, villous on the inner face. Corona of five scales, adnate to the column. Pollen-masses minute, waxy. Follicles terete, slender.

*G. laurifolius*, Hook. f. Fl. Br. I. 4. 16. *Toxocarpus crassifolius*, Dalz. & Gibs. Bomb. Fl. 148.

Sikkim Himalaya in hot valleys. On the Konkan and North Kánara gháts, in evergreen forests, common in the forests near the Nilkund and Gairsoppah gháts. Fl. Oct.-Dec. Fr. H. S.

### 6. CALOTROPIS, Br.

Erect shrubs. Leaves broad, subsessile. Flowers medium sized, cymose. Sepals glandular within. Corolla-tube broad, lobes ovate, valvate. Corona of five, compressed, fleshy appendages radiating from

a large staminal column, dorsally spurred. Anther-tips membranous, inflexed. Pollen-masses in pairs, waxy, pendulous. Stigma depressed, 5-angled or lobed. Follicles broad, ovoid. Seeds comose.

Flower buds, ovoid, angled.	Coronal appendages truncate	...	...	...	...	...	1. <i>C. gigantea</i> .
Flower buds hemispherical, not angled.	Coronal appendages acute	...	...	...	...	...	2. <i>C. procera</i> .

1. *C. gigantea*, Br. in Hort. Kew Ed. 2. II. 78; Fl. Br. I. 4. 17; Dalz. & Gibs. Bomb. Fl. 149; Brandis For. Fl. 331. *Madar, mudar*, M.; *Arka, akari, rowi*, Vern. Throughout India ascending to 3000 ft. in the Himalayas.

Throughout the presidency in dry, waste places; very common. Fl. throughout the year. Full of acrid, white juice. A large shrub easily distinguished from *C. procera*, by the coronal appendages which are shaped like mythological dolphins. In *C. procera*, the appendages are shaped like the prow of steamer. Yields a fine silky fibre which is up to this time difficult to prepare profitably.

2. *C. procera*, R. Br. in Ait. Hort. Kew Ed. 2. II. 78; Fl. Br. I. 4. 18; Dalz. & Gibs. Bomb. Fl. 149; Brandis For. Fl. 331. *Lalmandar, tambara, ak*, M.

Western and Central India from Sind and the Punjab to Mysore; common in the dry parts of the Belgaum district, associated with *C. gigantea*. Bark used in Sind for halters, lines and nets. Fl. Feb.-May. Fr. C. S.

#### 7. DÆMIA, Br.

Climbers. Leaves cordate. Flowers in axillary cymes, pedicels filiform. Corolla green, tube short, lobes large, broad, overlapping to the right. Corona of an outer annular, 5-10-crenate or lobed membrane and 5, compressed scales, adnate to the anthers and spurred behind with long subulate tips. Pollen-masses in pairs, pendulous, waxy. Follicles softly echinate.

*D. extensa*, Br. in Mem. Wern. Soc. 1. 50; Fl. Br. I. 4. 20; Dalz. & Gibs. Bomb. Fl. 150. *Utaran*, M.

Throughout India from the North-Western Himalayas to Lower Bengal and Ceylon, Burma. Throughout the dry districts of the Deccan; also in hedges in the Konkan, common in the Dhárwár district. Fl. apparently throughout the year. A foetidly smelling climber, yielding a fibre recommended as a substitute for flax.

#### 8. HOLOSTEMMA, Br.

Twining shrubs. Leaves membranous, cordate. Cymes axillary, of large purple flowers. Corolla-lobes thick, overlapping to the right. Corona 10-lobed, fleshy. Anthers large, horny, shining, cohering in a

10-winged column. Pollen-masses linear, falcate, compressed, pendulous; pedicels long, black. Stigma 5-winged. Follicles short, thick, smooth, acute.

*H. Rheedei*, Wall. Pl. As. Rar. II. 51; Fl. Br. I. 4. 21; Dalz. & Gibs. Bomb. Fl. 148. *Tultuli, shidori, dudurli*, M.

Tropical Himalayas from Sirmore to Sikkim, where it ascends to 3—5000 ft. altitude. Western Peninsula, from the Konkan southward. In the moist forests of the Konkan and North Kánara, often in hedges. Fl. July-Aug. Fr. C. S. Flowers edible. Root used as an application for ophthalmia. Bark yields a fibre.

9. **CYNANCHUM**, Linn.

Shrubs or herbs, erect or climbing. Leaves usually broad, cordate. Flowers small, green, in axillary cymes. Calyx 5-partite. Corolla rotate, lobes valvate or overlapping to the right. Corona adnate to the base of the column, cupular, with or without scales or tubercles on the inner face. Anthers sessile, or stipitate. Pollen-masses not compressed, pendulous, waxy. Stigma flat, umbonate or apiculate. Follicles terete or 2-winged, smooth. Seeds comose.

Leaves not glaucous beneath. Follicles terete ... 1. *C. pauciflorum*.  
 Leaves glaucous beneath. Follicles winged ... 2. *C. Callialata*.

1. **C. pauciflorum**, Br. in Mem. Wern. Soc. 1. 45; Fl. Br. I. 4. 23; Dalz. & Gibs. Bomb. Fl. 148.

Western Peninsula from the Konkan southwards to Travancore and Ceylon, Central Provinces. From the Konkan southwards, also in the Poona District. Fl. C. S.

2. **C. Callialata**, Ham. in Wgt. Contrib. 56; Fl. Br. I. 4. 24.

Behar, Western peninsula from the Konkan to Travancore, Burma.

From the Konkan southwards, common in the evergreen forests near the Nilkund ghát of North Kánara. Fl. Oct.-Dec. Fr. Jan.-Feb.

10. **SARCOSTEMMA**, Br.

Leafless, jointed shrubs with pendulous branches. Flowers small white, cymes in terminal umbels. Corolla rotate, lobes overlapping to the right. Corona membranous, cup-shaped, lobed, alternate lobes with large fleshy processes, adnate to the back of the anthers. Pollen-masses slender, pendulous, waxy. Stigma conical, fusiform. Follicles smooth, seeds comose.

Follicles thinly coriaceous. Seeds  $\frac{1}{2}$  inch, ovate ... 1. *S. brevistigma*.  
 Follicles thickly coriaceous. Seeds  $\frac{1}{2}$  inch, linear... 2. *S. Stocksii*.

1. **S. brevistigma**, Wight and Arnott's Contrib. 59; Fl. Br. I. 4. 26; Dalz & Gibs. Bomb. Fl. 149. *Somvel*, M.

Deccan peninsula, not uncommon in dry rocky places, Burma.

Throughout the Deccan in stony places. Fl. June.

2. *S. Stocksii*, Hook. f. Fl. Br. I. 4. 27. is found in Sind and *S. intermedium*, Dcne. Fl. Br. I. 4. 27; Dalz. & Gibs. Bomb. Fl. 27. *Phok*, M.

Common in the dry districts of the Deccan, abundant in the Gadag taluka of the Dhárwár District. Fl. July-Sept.

These jointed branched shrubs are not strictly forest species and are scarcely worth including in this work.

#### 11. GYMNEMA, R. Br.

Twining shrubs. Leaves opposite. Flowers small, in crowded umbellate cymes. Corolla rotate or urceolate, throat with 5 scales, alternating with the lobes. Anthers terminating with a membrane. Pollen-masses in pairs, erect. Stigma large, conical, clavate or capitate, exserted. Follicles slender or turgid, glabrous.

Fubescens. Leaves small, obovate, acute	...	1. <i>G. sylvestre</i> .
Glabrous or nearly so. Leaves large, coriaceous, ovate-oblong	... ..	2. <i>G. montanum</i> .

1. *G. sylvestre*, Br. in Mem. Wern. Soc. 1. 33; Fl. Br. I. 4. 29; Dalz. & Gibs. Bomb. Fl. 151. *Kawali, kali-kardori, vakhande*, M.

Central and Western Peninsula from the Konkan to Travancore.

Throughout the Presidency, common in hedges in the Dhárwár District, and also near the coast at Kárwár, North Kánara. Fl. June-Aug. Fr. Oct.-Nov.

The leaves of this plant when chewed remove the taste of bitters (quinine, etc.), also partially that of sweets like sugar.

2. *G. montanum*, Hook. f. Fl. Br. I. 4. 31. *Bidaria elegans*, Dalz. & Gibs. Bomb. Fl. 151.

Deccan peninsula on the higher gháts from the Konkan southwards.

#### MARSDENIA, R. Brown.

Twining shrubs. Leaves often cordate. Flowers medium-sized or small, in umbelliform cymes. Corolla campanulate, urceolate or salver-shaped, limb spreading, lobes overlapping to the right. Coronal-scales 5, sometimes auriculate, adnate to the anthers dorsally, erect. Pollen-masses 10, in stipitate pairs, erect. Stigma obtuse or beaked. Follicles lanceolate or poniard-shaped. Seeds comose.

*N. tinctoria*, Br. in Mem. Wern. Soc. 1. 30; Fl. Br. I. 4. 34; Brandis For. Fl. 332. *Asclepias tinctoria*, Roxb. Fl. Ind. 2. 43.

Eastern Bengal, Sikkim, up to 3000 ft. Burma. Cultivated in the Deccan. Fl. hot and rainy seasons.

A large twining shrub. Yields a very strong, valuable tenacious fibre. The leaves also yield indigo.



## 12. PERGULARIA, Linn.

Woody climbers. Leaves membranous. Flowers greenish, or yellowish-white, rather large, in interpetiolar cymes. Corolla salver-shaped, lobes oblong, overlapping to the right. Coronal-scales large, membranous, adnate to the back of the anthers, erect, simple or transversely bifid. Pollen-masses erect, or sub-cylindrical, clavate. Stigma capitate, longer than the anther-cells. Follicles ventricose-lanceolate, smooth. Seeds ovate, concave.

*P. pallida*, Wight & Arn. Contrib. 42; Fl. Br. I. 4. 38; Brandis For. Fl. 334.

Tropical Himalaya from Murree (5000 ft.) eastwards to Sikkim and southwards to Bombay and Central India. In the plains of the Deccan and in the scrub jungles, on the stony hills near Dhárwár. Fl. July-Aug.

*P. odoratissima*, L. West Coast or Primrose-Creeper is cultivated in gardens.

## 13. COSMOSTIGMA, Br.

A twining shrub. Leaves ovate or cordate. Flowers small, greenish, in axillary, racemose cymes. Corolla rotate. Coronal-scales adnate to the base of the anthers, erect broad, membranous, truncate or 2-fid. Pollen-masses obovoid, waxy, erect, pedicels long, flexuous. Stigma broad flat, 5-angled. Follicles large, linear-oblong, obtuse, smooth. Seed .75 in. long, broadly ovate, comose.

*C. racemosum*, Wight Contrib. 42; Fl. Br. I. 4. 46; Dalz. & Gibs. Bomb. Fl. 151. *Jati*, M.

Silhet, Chittagong and the Western gháts from the Konkan southwards to Ceylon. Throughout the Konkan and North Kánara, often in hedges. Fl. June-Aug. Fr. C. S.

## 14. DREGÆA, E. Meyer.

Twining shrubs. Leaves ovate or cordate, acuminate. Flowers green in axillary, umbelliform cymes. Corolla rotate. Coronal-scales 5, hemispheric, fleshy, adnate to the column, inner angle cuspidate, the tooth incumbent on the anthers. Pollen-masses erect, oblong, shortly pedicelled. Follicles thick, winged or ribbed, often yellow, mealy. Seeds comose.

*D. volubilis*, Benth. Gen. Pl. 775; Fl. Br. I. 4. 46. *Hoya viridiflora*, Br. Dalz. & Gibs. Bomb. Fl. 153. *Dori*, *ambri*, *herandori*, M.

Bengal, Assam and the Deccan peninsula from the Konkan southwards to Ceylon. Common on hedges throughout the presidency. Fl. Mch.-May. Fr. C. S. A tall climber. The variety "*lacuna*" with hoary or mealy pubescence is more common than the sub-erect velvety form var. *angustifolia*. Yields a very strong fibre.

15. **HETEROSTEMMA**, W. & A.

Twining shrubs. Leaves usually cordate, 3-5-nerved at the base. Flowers small, in umbelled cymes. Corolla rotate, lobes triangular, valvate. Corona of 5 large lobes, spreading from the column and lying flat on the corolla. Pollen-masses minute, broad, sessile, erect. Stigma included, truncate, 5-angled. Follicles slender, straight, terete, pericarp thin. Seeds comose.

*H. Dalzellii*, Hook. f. Fl. Br. I. 4. 48. *H. Wallichii*, Dalz. & Gibs. Bomb. Fl. 152.

The Konkan; at Vengurla and Málván, also in the Deccan near Poona. Fl. Aug.-Sept.

16. *Oianthus urceolatus*, Benth. *Heterostemma urceolatum*, Dalz. & Gibs. Bomb. Fl. 153, and *O. disciflorus*, Hook. f. Fl. Br. I. 4. 49, are twining under-shrubs of the Konkan gháts which Sir J. Hooker thinks are possibly abnormal forms of *Heterostemma*.

17. **HOYA**, Br.

Twining shrubs. Leaves thickly fleshy or very coriaceous. Flowers in axillary or terminal umbels. Calyx small, 5-partite. Corolla rotate, waxy, lobes 5, valvate in bud. Coronal-scales 5, stellately spreading, or ascending, turgid, laterally or vertically compressed, often concave on the upper surface, margins usually recurved so as to enclose a hollow space, the inner angle often produced into a tooth or spur which is erect or incumbent on the anther. Pollen-masses pedicelled, erect. Follicles usually slender, acuminate. Seeds with a long coma.

Leaves linear, very narrow, fleshy, glabrous, tip obtcordate.

Flowers sub-solitary, corona pink, lobes shorter than the corolla-tube ... .. 1. *H. retusa*.

Leaves broad, elliptic.

Nerves, distinct (when dry), horizontal.

Leaves long petioled, margins recurved (when dry).

Coronal-processes short, inflated ... .. 2. *H. Wightii*.

Nerves arching, distinct.

Leaves short petioled, often fascicled, margins flat.

Coronal-processes ovate, obtuse, concave above... 3. *H. ovalifolia*.

Leaves short petioled, not fascicled, margins recurved.

Coronal-processes ovate, inner angle spurred ... 4. *H. pendula*.

1. *H. retusa*, Dalz. in Hook. Kew Jour. Bot. IV. 294; Fl. Br. I. 4. 56; Dalz. & Gibs. Bomb. Fl. 153. *Jummaki*, *bendurki*; K.

On trees in the moist forests of the Konkan and North Kánara gháts, common in the forests near Yellápur. Appears to flower rarely and during the R. S. in July. Flowers purple.

2. *H. Wightii*, Hook. f. Fl. Br. I. 4. 59. *H. pallida*, Dalz. & Gibs. Bomb. Fl. 152.

Deccan peninsula from the Bombay gháts to the Nilgherries. On trees throughout the Konkan and North Kánara gháts, very common

on the Supa gháts. Fl. R. S., also in Jan. rarely. Fr. C. & H. seasons. Leaves usually short petioled. Petals reflexed.

3. *H. ovalifolia*, W. & A. Contrib. 37. Fl. Br. I. 4. 60. Neilgherry mountains and Mangalore, Ceylon, North Kánara.

4. *H. pendula*, Wgt. Icones. t. 474; Fl. Br. I. 4. 61; Dalz. & Gibs. Bomb. Fl. 152.

Deccan peninsula, Western gháts and the Neilgherry mountains, Konkan (hills of the Kolába District). Fl. R. & C. S.

#### 18. LEPTADENIA, Br.

Erect rigid, almost leafless or twining, glabrous, leafy shrubs. Leaves elliptic or ovate-cordate. Flowers small, in axillary crowded, umbelliform cymes. Corolla rotate; lobes bearded, valvate in bud. Corona double. Pollen-masses globose, sessile, erect. Stigma included, flat, 5-angled, 2-cuspidate. Follicles, acuminate, smooth. Seeds comose, flat, winged.

Twining. Leaves broad, coriaceous	...	...	1. <i>L. reticulata</i> .
Erect. Leaves linear, leathery or 0	...	...	2. <i>L. Spartium</i> .

1. *L. reticulata*, Wight. & Arn. Contrib. 47; Fl. Br. I. 4. 63; Dalz. & Gibs. Bomb. Fl. 152. *Khar-kodi*, M.; *Pala-kuda*, *shinguti*, *hodhi*, Vern.

Eastern Punjab and from Banda southwards through the Deccan peninsula, Ceylon. Common near the coast of the Konkan. Dalz. Throughout the dry Deccan districts, common near Dambal in the Dhárwár district. Fl. July-Aug. Fr. Sept.-Oct. Bark corky.

2. *L. Spartium*, Wight Contrib. 48; Fl. Br. I. 4. 64. *L. Jacquemontiana*, Dene. Dalz. & Gibs. Bom. Fl. 152. *Kip*, Vern.

Punjab and Sind, extending eastwards to the Jumna. On the sea-coast south of Gogha, very common in Sind, Dalz. Fl. Oct.

Fibre much used in Sind for the ropes used to draw water from wells. Water does not rot it. (Stocks.)

3. *H. ovalifolia*, W. & A. Contrib. 37; Fl. Br. I. 4. 60. Neilgherry mountains and Mangalore, Ceylon, North Kánara.

4. *H. pendula*, Wgt. Icones. t. 474; Fl. Br. I. 4. 61; Dalz. & Gibs. Bomb. Fl. 152.

Deccan peninsula, Western gháts and the Neilgherry mountains, Konkan (hills of the Kolába District). Fl. R. & C. S.

#### 19. FREREA, Dalz.

A fleshy, quite glabrous, erect shrub. Leaves oblong. Flowers large, solitary or in pairs, axillary. Corolla rotate, lobes acute, valvate. Corona annular round the column with five lobes alternating with 5 long, narrow processes inflexed over the anthers. Pollen-masses short, erect. Follicles terete, smooth. Seeds comose.

*F. indica*, Dalz. in Jour. Linn. Soc. VIII. 10. t. 3; Fl. Br. I. 4. 76. The Konkan, near Hewra, 3000 feet. alt., Dalz.

Cultivated in the garden of the Poona Coll. of Science in 1898 by Mr. Woodrow. Fl. R. S.

#### ORDER 61. LOGANIACEÆ.

Trees, shrubs often climbing, or herbs. Leaves opposite, simple, generally connected by interpetiolar stipules or a raised line. Inflorescence cymose. Flowers regular. Calyx inferior, 4-5-toothed. Corolla 4-5-lobed. Stamens 4-5, on the corolla tube and alternate with its lobes. Ovary free 2-celled, style simple, stigma often 2-lobed, ovules 1 or more in each cell. Fruit a capsule or berry, 1 to many seeded. Albumen copious.

Corolla imbricate.	Capsule 2-valved	...	...	1. BUDDLEIA.
Corolla contorted.	Fruit indehiscent	...	...	2. FAGRÆA.
Corolla valvate.	Fruit indehiscent	...	...	3. STRYCHNOS.

##### 1. BUDDLEIA, Linn.

Small trees or shrubs, often mealy or woolly tomentose. Leaves opposite, simple, united by a stipulary line. Flowers axillary or in terminal panicles, tetramerous. Calyx campanulate, 4-merous. Corolla-lobes imbricate in bud. Stamens 4, anthers nearly sessile. Ovary 2-celled; style linear; ovules many in each cell. Capsule septicidally 2-valved, leaving a free dissepiment in the centre. Seeds small, many, testa usually loose or expanded into a wing or tail; albumen fleshy.

*B. asiatica*, Lour. Fl. Cochinch. 72; Dalz. & Gibs. Bom. Fl. 180; Fl. Br. I. 4. 82; Brandis For. Fl. 318; Bedd. Fl. Sylv. 163; Gamble Ind. Timbers, 266.

Throughout India, ascending to 7000 ft., China and Indian Archipelago, not known in Ceylon. Throughout the presidency; common along the banks of nálas and ravines, also in deciduous forests. Fl. Jany.-Apl. Fr. June.

A large evergreen shrub. Bark thin, grey. Wood grey, moderately hard. Annual rings marked by a belt of closely-packed pores. Pores small, scanty. Medullary rays fine, numerous. Weighs 44 lbs. to the cub. ft. An ornamental garden plant with white fragrant flowers.

##### 2. FAGRÆA, Thunb.

Trees or scandent shrubs, often epiphytic. Leaves entire; petioles dilated at the base, or united by a stipulary sheath. Flowers white, bracteate, large or small, in axillary or terminal cymes. Calyx-lobes thick, broad, imbricate. Corolla with a long tube; lobes 5, twisted to the left. Stamens 5. Ovary 2-celled; style filiform, stigma capitate, ovules many in each cell. Berry with many seeds immersed in pulp. Albumen horny.

*F. obovata*, Wall. Cat. 1595; Fl. Br. I. 4. 83; Bedd. Fl. Sylv. 164  
*F. coromandeliana*, Bedd. Fl. Sylv. t. 244. *Menakalli*, *hannachalle*, K.

Deccan peninsula and Ceylon alt. 0-6000 ft., Khasia Mts. 0-4000 ft., Bhotan, and the Malay peninsula. In the evergreen forests of the Konkan and North Kánara. Fl. R. S. Fr. C. S.

A climbing epiphyte, throwing out branched roots at intervals on the host stem, like a *Ficus*. Stems about 3 in. in diameter. Bark smooth, dark grey, lenticellate; inner white. Host plant often *Terminalia paniculata*. Wood reddish, moderately hard, close-grained, smooth. Pores small, sometimes in short radial lines. Medullary rays fine and very fine, numerous. Weighs 46 lbs. to the cub. ft.

### 3. STRYCHNOS, Linn.

Trees or scandent shrubs with short tendrils. Leaves entire, 3-5-nerved. Flowers axillary or terminal, pentamerous. Corolla tubular or funnel-shaped, lobes valvate. Stamens in the throat of the corolla. Style filiform, stigma capitate; ovules many, on fleshy placentas. Fruit a berry, seeds compressed, immersed in pulp. Embryo eccentric, albumen cartilaginous.

Scandent, climbing shrubs.

Ovary hairy above. Fruit ovoid, small, 1-2-seeded. 1. *S. colubrina*.

Ovary glabrous. Fruit large, many-seeded ... 2. *S. Dalzellii*.

Trees.

Fruit black, 1-seeded,  $\frac{3}{4}$  in. in diam. ... 3. *S. potatorum*.

Fruit orange, many-seeded, 2-4-in. in diam. ... 4. *S. Nux-vomica*.

1. *S. colubrina*, Linn. Sp. Pl. 271; Fl. Br. I. 4. 87; Dalz. & Gibs. Bomb. Fl. 155; Bedd. Fl. Sylv. 163. *Kanal*, *kajer bel*, M.; *Goagarilakei*, Bomb.

Western peninsula on the gháts from the Konkan to Cochin.

In the evergreen forests of the Konkan and North Kánara gháts, common in the forests near the Tinai ghát and near Suntgal, Kumta táluka. Fl. Oct.-Jan. Fr. Jan.-Mch.

Stems 3 in. in diam. at base. Bark smooth (no spines), thick, inner reddish-brown. A lofty climber with simple tendrils, thickened upwards, and glabrous. Wood used in native medicine.

2. *S. Dalzellii*, C. B. C. Fl. Br. I. 4. 87. *S. axillaris*, Coleb. Dalz. & Gibs. Bomb. Fl. 155.

Western Peninsula, Konkan, Malabar and the Bababuden hills. Fl. Jany. A large climber with clavate ferruginous pubescent tendrils. I am not quite certain we have this species in the Bombay Presidency.

3. *S. Nux-vomica*, Linn. Roxb. Fl. Ind. Ed. Carey & Wall. II. 261. Fl. Br. I. 4. 90; Dalz. & Gibs. Bomb. Fl. 155; Bedd. Fl. Sylv. t. 243; Brandis For. Fl. 317. *Kasarkana*, K.; *Karo*, M.; *Kajra*, Vern.

South India, Burma, Bengal. Throughout the presidency in moist forests, very common in the Konkan and North Kánara. Fl. Mch.-Apl. Fr. ripe at various times throughout the year.

A large deciduous tree, attaining 100 ft. in height, spinous, sometimes without spines. Bark thin, grey, smooth or rough with minute open lenticels, sometimes exfoliating in thin, curly scales. Green cells developed. Wood brownish grey, hard, durable with a bitter taste. Pores of 2 classes, large branched ducts and small pores in irregular ramified or branched patches, joined by concentric, irregular bands of white tissue. Medullary rays moderately broad and fine, distinct. Weighs 60 lbs. to the cub. ft. Seeds yield the poisonous alkaloid strychnia. This tree is common on laterite along the sea-coast where it exists protected by its poisonous qualities. The Haigas in North Kánara do not use the branches of this tree for leaf manure as the strong, sharp, short axillary spines wound the feet of the cattle in the cattle sheds.

4. *S. potatorum*, Linn. f. Suppl. 148; Fl. Br. I. 4. 90; Dalz. & Gibs. Bomb. Fl. 156; Bedd. Fl. Sylv. 163; Brandis For. Fl. 317. Clearing Nut Tree. *Nermali, gajrah*, Vern.; *Nivali*, M.; *Chili gidda*, K.; *Chelbiga* (seeds).

Southern India, Bengal and Central Provinces. In the Southern Marátha Country, Belgaum District, and in other parts of the presidency in dry forests. Fl. hot season in beginning of May. Fr. C. S.

A moderate-sized tree. Bark black, cracked and scaly. Wood white, turning yellowish grey on exposure, hard, close-grained. No heartwood. Pores: a few large filled with a white shining substance, and small pores in irregular branched patches. Medullary rays moderately broad and fine, very distinct, crossed by concentric broad lines of light coloured tissue. Weighs about 60 lbs. to the cub. ft. Used for carts, agricultural implements, etc. Seeds used for clearing muddy water.

## ORDER 62. BORAGINEÆ.

Herbs, shrubs or trees. Leaves usually alternate, entire. Inflorescence definite; flowers usually in scorpioid cymes, rarely solitary and axillary. Calyx inferior, teeth 4—6, valvate in bud, usually persistent in fruit. Corolla gamopetalous, often with scales in the throat, lobes as many as those of the calyx. Stamens inserted in the corolla-tube, as many as the corolla-lobes and alternate with them. Ovary free, of 2 carpels, 2-ovuled, or 4, 1-ovuled; style terminal or from between the ovary-lobes. Fruit drupaceous or dividing into 2-4-nutlets. Albumen 0 or scanty.

Style twice bifurcate	...	...	... 1. CORDIA.
Style 2-fid.	...	...	... 2. EHBETIA.
Style 1, stigma capitate	...	...	... 3. RHABDIA.

### 1. CORDIA, L.

Trees or shrubs. Leaves alternate, petioled. Flowers often polygamous in terminal or leaf opposed cymes, ebracteate. Calyx tubular or campanulate, teeth short, in fruit accrescent. Corolla funnel-shaped; lobes 4-8. Stamens 4-8, filaments often hairy at the base. Ovary

4-celled, glabrous; style terminal, twice bipartite. Drupe ovoid, endocarp bony, often perforated at the apex, cells 4 or fewer by abortion. Albumen 0.

- Leaves alternate, 3-5-nerved at the base, without white disks. Calyx ribbed or not.
- Leaves ovate, rough, glabrous, not tomentose beneath. Cymes lax, glabrous ... .. 1. *C. Myxa*.
- Leaves white, tomentose beneath, glabrous above. Cymes lax, glabrous ... .. 2. *C. Wallichii*.
- Leaves small, alternate, 3-nerved, with white disks above, scabrous, beneath villous or glabrescent. Cymes small, tomentose ... .. 3. *C. monoica*.
- Leaves sub-opposite, feather-veined, small, narrow, scabrous or glabrescent above, glabrescent beneath. Berry small ... .. 4. *C. Rothii*.
- Leaves alternate, broad, cordate, ovate, densely tomentose beneath, feather-veined, or 3-5 nerved at the base. Cymes short, tomentose. Calyx ribbed. Berry medium sized ... .. 5. *C. Macleodii*.
- Leaves alternate, scabrid above with white disks, hard tomentose beneath, margin repand, base cuneate. Cymes tomentose ... .. 6. *C. fulvosa*.

I have followed Brandis and others in uniting *C. Myxa*, L., and *C. obliqua*, Willd. *C. Wallichii*, G. Don., I have kept distinct from *C. obliqua*, Willd., of which species it is made a variety in the Fl. Br. I. The dense tomentum of the leaves is constant and appears to be a specific character.

1. *C. Myxa*, Linn. Fl. Br. I. 4. 136; Dalz. & Gibs. Bomb. Fl. 173; Brandis For. Fl. 336; Bedd. Fl. Sylv. 165. *C. obliqua*, Willd. I. Fl. Br. 4. 137; Dalz. & Gibs. Bomb. Fl. 173. *C. latifolia*, Roxb. Dalz. & Gibs. Bomb. Fl. 173; Rheede Hort. Mal. 4. t. 37. *Chella*, K; *Shelu*, *sherti*, *chokri*, M.; *Bhokur vargund*, Vern.; *Lessuri*, *giluri*, Sind. Fruit sebesten.

Salt range, sub-Himalayan region from the Chenab to Assam, Khasia Hills, Bengal, Burma, Sind, Western, Central and Southern India.

Throughout the presidency, in deciduous forests, also in Sind. Fl. Meh.-Apl. Fr. June-Sept.

A moderate sized deciduous tree. Bark dark coloured, rough fissured. Wood grey, moderately hard, strong, and seasons well. Pores large and small. Medullary rays alternately broad and fine crossed by close, broad lines of light coloured tissue. Weighs about 40 lbs. to the cub. ft. Used for boat-building, agricultural implements, etc.

The mucilaginous fruit is used in medicine, it is also eaten by natives.

2. *C. Wallichii*, G. Don.; Brandis For. Fl. 337; Dalz. & Gibs. Bomb. Fl. 174; Bedd. Fl. Sylv. t. 245. *C. obliqua*, Willd. var. *Wallichii*, Fl. Br. I. 4. 137. *Burgund*, *duhiwur*, Vern.; *Geduri*, Sind; *Sepistan*, *pistan*, Guz.; *Buralessura*, Hind.

Western peninsula and Mysore. Common in Guzerat and in the drier districts of the presidency, also in the Mundgod sub-division of North Kánara in deciduous forests. Fl. Dec.-Jany. Fr. Apl.-May. Leaves

tomentose beneath. Calyx ribbed, fruit long acuminate. A moderate sized tree.

3. *C. monoica*, Roxb. Fl. Ind. Ed. Carey & Wall. II. 334; Fl. Br. I. 4. 137; Bedd. Fl. Sylv. 166; *C. polygama*, Bedd. For. Man. 166. Grab. Cat. Bomb. Pl. 136.

Deccan peninsula from Orissa and the Central Provinces to Ceylon.

In the dry districts of the Deccan near Bádámi, Bijápur Collectorate, on sandstone. Fl. Aug.-Sept. A small or moderate sized tree.

4. *C. Rothi*, Roem & Schul. Syst. IV. 798; Fl. Br. I. 4. 138; Dalz. & Gibs. Bomb. Fl. 174; Bedd. Fl. Sylv. 166; Brandis For. Fl. 338; *C. angustifolia*, Roxb. (not of Roem & Schul.) *Gund, gundni*, Vern.; *Lijar, Liai*, Sind.

Dry zones of the North-West, Central and Southern India, plentiful in Rajputana. Throughout the dry districts of the presidency; often planted and self-sown along the bunds of tanks and near villages. Fl. Apl.-June. Fr. C. S. A small tree. Bark grey with deep furrows.

Wood grey, compact, hard. Pores small, often subdivided. Med. rays fine and moderate-sized. Weighs 42 lbs. to the cub. ft. Used in Sind for building purposes and in Cutch for agricultural implements.

5. *C. Macleodii*, Hook. f. & T. in Jour. Linn. Soc. II. 128; Fl. Br. I. 4. 139; Brandis For. Fl. 337. *Dhawan, Sátára; Hadang, K.; Daiwas, dhaim, chote, M.*

Central India, Konkan and Belgaum; common on the Bababuden hills of Mysore at 3000 ft. alt. in dry forests.

Commonly planted along roadsides in the southern drier districts of the presidency, also in the forests of North Kánara, Belgaum and the Konkan. Fl. Mch.-April-May. Fr. cold season. Leaves and inflorescence densely tawny tomentose.

A tree. Attains 30—40 ft. in height by 2 ft. in diameter. Bark smooth, white, soft. Wood hard, light or dark brown, mottled, smooth, tough, elastic. Pores large or small, closed in irregular, concentric bands of white tissue. Medullary rays short, broad and fine, prominent. Weighs about 50 lbs. to the cub. ft. Used for the construction of country carts. This species has become rare in the Halyal sub-division of North Kánara owing to the large demand for the timber for cart-building purposes. An excellent wood.

6. *C. fulvosa*, Wight Ic. t. 1380; Fl. Br. I. 4. 140; Bedd. Fl. Sylv. 166. *Kurwesh, K.*

Western Deccan peninsula. Konkan and Belgaum in dry forests. Fl. July-Aug. Leaves very scabrous above with white, small disks. A small tree.

## 2. EHRETIA, Linn.

Trees or shrubs. Leaves alternate, entire or toothed. Flowers small, in axillary or terminal panicles, rarely solitary. Calyx deeply



5-divided. Corolla rotate, lobes imbricate in bud. Stamens 5, on the corolla-tube; anthers usually exerted. Ovary 2-celled; style terminal, cylindric, bifid or bipartite; stigmas small, capitate; cells 2-ovuled. Fruit a 1-4-seeded drupe.

Flowers in axillary and terminal corymbose cymes.

Style single, bifid; pyrenes 4.

Leaves elliptic, ovate, glabrous. Flowers sessile;  
corolla slightly exceeding the calyx ... .. 1. *E. lævis*.

Leaves obovate, oblong, obtuse, hairy. Flowers pedicellate; corolla twice the calyx ... .. 2. *E. obtusifolia*.

Flowers on axillary 1-few flowered peduncles. Styles

2, undivided. Pyrenes 1.

Leaves small, fasciated ... .. 3. *buxifolia*.

1. *E. lævis*, Roxb. Cor. Pl. t. 55; Fl. Br. I. 4. 141; Dalz. & Gibs. Bomb. Fl. 170; Bedd. Fl. Sylv. t. 246; Brandis For. Fl. 340. *Adak bagari*, K.; *Datrang*, M.; *Tamboli*, Vern.; *Ohambul*, Sind.

Throughout tropical and sub-tropical India. Throughout the Bombay presidency in deciduous forests. The variety *canarensis*, is common in the Konkan and North Kánara in the ghát forests. Fl. Jany-July. Fr. ripe March-June.

A small or moderate tree. Bark grey, thick, smooth, scaly; inner white, soft, without fibres. Wood greyish-white, hard, tough, durable. Annual rings distinct. Pores small in groups or radial lines. Medullary rays fine or very fine, short, distinct. Weighs about 40 lbs. to the cub. ft. Used for agricultural implements and building purposes.

2. *E. obtusifolia*, Hochst.; A. DC. Prodr. IX. 507; Fl. Br. I. 4. 142; Brandis For. Fl. 340.

Sind, Punjab; in the salt range; Rajputana. A shrub, differs from *E. lævis*, var. *aspera*, in the narrowed base of the leaves and the larger flowers in more lax corymbs. Wood similar in structure to that of *E. lævis*.

3. *E. buxifolia*, Roxb. Cor. Pl. 142, t. 57; Fl. Br. I. 4. 144; Bedd. Fl. Sylv. 167. *Pala*, M.

In the dry forests of the Deccan; common on the stony hills near Dhárwár. Fl. Mch. Fr. ripe June-July. A small shrub.

### 3. RHABDIA, Mart.

Shrubs. Leaves small, alternate or clustered. Flowers small, in few-flowered racemes. Calyx 5-divided. Corolla pink, tube short, limb 5-lobed, lobes imbricate in bud. Stamens 5, on the corolla-tube. Ovary 2-celled; style undivided. Fruit a drupe with 4, 1-seeded pyrenes. Seeds albuminous.

*R. lycioides*, Mart. Nov. Gen. & Sp. II. 137. t. 195. *R. vininea*, Dalz. & Gibs. Bomb. Fl. 170; Brandis For. Fl. 341.

India from Kumaon and Assam to Ceylon and Temnaserim, on gravelly banks flooded by rapid streams. Fl. Br. I.

Common in the b3ds of the Konkan and North Kánara rivers. Fl. Oct.-Dec. Fr. Jany. Fruit size of a pea, orange coloured. A small shrub.

ORDER 63. **CONVOLVULACEÆ.**

Shrubs or herbs, usually twining. Leaves alternate. Flowers cymose, bracteate, 1 or more together, regular, hermaphrodite, often showy. Calyx deeply 5-lobed, persistent, sometimes enlarged in fruit. Corolla usually campanulate or funnel-shaped; limb shortly or deeply lobed, often 5-plaited in bud. Stamens 5, on the corolla-tube. Ovary superior, carpels 2, 2-celled or by false dissepiments 4-celled; style 1, rarely 2, stigma capitate 2-lobed, or 2-branched; ovules 2 in each carpel. Fruit indehiscent, 2-4-valved or breaking up irregularly, 2-4, rarely 1-seeded. Seeds erect, albumen 0.

- Fruit indehiscent. Bracts inconspicuous.  
 Flowers small, nearly rotate, tube short. Ovary 1-celled. Stigma globose, sub-sessile. Fruit a fleshy, 1-seeded berry ... .. 1. ERYCIBE.  
 Flowers large, funnel-shaped. Ovary 4-celled.  
 Corolla large, white. Stigmas 2, linear-oblong.  
 Fruit indehiscent or irregularly breaking up.  
 Seeds glabrous ... .. 2. RIVEA.  
 Corolla large, purple or rose. Stigmas 2, sessile globose.  
 Fruit baccate or nearly dry, hard or papery.  
 Seeds glabrous or closely tomentose ... 3. ARGYREIA.  
 Flowers small or medium-sized. Corolla tubular, funnel-shaped. Ovary 2-celled. Fruit a 1-4-seeded berry ... .. 4. LETTSOMIA.  
 Fruit a 2-4-celled capsule or fragile and breaking up. Bracts small, deciduous.  
 Style simple. Stigmas 2, globose or 2, short, oblong.  
 Flowers of different sizes, purple, white or yellow. Sepals not enlarged in fruit.  
 Stigmas 2, globose. Capsule 2-4-celled ... 5. IPOMŒA.  
 Flowers small, white. Sepals enlarged in fruit. Stigma simple or 2-lobed. Capsule 1-seeded ... .. 6. PORANA.  
 Styles 2, nearly distinct from the base. Stigmas capitate.  
 Flowers medium-large, white. Sepals somewhat enlarged in fruit. Capsule globose, splitting into vertical segments, 4-seeded . 7. BREWERIA.  
 Fruit a small 4-valved, 1-seeded capsule, situated in the centre of a large membranous, orbicular, veined bract.  
 Corolla small, campanulate. Styles 2, separate from the base ... .. 8. NEUROPELTIS.

1. ERYCIBE, Roxb.

Climbing shrubs. Leaves coriaceous, evergreen. Sepals sub-equal, orbicular, coriaceous, adpressed to base of fruit. Corolla with a short

tube, lobes bifid, plaited in bud. Stamens at the base of the corolla tube. Ovary 1-celled with 4, erect ovules. Fruit a fleshy, 1-seeded berry; cotyledons plicate.

*E. paniculata*, Roxb. Fl. Ind. I. 585; Br. Fl. I. 4. 180; Dalz. & Gibs, Bomb. Fl. 169; Brandis For. Fl. 344. Var. *Wightiana*. *E. Wightiana*. Dalz. & Gibs. Bomb. Fl. 170; Brandis For. Fl. 344. *Ankole, sengar bally*, K.

Throughout India from Oudh eastwards and southward to Ceylon, ascending to 4000 feet in the Himalayas. Throughout the presidency. The variety *Wightiana*, is common in the moist forests of the Konkan and North Kánara. Fl. June-Dec. Fr. ripe March onwards.

Fruit black, fleshy, shining glabrous, ellipsoid, 1 in. long, supported by the rusty-pubescent, 5-lobed calyx. Cotyledons crumpled.

## 2. RIVEA, Chois.

Climbers. Leaves cordate, silky beneath, petiole long. Flowers few 1-3, on axillary peduncles. Sepals ovate or oblong, sub-equal. Corolla large, white, with a long cylindrical tube and a wide-mouthed, plaited limb. Stamens included. Ovary 4-celled, 4-ovuled; disk annular; stigmas linear, oblong. Fruit indehiscent or irregularly breaking up, shining, nearly dry, sub-globose. Seeds 1-4, in mealy pulp.

Leaves white-tomentose beneath. Corolla silky outside. 1. *R. ornata*.

Leaves silky beneath. Corolla glabrescent without ... 2. *R. hypocrateriformis*.

1. *R. ornata*, Chois. Convolv. Or. 27. t. 3; Fl. Br. I. 4. 183; *Argyreia ornata*, Brandis For. Fl. 343. Dalz. & Gibs. Bomb. Fl. 168; *Lettsonia ornata*, Roxb. Fl. Ind. I. 496. *Phand*, M.

Western peninsula in dry forests from Lahore to Mysore.

Throughout the presidency in deciduous forests, not common. Fl. R. S.

2. *R. hypocrateriformis*, Chois. Convolv. Or. 26; Fl. Br. I. 4. 184; Dalz. and Gibs. 168. *R. bona-nov*, Roxb.; Dalz. and Gibs. Bomb. Fl. 168. *R. fragrans*, Nimmo. Grah. Cat. Bomb. Pl. 127. The Midnapore Clove-scented Creeper. *Kulmiluta*, Vern.

Dry forests of Western India from Lahore to Mysore, also in Assam.

Common in hedges and in dry forests throughout the presidency. Fl. R. S. Fr. ripe Sept.-Oct. Flowers sweet-scented.

## 3. ARGYREIA, Lour.

Large twining shrubs. Leaves silky or pubescent beneath. Flowers large, purple, or rose, rarely white in axillary cymes. Sepals from orbicular to lanceolate, sub-equal, or the inner smaller, adpressed to the fruit, of the enlarged. Corolla usually campanulate. Stamens includ-

ed. Ovary completely 4-celled, 4-ovuled; disk annular; style filiform, stigmas 2, globose. Fruit indehiscent, baccate or nearly dry, hard or papery, 4-1-seeded.

- Climbing, scandent or prostrate, creeping shrubs.
- |   |                            |
|---|----------------------------|
| Leaves broad, cordate, glabrous above, white tomentose beneath. Bracts deciduous, softly woolly ... ..  | 1. <i>A. speciosa</i> .    |
| Leaves elongate, usually rounded at the base, glabrescent beneath. Bracts large, persistent, unequal, glabrescent or sparsely hairy beneath.          | 2. <i>A. involucrata</i> . |
| Leaves broad, ovate, cordate, hispid above, densely white silky beneath. Bracts with 3-5 basal nerves, densely white silky beneath, persistent ... .. | 3. <i>A. sericea</i> .     |
| Leaves acute, fulvous strigose beneath, scabrous above. Bracts linear, persistent, bristly ...  | 4. <i>A. pilosa</i> .      |
| Leaves elliptic, acute, base rhomboid, softly strigose on both surfaces. Bracts narrowly oblong ... ..  | 5. <i>A. Lawii</i> .       |
| Suberect. Leaves obovate, villous beneath. Bracts deciduous, small. Flowers bright purple ...   | 6. <i>A. cuneata</i> .     |

1. *A. speciosa*, Sweet. Hort. Brit. Ed. 2, 373; Fl. Br. I. 4. 185; Dalz. and Gibs. Bomb. Fl. 168; Brandis For. Fl. 343. Elephant Creeper. *Samudra-shoka*, *guguli*, Vern.

Found all over India from Assam to Belgaum and Mysore.

Throughout the presidency, common near the coasts of the Konkan and North Kánara, in moist forests and open places near villages. Fl. Aug.-Sept. Fr. Dec. A large woody climber, distinguished easily by the white, silky undersides of the large, cordate, acuminate leaves and the large, white leafy bracts.

2. *A. involucrata*, Clarke; Fl. Br. I. 4. 187; var. *inequalis*.

Western peninsula, Konkan and the Bababuden hills. Near the coasts of the Konkan and North Kánara; very common near Kárwár in open places. Fl. July-Aug. Fr. Nov.-Dec. Leaves often purple-coloured. The large, unequal bracts are characteristic. A twining or prostrate shrub.

3. *A. sericea*, Dalz. and Gibs. Bomb. Fl. 169; Fl. Br. I. 4. 188. *Ipomœa bracteata*, Grah. Cat. Bomb. Pl. 131. *Gavel*, M.

Malabar gháts and the Konkan, frequent.

Konkan and North Kánara, in moist forests. Fl. Sept.-Oct. Fr. C. S. A prostrate or twining shrub, rare in the forests near Yellapore, North Kánara. The specimens in my herbarium have the bracts with 3-5 basal parallel nerves.

4. *A. pilosa*, Arn. Pugill. Pl. Ind. Or. 38; Fl. Br. I. 4. 189. *Ugri balli*, K.

Western Deccan peninsula, the Konkan, Kánara and Mysore.

Throughout the Konkan and North Kanára, very common in the forests near Yellápur, in moist shady places, also near the banks of nálas. Fl. Sept.-Oct. Fr. Oct.-Nov.; often procumbent. Corolla dark red or purple.

5. *A. Lawii*, C. B. C., Fl. Br. I. 4. 190.

The Konkan, Malabar, Bababuden Hills. Fl. Br. I.

6. *A. cuneata*, Ker in Bot. Reg. t. 661; Fl. Br. I. 4. 191; Dalz. & Gibs. Bomb. Fl. 169; Brandis For. Fl. 344. *Kalkuka gidda*, K.

Deccan peninsula, common. Throughout the dry districts of the presidency, common and often gregarious in open situations, sometimes twining when it meets with support, but usually an erect shrub. Fl. Aug.-Sept. Fr. C. S. Flowers used in religious ceremonies.

#### 4. LETTSOMIA, Roxb.

Scandent more or less hairy shrubs. Leaves with a rounded or cordate base. Flowers in peduncled, axillary, dense cymes. Sepals orbicular, elliptic or oblong, in fruit somewhat thickened or enlarged. Corolla funnel-shaped, limb plaited in bud. Stamens included or exerted. Ovary 2-celled, 4-ovuled. Disk annular. Fruit a dry, indehiscent berry, 1-4-seeded.

Corolla small. Stamens exerted.

Fruiting calyx within and fruit red ... 1. *L. aggregata*.

Corolla comparatively large. Anthers included.

Leaves elliptic. Corolla glabrous. Fruit dark orange ... 2. *L. elliptica*.

Leaves ovate, cordate. Corolla densely hairy.

Fruit red ... 3. *L. setosa*.

1. *L. aggregata*, Roxb. Fl. Ind. I. 488; Fl. Br. I. 4. 191. *Argyreia aggregata*, Choisy; Dalz. & Gibs. Bomb. Fl. 169. *Buden balli*, K.

Deccan peninsula frequent. Dry districts of the presidency, very common in hedges in the Belgaum and Dhárwár Districts and in the drier parts of North Kanára. Fl. Aug.-Sept. Fr. Jany.-Feb.

Stem 2 in. in diameter, fluted. Bark smooth, thin. Wood consisting of rings, often not complete, of harder light tissue, containing very large simple or divided pores. Surrounding this lighter coloured tissue are narrow concentric bands of soft dark coloured medulla without pores. Each ring of hard tissue is traversed by a number of broad, brown rays joining the bands of brown medullary tissue.

2. *L. elliptica*, Wight, note to Icones t. 1356; Fl. Br. I. 4. 192. *Argyreia elliptica*, Choisy; Dalz. & Gibs. Bomb. Fl. 169. *Bondwail*, Vern.; *Sonariel*, *khedari*, M.

Deccan peninsula, Ceylon.

On the Konkan and North Kanára gháts in moist forests, common in the Supa ghát jungles. Fl. Oct.-Nov. Fr. Dec.-Feb.

3. *L. setosa*, Roxb. Fl. Ind. I. 490; Fl. Br. I. 4. 194. *Argyreia setosa*, Choisy; Brandis For. Fl. 343; Dalz. & Gibs. Bomb. Fl. 168.

Throughout tropical and sub-tropical India from Oudh, and Bombay to Pegu, Ceylon.

Throughout the Presidency, common in the Konkan and North Kánara from the coast, inland. Fl. Oct.-Jany. Fr. Feb.-Mch.

#### 5. IPOMŒA, Linn.

Herbs, rarely shrubs, twining or prostrate. Leaves entire, lobed or digitate. Sepals ovate or linear, equal or unequal. Corolla bell or funnel-shaped, limb 5-plaited. Stamens unequal, included or exerted, not connivent over the ovary. Ovary 2-celled, 4-ovuled, rarely 4-celled, 4-ovuled or 3-celled, 6-ovuled. Fruit a dry dehiscent capsule. Seeds as many as or fewer than the ovules.

Seeds villous, furred or woolly.

Corolla large, salver-shaped, white, tube very long.

Leaves large, cordate. Seeds softly villous ... 1. *I. grandiflora*.

Corolla usually medium-sized, coloured purple, pink or white.

Leaves cordate, 5-7-palmately lobed. Flowers many, on long peduncles, not umbelled.

Corolla campanulate, pink purple. Seeds

with long wool ... 2. *I. digitata*.

Leaves cordate, entire or sinuate. Flowers on long peduncles, pedicels sub-umbelled.

Corolla-tube cylindric, mouth suddenly

widened, pink, purple within. Seeds furred. 3. *I. sepiaria*.

Leaves shallowly cordate. Panicles many-flowered. Corolla small, campanulate, purplish-white.

Seeds with short, silky hairs...

4. *I. staphylina*.

Leaves cordate, acute. Panicles large, many-flowered. Corolla large, campanulate, white

with a purple centre. Seeds with long, brown,

silky hairs ... 5. *I. campanulata*.

Leaves cordate or hastate, elliptic, acute.

Cymes few-flowered, compact. Corolla tubular,

pure white. Seeds with stiff patent

hairs ... 6. *I. cymosa*.

Seeds glabrous.

Leaves ovate or oblong, cordate or obtuse. Cymes few-flowered. Corolla large, white tubular-

campanulate ... 7. *I. Turpethum*.

Leaves cordate, palmately-lobed, hairy. Peduncles

1-7-flowered. Corolla middle-sized, yellow.

8. *I. vitifolia*.

Seeds villous, margins woolly.

Leaves digitate nearly to the base. Peduncles

few-flowered. Corolla large, purplish ... 9. *I. palmata*.

1. *I. grandiflora*, Lamk. Ill. 1. 467; Fl. Br. I. 4. 198.

Western Deccan peninsula, Ceylon.

North Kánara, in moist forests and along the banks of nálas, very rare. Fl. R. S. Oct. A large twining shrub. Stems muricate.

2. *I. digitata*, Linn.; Meissn. in Mart. Brasil. VII. 278. *Batatus paniculata*, Dalz. & Gibs. Bomb. Fl. 167. *Bhuikohola, vidarikand*, M.

Tropical India from Bengal and Assam to Ceylon, not in the drier zone of Western India. Throughout the Konkan and North Kánara, common near the sea-coast in moist forests. Fl. R. S., Aug.-Sept. A large twining shrub.

3. *I. sepiaria*, Koen.; Roxb. Fl. I. 1. 500; Dalz. & Gibs. Bomb. Fl. 166. *Ami*, M.

Throughout India, Malay Peninsula and Ceylon. Throughout the presidency, common in the Konkan and North Kánara in hedges near the sea-coast. Fl. R. S. A perennial twining shrub.

4. *I. staphylina*, Roem. & Sch. Syst. IV. 249; Fl. Br. I. 4. 210.

South Deccan peninsula, common in Mysore at the foot of the Bababuden Hills. In hedges and along the banks of nálas in southern parts of the Dhárwár District. Fl. Dec.-Jany. Fr. Mch. A twining, scandent and spreading shrub. Flowers rather small.

5. *I. campanulata*, Linn.; Chois. Convolv. Or. 69; Dalz. & Gibs. Bomb. Fl. 165; Fl. Br. I. 4. 211. *Kugini balli*, K.; *Tugelmi*, M.

Deccan Peninsula, Malay Peninsula and Ceylon. Common throughout the Konkan and North Kánara in deciduous forests, usually in open situations near villages or deserted cultivation. A large and very beautiful climber when in full bloom during Dec. and Jany. Fr. ripe May. Young shoots made into curries. The slender stems are used as cords.

6. *I. cymosa*, Roem. & Sch. Syst. IV. 241; Fl. Br. I. 4. 211. *Convolvulus blandus*, Roxb. Fl. Ind. I. 470.

Abundant throughout India. Throughout the presidency, very common in the forests of the Supa sub-division of North Kánara. Fl. Feb.-Mch. Cymes usually recurved, corolla in bud hairy at apex.

7. *I. Turpethum*, Br. Prod. 485. H. Br. I. 4. 212; Dalz. & Gibs. Bomb. Fl. 165. *Nishottar, ter, shetar, phulkari*, M.

Throughout India, alt. 6—3000 ft., Ceylon. Throughout the Presidency in the dry districts, also in North Kánara, common. Fl. Oct.-Nov. Fr. Dec.-Jany.

Stems stout, angular, winged, compressed or round.

8. *I. vitifolia*, Sweet. Hort. Brit. Ed. 2. 372; Fl. Br. I. 4. 213; Dalz. & Gibs. Bomb. Fl. 165. *Navalichável*, M.

Throughout India, (except the dry North-west), Sikkin, Assam, Burma, southwards to Ceylon and Malacca, Malay Archipelago.

Throughout the moist forests of the Konkan and North Kánara, common on the Supa gháts. It is either a large climbing shrub or a creeper often along roadsides. Fl. Jany.-Feb. Corolla sulphur-yellow coloured. Capsule membranous. *I. bonanox*, L. (*Ohandrakant*, M.), *I. muricata*, Jacq., (*Bhauri*, M.) and other species are commonly cultivated. *I. biloba*, Forsk., (*Maryadvel*, *marjadvel*, M.) is common along the sea-coast.

9. *I. palmata*, Forsk. Fl. Ag. Arab. 43. Fl. Br. I. 4. 214.

Deccan peninsula and Ceylon. A twining shrub, common near the sea coast of North Kánara. *I. rhyncorhiza*, Dalz. A twiner with yellow flowers is found in North Kánara near the coast at Belekerry on laterite. Fl. rainy season.

6. **PORANA**, Burn.

Large climbers. Leaves entire. Flowers purple, steel-blue or white, usually in terminal panicles, often small. Sepals much enlarged, wing-like in fruit. Corolla campanulate or funnel-shaped, wide or narrow-mouthed, limb 5-plaited, sub-entire or lobed. Stamens sub-included. Ovary 2-celled 4-ovuled. Capsule usually 1-seeded by abortion.

*P. malabarica*, C. B. C., Fl. Br. I. 4. 223. *P. racemosa*, Dalz. & Gibs. Bomb. Fl. 162. *Bowri*, *gariya*, Vern.

Mahábaleshvar and the higher gháts, not seen in the southern parts of the presidency. Fl. Sept.-Oct. Fr. C. S.

7. **BREWERIA**, R. Brown.

Herbs or climbing shrubs. Leaves simple. Flowers terminal or axillary; bracts small. Sepals equal or unequal, scarcely altered in fruit. Corolla campanulate, or funnel-shaped, limb plaited. Stamens included, bases dilated. Ovary 2-celled, 4-ovuled; styles 2, nearly distinct; stigmas capitate. Capsule globose or ovoid, normally 4-seeded.

*B. cordata*, Blume Bijd. 722; Fl. Br. I. 4. 223. *B. Roxburghii*, Dalz. & Gibs. Bomb. Fl. 162.

West Deccan peninsula from the Konkan gháts southwards. Eastern Bengal and the Malay Peninsula, Ceylon. Throughout the Konkan and North Kánara, rather rare; usually found near the coast. Fl. Oct.-Dec. Fr. Jany.

A large and lofty twining shrub.

8. **NEUROPILTIS**, Wall.

A lofty climber with a tubercled stem. Leaves alternate. Flowers small, bracteate, in short villous racemes; bract inconspicuous in flower. Sepals sub-orbicular, hardly changed in fruit. Corolla funnel-shaped lobes entire. Stamens 5; filaments villous. Ovary 2-celled, 4-ovuled



styles 2, separate from the base. Fruit a small capsule, sessile in the centre of a large, scarious, veined, orbicular bract. Seed globose, glabrous, albuminous; cotyledons plaited.

*N. racemosa*, Wall. Cat. 1322; Fl. Br. I. 255; Bedd. Ic. Pl. Ind. Or. t. 291.

Malay Peninsula from Mergui southwards, Malabar plains.

In the evergreen forests of the Supa sub-division North Kánara, near Potolli, rare. Fl. Jany.-Feb. Fr. May.

#### ORDER 64. SOLANACEÆ.

Herbs, shrubs or small trees. Leaves alternate; stipules 0. Flowers regular, bisexual, in terminal or lateral, cymes or pedicels solitary or clustered. Bracts and bracteoles 0. Calyx 5-lobed. Corolla campanulate or rotate, often plaited, lobes 5. Stamens 5, on corolla-tube. Ovary 2-celled; style linear, stigma capitate. Fruit a small or large berry or capsular. Seeds indefinite, discoid.

Corolla-lobes plaited in bud	...	...	1. SOLANUM.
Corolla-lobes imbricate	...	...	2. LYCIUM.

##### 1. SOLANUM, Linn.

Herbs, shrubs or small trees, prickly or unarmed. Leaves simple. Calyx 5-10-lobed, unaltered or enlarged in fruit. Cymes dichotomous or racemose, lateral or terminal. Corolla rotate; limb plaited in bud. Stamens 5, anthers opening by terminal pores. Ovary 2-celled; style columnar, stigma small.

Small tree, unarmed. Berry yellow	...	...	1. <i>S. verbascifolium</i> .
Small tree, prickly. Berry red	...	...	2. <i>S. giganteum</i> .

1. *S. verbascifolium*, Linn., Dunal in DC. Prod. XIII. Pt. 1. 114; Fl. Br. I. 4. 230; Dalz. & Gibs. Bomb. Fl. 175.

Throughout tropical and sub-tropical India. Throughout the presidency. In the Supa sub-division of North Kánara in deciduous forests, common. Fl. Oct.-Nov. Fr. Dec.-Jan.

A large shrub or small tree. Wood yellow, soft. Corolla white, pubescence brownish yellow.

2. *S. giganteum*, Jacq. Coll. IV. 125; Fl. Br. I. 4. 233; Dalz. & Gibs. Bomb. Fl. 175. *Kutri*, *M. Cheena* or *chunna jhár* of Mahábaleshvar (Graham).

Mountains of the South Deccan and Ceylon, alt. 3—7000 ft.

Throughout the North Konkan and Kánara, usually in evergreen forests or in the vicinity of evergreen forests.

A small tree. Cymes stellately white woolly. Corolla blue. Fl. R. S. Fr. Oct.-Nov.

## 2. LYCIUM, Linn.

Spinous shrubs. Leaves small, often fasciated, entire, linear or oblong. Flowers small; pedicels solitary or fasciated at the nodes. Calyx campanulate, at first 5-merous, then irregularly 3-5-lobed or 2-lipped. Corolla funnel-shaped, lobes 5-4, imbricate in bud. Stamens usually unequal, anther-cells dehiscent longitudinally. Ovary 2-celled; style filiform, ovules few or many. Berry small, seeds few.

Stamens not exerted	...	...	...	...	1. <i>L. europæum</i> .
Stamens exerted	...	...	...	...	2. <i>L. barbarum</i> .

(These two species are doubtfully distinct, Fl. Br. I. 1. 241.)

1. *L. europæum*, L.; Sibth. Fl. Græc. t. 236; Fl. Br. I. 4. 240; Brandis For. Fl. 345. *Gangro, chirchitta*, M. In the dry Deccan districts and Sind, in the plains. Fl. Oct.-Mch. Used as fuel. Fruit edible.

2. *L. barbarum*, L.; Bess. Fl. Orient. IV. 289; Fl. Br. I. 4. 241; Brandis For. Fl. 345. Fl. Oct.-Mch. Punjab and Sind, 0—3000 ft. alt.

## ORDER 65. GESNERACEÆ.

Herbs or under-shrubs. Leaves opposite or alternate. Flowers hermaphrodite, irregular, bracteate, axillary or terminal. Calyx 5-divided. Corolla gamopetalous; tube long or short; segments 5, imbricate in bud. Stamens on the corolla-tube 5, didynamous, often 2 only, fertile. Disk various. Ovary 1-celled or sub-2-celled; style linear; stigma capitate or 2-lobed; placentas parietal, bifid; ovules many. Fruit a capsule or berry. Seeds many, minute; albumen 0 or scanty.

## ÆSCHYNANTHUS, Jack.

Epiphytic under-shrubs. Leaves opposite, fleshy, nerves obscure. Calyx truncate, 5-fid. Corolla tubular-ventricose; limb 2-lipped. Stamens 4, didynamous. Disk annular. Ovary superior, stipitate; stigma peltate; placentas deeply inflexed, then recurved, bearing the ovules. Capsule long, linear, loculicidally 2-valved. Seeds many, small, sessile, pendulous, rugose, hairy at the end next the hilum, 1 hair at the apex.

Æ. *Perrottetii*, A. DC. Prod. IX. 261; Fl. Br. I. 4. 339; Dalz. & Gibs. Bomb. Fl. 135.

Bombay ghâts and Neilgherries. On the Konkan and North Kánara ghâts on trees in the evergreen forests, common on the Nilkund ghât. Fl. Dec.-Jany. Fr. ripe next cold season. The flowers are ornamental.

## ORDER 66. BIGNONIACEÆ.

Trees. Leaves opposite, 1-2-3-pinnate or simple, exstipulate. Flowers showy, hermaphrodite, irregular, racemose or paniced. Calyx

campanulate, 2-5 lobed or spathaceous. Corolla tubular-ventricose, mouth 2-lipped. Stamens 4, didynamous or 5. Disk cushion-like or annular. Ovary 2-celled, style long, glabrous; stigma of 2 elliptic lobes, ovules numerous in many rows. Fruit a capsule usually elongated. Seeds discoid, broadly winged, exalbuminous.

Stamens 5, perfect.

Leaves bi-tri-pinnate, leaflets large. Capsule large, broad, flat. Seeds winged all round except at the base ... .. 1. *Oroxylum*.

Stamens 4, perfect.

Leaves bi-tri-pinnate, leaflets small. Capsule linear, flat. Seeds winged narrowly at the apex, not at the base ... .. 2. *Millingtonia*.

Leaves undivided or pinnate. Capsule linear somewhat compressed, wing broad, narrow at the apex, not at the base ... .. 3. *Tecoma*.

Leaves 1-pinnate. Capsule cylindrical or compressed. Seeds broadly winged on the 2 sides. 4. *Dolichandrone*.

Leaves 1-pinnate. Capsule straight, slightly compressed, divided into 4 cells by the 4-ridged septum. Seeds winged on the sides ... .. 5. *Heterophragma*.

Leaves 1-2-pinnate. Capsule elongate-linear or compressed quadrangular. Seeds sub-trigonal or thinly discoid, winged on 2 sides ... .. 6. *Stereospermum*.

Leaves 1-pinnate. Capsule large, oblong, winged, compressed. Seeds winged all round ... .. 7. *Pajanelia*.

### 1. OROXYLUM, Vent.

A tree. Leaves bi-tri-pinnate, large. Flowers large, in erect terminal racemes. Calyx persistent, leathery, large, campanulate, truncate. Corolla campanulate, oblique, 5-lobed; large, white or purplish, lobes subequal, crisped, toothed. Stamens 5, all fertile; anthers 2-celled, cells divergent below. Capsule large, flat, linear, the dissepiment parallel to the valves; septicidally dehiscent. Seeds with a broad transparent wing.

*O. indicum*, Vent. Dec. Gen. Nov. 8; Fl. Br. I. 4. 378; Bedd. Fl. Sylv. 148; *Spathodea indica*, Pers. *Calosanthos indica*, Brandis For. Fl. 347; Dalz. & Gibs. Bomb. Fl. 161. *Tetu*, K.

Throughout India from the Himalayas to Ceylon, not in the Western drier area. Throughout the Konkan and North Kánara gháts in moist forests, very common in the evergreen forests near the Nílkund ghát. Fl. May-July. Fr. ripe Jany.; remains long on tree. Flowers fœtid, fleshy. A small tree. Bark light brown, soft with green juice. Wood yellowish-white, soft: no heartwood. Pores moderate sized. Annual rings distinct. Med. rays fine to moderately broad. Weighs about 30 lbs. to the cub. ft.

### 2. MILLINGTONIA, Linn, f.

A large tree. Leaves opposite, bi-tri-pinnate. Flowers in numerous flowered panicles. Calyx 5-toothed, teeth recurved, truncate. Corolla with a long slender tube and an oblique mouth. 5-lobed.

Stamens 4; anthers 1-celled, the other cell reduced to a small hook. Capsule flat, linear, dehiscing at the edges. Seeds with a broad hyaline wing.

*M. hortensis*. Linn. f. Suppl. 291; Fl. Br. I. 4. 377; Bedd. Fl. Sylv. t. 249; Brandis For. Fl. 347; Wight. Ill. 101. *Nimi-chambeli*, *akas-nimb*, M.

Cultivated along roadsides and in parks and gardens throughout the presidency. Fl. Aug.-Sept., also during the cold weather in the Konkan. Indigenous in the Malay Archipelago, and the tropical forests of Burma from Ava to Tenasserim, perhaps wild in Central India, on the Godávári. A large tree. Wood soft, yellowish. Pores small numerous. Med. rays fine. Weighs about 40 lbs. to the cub. ft. Does not set fruit in Western India.

### 3. *TECOMA*, Juss.

Shrubs or small trees. Leaves simple or pinnate. Flowers in terminal racemes or panicles. Calyx campanulate, 5-toothed. Corolla tubular-ventricose, lobes 5. Stamens glabrous, inserted in the lower part of the corolla-tube; anthers 2-celled. Ovary 2-celled on the annular disk. Capsule linear, loculicidally 2-valved, somewhat compressed at right angles to the septum. Seeds flat, imbricate with a thin, membranous wing.

Leaves simple	...	...	...	...	1. <i>T. undulata</i> .
Leaves compound	...	...	...	...	2. <i>T. Stans</i> .

1. *T. undulata*, G. Don. Gen. Syst. IV. 223; Fl. Br. I. 4. 378; Dalz. & Gibs. Bomb. Fl. 161; Brandis For. Fl. 352. *Lohúri*, *lohero*, Sind.; *Rakta rohida*, M.

Western India, alt. 0—3000 ft.; Sind, Punjáb, Rajputana, extending eastwards to the Jumna. In Sind and Guzerat, planted in gardens at Bombay. Fl. Mch.-Apl. Fr. May-July. A shrub or small tree. Wood grey or yellowish-brown, close-grained, mottled, tough, strong and durable. Pores small and moderate sized, enclosed in small round patches of whitish tissue, often arranged in concentric lines. Med. rays fine and moderately broad. Weighs about 60 lbs. to the cub. ft. Used for furniture, carving and agricultural implements.

2. *T. stans*, Spreng. Syst. 2. 834; Dalz. & Gibs. Bomb. Fl. Suppl. 55.

In gardens, and run wild in the Konkan and North Kánara. Fl. R. and C. seasons. Corolla yellow. A native of South America.

### 4. *DOLICHANDRONE*, Seem.

Trees. Leaves 1-pinnate. Flowers in racemes or terminal panicles. Calyx spathaceous, circumsciss-deciduous. Corolla tubular, 5-lobed; lobes imbricate in bud, crisped, crenate or incised. Stamens didynamous, 4, with a rudimentary 5th; anther-cells diverging. Ovary

2-celled. Capsule elongate, terete cylindrical or compressed, loculicidally dehiscent, septum free. Seeds discoid, winged.

Leaflets glabrous, acuminate, petiolule  $\frac{1}{2}$  inch. Capsule slightly compressed ... .. 1. *D. crispa*.  
 Leaflets pubescent, obtuse, petiolule 0 or very short.  
 Capsule much compressed, falcate ... .. 2. *D. falcata*.

1. *D. crispa*, Seem. in Seem. Jour. Bot. VIII. 381; Fl. Br. I. 4. 379. *Spathodea crispa*, Brandis For. Fl. 350; Bedd. Fl. Sylv. 168; Dalz. & Gibs. Bomb. Fl. 160. *Mushwal, godmurgi*, K.

South Deccan peninsula. Common in the dry forests of the Kuputgudda range in the Dhárwár District, also in the Belgaum District at Sutguttee. Fl. Apl.-Sept. Fr. ripe next R. S. A small deciduous tree.

2. *D. falcata*, Seem. in Seem. Jour. Bot. VIII. 381; Fl. Br. I. 4. 380. *Spathodea falcata*, Wall.; Dalz. & Gibs. Bomb. Fl. 160; Bedd. Fl. Sylv. t. 71; Brandis For. Fl. 350. *Dolichandrone Lawii*, Seem. Fl. Br. I. 4. 380. *Mersingi, medasinghi, M; Gudmurki*, K.

Deccan peninsula, Mysore. Central Provinces and Rajputana. Throughout the Konkan and North Kánara, in deciduous forests. Fl. Mch.-May. Fr. ripe Jany. A small deciduous tree. Wood hard, whitish, close-grained, seasons well, mottled, shining and glossy, no heartwood. Annual rings distinct. Pores small, arranged in discontinuous wavy bands. Medullary rays very fine, rather indistinct. Weighs 42 lbs. to the cub. ft. Used for building and agricultural purposes.

### 5. HETEROPHRAGMA, DC.

Trees. Leaves large, 1-pinnate. Flowers in terminal, woolly panicles. Calyx irregularly lobed or lipped, closed when young. Corolla bell-shaped, rose or yellow, 5-lobed, tomentose or glabrous. Capsule elongate, cylindric or compressed, falcate or twisted, loculicidally 2-valved, spuriously 4-celled. Seeds winged on 2 sides.

*H. Roxburghii*, DC. Prod. IX. 210; Fl. Br. I. 4. 381; Dalz. & Gibs. Bomb. Fl. 160; Bedd. Fl. Sylv. 169. *Spathodea Roxburghii*, Brandis For. Fl. 350. *Wurus, panlag, M; Adwinuggi*, K.

West Deccan peninsula, from Bombay southwards, Central India; Godávári forests. Throughout the presidency in deciduous forests. Fl. Feb.-Apl. Fr. R. S. A large tree. Wood grey, rough, moderately hard. No annual rings. Pores moderate-sized, uniformly distributed. Med. rays fine. Weighs 40 lbs. to the cub. ft. Timber not much used in Kánara.

### 6. STEREOSPERMUM, Cham.

Trees. Leaves 1-2-pinnate. Flowers in large terminal lax panicles. Calyx ovoid, open or closed in bud. Corolla bell or funnel-shaped, yellow or rose, 5-lobed. Stamens 4 with a rudimentary 5th. Disk fleshy, annular. Capsule elongate, linear or compressed, quadrangular,

loculicidally 2-valved; septum thickened, sub-terete. Seeds compressed or subtrigonus, winged on 2 sides.

Leaves 1-pinnate.

Corolla thinly villous, yellow. Capsule quadrangular, linear, valves thin, smooth. Seeds subtrigonus, easily splitting through the centre ... 1. *S. chelonoides*.

Corolla viscous-hairy, lilac or purple. Capsule linear, terete, woody, valves thick, crustaceous, rough. Seeds sub-trigonus, deeply notched in the middle ... .. 2. *S. suaveolens*.

Leaves bipinnate.

Corolla glabrescent white. Capsule long, hard, woody, tuberculate, somewhat compressed. Seeds thinly discoid, in 4 rows ... .. 3. *S. xylocarpum*.

1. *S. chelonoides*, DC. Prod. IX. 210; Fl. Br. I. 4. 382; Bedd. Fl. Sylv. t. 72; Brandis For. Fl. 352. *Heterophragma chelonoides*, Dalz. and Gibs. Bomb. Fl. 160. *Padel, paral*, Vern.; *Kirsal, tuatuka, padoly, koosga, M.*; *Mukarti*, K.

Throughout moister India from the Terai of Oudh and Assam to Ceylon and Pegu. Throughout the Konkan and North Kánara in evergreen forests, also in deciduous moist forests. Fl. Apl.-June. Fr. Aug.-Jan. A large deciduous tree. Wood grey, hard, smooth, and durable, takes a good polish. Pores moderate-sized, enclosed in concentric wavy bands of white tissue. Med. rays fine, short, distinct, prominent. Weighs 60 lbs. to the cub. ft. Used for canoes, house building and in Assam for sea-boxes. Capsule 12—30 in. quadrangular, covered with small white raised dots. Seeds easily splitting through the centre.

2. *S. suaveolens*, DC. Prod. IX. 211; Fl. Br. I. 4. 382; Bedd. Fl. Sylv. 169; Brandis For. Fl. 351. *Heterophragma suaveolens*, Dalz. & Gibs. Bomb. Fl. 161. *Purul*, Vern. *Kalgari, patala, pahad*, M.

Throughout moister India from the sub-Himalaya (Terai) to Travancore and Tenasserim, Ceylon. In the deciduous forests of the dry districts of the presidency; common in the Dhárwár District forests. Fl. Apl.-May. Fr. Nov.-Dec. Flowers viscous-tomentose, fragrant. A large, deciduous tree. Bark smooth, grey, scaly. Sapwood large, grey, hard; heartwood small, yellowish-brown, beautifully mottled, very hard, seasons well, fairly durable. Used for building purposes. Makes excellent charcoal. Gamble.

3. *S. xylocarpum*, Wgt. Ic. t. 1335-6; Fl. Br. I. 4. 383; Bedd. Fl. Sylv. t. 70; Dalz. & Gibs. Bomb. Fl. 159. *Spathodea xylocarpa*, Brandis For. Fl. 349. *Kursing*, M.; *Genasing*, K.; *Bairsing*, Vern.

Deccan peninsula, extending north to the Sátputás. Throughout the presidency, common in the Dhárwár District dry forests. Fl. Apl.-May. Fr. next Apl.-May. Capsule long, woody, glabrous, tubercled. A moderate-sized tree. Bark grey. Sapwood large, grey; heartwood brown, hard, tough, elastic, close-grained. Pores small or moderate-sized, each pore or group of pores enclosed in light coloured tissue and arranged in broken concentric bands, usually filled with a white or yellowish resinous substance. Med. rays fine, uniform, distinct. Weighs 46 lbs. to the cub. ft. Used for cabinet work.

## 7. PAJANELIA, DC.

Trees. Leaves large, 1-pinnate, leaflets numerous. Flowers large, in great terminal panicles. Calyx bell-shaped. Corolla large, ventricose, lobes unequal, crisped, tube dark red, lobes yellow. Stamens 4 with a rudimentary 5th. Disk annular, white. Ovary 2-celled. Capsule large, oblong, 4-winged. Seeds winged all round.

**P. Rheedii.** DC. Prod. IX. 227; Fl. Br. I. 4. 384; Bedd. Fl. Sylv. 169. *Aminge*, K.; *Doundi*, M.

Silhet and Khasia Hills, Pegu, Tenasserim and the Andamans, Malabár, up to 2000 ft. In the moist forests of North Kánara, along the banks of nálas in the Yellápur táluka. Fl. C. S. Fr. H. S. A large or small, usually deciduous tree. Wood dark, mottled brownish grey, soft and light. Pores moderate-sized, equally distributed. Medullary rays moderately broad or fine, dark coloured. Weighs about 30 lbs. to the cub. ft. Timber not used in Kánara. Flowers very large, filled when young with white mucilage.

## ORDER 67. ACANTHACEÆ.

Herbs, shrubs or trees. Leaves opposite, simple. Flowers bracteate and 2 bracteolate. Calyx 5-partite. Corolla 2-lipped or subequally 5-lobed. Stamens 4-2, on the corolla-tube. Ovary superior, 2-celled; style filiform, notched or bifid; ovules 1 or more in each cell. Capsule loculicidal, often elastically dehiscent. Seeds generally seated on retinacula and often clothed with elastic hairs, seen when wetted; albumen 0, radicle next the trilum.

Stamens usually 4.

Corolla 5-lobed, not lipped.

Climbing shrubs. Anther-cells parallel, oblique, spurred or 0 at the base. Retinacula 0 ... 1. THUNBERGIA.

Erect shrubs. Anther-cells parallel, not spurred at the base. Seeds on retinacula ... 2. STROBILANTHES.

Corolla very deeply, 2-lipped ... 3. CALACANTHUS.

Corolla 1-lipped, the other lip obsolete ... 4. ACANTHUS.

Stamens 2; Anther-cells one higher than the other, appendaged at the base or muticous,

Corolla-tube short, 2-lipped, lips subequal.

Anther-cells obtuse with a white basal appendage ... 5. JUSTICIA.

Anther-cells acute, minutely tailed at the base ... 6. ADHATODA.

Corolla-tube long, 2-lipped, lips very unequal.

Anther-cells muticous ... 7. RHINACANTHUS.

## 1. THUNBERGIA, Linn. f.

Climbing shrubs. Leaves cordate, angular. Flowers in axillary, bracteate racemes. Calyx an entire or toothed ring, 2 bracteolate. Corolla curved, ventricose with 5 subequal lobes. Anther-cells ciliata. Ovary 2-celled, 2-ovuled. Disk thick, surrounding the ovary. Capsule globular, suddenly beaked, 2-4-seeded at the base. Seeds 2 in each cell, ovoid or dorsally compressed, not hairy, base plane or excavate, funicle minute or conic.

*T. mysorensis*, T. Anders. in Jour. Linn. Soc. IX. 448; Fl. Br. I. 4. 393. *Hexacentris mysorensis*, Wight Ic. t. 871; Dalz. & Gibs. Bomb. Fl. 183.

Neilgherries and Mysore. In the evergreen forests of North Kánara near the falls of Gairsoppah. Fl. Dec.-Jany. A climber with beautiful large purple and yellow flowers in long pendant racemes.

## 2. STROBILANTHES, Bl.

Shrubs or herbs. Leaves entire or serrate, often with raphides. Flowers axillary or in terminal, interrupted or strobiliform spikes or panicles. Bracts leafy, deciduous or persistent; bracteoles small or 0. Calyx 5-divided, segments equal or unequal. Corolla campanulate, lobes nearly equal. Stamens 4 or 2. Disk small or prominent as a stalk to the ovary. Ovary 4-ovulate; style linear, stigma linear. Capsule 4-2-seeded. Seeds compressed, hairy or glabrous; hairs elastic when wetted; retinacula curved.

Seeds glabrous.

Stem 4-winged.

Flowers in capitate, axillary heads. Corolla white, hairy within. Capsule 2-seeded ... 1. *S. barbatus*.

Stem not winged.

Flowers spikate, spotted purple. Leaves glabrous. Calyx much enlarged in fruit.

Capsule 4-seeded.

Spikes hairy ... .. 2. *S. varieensis*.

Spikes glabrous ... .. 3. *S. ciliatus*.

Flowers in ovoid, viscous-hairy heads. Leaves

rugose, hairy ... .. 4. *S. membranaceus*.

Seeds elastically hairy when wetted.

Flowers in dense cymes or spikes.

Flowers in small dense cymes. Bracts coriaceous, softly hairy. Corolla white or blue... 5. *S. lupulinus*.

Flowers in sub-globose spikes. Bracts membranous, veined glabrous, white, concave.

Corolla blue ... .. 6. *S. Heyneanus*.

Flowers in ovoid heads. Bracts viscous, hairy. Corolla pale blue or colourless ... 7. *S. ixiocephalus*.

Flowers in sub-globose heads. Bracts green, ciliate on margins ... .. 8. *S. minor*.

Flowers in short spikes, numerous along the branches which are naked. Bracts narrow, hairy, persistent. Corolla deep blue ... 9. *S. scrobiculatus*.

Flowers strobilate.

Leaves petioled, glabrous, lineolate above.

Bracts white, concave, glabrous in flower. Corolla blue, purple or rose ... ..10. *S. callosus*.

Leaves petioled, softly villous. Bracts

oblong or ovate, softly hairy viscous, Bracteoles linear. Corolla pale blue ...11. *S. asper*.

Leaves sessile. Bracts large, acute hairy, bracteoles 0. Corolla pale purple ...12. *S. sessilis*.

Flowers in lax spikes, viscid.

Leaves sessile, winged at the base, not perfoliate, pale beneath. Bracts oblong

linear. Corolla deep blue ... ..13. *S. perfoliatus*.



1. *S. barbatus*, Nees in Wall. Pl. As. Rar. III. 85; Fl. Br. I. 4. 437. *S. tetrapterus*, Dalz. & Gibs. Bomb. Fl. 187.

Western Deccan peninsula, from the Bombay gháts to Cape Comorin, alt. 3000 ft. In the evergreen forests of the Konkan and North Kánara, common in the Yellápur táluka. Flowers once every seven years. A gregarious shrub with winged stems and white flowers, hairy within. Fl. Sept.-Oct. Fr. Apl.-May. The bracts and bracteoles become densely viscous hairy in fruit.

2. *S. warreensis*, Dalz. in Hook. Kew Jour. II. 341; Dalz. & Gibs. Bomb. Fl. 187. *S. parviflorus*, Bedd. Ic. Pl. Ind. Or. t. 197.

Western gháts from the Konkan to South Kánara, up to alt. 3000 ft. Evergreen forests of the Konkan and North Kánara, common in the Nilkund ghát forests. Fl. Oct. Fr. ripe Feb. Leaves with 7-8 pairs of nerves. Peduncles jointed, softly woolly. Capsule  $\frac{3}{4}$  inch, exserted from the hairy calyx. Seeds thin, flat, shining, on large retacula.

3. *S. ciliatus*, Nees in Wall. Pl. As. Rar. III. 85; Fl. Br. I. 4. 439; Bedd. Ic. Pl. Ind. Or. t. 211; Wight Ic. t. 1517.

S. Deccan peninsula on the gháts up to 4000 ft. Evergreen forests of the Yellápur táluka of North Kánara. Fl. Oct.-Nov. Leaves with 4-5 pairs of nerves. Peduncles jointed; leafy, bracteate, glabrous. Stamens exserted. My specimens agree well with the plate in Wight's Icones.

4. *S. membranaceus*, Talb. sp. nov. Herb. No. 1616. A stout gregarious shrub. Leaves broadly ovate, long acuminate, narrowed into the petiole, deeply crenate-serrate, membranous, rugose, hispidulous; hairs flattened, silvery, from a bulbous base, often 3-4-jointed; blade 7-2 by 4-1 in., petiole 5-3 in. long. Heads ovoid, 1-1.5 in., long, densely viscous hairy; hairs mostly jointed. Seeds 1 in. exareolate, quite glabrous. This species which flowers at intervals of about 7 years was declared to be near *S. heteromallus*, at Kew, which species is found at or near Conoor on the Nilgherries (6-7000 ft. alt.). Common in the jungles near the Tinai ghát of N. Kánara (2000 ft. alt.). Distinguished from the other Bombay species of *Strobilanthes* by its rugose, hispidulous, softly membranous leaves.

5. *S. lupulinus*, Nees in Wall. Pl. As. Rar. III. 85; Fl. Br. I. 4. 443. *S. Dalzellii*, T. Anders.

Western gháts from the Konkan to Courtallum. On the Konkan and North Kánara gháts in moist forests, common near Yellápur, and in the forests near the Ram and Coessi gháts. Fl. C. S. Fr. C. & R. S. Sir G. King is of opinion that *S. lupulinus*, Nees, should be united with *S. Heyneanus*. The former has however quite different bracts.

6. *S. Heyneanus*, Nees in Wall. Pl. As. Rar. III. 85; Fl. Br. I. 4. 443; Dalz. & Gibs. Bomb. Fl. 187. *S. rugosus*, Wight Ic. t. 1619. *S. asperinus*, Dalz. & Gibs. Bomb. Fl. 187. Akra, M.

Western gháts from the Konkan to the Bababuden Hills and Nilgherries. On the gháts of the Konkan and North Kánara, common in the evergreen forests between the Nilkund and Gairsoppah gháts. Flowers apparently every year during Nov.-Dec. The bracts are white, glabrous. Corolla blue. A large shrub. I have a small shrub from the Bababuden hills of Mysore 5000 ft. alt., which has the red bracts and deep blue flowers of *S. rugosus*, Wgt. Ic. t. 1619, and reduced by C. B. Clarke to *S. Heyneanus*, in the Flora of British India. Fl. during Aug.-Sept. Fr. C. S.

7. *S. ixiocephalus*, Benth. in Flora. 1849. p. 557; Fl. Br. I. 4. 444; Bedd. Ic. Pl. Ind. Or. t. 203. *S. Neesianus*, Wight.; Dalz. & Gibs. Bomb. Fl. 188. *S. glutinosus*, Grah. Cat. Bomb. Pl. 162? *Gurgi* or *Pit Karvi*, K.

Western Deccan peninsula and South Madras. Throughout the Konkan gháts, very common in North Kánara from the coast inland in both evergreen and deciduous forests, often on laterite. Flowers annually during the cold season. Fr. H. S. A large gregarious shrub, with pale blue or almost white flowers in viscous hairy heads. The branchlets are sometimes clothed with long woolly hairs.

8. *S. minor*, Talb. sp. nov. Herb. No. 1338.

A small shrub, 1-2-feet high, with numerous branches. Leaves small, ovate, bluntly acuminate, crenate-repand, narrowed into the petiole, conspicuously lineolate above, paler beneath, ciliate on the margins and nerves; blade 3—1.5 by 1.75—.75 in.; petiole 1—.25 in. Flowers  $\frac{1}{2}$  in. in dense, small, sub-globose heads. Bracts green, ovate, ciliate on the margins, .25 in. across, bracteoles ciliate. Calyx 5-divided. Corolla blue, slightly hairy without at the tip, very hairy within. Stamens 4, filaments hairy downwards. Style entire, long, twice the corolla, hairy. This small shrub agrees in some respects with the plate in Wight's Icones. 1562. of *S. campanulata*, Wight, which C. B. Clarke has made a variety of *S. Heyneanus*, Nees, in the Fl. Br. I. I think that my plant differs specifically from *S. campanulata*, Wgt., and is certainly not *S. Heyneanus*, Nees. Banks of the Kalanuddi near Supa, North Kánara. Fl. & Fr. C. S.

9. *S. scrobiculatus*, Dalz. MS. Fl. Br. I. 4. 455.

Western gháts of Bombay. On the higher gháts of the Konkan and North Kánara, common on the summit of Dursing gudda in the Supa taluka of North Kánara, 3,400 feet elevation. Fl. annually Dec.-Jany. Fr. Jany.-Feb. I have a shrub from a lower level (2000 ft.) in the same taluka, which differs somewhat from *S. scrobiculatus*, in having longer spikes, larger persistent bracts and much smaller corollas. It grows in the beds of streams or on the rocky banks. Fl. Fr. Feb.-Mch.

10. *S. callosus*, Nees in Wall. Pl. As. Rar. III. 85; Dalz. & Gibs. Bomb. Fl. 188. *S. Grahamianus*, Wight Ic. t. 1520; Dalz. & Gibs. Bomb. Fl. 187. *Karvi*, Vern.

Western gháts from Bombay southwards. Covers large areas on the Konkan and North Kánara gháts, and forms the undergrowth in many

of the deciduous moist forests. Sometimes a very large shrub (30 ft. in height and  $2\frac{1}{2}$  in. in diameter). A general flowering takes place every seven or eight years. The white, glabrous bracts become covered after the flowering is over, with viscous, strongly-smelling hairs. The flowers vary in colour from purple-blue to pink. A general flowering of this species in North Kánara took place in Sept.-Oct. 1887. The capsules ripen during the cold and hot seasons and are elastically dehiscent, making a peculiar, almost continuous, noise during the shedding of the seeds in a forest of this species. The viscous, fruiting bracts are no doubt protective against boring insects. *S. ixiocephalus*, and this are the most widely distributed and abundant species of *Strobilanthes* on the North Kánara gháts.

11. *S. asper*, Wight Ic. t. 1518, not of Dcne. Fl. Br. I. 4. 452.

Mountains of Southern India, alt. 5-8000 ft. Nilgherries, Bababuden, Anamallays and Malabár gháts. S. Konkan gháts, 5-8000 ft. Stocks. Bababuden hills, Mysore, 6000 ft. alt. Fl. Aug. Sept. Fr. C. S.

12. *S. sessilis*, Nees in Wall. Pl. As. Rar. III. 85; Fl. Br. I. 4. 452; var. *Ritchiei*. *S. sessiloides*, Dalz. & Gibs. Bomb. Fl. 187. *Bukra*, M.; *Harkuni*, K.

Nilgherries alt. 6-8000 ft., Wynaad and Travancore. Very common on the gháts of the Belgaum District. In North Kánara common on laterite in the Supa, Siddápur and Sirsi tálukas, also on the gháts of the Konkan near Bombay. A gregarious small species growing in clumps. General flowering once in about seven years: one took place near the Rám ghát of the Belgaum District in Sept. 1889. Separate flowering clumps are found during Sept. and Oct. of years other than those of general flowering. Fr. ripe Nov.-Dec. Leaves shortly petiolate, more glabrous than in *S. sessilis*, Nees.

13. *S. perfoliatus*, T. Anders. in Jour. Linn. Soc. IX. 471; Fl. Br. I. 4. 458. *Endopogon integrifolius*, Dalz. & Gibs. Bomb. Fl. 185. *Gurgi*, K.

On the Konkan gháts near Panvel, Dalz.; common in North Kánara; usually in evergreen or near evergreen forests from Ainshi southwards, gregarious. General flowering once in about seven years: last took place near Ainshi from Dec. till Mch. 1887. Fr. Jany.-May. Leaves light-coloured or steel-grey beneath. Bracts linear, viscous-ciliate. Flowers blue, very handsome. A general flowering of this species took place in the Honavar and Kumta sub-divisions of North Kánara during the cold seasons of 1896.

3. CALACANTHUS, T. Anders.

A gregarious shrub. Leaves large entire. Flowers large, purple in terminal, bracteate, hairy spikes. Calyx 5-divided. Corolla purple, deeply 2-lipped, posterior, lip narrow shortly 2-fid, anterior of 3, short, emarginate lobes, lobes all contorted in bud. Stamens didynamous; anthers sub-equal, oblong, muticous. Ovary glabrous; 4, ovuled; style hairy. Seeds densely hairy, exareolate.

*C. Dalzelliana*, T. Anders. ; Benth. in Gen. Plant. II. 1088 ; Fl. Br. I. 4. 478. *Lepidagathis grandiflora*, Dalz. & Gibs. Bomb. Fl. 190. *Motayén*, M.

W. Gháts of the Bombay Presidency. Common on the Supa gháts of North Kánara. On the Konkan gháts, near Bombay. (Dalz.) Fl. Oct.-Nov. Fr. Jan. Flowers annually.

#### 4. ACANTHUS, Linn.

Shrubs or herbs. Leaves pinnatifid, toothed, often spinous. Flowers blue or white in terminal, dense strobiliform or interrupted, bracteate spikes ; bracts ovate, large, spinescent, or small ; bracteoles large, lanceolate, rarely 0. Calyx 4-partite. Corolla 1-lipped, lip 3-lobed ; tube short, ovoid, horny. Stamens didynamous ; anthers bearded. Capsule compressed, 4-seeded. Seeds large, flat without hairs ; retinacula thick ; testa very lax.

*A. ilicifolius*, Linn. Benth. Fl. Austral. IV. 548 ; Fl. Br. I. 4. 481. *Dilivaria ilicifolia*, Nees ; Dalz. & Gibs. Bomb. Fl. 192. Sea Holly. *Márándi*, *moránná*, M.

Sea coasts of India ; along the coasts of the Konkan and North Kánara. Common in tidal swamps and along the banks of creeks and tidal rivers. Fl. Apl.-May. Fr. June-July.

#### 5. JUSTICIA, L.

Herbs or shrubs. Leaves entire. Flowers small or middle-sized ; bracts large or small ; bracteoles narrow or 0. Calyx 4-5-divided. Corolla 2-lipped, tube shorter or scarcely longer than the limb. Stamens 2, anther-cells oblique, the lower one spurred with a white basal appendage. Capsule 2-4-seeded, base narrow, sterile. Seeds cordate, scaly or tubercular, without elastic hairs.

Bracts larger than calyx.

Spikes interrupted. Bracts green, herbaceous.

Corolla white with purple spots in the throat. 1. *J. montana*.

Spikes continuous. Bracts white, green-nerved.

Corolla white, rose-spotted ... .. 2. *J. Betonica*.

Bracts linear shorter than the calyx. Spikes interrupted.

Leaves lanceolate, glabrous. Flowers and

capsule glabrous ... .. 3. *J. Gendarussa*.

Leaves elliptic, pubescent. Flowers and cap-

sule pubescent ... .. 4. *J. wynaadensis*.

1. *J. montana*, Wall. Cat. 2471, not of Roxb. ; Fl. Br. I. 4. 525. *Hemichoriste montana*. Dalz. & Gibs. Bomb. Fl. 194.

Western gháts, from Mahábaleshvar to the Nilghiris. Konkan and North Kánara gháts, in evergreen forests. Fl. Dec.-Feb. Fr. Jany.-Mch. A large shrub. Seeds very rugose when ripe.

2. *J. Betonica*, Linn. ; Roxb. Fl. Ind. I. 128 ; Fl. Br. I. 4. 525 ; var. *ramosissima*. *Adhatoda ramosissima*, Nees ; Dalz. & Gibs. Bomb. Fl. 193. *Sut*, M.

Throughout India and Ceylon, common, often cultivated. Throughout the presidency, often in hedges and near villages. Fl. Fr. Dec.-Feb.

3. *J. Gendarussa*, Linn. f. Suppl. 85 ; Fl. Br. I. 4. 532 ; Dalz. & Gibs. Bomb. Fl. Suppl. 71. *Kala-adulsa*, *bakas*, *tao*. M. ; *Karelakki giddu*, K.

Throughout India, from Bengal to Ceylon and Malacca, often an escape from cultivation. Throughout the presidency, naturalized near villages and along the banks of nálas. Fl. & Fr. Jany.-Mch.

4. *J. wynaadensis*, Wall. Cat. 2474 ; Fl. Br. I. 4. 533. *Adhatoda wynaadensis*, Nees ; Dalz. & Gibs. Bomb. Fl. 194.

Western gháts from the Konkan southwards alt. 1—3000 ft. Common in the evergreen forests of North Kánara, also in the forests of the Belgaum gháts. Fl. & Fr. Dec.-April.

A shrub with long slender branches.

#### 6. ADHATODA, Nees.

Large shrubs. Characters of *Justicia*, but the anther-cells are acute at apex and scarcely spurred at base. Seeds tubercular-verrucose.

*A. vasica*, Nees in Wall. Pl. As. Rar. III. 103 ; Fl. Br. I. 4. 540 ; Dalz. & Gibs. Bomb. Fl. 194. *Adulsa*, *bakus*, *vasuka*, Vern. ; *Adsale*, *adsoge*, K. ; *Aduso*, Guz.

India from the Punjáb and Assam to Ceylon and Singapore. Throughout the presidency. A large shrub common as a hedge plant. Flowers at different times throughout the year. The leaves and dried bark are used in native medicine. Wood reddish white, with a reddish or dark coloured centre, moderately hard. Pores very small, equally distributed. Medullary rays fine, short, numerous. Weighs about 46 lbs. to the cub. ft. Used for gunpowder charcoal and brick burning. Corolla white, throat with a few irregular rose-coloured bars.

#### 7. RHINACANTHUS, Nees.

Shrubs. Leaves entire. Flowers in dense or spreading, lax panicles. Calyx small. Corolla white, limb 2-lipped, upper short, 2-lobed, lower broad, 3-lobed ; tube long, slender. Stamens 2 at the top of the corolla-tube ; anther-cells superimposed, muticous. Capsule clavate, 4-seeded. Seeds compressed, tuberculate.

*R. communis*, Nees, in Wall. Pl. As. Rar. III. 109 ; Fl. Br. I. 4. 541 ; Dalz. & Gibs. Bomb. Fl. 194. *Gājkharni*. *Tong-pang chonge*, Vern.

Throughout India cultivated, perhaps wild in the Deccan peninsula and Ceylon. Apparently wild in the deciduous forests of the Belgaum District, also on the gháts of North Kánara near Supa and generally throughout the presidency. Fl. Jany.-Apl. Fr. May.-June.

Leaves and root used for medicinal purposes, contains an acid allied to chrysophanic.

The following under-shrubs are found throughout the forests of the Deccan, Konkan and North Kánara:—*Dædalacanthus roseus*, T. Anders.; *D. purpurascens*, T. Anders. (gulsham, M.); *D. montanus*, T. Anders.; *Blepharis asperriima*, Nees; *Barleria Prionitis*, Linn. (kalsunda pivala-koranta, M.); *B. cuspidata*, Heyne, (common in the dry districts of the presidency); *B. Hochstetteri*, Nees (Sind); *B. mysorensis*, Roth. (Dhár-wár district); *B. acanthoides*, Vahl. (Sind); *B. involucrata*, Nees (var. *elata*); *B. Lawii*, T. Anders.; *B. montana*, Nees (kolista, ikhari, M.); *B. Gibsoni*, Dalz.; *B. cristata*, Linn.; *B. courtallica*, Nees; *B. strigosa*, Willd. (*wahii*, *kola koranta*, M.); *Neuracanthus sphaerostachyus*, Dalz.; *N. trinervius*, Wight, (moist forests of North Kánara); *Crossandra undulatafolia*, Salisb. (*Aboli*, M.; often cultivated); *Eranthemum mularbaricum*, C.B.C. (in evergreen forests); *Gymnostachyum latifolium*, T. Anders. (in evergreen forests); *Ecboium Linneanum*, Kz. (*ranaboli*, *dhakta-dalsa*, M.) (in the evergreen forests of North Kánara).

#### ORDER 68. VERBENACEÆ.

Herbs, shrubs or trees. Leaves opposite or whorled, simple or digitate, exstipulate. Inflorescence cymose, cymes often paniced, bracteate. Calyx 5-4-toothed, gamosepalous, persistent. Corolla gamopetalous, 2-lipped or subequally 5-lobed. Stamens generally 4, didynamous; anthers 2-celled; cells parallel and opening longitudinally. Ovary superior, 2-4-celled, style terminal, cells 4-ovuled. Fruit a drupe, 1-4-celled; cells 1-seeded. Seeds erect or pendulous, exalbuminous; radicle inferior.

Fruit a fleshy drupe; Calyx not much enlarged.

Leaves simple. Corolla lobes unequal.

Inflorescence in many-flowered spikes or bracteate heads.

Pyrenes of fruit 2-1, 1-seeded ... 1. LANTANA.

Inflorescence in paniced cymes. Drupe with 1 pyrene.

Flowers small; style with 2, short acute, stigmatic lobes. Erect or climbing trees or shrubs ... 2. PREMNA.

Flowers large. Corolla with a wide open mouth; style unequally 2-lobed. Erect tree ... 3. GMEIINA.

Leaves simple. Corolla-lobes regular.

Inflorescence in axillary cymes. Drupe of 4, 1-celled pyrenes ... 4. CALLICARPA.

Leaves digitately 3-5-foliolate ... 5. VITEX.

Fruit a dry or succulent drupe, separating into 2-4 pyrenes.

Calyx enlarged in fruit. Corolla-tube slender, lobes equal. Leaves simple ... 6. CLERODENDRON.

Fruit nearly dry, small, included in the calyx, a 1-seeded pyrene.

Cymes 3-9 flowered, capitate; bracts 3-6, large, involucriform ... .. 7. SYMPHOREMA.

Fruit a hard bony endocarp, 1-4-celled, surrounded by a spongy pericarp, enclosed in the inflated, urceolate calyx.

Cymes in large terminal panicles. Corolla regular. Bracts small, narrow ... .. 8. TECTONA.

Fruit capsular, fleshy, dehiscent, seeds sometimes germinating on the tree.

Flowers small, in densely capitate cymes. Corolla-limb of 4, equal segments. Bracts and bracteoles small ... .. 9. AVICENNIA.

### 1. LANTANA, Linn.

Shrubs; branches 4-sided, sometimes prickly. Leaves simple, crenate often rugose. Flowers in peduncled bracteate heads; bracts conspicuous, exceeding the calyx; bracteoles. Calyx small, membranous. Corolla-tube slender, limb spreading, lobes unequal. Ovary 2-celled; style short, stigma oblique, cells 2-ovuled. Drupe fleshy, containing two bony 1-celled pyrenes. Seeds without albumen; radicle inferior.

Branches hairy or strigose, not prickly. Bracts

broad, veined ... .. 1. *L. indica*.

Branches with recurved prickles. Bracts linear,

small... .. 2. *L. Camara*.

1. *L. indica*, Roxb. Hort. Beng. 46; Fl. Ind. III. 89; Fl. Br. I. 4. 562. *L. alba*, Dalz. & Gibs. Bomb. Fl. 198; Brandis For. Fl. 369. *Ghaneri*, M.

Throughout India and Ceylon in the warmer parts, common; on river banks of Bengal one of the commonest weeds. Fl. Br. I. "Thinly scattered throughout the presidency," Dalzell. Common in the Kadar district of Mysore, near coffee plantations. The variety *albiflora*, Wight, is also abundant at the base of the Bababuden hills, in dry forests. Flowers throughout the year. A small shrub.

2. *L. Camara*, Linn. Fl. Br. I. 4. 562. *L. aculeata*, Linn.; Dalz. & Gibs. Bomb. Fl. Suppl. 68. *Ghaneri*, M.; *Chadurang*, K.

A native of America, run wild in many parts of India. Very common in waste places near villages throughout the presidency, often in hedges; sometimes scandent. Fl. and Fr. throughout the year.

A gregarious shrub. A serious evil on cultivated and pasture lands, and even in forests owing to its great vitality and the difficulties of eradication. This bushy species occupies waste or semi-disforested areas, forming impenetrable thickets near villages in many parts of the Bombay presidency, North Kánara, Belgaum, Dhárwár and other districts.

2. *PREMNA*, Linn.

Trees or shrubs, sometimes climbing. Leaves entire or toothed. Cymes terminal, paniced or corymbose. Flowers greenish-white or purplish, often odorous. Calyx 2-lipped or cup-shaped. Corolla short, tubular; limb 2-lipped, 5-lobed or subequally 4-lobed. Stamens 4, didynamous. Ovary 2 or 4-celled; style linear, shortly bifid; cells 4-ovuled. Drupe small, globose, surrounded below by the calyx, 1-4-celled and seeded. Seeds oblong.

Large climbing shrub. Corymbs large, purple.

Calyx cupshaped ... .. 1. *P. coriacea*.

Erect tree, sometimes spinous. Corymbs greenish-yellow.

Calyx 2-lipped ... .. 2. *P. integrifolia*.

1. *P. coriacea*, Clark, Fl. Br. I. 4. 573. *P. scandens*, Dalz. & Gibs. Bomb. Fl. 199, not of Roxb. *P. cordifolia*, Grah. Cat. Pl. Bomb. 155, not of Roxb. *Chambari*, Vern.; *Rawan*, M.; *Zarangi bally*, K.

Western peninsula on the gháts from Bombay to Cochin. Konkan and North Kánara gháts, in moist forests. Common from Ainshi southwards. The large purple corymbs (not greenish-yellow) and young leaves appear in Apl.-May. Fr. ripe June. An ornamental climber. A large climbing, scandent shrub. Bark smooth, thin, covered with round, large, scattered, corky lenticels; inner bark white or yellowish with lighter brown fibres. Wood light, rough, soft, mustard-yellow colour. Pores large to small, numerous. Medullary rays moderately broad, wavy, numerous. Annual rings distinct, marked by lines of large pores. Weighs 34 lbs. to the cub. ft. The petals are white, but the rest of the inflorescence is purple or red coloured.

2. *P. integrifolia*, Linn. Mant. 252; Fl. Br. I. 4. 574; Brandis For. Fl. 366; Grah. Cat. Bomb. Pl. 155. *P. serratifolia*, Bedd. Fl. Sylv. 172. *P. latifolia*, Dalz. & Gibs. Bomb. Fl. 200. *Khárd-narvel*, *aran*, *narvel*, M.; *Arni*, Guz.

India near the sea from Bombay to Malacca, Ceylon, the Andamans and Nicobars. Throughout the Konkan and North Kánara, usually near the sea-coast. Fl. June-July. Fr. ripe July-Aug. A small tree. Wood white, with purple streaks, moderately hard, close-grained; used for firewood (Gamble). The greenish-yellow flowers have a peculiar odour. The seeds are pear-shaped with a fluted top—one to each fruit, not 3-4, in the North Kánara plant. *P. cordifolia*, Dalz. & Gibs. Bomb. Fl. 199; Grah. Cat. Bomb. Pl. 155, is doubtfully referred to *P. corymbosa*, Rottl. in the Fl. of Br. I. by Clarke; it is noted from Khandála on the Konkan gháts; leaves long acuminate, seeds rough. Is this simply a form of *P. integrifolia*, Linn.? In Graham's Catalogue, p. 155, there is a species, called *P. Nimmoniana*, G. (*Gura*, *kal gura*, Vern.), which is said to grow at Mahábaleshvar, also on the Rotunda ghát. This species is not quoted in the Fl. Br. I. I have not seen it.



## 3. GMELINA, Linn.

Trees or shrubs. Leaves entire or lobed. Cymes paniced; bracts narrow. Flowers large, yellow, tomentose at least when young. Calyx campanulate, 5-toothed. Corolla-tube ventricose upwards, limb oblique 4-5-lobed. Stamens 4, didynamous; anthers cells oblong, pendulous, sub-separate. Ovary 4-celled, 4-ovuled; style slender, shortly bifid. Fruit a succulent drupe, endocarp bony; calyx persistent, unaltered.

Unarmed tree ...	...	...	...	...	...	1. <i>G. arborea</i> .
Spinescent shrub	...	...	...	...	...	2. <i>G. asiatica</i> .

1. *G. arborea*, Linn.; Roxb. Fl. Ind. III. 84; Fl. Br. I. 4. 581; Dalz. & Gibs. Bomb. Fl. 201; Bedd. Fl. Sylv. t. 253; Brandis For. Fl. 364; Gamble Ind. Timbers 295. *Shivani*, K.; *Shivan*, M.; *Kasmiri*, Vern.

Throughout the Deccan peninsula, Ceylon and Chittagong. Throughout the presidency in deciduous forests. Fl. Mch.-Apl. Fr. May-June. A moderate-sized tree. Bark smooth; rhytidome thin, corky, grey; green cells in patches; inner bark mottled yellow, turning quickly brown on exposure. Wood yellowish-grey with a glossy lustre, soft, light. Annual rings more or less distinct. Pores large and moderate-sized, numerous in the spring wood. Medullary rays moderately broad and fine. Weighs 36 lbs. to the cub. ft. Yields an excellent, strong, light timber, useful for planking, furniture, carriages and ornamental work and does not warp or shrink. The fruit is eaten by the wild tribes of the Satpurus; it is also as well as the root and bark used in native medicine.

2. *G. asiatica*, Linn.; Roxb. Fl. Ind. III. 87; Brandis For. Fl. 365; Bedd. Fl. Sylv. 172; Grah. Cat. Bomb. Pl. 158. *Kal shivani*, K.

Deccan peninsula and Ceylon. Common in gardens near Bombay; forms an excellent hedge plant. Fl. throughout the year. Root and leaves used in native medicine.

## 4. CALLICARPA, Linn.

Stellately tomentose shrubs or trees. Leaves toothed or sub-entire. Cymes axillary. Calyx very small, limb minutely 4-lobed, not accrescent. Corolla small, tubular, purple or reddish. Stamens, 4; anthers exerted, 2-celled, glandular. Ovary imperfectly 2-celled, cells 2-ovuled; style linear, stigma dilated, obscurely bifid. Drupe small, globose; pyrenes 4, one-seeded.

*C. lanata*, Linn. Mant. 331; Fl. Br. I. 4. 567; Brandis For. Fl. 368; Bedd. Fl. Sylv. 173. *C. cana*, Dalz. & Gibs. Bomb. Fl. 200, not of Linn. *Kan phulia*, M.; *Eisur, eshwar*, Vern.; *Towdatti, mardī, tagdatti*, K.

Throughout the Western Peninsula and Ceylon, ascending to 4000 ft. Common in the evergreen forests of the Konkan and North Kánara gháts. Fl. Feb.-May. Fr. H. and R. seasons.

A small tree, but often only a large shrub. Bark grey, rough, corky.

Wood grey, smooth, soft. Pores small, equally distributed. Medullary rays moderately broad and fine, light coloured, distinct. Weighs 35 lbs. to the cub. ft. The bitter bark is used in native medicine. The tomentose buds are used as wicks in oil lamps.

### 5. VITEX, Linn.

Trees or shrubs. Leaves usually 3-5-foliolate. Calyx truncate or 5-toothed. Corolla small, tubular, 2-lipped, 5-toothed; central lobe of lower lip largest. Stamens 4, in pairs, exserted. Ovary 2-4-celled, style filiform, shortly bifid, cells 4-ovuled; drupe globose, supported by the more or less accrescent calyx.

Flowers in terminal panicles.

- |  |                           |
|--|---------------------------|
| Leaves 1-3-foliolate, leaflets sessile, white mealy beneath ... ..             | 1. <i>V. trifolia</i> .   |
| Leaves 3-5-foliolate, leaflets petioluled, grey-pubescent beneath ... ..       | 2. <i>V. Negundo</i> .    |
| Leaves 3-5-foliolate; petioles 0 or slightly winged ... ..                     | 3. <i>V. altissima</i> .  |
| Leaves 3-5-foliolate; petioles broadly winged, wing cordate at the base ... .. | 4. <i>V. alata</i> .      |
| Flowers in axillary corymbose cymes ... ..                                     | 5. <i>V. leucoxydon</i> . |

1. *V. trifolia*, Linn. f. Suppl. 293; Bedd. Fl. Sylv. 172; Brandis For. Fl. 370. *Nirgunda*, Vern.; *Indrani*, *lingur*, M.

Scattered throughout India in the tropical and sub-tropical region from the Himalayas to Ceylon, very easily distinguished from *V. Negundo*, when they are seen growing together. The panicles are shorter and the fruit larger than in *V. Negundo*. Sandy seashores near Murdeshwar, North Kánara. Fl. Fr. apparently throughout the year. A shrub or small tree.

2. *V. Negundo*, Linn. Roxb. Fl. Ind. III. 70; Fl. Br. I. 4. 583; Bedd. Fl. Sylv. 171; Brandis For. Fl. 369. *V. bicolor*, Willd.; Dalz. & Gibs. Bomb. Fl. 201. *Lekkiqidda*, *shurnboli*, K.; *Nirguda*, *lingur*, M.; *Nirgunda*, *nengar*, H.; *Nagodz*, Guz. Indian Privet.

Throughout tropical India and Ceylon. Throughout the presidency and Sind, very common along the banks of rivers and in moist situations in or near deciduous forests. Fl. Mch.-May; also throughout the year at other times.

A large shrub or small tree. Bark thin, grey. Wood greyish-white, hard; annual rings distinct. Pores small and moderate sized. Medullary rays numerous, fine. Weighs 42 lbs. to the cub. ft. Used for building purposes and fuel, often planted in hedges. The root is used in native medicine as a febrifuge.

3. *V. altissima*, Linn. f. Suppl. 294; Fl. Br. I. 4. 585; Dalz. & Gibs. Bomb. Fl. 201; Bedd. Fl. Sylv. t. 252; Brandis For. Fl. 370. *Bulgi*, *burnige*, *nauladi-mara*, *naulmitik*, K.

Bengal, Southern and Western India and Ceylon. In the evergreen forests of the Konkan and North Kánara, abundant in the Kumta and Yellápur táluka forests. Fl. May. Fr. June-July.

A very large tree. Bark grey, scaly, characteristic, inner bark yellow, fibrous, or with rings of darker yellow tissue. Wood grey-brownish, hard, close-grained, heavy; annual rings distinct, marked by a ring of dark hard tissue. Pores medium sized, equally distributed. Medullary rays fine, distinct, short. Weighs 60 lbs. to the cub. ft. Used for building purposes, furniture, doors and windows, carts, etc.: an excellent durable timber, and much in demand in parts of North Kánara.

4. *V. alata*, Heyne; Roth. Nov. Sp. 316; Fl. Br. I. 4. 584; Dalz. & Gibs. Bomb. Fl. 201; Grah. Cat. Bomb. Pl. 155.

In the moist forests of the Konkan and North Kánara; common in the Yellápur táluka in evergreen forests, not separable in my opinion from *V. altissima*, L. f. Fl. Apl.-May. Fr. June-July.

5. *V. leucoxylo*n, Linn. f. Suppl. 293; Fl. Br. I. 4. 587; Dalz. & Gibs. Bomb. Fl. 201; Bedd. Fl. Sylv. 171; Brandis For. Fl. 370. Gamble Ind. Timbers. 298; *Hole lakki, senkani*, K.; *Songarbi*, M.; *Sherus*, Vern.

Western Peninsula and Ceylon. Throughout the Konkan and North Kánara gháts, along the banks of rivers and nálas, in moist forests, attains a considerable size; stem thick and short. Fl. Feb.-Apl. Fr. May-June.

A large, deciduous tree. Wood pinkish grey, with a satin-like lustre moderately hard, close-grained and durable. Annual rings somewhat distinct. Pores small, more numerous in the spring wood. Medullary rays moderately broad and very fine. Weighs 40 lbs. to the cub. ft. Used for cart-wheels. The fruit is eaten by the Burmese in the Andamans. (Gamble). Leaves often 5-foliolate, petiole not winged.

## 6. CLERODENDRON, Linn.

Shrubs or small trees. Leaves simple, opposite or whorled. Flowers axillary or terminal. Calyx 5-toothed or lobed, accrescent in fruit. Corolla-tube long, cylindric; lobes 5, equal. Stamens 4, anthers long-exserted. Ovary imperfectly 4-celled, cells 1-ovuled; style filiform, shortly bifid. Fruit a drupe, dry or succulent.

Leaves opposite. Corolla white.

Inflorescence in, few-flowered, axillary cymes.

Leaves small, obovate. Calyx in fruit campanulate, slightly lobed or truncate ... 1. *C. inerme*.

Inflorescence in axillary or terminal panicles.

Leaves ovate, sinuate. Calyx deeply cleft, lobes caudate-acuminate ... 2. *C. phlomoides*.

Leaves large, ovate, cordate, tomentose. Calyx in fruit much enlarged, red within ... 3. *C. infortunatum*.

Inflorescence in lax terminal panicles.

Leaves long lanceolate. Calyx  $\frac{1}{2}$  in. deeply divided ... 4. *C. Siphonanthus*.

Leaves in verticils of 3. Flowers blue. Calyx  $\frac{1}{4}$  in. cup-shaped ... 5. *C. serratum*.

1. *C. inerme*, Gært. Fruct. 1. 271. t. 57. fig. 1; Fl. Br. I. 4. 589. Dalz. & Gibs. Bomb. Fl. 200 Bedd. For. Man. 174; Brandis For. Fl. 363.

India and Ceylon, near the sea. Australia, China. Common near the sea coast of the Konkan and North Kánara. Flowers throughout the year, abundantly during the rainy season.

A straggling shrub, sometimes scandent, quite glabrous.

The tube of the corolla is nearly 1 inch long. Often planted as a hedge plant. The thick, succulent leaves are used as a febrifuge.

2. *C. phlomoides*, Linn. f. Suppl. 292; Fl. Br. I. 4. 590; Dalz. & Gibs. Bomb. Fl. 200; Bedd. Fl. Sylv. 174; Brandis For. Fl. 363. *Irun*, Vern.; *Airanamula*, M.; *Arni*, Guz.

From the North-Western Himalaya, Terai to Ceylon in the drier climates.

In the dry districts of the presidency, usually in hedges, common in the south of Dhárwár, also in the Belgaum District. Fl. throughout the year.

A large bush with dark coloured branches. The roots are used as a bitter tonic.

3. *C. infortunatum*, Gært. Fruct. 1. 271. t. 57. fig. 1; Fl. Br. I. 4. 594; Bedd. Fl. Sylv. 173; Dalz. & Gibs. Bomb. Fl. 200. *Bhandira*, *bhat*, *kari*, Vern.

Common in waste places throughout India and Burma. Throughout the presidency in deciduous forests, very common in North Kánara. Fl. Dec.-Apl. Fr. R. S. A small shrub, often gregarious, the flowers are tinged with red. Calyx in fruit red, leathery. Sometimes this plant attains to a much larger size near the coast of Kánara.

4. *C. Siphonanthus*, Br. in Ait. Hort. Kew Ed. 2. IV. 65; Fl. Br. I. 4. 595; Brandis For. Fl. 364; Dalz. & Gibs. Bomb. Fl. Suppl. 69. *Barangi*, Vern.

Indigenous in Kumaon, Bengal and South India. Cultivated in gardens and near villages throughout the presidency, sometimes a garden escape. F. June-Oct. Tube of white corolla very long, 4 inches. A small shrub.

5. *C. serratum*, Spreng. Syst. II. 758; Fl. Br. I. 4. 592; Dalz. & Gibs. Bomb. Fl. 200; Brandis For. Fl. 364. *Barungi*, Vern.

Sub-Himalayan tract from the Sutlej eastwards to the Khasia Hills, Western Peninsula and Burma.

Throughout the presidency, often in deciduous forests Fl. May-Aug.

A small shrub, scarcely woody, growing in open situations or in the forest. The roots are used in native medicine.

## 7. SYMPHOREMA, Roxb.

Scandent shrubs. Leaves entire or toothed. Flowers in 7-flowered, capitate cymes. Involucre of 6, obovate bracts, accrescent in fruit. Calyx 4-8-toothed. Corolla small, white. Stamens 6-16; anthers exserted. Ovary 2-celled, cells 2-ovuled; style filiform, shortly bifid. Fruit dry, 1-seeded. Seed erect; cotyledons fleshy.

Leaves thin, entire or slightly toothed. Flowers small,  $\frac{1}{2}$  inch. Bracts linear, spatulate, membranous. Stamens few ... .. 1. *S. involucreatum*.  
 Leaves leathery, deeply repand or toothed. Flowers 1-inch. Bracts obovate, broad. Stamens many ... .. 2. *S. polyandrum*.

1. *S. involucreatum*, Roxb. Cor. Pl. II. 46. t. 186; Fl. Br. I. 4. 599; Dalz. & Gibs. Bomb. Fl. 199.

Western Peninsula from the Konkan southwards, Ceylon.

Throughout the Konkan and North Kánara in moist forests, common in the forests near Yellápúr. Fl. Mch.-Apl. Fr. May-June. A large climber.

2. *S. polyandrum*, Wight Ic. t. 363; Fl. Br. I. 4. 599.

South Deccan peninsula in the hills, extending north to Belgaum.

In the Belgaum and Dhárwár districts in open situations, also in dry deciduous forests. Bare of leaves when in flower. Flowers profusely during Feb.-Mch. Fr. May. Takes the place of *S. involucreatum*, in the dry zone. A climbing or spreading shrub.

## 8. TECTONA, Linn. f.

Trees stellately tomentose. Leaves large, petioled entire. Cymes in large terminal panicles. Bracts small, narrow. Calyx 5-6-lobed, in fruit enlarged, urceolate. Corolla small, tube short, equally 5-6-lobed. Stamens as many as the lobes of the corolla, on the corolla-tube; anthers exserted. Ovary 4-celled, cells 1-ovuled; style linear, tip shortly bifid. Drupe densely hairy, 4-celled; endocarp bony. Seeds erect, oblong.

*T. grandis*, Linn. f. Suppl. 151; Fl. Br. I. 4. 570; Dalz. & Gibs. Bomb. Fl. 199; Bedd. Fl. Sylv. t. 250; Brandis For. Fl. 354. *Ságwan*, *sálg*, M.; *Tegina*, K. The Teak Tree.

Western Deccan peninsula, Central and Southern India, Burma, found as far north as Jhánsi. Throughout the presidency in deciduous forests, grows to a large size along the well-drained slopes of the Kálánadi in North Kánara, the underlying rock being usually metamorphic schist. Fl. June-Aug. Fr. ripe Nov.-Jan.

A large deciduous tree. Bark grey, with shallow furrows, exfoliating in long, thin strips.

Wood yellowish-brown, hard, oily, very durable and strong; does not warp or split once properly seasoned; contains an aromatic oil; works easily and takes a good polish. Annual rings distinctly marked by a layer of large pores on the margin, a few moderate sized pores scattered in the ring. Medullary rays moderately broad, equi-distant. Weighs 48 lbs. to the cub. ft. The chief timber of India and Burma. Used for most purposes. Wood from dead trees is stronger than from trees girdled to death. Malabar teak is more oily than the Burmese wood and is preferred for ship-building, construction of gun carriages and other uses.

### 9. AVICENNIA, Linn.

A gregarious shrub or small tree. Leaves coriaceous, entire. Flowers sessile, yellow, in peduncled heads. Bracts and bracteoles small. Sepals 5, unaltered in fruit. Corolla-tube short, cylindrical; limb 4-divided, divisions equal. Stamens 4, on the throat of the corolla. Ovary imperfectly 4-celled by a 4-winged central column, ovules pendulous between the wings; style long or short, bifid at tip. Capsule compressed, ovate, mucronate, 1-seeded; cotyledons thick, fleshy, folded; radicle villous, inferior.

*A. officinalis*, Linn. Schauer in DC. Prod. XI. 700; Fl. Br. I. 4. 604; Bedd. Fl. Sylv. 174; Brandis For. Fl. 371. White Mangrove. *Tivar*, M.; *Ipati*, K.

Mangrove swamps of the Deccan peninsula and Ceylon, common in salt marshes and along the banks of tidal rivers and creeks, throughout the Konkan and North Kánara. Fl. Mch.-Apl.-May. Fr. ripe July-Aug.

Wood grey, heartwood darker, hard, heavy, brittle, composed of well-marked concentric layers which consist of a ring of white tissue sometimes anastomosing with the ring of the next layer. The ring is lined with a row of moderate sized pores, often containing a black substance. Fine pores surrounded with white tissue are equally distributed throughout the layer. Medullary rays fine, white uniform. Weighs 66 lbs. to the cub. ft. Used in India only for firewood. Bark contains tannin.

### ORDER 69. LABIATÆ.

Herbs, rarely shrubs, usually with many oil-glands. Stem quadrangular. Leaves opposite or whorled, stipules 0. Flowers irregular. Calyx 4-5-cleft or 2-lipped. Corolla monopetalous, limb 4-5-lobed or 2-lipped, lobes imbricate in bud. Stamens on the corolla-tube 4, didynamous, or the 2 upper imperfect. Disk prominent. Ovary 4-lobed and celled; style simple, inserted between the lobes, stigma usually 2-divided, ovules solitary erect, 1 in each cell. Fruit of 4, small, 1-seeded nuts, enclosed in the calyx. Seeds small erect; albumen scanty or 0, radicle inferior.

## 1. COLEBROOKIA, Smith.

A small tree or large woolly shrub. Leaves opposite or in verticels of 3. Flowers small, in paniced spikes of dense whorls. Calyx with long feathery teeth. Corolla very small, white. Stamens 4, very short, included equal, distant. Disk equal. Style 2-fid. Nutlets hairy, obovoid.

*C. oppositifolia*, Smith. Exot. Bot. II. t. 111; Fl. Br. I. 4. 642.  
*C. ternifolia*, Roxb.; Dalz. & Gibs. Bomb. Fl. 209. *Dussarika jhâr*,  
*Bhamini*, Vern.; *Tuggi gidda*, *falia*, K.

Sub-tropical Himalaya; alt. 1—4000 ft., Central India and Western Peninsula southwards to Travancore. Throughout the moist forests of the Konkan and North Kánara ghâts, common. Fl. Dec.-Feb. Fr. Mch.-Apl.

A small tree. Bark grey. Wood greyish-white, soft. Pores small, few, equally distributed. Medullary rays fine or moderately broad, prominent. Weighs 36 lbs. to the cub. ft. Used for gunpowder charcoal. Graham says "spikes like a squirrel's tail." The feathery calyx divisions are accrescent in fruit.

Several species of *Ocimum*, *Orthosiphon*, *Plectranthus*, and *Pogostemon*, are common under-shrubs throughout the presidency.

## ORDER 70. NYCTAGINEÆ.

Herbs, shrubs or trees. Leaves usually opposite, entire, simple, exstipulate. Inflorescence various, flowers often bracteate-involucrate, or bracts small, deciduous. Perianth petaloid; monopetalous, tube persistent; limb 3-5-lobed, plaited in bud. Stamens 4-5, rarely more (up to 20), sometimes unilateral. filaments unequal, inflexed in bud. Ovary free, 1-celled; stigma simple or multifid; ovule 1, erect. Fruit membranous, enclosed in the perianth-tube. Seed erect; albumen floury or soft; embryo curved, folded or convolute, radicle inferior.

## PISONIA, Linn.

Trees or shrubs, often spinous. Leaves opposite or alternate. Flowers in corymbs, usually diœcious. Perianth 5-10-toothed, of the male flower funnel shaped, of the female tubular. Stamens 6-10, exserted. Ovary sessile, oblique; stigma capitate or feathery. Fruit clavate or cylindrical; cotyledons crumpled, enclosing a scanty albumen; embryo straight.

*P. aculeata*, Linn.; Fl. Br. I. 4. 711; Grah. Cat. Bomb. Pl. 167.

Coast forests of Burma, the Andamans, Ceylon and Western Peninsula, N. Kánara in the evergreen forests near Bunwasi, Sircy sub-division. Fl. Jan.-Mch. Fr. Apl.-May. A robust, smooth, grey barked rambling scandent shrub. Trunk 6 in. in diameter. Spines axillary, recurved, sub-opposite. The cylindrical 5-ribbed fruit is about 1 in. long,

each rib has 1-2 vertical rows of sticky, short, capitate glands, pedicels divaricate 1 in., bracteolate.

*P. alba*, Spanoge. China Lettuce. *Chinai Salit*, Bombay. Cultivated about Indian bungalows as a pot plant. A native of the Andamans.

### ORDER 71. POLYGONACEÆ.

Herbs or rarely shrubs. Leaves usually alternate; stipules scarious, sheathing. Flowers bisexual, jointed on the pedicel. Perianth of 3-6, free or connate, persistent sepals, imbricate in bud. Stamens 5-8, opposite the sepals. Disk annular, glandular or 0. Ovary free, 2-4-angled; styles 1-3; ovule 1, basal. Fruit a hard nut, enclosed in the calyx. Albumen floury or hard, horny.

Stamens 12-18.	Styles 4	...	...	...	...	...	...	1. CALLIGONUM.
Stamens 8.	Styles 3	...	...	...	...	...	...	2. PTEROPYRUM.

#### 1. CALLIGONUM, Linn.

Rigid much branched shrubs. Leaves alternate, linear or 0, sheathing stipule short. Flowers solitary or few, 2-sexual. Sepals 5, flat. Stamens 12-18. Ovary free, 2-4-angled; styles 1-3, stigmas capitate, ovule 1, or orthotrope. Fruit a 4-angled nut, winged, hairy or bristly. Seed oblong, terete or 4-angled; embryo central, straight.

*C. polygonoides*, Linn. Meissn. in DC. Prod. XIV. 1. 29 Fl. Br. I. 5.  
22. *Phok, phog*. Sind.

Arid zone of Sind, Panjáb and Rajputana.

A glabrous, almost leafless shrub. Heartwood reddish-brown, very hard. Chiefly used for fuel. Flowers pink, appear in May, and when dry are gathered and eaten.

#### 2. PTEROPYRUM, Jaub. & Spach.

Rigid shrubs. Leaves small, alternate or fasciated, linear or spatulate; sheathing stipule short or 0. Flowers small, ochreate, 2-sexual. Sepals 5. Ovary 3-angled; styles 3. Fruit a broadly 3-winged, beaked nut. Seed beaked, base broad; embryo excentric, cotyledons oblong, short.

*P. Oliveri*, Jaub. & Spach. Ill. Pl. Orient. II. 9. t. 108; Fl. Br. I. 5.  
23; Wight Ic. t. 1809. Afghanistan, Persia, Sind. Fl. Sept., Oct.  
An excessively branched shrub with white branchlets.

### 72. ARISTOLOCHIACEÆ.

Herbs or shrubs, often climbing. Leaves alternate, entire or 3-5-lobed, exstipulate. Flowers bisexual, often large, solitary, racemose or cymose. Perianth superior, regular or irregular, 3-lobed or tubular, lobes valvate. Stamens 6 or more, subsessile in



a ring round the base of the style; cells parallel, opening by dorsal slits. Ovary 4-6-celled with parietal placentas; style columnar, stigma lobed, ovules numerous. Fruit capsular or baccate. Seeds numerous, albumen copious, embryo minute.

Erect shrubs. Leaves 3-5-basal nerved, not cordate.

Perianth regular ... .. 1. BRAGANTIA.

Twining. Leaves 5-7-basal nerved, cordate. Peri-

anth irregular, tubular and inflated at the base ... 2. ARISTOLOCHIA.

### 1. BRAGANTIA, Lour.

Shrubs or under-shrubs. Leaves 3-5-basal-nerved. Flowers axillary, cymose, bracteate. Perianth shortly campanulate, equally 3-lobed. Stamens 6-12, 1-seriate, free or connate; connective thick. Ovary elongate, 4-celled; style short, stigmas 3 or more, linear; ovules 2-seriate. Capsule elongate, 4-angled, 4-valved, valves separating from the column. Seeds oblong, 3-angled, rugose or pitted.

*B. Wallichii*, Br. in Wall. Cat. 7415; Fl. Br. 1. 5. 73; Wight Icones. t. 520; Dalz. & Gibs. Bomb. Fl. 225. *Chakrani*, M.; *Mirsagni*, K.

Western Peninsula in the ghát forests from the Konkan southwards, common in the evergreen forests near the Gairsoppah falls. A large shrub, almost a small tree. The foliage resembles that of *Piper trichostachyon*, hence the Kánarese name. The root is used in native medicine as a preventitive against cholera.

*B. Dalzellii*, Hook. F. Fl. Br. 1. 5. 73. Is a fine species probably from the Konkan, found in Dalzell's herbarium. It is described with leaves 12 in. long by 3 in. broad. Seeds lemon-coloured. I have not seen it.

### 2. ARISTOLOCHIA, Linn.

Twining shrubs. Leaves entire or lobed, petiole dilated at the base. Perianth coloured, tube dilated at the top, obliquely 1-2-lipped. Anthers 6. Style short, 3-6-lobed. Capsule septicidally 6-valved. Seeds often covered with the remains of the placenta.

Leaves cuneate, rounded or shallow cordate, 5-nerved.

Flowers 1-3 ... .. 1. *A. indica*.

Leaves large, deeply cordate, pedately 5-7-nerved.

Flowers in racemose cymes ... .. 2. *A. Roxburghiana*.

1. *A. indica*, Linn. Fl. Br. I. 5. 75.; Grah. Cat. Bomb. Pl. 178; Dalz. & Gibs. Bomb. Fl. 224.; Rheede Hort. Mal. 8. 25. *Sapshi. kadula*, K.; *Sampsun*, Vern. Throughout tropical India from Nepal, common in the ghát forests from the Konkan southwards.

2. *A. Roxburghiana*, Klotzsch in Monatsb. Berl. Akad. 1859, 596; Fl. Br. I. 5, 75. *A. acuminata*, Roxb. Fl. Ind. 3489. Wight Icones t. 771; Grah. Cat. Bomb. Pl. 178; Dalz. & Gibs. Bomb. Fl. 224.

E. Himalaya, southwards to Penang, gháts of the Konkan, southwards.

*A. bracteata*, Retz. Fl. Br. I. 5, 75. A glaucous leaved, herbaceous species is very common on the black-soil plains and is used as an antidote for snake-bites. It is called *Keeramar* in Maráthi.

### 73. PIPERACEÆ.

Aromatic herbs or shrubs. Leaves alternate, opposite or whorled, often pellucid-dotted, entire. Flowers minute, 1-2-sexual, in axillary or terminal catkin-like spikes, subtended by a peltate bract. Perianth 0. Stamens 2-6, hypogynous, anthers jointed to the filaments, cells confluent. Ovary 1-celled; stigmas sessile, ovules 1 or more. Fruit small, usually 1-seeded, testa thin; albumen copious; embryo minute.

#### PIPER, Linn.

Climbers with swollen nodes, often aromatic. Leaves entire, often unequal sided, stipules various. Flowers minute, dioecious, each in the axil of a bract, with or without bracteoles; bracts peltate or cupular, sometimes decurrent on the spike rachis with or without raised margins, bracteoles when present forming low ridges on the sides of the flower. Perianth 0. Stamens 1-4, filaments short; anthers 2-celled, cells often confluent. Ovary 1-celled; style conic, beaked or 0, stigmas 2-5, ovule solitary, erect. Fruit ovoid or globose with a thin testa and a hard albumen.

Climbers. Flowers dioecious in simple spikes.

Glabrous. Male bract and bracteoles enlarged into a globose, white receptacle. Fruit yellow ... .. 1. *P. trichostachyon*.

Grey hirsute. Male bract peltate, orbicular, somewhat decurrent ... .. 2. *P. Hookeri*.

Glabrous. Male bract adnate to the rachis with a winged, membranous margin. Fruit red ... .. 3. *P. nigrum*.

Erect shrub with thick soft branches. Flowers bisexual in subumbellate spikes ... .. 4. *P. subpeltatum*.

1. *P. trichostachyon*, Cas. Dc. in Prodr. 16. 1. 242; Fl. Br. I. 5. 80. *Muldera trichostachya*, Miq. Wight Icones t. 1944.

Deccan peninsula, Neilgherry and Shevagerry hills, common on the gháts from Bombay southwards in evergreen forests. A stout woody, distinct species with rather narrow leaves, strongly 3-nerved at the base and with 2 sub-opposite nerves higher up from the midrib. The waxy-white, globose receptacles with minute eye-like stamens, in short, leaf-opposed spikes and the yellow fruit, distinguish this species from the other indigenous Pipers. Fl. and Fr cold and hot seasons.

2. *P. Hookeri*, Miq. in Hook. Lond. Journ. Bot. 4. 437; Fl. Br. I. 5. 88; Dalz. and Gibs. Bomb. Fl. Suppl. 315.

Climbing shrub, but not so robust as the foregoing species. Leaves scarcely coriaceous, grey hirsute beneath, pellucid punctate and with 5-7, nerves from the broad sub-cordate, equal or oblique base; petioles tomentose or hairy. Stigmas 3-4, reflexed, grey tomentose. Western Peninsula on the gháts from Bombay southwards to Kánara, also on the Bababuden hills of Mysore. Fl. Fr. hot and rainy seasons.

3. *P. nigrum*, Linn. Sp. Pl. 28; Fl. Br. I. 5. 90; Wight Icones. t. 1935; Rheede Hort. Mal. 7. 23. t. 12. Blackpepper. *Kala merce*, H.

Cultivated in the Konkan and N. Kánara, doubtfully indigenous, found abundantly in some of the N. Kánara evergreen forests.

A stout climber, quite glabrous throughout. Leaves coriaceous, broadly ovate, 5-9-nerved from the rounded and oblique base. Fl. Fr. C. S.

4. *P. subpeltatum*, Willd. Sp. Pl. 1. 166; Fl. Br. 1. 5. 95. *Pothomorphe subpeltata*, Miq. Syst. Pip. 213; Wight Icones. t. 1925.

Deccan peninsula from the Konkan southwards, Penang, Ceylon and the Malay Archipelago. In open situations in some of the evergreen forests of N. Kánara. Distinguished from the other Bombay species by its erect habit and herbaceous appearance. Fl. and Fr. cold season.

Besides the cultivated *Piper longum*, Roxb. *Peepul*, Vern. *Piper Betel*, Roxb. *Pawn*, *betel leaf* and *P. nigrum*. Blackpepper. I have a climbing species common in some of our N. Kánara ghát evergreens which was doubtfully referred to *P. Wightii*, Miq., at Calcutta. It is closely allied to *P. sylvestre*, Lamk., which is included in Dalz. and Gits. Bomb. Fl. 225. The species of Piper (sec. Eupiper) are difficult to separate.

#### ORDER 74. MYRISTICÆ.

Evergreen trees. Leaves alternate, entire, usually dotted. Flowers dioecious, regular, fascicled, umbelled or paniced. Perianth deciduous, usually 3-lobed, lobes valvate in bud. Male fl. Anthers 3 or more, connate in a sessile or stipitate column, head, ring or disk, 2-celled. Female fl. Ovary superior, free, sessile, 1-celled; style short or 0; stigma capitate, discoid or lobed; ovule 1, basal, erect. Fruit fleshy, opening in 2-valves. Seed more or less covered with a lobed or lacerate, often coloured arillus; testa thin, albumen hard, rumiate. Embryo at base of seed, very small; cotyledons divaricate.

#### MYRISTICA, Linn.

The only genus, same characters as the order.

Anthers elongate, connate, stipitate. Male flowers bracteolate.

Male flowers axillary, crowded on short, stout peduncles. Fruit 2 in., brown, minutely pubescent, furrowed longitudinally ... .. 1. *M. laurifolia*.

Male flowers in axillary, branched, trichotomous cymes. Fruit rusty-brown densely covered with deciduous, pubescence ... .. 2. *M. malabarica*.

Male flowers in short dense, axillary clusters, densely, golden tomentose; peduncle short, 2-cleft, thick, woody. Fruit large, 4 in., hoary ... .. 3. *M. magnifica*.

Anthers produced to the base of the column, free at the tips and separable. Male flowers ebracteolate ... .. 4. *M. Farquhariana*.

Anthers on the toothed margin of a peltate, triangular disk. Male flowers bracteolate, fascicled on short axillary branches. Fruit obovoid, rusty-pubescent ... .. 5. *M. attenuata*.

1. *M. laurifolia*. Hook, f. & T. Fl. Ind. 163 ; Fl. Br. I. 5. 103 ; Bedd. Fl. Sylv. t. 267. *M. Beddomei*, G. King. Ann. Cal. Gard. III. 291. *Jaijkai*, K. ; *Jayphal*, M.

Western Peninsula on the gháts from N. Kánara to Cape Comorin, Ceylon. 1500—4000 ft.

Very common in the evergreen forests of the southern gháts of North Kánara ; also on the Konkan gháts. Fl. Nov.-Dec. Fr. June-July.

A moderate-sized tree. Bark smooth, inner red, juicy. Wood reddish-grey, moderately hard, smooth, compact. Pores small, in short radial lines. Medullary rays very fine, wavy, uniform, closely packed and distinct. Numerous concentric lines of light coloured tissue cross the rays at unequal distances apart. Weighs 52 lbs. to the cub. ft.

Fruit brown, minutely pubescent and with one longitudinal furrow.

2. *M. malabarica*, Lamk. in Act Par. 1788, 162 ; Fl. Br. I. 5. 103 ; Dalz. & Gibs. Bom. Fl. 4 ; Bedd. Fl. Sylv. t. 269 ; King Ann. Cal. Bot. Gard. III. 288. *Jangli jaiphál*, *ranjaiphál*, Vern.

Western Peninsula on the gháts, from the Konkan to Malabar.

In the evergreen forests of the Konkan and North Kánara gháts ; common in the Kumta táluka forests. Fl. Nov.-Mch. Fr. C. and H. seasons. A moderate-sized tree.

Bark smooth, with small lenticular spots, no rhytidome ; inner with much red juice. Wood reddish-grey, moderately hard. Pores moderate-sized, oval, not numerous. Medullary rays fine. Weighs 39 lbs. to the cub. ft. Used for building purposes. The yellowish mace (*ramputri*) completely covers the nutmeg (*ramphul*). Both are exported from North Kánara to Bombay.

3. *M. magnifica*. Bedd. Fl. Syl. t. 268 ; Fl. Br. I. 5. 104.

South Travancore in the plains. North Kánara near Malamani on the Gairsoppah ghát in evergreen forests.

A large evergreen tree. When young the trunk is furnished with immense aërial roots which start from the trunk at about 20 ft. from the ground and are about  $\frac{1}{2}$  in. thick at the ends. These roots give the tree the appearance of a mangrove on a large scale ; they afterwards develop into buttresses. The leaves are lanceolate, acute, 2 ft. long by 8 in. broad, shining, glabrous above, silvery beneath, with about 24 pairs of fairly prominent nerves, curving upwards and looping within the margin. Bark smooth, filled with much red juice.

4. *M. Farquhariana*, Wall. Cat. 6795 ; Fl. Br. I. 5. 108 ; Bedd. Fl. Sylv. t. 270. *M. canarica*, Bedd. MSS. King Ann. Cal. Bot. Gard. III. 289.

Western Peninsula from the Konkan to the Wynaad and Tinnevely, Malacca, Penang and Singapore. Not observed by me in North Kánara.

5. *M. attenuata*, Wall. Cat. 6791; Fl. Br. I. 5. 110; Bedd. Fl. Sylv. 176; King Ann. Cal. Bot. Gard. III. 316. *M. corticosa*, Bedd. Fl. Sylv. t. 27 (not of Hook. f. & T.). *M. amygdalina*, Grah. Cat. Bomb. Pl. 175. Dalz. & Gibs. Bomb. Fl. 4. *Rukt mara, hedaggal, K.*

Travancore Mountains, 2—3000 ft. alt.

Very common in the evergreen forests of the Konkan and North. Kánara gháts. Fl. Nov.-Jan. Fr. R. S. A tall evergreen tree with drooping or horizontal branches. Bark  $\frac{1}{4}$  in., scaly, coming off in patches, exposing a brown surface beneath; inner bark with much blood-red juice. Wood reddish, lustrous, light, smooth, soft. Pores moderately large, often subdivided in small groups or lines of 2—3 together. Medullary rays fine red, short, rather indistinct. Weighs 32 lbs. to the cub. ft.

#### ORDER 75. LAURINEÆ.

Aromatic trees or shrubs (except *Cassyltha*). Leaves alternate, rarely opposite, gland-dotted, exstipulate. Flowers in axillary cymes, panicles or racemes, usually 1-2-sexual; bracts 0 or deciduous, often involucriform. Perianth regular, 6-4-cleft, tube sometimes enlarged in fruit. Stamens normally 12, biseriate; usually half or more of the inner or outer stamens are wanting or reduced to staminodia. Anthers erect, 2-4-celled; cells opening by upcurved deciduous lids or valves. Ovary sessile, 1-celled; style terminal, stigma simple, discoid or dilated; ovule solitary, pendulous. Fruit a 1-seeded berry or drupe, peduncle often thickened, testa membranous; albumen 0; cotyledons plano-convex, fleshy, radicle superior, minute.

Anthers 2-celled.

Flowers bisexual.

Fruit wholly inclosed in the perianth tube... 1. CRYPTO-CARYA.

Fruit naked, perianth wholly deciduous ... 2. BELLSCHMIEDIA.

Anthers 4-celled.

Flowers usually bisexual.

Perianth-tube only persistent in fruit ... 3. CINNAMOMUM.

Perianth-lobes persistent, reflexed in fruit... 4. MACHILUS.

Perianth-lobes wholly deciduous ... 5. ALSEODAPHNE.

Flowers diœcious.

Leaves sub-verticillate. Bracts densely imbricating. Fruit small, globose, on the thickened cup-like calyx-tube ... 6. ACTINODAPHNE.

Leaves alternate. Bracts whorled. Fruit a drupe, situated on the slightly or much enlarged calyx-tube ... 7. LITSÆA.

#### 1. CRYPTO-CARYA, Brown.

Evergreen trees. Leaves alternate, penninerved. Flowers hermaphrodite, in axillary and terminal panicles. Perianth-segments 6, equal. Stamens 12, 6 outer perfect; anthers introrse, 3 inner

with extrorse anthers alternating with 3 staminodes. Ovary immersed in the perianth-tube. Fruit included in the perianth-tube.

Leaves large. Panicles spreading. Fruit globose ... 1. *C. Wightiana*.  
Leaves small. Panicles dense, contracted. Fruit ovoid. 2. *C. Stocksii*.

1. *C. Wightiana*, Thw. Enum. 254; Fl. Br. I. 5 120; Bedd. Fl. Sylv. t. 299. *C. floribunda*, Wight, Dalz. & Gibs. Bomb. Fl. 222. *Gulmur*, K.

Western Peninsula; from North Kánara southwards, Ceylon.

In the evergreen forests of the Konkan and North Kánara; common on the Yellápur gháts. Fl. Nov.-Jan. Fl. May-June.

A very large tree. Bark thin with large corky open lenticels, inner bark hard, reddish mottled. Wood strong, durable. Used for building purposes, sugarcane mills, etc.

2. *C. Stocksii*, Meissn. in DC. Prod. XV. I. 71; Fl. Br. I. 5. 120.

Deccan Peninsula, Nilgherry hills. Anamallays, Kánara, probably from the South Kánara gháts. I have not seen it in any of the North Kánara forests. I have specimens in fruit collected in October on the Bababuden hills of Mysore at 5000 feet altitude. Flowers during May-June on the Sispára ghát. A moderate-sized tree.

## 2. BEILSCHMIEDIA, Nees.

Evergreen trees. Leaves alternate, penninerved. Flowers small, bisexual, in short panicles or racemes, in the axils of the upper leaves. Perianth deciduous, segments nearly equal. Perfect stamens 9, anthers 2-celled; inner 3 stamens with extrorse anthers; outer 6 with introrse anthers. Staminodes of 4th series, sessile or cordate. Berry ovate, on the short thick pedicel.

*B. fagifolia*, Nees in Wall. Pl. As. Rar. II. 69; Fl. Br. I. 5. 122. Var. ? *B. Dalzellii*, Meissn. *B. fagifolia*, Bedd. Fl. Sylv. t. 263. *B. Roxburghiana*, Dalz. & Gibs. Bomb. Fl. 222. *Kamatti*, K.

Western Peninsula on the gháts from the Konkan southwards. Evergreen forests of the Konkan and North Kánara gháts; common on the Ainshi ghát. Fl. C. S. Fr. H. S.

A large or very large tree. Bark grey, scaly, inner bark thin, yellowish, woody. Wood light brown, smooth, shining, moderately hard. Pores moderately large, simple or divided, equally distributed. Medullary rays fine, uniform, reddish. Weighs 40 lbs. to the cub. ft. Fruit ovoid, like a plum, dark-blue with much white powdery bloom; episperm crustaceous. There is a small albumen intruded between the cotyledons and immediately surrounding them.

## 3. CINNAMOMUM, Blume.

Evergreen trees. Leaves opposite or alternate, usually 3-nerved at the base. Flowers small, bisexual or polygamous, in axillary or

terminal panicles. Perianth of 6, sub-equal segments. Perfect stamens 9, 6 outer eglandular with introrse, 4-celled anthers, the inner 3 perfect stamens with 2 glands at their bases, and extrorse anthers. 4th series of 3 short staminodia. Ovary free. Fruit supported by the thickened receptacle and perianth.

Fruiting peduncle  $\frac{3}{8}$  in. in diameter. Fruit  $\frac{3}{8}$  in. long... 1. *C. zeylanicum*.

Fruiting peduncle  $\frac{3}{8}$  in. in diameter. Fruit 1 in. long... 2. *C. macrocarpum*.

1. *C. zeylanicum*, Breyne in Ephem. Nat. Cur. Dec. 1. Ann. 4. 139; Fl. Br. 1. 1531; Bedd. Fl. Sylv. t. 262. *C. iners*, Grah. Cat. Bomb. Pl. 173. *Dalchini*, *nisani*, *nisne*, K.; *Ohez*, *bojevar*, Vern. Wild Cinnamon Tree.

Tennasserim, Burma and the Malay Peninsula, Western Peninsula, and Ceylon. In the evergreen forests of the Konkan and North Kánara, very abundant on the southern gháts in the Kumta and Siddápur tálukas. Fl. Nov.-Feb. Fr. June-July. A moderate-sized evergreen tree. Bark  $\frac{1}{2}$  in. thick, smooth, pale coloured, inner bark reddish. Green parenchyma, developed. Wood grey, light, soft, porous. Pores medium-sized, numerous in wavy lines. Medullary rays reddish, fine, equi-distant. Weighs 36 lbs. to the cub. ft. Cinnamon bark is collected and exported in considerable quantities from North Kánara.

2. *C. macrocarpum*. Hook. f. Fl. Br. I. 5. 133. *C. iners*, Wight Ic. t. 30. North Kánara in evergreen forests.

I am doubtful whether this is not a variety of *C. zeylanicum*, with a large fruit. The plate in Wight's Icones is copied from the Hortus Malabaricus and might be any species of Cinnamomum.

#### 4. MACHILUS, Nees.

Evergreen trees. Leaves alternate, penninerved. Flowers bisexual, in axillary panicles. Perianth of 6 segments, unchanged in fruit. Stamens as in *Cinnamomum*. Berry globose, seated on the persistent perianth.

*M. macrantha*, Nees in Wall. Pl. As. Rar. II. 70; Fl. Br. I. 5. 140; Bedd. Fl. Sylv. t. 264; Dalz. & Gibs. Bomb. Fl. 221. *M. glaucescens*, Wight Ic. 1825; Dalz. & Gibs. Bomb. Fl. 221. *Gulum*, M.; *Gulmavu*, K.

Western Peninsula on the gháts from the Konkan southwards, Ceylon, alt. 1500—4000 feet. Throughout the gháts of North Kánara and the Konkan, in moist forests.

A large tree. Wood grey or light reddish, soft, smooth, shining. Annual rings indistinct. Pores moderate sized, simple or subdivided. Medullary rays moderately broad, short, reddish, distinct. Weighs 42 lbs. to the cub. ft. Would suit for tea or cigar boxes. There may be two species distinct here. *M. macrantha*, Nees, has a small black fruit, green dotted when young, size of a large currant, and flowers during Jany.-Feb. Fruit ripe May-June. *M. glaucescens*, Wight, has a large fruit, depressed succulent, size of a small plum, green with white dots, common in the evergreen forests near Yellápur and elsewhere in North Kánara. Fl. Nov.-Dec. Fr. Feb.-Mch.

5. **ALSEODAPHNE**, Nees.

Evergreen trees. Leaves alternate, penninerved, subverticillate at the ends of the branchlets. Flowers in axillary, cymose, panicles. Stamens as in *Cinnamomum*. Fruit ellipsoid, seated on the truncate and of the swollen and fleshy peduncle.

*A. semicarpifolia*, Nees in Wall. Pl. As. Rar. II. 72; Fl. Br. I. 5. 144; Dalz. & Gibs. Bomb. Fl. 222; Bedd. Fl. Sylv. t. 297. *Nelthare, mase, mashe*, K.; *Miri, phudgus*, M.

Western Peninsula from the Konkan southwards.

On the Konkan and North Kánara gháts, usually in evergreen forests, from the coast inland. Fl. July, Aug., Sept. Fr. ripe Apl., May.

A medium sized tree. Bark dark coloured, smooth. Wood grey, or brownish, smooth, hard, compact. Pores small, sub-divided. Medullary rays fine, uniform, distinct; somewhat sinuous where they are in contact with the pores. Weighs 48 lbs. to the cub. ft. Used for building purposes and boats. The panicles often exceed the leaves in the North Kánara tree. Var. *angustifolia*, Meissn. is common near Yellápur,

6. **ACTINODAPHNE**, Nees.

Evergreen trees. Leaves subverticillate, penni or triplenerved. Flowers diœcious, in axillary, bracteate umbels or clusters; bracts imbricating, caducous. Perianth-segments 6. Stamens 6-9, anthers 4-celled all introrse, outer 6 stamens eglandular, inner 3, 2-glandular. Staminodes of female 9. Perianth-tube enlarged in fruit. Fruit globose, seated on the truncate, enlarged calyx.

*A. Hookeri*, Meissn. in DC. Prod. XV. 1. 218; Bedd. Fl. Sylv. t. 296; Fl. Br. I. 5. 149. *A. lanceolata*, Dalz. & Gibs. Bomb. Fl. 312. *A. angustifolia*, Nees, Wight Ic. 1841. *Pisha*, M.; *Tudgensu, kaggodgi mara*, K.

Evergreen forests of the Konkan and North Kánara. Dalzell says "very common at Mahábaleshvar." Fl. Oct.-Nov. Fr. Feb.-Mch. A large or medium-sized evergreen tree with smooth bark, often with lenticular markings; inner bark light brown, fibres short, tissue homogeneous. The verticels of white pubescent pendulous, young leaves are very conspicuous in some of the evergreen forests of North Kánara.

7. **LITSÆA**, Lamk.

Usually evergreen trees or shrubs. Leaves alternate, penninerved, rarely triplenerved. Flowers diœcious, umbellate; umbels few or many-flowered; involucrel bracts 4-6, concave. Perianth tubular, 4-6-lobed. Stamens, 6, 9, 12, outer 6 usually eglandular; anthers



introrse, 4-celled. Fruit a succulent drupe, seated on the slightly or much enlarged perianth-tube, which is 6-toothed or irregularly lobed.

Perianth-segments incomplete or 0, tube not or slightly accrescent in fruit. Stamens often more than 12.

Umbels solitary, many-flowered ... .. 1. *L. tomentosa*.

Umbels corymbose or racemed, few-flowered .. 2. *L. sebifera*.

Perianth-segments 6, tube enlarged, cupular in fruit. Stamens about 12.

Leaves glaucous beneath. Umbels on short peduncles or in sessile clusters ... .. 3. *L. Stocksii*.

Leaves rusty-tomentose beneath. Umbels in stout racemes ... .. 4. *L. Wightiana*.

Perianth-segments 4, deciduous. Tube not enlarged in fruit. Stamens 6.

Leaves strongly triple-nerved at the base, glaucous beneath. Fruit globose, situated on a

disciform perianth-tube, pedicel thickened ... 5. *L. zeylanica*.

1. *L. tomentosa*, Herb. Heyne, ex Wall. Cat. 2550; Fl. Br. I. 5. 157. *Tetranthera apetalata*, Dalz. & Gibs. Bom. Fl. 222. *Chikna*, M.

Deccan; Western Peninsula on the ghâts from the Konkan southwards, Ceylon, ascending to 4000 ft. Throughout the Konkan and North Kánara in evergreen forests, not so common as the next species, from which it scarcely differs. Fl. Dec. Fr. Feb.-Mch. Stamens 18-20. A small tree. Bark smooth. Wood grey, smooth, hard, compact. Pores small, often in radial lines. Medullary rays moderately broad or fine, distinct. Weighs about 45 lbs. to the cub. ft.

2. *L. sebifera*, Pers. Syn. II. 4; var. 3. *tomentosa*, Fl. Br. I. 5. 158. *Tetranthera laurifolia*, Jacq. Brandis For. Fl. 379. *Maidalakri*, M.

Throughout the hotter parts of India. Throughout the Konkan and North Kánara, in moist forests, common on the southern ghâts of the Kumta and Siddápur talukas. Fl. May-July. Fr. Jany.-Feb. Stamens 9-20.

A small tree. Bark smooth. Wood greyish-brown, moderately hard, shining, close-grained, durable. Annual rings distinct. Pores medium sized, usually sub-divided, equally distributed. Medullary rays fine or very fine. Concentric lines of white tissue at unequal distances cross the rays at right angles. Weighs 46 lbs. to the cub. ft. The bark is a popular native drug.

3. *L. Stocksii* Hook. f. Fl. Br. I. 5. 176. *Tetranthera lanceæfolia*, Grah. Cat. Bomb. Pl. 174 (Var. *acutata*). *Peesah, goolchæ*, Vern.

Evergreen forests of the Konkan and North Kánara, common on the ghâts from Ainshi southwards. Fl. Aug.-Nov. Fr. Mch.-Apl. A large or small evergreen glabrous tree, Graham says the fruit ripens at Mahabaleshwar in June and is of a red colour, The Kánara tree has black purple fruit ripe in Apl.

4. *L. Wightiana*, Wall. Cat. 2557; Fl. Br. I. 5. 177. *Tetranthera Wightiana*, Bedd. Fl. Sylv. t. 293. *Oylicodaphne Wightiana*, Dalz. & Gibs. Bomb. Fl. 222.

On the southern gháts of North Kánara in evergreen forests, common in the forests near the Falls of Gairsoppah. Fl. Oct.-Nov. Fr. Apl.-May. A large tree.

5. *L. zeylanica*, C. & Fr. Nees in Amoën. Bot. Bonn. Fasc. 1. 58 ; Brandis For. Fl. 382 ; Dalz. & Gibs. Bomb. Fl. 223 ; Bedd. Fl. Sylv. t. 294. *Kanvel*, *chirchira*, M. ; *Bili nisangi*, K.

Bhotan and the Khasia Mts., Chittagong, Pegu and Tenasserim, Western gháts from the Konkan southwards, ascending to 7000 feet in the Nilghiris. Throughout the Konkan and North Kánara moist forests, common. Fl. Oct.-Jany. Fr. Jany.-Feb. A small or moderate-sized tree. Wood reddish-white, heartwood darker, moderately hard and tough. Used for house-building, planks, etc.

*Cassytha filiformis*, Linn., a slender twining parasite, is common throughout the presidency, often growing on *Ipomœa biloba*, near the sea coast.

#### ORDER 76. THYMELACEÆ.

Trees or shrubs. Leaves alternate or opposite, entire. Flowers 2-sexual, regular. Inflorescence various. Perianth tubular or campanulate, 4-5-lobed ; throat with or without scales. Stamens usually as many or twice as many as the perianth segments. Disk annular, cupular or of scales. Ovary free, 1-celled (in *Thymelea* proper), with a single pendulous ovule ; style simple or 0, stigma capitate. Fruit indehiscent. Seed pendulous or lateral ; albumen fleshy or 0 ; embryo straight, radicle superior.

#### LASIOSIPHON, Fresen.

Small trees or shrubs. Leaves opposite or scattered. Flowers bisexual, in dense, bracteate heads. Perianth-tube cylindric, circumciss above the ovary ; lobes 5, spreading ; scales above the stamens, 5-10. Stamens 10, upper or all slightly exerted. Disk 0 or short, annulate. Ovary sessile, 1-celled ; style filiform, stigma capitate. Fruit small, dry ; pericarp membranous. Albumen scanty or 0.

*L. eriocephalus*, Dcne. in Jacq. Voy. Bot. 148 ; Fl. Br. I. 5. 197 ; Bedd. Fl. Sylv. 179. *L. speciosus*, Dcne. ; Dalz. & Gibs. Bomb. Fl. 221. *Rami*, *ramita*, M. ; *Mukurgal*, K. Woolly-headed Gnidia.

Western Peninsula on the gháts from the Konkan southwards, Ceylon, ascending to 400 feet. Throughout the Konkan and North Kánara, common on the Supa gháts, in deciduous forests. Fl. Oct.-Feb. Fr. Mch.-Apl. A small tree or large shrub.

The bark is a powerful vesicant. Both the bark and leaves are acrid and poisonous. A fibre is extracted from the bark.

ORDER 77. **ELÆAGNACEÆ.**

Shrubs or trees, silvery scaly. Leaves alternate or opposite, entire. Flowers small, regular, 1-2-sexual, white or yellow. Perianth tubular, 2-6-cleft, valvate in bud. Stamens usually 4, alternate with the perianth lobes. Ovary free, 1-celled, with a solitary erect ovule. Fruit indehiscent, enclosed within the accrescent perianth tube. Seed ascending; albumen 0 or scanty; embryo straight axile; cotyledons thick, radicle inferior.

**ELÆAGNUS**, Linn.

Trees or shrubs. Leaves alternate, entire, densely silvery scaly on the lower surface. Flowers hermaphrodite or unisexual by abortion. Perianth-tube constricted above the ovary; limb valvate, 4-cleft, deciduous. Stamens 4, on the mouth of the corolla. Style linear included; stigma lateral. Fruit with a bony or coriaceous endocarp.

*E. latifolia*, Linn. Sp. Pl. Ed. 2. 177 (excl. syn.); Fl. Br. I. 5. 202; Bedd. Fl. Sylv. t. 180; Brandis For. Fl. 390. *E. Kologa*, Schl.; Dalz. & Gibs. Bomb. F. 224. *Nurgi*, *ambgool*, Vern.; *Halige balli*, *jeeb kuthri*, K.; *Nildook*, M.

Widely distributed throughout the hilly parts of India, Burma, Penang, South India and Ceylon.

Throughout the Konkan and North Kánara, usually in or near evergreen forests. Fl. Nov.-Feb. Fr. May-July. An extensive climber with spinous stems 4 in. in diameter at the base, branches with spines which are often curved. Bark smooth with corky excrescences; shallow fissures at base of stem; inner bark red. Wood white or grey, smooth, soft. Annual rings more or less distinct. There is a large central pith. Pores large to small, uniformly distributed, numerous. Medullary rays fine to moderately broad. Weighs 42 lbs. to the cub. ft. Fruit ellipsoid with a subacid, fleshy pink perisperm covered outside with silvery white scales, endocarp with 8 longitudinal ribs. Within the coriaceous putamen there is a coat of thick felt round the fleshy cotyledons. An excellent edible fruit but not abundant.

ORDER 78. **LORANTHACEÆ.**

Parasitic evergreen shrubs. Leaves coriaceous, sometimes wanting, generally opposite, entire, exstipulate, often 2-bracteolate. Flowers regular, hermaphrodite or unisexual, usually bracteate. Calyx adnate to the ovary, limb truncate or 0, rarely toothed. Petals 4-8, free or connate, valvate in bud. Stamens as many as corolla lobes, usually inserted on them. Ovary inferior, 1-celled; style short or long, stigma simple, ovule 1, erect. Fruit a 1-seeded drupe, albumen fleshy, embryo straight, radicle superior.

Flowers 2-sexual	...	...	...	...	...	1. LORANTHUS.
Flowers 1-sexual	...	...	...	...	...	2. VISCUM.

## 1. LORANTHUS.

Shrubs, often with stellate hairs. Flowers usually large, coloured. Petals free or more or less connate into a tube. Stamens with versatile anthers, cells parallel.

Flowers small in glabrous spikes. Bract scale-like. Corolla 4-cleft, lobes reflexed symmetrically. Anthers continuous with the filaments, 2-celled. (*Phœnicanthemum*.)

Leaves short petioled.

Flowers  $\frac{1}{2}$  in.; buds cylindrical ... 1. *L. Wallichianus*.

Leaves long petioled. Flowers  $\frac{3}{4}$ -1 in.;

buds 4-angled ... .. 2. *L. obtusatus*.

Flowers in axillary fascicles or racemose, mealy-tomentose. Bract scale-like. Calyx limb 0. Corolla long-curved, 4-lobed, deeply cleft behind. Anthers narrow, cells indistinct. (*Cichlanthus*.)

Flowers, etc., rusty villous. Corolla buff or pink ... .. 3. *L. scurrula*.

Flowers, etc., covered with white, flocculent, mealy, stellate tomentum. Corolla pale-green ... .. 4. *L. pulverulentus*.

Flowers in axillary clusters or racemes. Bract scale-like. Calyx toothed above the ovary.

Corolla gibbously inflated or not, 5-lobed.

Anther-cells indistinct. (*Dendrophthœ*.)

Flowers villous or pubescent.

Flowers in peduncled or sessile fascicles, densely rusty-villous. Fruit ovoid ... .. 5. *L. gibbosus*.

Flowers solitary, sessile buff, mealy pubescent. Fruit pyriform ... 6. *L. Stocksii*.

Flowers glabrous.

Flowers subsessile in axillary fascicles.

Corolla-tube gibbously inflated above the middle, lobes 5. Leaves small, cuneate ... .. 7. *L. cuneatus*.

Flowers in solitary or fascicled racemes, secund. Corolla long, slender, slightly dilated above the middle. Leaves large, oblong, elliptic ... .. 8. *L. longiflorus*.

Flowers in axillary fascicles, sessile. Corolla-tube funnel-shaped, split, lobes 5, filiform, elastically coiled, longer than the tube. Leaves elliptic, oblong ... .. 9. *L. elasticus*.

Flowers 4-5, enclosed in a large bell-shaped involucre. (*Tolypanthus*.)

Corolla-tube narrow, straight, slightly dilated in the middle, contracted at the base of the lobes, lobes  $\frac{1}{2}$  the length of the tube. 10. *L. lageniferus*.

Flowers in axillary clustered cymes or racemes.

Bracts connate in a small cup. (*Macrosolen*.)

Branchlets triquetrous. Leaves often whorled in 3's. Corolla small, acicular ... 11. *L. trigonus*.

Flowers few, large, decussately arranged on short sessile or peduncled spikes. Bracts and bracteoles large, orbicular, at length deciduous. (*Elytranthe*.) Anthers multilocellate.

Corolla curved,  $\frac{1}{2}$  in. long ... .. 12. *L. loniceroides*.

Corolla straight,  $\frac{3}{4}$ - $\frac{2}{3}$  in. long ... .. 13. *L. capitellatus*.

1. *L. Wallichianus*, Schultz. Syst. VII. 100; Fl. Br. I. 5. 205; Dalz. & Gibs. Bomb. Fl. 109. *Banda*, M.

Western peninsula on the gháts, from the Konkan southwards. Throughout the Konkan and North Kánara, parasitic on *Locundi*, (*Meme-cylon*) and other trees. Common in the forests near Kárwár. Fl. Apl.-June. Fr. Aug.-September.

2. *L. obtusatus*, Wall. Cat. 526; Fl. Br. I. 5. 205; Dalz. and Gibs. Bomb. Fl. 109.

Western peninsula on the gháts from the Konkan southwards. North Kánara and Konkan gháts, common on *Jamba*, (*Xylia dolabriformis*,) *Myristica attenuata*, and other trees of the Supa gháts in the deciduous forests. Fl. Feb.-April, June-July. Branches with numerous raised white dots. Ovary nearly globose, rough.

3. *L. scurrula*, Linn.; Fl. Br. I. 5. 208. *L. buddleioides*, Desrouss; Dalz. & Gibs. Bomb. Fl. 110.

Throughout India from the Sikkim Himalaya and Bengal, southwards to Singapore and from Central India to Ceylon. Throughout the presidency, common in North Kánara, often growing on *Leca sambucina*, *Dillenia pentagyna*, and *Pterocarpus marsupium*. Fl. Nov.-Feb. Fruit pyriform, mealy, top obtuse, 4 in. long. Albumen pink, obtusely quadrangular at the radicle end, at the other end terminating in a hard elongated point; surrounded with a green sticky layer; embryo green fusiform; radicle not distinguishable from the tigellus.

4. *L. pulverulentus*, Wall. in Roxb. Fl. Ind. ed. Carey & Wall. 221; Fl. Br. I. 5. 211; Brandis For. Fl. 396.

Sub-tropical Himalaya, 24,000 ft. alt.; Pegu and Ava. Central Provinces; Konkan, Stocks. Fruit large, club-shaped, Kurz. In the Central Provinces on *Butea frondosa*, Brandis.

I have not seen this species.

5. *L. gibbosus*, Talb. sp. nov. *L. tomentosus*, Heyne, Talb. List of Trees &c. 171. *Dade*, K.

A large shrub with scaly, tomentose, long, pendant branches. Leaves alternate, ovate or obovate, obtuse, grey rusty tomentose beneath, glabrescent above; nerves 4-5 pairs; blade 2·5—1 by 1·75—·5 in.; petiole ·2 in. stout. Flowers in axillary, 1-5-flowered fascicles. Bract tomentose, shorter than the 5-toothed calyx. Calyx-teeth very short. Corolla ·75 in. long, curved, inflated and gibbous near the base, tube split on one side, lobes 5, reflexed, oblong; pedicels ·1 in. Fruit pink, ovoid, ·3 in. long. Albumen green, with the teeth connate into a conical point but marked with white lines and slightly swollen round the radicle presenting the appearance of a small grape seed. The embryo has a globose or ovoid smooth radicle dark green in colour.

This species is, I think, distinct from *L. tomentosus*, Heyne. The corolla is gibbous-inflated and there are no traces of hispid hairs. There

are no bracts like those of *L. bracteatus*. Both *L. tomentosus* and *L. bracteatus* are Neilgherry and Ceylon species. *L. gibbosus*, is found growing on *Phyllanthus Emblica* and more rarely on *Mussaenda frondosa*, throughout the Konkan and North Kánara ghát forests. Fl. C. S. Fr. Apl.-May.

6. *L. Stocksii*, Hook. f. Fl. Br. I. 5. 213.

The Konkan apparently a distinct species near *L. bracteatus*, but with sessile leaves and pyriform fruit like that of a "Cyclanthus." Fl. Br. I. A rare species apparently little known. I have not yet met with it.

7. *L. cuneatus*, Heyne in Roth. Nov. Sp. 193. *Archati*, K.

Western peninsula from the Konkan southwards. Throughout the Konkan and North Kánara, common near Yellápur, a dense shrub on *Terminalia paniculata*, *Odina Wodier*, and *Vitex altissima*. Fl. Nov.-Dec. Leaves small, cuneate. Fruit small, pink, minutely warted. Albumen green, teeth at top minute, pointed; embryo club-shaped, furrowed, radicle thick, rounded.

8. *L. longiflorus*, Desrouss. in Lamk. Encycl. III. 498; Dalz. & Gibs. Bomb. Fl. 110; Brandis For. Fl. 397. *L. bicolor*, Roxb. Fl. Ind. I. 548. Var. *falcata*. Kurz. For. Fl. II. 321; Var. *amplexifolia*, Thw. Enum. 134; Grah. Cat. Bomb. Pl. 86. *Banda*, *cainguli*, Vern.; *Muduk*, *bedudka*, K.; *Vanda*, M.; *Vando*, Guz.

Temperate and tropical Himalayas from Oudh, eastwards to Assam and south to Travancore, Ceylon and Malacca. Throughout the presidency. Parasitic on many species of trees in North Kánara. The var. *amplexifolia*, often grows on *Flacourtia montana* and the var. *falcata*, on *Careya arborea*.

*Var. coccinea*. Branches stout, lenticellate. Leaves usually sub-opposite, broad ovate, obtuse thickly coriaceous, shortly petioled; lateral-nerve 5-6 pairs. Flowers in rather lax, axillary racemes. Calyx urn-shaped, limb often 5-1-notched, very rugose outside. Corolla-tube long, slender, 2¼ inches, bright scarlet without; lobes short, light scarlet or greenish. Filaments scarlet. Fruit ovoid, crowned with the calyx-limb, hard, rugose. The teeth of the albumen and the white sticky layer are longer and more slender than in *L. longiflorus*. Embryo white, slender, gradually thickened at the radical end which is crowned with an apiculum. This variety, which perhaps should be made a new species, has the racemes with the flowers secund, but more lax than in *L. longiflorus*, *proper*, and the corolla is always bright red or scarlet. The leaves are shortly petioled and neither cordate or amplexicaul. A stout parasite growing frequently on *Terminalia bellerica*, in North Kánara. Flowers during the cold season Jan.-Feb. Fruit ripe May-June. The bark contains tannin.

The cylindrical ovoid, sometimes slightly curved fruit is seated in an oblique, green cup-like bract. The pink skin or epicarp is surmounted by the truncate calyx-tube. The glutinous covered, white albumen is easily forced from the epicarp which opens at the base. The albumen is

copious and at the top are five linear teeth surrounding the club-shaped green embryo, which is solid and resembles a small nail  $\frac{1}{4}$  in. long with a flattened head (the radicle).

9. *L. elasticus*, Desrouss. in Lamk. Encycl. III. 599; Fl. Br. I. 5. 216; Dalz. & Gibs. Bomb. Fl. 109.

Western peninsula from the Konkan southwards. Throughout the Konkan and North Kánara, very common on mango trees, also on *Ficus religiosa*, and *Casuarina*, near the sea-coast. The corolla lobes coil elastically. Fl. July-Aug. Fr. April-May. A very common species with sessile flowers. Fruit pink, ovoid .5 in.; embryo club-shaped, the radicle end is covered with minute knobs. Albumen white, 5-toothed at the apex.

10. *L. lageniferus*, Wight Ic. t. 306; Fl. Br. I. 5. 218; Dalz. & Gibs. Bomb. Fl. 110. *Bandgali*, M.

From the Konkan southwards to Malabár. Hills of the Konkan, common in the deciduous forests of North Kánara, near Dandeli, growing on *Adina cordifolia*. Fl. Apl.-May. Fr. July-Aug. The bell-shaped involucre distinguishes this species from all other species of *Loranthus* growing in the Bombay Presidency.

11. *L. trigonus*, Wight. & Arn. Prod. 386; Fl. Br. I. 5. 219. *Gonimaran bandalaki*, K.

On the gháts of the South Konkan and North Kánara, common on the Supa, Siddapore and Belgaum gháts, growing on *Eugenia jambolana*, *Ficus glomerata*, *Dalbergia latifolia*, *Ziziphus xylopyra*, *Ficus mysorensis*, and *F. glomerata*. Flower buds small, acicular. Fruit pink shortly pedicelled, crowned with the calyx-limb. Fl. Dec.-Feb. Fr. ripe Apl.-May.

A very robust species, branchlets often acutely 3-angled. Fruiting, peduncles 1.5 in., pedicels .2 in. Berry ovoid; embryo with a light green, warted, superior radicle and covered with the white, 4-5-toothed albumen; cotyledons conferruminate.

12. *L. loniceroides*, Linn. Sp. Pl. Ed. 2. 473; Fl. Br. I. 5. 221; Dalz. & Gibs. Bomb. Fl. 110. *Archati*, K.

Western Peninsula, from the Konkan to Travancore ascending to 6000 ft. in the Neilgherris, Ceylon. Throughout the presidency, common in the Konkan and North Kánara, growing on many different species of trees. Fl. Mch.-May. Fr. R. S.

Berry ovoid, green, crowned with the calyx-tube, .5 in. long. Albumen green, firm, grooved and striped longitudinally with 4-5 more or less distinct, grey or reddish lines, teeth cohering in a flattened tip. Embryo, with two separate cotyledons, jointed to the radicle which has a swollen and flattened end.

13. *L. capitellatus*, W. & A. Prod. 332; Fl. Br. I. 5. 221; Dalz. & Gibs. Bomb. Fl. 109.

Western Peninsula; from the Konkan, southwards. In North Kánara, on the Supa gháts, growing on *Artocarpus integrifolia*. I have never seen it on any other tree; it may be, however, only a variety of *L. loniceroides*, Linn. Fl. Feb.-May. Fr. R. S.

## 2. VISCUM.

Shrubs with opposite leaves or leaflets. Flowers axillary, unisexual. Petals 3-4, sessile. Anthers on the petals, opening by many pores. Ovary inferior. Stigma sessile, large, pulvinate. Fruit succulent. Embryo 1-2 in each seed, in fleshy albumen.

### Leafy shrubs.

- Large shrub, branchlets angular ... .. 1. *V. orientale*.  
 Dwarf tufted shrub, branches stout, short ... 2. *V. capitellatum*.  
 Branches terete, long, slender. Leaves 0  
 or few ... .. 3. *V. ramosissimum*.

### Leafless shrubs.

- Branches angled, not contracted at nodes ... 4. *V. angulatum*.  
 Branches flattened, contracted at nodes ... 5. *V. articulatum*.

1. *V. orientale*, Willd. Sp. Pl. IV. 737; Fl. Br. I. 5. 224; Brandis For. Fl. 393.

Bengal, Berár and Chittagong, southward to Singapore and Travancore, Ceylon. North Kánara and Konkan gháts, common near the Nilkund ghát in evergreen forests, growing on *Terminalia paniculata*, also on *Loranthus loniceroides*. Fl. Sept.-Jany. Leaves 3-5-longitudinal nerved.

Fruit ovoid, smooth. Albumen green, biconvex, firm. Embryo minute, comma-shaped, radicle green, slightly thickened at the top.

2. *V. capitellatum*, Sm. in Rees' Cycl. XXXVII; Fl. Br. I. 5. 225.

Western Peninsula from the Konkan southwards, on the North Kánara gháts, commonly parasitic on other *Loranthaceæ*, also on *Terminalia paniculata*. Fl. Nov.-Dec. Fr. Jan. Leaves thick, spatulate. Flowers on fascicled peduncles. I have a variety of this or another species with much thinner ovate leaves and sessile, fascicled flowers, growing on *Loranthus trigonus*, Wgt., No. 1619, prop. herb.

Fruit globose, white, size of a pea, albumen green, fleshy covered with the outer sticky layer; embryo minute with a globose radicle end.

3. *V. ramosissimum*, Wall. Cat. 6876; Fl. Br. I. 5. 225.

Deccan Peninsula on the gháts and low grounds. From the Konkan southwards, Fl. Br. I; on the lower slopes of the Bababuden hills of Mysore on *Flacourtia Ramontchi*. Fl. H. S. Fr. R. S. Leaves linear, few.

Very like *V. angulatum*, but has sometimes a few narrow lanceolate leaves.

4. *V. angulatum*, Heyne MSS. DC. Prod. IV. 283; Fl. Br. I. 5. 225; Dalz. & Gibs. Bomb. Fl. 110. *V. attenuatum*, Brandis For. Fl. 394.



Western Peninsula. Very common on the gháts from the Konkan southwards on many different kinds of trees. Fl. apparently throughout the year.

5. *V. articulatum*, Burm. Fl. Ind. 311; Brandis For. Fl. 394; Fl. Br. I. 5. 226.

Sub-tropical Himalaya from Chamba to Sikkim and southwards to Ceylon. Throughout the presidency, not common, growing on *Diospyros melanoxylon*, in the Dhárwár District. Fl. June-Aug. Fr. Dec.-Feb.

ORDER 79. **SANTALACEÆ.**

Trees, shrubs or herbs. Leaves entire, alternate or opposite, without stipules. Flowers regular, hermaphrodite or unisexual. Perianth superior or inferior, 3-8-toothed, lobed or partite, often with a hairy tuft behind the anthers. Stamens 3-6, opposite to perianth lobes. Disk various. Ovary inferior, 1-celled, with a free central placenta, bearing 2-5, pendulous ovules. Style usually short, stigma entire or 3-6-lobed. Fruit a nut or drupe. Seed globose, albumen copious; embryo usually terete.

- |   |        |                 |
|---|--------|-----------------|
| Tree. Leaves opposite. Disk of scales between the stamens     | ... .. | 1. SANTALUM.    |
| Shrub. Leaves alternate. Disk angled between the stamens      | ... .. | 2. OSYRIS.      |
| Spinous tree. Leaves alternate. Filaments 2-tid. Disk annular | ... .. | 3. SCLEROPYRUM. |

1. **SANTALUM, L.**

Glabrous trees or shrubs. Leaves simple, coriaceous. Flowers in terminal and axillary cymes, bisexual; bracts minute. Perianth tube campanulate adnate to the base of the ovary. lobes valvate with a tuft of hairs on the face and with a concave disk adhering to the base. Stamens 5-4, short, united at the bases of the lobes. Ovary at first free, at length  $\frac{1}{2}$  inferior, 1-celled with 2-4 pendulous ovules, attached near the base of the central placenta. Drupe globular, fleshy; endocarp ribbed.

*S. album*, Linn. Sp. Pl. 497; Fl. Br. I. 5. 231; Dalz. & Gibs. Bomb. Fl. 224; Brandis For. Fl. 398; Bedd. Fl. Sylv. t. 256. The White Sandalwood Tree. *Gundala*, K.; *Chandan*; *M. Sandal*, Hind.; *Sukhad*, Sind; *Suket*, Guz.

Western Peninsula from near Poona southwards. Indigenous throughout the dry districts of the presidency, also abundant in some of the dry deciduous forests of North Kánara; often along the bunds of tanks and in hedges. Fl. Mch.-Aug. Fr. C. and H. S. A small evergreen tree.

Fruit black, globose, succulent; endocarp bony, rough. The seeds yield a thick, viscid oil. The essential oil is distilled from the wood, the roots yield the greatest quantity. Heartwood is the sandalwood

commerce. Wood-yellowish-brown, strongly scetned, very hard, close-grained. Annual rings distinct Pores small, circular, numerous. Medullary rays very fine and numerous. Weighs about 60 lbs. to the cub. ft. Used for carving, for burning in Pársi temples and for the cremation of wealthy Hindus.

## 2. OSYRIS, L.

Glabrous shrubs; branches angular. Leaves alternate. Flowers hermaphrodite or unisexual, solitary or cymose. Perianth of male fl. slender, tube solid, of hermaphrodite fl. obconical, 3-4-lobed. Stamens 3-4-5. Disk angled between the stamens. Ovary inferior, ovules 2-4, at apex of short central placenta. Fruit a drupe. Seed globose, albuminous, embryo terete or with the cotyledons dilated.

*O. arborea*, Wall. Cat. 4035; Fl. Br. I. 5. 232; Brandis For. Fl. 399. *O. Wightiana*, Dalz. & Gibs. Bomb. Fl. 223. *Popoli, lotal*, M.; *Kuriganda, baingani*, K.

Sub-tropical Himalaya from Simla to Bhotan ascending to 7000 ft.; Western Peninsula on the gháts from the Konkan southwards, Ceylon. Throughout the Konkan and North Kánara, common in moist forests from the sea-coast inland, also in the dry forests of the Belgaum District, Fl. throughout the year.

A large shrub. Sapwood light red, heartwood dark red, close-grained, smooth, hard, tough. Pores very small, numerous. Medullary rays very indistinct. Weighs 54 lbs. to the cub. ft. Used for making walking sticks.

## 3. SCLEROPYRUM, Arnott.

Trees often spiny. Leaves coriaceous. Flowers in short catkin-like axillary spikes at the leafless nodes, polygamous. Perianth-tube of male fl. solid; of female fl. adnate to the ovary; lobes 5, valvate or sub-imbricate. Stamens 5, filaments 2-fid; anther-cells dehiscing transversely. Disk annular. Ovary inferior; style short, stigma large, peltate; ovules 3, pendulous from the top of a central column. Drupe pyriform, pedicelled. Seed subglobose, embryo terete.

*S. Wallichianum*, Arn. in Jard. Mag. Zool. & Bot. II. (1853) 550; Fl. Br. I. 5. 234. *Pyrrularia Wallichiana*, Bedd. Fl. Sylv. t. 304. *Bodlige*, K.

In the evergreen forests of the Konkan and North Kánara gháts; near Yellápur, common near the Nilkund and Dodmune gháts. Fl. Dec.-Mch., Apl.-June. A small tree with smooth bark armed with conical sharp spines. Wood whitish, very hard. Med. rays numerous, both fine and broad. Pith large. Flowers yellowish-red. Fruit 2 in., brown, pear-shaped, crowned with the persistent calyx; seed case bony.

ORDER 80. **EUPHORBIACEÆ.**

Trees or shrubs with milky juice. Leaves alternate or opposite, usually simple. Flowers unisexual. Perianth simple and calycine, rarely double. Stamens various, anthers 2-celled, often didymous. Ovary superior, 3-2 carpellary; styles as many as carpels, free or united, ovules 1-2, in each cell; pendulous from inner angle of the cell; funicle often thickened. Fruit a capsule or drupe. Seed with or without an arillus. Albumen fleshy, rarely 0, embryo straight with flat cotyledons and a superior radicle, rarely exalbuminous with fleshy cotyledons.

*Cells of ovary 2-ovuled (except Euphorbia).*

Flowers enclosed in an involucre or not (Euphorbiæ).

Flowers enclosed in an involucre, involucre calyx-like ... ..

1. EUPHORBIA.

Flowers not inclosed in an involucre (Phyllanthæ).

Petals minute or 0.

Petals present. Calyx-lobes valvate.

Filaments united.

Ovary 2-celled. Fruit a drupe ...

2. BRIDELIA.

Ovary 3-celled. Fruit a capsule ...

3. CLEISTANTHUS.

Filaments free. Calyx-lobes imbricate.

4. ACTEPHILA.

Petals 0.

Stamens 3-6. Styles or their arms slender (except *Glochidion*).

Perianth of male flowers 6-lobed, lobes spreading.

Flowers monoicous.

Disk present in both sexes ... ..

5. PHYLLANTHUS.

Disk absent. Styles confluent ... ..

6. GLOCHIDION.

Perianth of male flowers turbinate, lobes minute ... ..

7. BREYNIA.

Perianth of male flowers rotate, 6-lobed, lobes spurred ... ..

8. SAUROPLUS.

Flowers dicicous, sepals 5 ...

9. FLUEGGIA.

Stamens few or many. Styles or stigmas 2-3, dilated.

Leaves entire or serrulate. Fruit a drupe.

Stamens 2-3. Ovary 2-3-celled ... ..

10. PUTRANJIVA.

Stamens 8 or many. Ovary 1-celled ... ..

11. HEMICYCLIA.

Stamens many. Ovary 2-4-celled ... ..

12. CYCLOSTEMON.

Leaves trifoliolate. Stamens 5 ...

13. BISCHOFIA.

Stamens 2-8. Styles or stigmas very minute.

Male flowers in catkins. Fruit dehiscent ... ..

14. APOROSA.

Male flowers in spikes or racemose. Fruit small, compressed,

rugose, not arillate ... ..

15. ANTIDESMA.

Fruit large, coriaceous. Seeds arillate ... ..

16. BACCAUREA.

*Cells of ovary 1-ovuled.*

Flowers in terminal, unisexual cymes or with the central flower female. Petals present. (Crotoneæ).

Fruit capsular ... .. 17. JATROPHA.

Flowers in terminal, androgynous spikes. Males petaliferous. Females often apetalous. Filaments inflexed in bud with the anthers reversed ... .. 18. CROTON.

Flowers in axillary spikes or panicles, males petaliferous, females often without petals.

Filaments straight in bud, anthers erect.

Sepals imbricate. Petals united. Fruit a drupe ... .. 19. GIVOTIA.

Sepals imbricate. Petals free. Fruit a capsule.

Sepals enlarged in fruit.

Petals present in female flower ... .. 20. BLACHIA.

Petals absent in female flower. 21. DIMORPHOCALYX.

Sepals valvate. Petals 4-8 ... .. 22. AGROSTISTACHYS.

Flowers in axillary spikes or panicles, apetalous. Calyx of male closed in bud, membranous, splitting into 3-5 concave sepals,

Styles long, bifid or multifid.

Filaments free.

Stamens 4; anthers 2-celled ... .. 23. ADENOCHLÆNA.

Stamens very numerous; anthers 2-celled.

Capsule drupaceous. Anther cells

parallel ... .. 24. TREWIA.

Capsule dry. Anther cells globose. 25. MALLOTUS.

Stamens 1, few or many; anther cells 3-4-locellate.

Styles very long 2-fid ... .. 26. CLEIDION.

Styles entire ... .. 27. MACARANGA.

Filaments variously connate in bundles.

Flowers dioecious in axillary spikes ... .. 28. HOMONOIA.

Flowers monoecious in terminal panicles... 29. RICINUS.

Perianth single. Calyx of male minute and open in bud or obsolete. (Hippomaneæ.)

Male calyx terete, 2-3-lobed ... .. 30. SAPIUM.

Calyx terete, 3-partite ... .. 31. EXCÆCARIA.

## 1. EUPHORBIA, Linn.

Herbs or shrubs often with much milky juice. Leaves of the stem alternate, with or without stipular spines or opposite and stipulate, leaves of the flowering branches opposite. Flowers monoicous, consisting of many male and 1 female flower in a small perianth like involucre; lobes with thick glands at the sinuses; glands often with a petaloid wing. Male fl.: 1, 2-celled anther on an articulated filament. Female fl.: a stipitate 3-celled ovary in the centre of the involucre; styles 3, free or combined, simple or 2-fid. Capsule of 3, 2-valved cocci, separating elastically from a columella; cotyledons broad, flat.

The species noted below belong to the section Euphorbium, sub-sections Tirucalli and Dicanthium :

- |   |     |     |     |                           |
|---|-----|-----|-----|---------------------------|
| An unarmed tree ; branches cylindric                        | ... | ... | ... | 1. <i>E. Tirucalli</i> .  |
| Armed with stipular spines.                                 |     |     |     |                           |
| Branches angled and winged ; leaves minute or wanting       | ... | ... | ... | 2. <i>E. antiquorum</i> . |
| Branches jointed, cylindric or with 5 spirally twisted ribs | ... | ... | ... | 3. <i>E. neriifolia</i> . |
| Branches sub-cylindric                                      | ... | ... | ... | 4. <i>E. Nivulia</i> .    |

1. *E. Tirucalli*, Linn. Hort. Cliff. 197 ; Brandis For. Fl. 439 ; Dalz. & Gibs. Bom. Fl. Suppl. 76 ; Bedd. Fl. Sylv. 217. Milk Bush. *Nevli, thuvar, seyr, tej, niwal*, M. ; *Yele gulla*, K.

A native of Africa. Naturalized throughout the dry districts of the presidency ; usually in hedges, planted. Fl. Aug.-Sept. A small tree. Wood white, close-grained and strong. Used for toys, &c. Principal use is for making hedges.

Leaves linear 5 in. The milk is used in native medicine, acts as a purgative and is externally applied as a vesicant.

2. *E. antiquorum*, Linn. Hort. Cliff. 196 ; Fl. Br. I. 5. 255 ; Dalz. & Gibs. Bom. Fl. 226 ; Brandis For. Fl. 438 ; Bedd. Fl. Sylv. 217. *Narsej*, M ; *Tandhari-send*, Guz. ; *Tindari-send*, Belgaum.

Common on the dry hills of Bengal and the peninsula generally. Throughout the dry districts of the presidency. Fl. R. S. in the Belgaum and Bijápur Districts.

A shrub or small tree. Wood grey, soft, light, similar to the wood of *Givotia rottleriformis*. Weighs 25 lbs. to the cub. ft.

3. *E. neriifolia*, Linn. Hort. Cliff. 196. in part ; Fl. Br. I. 5. 255 ; Dalz. & Gibs. Bomb. Fl. 226 ; Brandis For. Fl. 439 ; Bedd. Fl. Sylv. 216. *Thor, nivarung, seej, mingut*, Vern. ; *Yellikalli*, K.

Deccan peninsula, cultivated in Bengal, cultivated and probably wild in Burma. Throughout the presidency ; often in waste, stony, dry situations, generally planted in hedges. Fl. Fr. Feb.-Mch. New leaves in March-Apr. A shrub or small tree.

4. *E. Nivulia*, Ham. in Trans. Linn. Soc. XIV. 286 ; Dalz. & Gibs. Bomb. Fl. 225 ; Brandis For. Fl. 439 ; Bedd. Fl. Sylv. 216 ; Fl. Br. I. 5. 255 ; Wight Ic. 1862. *Newrang*, M. A large shrub or small tree.

N. W. Himalaya on dry rocky hills, Gujarát, the Deccan peninsula and Snd, Pegu and Barma. Dry rocky hills in Gujarát and Sind. Fl. Mch. Fr. Apl.-May

## 2. BRIDELIA, Willd.

Shrubs or trees. Leaves alternate, entire, with prominent parallel, lateral nerves. Flowers monœcious or dicecious, bracteate,

in axillary or spicate clusters. Calyx 5-cleft; lobes valvate. Petals 5. Male fl.: stamens 5, on a central column, situated on a flat, sinuate disk. Female fl.: ovary 2-celled, surrounded by a membranous cup-shaped or tubular disk, variously lobed; styles 2, bifid, connate at the base. Fruit a berry, with 1-2, 1-seeded cocci or pyrenes.

Tree. Leaf lateral nerves 15-20-pairs ... .. 1. *B. retusa*.  
 A climbing shrub. Leaf lateral nerves 8-12-pairs . 2. *B. stipularis*.  
 A straggling shrub. Leaf lateral nerves 6-9-pairs. 3. *B. Hamiltoniana*.

1. *B. retusa*, Spreng. Syst. Veg. III. 48; Fl. Br. I. 5. 268; Brandis For. Fl. 449; Bedd. Fl. Sylv. t. 260. *B. montana*, Dalz. & Gibs. Bomb. Fl. 233. *Mulla honne, muljane, goojo, fatterphody, havu gandha*, K.; *Kutgi, kanta kauchi*, M.; *Asana, asauna*, Vern.

Throughout the hotter parts of India, along the foot of the Himalaya from Kashmir to Mishmi and southwards to Ceylon.

Throughout the Presidency in deciduous forests. Fl. Apl.-Oct. Fr. May-Jan. Both the varieties, "*Roxburghiana*" and "*glauca*," are common in North Kánara. "A small or moderate sized dioecious tree, spinous when young. Bark grey, rough; inner bark reddish, fibrous. Heartwood grey to olive-brown, close-grained, durable, seasons well, moderately hard, has a mottled grain and polishes well. Pores numerous, moderate-sized, often in rows. Medullary rays moderately broad, short, numerous, equi-distant. Weighs 48 lbs. to the cub. ft. Used for agricultural implements, building purposes, carts, etc. The bark is used for tanning. Fruit  $\frac{1}{2}$  in. black, succulent, edible; cocci dehiscing. Disk enclosing ovary, laciniate at top.

2. *B. stipularis*, Blume Bijl. 597; Fl. Br. I. 5. 270; Brandis For. Fl. II. 49; Bedd. Fl. Sylv. 201. *Bisal bali, bislu hannu, koju, phaterphod, akshatta bali*, K.

Throughout the hotter parts of India from the Himalaya to Ceylon.

Common in deciduous forests throughout the presidency. Fl. Fr. May-Nov. A large climber; stems 2-8 in. in diameter; branches, often with deflexed long spines, fluted. Bark dark grey,  $\frac{7}{8}$  in. thick with a hard, deeply fissured outer bark periderm in reddish-brown, thin plates. Aërial roots developed. Sapwood white, heartwood greyish-brown, moderately hard, annual rings visible. Pores moderate-sized, in short lines between the prominent fine, medullary rays. Weighs 60 lbs. to the cub. ft. Used for fuel in the Sunderbuns. Fruit yields a black colouring matter.

3. *B. Hamiltoniana*, Wall. Cat. 7882; Fl. Br. I. 5. 271; Bedd. Fl. Sylv. 202.

The Konkan gháts, Law, Stocks, etc. I have not met with this species in North Kánara.

### 3. CLEISTANTHUS, Hook. f.

Trees or shrubs. Leaves alternate, penniveined, lateral nerves prominent. Flowers small, in axillary clusters or short spikes, monoicous. Calyx-segments 5, valvate in bud. Petals 5, minute. Disk

of the male flat, of the female conical. Stamens 5, united in a column in the centre of the disk. Ovary 3-4-celled, usually clothed with long hairs; styles 3, free, bifid; ovules 2 in each cell. Fruit a 3-celled, 6-valved capsule. Seeds exarillate, albuminous; cotyledons thin or fleshy, often folded.

*C. malabaricus*, Muell. Arg. in DC. Prod. XV. II. 508; Fl. Br. I. 5. 276; Bedd. Fl. Sylv. 203. *Hole hutige*, K.

In the evergreen forests of the Konkan and North Kánara, usually near streams and rivers. In the forests near the falls of Gairsoppah, common near the river banks above the great (Rajah) fall. Fl. Nov.-Dec. Fr. Jany.-Feb. A large shrub or small tree with densely rufous villous branchlets. Fruit fulvo-pilose, 3-4-celled. Seeds rugose, 3-angled.

4. **ACTEPHILA**, Blume.

Trees or shrubs. Leaves alternate, large. Flowers in axillary clusters, petals present or 0. Male fl. Sepals 5-6, imbricate. Petals as many inserted under the 5-lobed disk or 0. Stamens 5, on the disk. Pistillode 3-cleft. Female fl. Ovary sessile on the 5-lobed disk; styles bifid. Capsule long peduncled 3-lobed, loculicidally dehiscent. Seeds solitary in the cocci, large, 3-angled, testa thin brittle; cotyledons fleshy, folded or crumpled together.

*A. excelsa*, Muell. Arg. in Linnæa XXXII. 78; Fl. Br. I. 5. 232; Bedd. Fl. Sylv. 189. *Anomospermum excelsum*, Dalz. & Gibs. Bomb. Fl. 233.

Upper Assam; Silhet; Khasia; Western Peninsula from the Konkan to Travancore, ascending to 5,500 ft., Ceylon; Konkan (Phoonda) Gháts. Dalzell. A shrub or small tree.

5. **PHYLLANTHUS**, Linn.

Trees, shrubs or herbs. Leaves entire, stipulate, usually distichous. Petiole short. Flowers in axillary clusters, monoicous or dioicous. Calyx segments usually 5-6, imbricate, in 2 series. Stamens 3-5, free or connate. Disk of distinct glands, alternating with the calyx-segments. Female fl. Sepals of the male. Ovary 3 or more celled; styles free or connate, usually 2-fid; ovules 2 in each cell. Fruit dehiscent, sometimes fleshy. Seeds without arillus or strophiole.

Shrubs.

- Scandent shrub. Leaves about 1 in. long. Fruit a small black, 4-8-celled berry ... .. 1. *P. reticulatus*.  
 Erect bushy, gregarious shrub. Leaves about  $\frac{1}{4}$  in. long. Fruit a small 3-celled, crustaceous capsule, cells 2-valved. ... .. 2. *P. Lawii*.

Trees.

- Leaves  $\frac{1}{2}$ - $\frac{1}{2}$  in. Fruit large, fleshy, globose with 3 bony 2-celled cocci ... .. 3. *P. Emblica*.  
 Leaves 2-3 in. Fruit fleshy, globose with a 3-4-celled bony endocarp ... .. 4. *P. distichus*.  
 Leaves 3-6 by 1-3 in. Fruit dry, globose, bursting irregularly;  $\frac{1}{3}$  in. ... .. 5. *P. indicus*.

1. *P. reticulatus*, Poir. Encycl. V. 298; Fl. Br. I. 5. 288; Brandis For. Fl. 453; Bedd. Fl. Sylv. 190. *Anisonema multiflorum*, Wgt. Icones. t. 1899, A. Juss. Dalz. & Gibs. Bomb. Fl. 234. *Pavan*, M.; *Datwan*, Guj.; *Kalc-madh-ka-jhar*, H.; *Hooli balli*, K.; *Kaili*, Kon.

Throughout tropical India, Burma and Ceylon. Throughout the presidency and Sind in deciduous forests, often in hedges, very common. Flowers throughout the year. A straggling shrub. Bark brown. Wood dark grey, smooth, hard, compact. Annual rings distinct. Pores small in a ring marking the annual growth, otherwise very small. Medullary rays fine, uniform, wavy. Weighs 48 lbs. to the cub. ft. Leaves and bark used in native medicine.

2. *P. Lawii*, Grah. Cat. Bomb. Pl. 181; Fl. Br. I. 5. 290. *P. spinulosus*, Herb. Heyne Wall. Cat. 7897. *P. polyphyllus*, Dalz. & Gibs. Bomb. Fl. 234. *P. juniperinoides*, Muell. Arg.

Deccan peninsula from the Konkan and Belgaum to the Wynaad.

Along the banks of streams and rivers in the Konkan and North Kánara, very common along the Kalánadi, a North Kánara river, forms dense thickets like tamarisk near the water's edge. Fl. Sept.-Oct. Fr. Nov.

Fruit 3-lobed, smooth; seeds triangular, rough.

3. *P. Emblica*, Linn. Sp. Pl. 982; Fl. Br. I. 5. 289; Brandis For. Fl. 454; Bedd. Fl. Sylv. t. 258. *Emblica officinalis*, Gært. Dalz. & Gibs. Bomb. Fl. 235. *Nelli*, K.; *Awla, arala*, M.; *Bhoza, amalí, amla, ambala*, Guz. The Emblic Myrobalan.

Throughout the forests of tropical India and Burma, wild or planted.

Throughout the presidency, in deciduous forests. Fl. Mch.-May. Fr. ripe Oct.-Feb. A moderate-sized deciduous tree. Bark thick, grey, exfoliating in small, irregular shaped patches. Wood dark-red, hard, mottled, close-grained, no heartwood, warps and splits in seasoning, flexible, tough. Annual rings indistinct. Pores small, often sub-divided. Medullary rays moderately broad, separated by the breadth of 1 pore, prominent on a radial section. Weighs 54 lbs. to the cub. ft. Used for building purposes, furniture, gun-stocks, and is adapted for turning. The astringent fruit is much used in native medicine and also for dyeing and tanning. The bark and leaves are similarly employed. A very good catechu is extracted from the wood-chips in North Kánara.

4. *P. distichus* Muell. Arg. in DC. Prod. XV. II. 413; Bedd. Fl. Sylv. 191. *Cicca disticha*, Dalz. & Gibs. Bomb. Fl. Suppl. 78. Country Gooseberry. *Harparawri, raivala*, Vern. *Cherambola*, Goa.

In gardens of the Konkan and Deccan, planted. Fl. May-Nov. Fr. R. & C. S. A small tree. Fruit is used as an article of food, raw, cooked or pickled. Bark used for tanning in S. India.

5. *P. indicus*, Muell. Arg. in Linnæa XXXII. 52; Fl. Br. I. 5. 305; Bedd. Fl. Sylv. 191. *Prosoras indica*, Dalz. & Gibs. Bomb. Fl. 236. *Panana, kali-kudai*, K.

Western Peninsula, on the Konkan and North Kánara gháts in deciduous and evergreen forests. Fl. Apl. Fr. May-June.



A moderate-sized, white barked tree. Bark scaly, very characteristic, smooth, exfoliating in plates, disclosing irregular shaped patches covered with brown, thick lines; inner bark with brown, regular bands of fibrous tissue; green cells developed. Wood reddish, white, tough, hard, smooth, compact. Annual rings distinct. Pores small equally distributed. Medullary rays fine, wavy, white. Weighs 54 lbs. to the cub. ft. This is the "Pan Nana" tree of some of the Belgaum District evergreen forests. Fruit slightly depressed, spherical, 25 in. in diam. Seeds blue.

#### 6. GLOCHIDION, Forst.

Trees or shrubs. Leaves alternate, bifarious. Flowers small, in axillary clusters, usually monoicous, apetalous. No disk glands. Male fl. Sepals 6, in 2 series, imbricate. Anther 3-8, connate in a column; cells linear; dehiscence extrorse; connective produced, into separate points or connate in an umbonate head. Female fl. Calyx of 6 short sepals. Ovary of 3-15-cells; styles connate in a globose, conical or sub-clavate column, lobed or toothed at the tip, usually lengthening during or after flowering; ovules 2 in each cell. Capsule of 3 or more 2-valved cocci. Seeds albuminous; cotyledons flat. This genus differs from *Phyllanthus* in the total absence of a disk and in the peculiar modification of the styles. The separation and limitation of the species of *Glochidion* is very difficult.

- Female calyx with 5-6 sepals. Anthers 4. Style conical.  
 Leaves glabrous, elliptic, base acute. Style truncate. 1. *G. lanceolarium*.  
 Leaves softly pubescent, large, ovate or cordate.  
 Style 4-5-cleft .. .. . 2. *G. tomentosum*.  
 Leaves glabrous, shining. Style 6-8-toothed .. .. . 3. *G. zeylanicum*.  
 Female calyx irregularly 4-6-lobed or toothed. Anthers  
 3. Style globose or sub-globose.  
 Ovary glabrous, 8-lobed. Capsule much depressed  
 6-8-lobed .. .. . 4. *G. Hohenackeri*.  
 Ovary very short, villous, 3-6-celled. Capsule  
 faintly lobed .. .. . 5. *G. Ralphii*.  
 Ovary glabrous, 4-5-celled. Capsule obtusely trian-  
 gular, 6-lobed .. .. . 6. *G. Johnstonei*.  
 Female calyx of 6, free sepals. Anthers 3. Style minute,  
 glabrous or nearly so.  
 Stipules subulate. Style very minute, conical .. 7. *G. malabaricum*.  
 Stipules triangular, hastate or falcate. Style  
 short, stout, conical .. .. . 8. *G. ellipticum*.  
 Pubescent or tomentose.  
 Style stout, exceeding the sepals, obconic, tip  
 lobed .. .. . 9. *G. velutinum*.

1. *G. lanceolarium*, Dalz. in Bomb. Fl. 235; Fl. Br. I. 5. 308; Bedd. Fl. Sylv. 192. *Phyllanthus lanceolarius*, Muell. Arg. Brandis For. Fl. 453. *Bhoma*, M.

North-West India from Nepal to Assam, Silhet and Chittagong.

Throughout the presidency, in deciduous forests, common on the Konkan and North Kánara gháts. Fl. Fr. Dec.-Apl.

A small tree. Bark smooth, thin; inner reddish. Wood hard and durable; used for house building. Capsule pale green, puberulous.

2. *G. tomentosum*, Dalz. in Hook. Jour. Bot. III. (1853), 38; Fl. Br. I. 5. 309; Bedd. Fl. Sylv. 192. *Niru chelle*, K.

Along nálas and water-courses, in North Kánara in deciduous forests. Fl. Apl.-May. Fr. June-July. There is a small tree found near the falls of Gairsoppah with the style stout conical in fruit which is var. *G. tomentosum* proper. Fl. Nov.-Dec. Fr. Jany. Var. *G. Talboti*; is found near Yellápore, North Kánara, the leaves are larger and more tomentose than in *G. tomentosum* proper. A small tree.

3. *G. zeylanicum*, A. Juss. Tent. Euphorb. 107, t. 3; Fl. Br. I. 5. 310; Bedd. Fl. Sylv. 192. *G. nitidum*, Dalz. & Gibs. Bomb. Fl. 235. *G. canarum*, Bedd. Fl. Sylv. 192. *Savre gidda*, K.

Western peninsula from the Konkan southwards, Assam, Silhet and the Malay peninsula, Ceylon. Common on the Konkan and North Kánara gháts, along streams and water-courses, both in evergreen and in deciduous forests. Fl. and Fr. at different times throughout the year, usually Dec.-June.

A small tree, stems 1 ft. in diameter, with flexuous glabrous or pubescent branchlets. Bark thin, grey, corky, with numerous, narrow fissures; inner bark reddish with thread like fibres. Wood dull red, smooth, moderately hard, even-grained. Annual rings visible. Pores small, equally distributed. Med. rays moderately broad. Weighs 42 lbs. to the cub. ft. Sir Joseph Hooker includes both *G. nitidum*, Dalz. & Gibs. Bomb. Fl. 235, and *G. canarum*, Bedd. For. Man. 192; in *G. zeylanicum*, A. Juss.

4. *G. Hohenackeri*, Bedd. Fl. Sylv. 193; Fl. Br. I. 5. 314. *Nir-challi*, K.

On the Konkan and North Kánara gháts, in evergreen forests, common in the forests near the Nilkund and Gairsoppah gháts. Fl. Jany.-Mch. Fr. Apl.-May. A small tree.

5. *G. Ralphii*, Hook. f. Fl. Br. I. 5. 314. *Sullai* on the Ram ghát.

Konkan and North Kánara gháts, common in the evergreen forests near the falls of Gairsoppah, along water-courses. Fl. Feb.-June. Fr. June-Nov. A small tree closely allied to *G. Hohenackeri*. Stigmas flatter than in *G. Hohenackeri*; yellow, with 2 distinct shallow furrows at right angles to each other.

6. *G. Johnstonei*, Hook. f. Fl. Br. I. 5. 314.

Western peninsula, Cochin, common on the Supa gháts of North Kánara near Anmode, also on the Arbail ghát. A small tree, stems 30-40 ft. high and 8 in. to 1.5 ft. in diameter. Bark dark coloured, rough, fissured; inner reddish, fibrous, 20 in. thick. Wood reddish grey, soft, annual rings visible. Pores small, equally distributed. Medullary rays moderately broad. Weighs about 40 lbs. to the cub. ft. Stigmas deeply 3-divided. Fruit small, much depressed, crowned by the 3-lobed stigma, usually fasciated along leafless branches; peduncles short, stout. Fl. Feb. Fr. Apl.

7. *G. malabaricum*, Bedd. Fl. Sylv. 194; Fl. Br. I. 5. 319.

Western gháts from the Konkan to the Nilghiris. On the Konkan and North Kánara gháts. A small tree.

8. *G. ellipticum*, Wight Ic. t. 1906; Fl. Br. I. 5. 321; Bedd. Fl. Sylv. 193; var. *Wightiana*. *G. diversifolium*, Bedd. Fl. Sylv. 193.

Malabar. South Konkan, also in the forests near the Ainshi ghát of North Kánara; a small tree. Fl. Dec.-Feb. Fr. Feb.-Mch. Flowers in dense fascicles. Capsule very small. A small tree.

9. *G. velutinum*, Wight. Ic. t. 1907-2; Fl. Br. I. 5. 322; Bedd. Fl. Sylv. 195. *Phyllanthus nepalensis*, Brandis For. Fl. 453. *Paritza*, showra, M.; *Parwi*, H.; *Salai mara*, K.

Hot valleys of the Himalayas from Kashmir eastwards to Burma, western peninsula from the Konkan to the Nilghiris.

Throughout the deciduous forests of the Konkan and North Kánara gháts. Common in the Supa táluka dry forests. Fl. Dec.-Mch. Fr. Mch.-June. A very distinct species. Capsule depressed, lobed.

Wood reddish-grey or red soft. Annual rings distinct. Pores small, distributed in short radial lines. Medullary rays broad or moderately broad short. Weighs about 42 lbs. to the cub. ft. Used for fuel.

## 7. BREYNIA, Forst.

Glabrous shrubs. Leaves small, stipulate, entire, often distichous. Flowers small, monoicous, axillary. Petals and disk 0. Male fl. Calyx turbinate, truncate, rim thickened and lobulate. Stamens central, 3; filaments united into a column; anthers adnate to the whole length of the column, slender; cells linear, parallel. Fem. fl. Calyx coriaceous, hemispheric, turbinate, campanulate or rotate, broadly 6-lobed, fruiting, often enlarged and disciform. Stamines 0. Ovary globose, fleshy above, 3-celled. Disk 0. Styles 3, bifid or obscure; ovules 2-in. each cell. Fruit dehiscent or indehiscent. Seeds albuminous or 0, testa membranous, cotyledons broad, radicle long.

Calyx of female much enlarged in fruit ... 1. *B. patens*.

Calyx of female not or little enlarged in fruit ... 2. *B. rhamnoides*.

1. *B. patens*, Benth. in Gen. Plant. III. 277.; Fl. Br. I. 5. 329. *Melantheopsis patens*, Muell. Arg.; Bedd. Fl. Sylv. 196; Brandis For. Fl. 455. *M. turbinata*, Dalz. & Gibs. Bomb. Fl. 234. *P. turbinatus*, Roxb.; Grah. Cat. Bomb. Pl. 180. *Kangli*, M.

Tropical Himalaya, from Nepal to Mishmi and Assam, Western peninsula from the Konkan southwards to Ceylon. Throughout the Konkan and North Kánara ghát forests. Fl. Apl.-June. Fr. Aug.-Sept. A shrub with spreading branches. Leaves membranous, distichous. ♂ Fl.; 1-3, fascicled; pedicels slender; calyx turbinate, yellow. ♀ Fl.; Calyx 6-lobed. Style trifid. Seeds with an arillus. Fruit red-coloured.

2. *B. rhamnoides*, Muell. Arg.; Fl. Fr. I. 5. 330; Brandis For. Fl. 455; Bedd. Fl. Sylv. 1961 (by error named *Melantheopsis patens*).

Throughout tropical India from Oudh to Assam and Burma and southwards to Travancore and Ceylon.

Throughout the Konkan and North Kánara, often in hedges. Fl. H. S. Fr. R. S. A large shrub. Styles obscure. Fruit red, succulent. Seeds exarillate.

### 8. SAUROPUS, Blume.

Shrubs. Leaves alternate, distichous, membranous, entire; stipules minute. Flowers minute, monœcious, axillary. Male fl. Calyx 6-lobed, disciform, urceolate or turbinate; lobes spurred inwards at the base. Stamens 3 on a triangular column; anthers extrorse, pistillode 0. Female fl. Calyx 6-cleft, persistent, accrescent; styles 3, sessile, spreading with 3 recurved, incurved arms. Fruit globose, depressed, epicarp fleshy or coriaceous, 6-valved or rupturing irregularly, containing 6, indehiscent, 3-angled, crustaceous or bony cocci; albumen fleshy; cotyledons broad, flat.

*S. quadrangularis*, Muell. Arg. in *Linnaea* XXXII. 72; Fl. Br. I. 5. 335. *Ceratogynum rhamnoides*, Dalz. & Gibs. Bom. Fl. 234. *Chikli*, M.

Northern Behar, Coromandel Coast. The Konkan and Mysore, Burma. Konkan and in North Kánara, near the Arbail ghát, in evergreen forests. A small slender branched shrub. The spurred petals of the minute male flower are remarkable. Fl. June-Aug. Fr. July-Sept.

### 9. FLUEGGIA, Willd.

Armed or unarmed shrubs. Leaves small, alternate, distichous, stipulate. Flowers minute, axillary, dicecious. Petals 0. Males in axillary fascicles; females subsolitary. Male fl. Sepals 5-subpetaloid, imbricate. Stamens 5 with alternating disk glands; filaments free; anthers erect, cells parallel. Pistillode large, 2-3-fid. Female fl. Calyx same as in male fl. Disk annular, toothed. Ovary 1-3-celled; styles 3, bifid; ovules 2 in each cell. Fruit more or less succulent, separating into 2-valved cocci. Seed 3-angled, dorsally convex, ventrally acute, albumen scanty; embryo curved; cotyledons flat.

Unarmed shrub...	...	...	... 1. <i>F. microcarpa</i> .
Spinous shrub ...	...	...	... 2. <i>F. Leucopyrus</i> .

1. *F. microcarpa*, Blume Bijl. 580; Fl. Br. I. 5. 328. *F. Leucopyrus* Dalz. & Gibs. Bomb. Fl. 236 (not of Willd.). *Securinega obovata*, Muell. Arg.; Brand's For. Fl. 455; Bedd. Fl. Sylv. 197. *Pandhar-phali*, *kodarsi*, M.; *Bili horli*, K.

Throughout India from Kashmir to Bhotan and southwards to Malacca and Travancore, Burma, China and Australia.

Throughout the presidency in deciduous forests, common. Fl. Hot season. Fr. R. S. A large unarmed shrub with angular branchlets. Bark grey, with small lenticular specks. Wood reddish-yellow, close-grained, strong and durable. Used for agricultural implements. Bark used to intoxicate fish.

2. *F. Leucopyrus*, Willd. Sp. Pl. IV. 757; Fl. Br. I. 5. 328; *F. virosa*, Dalz. & Gibs. Bomb. Fl. 236. *Securinega Leucopyrus*, Muell. Arg.; Brandis For. Fl. 456; Bedd. Fl. Sylv. 197. *Vorepwan*, M.; *Kiran*, Sind; *Parpo*, Kon.

Punjab, Deccan peninsula from North Kánara southwards, Burma and Ceylon.

Throughout the presidency and Sind, usually in open situations, very common. Fl. H. S. Fr. R. S. A large spinous shrub. Bark grey or dark brown with small white lenticels. Wood pink, hard, close-grained; used for fuel. The fruit of both the above species is a white, globose, edible berry.

### 10. PUTRANJIVA, Wall.

Trees. Leaves alternate, stipulate, entire or serrulate. Flowers dioicous, axillary, apetalous. Males clustered, females subsolitary. Disk 0. Male fl.; calyx 2-5-partite, imbricate. Stamens 2-3, central; filaments free or connate. Female fl. Ovary 2-3-celled; styles short spreading, dilated into broad fleshy arms, ovules 2 in each cell. Fruit indehiscent, 1-seeded with a bony endocarp. Seed ovoid, testa crustaceous; albumen fleshy, cotyledons broad, flat.

*P. Roxburghii*, Wall. Tent. Fl. Nep. 61. Cat. 6814; Fl. Br. I. 5. 336; Brandis For. Fl. 451; Bedd. Fl. Sylv. Fl. 275; Dalz. & Gibs. Bomb. Fl. 236. *Putranjiva*, Vern.; *Aumani*, K.; *Putajan*, Hind.

Throughout tropical India from the lower Himalaya eastwards and southwards to Pegu and Ceylon. In the evergreen forests of the Konkan and North Kánara, nowhere common. Fl. Mch.-May. Fr. ripe next Feb.-Mch. A moderate-sized evergreen tree. Bark corky with shallow fissures, inner bark yellow. Wood light, grey, moderately hard, evergreen and durable. Annual rings marked by prominent lines. Pores small or moderate-sized in radial lines. Med. rays fine, uniform, closely packed, crossed by numerous transverse bars of light tissue. Weighs 48 lbs. to the cub. ft. Used for turning. Nuts strung into necklaces, which are put round the necks of children to preserve them from evil, hence the origin of the name *putranjiva*.

### 11. HEMICYCLIA, W & A.

Trees or shrubs. Leaves alternate, petioled, entire, often unequal at the base. Flowers small, diceicous, apetalous; males clustered at the nodes; female flowers subsolitary. Male fl. Sepals 4-5, imbricate, inner larger. Stamens 4-23, inserted round an orbicular disk, filaments free. Female fl. Disk flat, annular. Ovary obliquely ovoid, 1-celled; stigmas 1, rarely 2, sessile or on a short style, broad reniform, flabelliform, orbicular; ovules 2, in each cell. Fruit with a hard endocarp. Seeds grooved, arillate; albumen fleshy, cotyledons broad, flat.

Stamens 8-10. Fruit globose, small, pisiform ... 1. *H. sepiaria*.

Stamens 5-8. Fruit .5-.75 in. obovoid, oblique, crowned with the stigma ... 2. *H. venusta*.

1. *H. sepiaria*, W. & A. in Edinb. New Phil. Jour. XIV. 297; Fl. Br. I. 5. 337; Dalz. & Gibs. Bomb. Fl. 229; Bedd. Fl. Sylv. 198.

Deccan peninsula, mountains on the east side of Madras, Cuddapah, Salem, Ceylon, from the Konkan southwards, ascending to 3000 ft. A rigid branched shrub or small tree. Wood hard, close-grained, like boxwood, used for turning and axe handles.

2. *H. venusta*, Thw. in Hook. Jour. Bot. VIII (1855) 272; Fl. Br. I. 5. 339; Dalz. & Gibs. Bom. Fl. 229; Bedd. Fl. Sylv. 198.

Western peninsula from Kánara to the Nilghiris and South Tinnevely ascending to 4000 ft., common on the southern gháts of North Kánara in evergreen forests. Fl. Nov. Fr. Jany.-Feb. A small evergreen tree 60 ft. high by 1.5 ft. in diameter. Bark smooth. Wood very hard.

## 12. CYCLOSTEMON, Blume.

Trees. Leaves alternate, entire or crenulate, base often unequal sided. Flowers dioecious, apetalous, axillary, in racemes or clusters, pedicelled. Male fl. Sepals 4-6, broad, imbricate; buds globose. Stamens 4-40, inserted round the margin of the disk, filaments free, anthers erect. Female fl. Ovary 2-4-celled on the small disk, styles elongate or 0, stigmas dilated fleshy or connate into a peltate disk; cells 2-ovuled. Fruit indehiscent. Seeds with a caruncle; albumen fleshy; cotyledons broad, flat.

*C. confertiflorus*, Hook f. Fl. Br. I. 5. 341. *Augai mara*, K.

In the evergreen forests between the Devimone ghát and the Yena rocks, North Kánara. Fl. C. S. Fr. Apl. A large tree. Bark grey, smooth. Wood olive-grey, hard, smooth, compact. Pores small, often in lines between the fine, close, uniform, wavy, medullary rays. Annual rings distinct, marked by a ring of dark tissue. Weighs 56 lbs. to the cub. ft. Fruit yellow, smooth; size of small orange, flattened, 2-seeded; seeds planoconvex .75 in., episperm fibrous, rough. Fruit used for poisoning fish.

## 13. BISCHOFIA, Blume.

A large tree. Leaves alternate, trifoliate, leaflets crenate. Flowers in axillary panicles, dioecious, apetalous; males scattered or clustered, females longer pedicelled. Male fl. Sepals 5, concave, imbricating, concealing the anthers. Disk 0. Stamens 5, filaments short, anthers large. Pistillode short, broad. Female fl. Sepals ovate, caducous. Staminodes 5, small or 0. Ovary 3-celled; cells 2-ovuled; styles long, linear, entire. Fruit a globose drupe, 3-4-celled, lined with a parchment-like 2-valved endocarp. Seeds turgidly oblong; testa fibro-crustaceous; albumen fleshy; cotyledons broad, flat; radicle straight, elongate.

*B. javanica*, Blume Bijd. 1168; Brandis For. Fl. 446; Bedd. Fl. Sylv. t. 259. *Stylodiscus trifoliatus*, Dalz. & Gibs. Bomb. Fl. 235. *Boke*, Vern.

Tropical Himalaya from Kumaon eastwards and from Assam southwards. Deccan peninsula on the gháts from Kánara to the Nilghiris, not in Ceylon. In the evergreen forests of North Kánara, common on the gháts. Fl. Mch.-April. Fr. ripe next Nov.-Dec. Fruit size of cherry, reddish-brown, smooth, fleshy, 3-4-celled and seeded. Seeds in a bony capsule like those of *Pyllanthus Emblica*; pedicels jointed. An immense tree with a cylindrical trunk. Bark dark coloured with great scales exfoliating from beneath. Wood red, moderately hard, rough, heartwood small, darker coloured. Used for building purposes in the Nilghiris, sometimes called red cedar.

#### 14. APOROSA, Blume.

Trees. Leaves alternate, entire. Flowers minute, dicecious, apetalous; males in short dense spikes; females sessile or in short, few flowered spikes. Male fl. Sepals 4, membranous, imbricate. Stamens 2-5 in the centre of the flower; filaments capillary. Female fl. Ovary 2-celled; stigmas small, plumose, short spreading or recurved, simple or 2-4-cleft; ovules 2 in each cell. Fruit dehiscent; epicarp fleshy. Seeds plano-convex, albumen fleshy; cotyledons broad, flat.

*A. Lindleyana*, Baill. Etudes Gen. Euphorb. 645; Fl. Br. I. 5. 349; Bedd. Fl. Sylv. t. 286. *Scepa Lindleyana*. Wight; Dalz. & Gibs. Bomb. Fl. 236. *Sali, chella, bidchala*, K.

A small or moderate-sized tree. Western Peninsula from the Konkan southwards; Ceylon abundant. Common in the evergreen forests of the Konkan and North Kánara. Fl. C. S. Fr. ripe June. A small or moderate-sized tree. Bark thin, scaly; inner bark yellowish with wavy red fibres. Wood dull-reddish-grey, smooth, rather soft. Annual rings indistinct. Pores small, equally distributed. Medullary rays moderately broad and fine, wavy. Weighs 48 lbs. to the cub. ft. Used for rafters of huts in the Yellápur táluka of Kánara.

#### 15. ANTIDESMA, Linn.

Shrubs or small trees. Leaves alternate, entire, penni-nerved, stipulate. Flowers small, or minute, dioicous; males in spikes; females in spikes or racemes. Male fl. Calyx 3-5-lobed, lobes imbricate. Petal 0. Stamens 2-5, inflexed in bud, inserted on or around the disk often irregularly, anthers didymous, connective thickened. Disk entire or lobed. Fem. fl. Ovary 1-celled; stigmas 2-4, usually short 2-fid; ovules 2; styles 3-4. Fruit an indehiscent, 1-seeded drupe, crowned with the sublateral or terminal stigmas. Seed small, albumen fleshy.

Small tree. Calyx 5-7-partite. Stamens 4-7.	
Ovary tomentose ... ..	1. <i>A. Ghæsembilla</i> .
Small tree. Calyx cupular, shortly 4-lobed.	
Stamens 3. Ovary glabrous ... ..	2. <i>A. Bunius</i> .
A shrub. Calyx spreading, cup-shaped, 5-dentate. Stamens usually 2. Ovary glabrous.	3. <i>A. diandrum</i> .
Small tree. Calyx 3-4 partite. Stamens 3-4.	
Ovary glabrous ... ..	4. <i>A. Menasu</i> .

1. *A. Ghæsembilla*, Gärtn. Fruct. 1. 189. t. 39; Fl. Br. I. 5. 357; Brandis For. Fl. 446. *A. pubescens*, Dalz. & Gibs. Bom. Fl. 236. *A. paniculatum*, Dalz. & Gibs. Bom. Fl. 237. *Jondhri*, M.

Tropical Himalaya from Simla to Bhotan and southwards to Ceylon and Singapore, Malay Peninsula, and China. Throughout the presidency, in North Kánara forests. Fl. Apl.-June. Fr. Sept.-Oct. A small deciduous tree. Bark grey, scaly. Wood red with a darker coloured heartwood, smooth, hard, close and even-grained. Leaves ovate, obtuse, sometimes slightly cordate at the base. Spikes paniced. Fruit and leaves are eaten.

2. *A. Bunius*, Spreng Syst. Veg. 1. 826; Fl. Br. I. 5. 358; Bedd. Fl. Sylv. 200. *A. Alexiteria*, Willd. Grah. Cat. Bom. Pl. 186. *Amati*, M.

Throughout the hotter parts of India from Nepal to Assam and southwards to Singapore and from Behar to Ceylon. Throughout the western gháts; Konkan and North Kánara in moist forests, not mentioned by Dalzell; rare on the Khandála ghát. Fl. May-June. Fr. Aug.-Sept. A small evergreen tree. Wood reddish, hard. Fruit bright red, turning black.

3. *A. diandrum*, Roth. Nov. Sp. 369; Fl. Br. I. 5. 361; Brandis For. I. 447; Dalz. & Gibs. Bomb. Fl. 237; Bedd. Fl. Sylv. 201. *A. lanceolatum*, Bedd. Fl. Sylv. 201.

Tropical Himalaya from Garwal, eastwards and southwards to Travancore, Ceylon. Throughout the presidency, common in the Konkan and North Kánara in moist forests from the coast inland. Fl. May-July. Fr. Aug.-Sept. A small tree or large shrub. Wood pinkish-grey, hard, close-grained. Annual rings distinct. Pores very small, few, equally distributed. Medullary rays fine and very fine, distinct. Weighs about 50 lbs. to the cub. ft. Leaves and fruit are eaten.

4. *A. Menasu*, Miq. Pl. Exsicc. Hohen. No. 104; Fl. Br. I. 5. 364. *A. lanceolatum*, Dalz. & Gibs. Bomb. Fl. 237. Western Peninsula from the Konkan and Circars southwards, Burma and the Andamans. In the evergreen forests of the Konkan and North Kánara; also along nálas in deciduous moist forests. Fl. Mar.-May. Fr. Sept.-Oct. Leaves sometimes 10 in. long; var. *linearifolia*, is very common in the Siddápur táluca of North Kánara. A small tree. Wood dark-red, similar to that of *A. Ghæsembilla*, but the pores are smaller and the medullary rays finer. Gamble.

#### 16. BACCAUREA, Lour.

Evergreen trees. Leaves alternate, entire. Flowers dicecious or rarely monoicous, often from the trunk or branches, in racemes or spikes, apetalous; males usually very minute, hoary or tomentose. Disk 0 or of obscure glands in the male flower. Male fl. Calyx 4-5-cleft. Petals 0. Disk 0 or present. Stamens 4-10, free. Pistil-lode pubescent, orbicular, sessile or stipitate. Fem. fl. Sepals 4-6,



linear, much larger than in the male. Ovary 2-5-celled, ovoid or globose; stigmas 2-5, free or connate into a short style, 2-lobed, arms broad or subulate, rarely united into a peltate, stigma cells 2-ovuled. Fruit tardily loculicidally dehiscent. Seeds with a large white arillus; albumen fleshy or hard; cotyledons broad, flat.

*B. courtallensis*, Muell. Arg. in DC. Prod. XV. II. 459; Fl. Br. I. 5. 367. *B. sapida*, Bedd. Fl. Sylv. t. 280. A large tree. Travancore and the Anamallays. North Kánara in the moist forests near Sungsal. Fl. C. S.

### 17. JATROPHA, Linn.

Herbs, shrubs or trees, often glandular and prickly. Leaves entire or digitately lobed; stipules often ciliate. Flowers in terminal cymes, monoicous; female often petaliferous. Male fl. Sepals 5, imbricate, often petaloid. Petals 5, free or connate. Disk entire or of 5 glands. Stamens many, filaments of all or of the inner connate. Pistillode 0. Fem. fl. Perianth of the male. Ovary 2-4-celled; styles connate below, 2-fid; ovule 1 in each cell. Fruit a capsule with a bony or crustaceous endocarp. Seeds ovoid or oblong, testa crustaceous; albumen fleshy; cotyledons broad, flat.

Petals free.

- |  |                             |
|--|-----------------------------|
| Leaves 3-5-lobed, cordate, glandular—bristly,<br>serrate ... ..    | 1. <i>J. glandulifera</i> . |
| Leaves entire or 3-lobed, not cordate ...                          | 2. <i>J. nana</i> .         |
| Leaves peltate, pinnatifid, segments many.<br>Cymes scarlet ... .. | 3. <i>J. multifida</i> .    |

Petals connate. Leaves entire or lobed ... .. 4. *J. Curcas*.

1. *J. glandulifera*, Roxb. Fl. Ind. III. 688; Fl. Br. I. 5. 382; Dalz. & Gibs. Bomb. Fl. 229. *Janqli-erandi*, *undarbibi*, M.

Common near villages in Bengal, Burma and the Northern Circars, rare in Oudh and the Punjáb. Western Peninsula at Punderpore in the Deccan, plentiful. Dalz. The seeds yield an oil similar to castor-oil, used in native medicine.

2. *J. nana*, Dalz. & Gibs. Bomb. Fl. 229; Fl. Br. I. 5. 382. *Kirkundi*, M. The Konkan, stony places near Poona, Bombay, &c. A small shrub, very little branched.

3. *J. multifida*, Linn. Sp. Pl. 1006; Fl. Br. I. 5. 383. *Chini-erandi*, Vern. Cultivated and naturalized throughout the presidency.

4. *J. Curcas*, Linn. Sp. Pl. 1006; Fl. Br. I. 5. 383; Brandis For. Fl. 442; Dalz. & Gibs. Bomb. Fl. Suppl. 77. *Irundi*, *jaiphal*, *kurukarlu*, Vern.; *Kadandla* (Dhárwár). *Ratanjota*, *jamalgota*, Guz.; *Maraharlu*, K. Indigenous in America, cultivated in most parts of India. Throughout the presidency, common in hedges, cultivated and naturalized. Fl. Apl.-May. Fr. R. S. A large shrub. Bark greenish. Wood white,

very soft, almost spongy, useless as timber. Weighs 25 lbs. to the cub. ft. The seeds yield an oil, used for burning and sometimes medicinally by poor natives.

*J. gossypifolia*, L. A large shrub, native of Brazil, is subsontaneous and very common near the sea coast from Kárwár, North Kánara, to Bombay. A garden escape. Fl. and Fr. throughout the year.

#### ALEURITES, Forst.

Trees with simple or stellate pubescence. Leaves simple or lobed, 2-glandular at the base. Flowers monoicous, in large terminal panicles. Calyx 2-3-partite. Petals 5, imbricate in bud. Disk urceolate, or glandular. Stamens numerous, on a conical torus. Ovary 2-5-celled; cells 1-ovuled; styles 2-5, 2-cleft. Fruit a large drupe: putamen 1-5-celled. Albumen oily; embryo straight, cotyledons flat.

*A. moluccana*, Willd. Sp. Pl. IV. 590; Fl. Br. I. 5. 384; Bedd. Fl. Sylv. t. 276. *A. triloba*, Dalz. & Gibs. Bomb. Fl. Suppl. 76. *Akrod, jaiphal*, Vern.

Indigenous in the Malay Archipelago. Planted in gardens throughout the Bombay Presidency; it is often called, by Europeans, the Indian or Belgaum walnut or the Candle-nut tree. Fl. Apl.-May. Fr. ripe next cold season. A moderate-sized tree. The kernels of the nuts are eaten and taste like walnuts. They yield a clear oil used for burning and cooking. Beddome says that a large trade is carried on in this oil in the Sandwich Islands.

#### 18. CROTON, Linn.

Trees or shrubs, rarely herbs. Leaves alternate, simple, 2-glandular at the base. Flowers small, in bracteate racemes or spikes, usually monoicous. Male fl. Calyx usually 4-partite, slightly imbricate in bud. Petals as many as sepals. Glands of the disk alternating with the petals. Stamens 5 or numerous, usually 10-20, inserted on a hairy receptacle, filaments inflexed in bud, afterwards erect. Fem. fl. Sepals more ovate than in male, rarely accrescent. Petals smaller or 0. Disk annular or of glands. Ovary 2-4-celled cells 1-ovuled; styles slender, 2-4-cleft. Capsule usually tricocous, cocci 2-valved, 1-seeded. Seeds smooth with a caruncle, testa crustaceous; albumen copious; cotyledons broad.

Ovary lepidote or stellately tomentose. Trees or shrubs.

Shrub. Inflorescence and leaves densely silvery-lepidote. Leaves entire, 3-nerved at the base. Capsule  $\frac{1}{2}$  inch ... 1. *C. reticulatus*.

Small tree. Young leaves and inflorescence lepidote. Leaves glabrous when old, toothed, penninerved. Capsule  $\frac{1}{2}$  inch ... .. 2. *C. oblongifolius*.

- Small tree. Inflorescence stellately tomentose or glabrous, not lepidote. Leaves 3-5-nerved at the base, denticulate. Capsule scabrid,  $\frac{1}{3}$  inch ... 3. *C. aromaticus*.
- Shrub. Leaves penninerved, mature glabrous, 3-nerved at the base. Capsule small, stellately tomentose, crustaceous,  $\frac{1}{2}$  inch ... 4. *C. Gibsonianus*.
- Small tree. Leaves strongly triple-nerved long petioled. Capsule large, obovoid, white, 1-inch, glabrous ... 5. *C. Tiglium*.
- Ovary glabrous. Young leaves softly stellately hairy, strongly 3-nerved. Capsule large, rugose, glabrous. A small tree ... 6. *C. Lawianus*.

1. *C. reticulatus*, Heyne in Wall. Cat. 7724 B. in part; Fl. Br. I. 5. 186. *C. hypoleucus*, Dalz. & Gibs. Bomb. Fl. 231. *Panduray*, Vern. Western Peninsula from the Konkan southwards, Ceylon. A large shrub with slender branches, leaves shining-silvery beneath. Common and gregarious in the evergreen forests near Parlé, Belgaum District. Fl. Jan. Fr. Feb.-Mch.

2. *C. oblongifolius*, Roxb. Fl. Ind. III. 685; Fl. Br. I. 5. 387; Brandis For. Fl. 440; Dalz. & Gibs. Bomb. Fl. 231; Beddome Fl. Sylv. 204. *Gunsur*, Vern. South India, Deccan peninsula, Burma and Ceylon. "Southern Konkan, rare," Dalzell. "A rare tree in our western forests," Beddome. Noted from the Bombay Presidency by Dalzell, who found it in the fort at Banda. Wood yellowish, close-grained, moderately hard and heavy.

3. *C. aromaticus*, Linn. Sp. Pl. 1005; Fl. Br. I. 5. 388; Bedd. Fl. Sylv. 204. *C. aromaticus*, Muell. Arg. in DC. Prodr. XV. 1. 588. *C. laciferus*.

Western Peninsula from the Konkan southwards, on the Bababuden hills of Mysore, above 4000 feet. Fl. Fr. R. & C. S. A small tree.

*C. Gibsonianus*, Nimmo. in Grah. Cat. Bomb. Pl. 251; Fl. Br. I. 5. 392; Dalz. & Gibs. Bomb. Fl. 232. On the southern ghâts of North Kánara, in evergreen forests, common near the falls of Gairsoppah. Fl. Fr. C. S. A small shrub. I am doubtful whether there are not two species included under this name. The small tree, described in Graham's Catalogue and Dalz. & Gibs. Bomb. Flora, with glands orange-coloured, cordate. Capsule red when ripe, size of walnut, Grah., and the small shrub with the glands small, orange-coloured, not cordate. Capsule small grey tomentose, from North Kánara.

5. *C. Tiglium*, Linn. Sp. Pl. p. 1004; Fl. Br. I. 5. 393; Grah. Cat. Bomb. Pl. 181; Brandis For. Fl. 440. Purging Croton. *Jamalgotá, jaípa*, Vern.

Naturalized in the South Konkan, probably indigenous in Assam and Eastern Bengal. A small tree. The nuts yield a valuable medicinal oil, a strong purgative. Externally applied the oil causes a blister.

6. *C. Lawianus*, Nimmo in Grah. Cat. Bomb. Pl. 251; Fl. Br. I. 5. 394; Dalz. & Gibs. Bomb. Fl. 232.

Beemashunker, Bheema Hills &c., Bababuden Hills, Mysore. Probably may be found in the southern parts of North Kánara, but not yet seen in the Bombay Presidency. A small tree. Fruit with the calyx white, foliaceous, enlarged like in *Dimorphocalyx glabellus*, Thw.

### 19. GIVOTIA, Griff.

A small stellately tomentose tree. Leaves alternate, cordate, sinuate toothed, 5-9-nerved at the base. Flowers dioecious, in axillary or terminal cymes. Disk entire or lobed. Male fl. Sepals 5, broad, unequal, imbricate. Petals 5, connate. Stamens 13-25 on a woolly receptacle, filaments connate, below, erect. Fem. fl. Perianth of the male. Disk cupular. Ovary 2-3-celled; styles short, 2-fid; ovules 1 in each cell. Fruit a subglobose, 1-seeded drupe; putamen crustaceous. Seed globose, testa bony, albumen fleshy; cotyledons broad, flat.

*G. rottleriformis*, Griff. in Calc. Jour. Nat. Hist. IV. 388; Fl. Br. I. 5. 395; Brandis For. Fl. 442; Dalz. & Gibs. Bomb. Fl. 228; Bedd. Fl. Sylv. t. 285. *Polki*, M.; *Pulkeer*, K.

Deccan Peninsula from Dhárwár and Bellary southwards, Ceylon in the drier parts of the island. Throughout the dry districts of the Deccan, abundant in the Belgaum district near Sutgutti in dry, deciduous, open jungles on the lower Kuddapah quartzites. Fl. H. S. A small tree. Wood yellowish-grey with dark streaks and patches, soft, light. Pores large, scattered, single, double or in short radial lines 2-4 together. Med. rays very fine and numerous, joined by fine lines of tissue, giving a faint reticulated appearance to the wood. Weighs 14 lbs. to the cub. ft. Used for making toys, &c.

### 20. BLACHIA, Baill.

Small trees or shrubs. Leaves alternate or opposite. Flowers monœcious; males subumbellate; females solitary or fascicled. Male fl. Sepals 4-5, concave, membranous, imbricate. Petals 4-5, small, hyaline. Disk of 4-5 scales, alternating with the petals. Stamens 10-20, on a convex torus, filaments free; anthers ovate, cells on the margin of the connective, tips at length confluent. Fem. fl. Sepals 5, imbricate, enlarging greatly in fruit. Petals 0. Disk obscure. Ovary 3-4-celled; styles filiform, 2-partite, recurved; ovules 1 in each cell. Capsule 3-celled; cells 2-valved. Seeds, smooth, shining; albumen fleshy; cotyledons broad, flat.

*B denudata*, Benth. in Jour. Linn. Soc. XVII. 226; Fl. Br. I. 5. 403. *Croton umbellatum*, Dalz. & Gibs. Bomb. Fl. 231.

In the evergreen forests of the Konkan and North Kánara, common on the Supa and Siddapore gháts. Fl. Oct.-Dec. Fr. Dec.-Feb. A large shrub or small tree about 30 ft. high and 3 in. in diameter. Bark smooth. Seeds smooth, mottled, carunculate.

## 21. DIMORPHOCALYX, Thw.

Trees. Leaves entire, coriaceous, alternate. Flowers in axillary or terminal few-flowered spikes or the female subsolitary, dioecious. Male fl. Calyx cupular, 5-toothed or lobed. Petals 5. Disk of 5 glands, alternating with the petals. Stamens 10-20, on a short torus; filaments stout, free or the inner connate; anthers dorsifixed. Pistillode 0. Fem. fl. Sepals 5, imbricate, greatly enlarged in fruit. Petals 5. Ovary 3-celled; styles erect, 2-fid; ovules 1 in each cell. Fruit a 3-celled capsule, cells 2-valved. Seeds ovoid, testa crustaceous, albumen fleshy; cotyledons broad.

D. Lawianus, Hook. f. Fl. Br. I. 5, 404. *Trigonostemon Lawianus*, Muell. Arg.; Bedd. Fl. Sylv. t. 273.

Travancore; on the Anamally Hills, in the evergreen forests of the Konkan and North Kánara, common on the southern gháts; between Nilkund and Gairsoppah. Fl. Feb.-Oct. Fr. Nov.-Jany. A small or moderate-sized tree. Wood unknown. Calyx segments of female flower unequal. Sir J. Hooker separates this species from *D. glabellus*, Thw. (found in Ceylon) with hesitation—*vide* Fl. Br. I. v. 404.

## 22. AGROSTISTACHYS, Dalzell.

Glabrous shrubs. Leaves long, entire or serrate, subsessile. Flowers dioecious, in bracteate spikes or racemes, males few within each bract; females solitary, long pedicelled. Male fl. Calyx globose of 2-5, valvate lobes. Petals 8, shorter. Disk-glands large, alternating with the petals. Stamens 8-13 on a convex receptacle; filaments free; anthers versatile, cells pendulous from the thickened connective. Pistillode 2-3-fid or 0. Female fl. Calyx 5-6-fid. Petals longer, caducous. Ovary 3-celled; styles thick, short, spreading, 2-fid, ovules 1 in each cell. Fruit a 3-celled capsule or subfleshy. Seeds globose, albumen fleshy; cotyledons broad, flat.

Bracts of male 1-3-flowered, densely imbricate ... 1. *A. indica*.

Flowers many under each bract, bracts remote ... 2. *A. longifolia*.

1. *A. indica*, Dalz. & Gibs. Bomb. Fl. 232; Fl. Br. I. 5. 406; Bedd. Fl. Sylv. 205.

Western Peninsula on the gháts from the Konkan southwards. Ceylon in the Central Province, 1—2000 ft. alt. Throughout the Konkan, North Kánara and Belgaum (Amboli) in evergreen forests, on the banks of streams. Fl. Feb. Fr. C. & H. S. A stout shrub with very tough branches and smooth bark. The male flowers are white; in short, flattened, axillary, fascicled, bracteate spikes, often deflexed like those of *Alsoidea*.

2. *A. longifolia*, Benth. in Gen. Pl. III. 303; Fl. Br. I. 5. 407; Bedd. Fl. Sylv. 205.

Western Peninsula, on the ghâts from Kánara to the Nilgiris and Travancore, Ceylon. Evergreen forests of North Kánara, on the Supa ghâts, along streams. Fl. R. S. Fr. ripe Feb.-Apl. A small tree.

### 23. ADENOCHLÆNA, Baill.

Trees or shrubs. Leaves alternate, entire, 3 or penninerved. Flowers monœcious, in terminal or axillary, interrupted spikes or capitate, males many, females few, at base of spike. Disk 0. Male fl. globose in bud. Sepals 4-6, valvate. Stamens 4-6, filaments free, exerted; anther-cells adnate to the thick connective, parallel. Female fl. Sepals 5-8, narrow, unequal, accrescent. Ovary 3-celled; styles long, connate at the base, bifid above, recurved, plumose with multifid arms; ovule 1 in each cell. Fruit a 3-celled capsule. Seeds subglobose, estrophiolate, albuminous, with a crustaceous testa; albumen fleshy; cotyledons broad, flat.

*A. indica*, Bedd. MSS. Fl. Br. I. 5. 418. *Cephalocroton indicum*, Bedd. Fl. Sylv. t. 261.

Western Peninsula, on the ghâts from Kánara to Travancore. Evergreen forests of North Kánara, near the falls of Gairsoppah. Fl. Oct.-Dec. A shrub or small tree with white, smooth bark.

### 24. TREWIA, Linn.

Soft wooded trees. Leaves simple, opposite, broadly ovate or orbicular, cordate, entire, 3-5-basal nerved and sometimes glandular. Flowers small, in axillary racemes, diœcious. Calyx 3-4-partite in the male flowers, valvate in the females, imbricate in bud. Petals and disk 0. Male fl. Calyx globose, splitting into 3-4, concave often reflexed segments. Stamens numerous, free, on a central depressed torus. Fem. fl. Calyx of 3-5, broad sepals, imbricate, caducous. Ovary 3-4-celled; cells 1-ovuled; styles connate at the base, long, undivided. Fruit a fleshy drupe, indehiscent or endocarp loculicidal. Seeds albuminous, testa hard; cotyledons broad, flat.

Female flowers solitary. Fruit globose,  $1\frac{1}{2}$  in. woody, indehiscent ... .. 1. *T. nudiflora*.

Female flowers in short racemes. Fruit  $\frac{1}{4}$  in. endocarp loculicidal ... .. 2. *T. polycarpa*.

1. *T. nudiflora*, Linn. Sp. Pl. Ed. 3. Append. 1661; Fl. Br. I. 5. 423; Brandis For. Fl. 443; Dalz. & Gibs. Bomb. Fl. 231. *Petari*, Vern.; *Tumri*, *shillauri*, *kat-kumbla*, K.

Hotter parts of India from Kumaon southwards and eastwards to Ceylon and Assam. Throughout the Konkan and North Kánara in moist forests, often along the banks of rivers and nálas. Fl. Dec.-Feb. Fr. R. S. A large, deciduous tree. Bark grey, smooth. Wood white, soft. Pores moderate-sized, subdivided, often elongated. Med. rays fine, closely packed, uniform. Weighs 29 lbs. to the cub. ft. Used

for making native drums. (Gamble.) Leaves 5 in. long 1 ft. by 4 in. broad, ovate, acuminate, often cordate, membranous, 3-nerved and sometimes with 2 basal glands, petiole 1-3 in.

2. *T. polycarpa*, Benth. in Gen. Plant. III. 319; Fl. Br. 5. 424. *T. nudiflora*, Bedd. Fl. Sylv. t. 281. The Konkan. Fl. C. S.

25. **MALLOTUS**, Lour.

Trees or shrubs. Leaves alternate or opposite, penni or 3-7-nerved, often glandular dotted beneath, simple or lobed, sometimes peltate. Flowers usually dioecious, small, in terminal racemes or spikes. Males clustered, females solitary in the bracts. Male fl. Calyx globose or ovoid, valvately 3-5-partite. Petals and disk 0. Stamens numerous, free or cohering at the base, on a central torus; anthers small, dorsifixed, cells often widely separated by the thickened connective. Pistillode 0 or very minute. Fem. fl. Calyx spathaceous or valvately 3-6-lobed or partite. Ovary 2-5-celled, cells 1-ovuled; styles as many as the ovary cells, simple or connate at the base. Fruit a dry capsule of 2-5, cocci. Seeds albuminous; cotyledons broad, flat.

Erect trees. Leaves opposite or alternate.

Leaves alternate, rusty white tomentose beneath, narrowly peltate. Capsule 3-4-coccous, muricate with soft white tomentose processes ... .. 1. *M. albus*.

Leaves opposite, nearly glabrous, minutely glandular beneath.

Capsule 3-dymous with soft, scattered tubercles ... .. 2. *M. stenanthus*.

Leaves opposite, golden glandular beneath. Capsule with long soft, villous filaments ... .. 3. *M. Lawii*.

Scandent shrub. Leaves alternate with soft, tawny tomentum, 3-nerved. Capsule didymous, stellately tomentose ... .. 4. *M. repandus*.

Erect tree. Leaves 3-nerved, glabrous above, puberulous beneath. Capsule tridymous, covered with crimson glandular powder, unarmed ... .. 5. *M. philippinensis*.

1. *M. albus*, Muell. Arg. in Linnæa. XXXIV. 188; Fl. Br. I. 5. 429; Brandis For. Fl. 444; Beddome Fl. Sylv. 208. *Rottlera mappoides*. Dalz. & Gibs. Bomb. Fl. 230. (Var. *occidentalis*.)

Sikkim, Eastern Bengal, Assam, Western Peninsula on the ghâts from the Konkan southwards to Mysore and Ceylon. Throughout the moist forests of the Konkan and North Kánara. Fl. Sept.-Oct. Fr. ripe Nov.-Feb. A moderate-sized or small tree up to 60 feet high, 1.5 feet in diameter. Bark pale white, smooth, inside a thin layer of green parenchyma; no rhytidome. Wood soft, white. Pores large and moderate sized, often subdivided. Medullary rays fine and very fine, closely packed.

2. *M. stenanthus*, Muell. Arg. in Linnæa XXXIV. 191; Fl. Br. I. 5. 437.

In the evergreen forests of North Kánara, on the gháts from Yellápur southwards. Fl. Sept.-Nov. Fr. ripe C. S. A small shrub. Leaves sinuate, toothed and glandular at the base.

3. *M. Lawii*, Muell. Arg. in Linnæa. XXXIV. 192; Fl. Br. I. 5. 438; Bedd. Fl. Sylv. 209. *Rottlera aureopunctata*, Dalz. & Gibs. Bomb. Fl. 230.

Throughout the evergreen forests of the Konkan and North Kánara, common in the forests near the Devimone and Nilkund gháts. Fl. Oct.-Dec. Fr. ripe Feb.-Mch. A small shrub. Leaves penninerved, repand dentate.

4. *M. repandus*, Muell. Arg. in Linnæa. XXXIV. 197; Fl. Br. I. 5. 442; Brandis For. Fl. 444; Bedd. Fl. Sylv. 210. *Rottlera tricocca*, Roxb. Dalz. & Gibs. Bomb. Fl. 230.

Throughout India from the tropical Himalaya in Bhotan to Assam and southwards to Ceylon. Throughout the Konkan and North Kánara in moist forests, common in the South Konkan, also in the evergreen forests near Yellápur. Fl. Sept.-Oct. Fr. ripe C. S. A large and extensive climber. Stem fluted with very rough bark at the base, covered sparingly with large spines 1-3 in. long, single or 3-4 from a tubercle. Bark white, scaly, yellowish fibrous within.

5. *M. philippinensis*, Muell. Arg. in Linnæa. XXXIV. 196; Brandis For. Fl. 444; Fl. Br. I. 5. 442; Bedd. Fl. Sylv. t. 289. *Rottlera tinctoria*, Dalz. & Gibs. Bomb. Fl. 230. The Monkey-face Tree. *Kunkuma*, K.; *Roen*, *kapila*, *shendri*, Vern.

Throughout tropical India from Kashmir (Murree-Srinuggar Road) to Burma and southwards to Ceylon. Throughout the dry forests of the presidency and in Sind. Fl. Nov.-Jan. Fr. ripe Feb.-May. A small tree. Bark thin, grey, irregularly cracked; inner bark red. Wood reddish grey, hard, close-grained, smooth. Pores small, equally distributed. Medullary rays fine and very fine, closely packed. Weighs 54 lbs. to the cub. ft. Used only for fuel. The powder from the fruit yields the kamela dye, used for colouring silk.

## 26. CLEIDION, Blume.

Glabrous trees. Leaves simple, alternate. Flowers dicecious, males in long axillary racemes, females solitary, axillary on a long peduncle. Male fl. Calyx globose, 3-5-partite, valvate. Stamens numerous, on a conical, central receptacle; anthers peltately attached, 4-celled; connective produced. Fem. fl. Sepals 3-5, imbricate. Ovary 2-3-celled; cells 1-ovuled; styles long, filiform, 2-cleft. Capsule 2-3-cccous. Seeds with fleshy albumen; cotyledons broad, flat.

*C. javanicum*, Blume Bijl. 613; Fl. Br. I-5. 444; Bedd. Fl. Sylv. t. 272. *Rottlera uranda*, Dalz. & Gibs. Bomb. Fl. 230.



Sikkim Himalaya to Burma, Penang and the Andamans, Western Peninsula from the Konkan to Travancore. Evergreen forests of the Konkan and North Kánara, common in the Ainshi ghát forests. Fl. Oct.-Dec. Fr. Jan.-Feb. A moderate sized tree. Bark grey, rough with a powdery surface of small raised corky cells; inner bark thick, yellowish, hard. Wood white or yellowish, rather heavy, close-grained, fibrous, soft, not durable. Used in Madras for building purposes. Gamble.

### 27. MACARANGA, Thouars.

Trees or shrubs. Leaves alternate, large, peltate, entire or lobed, more or less glandular beneath, 3-5-basal nerved; stipules large, deciduous. Flowers dioecious, in panicles, racemes or spikes. Males many, clustered; females 1 or few under each bract; bracts large, entire or toothed. Male fl. Calyx globose, sepals 3-4, valvate. Petals and disk wanting. Stamens 1 or more, central, on a convex receptacle; anthers peltately attached, 3-4-celled. Fem. fl. Calyx 2-4-lobed or toothed; styles entire. Ovary 2-6-celled, cells 1-ovuled. Fruit a small 1-5-celled, often waxy-glandular capsule. Seeds globose; albumen fleshy; cotyledons broad, flat.

Male bracts with a glandular appendage; female bracts without glands. Stamens 6-8 ... 1. *M. indica*.  
 Male bracts broad, toothed, tomentose; smaller in the female. Stamens 2-3 ... 2. *M. Roxburghii*.

1. *M. indica*, Wight, Ic. t. 1883 and 1949, f. 2; Fl. Br. I. 5. 446; Bedd. Fl. Sylv. t. 287.

From the Konkan southwards. Fl. Br. I.; "very common in the western forests of the Madras Presidency," Beddome. Not seen by me in North Kánara, probably not a species of the Bombay Presidency.

A small evergreen tree. Bark grey, thin, smooth. Wood grey, moderately hard (Gamble).

2. *M. Roxburghii*, Wight Ic. t. 1949, f. 4; Fl. Br. I. 5. 448; Dalz. & Gibs. Bomb. Fl. 228. *M. tomentosa*, Beddome. Fl. Sylv. t. 287. *Chanda*, Vern.; *Chandori*, Kon.; *Chandkal*, K.; *Chandoda*, M.

Deccan peninsula; in the Circars and on the gháts from the Konkan southwards to Travancore, Ceylon. Throughout the moist forests of the Konkan and North Kánara, very common. Fl. Feb.-March. Fr. April-May.

A large tree, bark dark grey, nearly smooth with scattered corky masses of cells; inner bark bright red with white patches of tissue. Wood grey or reddish, smooth, soft, close-grained. Pores moderate-sized or small, often divided. Medullary rays very fine, numerous, indistinct. Weighs 42 lbs. to the cub. ft. A light crimson-coloured gum exudes from cuts and wounds in the stem, used for taking impressions of coins, &c. Wood rejected as firewood by the Southern Mahratta Railway Company.

## 28. HOMONIOIA, Lour.

Rigid shrubs. Leaves alternate; stipules deciduous. Flowers dioecious, in spikes or racemes or the females solitary. Male fl. Calyx globose, 3-partite and valvate. Petals and disk 0. Stamens numerous in a dense globose head of branched filaments; connective obscure. Fem. fl. Sepals 5-8, narrow, unequal, imbricate. Ovary 3-4-celled, cells 1-ovuled; styles 3-4, connate at the base, simple. Fruit, a 3-4-celled capsule; albumen fleshy; cotyledons flat.

Leaves lanceolate. Spikes long, slender ... 1. *H. riparia*.  
 Leaves obovate. Spikes short, stout ... 2. *H. retusa*.

1. *H. riparia*, Lour. Fl. Coch. 637; Fl. Br. I. 5. 455; Brandis For. Fl. 401; Bedd. Fl. Sylv. t. 212. *Adelia neriifolia*, Roth., Dalz. & Gibs. Bomb. Fl. 231; Grah. Cat. Bomb. Pl. 185.

Rocky river banks. Sikkim Himalaya to Assam, southwards to Burma, Deccan peninsula from the Konkan southwards. In the beds of rivers and streams throughout the presidency, very common in Konkan and North Kánara rivers. Fl. Nov.-March. A shrub. Wood grey or greyish brown, moderately hard, close-grained. (Gamble.)

2. *H. retusa*, Muell. Arg. in Linnæa XXXIV. 200; Fl. Br. I. 5. 456; Brandis For. Fl. 445. *Adelia retusa*, Wight. Dalz. & Gibs. Bomb. Fl. 231; Bedd. Fl. Sylv. 212.

Deccan peninsula from the Konkan to the Nilghiris. Throughout the presidency in river beds, often associated with *H. riparia*, common in North Kánara rivers. Fl. Nov.-April. A small glabrous shrub with tough woody branches.

## 29. RICINUS, Linn.

Trees or shrubs. Leaves alternate, peltate, palmately 7-many-lobed, serrate. Flowers monœcious, apetalous, in terminal subpanicked racemes. Calyx 5-divided, valvate in bud. Petals and disk wanting. Stamens numerous; filaments variously connate on a plano-convex torus. Ovary 3-celled. Capsule dry, 3-coccos. Albumen oily.

*R. communis*, Linn. Sp. Pl. 1007; Fl. Br. I. 5. 457; Brandis For. Fl. 445; Dalz. & Gibs. Bomb. Fl. Suppl. 78. *Erandi*, Vern.; *Tirki*, Guz.; *Haralu*, K. Castor Oil Plant.

Cultivated and naturalized near villages, throughout the presidency, probably indigenous in Africa. Fl. Fr. Feb.-March.

## 30. SAPIUM, P. Br.

Trees or shrubs. Leaves alternate, entire or toothed; petiole often 2-glandular at top. Flowers in terminal, simple or paniced spikes, monœcious, apetalous; males several in each bract; females in the lower part of the spike. Petals and disk 0. Male fl. Calyx 2-3-lobed, toothed or split to the base into 2-3, valvate sepals. Stamens 2-3; anther-cells distinct. Fem. fl. Calyx 3-fid or partite. Ovary

2-3-celled; styles spreading and recurved, connate at the base; cells 1-ovuled. Fruit a tardily dehiscent 3-valved capsule. Seeds with fleshy albumen, usually long-persistent on the columella; cotyledons broad, flat.

Columella winged, persistent. Fruit capsular, size  
of a pea ... .. 1. *S. sebiferum*.  
Columella not persistent. Capsule large, woody ... 2. *S. indicum*.  
Fruit drupaceous, obscurely lobed,  $\frac{1}{2}$  inch ... 3. *S. insigne*.

1. *S. sebiferum*, Roxb. Fl. Ind. III. 693; Fl. Br. I. 5. 470; Dalz. & Gibs. Bomb. Fl. Suppl. 77. *Excæcaria sebifera*, Brandis For. Fl. 441. Chinese Tallow Tree. *Pipalyank*, Vern.

A native of China, cultivated near Bombay. Fl. June. Fr. ripe Oct.

2. *S. indicum*, Willd. Sp. Pl. IV. 572; Fl. Br. I. 5. 471; Fl. Br. I. 5. 471; Gralh. Cat. Bomb. Pl. 181. *Hurna*, M.

Bay of Bengal, from the Sunderbuns to Tenasserim. Various parts of the South Konkan, Graham. I do not think this tree is found in the Bombay Presidency.

Wood soft and white, with a small brown heartwood.

3. *S. insigne*, Benth. in Gen. Plant. III. 335; Fl. Br. I. 5. 471; var. *malabarica* *Excæcaria insignis*, Bedd. Fl. Sylv. 214; Brandis For. Fl. 442. *Falconeria malabarica*, Dalz. & Gibs. Bomb. Fl. 227. *Ura, hure, dudla*, M.; *Kurda, nanaka*, K.

Western peninsula from the Konkan southwards. Common near the coast of the Konkan and North Kánara, on dry rocky soil, usually on laterite, also in moist forests on the gháts. Fl. C. S. Fr. Mch.

A small or large deciduous tree with much acrid milk. Bark deeply fissured, corky. Wood greyish-white, very soft, and spongy; used for the cylinders of native drums.

### 31. EXCÆCARIA, Linn.

Trees or shrubs with milky sap. Leaves simple, usually alternate, with paired stipules. Flowers minute in terminal or axillary, androgynous spikes, usually monœcious. Males 1-3 in each bract 2-bracteolate; female at the base of the raceme or on separate racemes; rachis with large glands beneath or at the sides of the bracts. Male fl. Calyx 2-3 divided. Petals and disk 0. Stamens 2-3, free or connate. Fem. fl. Calyx 3-fid or partite. Ovary 2-4-celled; cells 1-ovuled; styles 2-4, simple, connate at the base. Fruit a 3-celled capsule; cocci separating from the columella. Seeds globose; albumen fleshy; cotyledons broad, flat. The genera *Excæcaria* and *Sapium* should be united.

Leaves alternate. Sepals minute, unequal ... 1. *E. Agallocha*,  
Leaves opposite. Sepals orbicular, irregularly  
toothed ... .. 2. *E. robusta*.

1. *E. Agallocha*, Linn. Sp. Pl. 1451; Fl. Br. I. 5. 472; Brandis For. Fl. 442; Dalz. & Gibs. Bomb. Fl. 227; Bedd. Fl. Sylv. 255. The Blinding Tree. *Geva, surúnd, phungali*, M.; *Haro*, K.

Tidal forests on the sea coast of India and Ceylon. In tidal marshes, along the coast of the presidency, very common. Fl. July-Aug. Fr. Sept.-Oct. A small tree with a poisonous sap which hardens into a kind of black caoutchouc. Wood white or yellow, soft and spongy. Pores small, in short lines. Medullary rays fine, closely packed. Weighs 36 lbs. to the cub. ft. Useful for general carpentry. The fishing nets along the western coast are supported by floats made from the roots of this tree.

2. *E. robusta*, Hook, f. Fl. Br. I. 474. Konkan, Stocks.

### ORDER 81. URTICACEÆ.

Herbs, shrubs or trees, often with milky sap. Leaves simple, usually alternate. Stipules present, often deciduous. Flowers small, or minute, in heads or cymes, usually monœcious or diœcious. Perianth simple of 3-5 segments. Stamens as many as perianth-segments and opposite to them, anthers 2-celled. Ovary free, 1-celled, 1-ovuled; style often excentric, simple or 2-fid with stigmatose arms or stigma sessile, plumose or penicillate. Fruit various. Seeds with or without albumen, erect or pendulous, embryo various.

Flowers bisexual, polygamous or monoicous. Anthers erect in bud. Ovule pendulous. Trees with watery sap.

- |   |                  |
|---|------------------|
| Flowers bisexual. Fruit a samara .. ..  | 1. HOLOPTELEA.   |
| Flowers polygamous, or unisexual. Fruit a drupe.  |                  |
| Flowers polygamous. Male sepals imbricate.  |                  |
| Stipules free. Cotyledons broad .. ..   | 2. CELTIS.       |
| Flowers monoicous.  |                  |
| Male sepals induplicate-valvate. Stipules free.   |                  |
| Cotyledons narrow .. ..   | 3. TREMA.        |
| Male sepals imbricate. stipules connate, convolute. Embryo contorted .. ..  | 4. GIRONNIERA.   |
| Flowers monoicous or dioicous. Stamens inflexed in bud. Ovule pendulous. Trees with milky sap.  |                  |
| Flowers dioicous. Male flowers capitate. Females solitary. Stigmas 2, filiform .. ..  | 5. STREBLUS.     |
| Flowers dioicous. Male and female flowers in globose heads. Style undivided .. ..   | 6. PLECOSPERNUM. |
| Flowers mono or dioicous. Male and female flowers spikate. Styles free or connate at the base .. ..   | 7. MORUS.        |
| Flowers unisexual in dense spikes or heads, often with a fleshy axis or enclosed in a fleshy receptacle. Anthers erect in bud. Ovule pendulous. Trees or shrubs with milky juice. |                  |
| Flowers on the inner wall of a closed receptacle .  | 8. FIGUS.        |
| Flowers on the outside of a cylindrical fleshy receptacle .. ..   | 9. ARTOCARPUS.   |
| Male flowers on a disk-like receptacle; females solitary .. ..  | 10. ANTIARIS.    |

- Flowers in unisexual heads. Anthers erect in bud.  
 Style undivided. Ovule erect. Climbing shrubs.  
 Male and female heads cymose, or fem. solitary . 11. CONOCEPHALUS.  
 Flowers unisexual. Stamens inflexed in bud. Style  
 undivided or 0. Ovule erect, orthotropous. Trees  
 or shrubs with watery sap.  
 Shrubs with stinging hairs.  
 Flowers cymose, 2-5-merous. Fruit an oblique  
 flattened achene, nor included in the perianth . 12. LAPORTEA.  
 Trees or shrubs without stinging hairs.  
 Flowers in spiked racemed or paniced clusters.  
 Fruit a dry achene included in the crustaceous  
 perianth... .. 13. BOEHMERIA.  
 Flower clusters in small branched, hispid cymes.  
 Fruiting perianth fleshy including the free  
 achene ... .. 14. VILLEBRUNEA.  
 Flowers in sessile, paniced or spikate clusters.  
 Achene at first cohering with the fleshy perianth 15. DEBREGESIA.

### 1. HOLOPTELEA, Planch.

Trees. Leaves simple, alternate, unequal-sided; stipules caducous.  
 Flowers bisexual, in lateral fascicles. Perianth cleft to the base  
 4-8-lobed; lobes imbricate in bud. Stamens as many as perianth-  
 lobes. Ovary free, 1-2-celled; styles 2, papillose on the inner surface;  
 cells 1-ovuled. Fruit a samara, surrounded by a reticulate, obcordate  
 wing; pedicel articulate. Albumen 0; cotyledons complicated  
 longitudinally.

*H. integrifolia*, Planch. in. Ann. Soc. Nat. Ser. 3. X. 269; Fl. Br. I.  
 5. 481; Dalz. & Gibs. Bomb. Fl. 238. *Ulmus integrifolia*, Brandis For.  
 Fl. 431; Bedd. Fl. Sylv. t. 310. The Entire-leaved Elm. *Wawuli*,  
*papara*, M.; *Tapsi*, K.

Outer lower ranges of the Himalaya. From Behar to Travancore and  
 from Pegu to Ceylon. Throughout the presidency in deciduous forests.  
 Fl. Feb.-Mch. Fr. June-Aug.

Wood yellowish, close-grained, smooth, moderately hard. Annual  
 rings visible. Pores small, enclosed in short, concentric, wavy bands  
 or lines of white tissue. Medullary rays fine, white, equidistant, very  
 distinct. Weighs 52 lbs. to the cub. ft. Used for building purposes, carts  
 and carving.

### 2. CELTIS, Linn.

Trees or shrubs. Leaves alternate, stipulate, entire or serrate,  
 triple-nerved. Flowers polygamous, in axillary or lateral cymes.  
 Perianth 4-5-divided; segments deciduous, imbricate in bud. Stamens  
 4-5, short, surrounding a woolly torus. Ovary on a hairy disk;  
 stigmas 2, sessile, deciduous. Fruit a globose drupe with a hard  
 endocarp. Albumen 0 or scanty; embryo curved; cotyledons broad,  
 inflexed, surrounding the upcurved radicle.

*C. tetrandra*, Roxb. Fl. Ind. II. 63; Fl. Br. I. 5. 482. *C. Roxburghii*, Planch; Dalz. & Gibs. Bomb. Fl. 237. *C. serotina*, Bedd. Fl. Sylv. 218. *Brumaj*, M.; *Hitari*, *heenari*, *henbig*, *hartal*, K.

Outer Himalayas from Kumaon eastwards; western peninsula from the Konkan southwards. Throughout the Konkan and North Kánara, usually in evergreen forests on the gháts, locally abundant. Fl. June-Sept. Fr. Mch.-May.

A moderate sized tree. Bark smooth, light coloured,  $\frac{1}{4}$  in. thick, very hard, with black or brown irregular bands or layers of almost bony tissue alternating with white or yellowish, soft tissue. Wood yellowish-grey, smooth, shining, moderately hard; annual rings distinct. Pores small, often subdivided in white lines of tissue, these bands or lines are continuous in the spring wood and in the remainder of the ring they are wavy and often discontinuous. Medullary rays moderately broad or fine, short, white. Weighs 52 lbs. to the cub. ft. Used for planking and canoes in Assam; for building purposes in N. Kánara.

### 3. TREMA, Lour.

Trees. Leaves alternate, 3-7-nerved at the base; stipules caducous. Flowers monoicous, in small axillary cymes. Male fl. Sepals 4-5, subimbricate in bud. Stamens 5, longer than the sepals, erect in bud. Fem. fl. Sepals of the male. Ovary sessile; style arms 2, linear; ovule pendulous. Fruit a small drupe with a hard endocarp. Albumen fleshy, embryo curved or involute; cotyledons narrow, radicle imbecumbent.

*T. orientalis*, Blume Mus. Bot. II. 62; Fl. Br. I. 5. 484. *Sponia orientalis*, Brandis For. Fl. 430; Bedd. Fl. Sylv. 219. *S. Wightii*, Dalz. & Gibs. Bomb. Fl. 238. *Ranambada*, *kapashi*, *kargol*, M.; *Bendakarke*, *gol*, Vern. The Indian Nettle or Charcoal Tree.

Foot of the Nepal Himalaya, Bengal, Behar and southwards to Travancore and Singapore. Throughout the Konkan and North Kánara in moist forests, common. Fl. Mch.-Jany. Fr. Dec.-Jany. A small tree. Bark smooth, grey. Wood light, reddish-grey, soft, very fast-growing. Pores moderate sized, often subdivided. Medullary rays fine, numerous. Made into gunpowder charcoal. A useful shade tree in some of the Mysore coffee plantations.

### 4. GIRONNIERA, Gaud.

Evergreen trees or shrubs. Leaves alternate; stipules sheathing the buds, caducous. Flowers dioicous, in axillary cymes or the female solitary. Male fl. Sepals 5, broad, obtuse, imbricate. Stamens 5, erect. Pistillode woolly. Female fl. Sepals narrower than in the male, acute. Ovary sessile, style central, arms 2, filiform, ovule pendulous. Drupe ovoid, often keeled, endocarp hard. Albumen 0, scanty or copious, embryo contorted.

*G. reticulata*, Thw. Enum. 268. Fl. Br. I. 5. 486. Bedd. Fl. Sylv. t. 313. Sikkim, Assam, Burma. Western Peninsula on the gháts from N. Kánara to Travancore, in the evergreen forests near Sonda, Hoolikul, &c. Sircy and Siddapore sub-divisions of N. Kánara. Fl. C. S. Fr. H. S.

A very large tree 100 ft. high by 4 ft. in diameter, with buttresses at the base. Bark grey, smooth, splitting into thin plates peeling from the bottom upwards, inner bark reddish with white bast, intermixed, very thin, fibrous; fibres long and strong. Wood said to be valuable.

#### 5. STREBLUS, Lour.

Tree or shrub. Leaves alternate, scabrid; stipules small. Flowers dioicous, axillary, males in shortly pedunculate clusters, females peduncled, solitary. Male fl. Sepals 4, imbricate. Stamens 4, inflexed in bud. Pistillode dilated at the top. Female fl. bracteate. Ovary 1-celled; style arms long; ovule 1, pendulous. Fruit globose, enclosed in the perianth. Seed globose, testa membranous, albumen 0.

*S. asper*, Lour. Fl. Cochin II. 615; Fl. Br. I. 5. 489; Bedd. Fl. Sylv. 220; Brandis For. Fl. 410. *Epicarpurus orientalis*, Blume, Dalz. & Gibs. Bomb. Fl. 240. *Punje, mittel gidda, mitli*, K.; *Poi, kharota, parayu*, M.; *Karvati*, Vern.

Throughout the drier parts of India from Rohilkund eastward, and southwards to Travancore, Ceylon. Throughout the presidency in dry open forests, common; it is also found in the evergreen forests of the North Kánara. Fl. Jany.-Mch. Fr. Apl.-May.

A small rigid tree. Bark grey, soft, irregularly ribbed. Wood grey, moderately hard, tough and elastic. No annual rings. Pores small or moderate sized, subdivided in concentric irregular bands of light soft tissue. Medullary rays moderately broad, short, equally distributed. Weighs 48 lbs. to the cub. ft. Used for cart wheels, fuel, &c. The leaves are used to polish ivory, horns and wood; they are steeped in water before use.

#### 6. PLECOSPERMUM, Trecul.

Trees or shrubs. Leaves alternate, entire, stipules minute. Flowers dioicous, in globular heads. Male flowers bracteolate; perianth 4-fid, segments imbricate. Stamens 4, free, inflexed in bud. Female fl. Perianths fleshy, gamophyllous, 4-toothed, connate into a fleshy many-celled head. Ovary free, 1-celled; ovule 1, pendulous, style filiform, exserted. Fruit an irregular syncarpium of akenes, enclosed in the connate perianth lobes. Albumen 0; embryo subglobose, one cotyledon very large fleshy, embracing the smaller folded one; radicle upcurved.

*P. spinosum*, Trecul. in Ann. Sc. Nat. Ser. 3. VIII. 124; Fl. Br. I. 5. 491; Brandis For. Fl. 401; Bedd. Fl. Sylv. t. 220.

From the salt range along the foot of the Himalaya and southwards to Ceylon. In the dry districts of the presidency, common in hedges in the Dhárwár District. Also in N. Kánara at Bunwasi, Sirsi sub-division. Fl. Jany.-April. Fr. Apl.-June. A large thorny shrub. Bark thin, peeling off in thin flakes. Wood grey, heartwood small, orange-yellow, very hard.

#### 7. MORUS, Linn.

Trees or shrubs. Leaves alternate, simple; stipules small, lateral, deciduous. Flowers unisexual, spicate. Male fl. Sepals 4. Stamens 4, opposite to and longer than the calyx-segments; anther-cells introrse. Pistillode rudimentary. Female fl. Sepals 4, accrescent in fruit. Ovary 1-celled; style central, 2-partite or 2-fid; ovule 1, pendulous. Fruit a syncarpium of akenes included in the succulent perianths. Albumen fleshy; embryo incurved; cotyledons equal; radicle ascending, incumbent.

Female spikes short, ovoid. Fruit black when ripe ... 1. *M. indica*.  
 Female spikes long, cylindric. Fruit cylindrical,  
 yellowish-white ... .. 2. *M. lævigata*.

1. *M. indica*, Linn. Sp. Pl. 986; Fl. Br. I. 5. 492; Brandis For. Fl. 408. *Tut, ambat, M.*

Temperate and subtropical Himalaya from Kashmir to Sikkim, ascending to 7000 ft. wild and cultivated. Cultivated and run wild near villages in North Kánara and elsewhere throughout the presidency. Fl. Mch.-June. Fr. June-Aug. A small tree. Wood yellow with darker streaks, hard.

2. *M. lævigata*, Wall. Cat. 4649; Fl. Br. I. 5. 492; Brandis For. Fl. 409.

Wild and cultivated with Himalaya from the Indus to Assam up to 4000 ft. Bengal, Burma. Cultivated in gardens at Dhárwár and probably elsewhere in the presidency. Fl. C. S. Fr. H. S. A small tree.

#### 8. FICUS, Linn.

Trees or shrubs. Leaves alternate or rarely opposite, entire or lobed. Flowers unisexual on the inner surface of a globose or ovoid receptacle, the mouth of which is closed by imbricate bracts. Receptacles bracteate, unisexual, but usually androgynous with the males near the mouth. Flowers of 4 kinds; male, female, gall-flowers and neuters. Male fl. Perianth thin, 2-6-fid or partite. Stamens 1-2; anthers of 2, distinct cells. Female fl. Perianth of the male or 0. Ovary 1-celled; style excentric, stigmas various, ovule 1, pendulous. Akenes crustaceous or fleshy. Albumen scanty, embryo curved; cotyledons equal or unequal, radicle upcurved.

The gall flowers are very like the females, but do not perfect seed. The style is often dilated and the ovary contains the pupa of a Hymenopterous insect.



**Paleomorphe.** Male fl. monandrous, containing a pistillode in the same receptacle with the gall flower. Fem. fl. in separate receptacles, perianth gamophyllous, (except *F. gibbosa*).

**Small trees or sub-scandent shrubs.**

Leaves alternate, hispid. Receptacles small, yellow or purple,  $\frac{1}{4}$  in. peduncled, fascicled or in pairs; basal bracts 0 ... .. 1. *F. gibbosa*.

**Urostigma.** Flowers unisexual. Males, females, and gall-flowers in the same receptacles. Stamens 1, sometimes 2 in *F. callosa*. Stigma elongate, usually acute. Trees or powerful climbers, epiphytic in early life. Leaves alternate, coriaceous or sub-membranous; petiole jointed or not jointed to the blade. Receptacles axillary or from the scars of fallen leaves; base 3-bracteate. (Bracts at the base of the peduncle in *F. nervosa*.) This section contains most of the western peninsular species of *Ficus* and includes the species between *F. gibbosa*, and *F. callosa*.

(Series 1.) **Leaves coriaceous or sub-coriaceous, never jointed to the blade.**

Leaves alternate, smooth or tomentose; petiole not jointed to the blade. Receptacles axillary, sessile or peduncled, tribracteate at the base.

Leaves more or less tomentose. Receptacles sessile, usually in pairs.

Fruit pubescent, red.  $\frac{1}{2}$  in. in diameter ... 2. *F. bengalensis*.

Fruit pubescent, orange-yellow, 1 in. in diameter 3. *F. mysorensis*.

Fruit tomentose, grey,  $\frac{1}{3}$  in. in diameter ... 4. *F. tomentosa*.

Leaves glabrous. Receptacles sessile, in pairs.

Fruit blood-red,  $\frac{3}{8}$  in. in diameter ... 5. *F. Benjamina*.

Fruit small,  $\frac{1}{2}$  in. yellow or reddish ... 6. *F. retusa*.

Fruit small,  $\frac{1}{4}$  in. greenish-yellow, dotted ... 7. *F. Talboti*.

Leaves alternate, receptacles in peduncled axillary pairs. Bracts at the base 0, but 3, small, free bracts low down on the peduncle.

Fruit globose,  $\frac{3}{8}$  in. in diameter, yellow ... 8. *F. nervosa*.

(Series 2.) **Leaves sub-coriaceous or membranous. Petiole long, jointed to the blade. Receptacles sessile, in pairs; basal bracts 3, small.**

Receptacles when young white with dark spots, black when ripe ... .. 9. *F. Rumphii*.

Receptacles dark purple; basal bracts broad, coriaceous ... .. 10. *F. religiosa*.

Receptacles in pairs from tubercles, purple black with greenish dots. Basal-bracts brown, membranous ... .. 11. *F. Arnottiana*.

Receptacles in clusters, small, dotted and whitish yellow; basal-bracts 3, bifid ... .. 12. *F. Tjakela*.

Receptacles crowded at the ends of the branches, purple black; basal-bracts 3, minute, scarious... 13. *F. Tsiela*.

Receptacles in axillary pairs, globose,  $\frac{1}{4}$  in. white, flushed with red and dotted; basal-bracts minute. 14. *F. infectoria*.

(Series 3.) Leaves coriaceous. Stamens usually 2 (1 in *F. callosa*).

Receptacles peduncled, solitary, 1½ in. in diameter,  
green, scabrid ... .. 15. *F. callosa*.

**Sycidium.** Flowers unisexual; male and gall-flowers in one of the receptacles, female in another set. Males monandrous. Shrubs, small trees or climbers, rarely epiphytic. Leaves alternate, small, more or less scabrid. Receptacles small, chiefly axillary, rarely fascicled.

Leaves coarsely-toothed or repand, scabrid. Receptacles solitary, axillary, peduncled, small, scabrid, green. A shrub ... .. 16. *F. heterophylla*.

Leaves scabrous, hispid, toothed. Receptacles peduncled, globose, 1 in. in diameter, yellow or purple ... .. 17. *F. asperrima*.

**Covellia.** Flowers unisexual; male and gall-flowers in the same receptacle. Fem. fl. in separate receptacles. Male fl. monandrous. Sepals 3-4. Fem. perianth gamophyllous or 0, rarely of 4-5 sepals. Trees or shrubs never epiphytes or climbers. Leaves alternate or opposite. Receptacles on long branches from near the base of the stem or sub-hypogæal, or on the trunk or large branches, rarely axillary.

Leaves opposite. Receptacles peduncled, fascicled on the old wood or on leafy branches, hispid, yellowish, sometimes hypogæal ... .. 18. *F. hispida*.

**Neomorphe.** Flowers unisexual. Male and gall-flowers in one set of receptacles; Fem. fl. in a distinct set, smaller than the males. Male fl. diandrous; perianth inflated, 3-4-sepalous. Trees, never epiphytes. Receptacles often large, in clusters from tubercles on the stem and large branches.

Leaves alternate, membranous, glabrous. Receptacles large, red, on short axillary branches, scaly and leafless from the trunk ... .. 19. *F. glomerata*.

1. *F. gibbosa*, Blume Bijl. 466; Fl. Br. I. 5. 496. *F. parasitica*, Koen.; Bedd. Fl. Sylv. 224; Brandis For. Fl. 420. *Urostigma ampelos*, Dalz. & Gibs. Bomb. Fl. 315. *U. volubile*, Dalz. and Gibs. Bomb. Fl. 242. *F. tuberculata*, Bedd. Fl. Sylv. 224. *Datir*, Vern.; *Umbar*, Guz.

Throughout India from Kumaon to Burma and southwards to the Malay Peninsula, Andamans and Ceylon. Throughout the presidency, common on old walls or on the sides of wells, also epiphytic; throughout the moist and dry forests of the western ghâts. Fruit Apl.-May, yellow when ripe.

Wood dark or light brown, moderately hard. The wavy bands of both soft and harder tissues are of equal width. Medullary rays indistinct. Weighs 42 lbs. to the cub. ft.

2. *F. bengalensis*, Linn. Hort. Cliff. 471. n. 4; Fl. Br. I. 5. 499; Bedd. Fl. Sylv. 222; Brandis For. Fl. 412. *F. indica*, Roxb. *Urostigma bengalense*, Dalz. & Gibs. Bomb. Fl. 240. *Banyan Tree*. *Wad, alada, vadi*, Vern.; *Al, K*; *Wur, bur*, Sind.

Planted in the plains of India, wild only in the sub-Himalayan forests and the hills of the Deccan peninsula.

Throughout the presidency, wild or planted; self-sown throughout the deciduous and evergreen forests of the western gháts. Dr. King in his *Species of Ficus* says "Really wild only in the sub-Himalayan forests and on the lower slopes of the hill ranges of Southern India." Fruit ripe April-June.

A large evergreen tree with thick aërial roots and greyish white smooth bark. Wood grey, moderately hard. Pores few, large, simple or subdivided. Medullary rays fine, equi-distant, crossed by narrow, wavy lines of light coloured tissue. Weighs 42 lbs. to the cub. ft. The large dropping roots make excellent light poles for palanquins, munchedels, cart yokes, &c.

3. *F. mysorensis*, Heyne in Roth, Nov. Sp. 390; Fl. Br. I. 5. 500; Brandis For. Fl. 414; King. Sp. Ficus 19; Bedd. Fl. Sylv. 222. *F. pubescens*, Roth. *Urostigma dasycarpum*, Dalz. & Gibs. Bomb. Fl. 242. *Bhurvar*, M.; *Chungal*, *goli*, K.

Forests of the base of the Himalaya from Sikkim eastwards. Burma, Deccan peninsula and Ceylon.

Throughout the Konkan and North Kánara in moist forests along the gháts, also near villages and in open situations, self-sown or planted. Fr. ripe Apl.-May. Fruit large, when young flocculent tomentose, when ripe glabrous, bright yellow, sometimes tinged with red. Often leafless when in ripe fruit. A large tree, stem usually short. Bark 5 in. thick, grey, rough with short horizontal lines of raised lenticels. Green cell layer close to surface. Inner bark very hard, yellowish, woody, with milky juice. Wood light, grey, soft. Pores moderate-sized, subdivided, few, mostly in the narrow, wavy bands of white tissue. Medullary rays medium or fine, somewhat sinuous. Weighs about 40 lbs. to the cub. ft.

4. *F. tomentosa*, Roxb. Fl. Ind. III. 550; Fl. Br. I. 5. 501; Brandis For. Fl. 414; Bedd. Fl. Sylv. 223. Donkey's Banyan. *Kulgolú*, *kull atti*, *kallu goli*, K.

Drier parts of the Gangetic plain, Behar, Central India, Deccan peninsula and Ceylon.

Throughout the presidency, common near the sea-coast of the Konkan and North Kánara, on sandstone rocks near Bádámi, Bijápúr Collectorate. Fr. ripe Mch.-Apl. A large shady tree with aërial roots from the branches. Bark white, scaly. Wood light, grey, soft. Pores large, few, subdivided. Bands of soft white tissue alternating with and broader than those of the darker coloured. Medullary rays moderately broad, white, distinct. Weighs 26 lbs. to the cub. ft. Leaves and branches lopped for fodder near Bádámi, Bijápúr District.

5. *F. Benjamina*, Linn. Mantiss. 129 (Excl. Syn. Rheede); Fl. Br. I. 5. 508; Bedd. Fl. Sylv. 223. *F. comosa*, Roxb.; Bedd. Fl. Sylv. 223; Wgt. Icones t. 658. *Urostigma Benjamina*, Miq.; Dalz. & Gibs. Bomb. Fl. 242; var. *comosa*. Kz. For. Fl. II. 446. *Pimpri*, Vern.

Wild in the base of the Eastern Himalayas, Assam, Chittagong, Burma, Western Peninsula and the Andamans. Probably may be found in the Southern Marátha Country, Dhárwár district, in deciduous forests. Sir G. King has never seen wild specimens of this species from the Western Peninsula. Fr. ripe H. S.

6. *F. retusa*, Linn. Mant. 129; Fl. Br. I. 5. 511; Brandis For. Fl. 417; Bedd. Fl. Sylv. 223; *Urostigma retusum* and *nitidum*, Dalz. & Gibs. Bomb. Fl. 241, 242. *Nandruk, pilala*, Vern.; *Pili mara, pilal*, K.; *Pinwal*, Hind.

Eastern Himalaya from Kumaon to Bengal, Assam, South India, the Deccan peninsula, Burma and the Andamans.

Throughout the presidency, commonly planted along road-sides. A moderate-sized tree affording dense shade. Bark rather smooth, dark-coloured. Wood light, reddish-grey, close-grained, moderately hard or soft, mottled. Pores small or moderate sized, few. Medullary rays moderately broad. Narrow bands of soft, reddish tissue. Weighs 35 lbs. to the cub. ft. Used for fuel only. Leaves broad, obovate, often very obtuse, shining above, paler beneath, petiole short  $\frac{1}{3}$ - $\frac{1}{2}$  in. Aërial roots often very numerous, like whipcord. Sometimes, but rarely, in the Southern Marátha Country the trees are without aërial roots.

7. *F. Talboti*, King. Sp. Fic. 51. t. 63; Fl. Br. I. 5. 512. *Attimara*, K.

Evergreen forests of Belgaum, on the southern gháts of North Kánara, common in moist forests. Fr. ripe cold season. A large grey, smooth-barked epiphytic tree with few or no aërial roots. Juice from young branchlets yellowish. Bark grey, smooth, the green-cell layer developed like in *F. Tsiela*; milky juice abundant.

8. *F. nervosa*, Roth. Nov. Sp. 338; Fl. Br. I. 5. 512; Bedd. Fl. Sylv. 223.

Sikkim and Bhotan Himalaya, Assam, Burma, the Malay and Deccan peninsulas and Ceylon. In the evergreen forests of North Kánara from Supa southwards. A very large tree with a cylindrical trunk without aërial roots. Fruit hard; walls thick, yellow when ripe in Feb. Bark smooth, dark-coloured. Juice white, pearly.

9. *F. Rumphii*, Blume Bijd. 437; Fl. Br. I. 5. 512. *F. cordifolia*, Roxb., Brandis For. Fl. 416. *Pair*, Vern.; *Payar, asht*, M.

Outer Himalaya, mountains of the Panjáb, Northern, Western and Central India, Assam, Burma and the Malay Peninsula. Western gháts near Bombay, Brandis. At Khandála and probably throughout the Konkan gháts. Fruit ripe May-June. I have not observed this tree in North Kanara. A moderate sized tree, closely resembling *F. religiosa*. Bark yellowish-grey, wrinkled, exfoliating in hard scales. Wood white, soft spongy. Used in Cachar to make charcoal.

10. *F. religiosa*, Linn. Hort. Cliff. 471; Fl. Br. I. 5. 513; Bedd. Fl. Sylv. t. 314; Brandis For. Fl. 415. *Urostigma religiosum*, Dalz. & Gibs.

Bomb. Fl. 241. The Peepul Tree. *Arle, basri, pipal*, Vern.; *Jari, pipro*, Panch Maháls. *Ashvatha*, M.

Wild in the sub-Himalayan forests, Bengal and Central India. Planted near temples and villages throughout the presidency. Fr. ripe May-July. A large tree. Bark grey. Wood light brown with yellowish patches, moderately hard. Pores moderate-sized, rather numerous, subdivided. Medullary rays reddish, moderately broad, wavy. Bands of light soft tissue, alternating with those of a harder substance of equal width. Weighs about 45 lbs. to the cub. ft. Used for fuel and for packing cases. A tree held very sacred by the Hindus. The leaves, bark and fruit are used in native medicine.

11. *F. Arnottiana*, Miq. Ann. Mus. III. 287; Fl. Br. I. 5. 513. *Urostigma cordifolium*, Dalz. & Gibs. Bomb. 242. *Paer*, Vern.

The Deccan peninsula and Ceylon, in rocky places. Throughout the Konkan and North Kánara, common on rocks near the coast, also in moist forests. Kumta, near the Yena Rocks. Fr. ripe Feb.-Apl. A small tree.

12. *F. Tjakela*, Burm. Fl. Ind. 227; Fl. Br. I. 5. 514. Rheede Hort. Mal. III. t. 64. *Kel*, M.

The Deccan Peninsula and Ceylon. Throughout the Konkan and North Kánara, common in moist forests, abundant in the forests near Yellápur and generally on the gháts of North Kánara. Fr. ripe Mch.-May. A large tree without aërial roots. Bark dark-coloured, with a very hard rhytidome breaking off in irregular plates; inner bark red. 75 in. thick, with much milky juice which soon coagulates. There are smooth, shining patches of the bark with groups of lenticels. Stipules large, membranous, red. Young leaves appear in Feb. Receptacles small, pealike, clustered. A very distinct species.

13. *F. Tsiela*, Roxb. Fl. Ind. III. 549; Fl. Br. I. 5. 515; Bedd. Fl. Sylv. 314; Brandis For. Fl. 415. *Urostigma pseudo-Tjiela*, Miq.; Dalz. & Gibs. Bomb. Fl. 241. Rheede Hort. Mal. III. t. 63. *Pipri*. Vern.; *Bili-basri*, K.

Western Peninsula from the Konkan southwards. Throughout the presidency; often planted along roadsides. Fruit purple black when ripe, Apl.-Oct. A large, quite glabrous, smooth greenish-white barked tree without aërial roots. Wood grey, moderately hard, somewhat shining. Pores few, moderate-sized; subdivided. Medullary rays fine, equidistant, white, wavy. Bands of white tissue, narrower than the dark-coloured. Weighs about 45 lbs. to the cubic ft.

14. *F. infectoria*, Roxb. Fl. Ind. III. 550; Fl. Br. I. 5. 515; Brandis For. Fl. 414; Bedd. Fl. Sylv. 222. *Urostigma infectoria*, Dalz. & Gibs. Bomb. Fl. 241. *Ficus Lambertiana*, Miq. *Urostigma Lambertianum*, Dalz. & Gibs. Bomb. Fl. 241. *Ficus Wightiana*, Bedd. Fl. Sylv. 222. *Bassari dhedumbara, pakari, lendva*, M.; *Karibasri, pipli, kaum*, Vern.; *Pepri*, Guz.

Suliman and Salt ranges, the outer Himalaya, plains and hills of India, Bengal, Assam and Burma; Western Coast forests. Common throughout the presidency, usually in dry forests. Var. *Lambertiana*, is common in

North Kánara in moist forests near Yellápur and elsewhere. Var. *Wightiana*, is found in the southern parts of North Kánara; it is not so common as the former variety. Var. *infectoria proper*, is often planted along roadsides and is very common throughout the presidency. A small or moderate-sized deciduous tree. The white dotted receptacles are sometimes more or less peduncled. Bark grey, smooth, scaly, inner tough, fibrous, milky. Wood reddish-grey, moderately hard. Pores few, large, subdivided. Medullary rays moderately broad. Narrow concentric bands of soft tissue. Weighs about 35 lbs. to the cub. ft., not durable. Used in Assam to make charcoal. Bark yields a fibre.

15. *F. callosa*, Willd. in Act. Acad. Berol. 1798, 102. t. 4; Fl. Br. I. 5. 516. *F. cinerascens*, Thw.; Bedd. Fl. Sylv. 224.

Deccan peninsula and from Kánara southwards, Burma, the Andaman, and Ceylon. In the evergreen forests of the Konkan and North Kánara. A very large smooth-barked tree with pearly juice and without aerial roots. Wood reddish-yellow, moderately hard, mottled. Pores moderate-sized. few, sub-divided. Med. rays moderately broad, red, uniform. Concentric bands red, rather narrow and close together. Weighs 42 lbs. to the cub. ft. Receptacles large, peduncled, solitary green. Fr. ripe June-July.

16. *F. heterophylla*, Linn. fl. Suppl. 442; Fl. Br. I. 5. 518; Dalz. & Gibs. Bomb. Fl. 243; Brandis For. Fl. 424. *F. repens*, Willd. Wight Icones, t. 636. *F. scabrella*, Roxb. Wight Icones, t. 661. *Datir*, M.

Throughout the hotter parts of India near water, from the Gangetic plain eastwards to pass Burma and southwards to Ceylon. Throughout the presidency, common in North Kánara, along the banks of streams and rivers. Fr. ripe May-June. A creeping shrub. The juice of the leaves and roots are employed in native medicine.

17. *F. asperrima*, Roxb. Fl. Ind. III. 554; Fl. Br. I. 5. 522; Dalz. & Gibs. Bomb. Fl. 243; Bedd. Fl. Sylv. 224; Wight Icones. t. 633. *Khargas*, *gargata*, K.; *Kharwat*, M. *Kal-ambar*, Guz.

Central India, Deccan peninsula and Ceylon. Throughout the moist forests of North Kánara and the Konkan, very common. Fr. ripe Mch.-Apl. A small tree with smooth white bark, no aerial roots. Wood yellowish-grey, moderately hard, warps and splits. Pores few, moderate-sized, in broad bands of white soft tissue. Medullary rays moderately broad, distinct. Weighs about 33 lbs. to the cub. ft. The rough leaves are used as sand paper for polishing wood.

18. *F. hispida*, Linn. f. Suppl. 442; Fl. Br. I. 5. 552; Brandis For. Fl. 423; Bedd. Fl. Sylv. 224. *Covellia oppositifolia*, Gasp.; Dalz. & Gibs. Bomb. Fl. 243. *C. dæmonum*, Dalz. and Gibs. Bom. Fl. 244. *Kurwut*, Vern.; *Dher-umber*, *kala-umber*, *kharoti*, *bokria*, *bhokada*, M.; *Dhedu mera*, Panch Maháls.

Throughout India from the Punjáb in the North-West to Malacca and Ceylon. Throughout the Konkan and North Kánara, often along the banks of rivers and in moist situations, common in the moist forests near Kárwár and along the coast. Ripe fruit H. & R. S. A

large shrub or small tree. Bark thin, grey, rough, inner milky. The opposite leaves distinguish this from the other species of *Ficus* growing in the Bombay presidency. Wood soft, grey, no heartwood. Pores scanty, moderate-sized, subdivided. Medullary rays moderately broad and fine. Concentric, regular bands of soft tissue. Weighs 35 lbs. to the cub. ft. Receptacles hispid, sometimes hypogeal, ridged at the top.

19. *F. glomerata*, Roxb. Fl. Ind. III. 558; Fl. Br. I. 5. 535; Brandis For. Fl. 422; Bedd. Fl. Sylv. 224. *Covellia glomerata*, Dalz. & Gibs. Bomb. Fl. 243. *Umbur*, M.; *Rumadi, atti*, K.; *Gooler*, Hind.

Salt range and Rajputana to the Khasia Mountains, Burma, Deccan peninsula and Ceylon. Common throughout the presidency, near villages along roadsides and near streams and rivers. Fr. ripe throughout the year at different times. A middle-sized or large tree. Bark brownish-grey, rather smooth, scaly. Wood dull reddish grey, soft, mottled on a longitudinal section, lasts well under water, but otherwise exposed quickly decays. Pores large or moderate-sized, few, enclosed in broad bands of soft reddish tissue. Medullary rays moderately broad. Weighs about 20 lbs. to the cub. ft. Fruit is eaten raw and cooked by the poor. One of the best shade trees in the Mysore coffee plantations.

#### 9. ARTOCARPUS, Forst.

Evergreen trees with milky juice. Leaves alternate, often very large, coriaceous, entire or divided. Flowers monoicous, minute, on the outside of globose or oblong receptacles, often mixed with peltate bracts; the males and females on separate heads. Male fl. Perianth of 2-4-segments, imbricate in bud. Stamen 1, erect. Female fl. Perianth tubular, entire, connate and confluent below with the receptacle, mouth minute. Style simple, usually exserted. Ovary 1-celled, ovule 1, pendulous. Fruit a syncarpium consisting of the enlarged fleshy carpels and perianths, (anthocarps) each enclosing a nut or achene deeply sunk in the fleshy mass. Albumen 0, embryo straight or incurved, cotyledons fleshy, equal or unequal; radicle short, superior.

Fruit tubercled, 1-2-feet long, oblong or cylindric ... .. 1. *A. integrifolia*.

Fruit spinous, size of a lemon, spines hispid, curved, perforate 2. *A. hirsuta*.

Fruit smooth, globose, 2-3-inches in diameter ... .. 3. *A. Lakoocha*.

*A. incisa*, L.; Fl. Br. I. 5. 589. *Vilayti phunnas*, M.; Breadfruit Tree. Cultivated near the coast of the Konkan and North Kánara.

1. *A. integrifolia*. Linn. f. Suppl. 412; Fl. Br. I. 5. 541; Brandis For. Fl. 425; Dalz. & Gibs. Bomb. Fl. 244; Bedd. Fl. Sylv. 219. Gamble Ind. Timb. 329; Rheede Hort. Mal. III. t. 26-28. *Halsina*, K.; *Phunnas*, M.; Jackfruit Tree.

Western ghâts from the Konkan southwards. Cultivated near villages throughout the Konkan and North Kánara, often planted along roadsides, F. C. S. Fr. ripe R. S. (June-Aug.) A large tree. Bark thin scaly, inner bright yellow, corky. Wood bright yellow, darkening on exposure, compact, even-grained, moderately hard, seasons well. Pores of different sizes sometimes filled with a white resin, in irregular

patches of soft tissue. Med. rays fine to moderately broad. Weighs about 40 lbs. to the cub. ft. Used for carpentry, furniture and cabinet work. An ornamental wood, takes a fine polish. The seeds of the large fruit are cooked and eaten and the yellow pulp surrounding the seeds is much liked by natives.

2. *A. hirsuta*, Lamk. *Encycl.* III. 201; *Fl. Br. I.* 5. 541; Brandis *For. Fl.* 26; *Bedd. Fl. Sylv.* t. 308; *Dalz. & Gibs. Bomb. Fl.* 244. *Heb-balsina*, K.; *Ran* or *patphunnas*, M. The Anjeli Wood.

Western peninsula on the gháts from the Konkan southwards, ascending to 4-000 ft. In the evergreen forests of the Konkan and North Kánara, *Fl. Jan.-Feb.* Fr. ripe May. A large evergreen tree. Bark dark-coloured, scaly. Wood hard, light, yellowish-brown, seasons well. Pores large, enclosed in narrow rings of soft tissue. Medullary rays mostly moderately broad, prominent, distinct. Weighs about 36 lbs. to the cub. ft. Used for house and ship building, furniture, &c. A valuable timber. Fruit yellow, ovoid, 3.5 by 2 in.; peduncles 1.25 in.

3. *A. Lakoocha*, Roxb. *Fl. Ind.* III. 524; *Fl. Br. I.* 5. 543; Brandis *For. Fl.* 426; *Dalz. & Gibs. Bomb. Fl.* 244; *Bedd. Fl. Sylv.* 219. *Wotomba*, *badhar*, M.; *Wonte*, K.; *Lowi*, Vern.

Tropical Himalaya from Kumaon eastwards to Burma and southwards to Travancore. Evergreen forests of the Konkan and North Kánara, common in the forests near Yellápur. *Fl. Mch.-Apl.* Fr. July-Aug. A large, deciduous tree. Bark grey, rough without furrows. Sapwood white, soft, large; heartwood yellow, hard, shining mottled. Pores large, oval, often filled with a white substance and enclosed in soft tissue, separate and uniformly distributed. Medullary rays moderately broad, distinct, prominent. Weighs 56 lbs. to the cub. ft. Used for canoes and furniture. Fruit edible.

#### 10. ANTIARIS, Lesh.

Evergreen trees. Leaves alternate, bifarious, stipulate. Flowers monoicous, axillary. Male flowers on the surface of a fleshy disk, surrounded by imbricate bracts. Sepals 4, spatulate, imbricate. Stamens 3-8; filaments short or 0; anthers 2-celled, extrorse. Female involucre 1-flowered, urceolate, many-cleft at the apex. Perianth 0. Ovary 1-celled; ovule 1, pendulous from the apex of the cell; style terminal, bifid. Fruit fleshy. Albumen 0; testa hard; embryo subglobose, cotyledons equal fleshy, radicle small, superior.

*A. toxicaria*, Leschen in *Ann. Mus. Paris* XVI. 478. t. 22; *Fl. Br. I.* 5. 537. *A. innoxia*, Brandis *For. Fl.* 427. *A. saccidora*, *Dalz. & Gibs. Bomb. Fl.* 244; *Bedd. Fl. Sylv.* t. 307. *Lepurandra saccidora*, Nimmo. *Grah. Cat. Bomb. Pl.* 193. The Upas Tree. The Travancore Sacking Tree. *Ajjanpatte*, K.; *Karvat, chandkura*, M.; *Jassoond, chandul*, Vern.

Western Deccan peninsula on the gháts from the Konkan southwards. In the evergreen forests of the Konkan and North Kánara, common near



Yellápur. Fl. Sept.-Oct. Fr. C. S. An immense evergreen tree. Bark dark-coloured, hard, smooth. Wood grey, soft, light. Annual rings visible. Pores moderate-sized, often in groups and joined by light coloured tissue. Medullary rays moderately broad, uniform, prominent. Weighs 28 lbs. to the cub. ft. Inner bark yields a good fibre for cordage, also made into sacks. Stem yields a white poisonous resin. Fruit globose, 75 in. diam., shortly peduncled, purple, tomentose, fleshy with a large globose pendulous seed; testa crustaceous; cotyledons thick, hemispheric, white, hard; embryo minute.

#### 11. CONOCEPHALUS, Blume.

Climbing shrubs, often very large. Leaves alternate, simple, penninerved sometimes 3-nerved; stipules connate. Flowers diœcious in axillary, cymose heads. Male fl. Perianth tubular, 4-lobed, valvate. Stamens 2-4, erect. Pistillode small. Female fl. Perianth oblong or clavate, 4-lobed. Ovary included; style undivided; ovule erect. Achene included. Seed erect, testa membranous, albumen scanty or not; embryo straight, cotyledons fleshy or thin, equal, radicle short.

*C. concolor*, Dalz. & Gibs. Bomb. Fl. 239; Fl. Br. I. 5. 546.

Konkan at the Phoonda ghát. Dalz. This may not be a *Conocephalus*. It is given as a doubtful species in the Fl. Br. I. Dalzell does not say it is a climber. I have not yet met with this plant.

#### 12. LAPORTEA, Gaud.

Shrubs or trees with stinging hairs. Leaves alternate, entire or toothed; 3 or penninerved stipules opposite, free or connate. Flowers monœcious or diœcious, in axillary panicles, flowers and fruit often reflexed. Male fl. Sepals 4-5. Stamens 4-5, inflexed in bud. Pistillode clavate. Female fl. Sepals 4 or 0. Ovary oblique; style linear ovule erect. Achene flattened. Albumen 0; cotyledons broad.

Tropical Himalaya from Sikkim eastwards to Assam and southwards to Perak. The Konkan.

*L. crenulata*, Gaud. in Freyc. Voy. Bot. 498; Fl. Br. I. 5. 550; Brandis For. Fl. 404; Bedd. Fl. Sylv. t. 306. Konkan, Stocks. Does not seem to have been met with in this presidency by any other collector since Dr. Stock's time.

#### 13. BOEHMERIA, Jacq.

Shrubs or small trees. Leaves opposite and alternate, toothed, 3-nerved, stipules usually free. Flowers dioicous or monoicous in axillary, sessile or paniced clusters, usually unisexual. Male fl. Perianth 4-lobed, segments valvate. Stamens 4. Pistillode clavate. Female fl. Perianth tubular, compressed or ventricose, with a narrow, 2-4-toothed mouth. Ovary 1-celled; ovule 1, erect. Akene dry. Seeds albuminous, cotyledons ovate.

Leaves rugose. Flowers in axillary clusters ... 1. *B. malabarica*.  
 Leaves long petioled. Flower-clusters in axillary  
 panicles ... .. 2. *B. platyphylla*.

1. *B. malabarica*. Wedd. Monogr. 355; Fl. Br. I. 5. 575. *B. travancorica*, Bedd. Fl. Sylv. 225. (*B. ramiflora*, t. 27. f. 2.)

Sikkim Himalaya ascending to 5000 ft., Chittagong, Tenaserim, Western Peninsula from the Konkan southwards. Throughout the Konkan and North Kánara in evergreen forests, common on the Siddápur gháts. Fl. Nov.-Feb. Fr. H. S. A large shrub or small tree. Yields a very strong fibre.

2. *B. platyphylla*, Don. Prodr. 60; Fl. Br. I. 5. 578; Brandis For. Fl. 403. *Splitgerbera scabrella*, Dalz. & Gibs. Bomb. Fl. 239. *Urtica scabrella*, Roxb. Fl. Ind. III. 581; Wight Icones, t. 691.

Throughout tropical India, Ceylon ascending to 6000 ft. altitude. Throughout the presidency, common in the moist forests near the sea-coast of the Konkan and North Kánara. Fl. Apl.-Sept. Fr. R. S. A shrub or small tree. Bark thin, greyish-brown. Wood moderately hard reddish-brown.

#### 14. VILLEBRUNEA, Gaud.

Trees. Leaves alternate, 3-5-nerved. Flowers monoicous or dioicous in spicate or paniced clusters. Male fl. Perianth 4-fid, valvate. Stamens 4. Pistillode woolly. Female fl. Perianth tubular, ventricose, adnate to the ovary, mouth toothed. Ovary 1-celled; ovule erect, stigma linear. Fruit a free akene. Albumen scanty.

*V. integrifolia*, Gaud. Bot. Bonite Voy. t. 91; Fl. Br. I. 5. 589. *Oreocnide acuminata*, Kz. For. Fl. II. 427. *O. sylvatica*, Bedd. Fl. Sylv. 225. t. 26. f. 4. Koorg, South Kánara gháts and Ceylon. Higher gháts of the Konkan, in moist forests. Stocks. This species has not been met with in the Bombay presidency as far as I know.

#### 15. DEBREGIASIA, Gaud.

Shrubs or trees. Leaves alternate, serrate, triple-nerved, often white tomentose beneath. Flowers monoicous or dioicous, males clustered, the females in small heads. Male fl. Perianth 3-4-partite, segments valvate in bud. Stamens 4. Pistillode glabrous or woolly. Female fl. Perianth tubular, dilated below, mouth 4-toothed, adnate to the 1-celled ovary, ovule erect; stigma tufted. Fruit a collection of small akenes on a fleshy torus, often yellow. Perianth accrescent. Albumen copious, cotyledons short, broad.

*D. velutina*, Gaud. Bot. Bonite Voy. t. 90; Fl. Br. I. 5. 590; *D. longifolia*, Wedd. in DC. Prodr. XVI. I. 235-24; Brandis For. Fl. 405; *Morocarpus longifolius* Bedd. Fl. Sylv. 226. t. 26. f. 5. *Conocephalus niveus*, Wight. Dalz. & Gibs. Bomb. Fl. 239. *Capsi, kurgul*, Vern. Sub-tropical Himalaya from Kumaon to Sikkim, alt. 3-6000 ft. Assam and the Khasia Hills. The Deccan peninsula from the Konkan to Ceylon,

ascending to 7000 ft. in the Nilghiris. Konkan and North Kánara, common in evergreen forests. Fl. Nov.-Dec. Fr. Dec.-Feb. A small tree. Easily recognised by the lanceolate leaves rugose above and ashy-white tomentose beneath and the small, yellow, raspberry-like fruit.

ORDER 82. **CASUARINEÆ.**

Leafless trees or shrubs, branchlets cylindric, grooved and jointed, internodes with a ring of small scales (leaves). Flowers unisexual, males in terminal spikes; female in ovoid heads, bracteate and 2-bracteolate. Male fl. Sepals 1-2, circumeiss at the base. Stamen 1, inflexed in bud. Female fl. Ovary minute, 1-celled; style 2-fid, arms filiform, stigmatose to the base, ovules 2, collateral. Fruit a small cone, formed of the hardened bracts and bracteoles, enclosing the winged akenes.

**CASUARINA**, Forst.

Characters of the order.

*C. equisetifolia*, Forst. Char. Gen. 103. f. 53; Fl. Br. I. 5. 598; Brandis For. Fl. 453; Bedd. Fl. Sylv. t. 226. Beefwood of Australia. *Sura* M.

East side of the Bay of Bengal from Chittagong southwards, cultivated elsewhere. Cultivated throughout the presidency. There are large plantations of this tree in North Kánara near the sea-coast. Fl. Sept.-Oct. Fruit ripe June. Flowers dioicous. A large, evergreen tree. Bark scaly, dark coloured. Wood brown, very hard, cracks and splits. Pores moderate-sized in radial and oblique lines. Medullary rays very fine, uniform. Numerous wavy concentric lines of soft tissue, containing small pores. Used nearly exclusively for fuel.

ORDER 83. **SALICINEÆ.**

Trees or shrubs. Leaves alternate, stipulate. Flowers dioicous, in lateral catkins, similar in both sexes, scales spirally arranged, each bearing 1 flower in its axil. Perianth 0. Disk cup-shaped or irregularly formed. Stamens 2 or more, filaments free or connate. Ovary 1-celled, style short or 0, ovules few or many on 2-4 placentas, erect, anatropous. Capsule 2-4-valved. Seeds few or many, each with a pencil of long silky hairs, growing from the funicle, albumen 0; cotyledons plano-convex, radicle short, inferior.

Leaves short-petiolate. Disk of 1-2, separate glands. Capsule 2-valved. 1. *Salix*.

Leaves long-petiolate. Disk cupular or annular. Capsule 2-4-valved ... 2. *Populus*.

1. **SALIX**, L.

Characters as above. Leaves short petioled. Stamens generally 2, long exserted. Disk of 1-2, separate glands. Capsule 2-valved, the valves usually rolling back, placentas near the base of the valves.

Capsule glabrous	...	...	...	...	...	1. <i>S. tetrasperma</i> .
Capsule densely woolly	...	...	...	...	...	2. <i>S. ichtnostachya</i> .

1. *S. tetrasperma*, Roxb. Fl. Ind. III. 573 ; Fl. Br. I. 5. 626 ; Brandis For. Fl. 462 ; Bedd. Fl. Sylv. t. 302 ; Dalz. & Gibs. Bomb. Fl. 220. *Bocha, bitasa*, M. ; *Wallunj*, Vern.

Throughout tropical and sub-tropical India, ascending in the Himalayas to 7000 feet altitude, absent from Ceylon. Commonly planted along roadsides and near fields in the Belgaum district : only male trees. Heartwood red, soft, porous. Annual rings indistinct. Pores small, numerous, sometimes subdivided. Medullary rays fine, numerous, not distinct. A moderate-sized tree.

2. *S. ichnostachya*, Lindl. in Wall. Cat. 3704 ; Fl. Br. I. 5. 628 ; Wight Icones t. 1953.

The Deccan, Pondicherry, Mysore. N. Kánara and the Konkan along river banks. Fl. Fr. Oct.-Nov. This is a very common species and has the densely woolly capsules described in the Fl. Br. I. It is reduced by Brandis and others to *S. tetrasperma*, but Sir J. D. Hooker keeps it separate in the Fl. Br. I.

*S. babylonica*, Linn. ; Fl. Br. I. 5. 629 ; Brandis For. Fl. 465. Weeping Willow. Cultivated in gardens at Poona, Bombay and elsewhere throughout the presidency. Wood white.

## 2. POPULUS, Linn.

Trees with broad leaves ; petioles usually exceeding  $\frac{1}{4}$  of the length of the blade. Scales of catkins caducous, obovate, crenate, lobed or cut. Disk flat, cup-shaped, often oblique, membranous or thick and slightly fleshy. Stamens 4-30, inserted on the disk ; filaments usually twice as long as the anthers. Stigmas 2-4, often lobed. Capsule 2-3-4-valved, each spreading valve with a median placenta.

*P. euphratica*, Oliv. Voy. III. 449, t. 45. 46 ; Fl. Br. I. 5. 638 ; Brandis For. Fl. 474 ; Gamble Man. Ind. Timbers, 378. *Safeda bhan*, Sind.

Common in Sind along the Indus, Punjáb and Western Thibet, where it ascends to 13,500 ft. alt.

A moderate-sized tree. Bark with irregular, vertical furrows ; inner bark fibrous. Wood ; sapwood white, heartwood red, often very dark in the centre, moderately hard, compact, even-grained, tough but not durable. Weighs about 35 lbs. to the cubic feet. Used for firewood, building purposes, turning, &c, and for boat building on the Euphrates.

## ORDER 84. GNETACEÆ.

Climbing shrubs with jointed stems. Leaves opposite, broad or scale-like. Flowers monœcious or diœcious, in axillary or terminal bracteate spikes or cones. Male flowers. Sepals 2-4 or tubular. Anthers 2-8, sub-globose 1-3 celled, sessile or on a column of the connate filaments. Female flower. An erect ovule terminating above in a long tubular prolongation of its coat, resembling a style,

and enclosed in an undivided perianth. Seed dry or drupaceous; albumen copious or scanty, embryo straight; cotyledons adpressed, radicle long, superior.

Nearly leafless shrubs	...	...	...	...	...	1. <i>Ephedra</i> .
Shrubs with broad green leaves..	...	...	...	...	...	2. <i>Gnetum</i> .

### 1. EPHEDRA, Linn.

Shrubs or undershrubs with nodose stems, branches articulate. Leaves reduced to a membranous sheath with 2 opposite lobes. Flowers dicecious in sessile or pedunculate spikes, opposite, in pairs or whorled, bracteate. Male flower; perianth of 2 membranous, opposite sepals. Anthers 2-10, sessile or stipitate. Female fl., a naked ovule with the outer coat produced into a styliform tube. Seeds usually oblong, plano-convex; testa dry. Wood of *Ephedra* is similar in structure in some respects to the wood of the *Coniferae*, and contains the fibres with bordered pits characteristic of that order.

*E. peduncularis*, Boiss Fl. Orient. V. 717; Fl. Br. I. 5. 641. *E. Alte*, Brandis For. Fl. 501.

Plains of Sind, Punjáb and Rajputana. Fl. Mch.-Apl. Fr. ripe May. A tall, scandent shrub with slender branches often gregarious, forming dense clumps of brushwood in very dry and arid situations.

### 2. GNETUM, Linn.

Climbing shrubs with jointed branches. Leaves elliptic, petiolate penninerved. Flowers monœcious, in the axils of cup-shaped bracts and mixed with articulate hairs. Male fl. monandrous, protruding from a thick clavate sheath, slits terminal. Female fl. Ovule ovoid, inner integument with a toothed or fimbriate mouth. Fruit an oblong drupe.

*G. scandens*, Roxb. Fl. Ind. III. 518; Fl. Br. I. 5. 642; Brandis For. Fl. 502; Dalz. & Gibs. Bomb. Fl. 246. *Kumbal, umbli*, Vern.; *Kodkan bali*, K.

Tropical Himalaya from Sikkim eastwards to Assam, Singapore and the Andamans. Throughout the moist forests of the Konkan and North Kánara, very common in the evergreen forests of the Supa gháts. Fl. Jan.-Apl. Fr. ripe R. S. The fruit is said to be eaten, also the roasted seeds. Stems 8 inches in diameter at the base. Bark thick, scaly with interrupted rings of brownish yellow, fibrous tissue. Wood of abnormal structure, consisting of many narrow soft yellowish lignous masses containing numerous, very large to small open pores and separated by thin layers of medullary tissue. Groups of these masses form rings of growth about  $\frac{1}{2}$  in. broad on a radial section. Each group is surrounded by a thick layer of dark medulla. The whole surrounded by bark. Weighs about 40 lbs. to the cub. ft.

ORDER 85. **PALMÆ.**

Trees or shrubs, erect or climbing, naked, prickly or spinous. Leaves pinnately or palmately divided, segments linear or lanceolate, folded longitudinally, with numerous parallel nerves. The segments of the palmatifid leaves are frequently bifid, those of the pinnate leaves entire or irregularly lobed. Petiole broad based, usually amplexicaul or sheathing. Inflorescence terminal or axillary of simple or paniced spikes, enclosed when young in usually more than one spathe. Each flower usually 3-bracteate. Flowers hermaphrodite, unisexual or polygamous. Perianth of 6 segments in two series, those of the fertile flower often persistent in fruit. Stamens 6, rarely 3 or more; anthers versatile. Ovary of 3 carpels, free or united; stigmas 3, usually sessile, undivided; ovules 1-2, erect in each cell. Fruit a 1-3-celled drupe or berry or 3 distinct drupes or berries, often 1-2 aborted; pericarp smooth, rough or retrosely scaled. Albumen ruminant or even, solid or hollow, embryo small in a small cavity near the surface of the albumen.

Erect trees or shrubs. Fruit without scales.

Leaves pinnately divided.

Spadix androgynous, flowering in the axil of a fallen leaf.

Male flowers minute, solitary or 2-nate towards the tip of the branches.

Female large, solitary.

Stamens 3-6. Fruit 1-celled, 1-seeded, orange yellow, seed 1 in. in diam ... ..

1. ARECA.

Male flowers small, 1 on each side of the female.

Stamens 20-30. Spathe solitary. Fruit brown, seed 1-2 in. in diam. A small slender-stemmed palm

2. PINANGA.

Spathes 2. Fruit purple. Seed 2 in. in diam. A large thick-stemmed palm ... ..

3. ACTINORHYTIS.

Spadix unisexual, androgynous in Cocos, or flowers dioecious in the axils of green leaves.

Spadix unisexual.

Spathes many. Stamens many. Fruit 3-celled, 3-seeded ... ..

4. ARENGA.

Spathes 3-5, incomplete, tubular. Stamens very many. Fruit 1-2-seeded, seed not grooved ... ..

5. CABYOTA.

Flowers dioecious.

Spathe solitary, Stamens 6. Fruit 1-seeded, seed grooved... ..

6. PHENIX.

Spadix androgynous.

Spathes 2. Stamens 6. Fruit large, hollow, 1-seeded ... ..

7. COCOS.

Leaves fan-shaped.

Spadix very large, terminal, paniculate. Spathes many, tubular. Flowers small, bisexual. Fruit 1-3, fleshy drupes

8. CORYPHA.

Spathes large, simply branched. Spathes numerous, sheathing. Flowers dioecious. Fruit a large, sub-globose drupe with 1-3, orbiculate, pyrenes ... ..

9. BORASSUS.

Spadix much branched, pyramidal. Spathes many, tubular, sheathing. Flowers polygamous. Fruit a small, globose drupe, 1-seeded ... ..

10. NANNORHOPS.

Climbing shrubs. Fruit with retrorse scales ... ..

11. CALAMUS.

1. ARECA, Linn.

Stems simple, annulate. Leaves pinnate, unarmed. Spathes solitary. Spadices branched, lax, pendant. Flowers monoicous, on the same inflorescence, sessile. Male flowers many, minute. Sepals 3. Petals 3 valvate. Stamens 3 or 6, filaments short, anthers linear. Female flowers much larger than the males. Calyx of 3 sepals, imbricate. Petals 3, imbricate, tips valvate; perianth accrescent. Ovary 1-celled; ovule erect. Fruit-ovoid; albumen ruminant, embryo basilar.

*A. Catechu*, Linn. Sp. Pl. 1189; Fl. Br. I. 6. 405; Brandis For. Fl. 551; Dalz. & Gibs. Bomb. Fl. Suppl. 95. Supári or Betelnut Palm; Pung, M.; Adiki, K.

A native of Cochin China. Cultivated in the hot regions of Asia and the islands of the Malay Archipelago. Cultivated throughout the presidency, but nowhere so abundantly as in the southern talukas of North Kánara (Sirsi and Siddápur). Fl. R. S. Fr. C. S. A slender elegant palm. Stems grey, smooth, shining, 80 ft. high by 12-15 in. in diameter, annulate with raised rings not quite horizontal, alternately inclined to opposite sides. Wood used for a variety of purposes, walking sticks, scaffolding poles, water channels, spear handles, &c. The sheaths of the leaves are used for a variety of purposes, amongst others they are made into hats stitched with kittul fibre and worn by some castes of Hindus on the Malabár Coast, also used for writing on. The seeds are turned and necklaces, &c., made from them. The principal use of the seed, however, is for chewing with lime and Piper Betel leaves.

2. PINANGA, Blume.

Erect, annulate-stemmed palms. Leaves pinnate with the upper leaflets confluent. Spadices from the axils of fallen leaves, androgynous; spathe solitary; flowers 3 together: a female between two males. Male flowers triquetrous. Sepals acute, keeled, not imbricate. Petals ovate, valvate. Stamens 6 or more, anthers sessile, basifixed, erect. Female flower much smaller, ovoid or globose. Sepals and petals orbicular, broadly imbricate. Ovary 1-celled, stigmas 3; ovule basal, erect. Fruit ovoid, pericarp fibrous. Albumen ruminant, embryo basilar.

*P. Dicksonii*, Blume Rumph. 2. 85; Fl. Br. I. 6. 409. *Areca Dicksonii*, Roxb. Fl. Ind. 3. 616; Griff. Palms Brit. I. 153. t. 231.

Western Gháts on the Nilgiris and Travancore hills, altitude 2500 ft. In the evergreen forests near the Gairsoppah and Nilkund Gháts of North Kánara, gregarious and locally abundant.

A very slender, smooth, green-stemmed palm, stems 20 feet high by 1 to 1.25 inch in diameter. Agrees well with the description of *P. Dicksonii*, in the Fl. Br. I., except that it is soboliferous, the stem nearer 1 than 2 inches in diameter, and there are no staminodes in the female flower. Flowers red in the spathe before it opens, also quite glabrous. Flowers at different times throughout the year. The stems are used for making cages to contain road metal on the Gairsoppah ghát road of North Kánara.

## 3. ACTINORHYSIS, H. Wendl.

Stems stout, annulate, unarmed. Leaves pinnate. Spathes 2, caducous. Spadix shortly peduncled with pendulous, flexuous branches. Flowers monoicous on the same spadix, near the base two males with a female between, above solitary or twin bracteate males. Male flowers many, minute. Sepals 3, imbricate. Petals 3, valvate. Stamens 24-30, in fascicles; anthers linear, versatile. Female flowers much larger than the males. Perianth accrescent, 1-celled, ovule 1, pendulous. Fruit large, ellipsoid; pericarp fleshy fibrous; endocarp crustaceous, albumen ruminant.

*A. capparica*, Wendl. et Drude in Linnæa XXXIX. 184. *Areca cocoides*. Griff. Palms. Brit. Ind. 150. t. 230 B. *Râm supâri*, K.

Planted throughout North Kânara in the supâri gardens of the Haiga Brahmins, probably introduced at the same time and along with the supâri. Fl. C. S. Said to be indigenous in the islands of the Malay Archipelago. Fr. ripe next C. S. Stems smooth, grey, 60 feet high by 1 foot in diameter.

## 4. ARENGA, Labill.

Stems simple, erect, covered with the remains of the fibrous leaf-sheaths. Leaves terminal, long, pinnate, white beneath; pinnæ præmorse, pinnicostate, 1-2-auricled at the base. Spathes many, basilar. Spadices from the axils of green leaves, large, paniced. Males and females usually solitary and on separate spadices. Male fl. Sepals 3, orbicular, imbricate in bud. Petals 3, valvate. Stamens indefinite. Female fl. Perianth of the male, accrescent. Staminodes many or 0. Ovary 3-celled, cells 1-ovuled. Fruit obovoid, 2-3-seeded; stigmas terminal. Albumen not ruminant, embryo dorsal.

*A. Wightii*, Griff. in Calc. Jour. Nat. Hist. V. 475; Palms Brit. Ind. 167. t. 235 E.; Fl. Br. I. 6. 422. *Dadset*, K.

On the Ankola táluka ghâts of North Kânara, common on the Mushki ghât at about 1,500 feet elevation, in moist forests, gregarious but very local; very common on the ghâts near the falls of Gairsoppah in evergreen forests. Male flowers strongly scented. Fl. C. S. Fr. R. & C. S.

A short thick-stemmed palm. Stem up to 10 ft. long, covered with the bases of the leaf-sheaths. Fruits arranged spirally on the branches of the ♀ spadix, obconic, triangular, top much depressed, 1 in. in diam., 3-seeded, crowned with the remains of the 3-cleft stigma and surrounded at the base by the thick valvate corolla lobes, underneath which is the small lobed calyx cup. Seeds 3, smooth. Albumen white horny, equable.

## 5. CARYOTA, Linn.

Tall palms flowering from the upper leaf-sheaths, and successively from lower (alternately male and female inflorescences). The trunk naked or sheathed. Leaves bipinnate, pinnules wedge-shaped,



erose-toothed. Spathes 3-5, incomplete, tubular. Spadices from the axils of green leaves, peduncled with many pendulous, slender branches. Flowers monoicous. Male fl. Sepals 3, imbricate in bud. Corolla 3-partite, valvate. Stamens numerous, connate at the base; anthers linear, basifixed. Female fl. Sepals as in the male. Petals imbricate in bud. Ovary 3-celled; stigma 3-lobed, ovules erect. Fruit globose, 1-2-seeded. Seeds smooth, plano-convex, dark-brown, shining; albumen horny, ruminant; embryo dorsal.

*C. urens*, Linn. Fl. Zeyl. 187; Fl. Br. I. 6. 422; Dalz & Gibs. Bomb. Fl. 278; Brandis For. Fl. 550. *Mhâr* Palm; Hill Palm or Sago Palm; *Birly mhâr*, Vern.; *Baini*, K.; *birli*, M.; *Shiwajata*, *Saukar jata*, Guz.

Throughout the hotter parts of India from the Sikkim Himalaya and Assam southwards to Ceylon. Common in evergreen forests throughout the Konkan and North Kânara. Fl. Fr. throughout the year. The stems are cylindrical 60 ft. high by 1 ft. 6 in. in diameter, smooth, grey, shining, covered with long, shallow cracks with corky edges. Green cell-layer developed, immediately over the soft tissue. The leaves and sheathing petioles yield an excellent black fibre, kittul fibre, used for fishing lines, ropes, brushes, baskets, etc. The trees are tapped for toddy, which when boiled yields sugar (jaggery). Wood in outer part of stem very hard with the abundant vascular black bundles; strong and durable. Used for agricultural implements, water conduits, &c.

## 6. PHŒNIX, Linn.

Shrubby or tall palms. Stems covered with the bases of the petioles, or rarely annulate. Leaves pinnate, pinnæ entire, lowest transformed into long spines, petiole with a fibrous amplexicaul sheath. Spathe complete, coriaceous. Spadices branched, erect or drooping. Flowers dioicous, small, sessile, coriaceous. Male fl. Calyx cupular, 3-toothed. Petals 3, valvate. Stamens 6 or 3, rarely 9. Female fl. Calyx of the male, accrescent. Petals 3, imbricate; staminodes 6, or a 6-toothed cup. Ovaries 3; stigmas sessile. Drupe 1-seeded. Seeds with a longitudinal furrow, albumen, horny, not ruminant, embryo dorsal.

- |  |                           |
|--|---------------------------|
| A moderate-sized tree. Leaves with alternate and opposite pinnæ. Fruit yellow ... .. | 1. <i>P. sylvestris</i> . |
| Small trees, stems slender or 0. Fruit black.  |                           |
| Stems short or 0. Pinnæ fascicled. Spadix peduncle very short ... ..                 | 2. <i>P. acaulis</i> .    |
| Stems 8-10 ft. Pinnæ fascicled. Spadix-peduncle long ... ..                          | 3. <i>P. humilis</i> .    |

*P. sylvestris*, Roxb. Fl. Ind. III. 787; Fl. Br. I. 6. 425; Dalz. & Gibs. Bomb. Fl. 278; Brandis For. Fl. 554. Wild Date or Date Sugar Palm. *Khajur*, Vern.; *Ichil*, K.; *Boichand*, *sendri*, *shindi*, M.; *Kharak*, Guj.

Indigenous in many parts of India, Bengal, Western Peninsula, Gujarât, Coromandel Coast, also cultivated and self-sown. In Sind and the south-west Punjab, *P. dactylifera*, takes its place.

Very common in moist ground throughout the dry districts of the presidency, usually along the banks and in the beds of streams and water-courses, certainly indigenous. Fl. Jany.-Feb. Fr. ripe June. A tree, stem 30—40 ft., rough with the scars of the fallen petioles. Mats are made from the leaves. The trunk yields abundance of sugary sap which bleeds from wounds made in the upper parts of the stem. The sap is boiled down into sugar. The wood is lighter than that of *Borassus*. Used for building purposes, water conduits, &c. Fruit edible.

*P. acaulis*, Buch. ex. Roxb. Fl. Ind. III. 783; Fl. Br. I. 6. 426; Dalz. & Gibs. Bomb. Fl. 278; Brandis For. Fl. 555. *Sunichil*, K.; *Shewra*, *shilind*, M. The Dwarf Date Palm.

Northern and Central India, from Kumaon eastwards to the Khasia hills. Common on the ghâts, Dalz. This is a bulbiform stemmed palm which I cannot distinguish from the next species, common on the Sirsi taluka ghâts of North Kánara. Fl. C. S. Fr. ripe May-June. Fruit edible.

*P. humilis*, Royle. III. 394, 397, 399; Fl. Br. I. 6. 426; var. *pedunculata*, Becc. Fl. Br. I. 6. 427. Same native names as *P. acaulis*.

Hilly districts of India from Kumaon eastwards to Burma and southwards to Malabar. Common on the ghâts of North Kánara. Fl. C. S. Fr. ripe May-June. Leaflets made into mats, commonly used for covering bales of red pepper in the Dhárwár district. Fruit edible.

#### 7. COCOS, Linn.

Tall palms with annulate stems. Leaves pinnate, petioles amplexicaul with a fibrous base. Spathe simple, woody. Spadix paniculate. Flowers monoicous, sessile, bracteate, male flowers numerous on the upper branches. Male fl. Calyx of 3 sepals. Petals 3, valvate in bud. Stamens 6; anthers erect. Female fl. Sepals 3, imbricate, with 2 bracts at the base. Petals 3, smaller than the sepals. Ovary 3-celled, surrounded with 6 staminodes. Fruit large, ovoid, trigonous 1-seeded, mesocarp woody-fibrous, endocarp bony with 3 basal pores. Albumen fleshy, oily, with a central cavity; embryo opposite 1 pore.

*C. nucifera*, Linn.; Roxb. Fl. Ind. III. 614; Brandis For. Fl. 556; Dalz. & Gibs. Bomb. Fl. 279. Coconut Palm. *Narel*, Vern.; *Tengina*, K.

Cultivated in the hot damp regions of India, Burma and Ceylon, indigenous in the Cocos Island and N. Andamans, along tropical coasts everywhere. Planted throughout the presidency, and cultivated extensively along the sea-coast. Fl. throughout the year. Fr. ripe 9—10 months after flowering. Trunk annulate. Wood close-grained, hard, heavy. Vascular bundles black, closely packed in the outer part of the stem, enclosing vessels and cells. Weighs 70 lbs. to the cub. ft., known as Porcupine Wood. Used for building purposes, walking sticks, &c.

The fibrous rind of the nuts yields coir fibre. Used for ropes, mats, &c. The oil from the fruit is an important article of trade, used for burning, cooking, the manufacture of soap, &c. For the many uses of the cocoanut tree, see Watt's Gazetteer of Economic Products.

#### 8. CORYPHA, Linn.

Tall, stout, annulate palms, dying after flowering and fruiting. Leaves very large, orbicular, flabellately multifid; petiole spinous. Spathes many, tubular. Spadix an immense terminal panicle. Flowers small, clustered, bisexual. Calyx cupular, 3-fid. Petals 3, valvate in bud. Stamens 6, equal, anthers dorsifixed. Ovary 3-lobed, 3-celled. Drupe usually solitary. Albumen horny; embryo spiral.

*C. umbraculifera*, Linn. Sp. Pl. Ed. II. 1657; Fl. Br. I. 6. 428; Dalz. & Gibs. Bomb. Fl. Suppl. 94; Brandis For. Fl. 549. The Talipot Palm of Ceylon and the Fan-Palm of South India. *Tali*, *shri-tali*, K.

Malabar Coast and Ceylon. In the moist forests of the Kumta and Honávar tálukas of North Kánara, covering extensive areas near Gairsoppah and Yena, also in the Honávar táluka and on the Yellápur gháts, sometimes planted in gardens near sea-coast. Flowers at about the age of 40 years and dies down afterwards. This period is probably incorrect and will be definitely settled when the N. Kánara Talipot palm forests have been organized. The horny globose seeds (*bajurbet*) are made into necklaces, rosaries and buttons and are exported to the Persian Gulf ports from North Kánara. Segments of the leaves are used for writing on, and there is a large trade in umbrellas made from the leaves. Long pieces of the pith are tied in bundles, *Tale chekki*, K., and carried from the forests near Gairsoppah and Honávar. A kind of brown flour or sago is extracted from the pieces. The Talipot palms of N. Kánara are fewer than in former years owing to the restrictions about felling not being stringent enough. Two thousand trees are annually cut for the wants of the Kunbis residing in the Southern Coast sub-divisions of N. Kánara.

#### 9. BORASSUS, Linn.

Lofty, simple-stemmed palms. Leaves palmately fan-shaped; petiole spinously serrate. Spathes several, incomplete. Spadix with a few branches. Flowers dioicous, bracts large, sheathing, coriaceous. Male fl. in cylindrical catkins. Calyx and corolla 3-divided. Stamens 6. Female fl. solitary within the scales of the catkin. Calyx of 3 sepals. Petals 6, imbricate. Staminodes 6-9, connate in a ring round the ovary. Ovary usually 3-celled; stigmas sessile. Drupe large, containing 2-4, obcordate, fibrous, pyrenes. Albumen horny, turning hollow; embryo sub-apical.

*B. flabelifer*, Linn.; *B. flabelliformis*, Roxb. Fl. Ind. III. 790; Brandis For. Fl. 544; Dalz. & Gibs. Bomb. Fl. 278. Palmyra Tree. *Tad, tamar*, M.

Cultivated throughout the plains of India, Burma and Ceylon.

Planted throughout the Presidency and Sind. Fl. Mch. Fr. May.

Stem tall, cylindrical rough, with the black narrow scars of the fallen petioles, 60—80 ft. high, 1—2 ft. in diameter. Wood hard, heavy, durable. Weighs about 65 lbs. to the cub. ft. Used for water-pipes and channels, posts, rafters, &c. Leaves used for thatching, mats, &c. The chief product of the tree is the sweet sap which flows from the cut spathes, and when boiled yields sugar (jaggery); it is also fermented and made into country liquor.

#### 10. NANNORHOPS, H. Wendl.

A gregarious, tufted palm with prostrate branching rhizomes or stems. Leaves flabellate, rigid, plicate, segments 2-fid. Spathes tubular, sheathing. Spadix in the axils of green leaves, much branched. Flowers polygamous. Calyx tubular, 3-lobed. Corolla 3-partite, segments valvate. Stamens in the hermaphrodite fl. 6, in the male about 9. Ovary trigonous. Fruit an ovoid or subglobose berry, varying in size from  $\frac{1}{4}$  to  $\frac{1}{2}$  in. in diameter. Albumen horny with a central cavity; embryo dorsal or sub-basilar.

*N. Ritchieana*, H. Wendle in Bot. Zeit. 1879, 148. *Chamærops Ritchieana*, Griff.; Brandis For. Fl. 547. *Pharra*, Sind. Western Punjáb on the salt range. Sind on dry arid hills, usually stemless, sometimes however forms a stem 6—8 feet high. Fr. ripe H. S. The fruits are like boy's playing marbles of different sizes.

#### 11. CALAMUS, Linn.

Armed scandent, rarely erect palms. Leaves alternate, pinnatisect, rachis often produced into an armed flagellum; sheath armed, produced into a ligula, with or without an armed flagellum. Spathes tubular or open persistent sheathing the peduncle and branches of the spadix and passing into bracts and bracteoles, *spathels* and *spathel-lules*. Spadices axillary, much branched, usually elongate, sometimes produced into a flagellum. Flowers polygamo-dioicous, solitary or binate within the bracteoles. Male fl. Calyx cupular, 3-toothed. Petals 3, coriaceous valvate. Stamens 6. Female fl. Calyx of male. Corolla tubular below, 3-fid, valvate. Ovary incompletely 3-celled, covered with retrorse scales; style short or rather long, stigmas 3. Fruit globose or ellipsoid, clothed with deflexed, polished scales. Seed smooth or pitted, albumen equable or ruminant, embryo ventral or basal.

*C. Thwaitesii*, Becc. Fl. Br. I. 6. 441. *Hundibet*, K.

Common in the evergreen forests at the foot of the Nilkund ghát of North Kánara. In flower and fruit Feb.-Mch. This species or a closely allied one is common near the sea-coast at Marmagoa. Sir J. Hooker remarks on specimens of this plant sent to Kew, in the Fl. Br. I. 6. 445, under *O. pseudo-tenuis*, Becc. There is a species common in North Kánara on the Ainshi ghát, also in the ravines near Kadra,

which was referred to *O. flagellum*, Griff. at Kew. It has, however, an equable albumen, deeply foveolate, surrounded with a brown spongy covering. The outside of the fruit is as in the description in the Fl. Br. I. 6. 439. Fl. Fr. C. & H. seasons.

*C. pseudo-tenuis*, Becc. MSS. Fl. Br. I. 6. 445. Common on the gháts of North Kánara. Fl. at different times throughout the year. The minute male flowers in short, decurved spikelets and the small, beaked, brown fruit are characteristic.

## 86. PANDANEEAE.

Erect or scandent trees or shrubs, often supported by thick aërial roots. Leaves simple, narrow, acuminate, sessile coriaceous, parallel-nerved, often spinous-toothed on the margins and midrib. Flowers small, dioecious, in axillary or terminal; simple or branched spadices, clothed with leafy bracts. Male fl. Perianth 0. Stamens many, filaments free or connate, anthers basifixed. Pistillode 0. Fem. fl. Perianth 0. Ovary 1-celled; stigmas sessile, ovules solitary or numerous, fruit a globose oblong head of woody or fleshy angular drupes. Seeds minute, albumen hard, fleshy, embryo minute.

### 1. PANDANUS, Linn.

Palm-like trees or shrubs with simple or branched stems. Leaves spinous, elongate, spirally arranged. Male fl. in a compound spadix with numerous yellow or white, keeled spathes. Stamens very numerous, single or united into bundles, anthers elongate, 2-celled. Female fl. Spadix simple, protected by leafy spathes. Ovaries free or connate, 1-celled, stigmas sessile, ovule solitary erect. Drupe fibrous, woody, in compact heads, free or united into bundles. Seed large, strophiolate, albumen fleshy, embryo small, radicle inferior.

Carpels not united in groups Stigmas forked, spinous.

Fruit or syncarp orange-red ... .. 1. *P. furcatus*.

Carpels connate in groups. Stigmas sessile, peltate.

Fruit or syncarp yellow ... .. 2. *P. fascicularis*.

1. *P. furcatus*, Roxb. Fl. 1. 3. 744; Fl. Br. 1. 6. 484; Dalz. & Gibs. Bomb. Fl. 279; Rheede Hort. Mal. 2. t. 8.

Himalaya, Sikkim, Assam, Khasya, Burma and the Malay peninsula, Western peninsula from Bombay southwards; common in the ghát forests of Belgaum and N. Kánara along streams and nálas in marshy situation. A low gregarious tree, forming dense almost impenetrable thickets in marshy places near water courses. Fl. and Fr. Cold and Hot seasons. The yellow spathes of the male spadix are inodorous.

2. *P. fascicularis*, Lam. Encycl. 372. t. i. Fl. Br. 16. 485; Dalz. & Gibs. Bomb. Fl. 27; Rheede Hort. Mal. 2. t. 1-8. The Screw Pine. *Keura*, Vern. Throughout the moister parts of India, common on

sandy soil near the sea-coast of the Konkan and N. Kánara. Fl. and Fr. Hot and Rainy seasons. Stems thick and short, grows gregariously like the foregoing species. The white fragrant, keeled spathes are used as an ornament for the hair by certain castes of native women along the coast. Gold imitations of this ornament are also much used in N. Kánara and the Konkan.

There is an evergreen prostrate, thin-stemmed, soboliferous, gregarious shrub found in some of the N. Kánara evergreens of the Siddapore subdivision which may be *P. factidus*, Roxb. I have never been able to procure flowers, which probably appear during the rainy season.

### ORDER 78. GRAMINEÆ.

Herbs, rarely shrubs or trees. Leaves alternate, distichous, consisting of a tubular, split sheath and a narrow linear blade, joined to the sheath by a petiole (in bamboos); sheath terminating in a scarious or fringed ligule. Flowers hermaphrodite or unisexual, arranged in distichous, 1 or many-flowered spikelets, usually with 1-2 empty glumes (bracts) at the base. The flowering axis bears 1 or more distichous glumes (flowering glumes). Each flowering glume bears in its axil the palea, a transparent 2-nerved or keeled bract. The flowering glume embraces the palea with its incurved edges. Between the flowering glume and the palea is situated the flower, consisting of 2-3 small scales (lodicules), 3 or more free stamens and the superior ovary, crowned with plumose stigmas. Ovary 1-celled. Fruit a 1-seeded caryopsis, pericarp adherent to the testa, and sometimes to the palea and flowering glume. Albumen farinaceous. Embryo at base of albumen small or minute.

Stamens 6.

Filaments free. Lodicules 3, 2. Style deciduous.

Embryo conspicuous on surface of caryopsis ... 1. BAMBUSA.

Filaments free. Lodicules 0. Style with a persistent base. Embryo not apparent on surface of caryopsis ... 2. DENDROCALAMUS.

Filaments united in a slender tube. Caryopsis linear, oblong ... 3. OXYTENANTHERA.

Stamens numerous or (6-9). Style long; stigmas 3-5 ... 4. OCHLANDRA.

#### 1. BAMBUSA, Schreber.

Large bamboos, usually in compact clumps. Spikelets 5 to many-flowered, usually clustered and spiked, forming a gigantic leafless panicle. Empty glumes 2 or more, lower shortest, the upper similar to the flowering glumes. Palea 2-keeled, usually fimbriate. Lodicules 3, ciliate, membranous. Stamens 6. Caryopsis with a longitudinal furrow, often adhering to the palea and flowering glume.

Branches spinescent. Leaves with longitudinal nerves distinct, transverse not so ... ..

Unarmed. Leaves with distinct, transverse veins, ... 1. *B. arundinacea*.

2. *B. vulgaris*.

1. *B. arundinacea*, Retz. Munro in Trans. Linn. Soc. 26. 103; Bedd. Fl. Sylv. 231; Brandis For. Fl. 564; Dalz. & Gibs. Bomb. Fl. 299; Gamble Ind. Timbers, 428. *Bans*, Vern.; *Dougi*, *bidrgalu*, K.; *Kalak, padai*, Konkan. The Spiny Bamboo of Western India.

An excellent bamboo, used for all purposes.

2. *B. vulgaris*, Wendl.; Munro l.c. 106; Dalz. & Gibs. Bomb. Fl. 299; Bedd. Fl. Sylv. 232; Brandis For. Fl. 568; Gamble Ind. Timbers, 428. *Kulluk*, *bamboo*, *vansa kullaha*, Vern. The Yellow and Green Striped Bamboo.

A native of the southern and central parts of Ceylon. Cultivated in Bombay, Kolhápur, Poona, Sátára, &c., but not indigenous. Stems with green and yellow stripes.

Much used in Ceylon for a variety of purposes.

## 2. DENDROCALAMUS, Nees.

Unarmed bamboos. Inflorescence paniculate, spikelets congested in heads. Characters of *Bambusa*. Lodicules 0. Ovary hairy, style long, filiform, undivided or 2-3-fid at the apex, base persistent. Caryopsis with a thick pericarp. Embryo not conspicuous on surface.

*D. strictus*, Nees, Munro Trans. Linn. Soc. 26; 147; Brandis For. Fl. 569; Bedd. Fl. Sylv. 235; Gamble. Ind. Timb. 430. Male Bamboo. *Shib, basa, udha, medar, mace, mandgay*, Vern. Throughout India. Throughout the presidency, usually in deciduous forests. The common unarmed bamboo.

## 3. OXYTENANTHERA, Munro.

Erect or scandent bamboos. Spikelets often elongate and curved, verticillate, few-flowered. Flowers 1-3, the terminal one or the last but one fertile, rachilla obsolete. Flowering glume many-nerved, spinose-mucronate. Palea in the fertile flowers convex on the back, keels obsolete, in the other flowers bicarinate. Lodicules none. Stamens 6, monadelphous, anthers with a mucro or bristle or with a few hairs. Style slender, divided at the apex into 2-3 long and plicate stigmas. Caryopsis linear-oblong with a longitudinal furrow.

2 flowers to spikelet.	Style hairy.	Anthers acute,			
not apiculate ...	...	...	...	...	1. <i>O. Stocksii</i> .
Spikelets slender,	1-flowered.	Style glabrous.			
Anthers apiculate ...	...	...	...	...	2. <i>O. monostigma</i> .

2. *O. monostigma*, Bedd. Fl. Sylv. 233; Gamble Ind. Timbers, 429. *Bambusa Ritcheyi*, Munro. *Choua*, K.

In the Anamallays. Common throughout the Konkan and North Kánara gháts, usually as undergrowth in deciduous forests. Culms often as large as those of *Dendrocalamus*, cavity small. A soft bamboo, young stems covered with deciduous brown tomentum. Flowers frequently, at least clumps or single stems are often found in flower.

Stems not much used in Kánara as other and better kinds of bamboos are everywhere abundant.

1. *O. Stocksii*, Munro; Trans. Linn. Soc. 26 to 130; Bedd. Fl. Sylv. 233. *Konda, Oor sheme, K.*

Commonly cultivated along the coast, rare in the ghát forests of North Kánara. A strong bamboo, used for punting poles and for making native umbrellas and baskets. Flowering culms are frequently found. A large unarmed bamboo 30 ft. high by 1—1·5 in. in diam. Culms covered when young with a white or grey, deciduous tomentum. Culm sheaths striated, silvery, shining within, covered outside with closely matted, reddish, deciduous hairs amongst which are numerous minute hairs from a bulbous, black base. The articulate, acuminate ligula is bearded at each side of its broad base. The lower culm-nodes develop rings of aerial roots.

*O. Thwaitesii*, Munro. Common on the Bababuden Hills of Mysore 5500—6000 ft. Was in flower during the rainy season of 1896.

#### 4. OCHLANDRA, Thw.

Unarmed bamboos. The spikelets in heads forming either an interrupted spike or arranged in a large terminal capitulum. Spikelets 1-flowered, rachilla inarticulate, often produced beyond the flower in a short stipe, flower hermaphrodite. Empty glumes many, mucous or mucronate, not keeled, many-nerved, spirally arranged, the smallest at the bottom. Stamens many (6—40), exerted in the old flowers. Ovary long acuminate, glabrous; style elongate, shortly 4-6-fid, stigmas 3-5, pilose. Caryopsis large, ovoid, conical, acuminate, beaked, supported by the persistent glumes; pericarp very thick, fleshy; seed free, subglobose.

*O. Rheedii*, Var. *sivagiriana*, Gamble. Hook and Benth. Gen. Plant. 3. 1214; Beesha, Munro; Trans. Linn. Soc. 6. 145; Beddome Fl. Syl. 234. *Hooda, M.; Wontenulgi, K.*

An unarmed bamboo growing in dense clumps of many culms, hollow, slender, .5 - .75 in. in diam, green, scaberulous, sometimes scandent, nodes thickened, shining glabrous. Leaves glabrous, pale, many-nerved, lanceolate, long acuminate; petioled; up to 10" × 2·5"; ligula bearded. Fl. in axillary or terminal clusters or spikes. Empty glumes hairy at tips. Stamens up to 40, filaments long, slender; anthers linear .5 in.; connective minutely apiculate; staminodes 6, linear, .75 in. long. Ovary prolonged into a slender style 1·5 in. long, stigmas 5, papillose. Fruit ovoid 2-3 in. long by .3 in. in diameter gradually narrowed into a long beak surrounded at the base by 4 glumes. This species flowered during 1896 throughout N. Kánara, and, as far as I can ascertain, had never before been seen in flower in that district. Good specimens sent to Kew were said to be *O. stridula*, Munro, a Ceylon species. Mr. Gamble however named it as above. It certainly seems to me to differ from both these species.



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