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# FLORA

OF THE

## PRESIDENCY OF MADRAS

J. S. GAMBLE

VOL. I.

*FOREWORD, PREFACE, AUTHOR'S NOTE, NOTES ON  
PART XI, GENERAL DESCRIPTION, ABBREVIATIONS,  
GLOSSARY AND KEY TO FAMILIES.*

*FLORA : RANUNCULACEAE TO CAPRIFOLIACEAE.*

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# FOREWORD

WITH this last part of the 'Flora of the Presidency of Madras,' should like to take the opportunity of thanking Mr. Fischer for the conscientious and thorough way in which he has completed my late husband's work, which was undertaken at the request of the Government of India in 1912.

Mr. Gamble told me that Mr. Fischer was the only man he knew who could carry on the work if he did not live to complete it himself. I am much gratified that my husband's wish has been so ably fulfilled.

I should also like to thank Sir Arthur Hill for his kind and valuable help in furthering the work.

GERTRUDE GAMBLE.

18, CUMBERLAND ROAD,

KEW,

SURREY ;

*August, 1935.*





# PREFACE

IN 1912 the late Mr. J. S. Gamble, C.I.E., F.R.S., was requested to undertake the preparation of a 'Flora of the Presidency of Madras,' a task for which he was remarkably well qualified owing to the exceptional knowledge of the Flora he had acquired during his long service in the Presidency as Conservator of Forests. During the course of his extensive and careful tours he made very complete collections of plants of the Presidency, and formed and maintained a very complete private Herbarium, which he subsequently presented to the Royal Botanic Gardens, Kew. Mr. Gamble retired from the Indian Forest Service in 1899, and at the time was fully occupied with the publication of his 'Materials for a Flora of the Malayan Peninsula'. The first part of the 'Flora of the Presidency of Madras' (*Ranunculaceae* to *Opiliaceae*), consisting of 200 pages, was published in November, 1915, and the draft of the botanical portion of about the first 132 pages was prepared by Mr. S. T. Dunn, as explained by Mr. Gamble in his introduction to this part, since Mr. Gamble had not at the time completed his Malayan work. The remainder of this part and the editing of the whole and the preparation of Parts II–VII inclusive was undertaken entirely by Mr. Gamble. Part II was published in 1918 and was followed by Part III in 1919, Parts IV, V, VI and VII in 1921, 1923, 1924 and 1925 respectively ; Part VII being published very shortly after Mr. Gamble's death on October 16th, 1925. The publication of this part carried the work to the end of the *Euphorbiaceae*. With the consent of the Government of India and of Mrs. Gamble, the completion of the 'Flora' was entrusted to Mr. C. E. C. Fischer, late of the Indian Forest Service, now Assistant for India, Royal Botanic Gardens, Kew, who had had many years of experience in the Madras Presidency, and thanks to his knowledge of the flora the work has now

been completed by the publication of Parts VIII–X in 1928, 1931 and 1934 respectively.

The choice of Mr. Fischer to complete the task has been a fortunate one, since not only has he had all the resources of the Kew Herbarium at his disposal, but he has received the same ready help from the botanists in India which was so freely given to Mr. Gamble.

The work has been completed on the lines laid down by Mr. Gamble, and though it is much to be regretted that he did not live to complete the 'Flora,' the change in authors has most fortunately very little affected the character of the work, and is a worthy memorial to the assiduous labours of a distinguished Indian botanist.

A. W. HILL.

KEW ;

*July, 1935.*

# AUTHOR'S NOTE

It has been a very real source of personal gratification to be allowed to complete the work left unfinished at the lamented death of Mr. J. S. Gamble, and this not so much as a botanist, but rather as a tribute to the memory of one for whom I have a sincere admiration and affection.

I have endeavoured to adhere as precisely to Mr. Gamble's scheme as lay in my power.

I have to acknowledge with thanks the assistance of several of my colleagues at the Kew Herbarium, but I alone must be charged with all the shortcomings. I must also gratefully acknowledge advice and help from my friends Mr. J. H. Burkill and the late Professor W. G. Craib. I am indebted to Mrs. Gamble, who proved unfailingly encouraging and patient, and to Sir Arthur Hill, K.C.M.G., F.R.S., for his kind support. Finally, I thank my wife for help in preparing the Indexes.

A very large number of botanical specimens have been examined and compared in connection with the flora; not only those in the Kew Herbarium, to which, during the progress of the work, Mr. Gamble's own herbarium and that from South India collected and presented by Sir A. G. and Lady Bourne were added, but also those among the large sets obtained on loan from the Superintendent of the Royal Botanic Gardens, Calcutta, the Principal of the Government Agricultural College at Coimbatore, and the Conservator of Forests, Travancore. Further, the Professors of Botany at Oxford, Cambridge and Edinburgh kindly placed the Indian specimens in their charge at the disposal of Mr. Gamble and myself. Through Mr. A. Meebold, the collection of Indian grasses he made from 1908 to 1912 were lent to me by the Director of the Breslau Museum. A number of the type-specimens of species described by Retzius from plants collected in S. India by F. G. Koenig were kindly sent on loan from the Lund Herbarium. Smaller, but

valuable, recent collections were received from Professor E. Barnes and the Botanical Assistant at the Government Museum, Madras, Mr. P. V. Mayuranathan. To all these thanks are due and here expressed.

It was Mr. Gamble's practice to publish explanatory notes in the 'Kew Bulletin' soon after the appearance of each part—a practice which the Editor has kindly permitted me to continue. These notes appeared as follows :

For Part I in 'Kew Bulletin,'	1916,	p. 57.
„ „ II „ „	1918,	p. 222.
„ „ III „ „	1920,	p. 49.
„ „ IV „ „	1921,	p. 312.
„ Parts V and VI in 'Kew Bulletin,'	1924,	p. 235.
„ Part VIII in 'Kew Bulletin,'	1928,	p. 281.
„ „ IX „ „	1931,	p. 257.
„ „ X „ „	1935,	p. 143.

Mr. Gamble appears to have made no observations for Part VII.

For Part XI the notes will be found on p. ix below.

It was intended that the map accompanying the final part should include every locality mentioned in the work, but a very few have been omitted as they could not be traced, and three or four to avoid further congestion on the map. Absolute accuracy is not claimed for every item indicated because many of the places cited are not recorded on any published map; their positions are sufficiently proximate, however, to make it easy to locate them *in situ*.

CECIL E. C. FISCHER.

ROYAL BOTANIC GARDENS,

KEW ;

9th September, 1935.

## NOTES ON PART XI

### LYTHRACEAE.

ROOTALA FYSONI, Blatt. & Hallb. in J. B. N. H. S. xxv, 709, is, I consider, *R. illecebroides*, Koehne.

### ONAGRACEAE.

In 'Kew Bull.,' 1924, 236, Mr. Gamble drew attention to a paper by Mr. N. Ridley in 'Journ. Bot.,' 1921, 257, in which it was shown that *Jussiaea suffruticosa*, Linn., as described in 'F. B. I. 'ii. 587, comprises more than one species. Mr. Ridley further identifies the true *J. suffruticosa*, Linn., with *J. fissendocarpa*, Haines, of which one sheet from Malabar is in the Kew Herbarium. This latter sheet, which appears not to differ from Haines's specimens from Purneah, however, has been identified by Dr. Lewin, of Berlin, as *J. linifolia*, Vahl. After comparing the Malabar sheet with American specimens of the last-named species, I agree with Dr. Lewin's determination. It is not the *J. suffruticosa*, Linn., based on the description of "Karambu" in 'Hort. Malab.' ii., 55, t. 49. For the rest I agree with Mr. Ridley, and in the Addenda three species of *Jussiaea* have been added.

### GRAMINEAE.

Too late for quoting in any part of the 'Flora,' I have seen a copy of 'Bombay Grasses' by Rev. E. Blatter and C. McCann, with illustrations by R. K. Bhide. The illustrations will greatly facilitate identification, and as many of the grasses are common to the two areas this work is mentioned here.

THELEPOGON ELEGANS, Roth. When dealing with the *Gramineae* in Part X, I had seen no specimen from the area included in the 'Flora,' but since then one collected in the northern part of the Hyderabad State has come to hand.

ANDROPOGON MICRANTHUS, Kunth. No specimen of this species was forthcoming until after the publication of Part X. One sheet from Horsleykonda has turned up, and the species has been included in the Addenda as *CAPILLIPEDIUM PARVIFLORUM*, Stapf.

*EHRHARTA ABYSSINICA*, Hochst. The genus *EHRHARTA* is mainly African; it has not been reported hitherto from India, and so does not find place in the 'F. B. I.' Since the publication of Part X of the present work, Mr. C. E. Hubbard had drawn my attention to a sheet of the species mentioned above collected not later than 1835 in the Nilgiri Hills by B. Schmid and now in the Kew Herbarium. On the label is a note, not in the collector's hand, suggesting that it is an introduction, but as the species occurs in the mountains of Abyssinia and also in E. Africa, it is not at all a likely plant to be introduced either intentionally or accidentally. Moreover, certain plants are known to be common to India and E. Africa. In spite, therefore, of the fact that no further specimens have been collected since B. Schmid's time, it seems to be the safest course to include this species in the Addenda. Unfortunately there is no mention of the precise locality where Schmid found it.

# GENERAL DESCRIPTION OF THE FLORA

THE Presidency of Madras presents, probably, a more varied flora than any other tract of equal area in India, possibly in the world.

This phenomenon is due to the combined effects of its geographical situation and its topography.

A double coast line with the Indian Ocean on the West and the Bay of Bengal on the East, yet the two sufficiently distant from each other to allow of continental conditions in the interspace; two main hill ranges of the Eastern and Western Gháts within the direct influence of these expanses of water and numerous other lesser connected and isolated hill masses; considerable tracts of open plain or plateau land within the said heights; elevations ranging from sea-level to almost 9,000 ft; the proximity of the southernmost part to the Equator; all these, with the climatic features they connote, are the factors which contribute to this variation.

The most interesting feature, and one that distinguishes it from that of the rest of the Indian Peninsula, is found in the dense, evergreen forests of the West and South with their wealth of subtropical species.

The flora falls into the 4th (Malabar) and 5th (Deccan) Provinces described by Sir Joseph Hooker in 1904 in his 'Sketch of the Flora of British India'. As there stated, the flora comprised upwards of 4,000 species of flowering plants. Since then a number of new species have been described, so that the total in the present work amounts to 4,516. This figure must not be accepted as final; further botanical exploration is bound to yield more species new to botanical science, as indeed is indicated by the results of Professor E. Barnes's collections made during the past three years, as well as discoveries by others. This is particularly marked in the genus



*Impatiens*, to which Sir Joseph attributed about 50 species, whereas the present work includes 81.

It is interesting to compare the ten dominant families with similar lists drawn up by Sir Joseph Hooker, as follows :

Madras Presidency.	Position in list for—		
	All British India.	Western Peninsula.	Burma.
1. <i>Leguminosae</i> 432 species .	2 .	2 .	2
2. <i>Gramineae</i> 388 „ .	3 .	1 .	3
3. <i>Rubiaceae</i> 226 „ .	4 .	7 .	4
4. <i>Acanthaceae</i> 202 „ .	6 .	3 .	6
5 and 6 { <i>Euphorbiaceae</i> 199 „ .	5 .	6 .	5
6 { <i>Orchidaceae</i> 199 „ .	1 .	4 .	1
7. <i>Compositae</i> 189 „ .	7 .	8 .	9
8. <i>Cyperaceae</i> 172 „ .	8 .	5 .	7
9. <i>Labiatae</i> 128 „ .	9 .	9 ..	..
10. <i>Asclepiadaceae</i> 93 „ .	.. .	10 .	..
14. <i>Urticaceae</i> 76 „ .	10 .	.. .	8
25. <i>Scitamineae</i> 40 „ .	.. .	.. .	10

*Geraniaceae* with 92 species (including *Balsaminaceae*) comes close to *Asclepiadaceae*, and is likely to outstrip it in the future.

The number of Dicotyledons is slightly more than three times that of Monocotyledons, and there are only 5 indigenous Gymnosperms.

In spite of, perhaps because of, its numerous components it is difficult to split up the area into very well-defined regions, and still more to fix clear limits to them, although the typical characteristics of each are susceptible of differentiation. There is so much overlapping, intrusion and shading off from one to the next that only a minutely detailed description of each can give a clear idea; an ecological study would involve the compilation of several volumes. Much the same would apply to the variations within each region due to the influence of elevation, atmospheric, topographic and phreatic moisture and to changes in soil. On the hills the flora peculiar to the higher slopes and plateaux may intrude into a lower and dryer region along the streams, and the more xerophytic species often climb upwards along exposed and eroded spurs. Unfortunately, detailed ecological investigation is lacking. The examination, in more or less detail, of one range of hills has shown that



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flora is characterized by thorny small trees and shrubs with small leaves, such as *Dalbergia spinosa*, Roxb., *Dalbergia coromandelina*, Prain, and *Acacia planifrons*, W. & A.

IV. The *Wet Region*; comprising the coastal tracts and the Western Gháts in the districts of South Kanara, Malabar, Nilgiri, Coimbatore and Tinnevelly, and the Native States of Cochin and Travancore, up to an elevation of about 6,000 feet.

The flora of this region is particularly diversified and rich, so that a number of sub-regions depending on elevation, aspect and latitude and on the resulting rainfall and temperature define themselves.

The characteristic species are *Hopea parviflora*, Bedd., *Vateria indica*, Linn., and *Xylia xylocarpa*, Taub. near the coast; the enormous growth of *Tectona grandis*, Linn., *Dalbergia latifolia*, Roxb., *Pterocarpus Marsupium*, Roxb., *Terminalia crenulata*, Roth., *Lagerstroemia lanceolata*, Wall., etc., in the moist deciduous forests further away from the coastline, and a host of evergreen species of *Guttiferae*, *Myrtaceae*, *Rubiaceae*, *Acanthaceae*, *Euphorbiaceae*, *Orchidaceae* and *Scitamineae* among others in the wet forests higher up the mountains. In the latter are found large tracts covered with a dense growth of the reed-like bamboo, *Ochlandra travancorica*, Benth., generally along streams, and also a great wealth of mosses and ferns, including several tree-ferns.

It is in this sub-region that occurs the only indigenous conifer, *Podocarpus latifolia*, Wall., and the two tree composites, *Vernonia monosis*, C. B. Clarke, and *V. travancorica*, Hook. f.

V. The *Alpine Region*; occupying the higher hills of the Nilgiri, Pulney and Anamalais ranges and the higher ranges of Travancore and Tinnevelly above 6,000 ft.

This tract comprises open grass lands with small alpine plants and bushes. Among them may be cited *Parochetus communis*, Ham., *Hypericum mysorense*, DC., numerous species of *Impatiens*, *Oldenlandia*, *Anaphalis*, *Exacum*, *Sonerila grandiflora*, Wall., and many terrestrial orchids, *Arisaemas* and *Eriocaulons*.

The ravines usually shelter patches of evergreen trees (*sholas*), among which may be mentioned *Rhododendron nilagaricum*, Zenk., *Syzygium Arnottianum*, Walp., and other *Myrtaceae*, *Microtropis* spp., *Rapanea Wightiana*, Mez., *Elaeocarpus ferrugineus*, Wight, and

*Daphniphyllum glaucescens*, Bl. On the borders of these fragments of evergreen are found belts of *Strobilanthes Kunthianus*, T. And., *Gaultheria fragrantissima*, Wall., and *Rubus* spp.

As already indicated, within all the regions are a number of lesser distinctive features and some of these must be further mentioned.

Along both coasts in the deltas estuarine belts of mangroves occur, such as *Avicennia officinalis*, Linn., *Lumnitzera racemosa*, Willd., *Bruguiera* spp., *Rhizophora* spp. and of halophytic *Chenopodiaceae*.

On the dry foreshore sands the exotic *Casuarina equisetifolia*, Forst., has been planted extensively, but the natural flora consists of herbs and creeping shrubs such as *Hydrophylax maritima*, Linn. f., *Ipomea biloba*, Forst., *Sesamum prostratum*, Retz., and *Spinifex squarrosus* Linn.

A feature of the coastal tract in Region II is the shrubby and small tree growth of evergreen species that clothe the low-lying parts and the small hillocks within 20 miles or so of the sea. There may be a stratum of 3 to 6 ft. of wind-blown sand overlying better soil, or they may grow directly on the soil washed down from the higher hills. Characteristic species of these evergreens are : *Eugenia bracteata*, Roxb., *Memecylon umbellatum*, Burm. f., *Capparis brevispina*, DC., *Carallia integerrima*, DC., *Linociera malabarica*, Wall., and *Mimusops hexandra*, Roxb.

# ABBREVIATIONS AND SIGNS

## WORKS CITED AND ABBREVIATIONS USED.

- Acta Hort. Petrop.* : Acta horti Petropolitani.  
*Andr. Repos.* : H. Andrew's Botanist's Repository.  
*Ann. Bot.* : Annals of Botany.  
*Ann. Calc.* : Annals of the Royal Botanic Garden, Calcutta.  
*Arn. Pug.* : Pugillus plantarum Indiae orientalis, by G. Walker-Arnott.  
*Bedd. Fl.* }  
*Bedd. Fl. Sylv.* } Flora sylvatica, by R. H. Beddome.  
*Bedd. For. Man.* : Forester's Manual of Botany, by R. H. Beddome.  
*Bedd. Ic.* }  
*Bedd. Ic. Pl. Ind. Or.* } Icones plantarum Indicae orientalis, by R. H.  
*Bedd. Ic. Pl. Or.* } Beddome.  
*Benth. Fl. Aust.* : Floraaustraliensis, by G. Bentham.  
*Bidie* : Report on Neilgherry loranthaceous parasitical plants, by  
G. Bidie.  
*Bot. Cent.-Blatt.* : Botanisches Centralblatt.  
*Bot. Mag.* : Curtis's Botanical Magazine.  
*Bourd. For. Trees Trav.* : The Forest Trees of Travancore, by T. F.  
Bourdillon.  
*Brand. For. Fl.* : Illustrations of the Forest Flora of North-West and  
Central India, by D. Brandis.  
*Brandis Ind. Trees* : Indian Trees, by D. Brandis.  
*Brand. Monog.* : Das Pflanzenreich iv. 242—Symplocaceae.  
*Bull. Herb. Boiss.* : Bulletin de l'herbier Boissier.  
*Bull. Jard. Bot. Buit.* : Bulletin du jardin botanique de Buitenzorg.  
*Bull. Madr. Gov. Mus.* : Bulletin of the Madras Government Museum.  
*Bull. Soc. Imp. Nat. Mosc.* : Bulletin de la Société Imperiale des  
Naturalistes de Moscou.  
*Burm. f. Fl. Ind.* : Flora indica, by N. L. Burmann.  
*Calc. Journ. Nat. Hist.* : Calcutta Journal of Natural History.

- Clarke Comp. Ind.* : Compositae Indicae, by C. B. Clarke.
- Cogn. Monog.* : de Candolle's Monographiae phanerogamarum—Melastomaceae.
- Comm. Beng.* : Commelynaceae et Cyrtandraceae bengalensis, by C. B. Clarke.
- Contr. Gray Herb.* : Contributions to the Gray Herbarium.
- Cooke Bomb. Fl.* }  
*Cooke Fl. Bomb.* } Flora of the Presidency of Bombay, by T. Cooke.
- Cor. Pl.* : Coromandel Plants, by W. Roxburgh.
- DC. Fl. Fr.* : Flore française, by A. P. de Candolle.
- DC. Monog.* : de Candolle's Monographiae phanerogamarum.
- DC. Prodr.* : A. de Candolle's Prodrômus systematis naturalis regni vegetabilis.
- D. Don Prodr. Fl. Nep.* }  
*Don Prodr.* } Prodrômus florae Nepalensis, by D. Don.
- Denkschr. Akad. Wien.* Denkschriften der Mathematisch-Naturwissenschaftlichen Classe der Kaiserlichen Akademie der Wissenschaften, Wien.
- Desc. et Ic.* : Descriptionum et iconum novas plantas, by C. I. Rottboell.
- Engl. & Prantl. Naturl. Pflzm.* : Natürlichen Pflanzenfamilien.
- Engl. & Prantl. Naturl. Pfl. Nacht.* : „ „ Nachtrag.
- Engl. Jahrb.* : Engler's Botanische Jahrbücher.
- Engl. Pflanzenr.* }  
*Engl. Pflzreich.* } Das Pflanzenreich.
- Enum. Pl. Zeyl.* : Enumeratio plantarum zeylanicae, by G. H. K. Thwaites.
- Enum. Subst. Braz.* : Enumeração das substancias brazileiras, etc., by Silva Manso.
- Exot. Bot.* : J. E. Smith's Exotic Botany.
- F. B. I.* : The Flora of British India.
- Fl. Cap.* : Flora capensis.
- Fl. Gang. Pl.* : Flora of the Upper Gangetic Plain, by J. F. Duthie.
- Fl. Madr.* : Flora of the Presidency of Madras.
- Fl. Nilg. & Puln.* : Flora of the Nilgiri and Pulney Hill-tops, by P. F. Fyson.
- Fl. N. Z.* : Handbook of the New Zealand Flora, by J. D. Hooker.
- Fl. Trop. Afr.* : Flora of Tropical Africa.
- Forsk. Fl. Aeg.-Ar.* : Flora Aegyptiaco-Arabica, by P. Forsskaal.
- F. R.* : Fedde's Repertorium specierum novarum regni vegetabilis.
- Gaertn. Fruct.* : De fructibus et seminibus plantarum, by J. Gaertner.
- Gard. Chron.* : The Gardener's Chronicle.

- G. Don. Gen. Syst.* : A General System of Gardening and Botany, by George Don.
- Hook. Bot. Misc.* : W. J. Hooker's Botanical Miscellany.
- Hook. Ic. Pl.* : J. D. Hooker's Icones plantarum.
- Hort. Mal.* }  
*Hort. Malab.* } H. van Rheedé's Hortus Indicus Malabaricus.
- Ic. Pl.* : J. D. Hooker's Icones plantarum.
- Ind. For.* : The Indian Forester.
- Ind. For. Rec.* : Indian Forest Records.
- Interp. Rumph. Herb. Amb.* : An Interpretation of Rumphius's Herbarium Amboinense, by E. D. Merrill.
- Journ. As. Soc. Beng.* : Journal of the Asiatic Society of Bengal.
- Journ. Bomb. Nat. Hist. Soc.* : Journal of the Bombay Natural History Society.
- Journ. Bot.* : The Journal of Botany.
- Journ. Ind. Bot. Soc.* : Journal of the Indian Botanical Society.
- Journ. Linn. Soc.* : The Journal of the Linnean Society of London.
- Kew Bull.* : Bulletin of Miscellaneous Information, Royal Botanic Garden, Kew.
- Lamk. Encycl.* : Tableau encyclopédique et méthodique des trois règnes de la nature, by de la Mark.
- Linn. Mant.* : Mantissa plantarum, by C. von Linné.
- Madr. Journ.* : The Madras Journal of Literature and Science.
- Mez Monog. Myrs.* : Das Pflanzenreich IV—Myrsinaceae.
- Monog. Myrist.* : Monographie der Myristicaceen, by O. Warburg.
- Mus. Bot. Lugd. Bat.* : Museum botanicum Lugduno-Batavum, by C. L. Blume.
- Nilg. Hill. Fl.* : Flora of the Nilgiri and Pulney Hill-tops, by P. F. Fyson.
- Not. Bot. Gard. Edin.* : Notes from the Royal Botanic Garden, Edinburgh.
- Nov. Sp. Pl.* : Novae plantarum species, by A. G. Roth.
- O. Kze. Rev. Gen.* : Revisio generum plantarum, by O. Kuntze.
- Pflanzenr.* ; Das Pflanzenreich.
- Philipp. J. Sc.* }  
*Phil. Journ. Sc.* } The Philippine Journal of Science.
- Phyt.* : Phytographia, by C. L. Willdenow.
- Planch. Monog. Vitaceae* : de Candolle's Monographiae phanerogamarum—Ampelideae.
- Pl. As. Rar.* : Plantae asiaticae rariores, by N. Wallich.
- Pl. Hohenack.* : F. A. W. Miquel's MS. identifications on Hohenacker's specimens.

- Pl. Ind. Coimb.*: Plantae indicae qua in montibus coimbatoricis coeruleis collegit B. Schmid, by J. C. Zenker.
- Rec. Bot. Surv. Ind.*: Records of the Botanical Survey of India.
- Rees Cycl.*: Cyclopaedia, by A. Rees.
- Royle Ill.*: Illustrations of the Botany of the Himalayan Mountains, by J. F. Royle.
- S. I. G.*: Handbook of Some South Indian Grasses, by K. Ranga Achariyar and C. Tadulinga Mudaliyar.
- S. I. H. S.*: Flora of the South Indian Hill-stations, by P. F. Fyson.
- Sim's Bot. Mag.*: Curtis's Botanical Magazine, vols. xv–liii.
- Syst. Laur.*: Systema laurinarum, by C. G. Nees.
- Talb. Bomb. List*  
*Talb. Trees and Shrubs, Bomb.* } The Trees, Shrubs and Woody Climbers  
of the Bombay Presidency, by W. A. Talbot.
- Trans. Linn. Soc.*: Transactions of the Linnean Society of London.
- Trav. Trees*: The Forest Trees of Travancore, by T. F. Bourdillon.
- Trimen Fl. Ceyl.*: Handbook of the Flora of Ceylon, by H. Trimen.
- Wall. Cat.*: Catalogue of the Wallich Herbarium.
- W. & A.*: Prodrromus florae Peninsulae Indae orientalis, by R. Wight and G. Walker-Arnott.
- Wt. Contrib.*: Contributions to the Botany of India, by R. Wight.
- Wt. Ic.*: Icones plantarum Indiae orientalis, by R. Wight.
- Wt. Ill.*: Illustrations of Indian Botany, by R. Wight.
- Wt. Spic. Neilgh.*: Spicilegium neilgherrense, by R. Wight.

## OTHER ABBREVIATIONS.

<i>diam.</i> , diameter.	<i>n. sp.</i> , new species.
<i>fig.</i> , figure.	<i>n. var.</i> , new variety.
<i>ft.</i> , foot or feet.	<i>pl.</i> , plate.
<i>Hind.</i> , Hindi.	<i>subsp.</i> , subspecies.
<i>in.</i> , inch or inches.	<i>t.</i> , table.
<i>Kan.</i> , Kanarese.	<i>Tam.</i> , Tamil.
<i>Mal.</i> , Malayalam.	<i>Tel.</i> , Telugu.
<i>Mar.</i> , Marathi.	<i>Ur.</i> , Uriya.
<i>n. comb.</i> , new combination.	<i>Var.</i> , variety.
<i>Nilg.</i> , Nilgiri.	<i>Vern.</i> , vernacular.

## SIGNS.

♂ male ; ♀ female ; ♂ ♀ bisexual.



# GLOSSARY OF BOTANICAL TERMS USED

ACCRESCENT : increasing in size with age.

ACCUMBENT : lying against.

ACHENE : a small, hard, dry, *indehiscent*, 1-seeded fruit; in a strict sense of a single free *carpel*, but also used when more.

ACTINOMORPHIC : symmetrical in several planes.

ACUMINATE : tapering to an acute end.

-ADELPHOUS : of *stamens* united into one or more bundles.

ADNATE : attached by the whole length.

ADVENTITIOUS : arising irregularly and not in the normal order.

AESTIVATION : the manner in which the parts of a flower are arranged and folded before expansion.

ALBUMEN : the nutritive material stored within the seed outside the *embryo*.

ALGIFORM : resembling an alga.

ALVEOLA : a surface cavity.

AMPHITROPOUS : said of an *ovule* curved to bring its two ends near together.

AMPLEXICAUL : stem-clasping, as the bases of some leaves or *petioles*.

ANASTOMOSING : when veins meet and join to form a net.

ANATROPOUS : said of an *ovule* inverted on its *funicle* so that the opening is close to the *hilum* and the *chalaza* at the other end.

ANDROEICUM : the entire male parts of a flower.

ANDROGYNOUS : male and female flowers in the same *inflorescence*.

ANISOMEROUS : when the different series of a flower are unequal in number.

ANNULAR : in the form of a ring.

ANTHER : that part of the *stamen* which contains the *pollen*.

ANTHOCARP : a false-fruit formed by the fusion of the whole or a part of the flower with the fruit itself.

ANTICOUS : the forepart, that most remote or turned away from the *axis*.

APICULA : a short, sharp, but not rigid point.

APOCARPUS : when the *carpels* are free and separate.



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- CAMPYLOTROPOUS : said of an *ovule* curved by unilateral growth so that the true apex is brought near the *hilum*.
- CANCELLED : latticed.
- CANESCENT : becoming grey or hoary.
- CAPILLARY : so slender as to be hair-like.
- CAPSULE : a dry *dehiscent* fruit.
- CARPEL : a single modified leaf forming an *ovary* or part of it and bearing the *ovules*.
- CARPOPHORE : the *axis* of an ovary from which the ripe *carpels* eventually separate.
- CARPOPHYLL : = *carpel*; but often used specially where the carpel is open and the ovules exposed.
- CARTILAGINOUS : hard and tough, like the rind of an apple-pip.
- CARUNCLE : protuberance or peculiar growth near the attachment of a seed.
- CATAPHYLL : the early leaf-forms of a plant, usually without blades.
- CATKIN : a *spike* consisting usually of unisexual flowers without *petals*, solitary or twin in the *axils* of *bracts*.
- CAUDATE : with a tail-like tip.
- CAUDEX : the *axis* of a plant consisting of stem and roots.
- CAUDICLE : a small tail-like organ; in orchids the stalk of the *pollinium*.
- CAULESCENT : having an obvious, though not large stem.
- CAULINE : belonging to or arising from the stem.
- CENTRIFUGAL : developing from the centre outwards.
- CENTRIPETAL : developing from the outside towards the centre.
- CHALAZA : that part of the *ovule* or seed where the nucleus is nearest the *integuments*.
- CHARTACEOUS : papery.
- CHLOROPHYLL : the green colouring matter of plants.
- CIDAL : a suffix denoting *dehiscence*; e. g. *loculicidal*, splitting down the middle of the *carpel*, and *septicidal*, splitting along the *septum*.
- CILIA : a marginal hair.
- CINERACEOUS : somewhat ashy in tint.
- CINEREOUS : the grey of wood-ashes.
- CINNAMOMEUS : the light yellowish-brown tint of cinnamon.
- CIRCINNATE OR CIRCINATE : coiled.
- CIRCUMSCISS : splitting as if cut around transversely.
- CIRRHUS OR CIRRUS : a tendril.
- CLADODE : a branch or single *internode* simulating a leaf.
- CLADOPHYLL : a branch assuming the form and function of a leaf.
- CLAVATE : club-shaped.

- CLAW : the narrowed base of an organ, especially of a *petal*.
- CLEISTOGAMOUS : flowers that are fertilized within the unopened *perianth*.
- COCCUS : one part of a *lobed* fruit becoming more or less detached from the rest and usually derived from a single *carpel*.
- COLLATERAL : placed side by side at the same level.
- COLUMELLA : a persistent axis around which the *carpels* of some fruits are arranged.
- COLUMN : the fusion of stamens or of stamens and styles into a solid body.
- COMA : the tuft of hairs at the end of some seeds ; the tuft of empty *bracts* at the summit of some *inflorescences*.
- COMMISSURE : the face of adherence of 2 *carpels*.
- COMPLICATE : folded lengthwise upon itself.
- COMPOUND : formed of similar parts grouped in a whole ; of leaves when composed of more than one separate leaflet.
- CONCOLOROUS : uniform in colour.
- CONDUPLICATE : folded together lengthwise.
- CONFERRUMINATE : adhering by adjacent faces.
- CONFLUENT : blended or merged into one.
- CONNATE : united to one another.
- CONNECTIVE : the portion of a *stamen* distinct from the *filament* which connects the *lobes* or cells of an *anther*.
- CONNIVENT : in contact or weakly cohering.
- CONTORTUPLICATE : twisted back upon itself.
- CONVOLUTE : rolled up from one or both margins.
- CORDATE : heart-shaped, *i. e.* more or less deeply notched at the base and in form like a conventional heart.
- CORIACEOUS : leathery.
- CORM : a bulb-like fleshy stem or base of a stem.
- CORNICULATE : bearing one or more little horns.
- COROLLA : the interior series of the *perianth*.
- COROLLINE : resembling *petals* in texture.
- CORONA : an inner appendage to the *corolla* shaped like a coronet, or a more or less interrupted outer appendage to the *stamens*.
- CORYMB : a form of *centripetal inflorescence* where the branches or *pedicels* arise at different levels but attain to nearly the same height to form a flat-topped or slightly domed cluster.
- COSTATE : ribbed.
- COTYLEDON : the leaf or pair of leaves present on the embryonic plant while still in the seed.
- CRENATE : scalloped or toothed with rounded teeth.

CRISTATE : crested.

CUCULATE : hood-shaped.

CULM : the stem, usually hollow, of grasses and bamboos.

CUNEATE : wedge-shaped.

CUPULE : a small cup.

CUSP : a sharp, usually rigid terminal point or *beak*.

CYMBIFORM : boat-shaped.

CYME : a *centrifugal inflorescence* in which the secondary or lateral branches continue to grow and may extend beyond the main *axis*.

CYSTOLITH : a mineral concretion in a cell of a leaf.

DECIDUOUS : falling off, not *persistent*.

DECLINATE : bent or curved downward or forward.

DECOMPOUND : repeatedly divided or branched or *compound*.

DECURRENT : prolonged downwards from the base.

DECUSSATE : in pairs alternately at right angles.

DEFINITE : not numerous, of *stamens* not exceeding 15.

DEHISCENT : splitting into definite parts.

DELTOID : shaped like an equilateral triangle.

DENTATE : sharply toothed, especially with teeth not pointing forward.

DICHASium : a *centrifugal inflorescence* in which all the *axes* end in flowers from below which lateral opposite branchlets arise.

DICHOTOMOUS : forked.

DICLINOUS : unisexual, the *stamens* and *pistil* in separate flowers.

DIDYMOUS : in equal pairs or connected halves.

DIDYNAMOUS : in two unequal pairs.

DIGITATE : spreading like the fingers of a hand ; in a compound leaf, when the leaflets are all borne at the apex of the *petiole*.

DIMIDIATE : one half wanting or rudimentary or apparently so.

DIMORPHOUS : occurring in two different forms.

DIOECIOUS : the two sexes segregated on different plants.

DISK or DISC : a development of the *torus* within the calyx and under or outside the *pistil*.

DISSEPIMENT : a partition in an *ovary* or *pericarp*.

DISTICHOUS : arranged in two vertical rows.

DIVARICATE : extremely divergent.

DORSAL : relating to the back ; the surface turned away from the *axis*.

DREPANIFORM : sickle-shaped.

DRUPE : a fruit with a more or less succulent flesh enclosing a single, 1-many-celled stone.

ECHINATE : beset with prickles or spines.

EFFUSE : loosely and widely spreading.

ELLIPSOID : an elliptical solid body.

EMARGINATE : rather deeply notched at the apex.

EMBRYO : the incipient new plant within the seed.

ENDOCARP : the inner layer of the wall of a fertilized *ovary* or a fruit.

ENSIFORM : sword-shaped.

EPICALYX : a whorl of bracts on or just below the *calyx* and more or less resembling it.

EPICARP : the external layer of the wall of a fertilized *ovary* or a fruit.

EPICHILE : the terminal part of the *lip* of an orchid flower when it is distinct from the *hypochile*.

EPIGYNOUS : borne on the *ovary* or apparently so.

EPIPHYTE : a plant growing on another.

EQUABLE : even ; uniform.

EQUITANT : folded over as if astride ; said of leaves when in vertical rows with the bases of the outer sheathing those of the inner.

EROSE : eroded ; appearing torn or frayed at the edge.

EXCURRENT : running out beyond the tip or margin.

EXOCARP : the outer layer of a *pericarp*.

EXOGENOUS : arising from the superficial tissues.

EXTORSE : directed outwards ; often referring to the opening of anthers.

FALCATE : sickle-shaped.

-FARIOUS : a suffix indicating parts, *e. g. bifarious*, in 2 parts ; *quadri-farious*, in 4 parts.

FASCICLE : a close cluster or bundle.

FASTIGIATE : with branches all clustered and erect.

FENESTRATE : pierced with holes.

-FEROUS : a suffix meaning bearing, *e. g. floriferous*, bearing flowers.

FERTILE : capable of producing fruit ; also used of *stamens* provided with pollen.

-FID : cleft ; *e. g. bifid*, 2-cleft.

FILAMENT : the stalk of an *anther* ; any thread-like body.

FILIFORM : thread-shaped.

FIMBRIATE : fringed.

FISTULAR : hollow throughout the length.

FLABELLATE : fan-shaped.

FLACCID : limp, flabby.

FLAGELLUM : a whip-like appendage.

- FLOCCOSE or FLOCCULENT : bearing or clothed with locks of soft hair or wool.
- FOLIACEOUS : of the texture and shape of a leaf ; also leafy.
- FOLLICLE : a fruit of one *carpel* opening by a *ventral suture* to which the seeds are attached.
- FOVEA or FOVEOLA : a pit or depression.
- FRAGAL : a suffix indicating breaking or splitting.
- FUCOID : resembling seaweed.
- FUGACIOUS : soon perishing ; rapidly falling off.
- FULVOUS : tawny.
- FUNICLE : the stalk present in many *ovules* or seeds.
- FURCATE : forked.
- FURFURACEOUS : scurfy, covered with bran-like scales or powder.
- FUSCOUS : dusky, greyish-brown.
- FUSIFORM : spindle-shaped.
- GALEATE : helmet-shaped.
- GAMO- : a prefix indicating union, *e. g. gamopetalous, petals* united by their edges into one piece.
- GEMINATE : in pairs.
- GENICULATE : bent abruptly like a knee.
- GIBBOUS : swollen on one side ; humped.
- GLABROUS : without any kind of hairs.
- GLABRESCENT : with deciduous hairs and becoming glabrous.
- GLAUCOUS : sea-green or blue-green.
- GLOCHIDIATE : bearing barbed bristles.
- GLUMACEOUS : resembling the outer empty floral *bracts* of grasses.
- GONOPHORE : an elongation of the *axis* of a flower bearing the *stamens* and *carpels*.
- GONOUS : a suffix indicating an angled body, *e. g. trigonous, 3-angled*.
- GYNAECIUM : the entire female part of a flower.
- GYNANDROUS : the *stamens* adnate to or borne on the *pistil*.
- GYNOBASIC : applied to a style arising from the base of the *carpels*.
- GYNOPHORE : an elongation of the *axis* forming a stalk to the *ovary*.
- HASTATE : halberd-shaped ; with 2 acute basal *lobes* turned outwards.
- HELICOID : coiled like a snake-shell ; applied to an inflorescence which is more or less coiled with all the flowers on one side.
- HERMAPHRODITE : with the flowers bisexual.
- HETEROGAMOUS : bearing 2 kinds of flowers sexually dissimilar.
- HETEROGENEOUS : not uniform in kind.
- HETEROMORPHOUS : not uniform in structure.

- HILUM : the scar left on a seed at the former point of attachment.
- HIRSUTE : bearing long tolerably distinct hairs.
- HISPID : with rough or bristly hairs.
- HOMOGAMOUS : bearing only one kind of flower.
- HOMOGENEOUS : all of the same kind.
- HYALINE : thin and transparent.
- HYGROSCOPIC : apt to swell and expand on the application of water and shrink on its removal.
- HYPOCARP : an enlargement of the *pedicel* below the fruit.
- HYPOCHILE : the basal portion of the *lip* in an orchid flower.
- HYPOCRATERIFORM : salver-shaped.
- HYPOGYNOUS : free from but inserted below the *pistil*.
- IMBRICATE : overlapping like the tiles on a roof.
- IMPARIPINNATE : *pinnate* with an odd terminal member.
- IMPERFECT : where certain parts usually present are not developed *e. g.* when one sex is absent in a flower.
- INCUMBENT : resting or leaning upon.
- INDEFINITE : too many for easy enumeration, of *stamens* when exceeding 15.
- INDUMENTUM : a covering, such as of hairs.
- INDUPLICATE : with the edges folded inwards.
- INDURATED : hardened.
- INFLORESCENCE : the disposition of the flowers on the floral *axis* the flower clusters as a whole.
- INFUNDIBULAR : funnel-shaped.
- INNOVATION : a new-formed shoot.
- INTEGUMENT : the covering of an organ or body.
- INTERCALATED : interposed.
- INTERNODE : the portion of an *axis* between two adjacent *nodes*.
- INTERPETIOLAR : between two opposite petioles.
- INTRAPETIOLAR : within the petiole, or between it and the stem.
- INTRORSE : directed inwards, usually referring to the opening *anthers*.
- INVOLUCEL : an inner wrapping.
- INVOLUCRE : a ring of free or more or less united *bracts* surrounding several, rarely 1. flowers or their supports.
- INVOLUTE : rolled in from both margins so that the upper side is within.
- IRREGULAR : symmetric only on either side of a median plane.
- ISOMEROUS : having the members of successive series in equal number.
- KEEL : a ridge like the keel of a boat.



- LABIATE : lipped, *i. e.* divided at the apex to shape like lips, usually 2.
- LACINIATE : irregularly cut into narrow *lobes*.
- LACUNOSE : a surface covered with depressions, or perforated with holes.
- LAMELLA : a thin plate.
- LAMINA : the blade of a leaf.
- LANATE : clothed with woolly and intergrown hairs.
- LANCEOLATE : shaped like a lance-head.
- LEGUME : a 1-celled, 2-valved, *dehiscent* fruit.
- LENTICEL : *lenticular* corky spots on young bark.
- LENTICULAR : shaped like a biconvex lens.
- LEPIDOTE : beset with small scurfy scales.
- LIGNIFIED : converted into wood.
- LIGULE : a strap-shaped organ ; in grasses and some sedges a narrow transverse appendage at the base of the leaf within.
- LINEAR : several times longer than wide.
- LINEOLATE : marked with fine or obscure lines.
- LIP : one of the sections of a lipped organ ; in orchids the third petal, which is usually enlarged and dissimilar to the others ; also used in other flowers for a petal distinct in form from the others.
- LOBE : any division of an organ, or specially a rounded division or projection.
- LOCULE : a cell.
- LOMENTUM : a legume contracted between the seeds and falling apart when mature at the constriction between the seeds.
- LORATE : strap-shaped.
- LUNATE : crescent- or halfmoon-shaped.
- LYRATE : *pinnatifid* with the terminal *lobe* large and rounded and the lower lobes small.
- MACROPODAL : long-footed or long-stalked.
- MARCESCENT : remaining attached after withering.
- MERICARP : a portion of a fruit which splits away and simulates a perfect fruit.
- MEROUS : a suffix used in combination to indicate the number of the parts, *e. g.* *trimerous* in threes.
- MESOCARP : the middle layer of a *pericarp*.
- MITRIFORM : mitre-shaped.
- MONILIFORM : resembling a string of beads.
- MONOECIOUS : with the male and female parts in different flowers but on the same individual plant.
- MUCOUS : slimy.



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- MUCOUS : slimy.

- MUCRO : a short sharp terminal excrescence, rather longer than an *apicula* but shorter than a *cuspid*.
- MURICATE : rough with short, hard, tubercular excrescences.
- MUTICOUS : blunt ; without any apical excrescence.
- NATE : a suffix used in combination to indicate the number of parts, *e. g. binate*, in pairs ; *ternate*, in threes.
- NECTARY : an organ in which nectar is excreted ; sometimes applied to any anomalous part of a flower, such as a *spurred* petal.
- NODE : the part of an axis whence a secondary member or whorl of members arises.
- NODOSE : knotty or knobby.
- NUT : a hard, dry, *indehiscent* 1-seeded fruit ; often also applied to a similar single part of a several-celled fruit.
- OB- : used as a prefix inverts the term affixed.
- OBLATE : spherical but flattened at the poles.
- OCHREA OR OCREA : a tubular *stipule* or pair of combined *stipules*.
- OID : a suffix indicating similarity to the term prefixed, *e. g. petaloid*, resembling *petals*.
- OLIVACEOUS : olive-coloured.
- OPERCULUM : a lip or cover which separates by transverse *dehiscence*.
- ORBICULAR : circular in outline.
- ORTHOTROPOUS : an ovule with a straight *axis*, the *chalaza* close to the *hilum* and the orifice at the opposite end.
- OVARY : that part of the *pistil* which contains the *ovules*.
- OVATE : egg-shaped.
- OVULE : the incipient seed before fertilization.
- PALATE : the prominent lower *lip* of certain *corollas* ; the throat of some *2-lipped corollas*.
- PALEA : chaffy or *hyaline* scale present in the *inflorescence* of some plants.
- PALMATE : diverging like the widely spreading fingers of a hand.
- PANDURIFORM : fiddle-shaped.
- PANICLE : a repeatedly branched *inflorescence*.
- PAPILLA : a soft superficial protuberance or gland.
- PAPPUS : various tufts of hairs on some achenes or fruits, specially the scaly, bristly, hairy or feathery modified *calyx* in the *Compositae*.
- PARIETAL : borne on the wall.

- PARIPINNATE : *pinnate* with an equal number of members on each side of the axis and no odd terminal one.
- PARTITE : a suffix denoting division deeper than to the middle.
- PATENT : spreading.
- PECTINATE : *pinnately* cut in narrow segments set close like the teeth of a comb.
- PEDATE : *palmately* divided with the lateral divisions 2-cleft.
- PEDICEL : the stalk of a single flower.
- PEDUNCLE : the common stalk of 2-many flowers or of a complete inflorescence.
- PELTATE : shield-shaped ; said of leaves of which the *petiole* is attached to the lower surface of the blade and not at the margin.
- PENICILLATE : shaped like an artist's brush, with a terminal tuft of hairs.
- PENNATE : with members or incisions more or less regularly placed on either side of the median line, resembling the arrangement in a feather.
- PERFECT : an organ or a flower in which all the normal parts are present.
- PERGAMENTACEOUS : parchment-like.
- PERIANTH : the flower envelopes of 1 or 2 series, *i. e.* *calyx* and *corolla* ; more commonly used when the two series are not differentiated or when only one of them is present.
- PERICARP : the wall of a fertilized *ovary* ; sometimes improperly used for the protective husks of a fruit.
- PERIGYNOUS : said of the floral parts other than the pistil when they are inserted above the level of the base of the *ovary*, but not above the *ovary*.
- PERISPERM : the nutritive tissue outside the *embryo* sac which remains in the seed until absorbed ; sometimes the *pericarp* or even the *integuments* of a seed.
- PERSISTENT : remaining attached until the part bearing it is wholly matured.
- PERULATE : furnished with protective scales.
- PETAL : a single member of the *corolla*.
- PETIOLE : the stalk of a leaf.
- PHYLLODE : a *petiole* assuming the form and function of a leaf.
- PILOSE : hairy with rather long, soft, distinct hairs.
- PINNATE : organs or leaflets arranged on each side of a common *axis* as in a feather.
- PISIFORM : pea-shaped.
- PISTIL : the complete female part of a flower.

PISTILLODE : a rudimentary *pistil*.

PLACENTA : the part of the *ovary* that bears the *ovules*.

PLANO-CONVEX : flat on one side and convex on the other.

PLICATE : folded into plaits, usually lengthwise.

PLUMOSE : feathery or feathered.

PLUMULE : the primary leaf-bud of an *embryo*.

POLLEN : the fertilizing powdery, granular or waxy bodies produced  
· in the *anthers*.

POLLINIA : a *pollen* mass, specially in orchids.

POLLINIFEROUS : bearing or containing *pollen*.

POLY- : a prefix indicating the presence of many of the affixed objects.

POLYGAMOUS : with both bisexual and unisexual flowers on the same  
or on different individual plants.

POSTICOUS : on the back-part ; next to the *axis*.

PREMORSE : as though bitten off, *i. e.* the end *truncated* and more or  
less irregular.

PROCUMBENT : lying along the ground.

PROLIFEROUS : bearing progeny as offshoots.

PRUINOSE : with a waxy-powdery secretion ; bloom.

PUBERULOUS : slightly hairy with very short hairs.

PUBESCENT : clothed with soft, rather short hairs or down.

PULVINUS : an enlargement close to the insertion of a leaf or the  
swollen base of the *petiole*.

PUNCTATE : marked with dots, depressions or glands.

PUNGENT : ending in a rigid and sharp point ; a sharp taste or smell.

PUSTULATE : pimply ; as though blistered.

PUTAMEN : the shell of a nut ; the hardened *endocarp* of a stone-fruit.

PYRENE : a nutlet ; one of the small stones of a drupe or similar fruit.

PYRIFORM : pear-shaped.

QUADRATE : squared.

RACEME : a *centripetal inflorescence* with lengthened *axis* and equally  
*pedicellate* flowers.

RADIANT : when the flowers on the outer rim of an *umbel* are larger  
than the inner.

RADICAL : arising from the root or its crown.

RADICLE : the rudimentary root of the *embryo*.

RAMULUS : branchlet.

RAPHE : the ridge formed by the adherent *funicle* along the side of  
some *ovules*.

RAPHIDES OR RHAPHIDES : needle-shaped crystals in the cells.

- RECEPTACLE : that part of the *axis* that bears one or more organs or flowers.
- REGULAR : symmetrical in several planes.
- RENIFORM : kidney-shaped.
- REPAND : with wavy margin, but less so than if *sinuate*.
- REPLICATE : folded down so that the upper part comes against the lower.
- RESUPINATE : upside down or appearing so.
- RETICULATE : resembling network.
- RETINACULUM : the horny curved *funicle* of many *Acanthaceae*.
- RETROSE : directed backwards or downwards.
- RETUSE : a shallow notch in a rounded apex.
- REVOLUTE : rolled back from the margins or apex so that the upper face is outside.
- RHACHÉOLA OR RHACHILLA : a secondary *axis* in the inflorescence of grasses.
- RHACHIS OR RACHIS : the *axis* of an *inflorescence* or of a *compound* leaf.
- RHIZOME : an underground stem, usually horizontal and elongated.
- ROSTELLUM : a small beak ; a narrow extension of the upper edge of the *stigma* in some orchids.
- ROSTRATE : beaked with slender tip.
- ROSULATE : with clustered leaves collected into a rosette.
- ROTATE : wheel-shaped ; said of a *gamopetalous corolla* with a short tube and spreading limb.
- RUFIOUS : reddish.
- RUGOSE : thrown into wrinkles.
- RUMINATE : said of a seed with the *testa* projected as points and plates into the *albumen*.
- RUNCINATE : incised with the teeth or *lobes* directed backwards.
- SACCATE : bag-shaped.
- SAGITTATE : arrow-head-shaped with the base enlarged into two straight, acute lobes.
- SAMARA : an *indehiscent* winged fruit, or winged parts of a dehiscing fruit.
- SAPROPHYTIC : feeding on decayed organic matter, such as humus.
- SARMENTOSE : producing long and lithe runners.
- SCABRID : covered with small hard hairs or points and feeling rough.
- SCABROUS : very *scabrid*.
- SCANDENT : climbing.
- SCAPE : a leafless, or at most 1-leaved, floral *axis* or *peduncle* arising directly from the root.

SCAPIGEROUS : scape-bearing.

SCARIOUS : thin, dry and membranous, not green.

SCORPIOID : said of an *inflorescence* with flowers in 2 ranks and the *axis* coiled like the tail of a scorpion.

SCROBICULATE : pitted.

-SECT : suffix used to denote division of an organ to its base or nearly so into the number of parts stated by the prefix.

SECUND : with the parts or members all directed to one side.

SEPAL : a single member of the *calyx*.

SEPTUM : any kind of interior wall or partition.

SERRATE : with forward-pointing, sharp marginal teeth.

SESSILE : without stalk.

SETA : a bristle or long, stiff, needle-like hair.

SIGMOID : doubly curved in opposite directions, like the letter S.

SILIQUA : a fruit with two valves falling away from a frame on which the seeds are attached and across which a false partition is formed.

SINUATE : with a deeply wavy margin.

SINUS : a recess or re-entering angle.

SPADIX : a flower *spike* with a fleshy *axis*.

SPATHE : a more or less modified *bract* enclosing or subtending a flower-cluster or complete *inflorescence*.

SPATHEOLE : a small secondary spathe on a partial *inflorescence*.

SPATHULATE : narrowly oblong with the end expanded and broader, more or less like a chemist's spatula.

SPHACELLATE : dark and withered, as though dead.

SPICIFORM : *spike*-like.

SPICULE : a diminutive or secondary *spike*.

SPIKE : an *inflorescence* with *sessile* flowers on a usually elongate *axis*.

SPIKELET : a cluster of 1 or more flowers each in the *axil* of one or a pair of *bracts* and subtended by 2, rarely 1, empty *bracts*.

SPINULOSE : bearing small spines.

SPUR : a hollow, or sometimes solid, extension of some part of a flower.

SQUARROSE : with numerous spreading and outstanding processes.

STAMEN : the floral organ bearing the *anther* and *pollen*.

STAMINODE : a sterile or abortive *stamen* without pollen.

STELLATE : with its parts radiating like the points of a conventional star.

STERILE : barren ; devoid of one or other of the sexual parts.

STIGMA : that part of the *pistil* which receives the *pollen*.

STIPE : the stalk or support of an *ovary* or *carpel*.

STIPELLA : the *stipule* of a leaflet.



STIPITATE : stalked.

STIPULE : one of a pair of appendages borne on each side of the base of the leaves or *petioles* of many plants.

STOLON : a sucker ; any basal branch that is disposed to form roots.

STOMA : an aperture in the epidermis of young branches.

STRAMINEOUS : straw-coloured.

STRIATE : marked with longitudinal, parallel fine lines.

STRIGOSE : beset with sharp-pointed, appressed, straight, stiff hairs.

STROBILATE : resembling the cone of conifers ; an *inflorescence* largely made up of *imbricating* scales.

STROPHIOLE : an appendage to the *hilum* of some seeds.

STYLE : that part of the *pistil* between the *carpel* and the *stigma*.

STYLOPOD : an enlargement at the base of some styles.

SUB- : a prefix implying an approach to the condition indicated by the suffix without quite attaining to it ; also giving the sense of subordinate to.

SUBULATE : awl-shaped ; slender, terete and tapering to a sharp tip.

SUCCULENT : soft and juicy.

SULCATE : grooved or furrowed.

SUTURE : a junction or seam of union ; line of opening.

SYNANDRIUM : where the *stamens* are united throughout.

SYNCARPIUM : a multiple or fleshy aggregate fruit.

SYNCARPOUS : composed of 2 or more united *carpels*.

TABESCENT : wasting or shrivelling.

TEGMEN : the inner coat of a seed.

TEPAL : a division of a *perianth*, usually employed when there is no distinction between the 2 series ; one of the 2 unchanged *petals* of orchids.

TERETE : cylindrical and circular in cross-section.

TESSELLATE : chequered.

TESTA : the outer coat of a seed.

THALLUS : a vegetative body without differentiation into stem and leaf ; the organ of attachment of some *Podostemonaceae*.

THECOUS : celled.

THYRSE : a close *panicle*, more or less spindle-shaped or *ovate*.

TIGELLUS : a miniature or initial stem.

TOMENTOSE : densely matted with woolly hairs.

TORULOSE : more or less cylindric but with alternate swellings and constrictions.

TORUS : that portion of the *axis* of a flower on which its parts are inserted.



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# ARTIFICIAL KEY TO THE FAMILIES

N.B.—*This Key has been adapted mainly from that in Sir D. Prain's 'Bengal Plants,' with the author's kind permission. The necessary modifications make it applicable only to the present flora. Dr. J. Hutchinson's 'Families of Flowering Plants' has also been of help.*

Ovules naked, not enclosed but borne on an open carpel, devoid of stigma. Wood usually with no true vessels (except in *Gnetaceae*); cotyledons 2-many; flowers always 1-sexual (*Gymnospermae*):—

Large climbers; leaves simple; flowers monoecious, whorled in the axils of bracts on solitary or paniced spikes; perianth present

CXLIII. GNETACEAE.

Trees or shrubs; flowers in cones or quasi cones; perianth 0:—

Leaves simple, scale-like, needle-like or flat and lanceolate, up to 8 in. long . . . . . CXLIV. CONIFERAE.

Leaves pinnate, resembling palm leaves, 3-9 ft. long; petioles more or less spiny . . . . . CXLV. CYCADACEAE.

Ovules enclosed in the carpels, crowned by a style and stigma. Wood, when present, consisting of true vessels; cotyledons 1-2 (ANGIOSPERMAE):—

Stem with a central pith surrounded by one or more concentric rings of woody vascular tissue enclosed in a separable bark; leaves usually articulated on the stem and usually with branched or reticulated veins; cotyledons usually 2, opposite, the young stem arising between them (*Dicotyledones*):—

Calyx and corolla usually both present; flowers mostly bisexual (*Dichlamydeae*):—

Petals usually free; stamens often numerous (*Polypetalae*):—

Stamens hypogynous, arising apart from the calyx direct from the receptacle or from a disk crowning the pedicel;

segments of calyx usually free (*Thalamiflorae*):—

Sepals usually imbricate in bud; if valvate, then sepals free, leaves opposite, stamens many and fruitlets separate; or with paripinnate leaves and arillate seeds:—

Sepals usually free; if united below, then the petals dissimilar (*Resedaceae*); or leaves opposite and simple or imparipinnate; or leaves alternate and paripinnate:—

Stamens more than 12; if fewer, then sepals 4 and petals 4 with a 2-valved capsule or a berried fruit on a long gynophore; or sepals 2 with a central placenta; or the stamens attached to the base of the petals:—

Sepals 2–3, deciduous:—

Petals more or less like the sepals, in 2–many more or less distinct 3-nate whorls; carpels many in several whorls; trees, shrubs or climbers

### III. MAGNOLIACEAE.

Petals coloured, unlike the green sepals; herbs:—

Sepals 2 and petals 4, or sepals 3 and petals 6; placentas parietal. Leaves alternate, more or less lobed or cut; sap milky or yellow

### VIII. PAPAVERACEAE.

Sepals 2, petals 4–5; placentas free-central. Leaves opposite or alternate, entire, sometimes terete; sap watery

### XVIII. PORTULACACEAE.

Sepals 4 or more; if 2–3, then trees with opposite or 3-nate, leathery leaves and resinous juice:—

Petals many in several whorls or in a continuous spiral with the sepals; aquatic plants with submerged rootstock . . . . VII. NYMPHAEACEAE.

Petals usually 4–5, rarely 6–12, in I, rarely 2 whorls; or if petals many then terrestrial climbers with the petals like staminodes and with opposite cirrhiferous leaves:—

Petals all similar and entire:—

Sepals deciduous:—

Carpels quite free when ripe; ovule 1, ascending or pendulous

### I. RANUNCULACEAE.

Carpels cohering in a 1-locular ovary with parietal or intruded placentas; ovules 2–many:—

Herbs; or if shrubs or trees, then with ovary and fruit borne on a long gynophore; sepals 4 . . . XI. CAPPARIDACEAE.

FLORA OF MADRAS:

Trees or shrubs with sessile ovary and fruit; sepals usually 5, sometimes 3-8

XIV. BIXACEAE.

Sepals persistent :—

Leaves alternate :—

Stamens quite free from the petals :—

Carpels 1-many, distinct or cohering in the axis of the flower; disk 0; styles quite free ...II. DILLENACEAE.

Carpels united into a superior deeply 3-10-lobed and -celled ovary embedded in a lobed disk; styles connate

XXXVI. OCHNACEAE.

Stamens attached to the bases of and deciduous with the petals

XXIII. TERNSTROEMIACEAE.

Leaves opposite, sometimes whorled :—

Herbs or shrubs without resinous juice; leaves herbaceous, gland-dotted; flowers bisexual, 5-merous

XXI. HYPERICACEAE.

Trees with resinous juice; leaves coriaceous, not gland-dotted; flowers usually 1-sexual or polygamous, usually 4-merous . . . . . XXII. GUTTIFERAE.

Anterior petals palmately lobed, posterior narrow entire; ovary 1-celled, 2-6-lobed at the apex; small herbs . . . . XII. RESEDACEAE.

Stamens 10 or fewer :—

Flowers usually 3-merous; if 2-merous, then 1-sexual; carpels solitary or free; stamens 6, free, equal, opposite the petals; leaves alternate :—

Dioecious, scandent herbs or shrubs; flowers very small; anthers dehiscing by slits; carpels 3; seeds usually reniform or horseshoe-shaped

V. MENISPERMACEAE.

Bisexual, erect shrubs; flowers patent, carpel 1; anthers sensitive, dehiscing by valves

VI. BERBERIDACEAE.

Flowers 4-5-merous (sepals 2 in *Fumariaceae*) :—

Petals 4; stamens 6 :—

Sepals 2; petals 4 in 2 dissimilar pairs; stamens

in 2 bundles of 3 united; fruit without partition . . . . . IX. FUMARIACEAE.  
 Sepals 4; petals 4, uniform; stamens in 2 rows, free, filaments of inner 4 long, of outer 2 shorter; fruit with an internal partition

## X. CRUCIFERAE.

Petals usually 5, sometimes 4, rarely 2-3; perfect stamens as many as or twice as many as the sepals and petals, rarely fewer, never 6:—

Ovary 1-celled; sepals usually persistent:—

Leaves developed, flat, never scale-like:—

Stamens as many as the sepals; placentas parietal:—

Leaves stipulate; ovary 1-celled; sap not pungent; herbs with irregular corolla or trees with regular corolla

## XIII. VIOLACEAE.

Leaves exstipulate; ovary incompletely 2-3-celled; sap pungent; trees

## XV. PITTOSPORACEAE.

Stamens twice as many as the sepals; placentas free-central; herbs

## XVII. CARYOPHYLLACEAE.

Leaves minute, scale-like; shrubs

## XIX. TAMARICACEAE.

Ovary 2- or more-celled; or if 1-celled, then distinctly stipitate:—

Filaments of anthers free; or if united at the base (some *Geraniaceae*), then with compound or deeply palmately lobed leaves:—

Leaves stipulate:—

Seeds many, attached to the inner angles of the cells; flowers regular; carpels as many as the sepals; small herbs with simple, opposite leaves

## XX. ELATINACEAE.

Seed 1 in each cell, less often 2; if more than 2 and attached to the inner angles of the cells, then flowers irregular or leaves compound:—

Seeds pendulous:—

Leaves compound, opposite ;  
stamens always 10, quite free

XXXII. ZYGOPHYLLACEAE.

Leaves simple ; or if compound,  
then alternate ; stamens usually  
5, filaments often united at the  
base ; anthers sometimes cohering ;  
flowers often irregular

XXXIII. GERANIACEAE.

Seeds erect :—

Leaves imparipinnate ; fruit a  
berry .. XLVIII. STAPHYLEACEAE.

Leaves simple ; fruit of 2 winged  
carpels ..... XLIX. ACERACEAE.

Leaves exstipulate ; flowers often zygo-  
morphic ; stamens usually 8, inserted  
inside the disk or between it and the  
ovary, rarely outside .. L. SAPINDACEAE.

Filaments of anthers more or less united ;  
leaves simple, alternate ; seeds pendulous :—

Flowers irregular ; sepals 5, unequal ;  
petals usually 3, or if 4–5, then keeled ;  
stamens usually 8 ; if fewer, then anthers  
opening by pores, all or all but 2 united  
into a sheath attached to the base of the  
petals ; ovary 1–3-celled ; style single

XVI. POLYGALACEAE.

Flowers regular ; sepals 4–5, equal ; petals  
4–5 ; stamens 5 or 10, filaments united  
below, free from the petals ; anthers  
opening by slits ; ovary 3–5-celled ; styles  
3–5, free or more or less connate

XXX. LINACEAE.

Sepals more or less united at the base :—

Stamens 5 to very many ; sepals 5, 2 or more of them  
enlarged in fruit ; petals 5, contorted ; leaves simple  
alternate, not gland-dotted ; trees with resinous sap ;  
stamens 10–100 ; ovary 3-celled, cells 2-ovuled ;  
style single ..... XXIV. DIPTEROCARPACEAE.

Stamens 3–12 ; if more numerous, then leaves  
gland-dotted :—

Leaves pellucid gland-dotted, simple or compound ;

sepals and petals 5 ; stamens sometimes numerous, inserted outside a prominent disk ; trees or shrubs, sometimes climbing, sometimes thorny

## XXXIV. RUTACEAE.

Leaves not gland-dotted :—

Leaves opposite, simple ; calyx-lobes and petals 5 ; stamens 10 ; disk obscure ; ovary 3-celled, cells 1-ovuled . . . . . XXXI. MALPIGHIACEAE.

Leaves alternate ; or if opposite, then disk large or stamens 5 :—

Carpels syncarpous and septate or apocarpous ; ovules few :—

Stamens alternate with the petals :—

Ovules and seeds pendulous ; or if horizontal (some *Meliaceae*), then the filaments united into a tube :—

Leaves compound ; or if simple, then the filaments united into a tube :—

Filaments free ; fruit drupaceous, indehiscent ; leaflets opposite

## XXXV. SIMARUBACEAE.

Filaments united into a tube ; or if free, then the fruit capsular or the leaflets alternate . . . . . XXXVIII. MELIACEAE.

Leaves simple :—

Petals 2-lobed, imbricate ; raphe of seed ventral

## XXXIX. DICHAPETALACEAE.

Petals entire ; raphe of seed dorsal :—

Petals valvate ; fruit 1-celled, 1-seeded . . . . . XLII. ICACINACEAE.

Petals imbricate ; fruit of 3–5 1-seeded, free or connate stones

## XLIII. AQUIFOLIACEAE.

Ovules and seeds erect or ascending :—

Ovary 3–5-celled ; leaves simple :—

Sepals and petals 4–5 ; stamens 4–5 ; seeds arillate, usually albuminous

## XLIV. CELASTRACEAE.

Sepals and petals 5 ; stamens 3 ; seeds not arillate, not albuminous, sometimes winged . . . . . XLV. HIPPOCRATEACEAE.



Ovary 1-celled; or if 2-5-celled, then leaves compound

## LII. ANACARDIACEAE.

Stamens opposite the petals:—

Petals valvate:—

Leaves exstipulate; ovules and seeds pendulous; fruit 1-celled, 1-seeded:—

Flowers in open racemes or cymes; bracts, if present, very small; ovary 3-5-celled; or if 1-celled, then trees or climbers with tendrils

## XL. OLACACEAE.

Flowers in cone-like racemes or spikes (at least in bud); bracts patent; ovary 1-celled; climbers without tendrils . . . . . XLI. OPILIACEAE.

Leaves stipulate; ovules and seeds erect or ascending; fruit usually 2-celled, 2-6-seeded, rarely 1-celled, 1-seeded

## XLVII. VITACEAE.

Petals imbricate; styles 2-3, free or connate; leaves exstipulate

## LI. SABIACEAE.

Carpels syncarpous, 1-celled:—

Climbing shrubs with hooked branchlets; leaves simple; stamens 5-10; staminodes 0; ovary sessile; styles 3; ovule 1, erect or lateral

## XXV. ANCISTROCLADACEAE.

Erect trees; leaves 2-3-pinnate; disk large, lining the calyx-tube; stamens 5; staminodes 5-7; ovary stipitate; style single; ovules numerous on 3 parietal placentas

## LIII. MORINGACEAE.

Sepals valvate in bud; or if imbricate or subimbricate, then with valvate petals or 3-merous, 2-sexual flowers, or anthers dehiscing by pores or valves, or trees with balsaminous sap:—

Flowers 3-merous; sepals free, rarely united; stamens free, usually numerous; ripe carpels free, often stalked, rarely (*Anona*) conjoined; leaves simple; pith trabeculate . . . . . IV. ANONACEAE.



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Stems herbaceous or woody; or if fleshy, then not flattened or articulated; leaves patent:—

Ovary of 1 or more free carpels; or if carpels united, then more than 1-celled, or if 1-celled, then small herbs with pendulous ovules, or leaves radical and not glandular:—

Ovules attached to the inner angles or the bases of the carpels or cells; or if to the apex, then ovules very many:—

Carpels solitary excentric; style terminal; flowers irregular with 10 or fewer stamens or regular and usually with numerous stamens; ovules 1-many on the inner angle of the carpel; leaves almost always stipulate . . . . .LV. LEGUMINOSAE.

Carpels several; or if solitary, then the style not terminal or ovules at the base of the carpel and leaves exstipulate:—

Flowers bisexual, rarely polygamous and then petals 0:—

Carpels free; or if ultimately united at least the styles distinct:—

Stamens many; or if only 4-5, then styles basal; leaves stipulate; carpels 1-several, free or ultimately united; styles not terminal

LVI. ROSACEAE.

Stamens 5-10; stipules 0; styles terminal:—

Carpels quite free; sepals and petals 4-5; fruit follicular:—

Ovules 2 in each cell, ascending from the base; leaves alternate, 1-foliate or imparipinnate; trees or climbing shrubs

LIV. CONNARACEAE.

Ovules many on the inner angles of the cells; leaves opposite, rarely the upper alternate, simple; fleshy herbs

LVIII. CRASSULACEAE.

Carpels united; or if free, then petals 0; styles free; fruit capsular:—

Ovary 1-celled; ovules pendulous

LVII. SAXIFRAGACEAE.

Ovary 2-5-celled; or if 1-celled, then petals 0; ovules axile or basal

LXXVII. AIZOACEAE.

Carpels and styles united throughout; leaves simple; or if pinnate, then the whole plant submerged; stipules 0, or minute and deciduous:—

Calyx-lobes imbricate; or if valvate, then trees with flowers in long pendulous racemes and fruit a fibrous berry:—

Stamens many; anthers opening by slits; petals imbricate in bud:—

Leaves opposite (in *Eucalyptus* of 2 kinds and often the later to appear alternate), usually gland-dotted

LXIII. MYRTACEAE.

Leaves alternate, not gland-dotted

LXIV. LECYTHIDACEAE.

Stamens 3–12; anthers usually opening by pores; petals contorted in bud; leaves usually 3–5-ribbed

LXV. MELASTOMACEAE.

Calyx-lobes valvate; stamens 2–12; or if numerous, then leaves not gland-dotted and fruit a capsule:—

Ovary free from the calyx-tube; or if slightly adnate at the base, then sea-coast trees:—

Flowers axillary or in terminal panicles; petals usually crinkled; ovary quite free; ovary and fruit 1–6-celled

LXVI. LYTHRACEAE.

Flowers solitary, terminal; petals not crinkled; ovary slightly adnate at the base to the calyx-tube; ovary and fruit 10–15-celled; coastal trees

LXVII. SONNERATIACEAE.

Ovary completely or half adnate to the calyx-tube; stamens as many or twice as many as the petals and inserted with them; herbs and undershrubs, often in marshes, sometimes floating

LXVIII. ONAGRACEAE.

Flowers 1-sexual; ovary always inferior:—

Flowers symmetrical; stamens few, usually 3,

with sinuous or conduplicate anthers; styles united or free only at the apex; fruit not winged; climbers or prostrate plants, usually bearing tendrils . . . LXXIII. CUCURBITACEAE. Flowers not symmetrical, stamens many, free or united into bundles; anthers ovoid; styles free or united only at the base; fruit often 2-3-winged; erect herbs or shrubs, usually more or less succulent

## LXXV. BEGONIACEAE.

Ovules pendulous from the apex of the carpels or cells; ovary almost always inferior, usually more than 1-celled; ovules always few:—

Ovules 2 or more in each cell; or if only 1, then aquatic herbs with 1-sexual flowers:—

Herbs, often aquatic; styles 4, free; flowers often 1-sexual with solitary ovule

## LX. HALORRHAGIDACEAE.

Trees or shrubs; flowers rarely 1-sexual; ovules always more than 1 in each cell; style single:—

Ovary 2-6-celled; or if 1-celled, then maritime trees; ovary often  $\frac{1}{2}$  inferior; or if superior, then petals fimbriate; leaves opposite

## LXI. RHIZOPHORACEAE.

Ovary 1-celled; leaves opposite or alternate; fruit often 2-5-winged

## LXII. COMBRETACEAE.

Ovule 1 in each cell; flowers bisexual:—

Flowers in simple or compound umbels; leaves almost always alternate, usually compound:—

Herbs; fruit dry, separating into two dehiscent carpels with glandular tubules containing an essential oil

## LXXVIII. UMBELLIFERAE.

Trees or shrubs, sometimes scandent; fruit usually fleshy; carpels generally more than 2, never separating spontaneously; devoid of glandular tubules . . . . LXXIX. ARALIACEAE.

Flowers in axillary or terminal fascicles, cymes or panicles, not in umbels; fruit drupaceous, containing 1-4 stones; leaves always simple, entire; trees or shrubs:—

Calyx 4–10-toothed ; petals 4–10, linear ; style elongate ; stigma large, capitate

## LXXX. ALANGIACEAE.

Calyx 4–5-lobed or truncate ; petals 4–5, ovate ; style short, small, not capitate

## LXXXI. CORNACEAE.

Ovary syncarpous, usually free from the calyx, occasionally inferior or half inferior, 1-celled, placentas 3–5, parietal ; flowers regular, 3–9-merous ; ovules many ; styles usually distinct :—

Flowers bisexual ; or if 1-sexual, then trees with milky sap, palmately lobed leaves and superior ovary :—

Small herbs ; leaves beset with glandular hairs ; styles quite distinct . . . . . LIX. DROSERACEAE.

Erect or climbing woody herbs, shrubs or trees without glandular hairs :—

Plants climbing by means of tendrils ; flowers often with a distinct corona between petals and stamens . . . . . LXXI. PASSIFLORACEAE.

Erect undershrubs, shrubs or trees without tendrils ; flowers without corona :—

Flowers bisexual ; leaves entire or rarely pinnately lobed ; sap watery :—

Trees or large shrubs ; leaves entire, often bearing pellucid glands ; sepals and petals similar, petals 0 . . . . . LXIX. SAMYDACEAE.

Undershrubs ; leaves entire or pinnately lobed, not pellucid, but usually bearing 2 glands at the base ; sepals and petals very dissimilar . . . . . LXX. TURNERACEAE.

Flowers dioecious ; leaves palmately lobed, subpeltate ; sap milky

## LXXII. CARICACEAE.

Flowers 1-sexual or polygamous ; ovary inferior ; calyx-teeth minute ; petals 0 ; large trees

## LXXIV. DATISCEAE.

Stem fleshy, flat, articulated, usually bearing large thorns and smaller spines ; leaves minute ; lobes of calyx, petals and stamens numerous . . . . . LXXVI. CACTACEAE.

Petals almost always and sepals very often united, corolla rarely absent ; stamens almost always fewer than 12, usually

inserted on the corolla, seldom hypogynous, rarely epigynous; ovary inferior; or if superior, then carpels more than 3 (*Corollifloræ*):—

Ovary inferior; stamens as many as, rarely fewer than and always alternate with the corolla-lobes; flowers regular or sometimes more or less irregular; fruit never of 2 elongated follicles:—

Stamens inserted on the corolla:—

Anthers free; ovary 2-many-celled; calyx limb 0, annular, toothed, lobed or partite:—

Leaves opposite, usually herbaceous or membranous:—

Stipules 0, or represented by a mere rim, or very inconspicuous and lateral:—

Trees or shrubs, sometimes climbing; fruit a 1-celled drupe or a 2-3-celled berry

LXXXII. CAPRIFOLIACEAE.

Herbs; fruit dry, 1-seeded:—

Flowers in terminal paniced cymes; calyx-limb obscure in flower, pappus-like in fruit; stamens 3; ovary 3-celled, one 1-ovuled, two empty; fruit without involucl

LXXXIV. VALERIANACEAE.

Flowers in long-peduncled, terminal heads surrounded by bracts; bracteoles rigid; calyx-limb cup-shaped, 4-lobed; stamens 4; ovary 1-celled, 1-ovuled; fruit enveloped in an involucl . . . . . LXXXV. DIPSACEAE.

Stipules usually conspicuous, inserted within or between the petioles or leaf-like and whorled with the leaves; ovary 2-10-celled; ovules 1-many in each cell . . . . . LXXXIII. RUBIACEAE.

Leaves alternate, fleshy; flowers in axillary cymes; corolla split to the base at the back; ovary 2-celled; ovules 2, erect; style with a cup-shaped sheath including the stigma

LXXXVII. GOODENIACEAE.

Anthers cohering in a tube around the style, filaments free; flowers usually in heads, rarely solitary, surrounded by an involucre of bracts; calyx-limb 0 or reduced to pappus; ovary 1-celled, 1-ovuled; fruit dry; leaves usually alternate

LXXXVI. COMPOSITAE.

Stamens free from the corolla ; ovary 2–15-celled ; ovules and seeds numerous ; corolla sometimes somewhat irregular ; herbs, sometimes tall

## LXXXVIII. CAMPANULACEAE.

Ovary superior ; or if inferior, then stamens more numerous than the corolla-lobes and anthers produced into two tubes opening by pores ; or if half inferior, then stamens opposite the corolla-lobes :—

Ovary 1-celled ; placentation free–central ; stamens inserted on the corolla ; or if nearly free, then calyx covered with stalked glands :—

Stamens as many as and opposite to the lobes of a regular corolla :—

Ovule solitary, pendulous from an ascending funicle ; style 5-fid ; calyx beset with stalked glands

## XCI. PLUMBAGINACEAE.

Ovules 2–many ; style undivided ; calyx not bearing stalked glands :—

Herbs ; fruit capsular ; leaves often in radical rosettes, not gland-dotted

## XCII. PRIMULACEAE.

Trees or shrubs, sometimes scandent ; fruit a berry ; leaves often gland-dotted

## XCIII. MYRSINACEAE.

Stamens 2, alternate with the 3 anterior lobes of a 2-lipped corolla ; small, often aquatic herbs

## CIX. LENTIBULARIACEAE.

Ovary 2–many-celled ; or if 2-celled, then placentas axile or parietal ; or if the ovule basal and erect, then the style undivided :—

Stamens free from the corolla and usually more numerous than its lobes :—

Flowers bisexual ; stamens usually twice as many as the corolla-lobes ; style simple ; ovules many in each cell :—

Ovary inferior, 5-celled, or apparently but falsely 10-celled ; fruit a berry

## LXXXIX. VACCINIACEAE.

Ovary superior, 5–20-celled ; fruit capsular

## XC. ERICACEAE.

Flowers dioecious ; stamens as many as and opposite the corolla-lobes or twice as many or more ; ovary



*FLORA OF MADRAS.*

superior, 3-10-celled; styles 2-8; ovules always twice as many as the styles, 1-2 in each cell

XCV. EBENACEAE.

Stamens inserted on the corolla:—

Ovary 3- or more-carpelled; or if 2-carpelled, then stamens either as many as and opposite the corolla-lobes or more numerous:—

Ovary superior; 2-8-celled; ovules 1 in each cell, axile; trees with milky sap or thorny

XCIV. SAPOTACEAE.

Ovary inferior, 2-4-, usually 3-celled; ovules 2-4 in each cell, pendulous from the inner angles; trees or shrubs; sap watery; not thorny

XCVI. SYMPLOCACEAE.

Ovary 2-carpelled; or if 3-5-carpelled, then stamens either as many as and alternate with the corolla-lobes or fewer:—

Corolla regular, rarely slightly oblique; stamens as many as and alternate with the corolla-lobes; or if corolla oblique or irregular and stamens fewer than the lobes, then corolla-limb plicate or sub-contorted, or stamens 2 and alternate with the carpels:—

Leaves opposite; or if alternate, then either floating aquatic plants with 1-celled ovary, or with free carpels and united styles; or if carpels united, then with a ring of hairy scales in the corolla-throat hiding the stamens; if leaves 0, then sap milky and stamens united:—

Stamens 2, alternate with the carpels; corolla-lobes 4-9, imbricate or valvate; ovary 2-celled, cells 2- or rarely 1-4- or 8-ovuled; stipules 0

XCVII. OLEACEAE.

Stamens 4 or more, alternate with the corolla-lobes:—

Corolla-lobes or free petals and stamens 4; lobes of corolla imbricate in bud; ovary 1-2-celled, cells 1-2-ovuled:—

Trees with united petals or thorny shrubs with free petals; leaves opposite; flowers paniced, all alike

XCVIII. SALVADORACEAE.



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Leaves alternate; if opposite or subopposite, then ovary 4-celled; if leaves 0, then parasitic herbs with watery sap and free stamens; carpels never free; if aquatic herbs, then ovary 2-celled:

Ovary-cells many-ovuled:—

Corolla-lobes imbricate; styles 2; small herbs . . . . .CIII. HYDROLEACEAE.

Corolla-lobes plicate; style single; herbs or shrubs, rarely trees

CVI. SOLANACEAE.

Ovary-cells 2-, seldom 1-, rarely 4-ovuled:—

Corolla-lobes imbricate or contorted; ovary 2-celled, cells 2-ovuled or spuriously 4-celled and cells 1-ovuled; fruit of two 1-2-seeded pyrenes or of four 1-seeded nutlets; embryo with superior radicle; herbs, shrubs or trees

CIV. BORAGINACEAE.

Corolla-lobes plicate; if imbricate, then fruit a valvular capsule or leafless parasitic plants; ovary 2-, rarely 3-5-celled; fruit usually dehiscent, or if indehiscent, then embryo with inferior radicle; usually climbing plants . . . . .CV. CONVULVACEAE.

Corolla irregular or at least distinctly oblique, lobes overlapping; uppermost stamen smaller than the rest or reduced to a staminode or absent; or if corolla regular and cells of ovary 1-2-ovuled, then embryo with inferior radicle:—

Carpels 2- or more, usually many-ovuled; or if only 2-ovuled, then ovules superposed, or if collateral, then fruit a 2-valved capsule opening elastically from the apex:—

Ovary 1-celled with parietal placentas; or if 2-celled by the intrusion of the placentas only imperfectly so; ovules many:—

Leafless herbs parasitic on roots; seeds very small; embryo very minute

CVIII. OROBANCHACEAE.

Leafy green herbs or undershrubs, sometimes epiphytic; ovary often inferior; leaves usually opposite . . . . .CX. GESNERIACEAE.

Ovary 2-celled :—

Fruit not opening elastically, rarely indehiscent :—

Seeds small or minute, not winged ; leaves simple, sometimes very deeply lobed ; herbs or shrubs :—

Ovules many on placentas attached to the middle of the septum ; seeds almost always albuminous

CVII. SCROPHULARIACEAE.

Ovules attached singly or 1-seriately under the leaves of a projecting parietal 2-bladed placenta ; or with 2 ovules in each cell ; or the 2 cells spuriously 4-celled by the intrusion of a false septum with many ovules attached singly or 2-seriately to the inner angles ; seed not albuminous . . . . CXII. PEDALIACEAE

Seeds rather large, transverse, with broad, membranous or hyaline wings ; or if not winged, then trees with imparipinnate leaves ; embryo horizontal ; fruit capsular ; leaves compound . . . CXI. BIGNONIACEAE.

Fruit opening elastically from the apex of 2 loculicidal valves ; seeds usually supported on upcurved processes from the placentas ; leaves simple, opposite

CXIII. ACANTHACEAE.

Carpels 1-ovuled ; or if 2-ovuled, then ovules collateral, not superposed and fruit indehiscent, 1-seeded ; leaves opposite or whorled :—

Fruit not 4-lobed ; or if 4-lobed, then drupaceous ; or if separating into nutlets, then ovary entire . . . . . CXIV. VERBENACEAE.

Fruit separating into 4 distinct nutlets or, less often, drupes, rarely 4-lobed and not separating, and then not drupaceous ; ovary always 4-lobed . . . . . CXV. LABIATEAE.

Corolla rarely present and calyx often absent, sometimes perianth altogether lacking ; flowers more often 1- than 2-sexual (*Monochlamydeae*) :—

Flowers very often 2-sexual; or if 1-sexual, then the embryo peripheric-annular, or the ovule not clearly distinguishable from the carpellary tissue and the seeds without testa, or perianth-lobes 2-seriate and anthers opening by valves; perianth almost always present, usually single; or if double, then the outer whorl very small, seeds without testa and stamens opposite the inner perianth-lobes; or if perianth 0, then embryo peripheric-annular:—

Ovary inferior; seeds with copious albumen:—

Ovary 4–6-celled; ovules very many, 1–2-seriate; seeds with a distinct testa; perianth 3-lobed, usually irregular; stamens 6–12; scandent herbs or shrubs or erect shrubs

#### CXXII. ARISTOLOCHIACEAE.

Ovary 1-celled; ovules 1–4; seeds without proper testa; stamens as many as and opposite the inner or only perianth-lobes:—

Ovules solitary, basal, erect; perianth corolline, single or occasionally double, the inner coloured, large, the outer minute; epiphytic, parasitic herbs, undershrubs or shrubs . . . . . CXXXI. LORANTHACEAE.

Ovules 2–4, pendulous from a free-central column; perianth always single, calycine or corolline; terrestrial herbs, shrubs or trees, frequently root-parasites

#### CXXXII. SANTALACEAE.

Ovary superior, quite free or its base adnate to the persistent perianth-base; 1-, less often 2–3-celled; ovule 1- or 2-many on a free-central placenta, or many axile or parietal:—

Seeds usually with copious albumen; or if albumen scanty or 0, then embryo curved and excentric or peripheric; usually herbs, rarely shrubs or trees:—

Stipules 0; ovary 1-celled, 1-ovuled:—

Perianth tubular, its base adhering to the ovary, tube long or short, limb truncate or 3–5-toothed or -lobed, segments plicately or simply valvate

#### CXVII. NYCTAGINACEAE.

Perianth-lobes united only at the base, always imbricate; stamens 1–5, often connate at the base:—

Perianth scarious and dry; flowers always with scarious or hyaline bracts and 2 bracteoles; anthers 1–2-celled; leaves membranous, opposite or alternate, never terete . . CXVIII. AMARANTACEAE.

Perianth membranous, herbaceous, coriaceous or

fleshy or 0, never scarious ; flowers sometimes sunk in the nodes of a jointed rhachis, rarely bracteate, very rarely both bracteate and 2 bracteolate ; anthers 2-celled ; leaves alternate or 0, often fleshy, sometimes terete . . . . .CXIX. CHENOPODIACEAE.

Leaves stipulate ; stipules usually connate in a tube around the nodes, persistent or rarely deciduous and leaving a circular scar ; perianth membranous, often coloured, segments 3–6, connate or free ; herbs or shrubs, sometimes climbing . . . . .CXX. POLYGONACEAE.

Seeds without albumen ; or if albuminous, then embryo straight :—

Aquatic, usually annual herbs, closely attached to submerged rocks ; flowers bisexual, regular, 3-merous with a perianth, or irregular, 2-merous and devoid of perianth . . . . .CXXI. PODOSTEMONACEAE.

Terrestrial trees, shrubs or climbers ; perianth always present :—

Perianth-tube narrowed above the ovary, subcorolline, base persistent, upper part deciduous, lobes 4, short, valvate ; stamens 4, alternate with the lobes ; ovary 1-celled ; ovule 1, erect ; trees or shrubs with silvery or stellate scales . . . . .CXXX. ELAEAGNACEAE.

Perianth-tube not narrowed above the ovary, lobes rather long ; stamens as many as and opposite the perianth-lobes, or twice, rarely thrice as many ; ovary 1-celled ; or if 2-celled, then with a ring of connate scales above the stamens :—

Perianth-lobes 4, valvate, revolute in open flower ; stamens 4 in 1 series ; anthers opening by slits ; ovules 2, basal or lateral, ascending

CXXVIII. PROTEACEAE.

Perianth-lobes 4 or 6, imbricate ; stamens often in 2, less often in 3 or 4 series ; ovules pendulous :—

Perianth-tube very short, lobes 4 or 6, 2-seriate ; stamens in 2–4-series, usually accompanied by glands ; anthers 2- or 4-celled, opening by as many upcurved, valvular lids ; shrubs or trees, rarely parasitic, twining herbs

CXXVI. LAURACEAE.

Perianth-tube rather long ; lobes 4–5, 1-seriate ; stamens not accompanied by glands ; anthers

opening by slits ; if ovary 2-celled, then with a ring of connate scales above the stamens ; shrubs or trees . . . . . CXXIX. THYMELIACEAE.

Flowers 1-sexual ; or if 2-sexual, then perianth 0 ; perianth, when present, single ; or if double, then the outer whorl conspicuous with the stamens either all central or the outer whorl of stamens alternate with the inner perianth-lobes ; or if the stamens of the outer whorl opposite the inner perianth-lobes, then the seed with a testa and the plant not parasitic ; ovary superior ; or if inferior, then stamens opposite to and more numerous than the perianth-lobes ; anthers never opening by valves :—

Leafy herbs, shrubs or trees ; leaves sometimes much reduced and then sap milky :—

Terrestrial plants :—

Ovary 1-carpelled, 1-celled ; or if syncarpous, then 2- or more-celled ; ovules 1-2, collateral in each cell ; or if ovary imperfectly 3-4-celled with 6-8 ovules in each, then flowers 2-sexual :—

Stipules 0 ; trees :—

Flowers bracteolate ; perianth 3, sometimes 4-lobed ; stamens 6-30, connate in a column ; staminodes 0 ; ovary superior, free, 1-celled ; ovule 1, erect ; fruit fleshy, at length 2-4-valved ; seed enclosed in a thin or fleshy aril . . . . . CXXV. MYRISTICACEAE.

Flowers without bracteoles or bracts ; perianth 4-7-partite in ♂, 2-lobed in ♀ ; stamens 4-7, free, alternating with clavate staminodes ; ovary adhering to the perianth, 1-celled ; ovule 1, pendulous ; fruit a drupe-like nut crowned with the elongate, spathulate, wing-like perianth-lobes ; seed without aril . . . . . CXXVII. HERNANDIACEAE.

Stipules present though sometimes minute and often early deciduous ; or if absent, then flowers bisexual and perianth 0 :—

Ovary 1-celled, 1-ovuled ; flowers usually very small :—

Seeds with copious albumen and a minute embryo ; perianth almost always 0 ; herbs or shrubs :—

Flowers usually 1-sexual, sometimes bisexual ; leaves usually alternate, sometimes opposite or

whorled, often unequal-sided ; stamens 2–4, filaments short, free ; anthers 2-celled ; ovule erect ; herbs or shrubs, often aromatic, sometimes scandent . . . . .CXXIII. PIPERACEAE. Flowers spuriously bisexual, the ♂ and ♀ connate on a bract ; leaves opposite, equal-sided ; stamens 1, or 3 confluent and then the central anther 2-celled, the two lateral 1-celled ; ovule pendulous ; erect shrubs

## CXXIV. CHLORANTHACEAE.

Seeds with little or no albumen and a large embryo filling the seed-coats ; or if albumen copious, then the embryo nearly or quite as long as the albumen ; flowers generally 1-sexual, often dioecious, rarely bisexual or polygamous ; perianth dioecious, rarely bisexual or polygamous ; perianth usually present :—

Filaments not inflexed in bud nor with reversed anthers ; sap watery ; ovule pendulous :—

Trees with simple, alternate leaves ; fruit dry and winged or drupaceous

## CXXXVI. ULMACEAE.

Herbs or shrubs with palmate, compound, opposite leaves, or only the uppermost sometimes 1-foliate and alternate ; fruit a small achene

## CXXXVII. CANNABINACEAE.

Filaments inflexed in bud with reversed anthers :—

Styles or style-branches 2 ; or if style single and undivided, then large trees with a milky sap or flowers with a single stamen ; ovules pendulous ; leaves alternate, rarely opposite and then the flowers aggregated on the inner walls of a closed receptacle ; herbs, shrubs and trees, usually with milky sap

## CXXXVIII. MORACEAE.

Style single, undivided ; stamens 3–5 ; ovule basal, erect ; leaves alternate or opposite ; herbs, shrubs or trees with watery sap, sometimes beset with stinging hairs

## CXXXIX. URTICACEAE.



Ovary 2-more-celled, rarely 1-celled, with 2 ovules in each cell; or if ovary 1-celled, 1-ovuled, then stamens many more than the perianth-lobes and those of the outer or only series opposite the lobes; seeds usually with copious albumen; or if albumen scanty or 0, then fruit a capsule or drupe or berry-like with fleshy or leathery pericarp:—

Stipules 0; perianth single, lobes free, imbricate; stamens as many as and opposite the perianth lobes; evergreen shrubs with watery sap

CXXXIV. BUXACEAE.

Stipules almost always present, though often minute or falling early; perianth usually single, sometimes double or lacking in either or both sexes, outer series valvate or imbricate, inner, when present, free; stamens various, often very many, filaments frequently connate; herbs, shrubs and trees, very often with milky sap

CXXXV. EUPHORBIACEAE.

Ovary syncarpous, 1-celled, placentas 2-4, not intruded; ovules 4 or more, 2-seriately superposed on each placenta; flowers in catkins, 1-sexual; seeds small with a pencil of long silky hairs; leaves simple, stipulate; trees

CXLI. SALICACEAE.

Submerged, dichotomously branched herbs; leaves whorled, dichotomously cleft into filiform segments; flowers monoecious . . . . .

CXLII. CERATOPHYLLACEAE.

Leafless herbs or trees:—

Fleshy root-parasitic herbs devoid of chlorophyll; flowers dioecious, in crowded heads

CXXXIII. BALANOPHORACEAE.

Trees with slender, jointed, green branchlets with whorls of small scales at the nodes; flowers minute, monoecious or dioecious, in spikes or globose heads; perianth 0 in ♀, of 1-2 scarious scales in ♂ . . . . .

CXL. CASUARINACEAE.

Stem without central pith, the woody substance in isolated bundles embedded in cellular tissue encased in a firmly adhering outer rind; leaves usually sheathing at the base and not articulated on the stem; their veins usually parallel and unbranched, running from base to apex and connected by straight cross-veinlets; embryo with only 1 cotyledon, the young stem arising from a lateral cavity (*Mono-cotyledones*):—



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anther 1-celled, laterally adnate to a broad petaloid filament :—

Ovule 1 in each cell; embryo curved; style excentric, incurved or involute ..CL. MARANTACEAE.

Ovules many in each cell; embryo straight; style terminal, flattened .....CLI. CANNACEAE.

Flowers regular or nearly so :—

Outer perianth-series calycine; stamens 6

CLIII. BROMELIACEAE.

Both perianth-series corolline; or if, rarely, both subherbaceous, then leaves pinnatifid; stamens usually 6, rarely 3 with 3 staminodes :—

Leaves radical, pinnatifid; filaments dilated at apex into a hood containing the anthers; ovary 1-celled; fruit a berry .....CLVI. TACCACEAE.

Leaves entire; or if simply lobed or digitately compound, then climbing herbs with 1-sexual flowers and winged capsules :—

Ovules many, 2-seriate on the inner angle of each cell; leaves radical or clustered at the apex of a short stem; herbs or large shrubs, the root a bulb corm or tuber .....CLV. AMARYLLIDACEAE.

Ovules 2-several in each cell, not 2-seriate :—

Leaves radical, ovules 2-several, basal, erect; erect herbs; fruit not winged

CLIV. HAEMODORACEAE.

Leaves cauline or terminal; ovules 2, superposed; climbing, rarely erect herbs or shrubs with 3-winged capsules CLVII. DIOSCOREACEAE.

Ovary superior; flowers regular or nearly so :—

Inflorescence not a bracteate head; both perianth-series present and of the same number of subequal segments :—

Both perianth-series corolline :—

Perianth-segments 2-merous; stamens 4; ovary 1-celled; twining plants CLVIII. ROXBURGHACEAE.

Perianth segments 3-merous; stamens 6 or 3 :—

Dry-ground herbs or shrubs, sometimes climbing; inflorescence never terminating a 1-leafed scape; embryo small, shorter than and completely enclosed in the albumen .....CLIX. LILIACEAE.

Aquatic, erect or floating herbs; inflorescence terminating a 1-leafed scape; embryo cylindrical,

as long as and lying in a central canal in the albumen . . . . . CLX. PONTEDERIACEAE.

Outer perianth-series calycine, inner corolline; embryo marginal or only partly enclosed in the albumen

## CLXII. COMMELINACEAE.

Inflorescence in a dense head supported by rigid, dark-brown, imbricating bracts; perianth 3-merous, outer segments bract-like, scarious, one conspicuously larger than the other 2, inner segments corolline

## CLXI. XYRIDACEAE.

Perianth-series both calycine; or if the inner series corolline, then its segments not larger than those of the outer ones; or if the perianth 1-seriate, then calycine and either terrestrial plants or aquatic herbs with 1-carpelled or apocarpous ovary; or perianth reduced to scales or bristles or altogether wanting; or if perianth-segments of inner series corolline and larger than those of the outer series, then aquatic herbs with apocarpous ovary; ovary always superior:—

Perianth regularly 2-seriate, 3-merous; ovary syncarpous; seeds albuminous; or if ovary apocarpous and seeds without albumen, then in erect, scapigerous herbs with conspicuous, whorled, paniculate or umbellate flowers:—

Both perianth-series calycine, rigid or herbaceous; ovary syncarpous; albumen copious:—

Grass-like herbs with slender, linear or terete leaves, or leaves reduced to sheaths; flowers in bracteate cymes; fruit a 3-valved capsule; embryo enclosed in the albumen

## CLXIII. JUNCACEAE.

Trees or shrubs, sometimes climbing by hooked thorns, with flabellate-plicate or pinnatisect leaves; flowers in 1 or more sheathing spathes; fruit indehiscent; embryo in a small pit near the circumference of the albumen

## CLXIV. PALMACEAE.

Perianth of a single series of calycine, valvate segments, or of 2 series with the outer herbaceous and the inner corolline; ovary apocarpous; albumen 0:—

Leafless, saprophytic herbs without chlorophyll; perianth 1-seriate, 3-8-partite or -lobed; flowers insignificant, monoecious or dioecious, in terminal corymbs or racemes

## CLXIX. TRIURIDACEAE.

Leafy, green, marsh- or water-plants, often with milky juice; perianth 2-seriate, outer 3 herbaceous, inner 3

corolline ; flowers 2-sexual or monoecious, conspicuous in umbellate or paniced whorls . . . . .CLXX. ALISMACEAE. Perianth 0, or reduced to scales or bristles ; or if perianth herbaceous or hyaline, then the segments either not regularly 3-merous, or if, rarely, 6 in 2 rows, then erect, aquatic weeds with small flowers in simple racemes or spikes and fleshy, not horseshoe-shaped embryo :—

Inflorescence of many- or few-flowered spadices or spikes or racemes ; or if flowers solitary, then not in the axils of modified, glumaceous bracts :—

Flowers on a spadix subtended and usually covered by a more or less modified spathe ; terrestrial trees or shrubs, sometimes scandent, sometimes marsh plants, very rarely free floating :—

Shrubs or trees with long, ensiform, spinulose leaves arranged in 3-farious spirals ; often with aerial roots ; flowers dioecious, crowded and catkin-like ; spadix often branched ; spathe little modified, sometimes coloured ; perianth 0 . . . . .CLXV. PANDANACEAE.

Herbs or shrubs, sometimes climbing by aerial roots ; seldom marsh plants, very rarely free floating ; flowers 2-sexual or monoecious, rarely dioecious and then tuberous-rooted with much modified spathes ; spadix simple ; leaves not in spirals rarely spinous ; perianth 0 or of scales . . . . .CLXVII. ARACEAE. Flowers not on a spadix ; or if on a spadix, then not covered by a spathe or spathaceous bracts ; aquatic or marsh plants, sometimes free-floating :—

Free-floating minute, lenticular or granular plants with 1 or more roots that do not enter the soil ; flowers very minute from the margins or the upper side of a frond ; perianth 0 . . . . .CLXVIII. LEMNACEAE.

Fixed herbs with erect, scapigerous or elongate floating or submerged leafy stems, arising from a usually creeping stock rooted in the soil ; perianth present or 0 :—

Perianth of filiform bristles or membranous scales ; rootstock creeping, emitting annual stems ; leaves elongate, linear ; flowers on cylindric or globose 1-sexual, superposed spadices ; ovary 1-celled, borne on a hairy gynophore . . . . .CLXVI. TYPHACEAE. Perianth 0, or of 1-4 herbaceous or hyaline segments,

or tubular; inflorescence rarely spadix-like and then in herbs with leafy submerged floating stems; ovary sessile, of 1–several free carpels; fruit of follicles or an achene; or if drupaceous, then of 2 or more free carpels; marine or fresh-water erect or floating herbs:—

Flowers in racemes or spikes; or if axillary, then the ovule solitary and pendulous; ovary of 2–9 free carpels; fruit of follicles or drupelets:—

Ovules 2–8; basal or 2-seriate on the ventral suture, ascending; perianth of 1–3 white or coloured segments; stamens 6 in 2 whorls; fruit of 3 inflated, beaked follicles

CLXXI. APONOGETONACEAE.

Ovule 1, apical or parietal, pendulous; perianth 0, or of 3–4 green segments, rarely cupular; anthers 1–4, sessile; fruit of 2–9 drupelets

CLXXII. POTAMOGETONACEAE.

Flowers axillary, solitary or clustered; ovary of 1 carpel; ovule 1, basal, erect; perianth tubular, herbaceous or hyaline, or 0 in ♀; anther 1, adnate to the perianth; fruit an achene

CLXXIII. NAJADACEAE.

Inflorescence of heads or spikelets composed of solitary flowers in the axils of glumaceous bracts; perianth segments small, bristle- or scale-like or 0; seeds albuminous:—

Flowers in depressed or subglobose, usually androgynous heads, always 1-sexual; ovary 3- or 2-celled; ovule 1 in each cell, pendulous; perianth segments 6 or fewer, usually in 2 series, membranous, scarious or hyaline, free or connate; usually aquatic or marsh, scapigerous herbs

CLXXIV. ERIOCAULACEAE.

Flowers in spikelets with imbricating glumes, 1- or 2-sexual, rarely dioecious; ovary 1-celled; ovule 1, erect or ascending; perianth 0 or of bristles or scales; grassy herbs, shrubs or trees:—

Stems solid; leaves 3-ranked, rarely 0; sheaths rarely with a ligule, closed in front; perianth 0 or of bristles or scales; fruit a compressed or 3-angled nut with the seed free within; embryo inside the albumen; *sedges*

CLXXV. CYPERACEAE.

Stems usually hollow except at the nodes; leaves 2-ranked, very rarely subspirally arranged; sheaths almost always with a ligule and split in front; perianth represented by 2, rarely 3 or more hyaline scales, rarely 0; fruit a grain with the seed-coat adhering to the pericarp, rarely free within it; embryo at the base of the albumen: *grasses* and *bamboos*

CLXXVI. GRAMINEAE.

FLORA

OF THE

PRESIDENCY OF MADRAS

BY

J. S. GAMBLE, C.I.E., M.A., F.R.S., F.L.S.

LATE OF THE INDIAN FOREST DEPARTMENT

PART I.

*RANUNCULACEAE* TO *OPILIACEAE*

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Calcutta

1915



## INTRODUCTION TO PART I.

It has been arranged that the 'Flora of Madras' should issue in Parts of 192 pages each, and this is the first of the Parts. Others will issue by degrees until the whole is complete, when the Introduction to the whole with the Key to the Families will be prepared, to be placed, for binding purposes, at the beginning of the work.

It is right to explain here that the draft of the botanical portion of about the first 132 pages was prepared by Mr. S. T. Dunn, B.A., F.L.S., F.R.G.S., late Superintendent of the Botanical and Forestry Department at Hong Kong. He was then, most unfortunately, obliged to relinquish his share in the work, so that the responsibility for its continuation and for the work of editing the whole rests entirely with the undersigned.

J. S. GAMBLE.

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Leaves opposite; sepals valvate; climbing shrubs:—

Petals 0; tendrils 0; ripe carpels ovate.....1. **Clematis**.

Petals many, linear; terminal leaflet generally transformed into a tendril; ripe carpels linear .....2. **Naravelia**.

Leaves radical or alternate; sepals imbricate; herbs:—

Petals 0, but sepals often petaloid:—

Flowers moderately large, supported by an involucre of bracts

3. **Anemone**.

Flowers small, not involucre .....4. **Thalictrum**.

Petals and sepals present.....5. **Ranunculus**.

### 1. **Clematis**, Linn.

Climbing shrubs. *Leaves* opposite, simple or compound, exstipulate, petioles often twining. *Inflorescence* axillary or terminal. *Sepals* usually 4, petaloid, valvate. *Petals* 0. *Stamens* many. *Carpels* numerous, distinct, with 1 pendulous ovule in each. *Fruit* a head of sessile or stalked achenes with long usually feathery styles.

Stamens with glabrous filaments:—

Flowers over 1 in. in diam., few in a panicle; sepals velvety brown outside; leaflets usually 7-ribbed, sometimes serrate; achene tails 2-3 in. long:—

Sepals at maturity glabrous within; connective much produced beyond the anther; leaves 1-3-foliolate:—

Flowers erect; filaments uniform in thickness.....1. *smilacifolia*.

Flowers nodding; filaments constricted below the anthers

2. *Munroana*.

Sepals tomentose within when mature; connective produced very little if at all beyond the anther; leaves 3-foliolate...3. *theobromina*.

Flowers under 1 in. in diam., many in a panicle; sepals puberulous; leaflets 3-5-ribbed, sometimes coarsely toothed; achene tails 2 in. long:—

Flowers more than .7 in. in diam.; connective produced considerably beyond the anther.....4. *Bourdillonii*.

Flowers under .5 in. in diam.; connective not produced

5. *gouriana*.

Stamens with pubescent filaments; leaves pubescent or tomentose; leaflets usually 3-5-lobed, more or less coarsely dentate; flowers over 2 in. in diam., pale yellow:—

Sepals ovate, spreading from the base ; veins of leaflets thick, prominent.....6. *Wightiana*.  
 Sepals oblong-lanceolate, erect at the base, recurved at the tip ; veins of leaflets slender, little raised .....7. *nutans*.

1. CLEMATIS SMILACIFOLIA, Wall. ; F. B. I. i. 3 ; Wt. Ic. t. 1.  
 Hills of Ganjam ; W. Gháts from S. Canara to Tinnevelly, up to 5,000 ft.
2. CLEMATIS MUNROANA, Wt. Ill. i. 5, t. 1.  
 Hill ranges from Coorg through the Nilgiris, Anamalais and Pulneys.
3. CLEMATIS THEOBROMINA, Dunn in Kew Bull. 1914, 181.  
 Nilgiris, at Coonoor and Naduvatam at 6,000 to 8,000 ft. alt.
4. CLEMATIS BOURDILLONII, Dunn in Kew Bull. 1914, 181.  
 Travancore, Merchiston Estate, at 2,500 ft. alt.
5. CLEMATIS GOURIANA, Roxb. ; F. B. I. i. 4 ; W. & A. 2 ; Wt. Ic. t. 933-4.  
 A very common species, found in hilly regions in almost all Districts.
6. CLEMATIS WIGHTIANA, Wall. ; F. B. I. i. 5 ; W. & A. 2 ; Wt. Ic. t. 935.  
 Hills of Ganjam and south to the Kistna ; common in the W. Gháts, especially in Nilgiris, up to 7,500 ft.
7. CLEMATIS NUTANS, Royle ; F. B. I. i. 5.  
 Hills of the N. Circars, in Ganjam and Vizagapatam, up to 3,000 ft.

## 2. Naravelia, DC.

Climbing shrubs. *Leaves* 3-foliolate, terminal leaflet usually transformed into a tendril. *Flowers* axillary or in terminal panicles, normally ♀. *Sepals* 4-5. *Petals* 6-12, narrow, usually elongating after the fall of the calyx. *Stamens* many. *Achenes* long, narrow, stalked, prolonged into a feathery style, which persists in fruit as a twisted pilose tail.

NARAVELIA ZEYLANICA, DC. ; F. B. I. i. 7 ; W. & A. 2 ; Roxb. Cor. Pl. ii. t. 188.

A climbing shrub with ovate-lanceolate downy sepals and elongated linear-clavate yellow petals. Fruit a head of linear achenes ending in twisted feathery tails.

Common in hedges and thickets in nearly all Districts.

### 3. *Anemone*, Linn.

Perennial herbs. *Leaves* radical, more or less cut or lobed. *Flowers* single or several together on simple or branched scapes; involucre 3-partite; bracts free or connate. *Sepals* 4–20, petaloid, imbricate. *Petals* 0. *Stamens* numerous, outer sometimes petaloid. *Carpels* many, 1-ovuled; ovules pendulous. *Fruit* a head of sessile achenes, with short or long, hooked or straight, naked or bearded, styles.

ANEMONE RIVULARIS, Ham.; F. B. I. i. 9. *A. dubia*, Wall.; W. & A. 3. *A. Wightiana*, Wall.; W. & A. 3; Wt. Ic. t. 936.

A strong perennial herb with rootstock sheathed in fibres. *Leaves* radical, long-petioled, 3-partite. *Flowers* about 1 in. in diam., sepals white within, blue outside or sometimes pink or yellow. *Achenes* glabrous with hooked styles.

Hills of the W. Gháts, especially in the Nilgiris, Anamalais and Pulneys, usually above 6,000 ft.

### 4. *Thalictrum*, Linn.

Erect, stiff, perennial herbs. *Leaves* compound; petioles sheathing, often auricled or stipuled. *Flowers* in panicles or racemes, often polygamous, not involucrate. *Sepals* 4–5, petaloid, imbricate in bud. *Petals* 0. *Stamens* many. *Carpels* few or numerous; ovule 1, pendulous. *Fruit* a head of small sessile or stalked achenes; style persistent or deciduous.

Leaves more than three times ternately divided, leaflets mostly cuneate, obtuse at base; flowers white; achenes .2 in. long (with style) forming a loose head:--

Beak of achene  $\frac{1}{3}$  of seed-bearing part .....1. *javanicum*.

Beak of achene equal to seed-bearing part .....2. *saniculaeforme*.

Leaves once or twice ternately divided; leaflets mostly orbicular, cordate; flowers white; achenes .1 in. (with style) forming a small compact globe .....3. *Dalzellii*.

1. THALICTRUM JAVANICUM, Bl.; F. B. I. i. 13. *T. glyphocarpum*, W. & A. 2; Wt. Ic. t. 48.

Mahendragiri Hill in Ganjam; W. Ghát Range, usually at over 6,000 ft.

2. THALICTRUM SANICULAEFORME, DC.; F. B. I. i. 13.

Hills of W. Gháts n Mysore and Nilgiris, scarce.

## 3. THALICTRUM DALZELLII, Hook.; F. B. I. i. 13.

Mysore, in the Bababudan Hills.

## 5. Ranunculus, Linn.

Annual or perennial, land or water herbs. *Leaves* entire, lobed or dissected; stipules membranous or 0. *Flowers* white or yellow, single or paniced. *Sepals* 3-5, deciduous or caducous, imbricate. *Petals* 5 or rarely more, very rarely 0, often bearing a nectary near the base. *Stamens* many. *Fruit* a head or spike of beaked or apiculate achenes.

Achenes not compressed, oblong-globose; leaves long-stalked, oval or orbicular, coarsely crenate only, usually cordate; flowers yellow

1. *reniformis*.

Achenes compressed; leaves deeply divided:—

Achenes finely and evenly pitted; sepals spreading; petals yellow

2. *subpinnatus*.

Achenes tubercled or muricate; sepals reflexed:—

Achenes 5 times longer than their beak, with a few blunt tubercles; petals yellow.....3. *Wallichianus*.

Achenes only slightly longer than beak, with prominent, usually numerous and spiny tubercles; petals yellow ..... 4. *muricatus*.

1. RANUNCULUS RENIFORMIS, Wall.; F. B. I. i. 16; W. & A. 3; Wt. Ill. i. t. 2, Ic. t. 75.

Higher hills of the W. Gháts, usually at over 6,000 ft.

2. RANUNCULUS SUBPINNATUS, W. & A. 4; Wt. Ic. t. 49.

W. Gháts, in the Nilgiris and Pulneys, at over 6,000 ft.

3. RANUNCULUS WALLICHIANUS, W. & A. 4; F. B. I. i. 20; Wt. Ic. t. 937.

W. Gháts, common, usually at over 6,000 feet.

4. RANUNCULUS MURICATUS, Linn.; F. B. I. i. 20.

Nilgiris, banks of Ootacamund Lake at 7,000 ft.

## Family II. DILLENACEAE.

Trees, shrubs or herbs, sometimes climbing. *Leaves* alternate, simple, entire, toothed or rarely pinnatipartite; petioles with sheaths and without stipules or without sheaths and with lateral deciduous stipules. *Flowers* yellow or white, sometimes very large. *Sepals* 5, imbricate, persistent. *Petals* (3-)5, deciduous,

*Stamens* in many hypogynous series; anthers innate with lateral or apical dehiscence. *Carpels* 1 or more, free or joined at the axis; styles quite distinct; ovules amphitropous, solitary or few, and ascending or many, and attached to the ventral suture. *Fruit* follicular or indehiscent and sub-baccate. *Seeds* 1-many, with an aril, testa crustaceous, raphe short, albumen fleshy; embryo next the hilum, minute.

Herbs, usually stemless, with large radical leaves .....1. **Acrotrema.**  
Trees or climbing shrubs:—

Stamens with filaments thickened upwards and oblique anther cells; fruit of several shining follicles.....2. **Tetracera.**

Stamens with cylindric filaments and parallel anther cells; fruit globose, enclosed in the enlarged fleshy calyx.....3. **Dillenia.**

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### 1. **Acrotrema**, Jack.

Herbs, usually stemless with woody rhizomes. *Leaves* large, parallel-nerved, entire, toothed or pinnatipartite, with deciduous sheathing stipules. *Scape* short, axillary, many-bracteolate. *Flowers* large, yellow. *Sepals* and *petals* 5 each. *Stamens* numerous, in 3 bundles, which alternate with the carpels; filaments thread-like; anthers erect, dehiscing from the middle to the top. *Carpels* 3, slightly cohering at the axis; styles subulate, recurved; ovules 2 or more. *Follicles* 3, bursting irregularly. *Seed* solitary; aril membranous; testa crustaceous, pitted.

ACROTREMA ARNOTTIANUM, Wight; F. B. I. i. 32.

Stem short, rarely none or elongated; leaves obovate-oblong, blunt, sharply toothed, 6-12 in. long; scape many-flowered, axis long or abbreviated.

Forests of W. Gháts in Travancore and Tinnevely, at 1,000-3,000 ft.

### 2. **Tetracera**, Linn.

Climbing shrubs or trees, scabrid or pubescent. *Leaves* with parallel main nerves. *Flowers* in terminal or lateral panicles, hermaphrodite or sometimes unisexual. *Sepals* 4-6, spreading. *Petals* 4-6. *Stamens* many, with filaments dilated upwards and distant anther-cells. *Carpels* 3-5; ovules many, in 2 rows. *Follicles* coriaceous, shining. *Seeds* 1-5, with a fimbriate or toothed aril,

TETRACERA LAEVIS, Vahl; F. B. I. i. 31. *T. Rheedii*, DC.; W. & A. 5; Wt. Ic. t. 70.

A glabrous climbing shrub with smooth leaves; sepals glabrous outside, silky within, broadly oval; petals white; follicles 1-2-seeded.

Forests of Malabar and Travancore.

### 3. Dillenia, Linn.

Trees. *Leaves* large, with conspicuous parallel main nerves. *Flowers* large, solitary or fascicled, yellow or white. *Sepals* 5, spreading. *Petals* 5, broad. *Stamens* cohering slightly at the base; anthers linear, dehiscing by pores or small slits; inner erect or recurved, introrse, outer recurved, extrorse. *Carpels* 5-20, cohering at the axis; ovules numerous. *Fruit* globose, comprising the matured indehiscent carpels and the enveloping thickened fleshy calyx; seeds not arillate.

Flowers 2-3 in. across, in few-flowered racemes; sepals silky; leaves ovate-oblong, crenate:—

Leaves blunt at top, cuneate at base, serrate, glabrous; petals narrow, spatulate; twigs and peduncles nearly glabrous .....1. *retusa*.

Leaves blunt at base, crenate, pubescent, at least on the nerves; petals broadly obovate; twigs and peduncles very silky .....2. *bracteata*.

Flowers 1 or 6 in. across, solitary or fascicled on the old wood; sepals glabrous; leaves oblong-lanceolate, serrate:—

Flowers white, solitary, 6 in. across, terminal, appearing with the leaves; leaves under 1 ft. long .....3. *indica*.

Flowers yellow, clustered on nodes of the old wood, 1 in. across, appearing before the leaves; leaves often 2 ft. long... .....4. *pentagyna*.

1. DILLENIA RETUSA, Thunb.; F. B. I. i. 37; W. & A. 6. *Wormia bracteata*, Bedd. Fl. t. 115 (not of Wight).

Forests of the Bolampatti and Anamalai Hills in Coimbatore District.

A large and ornamental tree, scarce in the Peninsula.

2. DILLENIA BRACTEATA, Wt. Ic. t. 358; F. B. I. i. 37.

Dry forests of the Nilgiris, Mysore, North Arcot and Chingleput, not common.

3. DILLENIA INDICA, Linn.; F. B. I. i. 36. *D. speciosa*, Thunb.; W. & A. 5; Wt. Ic. t. 823; Bedd. Fl. t. 103.

Damp valleys of the hills of the N. Circars; also in



the Malabar Gháts; often cultivated in gardens and near temples.

A beautiful evergreen tree. Vern. *Hind.* Chalta; *Ur.* Rai; *Tel.* Pedda Kalinga; *Tam.* Uva; *Mal.* Syalita; *Mar.* Mota Karmal.

4. *DILLENIA PENTAGYNA*, Roxb. Cor. Pl. i. t. 20; F. B. I. i. 38; W. & A. 5; Bedd. Fl. t. 104.

Dry forests and grass lands in most Districts, common and conspicuous both in leaf and in flower.

A deciduous tree. Vern. *Ur.* Rai; *Tel.* Chinna Kalinga; *Tam.* Nai-tékku; *Mal.* Koddapanna.

### Family III. MAGNOLIACEAE.

Trees or shrubs, sometimes climbing, often aromatic. *Leaves* alternate, entire or rarely toothed; stipules convolute or 0. *Flowers* axillary and terminal, sometimes unisexual, white yellow or red, often showy and fragrant. *Sepals* and *petals* similar, very deciduous, arranged in whorls of 3. *Stamens* very numerous or rarely as few as 5, hypogynous, filaments free or monadelphous; anthers adnate, basifixed, dehiscing longitudinally. *Carpels* indefinite, free or cohering to an elongated axis or in one whorl; styles usually short, stigmatose on the inner surface; ovules anatropous or amphitropous, 2 or more on the ventral suture. *Fruit* baccate, follicular or of woody dehiscent carpels which are sometimes arranged in a cone. *Seeds* 1 or few, sometimes pendulous from a long funicle; testa single and crustaceous or double with the outer part fleshy; albumen granular or fleshy and oily; embryo minute; cotyledons spreading; radicle short, blunt, next the hilum.

Trees with perfect flowers and oblong spikes of leathery dehiscent carpels ..... 1. **Michelia**.  
Climbers with unisexual flowers and globular fleshy fruits... 2. **Kadsura**.

#### 1. *Michelia*, Linn.

Trees. *Leaves* evergreen or deciduous, enveloped in bud in their connate, convolute stipules. *Flowers* solitary, axillary or terminal. *Sepals* and *petals* similar, 9–15 or more, in 3 or more rows. *Stamens* numerous, many-seriate, with flat filaments;



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KADSURA ROXBURGHIANA, Arn. ; F. B. I. i. 45 ; King Ann. Calc. iii. 222, t. 73A. *K. Wightiana*, Arn. ; F. B. I. i. 45.

Petals roundish, concave, outer larger ; berries cuneate globose, scarlet.

Forests of the W. Gháts, in Malabar.

#### Family IV. ANONACEAE.

Trees or shrubs often climbing and frequently aromatic. *Leaves* alternate, simple, entire, penninerved, more or less distichous ; stipules 0. *Flowers* 2- or rarely 1-sexual, greenish purple, red, brown or yellow. *Sepals* 3 or rarely 2, free or connate. *Petals* 6, usually thick and fleshy, generally biseriate, hypogynous, valvate or slightly imbricate, the inner sometimes absent, very rarely coherent. *Stamens* many, closely packed on the torus or rarely few in one whorl ; filaments short or 0 ; anthers adnate, bilocular with dorsal or lateral, contiguous or distant cells, with longitudinal dehiscence ; connective produced into an oblong or truncate head. *Carpels* numerous or rarely few or solitary, distinct or rarely coherent with distinct stigmas, sessile on the top of the torus ; styles short or 0 ; ovules one or more, anatropous. *Fruit* of 1 or more distinct sessile or stalked 1- or many-seeded, usually indehiscent, carpels or rarely of several carpels cohering together in a 1- or many-locular, dry or fleshy, dehiscent or indehiscent fruit. *Seeds* with abundant ruminant albumen and a minute basal embryo with divaricate cotyledons.

Petals imbricate in bud (Tribe i. **UVARIEAE**) :—

Stamens with connectives produced and not concealing the anthers ; trees.....1. **Sageraea**.

Stamens with anthers concealed by the overlapping connectives ; climbing shrubs.....2. **Uvaria**.

Petals valvate or open in bud :—

Anther-cells concealed by the overlapping connectives :—

Outer petals spreading, flat or only concave at the base :—

Inner petals spreading like the outer or none (Tribe ii. **UNONEAE**) :—

Petals bent in at the base over the stamens and ovaries, then spreading :—

Peduncles not hooked, carpel 1, many-ovuled

3. **Cyathocalyx**.

Peduncles hooked, carpels many, 1-2-ovuled...4. **Artabotrys**.

Petals flat, spreading from the base:—

Ovules 2–6, in one row on the ventral suture; carpels 2- or more-seeded.....5. **Unona.**

Ovules 1 or 2, basal; carpels baccate, 1-seeded...6. **Polyalthia.**

Inner petals dissimilar to the outer, arching over the stamens and ovaries and meeting at their tips (Tribe iii. **MITREPHOREAE**):—

Inner petals without claws:—

Inner petals as large as the outer but not larger, tomentose outside .....7. **Popowia.**

Inner petals much larger than outer, glabrous

8. **Phaeanthus.**

Inner petals clawed and connivent in a vaulted cone:—

Ovules 1 or 2; largest leaves 6–11 inches, smooth

9. **Goniothalamus.**

Ovules 4 or more; largest leaves 4–5 inches, reticulate

10. **Mitrephora.**

Outer petals thick, rigid, connivent; inner similar but smaller or 0 (Tribe iv. **XYLOPIAEAE**):—

Fruit of confluent carpels, fleshy, globose .....11. **Anona.**

Fruit of distinct spreading carpels .....12. **Xylophia.**

Anther-cells not concealed by the overlapping connectives (Tribe v. **MILIUSEAE**):—

Outer petals shorter than inner:—

Inner petals flat, or if a little pouched then glabrous; ovules definite (1–2); leaves glabrous or, if tomentose, inner petals glabrous within .....13. **Miliusa.**

Inner petals pouched at base, pubescent on both surfaces; ovules 6 or more; leaves tomentose .....14. **Saccopetalum.**

Outer petals equal to inner; ovules 4–8 .....15. **Alphonsea.**

Outer petals longer than inner; ovules 2–4.....16. **Orophea.**

### 1. **Sageraea**, Dalz.

Trees. *Leaves* shining and branches glabrous. *Flowers* small, terminal, axillary or fascicled on woody tubercles, 1–2-sexual. *Sepals* orbicular or ovate, imbricate. *Petals* 6, imbricate in 2 rows, nearly equal, usually orbicular, concave. *Stamens* 6–21, imbricate in 2 or more series, broadly oblong, thick, fleshy; anther cells dorsal, oblong; connectives produced, not concealing the anthers. *Ovaries* 3–6; style short, stigma obtuse or capitate; ovules 1–8 on the ventral suture. *Fruit* of stalked globose carpels.

Larger petals .25 in. long; stamens about 25; leaves 5-7 in. long

1. *Dalzellii*..

Larger petals .5 in. long; stamens about 12; leaves 9-12 in. long

2. *grandiflora*..

1. SAGERAEA DALZELLII, Bedd. Ic. t. 42. *Bocagea Dalzellii*, Hook. f. & Th.; F. B. I. i. 92 *in part*.

Moist forests of W. Gháts in Malabar, the Anamalais, Travancore and Tinnevelly, up to 2,000 ft.

An evergreen tree with black bark. Vern. *Mal.* Mauja nára, Kána Kaitha.

2. SAGERAEA GRANDIFLORA, Dunn in Kew Bull. 1914, 182.

Forests of Travancore.

## 2. *Uyaria*, Linn.

Scandent or straggling shrubs, usually stellately pubescent. *Inflorescence* terminal or leaf opposed or rarely axillary. *Flowers*: solitary, cymose, umbellate or fascicled, yellow, purple or brown. *Sepals* 3, valvate, often connate below. *Petals* 6, orbicular, oval or oblong, imbricate in 2 rows, sometimes connate at the base. *Stamens* indefinite; top of connective ovoid-oblong, truncate or subfoliaceous, concealing the anthers. *Torus* depressed, pubescent or tomentose. *Ovaries* indefinite, linear-oblong; style short, thick; ovules many, 2-seriate, rarely few- or 1-seriate. *Fruit* of many dry or baccate, few- or many-seeded carpels.

Leaves, twigs, calyx and petals stellate-tomentose:—

Calyx smooth and soft.....1. *Hamiltonii*..

Calyx granular:—

Calyx globose splitting irregularly.....2. *eucincta*..

Calyx of 3 acuminate sepals .....3. *macropoda*..

Leaves glabrous:—

Leaves 2.2-3 in. long; flowers .6-.8 in. across; carpels sessile, blunt at both ends .....4. *zeylanica*.

Leaves 3-9 in. long; flowers 1-1.5 in. across, yellow; carpels on slender pedicels, red .....5. *Narum*.

1. UVARIA HAMILTONII, Hook. f. & Thoms.; F. B. I. i. 48; King Ann. Calc. iv. 17, t. 6.

Hill forests of Ganjam, up to 2,000 ft,

2. *UVARIA EUCINCTA*, Bedd. ex Dunn in Kew Bull. 1914, 182.  
Hill forests of Ganjam, about 2,000 ft.
3. *UVARIA MACROPODA*, Hook. f. & Thoms.; Bedd. Ic. t. 79;  
F. B. I. i. 50; King Ann. Calc. iv. 27, t. 20.  
Hill forests of Ganjam, about 2,000 ft.; hills of S. Arcot.
4. *UVARIA ZEYLANICA*, Linn.; F. B. I. i. 51; Bedd. Ic. t. 78;  
King Ann. Calc. iv. 26, t. 19. *U. Heyneana*, W. & A. 8.  
Forests of the W. Gháts, in the Anamalais, Pulneys and Travancore.
5. *UVARIA NARUM*, Wall.; F. B. I. i. 50; W. & A. 9; Wight Ill. i. t. 6; King Ann. Calc. iv. 27, t. 21. *U. Hookeri*, King Ann. Calc. iv. 28, t. 22.  
Forests of the W. Gháts, from S. Canara to Travancore; hills of Salem, up to 4,000 ft.; common.

### 3. *Cyathocalyx*, Champ.

Trees. *Leaves* glabrous. *Flowers* in terminal or leaf-opposed fascicles. *Sepals* combined into a 3-lobed cup or nearly free. *Petals* in 2 whorls of 3 each, valvate, arching at the base over the stamens and pistils but above them flat and spreading. *Stamens* numerous, cuneate, truncate; anther-cells linear, dorsal. *Ovaries* usually solitary on a concave torus; stigma large peltate; ovules many. *Ripe carpels* large globose berries.

*CYATHOCALYX ZEYLANICUS*, Champ.; Bedd. Ic. t. 47; F. B. I. i. 53; King Ann. Calc. iv. 36, t. 42.

Moist forests on the slopes of the W. Gháts in S. Canara, Malabar, Anamalais and Travancore, up to 3,000 ft.

A moderate-sized evergreen tree.

### 4. *Artabotrys*, R. Br.

Climbing or straggling shrubs. *Leaves* shining. *Flowers* solitary or fascicled, usually on woody hooked recurved branches (peduncles). *Sepals* 3, valvate. *Petals* 6, in 2 whorls, bases concave, connivent, spreading above, limb flat, subterete or clavate. *Stamens* oblong or cuneate; connective truncate or produced, concealing the dorsal anther-cells. *Torus* flat or convex. *Ovaries* few or many; style oblong or columnar; ovules 2, erect, collateral. *Fruit* a circle of usually yellow, sometimes odorous, berries.

Leaves oblong-lanceolate; mature petals yellow, thinly adpressed-silky; fruit orange .....1. *odoratissimus*.  
 Leaves oval-oblong; mature petals tomentose .....2. *zeylanicus*.

1. *ARTABOTRYS ODORATISSIMUS*, R. Br.; F. B. I. i. 54; W. & A. 10; King Ann. Calc. iv. 44, t. 55.

Cultivated in gardens, especially on the W. Coast, the flowers very fragrant. King considers it truly wild in S. India.

2. *ARTABOTRYS ZEYLANICUS*, Hook. f. & Thoms.; F. B. I. i. 54; Bedd. Ic. t. 48; King Ann. Calc. iv. 43, t. 53.

Evergreen forests of the W. Coast and W. Gháts, S. Canara to Travancore.

### 5. *Unona*, Linn.

Trees or shrubs, erect or climbing. *Flowers* often solitary, axillary, terminal or leaf-opposed. *Sepals* 3, valvate. *Petals* 6, valvate or open in aestivation, 2-seriate; 3 inner sometimes absent. *Torus* flat or slightly concave. *Stamens* cuneate; anther-cells linear, extrorse; top of connective subglobose or truncate, concealing the anthers. *Ovaries* numerous; style ovoid or oblong, recurved, grooved; ovules 2-8, 1-seriate (rarely sub-2-seriate). *Fruit* a ring of many carpels, elongate or constricted between the seeds or baccate. *Seeds* few or many.

A small tree. Flowers subsessile; petals oblong-lanceolate, densely tomentose, glabrescent; carpels sessile or subsessile; leaves lanceolate, dark green, nerves sunk above, raised beneath:—

Carpels soft, velvety, globose .....1. *pannosa*.

Carpels solid, glabrescent, slightly torulose .....2. *Ramarowii*.  
 Flowers on slender peduncles; petals linear or narrowly lanceolate, slightly silky; carpels glabrous, stalked:—

A large climber. Young shoots rufous; petals narrow-lanceolate; sepals over .75 in. long; peduncle with a cordate bract...3. *viridiflora*.

A large shrub. Young shoots glabrous; petals narrow-linear; sepals less than .5 in. long .....4. *Lawii*.

1. *UNONA PANNOSA*, Dalz.; F. B. I. i. 58; Bedd. Ic. t. 52; King Ann. Calc. iv. 55, t. 72.

Forests of the W. Gháts in Malabar, Anamalais, Travancore and Tinnevelly, at 2,000 to 4,500 ft.

A small tree reaching 30 ft. in height, common in Travancore.

## 2. UNONA RAMAROWII, Dunn in Kew Bull. 1914, 183.

Forests of the W. Gháts from S. Canara to Travancore, up to 4,000 ft.

## 3. UNONA VIRIDIFLORA, Bedd. Ic. t. 158; F. B. I. i. 60; King Ann. Calc. iv. 56, t. 75.

Anamalai Hills, banks of Sholayar river, at 3,000 ft., scarce.

## 4. UNONA LAWII, Hook. f. &amp; Thoms.; F. B. I. i. 59; Bedd. Ic. t. 73; King Ann. Calc. iv. 57, t. 77A.

Forests of the W. Gháts in Mysore, Wynaad, Travancore and Tinnevely, at 2,000 to 3,000 ft.

## 6. Polyalthia, Blume.

Trees or erect or climbing shrubs. *Flowers* solitary or fascicled, axillary, terminal, leaf-opposed or below the leaves on the young or old wood. *Sepals* free, valvate or subimbricate. *Petals* 6, 2-seriate, ovate or elongated, flat or the inner vaulted. *Torus* convex. *Stamens* cuneate; anther-cells extrorse, remote, concealed below the overlapping connectives. *Ovaries* indefinite; style usually oblong; ovules 1-2, basal and erect or sub-basal and ascending. *Fruit* a ring of one-seeded berries.

Flowers in fascicles, umbels or cymes:—

Flowers green, in fascicles or umbels; petals 7-1 in. long; leaves narrow-lanceolate, 7-9 in. long, margins undulate .....1. *longifolia*.

Flowers yellow, in cymes; petals 1.5 in. long; leaves elliptic; nerves close, numerous, ascending; carpels ash-coloured ..... 2. *fragrans*.

Flowers solitary, occasionally many, on tubercles of the trunk, but then not closely fascicled:—

Leaves glabrous or nerves puberulous beneath:—

Leaves attenuate or acuminate at top:—

Leaves 2.5-3.5 in. long, boldly reticulate ..... 3. *Korinti*.

Leaves up to 8.5 in. long, slightly reticulate; nerves ascending, 12-16 pairs:—

Leaves gradually attenuate; twigs glabrous; petals greenish-yellow, over 1 in. long.....4. *coffeoides*.

Leaves acuminate; twigs rufous-pubescent; petals .5 in. long  
5. *rufescens*.

Leaves rounded at top or very obtuse; nerves spreading; bark corky; flowers pale green or yellow; berries purple .....6. *suberosa*.

Leaves pubescent below, acute or acuminate, nerves ascending; flowers green; berries red .....7. *cerasoides*.



1. *POLYALTHIA LONGIFOLIA*, Hook. f. & Thoms.; F. B. I. i. 62; Bedd. Fl. t. 38. *Guatteria longifolia*, Wall.; W. & A. 10; Wt. Ic. t. 1; King Ann. Calc. iv. 72, t. 99.

Cultivated in gardens and avenues and near temples, native of Ceylon.

A handsome evergreen tree, easily recognized. Vern. *Hind.* Asok, Devidari; *Tam.* Assothi; *Mal.* Choruna.

2. *POLYALTHIA FRAGRANS*, Bedd. Ic. t. 54, and Fl. t. 74; F. B. I. i. 63; King Ann. Calc. iv. 72, t. 100A.

Forests of the W. Gháts in S. Canara, Malabar, Anamalais and Travancore, up to 4,000 ft.

A tall, straight, handsome tree, the wood used on the W. Coast for the masts of native craft. Vern. *Tam.*, *Mal.* Nedunar.

3. *POLYALTHIA KORINTI*, Hook. f. & Thoms.; F. B. I. i. 64; King Ann. Calc. iv. 79, t. 110A. *Guatteria Korinti*, Dunal; W. & A. 10; Wt. Ic. t. 398.

Forests of the E. Gháts and hills from Vizagapatam southwards to Tinnevelly and Travancore.

A spreading shrub, scarce.

4. *POLYALTHIA COFFEOIDES*, Hook. f. & Thoms.; F. B. I. i. 62; King Ann. Calc. iv. 67, t. 91.

Forests of the W. Gháts in S. Canara, Coorg, Malabar, Nilgiris and Travancore, up to 4,000 ft.

A handsome evergreen tree with straight trunk, conspicuously studded with the flower-tubercles, the leaves coming out red at first. Vern. *Tam.* Nedunarai; *Mal.* Villa.

5. *POLYALTHIA RUFESCENS*, Hook. f. & Thoms.; F. B. I. i. 66; King Ann. Calc. iv. 83, t. 116 (tris).

W. Coast forests in Cochin and Travancore.

A tree with tomentose branches, scarce.

6. *POLYALTHIA SUBEROSA*, Hook. f. & Thoms.; F. B. I. i. 65; King Ann. Calc. iv. 64, t. 77B. *Uvaria suberosa*, Roxb. Cor. Pl. i. t. 34. *Guatteria suberosa*, DC.; W. & A. 10.

Dry forests of the N. Circars and E. Gháts from Ganjam southwards, also in the Deccan forests of Kurnool, Mysore and Coimbatore, and occasionally on the W. Coast.

A small evergreen corky-barked tree or large shrub, very common, except on the west side. Vern. *Ur.* Karadia; *Tel.* Chilka dúdúga.



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oblong-lanceolate, taper-pointed; flowers .5–.7 in. across, red.

Forests of the W. Gháts, in Wynaad at about 2,000 ft., abundant about Tambachari Ghát (Bedd.).

### 9. *Goniothalamus*, Blume.

Trees or shrubs. *Leaves* with small nerves, forming intra-marginal loops. *Flowers* solitary or fascicled, axillary or extra-axillary; peduncles with basal scaly distichous bracts. *Sepals* 3, valvate. *Petals* 6, valvate, in two whorls; outer thick, flat or nearly so; inner smaller, shortly clawed, cohering in a vaulted cap over the stamens and ovary. *Stamens* many, linear-oblong; anther-cells remote, dorsal, hidden by the connective, which is produced into an oblong or truncate process. *Ovaries* many; style simple or 2-fid; ovules solitary or 2 (or rarely 4), superposed, sub-basal. *Fruit* of many 1-seeded carpels.

Outer petals softly brownish pubescent on both sides; stigma 2-fid:—

Outer petals clawed, hooded; leaves oblong, 6–9 in. long; small tree

1. *cardiopetalus*.

Outer petals ovate, flat; leaves linear-lanceolate, 3–8 in. long; small tree

.....2. *Wightii*.

Outer petals subglabrous; stigma entire or 2-lobed:—

Style subulate; leaves oblong-lanceolate, 3.5–6 in. long; veins obscure; small trees:—

Petals less than twice as long as the sepals; anthers beaked

3. *rhynchantherus*.

Petals five times as long as the sepals; anthers truncate

4. *Thwaitesii*.

Style 2-lobed; leaves 8–11 in. long; veins prominent beneath; shrub

or tree .....5. *wynaadensis*.

1. *GONIOTHALAMUS CARDIOPETALUS*, Hook. f. & Thoms.; F. B. I. i. 75; Bedd. Ic. t. 62; King Ann. Calc. iv. 93, t. 129.

W. Gháts in S. Canara, Coorg, Wynaad, Anamalais; Shevaroy Hills, at 2,500 to 4,000 ft.

2. *GONIOTHALAMUS WIGHTII*, Hook. f. & Thoms.; F. B. I. i. 76; Bedd. Ic. t. 63; King Ann. Calc. iv. 92, t. 122B.

W. Gháts in the Anamalais, Travancore and Tinnevelly at 3,000 to 5,000 ft., in evergreen forests.

3. *GONIOTHALAMUS RHYNCHANTHERUS*, Dunn in Kew Bull. 1914, 182.

W. Gháts, in Tinnevelly and Travancore, in dense forest.

4. *GONIOTHALAMUS THWAITESII*, Hook. f. & Thoms.; F. B. I. i. 72; Bedd. Ic. t. 58; King Ann. Calc. iv. 88, t. 121.

W. Gháts of S. Travancore and Tinnevelly at 2,000 to 4,000 ft., in moist forests.

5. *GONIOTHALAMUS WYNAADENSIS*, Bedd. Ic. t. 61; F. B. I. i. 74; King Ann. Calc. iv. 92, t. 128.

W. Gháts, in Wynaad about Devala and Cherambadi, at 2,500 to 3,500 ft.

### 10. *Mitrephora*, Blume.

Trees. *Leaves* coriaceous, strongly nerved, plaited in vernation. *Flowers* usually terminal or leaf-opposed, sometimes 1-sexual. *Sepals* 3, orbicular or ovate. *Petals* 6, 2-seriate, valvate; outer ovate, thin veined; inner clawed, vaulted and cohering. *Stamens* oblong-cuneate; anther-cells dorsal, remote, the connectives broadly truncate at the apex, hiding the anther-cells. *Ovaries* oblong; style oblong or clavate, ventrally furrowed; ovules 4 or more, 2-seriate. *Fruit* of globose or ovoid, stalked or sessile, carpels.

A large tree. Leaves with woolly tufts in the forks of the nerves beneath, 4–5 in. long; stigma club-shaped; flowers 2–3 in. across, outer petals white, inner spotted with crimson.....1. *grandiflora*.

A small tree. Leaves glabrous, 2–4 in. long; stigma globular, sessile; flowers 1.5 in. across, yellow .....2. *Heyneana*.

1. *MITREPHORA GRANDIFLORA*, Bedd. Ic. t. 101, and Fl. t. 75; F. B. I. i. 78; King Ann. Calc. iv. 112, t. 155.

Forests of the W. Gháts in S. Canara, at about 2,000 ft., Mysore and Wynaad.

2. *MITREPHORA HEYNEANA*, Thwaites; F. B. I. i. 77; Bedd. Ic. t. 77; King Ann. Calc. iv. 113, t. 152B. *Uvaria lutea*,  $\beta$  W. & A. 8.

Forests of the W. Gháts in the Nilgiris, Pulneys, Travancore and Tinnevelly, near the base of the hills, and up to 2,000 ft.

### 11. *Anona*, Linn.

Trees or shrubs. *Flowers* solitary or fascicled, terminal or leaf-opposed. *Sepals* 3, small, valvate. *Petals* 3–6, valvate, in 2

whorls, or the inner whorl wanting; outer triquetrous, base concave. *Stamens* numerous; anther-cells narrow, dorsal, contiguous, hidden by the overlapping ovoid tops of connectives. *Ovaries* many, subconnate; style oblong; ovule 1, erect. *Fruit* many-celled, ovoid or globose, many-seeded.

Leaves obtuse, 2–3 in. long, glaucous beneath; nerves ascending; flower greenish; fruit green, ovoid, with projecting ovoid areoles...1. *squamosa*.

Leaves acuminate, 5–8 in. long, green beneath; nerves divergent; flowers pale green; fruit orange, subglobose, with flat, 5-cornered areoles

2. *reticulata*.

1. ANONA SQUAMOSA, Linn.; F. B. I. i. 78; W. & A. 7.

The West Indian “Sweet Sop,” the “Custard Apple” of India.

Cultivated for its fruit, and now very widely spread in the vicinity of villages, temples and old forts. Vern. *Hind.* Sharipha, Sitaphal; *Tam.* Sita; *Tel.* Sita pandu.

2. ANONA RETICULATA, Linn.; F. B. I. i. 78; W. & A. 7.

The “Bullock’s Heart” of India, the “Custard Apple” of the West Indies, also sometimes occurs in a naturalized state.

## 12. Xylophia, Linn.

Trees or shrubs. *Leaves* coriaceous. *Flowers* axillary, supra-axillary, or on nodes below the leaves, solitary, cymose or fascicled; buds triquetrous, conic, often slender. *Sepals* 3, valvate, connate or free. *Petals* 6, elongate, valvate, in two whorls; outer flat or concave; inner nearly as long, 3-gonous, concave at the base only. *Torus* flat, or hollow and enclosing the carpels. *Stamens* oblong, truncate or connective produced; anther-cells hidden under overlapping connectives, remote or continuous, usually septate with a large pollen grain in each cellule. *Ovaries* 1 or more; style long, clavate; ovules 2–6 or more, 1–2-seriate. *Fruit* a ring of long or short, continuous or moniliform, usually several-seeded carpels.

XYLOPIA PARVIFOLIA, Hook. f. & Thoms.; F. B. I. i. 84; Bedd. Ic. t. 43, and Fl. t. 172; King Ann. Calc. iv. 145, t. 190A.

A lofty but slender buttressed tree with narrow sessile pubescent brown flowers; bracts longer than the sepals; leaves 2–3.5 in. long, reticulate.

Moist forests of Travancore up to 2,000 ft.

13. *Miliusa*, Lesch.

Trees or shrubs. *Flowers* 1-2-sexual, green or red, axillary or extra-axillary, solitary fascicled or cymose. *Sepals* 3, small, valvate. *Petals* 6, valvate, in 2 series; outer smaller, like the sepals; inner cohering when young by the margins, at length free. *Torus* elongated, cylindric. *Stamens* definite or indefinite; anthers subdidymous, cells contiguous, ovoid, extrorse, connective hardly apiculate. *Ovaries* indefinite, linear-oblong; style oblong or very short; ovules 1-2 (-3-4). *Fruit* a ring of globose or oblong 1-many-seeded carpels.

A moderate-sized tree, the whole plant tomentose; flower stalks 2-4 in. long; inner petals yellowish, glabrous within, flat (not saccate) at base; fruit purple .....1. *velutina*.

Leaves glabrous or pubescent only on the nerves beneath:—

A small tree; peduncles 1-1.5 in. long; carpels glabrous, on stalks .3-.5 in. long; twigs early glabrous; stamens very numerous

2. *Wightiana*.

Shrubs; peduncles .3-.8 in. long:—

Stamens very numerous; twigs pubescent or strigose; carpels short-stalked or sessile:—

Carpels grey-tomentose; twigs strigose .....3. *eriocarpa*.

Carpels glabrous; twigs pubescent.....4. *montana*.

Stamens 8-12; twigs glabrous; leaves narrow-lanceolate, nerves obscure.....5. *nilagirica*.

1. *MILIUSA VELUTINA*, Hook. f. & Thoms.; F. B. I. i. 87; Bedd. Ic. t. 87, and Fl. t. 37; King Ann. Calc. iv. 158, t. 206.

Forests of the N. Circars from Ganjam to Godavari; Cuddapah District.

A common deciduous tree of the deciduous forests of N. and C. India, especially with Sál. It gives a useful wood.

Vern. *Hind.* Domsal.

2. *MILIUSA WIGHTIANA*, Hook. f. & Thoms.; F. B. I. i. 87; Bedd. Ic. t. 86; King Ann. Calc. iv. 156, t. 202B.

Forests of the W. Gháts in the Nilgiris, Coimbatore, Travancore and Tinnevely, up to 5,000 ft., evergreen.

3. *MILIUSA ERIOCARPA*, Dunn. *M. indica*, Hook. f. & Thoms.; F. B. I. i. 86 (var. *tomentosa*), (not of Lesch.); Bedd. Ic. t. 85.

Forests of the W. Gháts in Mysore, Travancore and Tinnevely; Hills of Salem.

4. MILIUSA MONTANA, Gardn. ; Bedd. Ic. t. 84. *M. indica*, var. *montana*, Hook. f. & Thoms. ; F. B. I. i. 86.

Forests of the W. Gháts in Malabar, Nilgiris, Anamalais and Tinnevelly, up to 4,500 ft. ; Cuddapah.

5. MILIUSA NILAGIRICA, Bedd. Ic. t. 88 ; F. B. I. i. 87 ; King Ann. Calc. iv. 156, t. 203A.

Forests of the W. Gháts in the Wynaad, Nilgiris and Anamalais, at about 5,000 ft.

#### 14. *Saccopetalum*, Benn.

Trees. *Leaves* deciduous. *Flowers* axillary, solitary or fascicled. *Sepals* 3, small, valvate. *Petals* 6, valvate, in 2 whorls ; outer small, like the sepals ; inner much larger, erect or conniving, base saccate. *Stamens* indefinite ; anther-cells dorsal, contiguous, not concealed by the connective, which is produced into a conspicuous appendage. *Ovaries* indefinite ; ovules 6 or more. *Fruit* a ring of subglobose carpels.

SACCOPE TALUM TOMENTOSUM, Hook. f. & Thoms. ; F. B. I. i. 88 ; Bedd. Ic. t. 49, and Fl. t. 39 ; Roxb. Cor. Pl. i. t. 35 ; King Ann. Calc. iv. 159, t. 207.

A large deciduous tree with twigs and under side of leaves tomentose ; flowers in small leaf-opposed or terminal cymes, on pedicels 2-3 in. long ; carpels large, globose, stalked, velvety brown.

Forests of the N. Circars, especially with Sál (Brandis) ; Hyderabad ; W. Gháts from S. Canara to Tinnevelly. Vern. *Ur*. Gondapalasu ; *Kan*. Hessare.

#### 15. *Alphonsea*, Hook. f. & Thoms.

Lofty or rarely small trees or occasionally erect or climbing shrubs. *Leaves* thick, coriaceous, glabrous and shining. *Flowers* small or middle-sized, in leaf-opposed rarely extra-axillary peduncled fascicles. Calyx with 3 small valvate *sepals* or cupular with 3 valvate teeth. *Petals* 6, valvate, in 2 whorls, larger than the sepals, equal, or the inner rather smaller. *Torus* cylindrical or hemispheric. *Stamens* indefinite, loosely packed ; anthers dorsal, contiguous, not concealed by the apiculate connective. *Ovaries* 1 or more ; style oblong or depressed or stigma sessile ; ovules 4-8

in two series on the ventral suture. *Fruit* a ring of subsessile or stalked carpels.

Leaves glabrous:—

Petals .25 in. long; leaves obtuse:—

Leaves ovate; carpels smooth .....1. *madraspata*na.

Leaves lanceolate; carpels muricate .....2. *sclerocarpa*.

Petals .5 in. long; leaves caudate-acuminate .....3. *zeylanica*.

Leaves tomentose below; flowers .5 in. long, reddish green; carpels tomentose, yellow .....4. *lutea*.

1. ALPHONSEA MADRASPATANA, Bedd. Ic. t. 92, and Fl. t. 76; F. B. I. i. 89; King Ann. Calc. iv. 165, t. 214A.

Forests of the E. Gháts, in ravines and by streams in Vizagapatam, Cuddapah and N. Arcot, up to 3,000 ft.

2. ALPHONSEA SCLEROCARPA, Thw.; F. B. I. i. 89; King Ann. Calc. iv. 166, t. 215A.

Forests of the W. Gháts, in Nilgiris, Malabar, Anamalais, Pulneys and Tinnevelly, up to 2,000 ft.

3. ALPHONSEA ZEYLANICA, Hook. f. & Thoms.; F. B. I. i. 89; Bedd. Ic. t. 90; King Ann. Calc. iv. 166, t. 214B.

Evergreen forests of Travancore and Tinnevelly, at 2,000 to 3,000 ft.

4. ALPHONSEA LUTEA, Hook. f. & Thoms.; F. B. I. i. 89; Bedd. Ic. t. 91; King Ann. Calc. iv. 162, t. 209. *Uvaria lutea*, Roxb. Cor. Pl. i. t. 36.

Eastern slopes of Nilgiris below Coonoor, at 2,000 ft.

### 16. Orophea, Blume.

Small trees or shrubs. *Flowers* usually small, axillary, solitary, fascicled or cymose. *Sepals* 3, valvate. *Petals* 6, valvate, in 2 whorls; outer ovate; inner clawed, usually cohering by their margins into a mitriform cap, sometimes oblong and slightly approximate below the middle, the apices divergent, not vaulted, rarely without claws and very rarely slightly imbricate. *Stamens* definite, 6–12, ovoid, fleshy; anther-cells dorsal, large, contiguous, not concealed by the connective, which is sometimes prolonged into a conical apical point, not truncate. *Staminodes* 0 or 3–6. *Ovaries* 3–15; style short or 0; ovules 4. *Fruit* a ring of 1- or more-seeded, globular or oblong (rarely very long) carpels.



Outer petals, pedicels and young parts shaggy; carpels oblong, red.

1. *erythrocarpa*.

Outer petals and young parts pubescent or glabrous; carpels globose:—

Pedicels under .1 in. long, in nearly sessile clusters .....2. *Thomsoni*.

Pedicels more than .2 in. long:—

Buds and young shoots shortly tomentose; stamens 6...3. *zeylanica*.

Buds and young shoots glabrous; leaves 1.5–2.5 in. long, ovate; stamens 12 .....4. *uniflora*.

1. *OROPHEA ERYTHROCARPA*, Bedd. Ic. t. 68; F. B. I. i. 91; King Ann. Calc. iv. 103, t. 145A.

Forests of the W. Gháts in the Anamalais and Travancore, up to 2,000 ft.

2. *OROPHEA THOMSONI*, Bedd. Ic. t. 67; F. B. I. i. 91; King Ann. Calc. iv. 103, t. 144B.

Forests of the W. Gháts in the Anamalais and down to Tinnevelly, up to 2,500 ft.

3. *OROPHEA ZEYLANICA*, Hook. f. & Thoms.; F. B. I. i. 90; Bedd. Ic. t. 70; King Ann. Calc. iv. 104, t. 146B.

Coorg and Mysore.

4. *OROPHEA UNIFLORA*, Hook. f. & Thoms.; F. B. I. i. 90; Bedd. Ic. t. 69; King Ann. Calc. iv. 102, t. 144A.

Forests of the W. Gháts from Coorg through Wynaad to Travancore and Tinnevelly, up to 4,000 ft.

### Family V. MENISPERMACEAE.

Climbing or twining shrubs or occasionally herbs, or very rarely erect shrubs or small trees. *Leaves* alternate, simple or very rarely compound, entire or lobed, usually palminerved, often peltate; stipules 0. *Flowers* dioecious, small, solitary, fascicled capitate or cymose or more frequently racemed or paniced, sometimes bracteate, occasionally 3-bracteolate. *Sepals* 6, in 2 whorls, or 9–12 in 3–4 whorls, rarely fewer than 6 and very rarely 5, outer often minute, occasionally all connate into a toothed or lobed cup. *Petals* never more than 6, rarely fewer, free or connate or 0. ♂ *Stamens* usually of the same number as, and opposite to, the petals; filaments free, with extrorse or vertically dehiscent anthers, or connate with anthers capitate or on the rim of a terminal disk; rudimentary carpels very small or 0. ♀ *Staminodes* 6 or 0; ovaries 3 or sometimes 1, rarely 6–12; styles simple or divided,



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Flowers in umbellate heads or in solitary condensed cymes

7. **Stephania.**

Ovaries 3-many :—

Drupes pedicelled on the receptacle :—

Leaf-blade rotund-cordate, acuminate, less than twice the petiole ; petals 0 .....2. **Anamirta.**

Leaf-blade oblong-ovate, acute, seldom cordate, more than 4 times the petiole ; petals 6, minute.....4. **Tiliacora.**

Drupes sessile on the receptacle :—

Drupes elongate, 1 in. long, panicles long, drooping

5. **Diploclisia.**

Drupes pisiform, under .3 in. :—

Flowers in short erect panicles or subsolitary ; albumen fleshy.....6. **Cocculus.**

Flowers racemose ; albumen 0 .....10. **Pachygone.**

1. **Tinospora, Miers.**

Climbing shrubs. Racemes or rarely panicles of usually precocious *flowers*, axillary terminal or from the old wood. *Sepals* 6, 2-seriate, inner larger. *Petals* 6, smaller.  $\sigma$  *Stamens* 6, free ; anther-cells connivent at the thickened top of the filament, bursting longitudinally.  $\text{♀}$  *Staminodes* 6, clavate ; ovaries 3 ; stigmas forked. *Drupes* ventrally flat, dorsally convex, round or oval ; style-scar subterminal ; endocarp rugose or tubercled, dorsally keeled, ventrally concave. *Seed* grooved ventrally or curved round a 2-lobed intrusion of the endocarp ; albumen ventrally ruminant ; cotyledons foliaceous, ovate, spreading.

TINOSPORA CORDIFOLIA, Miers ; F. B. I. i. 97. *Cocculus cordifolius*, DC. ; W. & A. 12 ; Wt. Ic. t. 485-6.

A climbing shrub with succulent stems, the bark papery at first then corky ; leaves glabrous ; flowers yellow, on nodes on the old wood ; drupes red, sessile ; endocarp with few isolated tubercles or smooth.

In forests and among trees in almost all Districts. Vern. *Hind.* Goluncha ; *Tel.* Tippa tiga ; *Tam.* Chintil.

2. **Anamirta, Colebr.**

Climbing shrubs. *Flowers* bibracteolate, paniced. *Sepals* 6. *Petals* 0.  $\sigma$  *Anthers* capitate in many whorls on the top of the staminal column, 2-celled, bursting transversely.  $\text{♀}$  *Staminodes*

9, clavate, in 1 whorl; ovaries 3, on a short gynophore; stigmas subcapitate, reflexed. *Drupes* on a 3-fid gynophore, transversely or obliquely ovoid, somewhat compressed, dorsally gibbous; style-scar sub-basal; endocarp woody. *Seed* globose, embracing a subglobose hollow intrusion of the endocarp; albumen dense, of horny granules; embryo curved; cotyledons narrow-oblong, thin, spreading.

ANAMIRTA COCCULUS, W. & A. 446; F. B. I. i. 98. *Cocculus suberosus*, W. & A. 11.

A large climbing shrub with long panicles of greenish flowers drooping from nodes of the old wood; leaves broadly ovate, cordate, firm, glabrous except for small tufts in the principal nerve axils.

Deccan, in Cuddapah and Mysore; W. Gháts in the Pulneys, Cochin and Travancore.

The source of the bitter drug "Cocculus indicus."

### 3. *Coscinium*, Colebr.

Climbing shrubs. *Flowers* bracteate, in dense globular solitary or racemose heads. *Sepals* 6, orbicular. *Petals* 3, large, spreading, elliptic. - ♂ *Stamens* 6; outer 3 free, with 2-celled anthers; inner 3 connate, with 1-celled anthers; anthers bursting vertically. ♀ *Staminodes* 6; ovaries 3-6, subglobose; styles subulate, reflexed. *Drupes* globose; endocarp bony. *Seed* globose, embracing a globose intrusion of the endocarp; albumen fleshy, ruminant ventrally; embryo straight; cotyledons orbicular, spreading, thin, sinuate laciniate or fenestrate.

COSCINIUM FENESTRATUM, Colebr.; F. B. I. i. 99.

Young shoots and under side of leaves hoary; leaves oblong-deltoid; flowers green, in heads .5-.8 in. across, borne on stalks 1 in. long; drupes 1-3, .5 in. in diam., subglobose, villous.

W. Gháts, in the Nilgiris and Travancore.

### 4. *Tiliacora*, Colebr.

Climbing shrubs. *Flowers* dioecious or polygamous, in axillary panicles. *Sepals* 6, 2-seriate, the outer much smaller. ♀ *Petals* 6, minute, cuneate. ♂ *Stamens* 6; anthers adnate, bursting vertically; rudimentary carpels 3. ♀ *Ovaries* 3-12; styles short, subulate. *Drupes* obovoid, pedicelled, subcompressed; style-

scar sub-basal; endocarp thin, obscurely ribbed, grooved on both sides. *Seed* horseshoe-shaped; albumen oily, ruminant; cotyledons linear, fleshy, plano-convex, appressed.

TILIACORA ACUMINATA, Miers. *T. racemosa*, Colebr.; F. B. I. i. 99. *Cocculus acuminatus*, W. & A. 12.

A large evergreen climbing shrub; leaves ovate to lanceolate, obtuse or cordate at base, glabrous; flowers yellow, in racemes or narrow panicles; drupes oblong, red.

In all Districts, common in hedges and among bushes, but sometimes in forests, when it climbs to the tree-tops.

### 5. Diploclisia, Miers.

Characters of *Cocculus* but flowers in long drooping panicles from the old wood and centre of endocarp reduced to a thin flat septum.

DIPLOCLISIA GLAUDESCENS, Diels in Engl. Pflanzenr. Menisperm. 225, t. 77. *Cocculus macrocarpus*, W. & A. 13; F. B. I. i. 101; Wt. Ill. i. t. 7.

A large climber; leaves round or broader than long, 5-nerved, glaucous beneath, 2-4 in. across, shorter than their petioles; flowers yellow; drupes reddish, obovoid, 1 in. long.

Forests of the W. Gháts in Malabar, Nilgiris, Pulneys and Travancore up to 6,000 ft.

### 6. Cocculus, DC.

Climbing or straggling or erect shrubs, or even trees. *Flowers* paniced or rarely fascicled in the axils of the leaves. *Sepals* 6, 2-seriate, outer smaller. *Petals* 6, smaller than the sepals, usually auricled at the base. ♂ *Stamens* embraced by the petals; anthers subglobose, cells bursting transversely. ♀ *Staminodes* 6 or 0; ovaries 3-6; styles usually cylindric. *Drupes* compressed; endocarp horseshoe-shaped, dorsally keeled and tubercled, sides concave, but not reduced to a thin flat septum. *Seed* curved; albumen fleshy; embryo annular; cotyledons linear flat, appressed.

Erect shrub or small tree; leaves strongly 3-ribbed, caudate-acuminate; flowers pale yellow; peduncles glabrous .....1. *laurifolius*.



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2. STEPHANIA WIGHTII, Dunn. *S. rotunda*, Hook. f. & Thoms.; F. B. I. i. 103 not of Lour. *Clypea Wightii*, Arn. in Wt. Ill. i. 22.

Forests of the W. Gháts, in Malabar, Nilgiris and Tinnevely.

### 8. Cissampelos, Linn.

Suberect or climbing shrubs. *Leaves* often peltate. *Flowers*: ♂ cymose; sepals 4 (-5-6), erose; petals 4, connate, forming a 4-lobed cup; anthers 4, connate round the flattened top of the staminal column, bursting horizontally: ♀ racemed, crowded in the axils of leafy bracts; sepals 2 (or sepal and petal 1 each), 2-nerved, adnate to the bracts; staminodes 0; ovary 1, style short, 3-fid or 3-toothed. *Drupe* ovoid, style-scar sub-basal; endocarp horseshoe-shaped, compressed, dorsally tubercled, sides excavated. *Seed* curved; embryo slender; cotyledons narrow, semi-terete, appressed.

CISSAMPELOS PAREIRA, Linn.; F. B. I. i. 103. *C. convolvulacea*, Willd.; W. & A. 14.

A more or less tomentose climber with rotund usually cordate leaves, about equal in length to their petioles. Flowers greenish. Bracts of female racemes often densely imbricate. Cymes of male flowers 1-2 in. long, decompound. Drupes scarlet, hirsute.

In almost all Districts, very common.

### 9. Cyclea, Arn.

Climbing shrubs. *Leaves* usually peltate. *Flowers* in axillary panicles: ♂ Sepals 4-8, connate into a 4-5-lobed calyx; petals 4-8, more or less connate into a 4-5-lobed corolla; anthers 4-6, connate round the rim of the disk-like top of the staminal column, bursting horizontally: ♀ Calyx globose or campanulate, lobed; corolla globular; ovary 1, style short, 3-5-lobed, lobes radiating. *Drupe* ovoid; style-scar sub-basal; endocarp horseshoe-shaped, 2-locellate, dorsally tubercled, sides convex. *Seed* curved; cotyledons slender, semi-terete, appressed.

Calyx globose or broadly campanulate, lobes  $\frac{1}{4}$  of tube; anther 6-8-celled.....1. *peltata*.  
 Calyx campanulate, lobes  $\frac{1}{4}$  of tube; anthers 4-celled..... 2. *Arnottii*.  
 Calyx campanulate, divided nearly to the base..... 3. *fissicalyx*.

1. *CYCLEA PELTATA*, Diels (*not of* Hook. f. & Thoms.). *C. Burmanni*, Hook. f. & Thoms.; F. B. I. i. 104; Cooke Fl. Bomb. i. 23.

W. Gháts from S. Canara to Tinnevelly, up to 3,000 ft.; Hills of Mysore and N. Arcot, up to 3,000 ft.

2. *CYCLEA ARNOTTII*, Miers. *C. peltata*, Hook. f. & Thoms.; F. B. I. i. 104 (*not Menispermum peltatum*, Lam.).

W. Gháts in S. Canara, Coorg, Wynaad, Nilgiris, Anamalais and Tinnevelly Hills, up to 6,000 ft.

3. *CYCLEA FISSICALYX*, Dunn. *C. peltata*, Cooke Fl. Bomb. i. 24 (*not of* Hook f. & Thoms. *nor of* Diels).

Forests of Wynaad in Malabar.

### 10. Pachygone, Miers.

A climbing shrub. *Flowers* in axillary racemes. *Sepals* 6, in 2 whorls, outer smaller. *Petals* 6, much smaller, bases auricled and embracing the filaments.  $\sigma$  *Stamens* 6, filament incurved, anthers subglobose, didymous, bursting transversely; rudimentary carpels 3, minute.  $\wp$  *Staminodes* 6; ovaries 3; styles stout, horizontal. *Drupes* reniform; style-scar sub-basal; endocarp reniform, rugulose. *Seed* horseshoe-shaped; albumen 0; cotyledons semi-terete, very thick, hard; radicle very short.

*PACHYGONE OVATA*, Miers; F. B. I. i. 105. *Cocculus Plukenetii*, DC.; W. & A. i. 14; Wt. Ic. t. 824, 825.

A large evergreen spreading shrub with long drooping or climbing branches and ovate blunt leaves. Flowers minute, white, honey-scented. Drupe .3 in. long.

Sandy sea-shores on the Coromandel Coast from Nellore to Tanjore and Tinnevelly; Deccan in Bellary, Cuddapah and Mysore.

### Family VI. BERBERIDACEAE.

Glabrous herbs or shrubs, sometimes climbing. *Leaves* 1-many-foliolate. *Stipules* petiolar or usually 0. *Flowers* hermaphrodite or rarely diclinous, regular, axillary, solitary or in simple or compound racemes, usually yellow or white, all members inserted on the receptacle. *Sepals* often petaloid, 3-9, in 1-3 whorls, imbricate or the outer rarely valvate. *Petals* equal in number to the sepals or twice as many, and, like them, caducous, nectariferous at the base or reduced to nectaries. *Stamens* (4-) 6 (-8)



opposite to the petals; filaments free or connate, sometimes irritable. *Anthers* bursting by two apical valves attached by their upper end or longitudinally. *Carpels* 1-3 (-9) distinct; stigma usually peltate; ovules many on a ventral suture, or few near the base, or covering the whole wall, usually anatropous. *Ripe carpels* berries or capsules, dehiscent or not.

Leaves simple .....1. **Berberis**.  
 Leaves pinnate .....2. **Mahonia**.

### 1. **Berberis**, Linn.

Erect shrubs with yellow wood. *Leaves* simple, fascicled in the axils of 3-5-partite or rarely simple spines. *Flowers* yellow, solitary fascicled racemose corymbose or paniced, with 2-3 small appressed bracteoles. *Sepals* 6, imbricate in 2 whorls. *Petals* 6, imbricate in 2 whorls, usually with 2 glands inside at the base. *Stamens* 6, free; anther-cells opening by recurved valves. *Ovary* simple; stigmas peltate, sessile or nearly so; ovules few, basal, erect. *Berries* few-seeded.

BERBERIS TINCTORIA, Lesch.; W. & A. 16.

An erect evergreen bush with pale brown shining twigs, prickly leaves, yellow flowers in panicles or corymbs, and glaucous spindle-shaped red berries with short stout styles.

Nilgiri and Pulney Hills of the W. Gháts, above 6,000 ft.; Shevaroy Hills of Salem.

### 2. **Mahonia**, Nutt.

Characters of BERBERIS but leaves pinnate with opposite leaflets, and stamens usually 2-toothed below the anther.

MAHONIA LESCHENAULTII, Takeda. *Berberis nepalensis*, var. *Leschenaultii*, Hook. f. & Thoms.; F. B. I. i. 109 *B. Leschenaultii*, Wall.; Wt. Ic. t. 940.

A shrub with stiff, erect, corky-barked stems; leaflets ovate-lanceolate, prickly; flowers yellow, in long erect racemes, fascicled among the upper leaves; berries globose, glaucous purple.

Hills of the W. Gháts from the Nilgiris southwards, above 5,000 ft., in Shola forest.



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2. *NYMPHAEA PUBESCENS*, Willd.; W. & A. 17. *N. Lotus*, Hook. f. & Thoms.; F. B. I. i. 114 (*not of Linn.*).

Ditches and tanks in most Districts both along the Coasts and on the Mysore plateau up to 3,000 ft.

## 2. *Nelumbium*, Juss.

A large erect herb, growing in shallow water from a stout creeping rootstock. *Leaves* when mature raised high above the water, peltate. *Flowers* rose white or yellow. *Sepals* 4-5. *Petals* and *stamens* numerous, all hypogynous and caducous; connective prolonged above the anther. *Ovaries* many, 1-celled, sunk in pits on the flat top of the broadly turbinate torus; style very short, exserted; stigma terminal, peltate; ovules 1-2, pendulous. *Carpels* ovoid, loose in the cavities; pericarp bony, smooth. *Seed* filling the carpel; testa spongy; albumen 0; cotyledons fleshy, thick, enclosing the folded plumule.

*NELUMBIUM SPECIOSUM*, Willd.; F. B. I. i. 116; W. & A. 16.

Peduncles and petioles 3-6 ft. high; leaves 2-3 ft. across, glaucous, concave; fruiting torus 3-4 in. across; ripe carpels rather larger than peas.

In tanks and ponds in most Districts, especially in the hotter localities.

The sacred Lotus. Vern. *Hind.* Kanwal; *Tam.* Tamaray.

## Family VIII. *PAPAVERACEAE*.

Herbs with milky or coloured juice, rarely watery. *Leaves* radical or alternate. *Flowers* terminal, solitary cymose or paniculate. *Sepals* 2-3, hypogynous, free or cohering in a cap, caducous. *Petals* 4, in 2 whorls, large, crumpled, rarely more or 0. *Stamens* very numerous, in many series, very rarely few; filaments thread-like; anthers basifixed, bursting by lateral slits. *Ovary* 1-celled, with 2 to many parietal placentas or these being sometimes prolonged, divided into many nearly complete cells; style short or 0; stigmas radiating, as many as the placentas, free or adnate to and crowning the flat top of the ovary; ovules anatropous, parietal. *Fruit* a 1-celled or by the intrusion of the parietal placentas a many-celled capsule, opening longitudinally by 2 or 4 valves or by pores at the top of and between the placentas. *Seeds* usually numerous, with oily or fleshy albumen; embryo basal, minute,

Leaves and capsules quite glabrous; petals white pink or purple; stigmas adnate to the top of the capsule ... ..1. **Papaver**.  
 Leaves and capsules spiny; petals yellow; stigmas radiating from the top of a short style .....2. **Argemone**.

### 1. Papaver, Linn.

Annual or perennial herbs with milky juice. *Leaves* variously lobed or cut. *Flowers* on long peduncles. *Ovary* 1-celled; stigmas adnate, radiating. *Capsule* short, opening by pores round the upper rim. *Seeds* small, pitted.

PAPAVER SOMNIFERUM, Linn.; F. B. I. i. 117; W. & A. 17.

An erect unbranched annual, with glabrous glaucous semi-amplexicaul leaves, ovate or linear-oblong and variously toothed; flowers white, red or purple; capsule globose, smooth, up to 1 in. thick.

Occasionally cultivated and found run wild. The Opium Poppy.

### 2. Argemone, Linn.

An erect, prickly annual with yellow juice. *Flowers* bright yellow. *Sepals* 2-3. *Petals* 4-6. *Stamens* very many. *Ovary* 1-celled; style very short; stigma 5-7-lobed; ovules many, on 4-7 parietal placentas. *Capsule* short, opening at the top by valves. *Seeds* many.

ARGEMONE MEXICANA, Linn.; F. B. I. i. 117; W. & A. 18.

A strong branched prickly annual, with sessile semi-amplexicaul sinuate-pinnatifid leaves variegated with white; flowers 1-3 in. across, yellow.

An introduced weed, found on roadsides, in waste places and fallow fields in all Districts.

## Family IX. FUMARIACEAE.

Annual or perennial often glaucous herbs with watery juice. *Leaves* usually decomposed. *Flowers* irregular, bisexual, racemed. *Sepals* 2, small, petaloid or scarious, deciduous. *Petals* 4, in 2 dissimilar pairs; 2 outer, both or only one gibbous at the base or spurred; inner smaller, often coherent at the tip. *Stamens* 6, usually in two bundles opposite the outer petals; central anther in each bundle 2-celled, others 1-celled. *Ovary* 1-celled; stigma on a distinct style, obtuse or lobed; ovules

parietal, 2 or more, amphitropous. *Fruit* an indehiscent 1-seeded nut, or a 2-valved many-seeded capsule. *Seeds* albuminous, with a minute embryo.

### Fumaria, Linn.

Annual branched sarmentose herbs. *Leaves* finely divided. *Flowers* small, white or pink, with purple tips to the petals, in terminal or leaf-opposed racemes. Outer anterior *petal* flat, posterior gibbous at the base. *Stamens* diadelphous, the posterior bundle with a spur inside the base of the posterior petal. *Ovary* 1-celled; style filiform; ovules 2 on 2 placentas. *Fruit* indehiscent, globose, 1-seeded.

FUMARIA PARVIFLORA, Lam.; W. & A. 18.

A diffuse pale green herb; leaf-segments very narrow; flowers .15-.3 in. long; fruit slightly pointed even when ripe.

A weed of cultivation, chiefly at somewhat high elevations, as on the Mysore plateau and in the E. Nilgiris.

### Family X. CRUCIFERAE.

Herbs, rarely a little woody at the base, with watery sometimes pungent juice. *Leaves* alternate or radical, exstipulate. *Flowers* usually racemed rarely solitary, terminal or axillary. *Sepals* 4, 2 often larger and saccate at the base, imbricate. *Petals* 4, hypogynous, imbricate. *Stamens* 6, rarely fewer or many, 4 inner longer, in opposite pairs. *Disk* with 4 glands opposite the sepals. *Ovary* 2-celled, the division formed by a membrane connecting the placentas, or 1-celled, or with many superposed cells; style short or 0; stigma entire or 2-lobed. *Ovules* many, 2-seriate on the 2 parietal placentas, or rarely 1 or 2 erect. *Fruit* either 2-celled, the 2 valves deciduous and leaving the seeds on the persistent dissepiment or indehiscent or transversely jointed. *Seeds* small; albumen 0; cotyledons plano-convex or longitudinally bent or folded; radicle turned over the back of the cotyledon (*incurvibent*) or along its side (*accumbent*).

Pods linear and dehiscent:—

Pods dehiscing and bearing seeds throughout their whole length; sepals not pouched; cotyledons accumbent:—

Pods cylindric seeds globose, 2-seriate or irregularly 1-seriate

1. **Nasturtium.**



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clawed. *Pods* narrow-linear, compressed, tapering at both ends; valves elastic, with a distinct midrib; stigma entire or 2-lobed. *Seeds* flattened, 1-seriate; cotyledons accumbent.

Lower leaves trifoliolate; pods 1.5 in. long.....1. *africana*.

Lower leaves 5- or more- foliolate; pods .5-1 in. long:—

Petals 0; leaflets sinuate .....2. *trichocarpa*.

Petals 4; leaflets entire .....3. *hirsuta*.

1. **CARDAMINE AFRICANA**, Linn.; F. B. I. i. 137; W. & A. 20; Wt. Ic. t. 941.

W. Gháts from the Nilgiris to the Travancore Hills at 4,000 to 7,500 ft.; Sivagiri Hills in Tinnevely; in woods.

2. **CARDAMINE TRICHOCARPA**, Hochst. *C. subumbellata*, Hook.; F. B. I. i. 138. *C. borbonica*, Pers.; W. & A. 20.

W. Gháts, in the Nilgiris and Pulneys, above 6,000 ft.; hills of Mysore; in woods.

3. **CARDAMINE HIRSUTA**, Linn.; F. B. I. i. 138; W. & A. 20.

W. Gháts, in the Nilgiris and Pulneys, a weed, probably introduced.

### 3. *Capsella*, Moench.

Small branched herbs. Radical *leaves* in a rosette, entire or pinnatifid. *Sepals* spreading, not pouched at the base. *Pods* obcordate ovate-oblong or cuneate, laterally compressed; valves boat-shaped; septum very narrow; style short. *Seeds* many, in 2 rows, narrowly margined; cotyledons incumbent.

**CAPSELLA BURSA-PASTORIS**, Moench; F. B. I. i. 159.

A small herb with pinnatifid root leaves and auricled stem ones; pods obcordate.

A weed of cultivation, especially at higher elevations. The Shepherd's Purse.

The following species occur as escapes from cultivation, as casual weeds, or in cultivation only:—

**BARBAREA PRAECOX**, R. Br. "Winter Cress." Nilgiris.

**BRASSICA CAMPESTRIS**, Linn. Cultivated in various forms as the "Turnip," "Rape," "Kohl-Rabi," etc.

**BRASSICA JUNCEA**, Hook. f. & Thoms. Cultivated and found run wild, occasionally, as by Gough in the Kunbahs of the Nilgiris, in a locality to which it would hardly be considered introduced. The "Indian Mustard." Vern. *Hind.* Rai.

ERUCA SATIVA, Lam. "Rocket." Vern. *Hind.* Taranuri, Asan. Found only run wild in Madras, cultivated in N. India.

LEPIDIUM SATIVUM, Linn. "Garden Cress." Cultivated.

RAPHANUS SATIVUS, Linn. "Radish." Vern. *Hind.* Múli. Cultivated.

SENEBIERA DIDYMA, Pers. "Lesser Wart-cress." Nilgiris.

### Family XI. CAPPARIDACEAE.

Herbs or shrubs, erect or climbing, rarely trees. *Leaves* alternate or very rarely opposite, simple or palmately 3-9-foliolate; leaflets usually entire; stipules spinescent or minute or 0. *Flowers* solitary, racemed, corymbose or umbelled, regular or rarely a little irregular, bisexual or rarely dioecious. *Sepals* generally 4, free or connate, usually imbricate. *Petals* 4, rarely 0, or very rarely 2, imbricate, hypogynous or sometimes inserted on the disk. *Stamens* usually 6, sometimes 4 or numerous, hypogynous or perigynous or inserted at the base of or on a long or short gynophore. *Disk* 0 or annular or lining the tube of the calyx. *Ovary* usually stalked, 1-celled; stigma usually capitate, sessile; ovules many, amphi- or campylo-tropous, on 2-4 parietal placentas. *Fruit* a pod-like capsule or a berry or rarely a drupe. *Seeds* angular or reniform, often imbedded in pulp; albumen 0, or thin; embryo variously folded and curved.

Herbs with usually digitate leaves and capsular fruit:—

Ovary long-stalked, with 6 stamens inserted on the gynophore; leaves 5-foliolate .....1. **Gynandropsis.**

Ovary sessile, with 12 or more stamens inserted on the disk or, if the ovary is shortly stalked or stamens 6, then leaves 1-3-foliolate

2. **Cleome.**

Trees or shrubs with usually simple leaves and fruit usually a berry:—

Calyx tubular below:—

Petals 0; berry ovoid; leaves 3-5-foliolate; small trees

3. **Niebuhria.**

Petals 4; berry moniliform; leaves simple; climbers ...4. **Maerua.**

Calyx divided to the base into 4 sepals:—

Stamens inserted on the middle of the gynophore ... .....5. **Cadaba.**

Stamens inserted on the base of the gynophore:—

Leaves simple; thorny or unarmed small trees or erect or climbing shrubs .....6. **Capparis.**

Leaves trifoliolate; large unarmed trees .....7. **Crataeva.**



### 1. *Gynandropsis*, DC.

Annual leafy herbs. *Leaves* long-petioled, digitately 3-7-foliolate. *Flowers* white or purple, in bracteate racemes. *Petals* 4, spreading, long-clawed, open in bud. *Stamens* about 6, inserted upon the long gynophore, spreading. *Ovary* stalked, 1-celled, with 2 many-ovuled parietal placentas. *Capsule* and *seeds* as in CLEOME.

GYNANDROPSIS PENTAPHYLLA, DC. ; F. B. I. i. 171 ; W. & A. 21.

A tall pubescent plant with pale purplish flowers 3-6 in. across in glutinous corymbs which elongate into dense bracteate racemes. Capsules 2-4 in. long, nearly glabrous, striate.

An annual weed, common in waste places in all Districts in the plains and at low elevations.

### 2. *Cleome*, Linn.

Herbs. *Leaves* simple or digitately 3-9-foliolate. *Flowers* racemose or solitary and axillary, yellow rose or purple. *Sepals* 4, spreading. *Petals* 4, ascending, imbricate in the bud. *Stamens* 6-20, inserted on the disk. *Ovary* sessile or shortly stalked ; style short or 0 ; ovules many on 2 parietal placentas. *Capsule* oblong or linear, valves 2, deciduous and leaving the seeds attached to the placentas. *Seeds* reniform.

Whole plant viscous with stalked glands ; ovary densely glandular, sessile ; capsule thinly glandular ; leaves 3-5-foliolate ; flowers yellow

1. *viscosa*.

Plants glabrous, pubescent or asperous but not viscous ; ovary and capsule glabrous :—

Leaves simple, linear oblong ; stamens 6 ; flowers dull purple or pink

2. *monophylla*.

Leaves 3-9-foliolate :—

Leaflets filiform ; capsule sessile ; stamens 6 ; flowers yellow ; plant glabrous .....3. *tenella*.

Leaflets linear-oblong to obovate :—

Leaves 3-foliolate :—

Stem and leaves glabrous, not asperous ; stamens 6 ; flowers purple .....4. *Burmanni*.

Stem and leaves asperous ; capsule glabrous :—

Stem and leaves entirely clothed with stiff appressed scale-like hairs ; capsule 8 times as long as broad ; stamens about 30 ; flowers pink .....5. *felina*.



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Dry forest tracts in Kistna, Kurnool and Cuddapah, also in Tinnevely.

The wood is divided by bark tissue into concentric sometimes anastomosing layers. Vern. *Tam.* Iruvalli.

#### 4. *Maerua*, Forsk.

Climbing shrubs. *Leaves* simple. *Flowers* corymbose. *Calyx-tube* lined by the disk, with 4 valvate lobes. *Petals* 4, inserted on the edge of the disk, ovate, smaller than the calyx-lobes. *Stamens* many, inserted high up on the gynophore. *Ovary* long-stalked, 1-celled or becoming 2-celled by the cohesion of the placentas; ovules many, on 2-4 parietal placentas. *Berry* fleshy, elongate, moniliform, 1- or more-seeded. *Cotyledons* fleshy, involute.

MAERUA ARENARIA, Hook. f. & Thoms.; F. B. I. i. 171. *Niebuhr* *oblongifolia*, DC.; W. & A. 23.

A large woody climber with terminal corymbs of greenish-yellow flowers. Leaves simple and entire, varying from broadly ovate to oblong and from acute to retuse.

Deccan and Carnatic Districts from Godavari southwards.

The wood is in concentric layers as in *Niebuhr*.

#### 5. *Cadaba*, Forsk.

Rigid wiry unarmed shrubs. *Leaves* simple or 3-foliolate. *Flowers* solitary, corymbose or racemed. *Sepals* 4, unequal, in 2 whorls, outer 2 valvate. *Petals* 4 or 2, clawed, hypogynous. *Disk* large, coloured, encircling the gynophore with its tubular stalk and expanded trumpet-wise at the top or spathulate. *Stamens* 4-6, inserted unilaterally on the slender gynophore. *Ovary* 1-celled; stigma sessile; ovules many, on 2-4 parietal placentas. *Fruit* a fleshy slender cylindrical berry or sometimes dehiscent ultimately by two valves which fall away from the placentas. *Seeds* globose; testa horny; cotyledons convolute.

Leaves trifoliolate; petals 2, pure white with yellowish veins; disk limb bright yellow; stamens 6; fruit 2-4 in. long, dehiscent.....1. *trifoliata*.

Leaves simple; petals 4, greenish white; stamens 4; fruit 1-1.5 in. long, eventually dehiscent .....2. *indica*.

1. CADABA TRIFOLIATA, W. & A. 24; F. B. I. i. 172.

E. Ghát forests of Nellore, Cuddapah and Kurnool; also in Coimbatore, S. Arcot and Tinnevely.

A large shrub, the wood in concentric layers as in *Niebuhria*.

2. CADABA INDICA, Lam. ; F. B. I. i. 172; W. & A. 24.

Dry Districts of the N. Circars, Deccan and Carnatic from Vizagapatam southwards; often on old walls, on trees, in waste places, and about villages.

A straggling or half-climbing shrub; wood not in concentric layers.

### 6. Capparis, Linn.

Trees or shrubs, erect straggling or climbing, unarmed or with stipular thorns. *Leaves* simple or 0. *Flowers* white or coloured, often showy. *Sepals* 4, free, in 2 whorls, all imbricate or the outer valvate. *Petals* 4, sessile, imbricate, 2 rarely united into a short spur at the base. *Stamens* long, numerous, inserted on the torus at the base of the gynophore. *Ovary* stalked, 1-4-celled; ovules many, on 2-6 parietal placentas. *Fruit* fleshy, rarely dehiscent by valves. *Seeds* numerous, imbedded in pulp; testa crustaceous or coriaceous; cotyledons convolute.

Mature branches leafless; thorns straight; flowers under 1 in. across, red; fruit globose, red .....1. *aphylla*.

Mature branches leafy:—

Flowers solitary or nearly so:—

Ovary glabrous, grooved; flowers 2.5-3 in. across:—

Thorns hooked; leaves pubescent beneath; flowers white; fruit slightly granular, oblong.....2. *grandiflora*.

Thorns straight; leaves glabrous; flowers red; fruit rugose, globular.....3. *stylosa*.

Ovary tomentose; flowers white tinged with yellow:—

Flowers 1.5-2 in. across:—

Pedicel not less than  $\frac{1}{2}$  the gynophore:—

Berry ovoid; leaves 1.5-2.5 in. long .....4. *brevispina*.

Berry fusiform, narrowed into the gynophore; leaves 3-5 in. long .....5. *fusifera*.

Pedicel 5 times shorter than the gynophore; berry .7 in. across, black .....6. *olacifolia*.

Flowers 4-5 in. across; thorns minute or 0.....7. *Heyneana*.

Flowers in racemes, umbels, corymbs or panicles:—

Umbels or corymbs solitary:—

Pedicels stout, umbelled, 1-3-flowered, sessile at the ends of leafy twigs; fruit oblong .....8. *diversifolia*.

Pedicels approximate but not umbelled, often at the ends of leafless twigs, forming stout corymbs, or, if forming slender umbels, then thorns small or 0, and buds and pedicels finely tomentose :—

Leaves glabrous, oblong :—

Flowers 4–5 in. across ; thorns short, stout, hooked ; young branches glabrous .....9. *Moonii*.

Flowers 1·5 in. across ; thorns few or 0 ; young branches hoary :—

Flower-buds glabrous ; leaf nerves ascending  
10. *Roxburghii*.

Flower-buds tomentose ; leaf nerves divaricate  
11. *Cleghornii*.

Leaves usually velvety on both sides, never quite glabrous, lanceolate to oblate ; flowers 1 in. across ; fruit globose, dotted, 1·5 in. across .....12. *grandis*.

Pedicels slender, usually numerous, in terminal or axillary sessile or shortly-stalked umbels :—

Spines 0, or very few and small ; buds and pedicels glabrous :—

Twigs densely shortly pubescent ; fully grown buds ·2 in. long  
13. *tomentella*.

Twigs glabrous ; fully grown buds ·1 in. long ; fruit pisiform  
14. *parviflora*.

Spines numerous, recurved :—

Leaves round ; gynophore in flower 1 in. long ; umbel few-flowered .....15. *pedunculosa*.

Leaves ovate lanceolate ; gynophore in flower ·2 in. long ; umbel many-flowered ; flower small, white ; fruit ·5 in. across  
16. *sepiaria*.

Umbels paniced ; flowers small, white ; prickles recurved or 0 ; fruit ·7 in. across, green .....17. *floribunda*.

Flowers in supra-axillary rows :—

Stout climbing shrub ; young parts tomentose ; fully grown buds ·3 in. in diam. ; fruit 1·5 in. in diam., reddish brown ; flowers white, turning rose .....18. *zeylanica*.

Slender shrub ; young parts glabrous ; fully grown buds ·15–·2 in. in diam. ; flowers white ; fruit pisiform.....19. *tenera*.

1. CAPPARIS APHYLLA, Roth ; F. B. I. i. 174 ; W. & A. 27 ; Brand. For. Fl. t. 3.

Tinnevelly.

A twiggy shrub or small tree ; wood light yellow, hard and close-grained.



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11. *CAPPARIS CLEGHORNII*, Dunn. *C. Roxburghii*, Cooke Fl. Bomb. i. 46 (not DC.).  
Forests of the W. Gháts in S. Canara and Mysore.  
A large woody climber.
12. *CAPPARIS GRANDIS*, Linn. f.; F. B. I. i. 176; W. & A. 27.  
*C. bisperma*, Roxb.; W. & A. 26.  
Hill forests of the Deccan, Carnatic and E. slopes of the W. Gháts from the Godavari through Kurnool and Bellary southwards.  
A small tree with white durable wood. Vern. *Tel.* Guli, Ragota, Nallupi; *Tam.* Mudkondai; *Kan.* Torate.
13. *CAPPARIS TOMENTELLA*, Dunn. *C. parviflora*, Bedd. Ic. t. 276 (not of Hook. f. & Thoms.).  
Forests of Travancore.  
A large spreading much-branched shrub.
14. *CAPPARIS PARVIFLORA*, Hook. f. & Thoms.; F. B. I. i. 176.  
Sivagiri Hills in Tinnevely on E. slopes of W. Gháts.  
A spreading much-branched shrub.
15. *CAPPARIS ROTUNDIFOLIA*, Rottl. *C. pedunculosa*, Wall.; F. B. I. i. 176; W. & A. 27; Bedd. Ic. t. 277.  
Striharikota forest in Nellore; Point Calimere in Tanjore, a coast plant.  
A spreading shrub with small round leaves.
16. *CAPPARIS SEPIARIA*, Linn.; F. B. I. i. 177; W. & A. 26. *C. incanescens*, DC.; W. & A. 26.  
N. Circars, Hyderabad, Deccan and Carnatic in dry forests and in hedges and scrub.  
A large straggling shrub with wiry branches, very thorny.
17. *CAPPARIS FLORIBUNDA*, Wt. Ill. t. 14; F. B. I. i. 177.  
N. Circars; Malabar.  
A large woody climbing shrub.
18. *CAPPARIS ZEYLANICA*, Linn. *C. horrida*, Linn. f.; F. B. I. i. 178; W. & A. 26; Wt. Ic. t. 173.  
Dry forests in all Districts of the N. Circars, Deccan and Carnatic, very common.  
A large, climbing, very thorny shrub. Vern. *Ur.* Oserwa; *Tel.* Atonda; *Mar.* Wag, Gowindi; *Tam.* Atanday.
19. *CAPPARIS TENERA*, Dalz.; F. B. I. i. 179.  
W. Gháts in Malabar.  
A climbing shrub with hooked thorns.

7. *Crataeva*, Linn.

Small or medium-sized spreading trees. *Leaves* digitately trifoliolate. *Flowers* large, polygamous. *Sepals* 4, adnate to the lobed disk. *Petals* 4, long-clawed, open in bud. *Stamens* very numerous, inserted at the base of the gynophore. *Ovary* on a slender gynophore, 1-(2-)celled; stigma sessile; ovules many, on 2 parietal placentas. *Berry* fleshy with a hard rough rind; sometimes divided by a longitudinal septum. *Seeds* imbedded in the pulp.

CRATAEVA RELIGIOSA, Forst. ; F. B. I. i. 172; Bedd. Fl. t. 116. *C. Roxburghii*, Br. ; W. & A. 23. *C. Nurvala*, Ham. ; W. & A. 23.

A small or medium-sized tree with broad terminal corymbs of white flowers, which turn yellow soon after opening; filaments purple. Berry 1-2 in. thick, globose or ovate.

Found here and there occasionally in almost all Districts, often planted, frequent along river banks.

Wood yellowish white, even-grained but not durable. Vern. *Tam.* Marvilinga; *Tel.* Uskia man, Voolemara; *Kan.* Nirvála; *Mal.* Nir mathalam.

## Family XII. RESEDACEAE.

RESEDA LUTEOLA, L., has occurred as a casual weed about Ootacamund in the Nilgiris.

## Family XIII. VIOLACEAE.

Herbs, shrubs or trees. *Leaves* alternate or very rarely opposite, entire crenate serrate or pinnatisect, stipulate. *Flowers* regular or irregular. *Sepals* 5, equal or unequal, imbricate or contorted in bud. *Stamens* 5, free or monadelphous; anthers erect, connective produced beyond the cells. *Ovary* sessile, 1-celled; style simple; stigma terminal or lateral, capitate, truncate or cupular, entire or lobed; ovules many, on 3 parietal placentas, anatropous. *Fruit* a 3-valved capsule, rarely a berry. *Seeds* small; albumen fleshy; embryo axile; cotyledons flat.

Herbs, sometimes a little woody at the base; flowers irregular:—

Petals about equal in height; sepals produced below their insertion; peduncles more than 1 in. long .....1. **Viola.**



Petals unequal, lower larger, oval or orbicular, on a long claw; sepals not produced below; peduncles less than .5 in. long .....2. **Ionidium**.  
 Shrubs or trees with regular flowers .....3. **Alsodeia**.

### 1. *Viola*.

Herbs, rarely woody below. *Flowers* 1-2 on long axillary peduncles, sometimes large-petalled but ripening few seeds, sometimes small-petalled ripening many seeds, normal and cleistogamous. *Sepals* produced at the base. *Petals* erect or spreading, lower largest, spurred at the base. *Anthers* connate, connectives of the lower 2 often produced into spurs within the spur of the corolla. *Style* clavate or truncate, tip straight or bent; stigma obtuse, lobed or cup-shaped. *Capsule* 3-valved. *Seeds* ovoid or globose.

Leaves triangular-lanceolate, not deeply cordate; petiole winged; plant stemless .....1. *Patrinii*.

Leaves ovate, deeply cordate; petiole not winged; flowers on leafy stems:—

Sepals linear, gradually attenuate from a lanceolate base; stigma usually lateral.....2. *serpens*.

Sepals ovate-lanceolate, obtuse; stigma terminal.....3. *distans*.

1. *VIOLA PATRINII*, DC. ; F. B. I. i. 183; W. & A. 32. *V. Walkeri*, Wt. Ill. i. 42, t. 18.

Hills of the N. Circars in Ganjam at 4,000 ft.; W. Gháts in Mysore, the Nilgiris, Anamalais and Pulneys at over 4,000 ft.; Shevaroy Hills in Salem.

2. *VIOLA SERPENS*, Wall.; W. & A. 32; F. B. I. i. 184. *V. Wightiana*, Wt. Ic. t. 943.

Hills of Ganjam; W. Gháts from the Nilgiris to Travancore at over 6,000 ft.

3. *VIOLA DISTANS*, Wall.; F. B. I. i. 183.

W. Gháts, in Mysore the Nilgiris and Pulneys at over 6,000 ft.

### 2. *Ionidium*, Vent.

Herbs or small shrubs. *Leaves* alternate, rarely opposite. *Flowers* solitary, axillary, red. *Sepals* 5, subequal, not produced below their insertion. *Petals* 5, the lower one on a long claw, saccate or spurred at the base. *Anthers* connate or free, 2 or 4 of



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stigmas free or united. *Ovules* on 2 or many parietal placentas, amphitropous or anatropous. *Fruit* dry or fleshy, indehiscent or dehiscent with as many valves as placentas. *Seeds* arillate or testa pulpy; albumen fleshy; embryo axile; cotyledons foliaceous, often cordate.

Leaves palmately lobed; flowers 4–5 in. across; fruit a capsule

### 1. *Cochlospermum*.

Leaves not lobed:—

Leaves large, ovate-cordate; petals white or pink, 1 in. long; fruit a bristly capsule; seeds covered by a red testa .....2. **Bixa.**

Leaves large, more or less oblong; petals white or yellowish, .5 in. long with scales attached within; fruit large, woody, tomentose:—

Stamens 5–8; peduncles 1–few-flowered, axillary; leaves serrate or with reticulate nervules .....3. **Hydnocarpus.**

Stamens indefinite; peduncles often fascicled on the old wood; leaves entire with parallel nervules .....4. **Asteriastigma.**

Leaves rather small; petals 0, or under .1 in. long; fruit a small glabrous berry; usually thorny:—

Style long, erect, entire or lobed; all the flowers bisexual

### 5. *Scolopia*.

Style very short, entire or branched; most flowers unisexual:—

Stigma entire or slightly lobed at the end of the simple style; ovary 1-celled; berry globose, passing abruptly into the style, under .3 in. in diam.....6. **Xylosma.**

Stigmas separate at the top of the style or of its branches or, if capitate, then berry ovate, acuminate, over .5 in. in diam.

### 7. *Flacourtia*.

## 1. *Cochlospermum*, Kunth.

Trees or shrubs with yellow or red juice. *Leaves* palmately lobed. *Flowers* bisexual. *Sepals* 5, deciduous. *Petals* 5, large, contorted in bud. *Stamens* many, inserted on an eglandular disk; anthers opening by a short slit at the top. *Ovary* nearly 3–5-celled; ovules numerous, on 3–5 parietal placentas; style 1, filiform. *Capsule* 3–5-valved. *Seeds* numerous, cochleate; testa with long woolly hairs; albumen oily; embryo curved.

COCHLOSPERMUM GOSSYPIUM, DC.; F. B. I. i. 190; W. & A. 87; Bedd. Fl. t. 171.

A deciduous tree with 5-lobed leaves tomentose beneath, and large golden-yellow flowers with silky sepals. Fruit a

large brown pear-shaped striate leathery capsule, containing numerous seeds surrounded by pale brown cottony hairs. Dry forests, especially on stony hills, in all Districts, but less common on the W. Coast, conspicuous when in flower in the hot season before the leaves appear. Wood fibrous, quite valueless; cotton of the seeds but little used. Vern. *Hind.* Galgal; *Ur.* Kontopalas; *Tel.* Kandugogu; *Tam.* Tanaku, Kongillam; *Mal.* Appa kudakka; *Kan.* Baruga.

## 2. *Bixa*, Linn.

A shrub or small tree. *Leaves* simple; stipules minute. *Flowers* in terminal panicles, bisexual. *Sepals* 5, imbricate, deciduous. *Petals* 5, contorted in bud. *Anthers* opening by 2 terminal pores. *Ovary* 1-celled; style slender, curved; ovules numerous, on 2 parietal placentas. *Capsule* loculicidally 2-valved. *Seeds* many, testa red and pulpy; albumen fleshy; embryo large; cotyledons flat.

*BIXA ORELLANA*, Linn. ; F. B. I. i. 190 ; W. & A. 31 ; Wt. Ill. i. 17 ; Bedd. Fl. t. 79.

A small evergreen tree with large cordate-acuminate leaves. Flowers large, white or purplish, few together in terminal panicles. Capsules reddish brown, softly bristly. Cultivated and found run wild especially in Western Districts. The Arnotto. Vern. *Hind.* Latkan; *Tel.* Jafra.

## 3. *Hydnocarpus*, Gaertn.

Shrubs or trees. *Leaves* alternate, entire or serrate; transverse nervules and reticulation conspicuous. *Flowers* solitary, fascicled, racemose or cymose, dioecious. *Sepals* 5, imbricate. *Petals* 5, provided at the base inside with a scale often as long as themselves. ♂ *Stamens* 5-15; anthers reniform or ovate-cordate with a broad connective. *Ovary* rudimentary or 0. ♀ *Stamens* similar but without pollen, or rudimentary. *Ovary* 1-celled; stigmas 3-6, sessile or nearly so, spreading, dilated, lobed; ovules many, on 3-6 parietal placentas. *Berry* globose, many-seeded; rind hard. *Seeds* 1, 2 or few, imbedded in pulp; testa bony; albumen oily; cotyledons broad, flat.

Leaves more or less serrate, nervules parallel; petals glabrous, greenish white; scale as long as petals, linear, ciliate .....1. *Wightiana*.

Leaves entire, nervules reticulate; petals ciliate, greenish; scale  $\frac{1}{2}$  as long as petals, ovate, woolly .....2. *alpina*.

1. HYDNOCARPUS WIGHTIANA, Bl.; F. B. I. i. 196. *H. inebrians*, Vahl; Wt. Ill. i. t. 16.

Forests of the W. Coast and W. Gháts from S. Canara southwards, up to 2,000 ft., often near water.

A large evergreen tree: wood greyish white, of no value. Vern. *Mar.* Kastel; *Tam.* Maravetti; *Kan.* Toratti; *Mal.* Kodi, Nirvetti.

2. HYDNOCARPUS ALPINA, Wt. Ic. t. 942; F. B. I. i. 197; Bedd. Fl. t. 77.

W. Gháts in hill forests from S. Canara to Travancore, at up to 6,000 ft.

A large evergreen tree; wood greyish brown, of no great value. Vern. *Tam.* Attuchankalai.

#### 4. *Asteriastigma*, Bedd.

Large trees with alternate entire leaves. *Flowers* large, polygamous, in axillary fascicles or on the old wood. *Sepals* 4, imbricate. *Petals* 12-16, shorter than the sepals, ciliate, furnished with 3-lobed scales at the base inside. *Stamens* very numerous, many-seriate. *Ovary* with many ovules on 6-7 parietal placentas, and as many large sessile 2-lobed stigmas. *Fruit* woody, globose, with numerous angular seeds.

ASTERIASTIGMA MACROCARPA, Bedd. Fl. t. 266; Bedd. Ic. t. 242.

A handsome evergreen tree. Flowers 1 in. across, white, with a sickly scent. Fruit dark brown, 5-6 in. in diam.

Forests of Travancore at 1,500 to 3,000 ft.

#### 5. *Scolopia*, Schreber.

Spinous trees; spines often branched. *Leaves* alternate, with 3 or 5 pairs of nerves spreading from the base; stipules minute or 0. *Flowers* small, 2-sexual, in axillary racemes or narrow panicles. *Sepals* and *petals* 4-6 each, imbricate in bud. *Stamens* many; anthers ovoid, opening by slits, connective produced above. *Ovary* 1-celled; style erect; stigma entire or lobed; ovules few, on 3-4 parietal placentas. *Berry* 2-6-seeded.

SCOLOPIA CRENATA, Clos.; F. B. I. i. 191; Bedd. Fl. t. 78.



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A shrub. Leaves 1–2 in. long, obovate; flowers usually on the thorns; pedicels nearly or quite glabrous .....1. *sepiaria*.

A shrub or small tree. Leaves 2–4 in. long, ovate, usually glabrous; flowers not on the thorns:—

Racemes glabrous; fruits ovoid, .6–.7 in. long .....2. *Cataphracta*.

Racemes pubescent or tomentose; fruits purple, the size of peas

3. *Ramontchi*.

A thorny tree. Leaves 5–7 in. long, pubescent beneath; fruits resembling cherries .....4. *montana*.

1. FLACOURTIA SEPIARIA, Roxb. Cor. Pl. i. 48, t. 68; F. B. I. i. 194; W. & A. 29.

Scrub forests in all Districts, especially on the Coromandel coast and in the Deccan.

2. FLACOURTIA CATAPHRACTA, Roxb.; F. B. I. i. 193.

E. Gháts of Vizagapatam District (Lushington).

A small tree, only once reported, but it occurs in Orissa, so may well be occasional in the N. Circars.

3. FLACOURTIA RAMONTCHI, L'Hérit.; F. B. I. i. 193; W. & A. 29; Wt. Ic. t. 85. *F. sapida*, Roxb. Cor. Pl. i. t. 69; W. & A. 29.

Forests of the N. Circars and Deccan, up to 3,000 ft.; occasional on the W. Coast.

A shrub with small leaves in the scrub forests and on rocky hills, a small tree with rather large leaves in the larger forests. Vern. *Ur.* Balibaincho; *Tel.* Kanregu; *Tam.* Katukali.

4. FLACOURTIA MONTANA, Grah.; F. B. I. i. 192.

Forests of the W. Coast and W. Gháts, not common, up to 3,000 ft.

#### Family XV. PITTOSPORACEAE.

Trees, erect or climbing shrubs or undershrubs. *Leaves* alternate, fascicled, very rarely opposite or verticillate, quite entire or very rarely toothed. *Flowers* hermaphrodite, in various terminal and axillary inflorescences. *Sepals* 5, free or connate, imbricate. *Petals* 5, hypogynous, free or connate, imbricate. *Torus* small. *Stamens* 5, free; anthers versatile. *Ovary* 1-celled, or 2–5-celled by the intrusion of as many parietal placentas; style simple; stigma terminal, 2–5-lobed; ovules many, parietal or axile, anatropous. *Fruit* capsular or indehiscent. *Seeds* usually

numerous; albumen copious; embryo minute, radicle next the **hilum**.

### Pittosporum, Banks.

Trees or erect shrubs, usually green. *Sepals* free or connate below. *Petals* erect, recurved at the top, claws connivent or connate. *Stamens* 5, erect; anthers 2-celled, bursting inwards by slits. *Ovary* sessile or shortly stalked, incompletely 2-3-celled; ovules 2 or more on each placenta. *Capsule* 1-celled, woody, 2- or 3-valved; placentas in the middle of the valves. *Seeds* 2-9, covered with oily resinous pulp.

Flowers in paniculate often contracted racemes; fruit .2 in. in diam.; seeds 6; twigs glabrous.....1. *floribundum*.

Flowers in slender simple racemes; fruit .35-.4 in. in diam.; seeds 5-9; twigs glabrous .....2. *nilghirensis*.

Flowers in stout sessile or subsessile umbels; fruit .4 in. in diam.; seeds 3-4; twigs glabrous or pubescent.....3. *tetraspermum*.

Flowers in umbellate racemes; fruit .4 in. in diam.; seeds 6; ovary inflorescence and twigs densely tomentose .....4. *dasycaulon*.

1. **PITTOSPORUM FLORIBUNDUM**, W. & A. 154; F. B. I. i. 199.

Mahendragiri Hill in Ganjam at 4,500 ft.; Hills of S. Arcot and Salem; W. Gháts from Mysore southwards, at 4,000 ft. and higher.

2. **PITTOSPORUM NILGHIRENSE**, W. & A. 154; F. B. I. i. 198; Wt. Ill. i. t. 70.

W. Gháts, in Shola forests above 3,000 ft., from Mysore to Travancore.

3. **PITTOSPORUM TETRASPERMUM**, W. & A. 154; Wt. Ic. t. 971; F. B. I. i. 198.

W. Gháts, in Shola forests above 5,000 ft. from Nilgiris to Travancore; Hills of Coimbatore.

4. **PITTOSPORUM DASYCAULON**, Miq.; F. B. I. i. 199.

W. Gháts, in Shola forests above 3,000 ft., from Mysore to Travancore.

### Family XVI. POLYGALACEAE.

Annual or perennial herbs, erect or climbing shrubs, or large trees. *Leaves* usually alternate, simple, entire or occasionally



reduced to scales or 0. *Stipules* 0. *Flowers* irregular, 2-sexual, bracteate racemose capitate paniced or spicate. *Sepals* 5, unequal, the 2 inner (*wing-sepals*) larger, petaloid, deciduous or persistent, imbricate in bud. *Petals* 3 or 5, unequal, free from each other but usually adherent to the staminal sheath, the lower one usually boat-shaped. *Stamens* usually 8, monadelphous or rarely distinct; anthers 1- or 2-celled opening by transverse valves or terminal pores. *Ovary* free, 1-3-celled; style simple, generally curved, filiform or variously dilated above; stigma capitate; ovules 1 or more in each cell, anatropous. *Fruit* generally a 2-celled 2-seeded loculicidal capsule, or indehiscent and 1-seeded or of 3 indehiscent samaroid carpels. *Seeds* pendulous, usually carunculate; testa often hairy; embryo axile, with or without fleshy albumen.

Herbs or shrubs; capsule loculicidal, 2-celled, 2-seeded; flowers irregular:—

Annual herbs. Flowers minute, in long terminal spikes; stamens 4-5; sepals nearly equal .....1. **Salomonina.**

Herbs or shrubs. Flowers fairly large, stalked; stamens 8; 2 sepals larger (wing-sepals) .....2. **Polygala.**

Large trees; fruit indehiscent; 1-seeded; flowers nearly regular

3. **Xanthophyllum.**

### 1. **Salomonina**, Lour.

Small branched or simple annuals. *Flowers* minute, in dense terminal spikes. *Sepals* nearly equal. *Petals* 3, united at the base with the staminal tube, the inferior one keel-shaped, hooded, not crested. *Stamens* 4-5, filaments united into a sheath below; anthers opening by pores. *Ovary* 2-celled; 1 pendulous ovule in each cell. *Capsule* laterally compressed, 2-celled, loculicidal; margins toothed. *Seeds* albuminous; strophiole small or 0.

SALOMONIA OBLONGIFOLIA, DC.; F. B. I. i. 207. *S. obovata*, Wt. Ill. i. t. 22B.

A small, slender, simple or much-branched herb with angular stems, small elliptic or ovate-lanceolate leaves and long thin spikes of minute pink flowers, followed by didymous fruit with setose-dentate margins.

W. Coast, from S. Canara southwards; W. Gháts, in Mysore at 2,000 to 3,000 ft., not common,



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Capsule wingless; wing-petals falcate, herbaceous:—

Racemes less than 1 in. long:—

Capsule downy throughout; flowers yellow, .17–.25 in. long; wing-petals densely pubescent, triangular; bracts persistent; leaves thin .....10. *erioptera*.

Capsule glabrous; flowers .1 in. long, greenish; wing-petals subglabrous, oblique; bracts caducous; leaves fleshy

11. *telephioides*.

Racemes over 2 in. long .....12. *Wightiana*.

1. POLYGALA ARILLATA, Ham.; F. B. I. i. 200; W. & A. 39.

W. Gháts, in forests throughout the Range above 4,000 ft.

A large graceful shrub, reaching 12 ft. in height.

2. POLYGALA JAVANA, DC.; F. B. I. i. 201; W. & A. 38.

Hills of the Deccan in Cuddapah, Coimbatore, S. Arcot and Madura; W. Gháts from Malabar to Tinnevelly; up to 5,000 ft.

A branching undershrub.

3. POLYGALA SIBIRICA, Linn.; F. B. I. i. 205. *P. Heyneana*, W. & A. 38 (*not of Wall.*).

W. Gháts from the Nilgiris to Tinnevelly, chiefly above 6,000 ft.

4. POLYGALA ROSMARINIFOLIA, W. & A. 37; F. B. I. i. 204.

N. Circars, Hills of Vizagapatam; W. Gháts from Coimbatore to Tinnevelly; Hills of Salem.

5. POLYGALA BOLBOTHRIX, Dunn. *P. ciliata*, W. & A. 38 (*not of Linn.*).

W. Gháts, from Coimbatore to Tinnevelly.

6. POLYGALA CHINENSIS, Linn.; F. B. I. i. 204. *P. arvensis*, Willd.; W. & A. 36. *P. Rothmana*, W. & A. 37. *P. tranquebarica*, Mart.; W. & A. 37.

In all dry Districts from the plains to 3,000 ft.; scarce or absent from the W. Coast.

7. POLYGALA ELONGATA, Klein; F. B. I. i. 203; W. & A. 38.

Dry Districts of the Deccan and Carnatic from Bellary southwards.

8. POLYGALA LEPTALEA, DC.; F. B. I. i. 202.

N. Circars, in Ganjam; Nilgiris and Hills of Coimbatore.

9. POLYGALA PERSICARIAEFOLIA, DC.; F. B. I. 202. *P. Wallichiana*, Wt. Ill. i. t. 22A.

Hills of Mysore and Coimbatore above 4,000 ft.;

W. Gháts from Nilgiris to Travancore, about 4,000 to 5,000 ft.

10. POLYGALA ERIOPTERA, DC.; F. B. I. i. 203. *P. Vahliana*, DC.; W. & A. 36. *P. triflora*, W. & A. 37 (Linn. ?).

Dry parts of the N. Circars in Vizagapatam and Godavari; dry Deccan and Carnatic Districts from the Kistna river southwards.

11. POLYGALA TELEPHIODES, Willd.; F. B. I. i. 205; W. & A. 36. Carnatic, in Nellore and Chingleput; Travancore.

12. POLYGALA WIGHTIANA, Wall.; W. & A. 38.

W. Carnatic, in Coimbatore and Madura.

### 3. Xanthophyllum, Roxb.

Large trees. *Leaves* large coriaceous, often yellowish green. *Sepals* subequal, 5. *Petals* 4-5, nearly equal, the lower one keeled, not crested. *Stamens* 8, 2 hypogynous, the remainder adnate to the base of the petals. *Ovary* 1-celled, stipitate; ovules 4-16, various in insertion and direction. *Fruit* 1-celled, indehiscent, 1-seeded. *Seeds* exalbuminous, estrophiolate.

XANTHOPHYLLUM FLAVESCENS, Roxb. Cor. Pl. iii. t. 248; F. B. I. i. 209; W. & A. 39.

A large timber tree with stout oblong-lanceolate leaves and finely tomentose terminal panicles of white or yellowish flowers, followed by globular thick-walled rugose green fruits .5-.8 in. in diam.

W. Gháts from the Nilgiris southwards, up to 4,000 ft.

Wood yellowish, hard and close-grained. Vern. *Tam.* Mattei; *Mal.* Madakka.

### Family XVII. CARYOPHYLLACEAE.

Herbs, sometimes a little woody at the base. *Leaves* opposite, usually quite entire; stipules scarious, setaceous or 0. *Flowers* bisexual or rarely unisexual. *Sepals* 4-5, free and imbricate in bud or united into a toothed calyx. *Petals* 4-5, entire toothed or bifid, sessile or clawed or sometimes 0. *Stamens* 8-10, rarely fewer, inserted with the petals and sometimes slightly adherent to them; anthers 2-celled, cells parallel, dehiscing lengthwise. *Disk* annular or glandular or elongated into a gynophore. *Ovary* free, 1-celled or imperfectly 3-5-celled; styles 2-5, free or connate, stigmatose on the inner side; ovules 2 or many on a free central

or a basal placenta. *Fruit* a dry capsule, dehiscing by teeth or valves equal to or double in number to the styles or rarely indehiscent or irregularly dehiscent. *Seeds* few or many, rarely solitary; albumen mealy or rarely fleshy; embryo usually curved round the albumen; cotyledons frequently incumbent.

Calyx gamosepalous, 4-5-lobed; petals long-clawed; styles distinct; leaves ovate:—

Styles 2; leaves clasping the stem; pedicels long and slender

1. **Saponaria.**

Styles 3; leaves narrowed below; pedicels very short .....2. **Silene.**

Sepals free; petals subsessile or 0:—

Stipules 0; styles free; capsule 3-10-toothed; leaves ovate or oblong (except *Sagina*):—

Leaves ovate or oblong:—

Capsule long, often curved, with 6-10 short teeth; petals shortly notched or 0; pubescence scattered .....3. **Cerastium.**

Capsule short, straight, splitting to below the middle into 3-5 blunt lobes; petals split to the base or entire or 0; pubescence in a line on the stems:—

Petals split to the base or 0 ... .....4. **Stellaria.**

Petals entire .....5. **Arenaria.**

Leaves linear; petals entire, minute or 0; capsule 4-5-valved to the base .....6. **Sagina.**

Stipules setaceous or scarious; styles 3, united below (except *Spergula*); capsule 3-valved; leaves linear-subulate to obovate:—

Stipules small, scarious; petals entire; styles distinct; leaves linear-subulate .....7. **Spergula.**

Stipules setaceous or linear, forming an interpetiolar fringe; petals 2-6-fid; styles 3-fid; leaves ovate .....8. **Drymaria.**

Stipules and bracts conspicuous, shining, scarious; petals entire or toothed; styles united; leaves linear-lanceolate or spathulate:—

Sepals keeled; style 3-fid .....9. **Polycarpon.**

Sepals terete; style 3-toothed .....10. **Polycarpaea.**

### 1. **Saponaria, Linn.**

Annuals. *Leaves* flat. *Flowers* in dichotomous cymes. *Calyx* tubular or inflated, 5-toothed; obscurely nerved. *Petals* 5, clawed; limb obvoid. *Stamens* 10. *Disk* produced into a very short gynophore. *Ovary* 1-celled or imperfectly 2-3-celled; styles 2-3; ovules many. *Capsule* broadly ovoid, 4-toothed. *Seeds* globose, hilum marginal; embryo annular.



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#### 4. *Stellaria*, Linn.

Herbs. *Flowers* in dichotomous cymes or rarely solitary and terminal, white. *Petals* 5 or rarely 4, 2-fid or 2-partite or 0. *Stamens* 10, rarely 8. *Disk* annular or glandular. *Ovary* 1- rarely 3-celled; styles 3, rarely 2-5; ovules usually numerous. *Capsule* short, splitting to below the middle into entire or bifid valves equalling in number the styles. *Seeds* compressed, tubercled, granular or smooth; embryo annular.

Plants with simple hairs:—

Leaves 1-2 in. long, petiole .1-.2 in. long; flowers in long-stalked paniculate cymes; seed solitary, wrinkled .....1. *paniculata*.

Leaves under 1 in. long, lower petioles as long as the leaves; flowers mostly solitary, axillary; seeds numerous, tubercled

2. *media*.

Plants with stellate tomentum .....3. *saxatilis*.

1. *STELLARIA PANICULATA*, Edgew.; F. B. I. i. 229. *S. media*, W. & A. 42 (not of Linn.)

W. Gháts, in Nilgiris at 8,000 ft.

2. *STELLARIA MEDIA*, Linn.; F. B. I. i. 230; Wt. Ic. t. 947.

W. Gháts, in the Nilgiris, Anamalais and Pulneys; Shevaroyes in Salem District; usually above 7,000 ft. Chickweed.

3. *STELLARIA SAXATILIS*, Ham.; F. B. I. i. 232.

About Ootacamund in Nilgiris, 7,000 to 8,000 ft.

#### 5. *Arenaria*, Linn.

Herbs. *Flowers* white or pink, solitary or in dichotomous cymes. *Sepals* 5. *Petals* 5, entire lacerate or retuse never 2-fid or 2-partite, sometimes 0. *Stamens* 10, rarely 5. *Disk* lobed or annular. *Ovary* 1-celled; styles (2-)3-4; ovules usually many. *Capsule* rarely longer than the sepals, 2-6-valved. *Seeds* smooth or tubercled.

*ARENARIA NEELGERRENSIS*, Wight & Arn. 43; F. B. I. i. 239; Wt. Ic. t. 949.

A small procumbent herb with long rather stiff branches terminating in paniculate bracteate racemes of small flowers with entire white petals; leaves ovate, apiculate, .2-.5 in. long.

Nilgiris, above 6,000 ft.

*Arenaria serpyllifolia*, Linn., was formerly found near Madras.

### 6. *Sagina*, Linn.

Small herbs. *Leaves* linear-subulate, connate at the base, exstipulate. *Flowers* small, globose, solitary, axillary and terminal, pedicelled. *Sepals* 4-5. *Petals* 4-5, entire or 0. *Stamens* 4-10, perigynous. *Ovary* 1-celled; styles 4-5; ovules numerous. *Capsule* 4-5-valved to the base. *Seeds* reniform.

SAGINA PROCUMBENS, Linn.; F. B. I. i. 242.

A small annual with many branches from near the base, short linear acute leaves and small globose flowers on long slender cymose pedicels.

Nilgiri Hills, above 6,000 ft.

### 7. *Spergula*, Linn.

Herbs with forked or fascicled branches. *Leaves* often apparently whorled; stipules small scarious. *Flowers* in peduncled paniculate cymes. *Sepals* 5. *Petals* 4, entire. *Stamens* 5 or 10, rarely fewer. *Ovary* 1-celled; styles 3-5, ovules many. *Capsule* with 3-5 entire valves. *Seeds* margined or winged.

SPERGULA ARVENSIS, Linn.; F. B. I. i. 243.

A loosely-branched annual weed with whorl-like clusters of narrow linear leaves and large irregular terminal cymes of long-stalked flowers. Seeds brown or black, papillose.

A weed of cool climate cultivation, Nilgiri and Pulney Hills above 6,000 ft.

### 8. *Drymaria*, Willd.

Diffuse glabrous herbs. *Leaves* roundish; stipules of several bristles. *Flowers* in axillary and terminal cymes. *Sepals* 5. *Petals* 5, 2-6-fid. *Stamens* 3-5. *Ovary* 1-celled; style 3-fid; ovules 3 or more. *Capsule* 3-valved to the base. *Seeds* orbicular, muricate.

DRYMARIA CORDATA, Willd.; F. B. I. i. 244; W. & A. 359.

A diffuse glabrous herb with nearly orbicular 3-5-nerved leaves and slender inflorescence.

W. Gháts, from S. Canara and Mysore southwards, up to 4,000 ft., in shady places.



### 9. *Polycarpon*, Linn.

Diffuse or erect and dichotomously branched herbs. *Leaves* opposite or from the presence of axillary fascicles appearing whorled; stipules scarious. *Flowers* crowded, with many scarious bracts. *Sepals* 5, keeled. *Petals* 5, small, hyaline, entire or notched. *Stamens* 3-5. *Ovary* 1-celled; style short, 3-fid. *Seeds* many, ovoid; embryo nearly straight.

Perennial with all the flowers subsessile .....1. *Loeflingiae*.  
Annual with the older flowers shorter than their pedicels

2. *tetraphyllum*.

1. POLYCARPON LOEFLINGIAE, Benth. & Hook. f.; F. B. I. i. 245.  
*Hapalosia Loeflingiae*, Wall.; W. & A. 358.

Fields and waste places in various Districts.

2. POLYCARPON TETRAPHYLLUM, Linn.; Hook. f. Stud. Fl. B. Isles 63.

Nilgiri Hills, an introduced weed.

### 10. *Polycarpaea*, Linn.

Herbs, usually erect. *Leaves* subulate, linear or spatulate; stipules scarious. *Flowers* numerous, in lax or contracted cymes. *Sepals* 5, often coloured, scarious throughout or, rarely, at the margins only. *Petals* 5, entire toothed or erose. *Stamens* 5, free or coherent with the petals. *Ovary* 1-celled; style slender, 3-fid or 3-toothed; ovules numerous. *Capsule* 3-valved. *Seeds* obovoid or compressed. *Embryo* curved, rarely straight.

Leaves spatulate, in rosettes at the root and at the internodes; flowers spicate at the ends of subumbellate branches .....1. *spicata*.

Leaves subulate, not forming rosettes; flowers in irregular cymes:—

Plant shortly tomentose; cymes dense or lax:—

Erect annual or subperennial herb of sandy places; leaves flat with leaf-fascicles in the axils; stipules much fimbriate, .15 in. long; internodes with scattered hairs; sepals white, .1-·2 in. long

2. *corymbosa*.

Much-branched shrub of rock crevices; leaves with inrolled margins; leaves in axils few or 0; stipules hardly fimbriate, .05 in. long; internodes densely white-tomentose; sepals coloured, .1 in. long .....3. *aurea*.

Plant glabrous; cymes lax; stipules .03 in. long .....4. *diffusa*.



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Nodes without scales or hairs; leaves cuneate-oblong to linear, .3–1.5 in. long; flowers clustered .....1. *oleracea*.  
 Nodes surrounded by lanceolate scales; leaves ovate-lanceolate; flowers solitary .....2. *Wightiana*.  
 Nodes clothed with few or abundant hairs:—

Leaves lanceolate to ovate; flowers solitary, half sunk in the enlarged end of the pedicel and surrounded by 4 involueral leaves

3. *quadrifida*.

Leaves terete or linear; flowers clustered; abundant brown hairs round the flowers and, usually, at the nodes:—

Stems many, diffuse from the top of a fusiform fleshy root; leaves linear, margined; hairs plentiful and conspicuous.....4. *tuberosa*.

Stem erect from a stout branched annual root; leaves terete; hairs short and inconspicuous .....5. *suffruticosa*.

1. *PORTULACA OLERACEA*, Linn.; F. B. I. i. 246; W. & A. 356.

In all dry Districts, a prostrate succulent herb.

2. *PORTULACA WIGHTIANA*, Wall.; F. B. I. i. 247; W. & A. 356.

Dry Districts of the Deccan and Carnatic from the Godavari southwards, usually on rocks and up to 2,500 ft.

3. *PORTULACA QUADRIFIDA*, Linn.; F. B. I. i. 247; Wt. Ill. ii. t. 109.

Roadsides and waste places in most Districts.

4. *PORTULACA TUBEROSA*, Roxb.; F. B. I. i. 247.

Dry Districts of the S. Carnatic from S. Arcot to Travancore.

5. *PORTULACA SUFFRUTICOSA*, Wight; F. B. I. i. 247; W. & A. 356.

Carnatic Districts from Coimbatore and S. Arcot to Travancore, up to 3,500 ft.

## 2. *Talinum*, Adans.

Succulent shrubs. *Leaves* flat, exstipulate. *Flowers* paniced. *Petals* 4–5, hypogynous. *Stamens* numerous. *Ovary* superior; style 3-fid; ovules many. *Capsule* globose, 3-valved. *Seeds* radiate-striate, strophiolate.

*TALINUM CUNEIFOLIUM*, Willd.; F. B. I. i. 247. *T. indicum*, W. & A. 356.

A small shrubby plant with obovate-cuneiform leaves, purple flowers and pea-like fruit.

Carnatic at “Chimmanackmoor” (Chinnanayakanur?) (W. & A.).

## Family XIX. TAMARISCACEAE.

Mostly bushes or small trees. *Leaves* minute, scale-like, rarely sheathing, sometimes fleshy, stipules 0. *Flowers* usually spicate or in crowded racemes, small, regular. *Sepals* and *petals* 5 each or rarely 4, sometimes a little connate below. *Stamens* 5-10 or many, free or connate below. *Disk* 10-glandular. *Ovary* free, 1-celled or imperfectly 2-5-celled; styles 2-5, free or connate; ovules 2-many on each of the 2-5 basal placentas. *Capsule* 3-valved. *Seeds* erect, plumed with a crest of long hairs or winged; albumen floury or 0; embryo straight.

## Tamarix, Linn.

*Leaves* amplexicaul or sheathing. *Flowers* in lateral or terminal spikes or close racemes, white or pink. *Stamens* 4-10; anthers apiculate. *Ovary* narrowed upwards; styles 3-4, short, dilated into stigmas above. *Seeds* with a sessile plume, exalbuminous; embryo ovoid.

Young twigs covered by the minute imbricating leaf-blades, which ultimately spread showing their amplexicaul but not sheathing bases; flowers .08 in. long, in long narrow paniced racemes; capsule valves .12 in. long; stamens 5 .....1. *gallica*.

Young twigs covered by the short cylindric leaf-sheaths:—

Flowers .08 in. long, in narrow terminal spikes; capsule valves .15 in. long; stamens 5 .....2. *dioica*.

Flowers .2 in. long in a long terminal raceme; valves of capsule .4 in. long; stamens 10 .....3. *ericoides*.

1. TAMARIX GALLICA, Linn.; F. B. I. i. 248; W. & A. 40: Brand. For. Fl. t. 5.

Sandy river-beds in the Deccan and on the E. Coast, Godavari, Anantapur.

A gregarious shrub or small tree. Bark rough; wood reddish with broad medullary rays, a good fuel. Vern. *Hind.* Jhau; *Tel.* Palivi; *Tam.* Kiri.

2. TAMARIX DIOICA, Roxb.; F. B. I. i. 249; W. & A. 40; Brand. For. Fl. t. 6. *T. gallica*, Wt. Ill. i. t. 24A (not of Linn.).

Sandy river-beds and on the sea-coast, apparently very scarce.

A gregarious shrub or small tree, used for fuel.

3. TAMARIX ERICOIDES, Rottl.; F. B. I. i. 249. *Trichaurus ericoides*, W. & A. 40; Wt. Ill. i. t. 24B; Wt. Ic. t. 22.

Beds of rivers in the Circars, Deccan and Carnatic, usually inland and often in forest regions.

A beautiful shrub, not gregarious, often associated with other river-bed shrubs like *Rhabdia* and *Homonoya riparia*.

### Family XX. ELATINACEAE.

Small aquatic or terrestrial herbs or small shrubs. *Leaves* opposite or whorled, stipulate. *Flowers* small, axillary, regular, hermaphrodite. *Sepals* and *petals* 2-5, free, imbricate. *Stamens* as many as the petals or twice as many. *Ovary* 2-5-celled; styles 2-5. *Ovules* numerous, axile. *Capsule* septicidal; valves separating from the axis and septa. *Seeds* straight or curved, often rugose; albumen 0 or scanty; embryo cylindric; cotyledons small.

Leaves entire; sepals 3; small aquatic herbs with solitary axillary flowers .....1. **Elatine**.

Leaves serrate or crenate; sepals 5; stout erect terrestrial plants, with solitary or more or less densely clustered flowers .....2. **Bergia**.

#### 1. **Elatine**, Linn.

Small aquatic creeping herbs. *Leaves* opposite or whorled. *Flowers* minute, usually one at each node. *Sepals* 2-4, membranous, obtuse. *Petals* 2-4. *Ovary* globose. *Capsule* membranous; valves separating from the septa. *Seeds* curved, ridged and pitted.

Flowers subsessile; stamens exceeding the sepals .....1. *americana*.

Flowers shorter than their pedicels; stamens shorter than the sepals  
2. *ambigua*.

1. ELATINE AMERICANA, Arn.; F. B. I. i. 250.

Prostrate in patches on mud, Nilgiris.

2. ELATINE AMBIGUA, Wight; W. & A. 41; Wt. Ill. i. t. 25B; F. B. I. i. 251.

Prostrate in patches on mud, Madras.

#### 2. **Bergia**, Linn.

Terrestrial or aquatic herbs, annuals or undershrubs. *Leaves* opposite, usually serrate. *Flowers* axillary, solitary or fascicled,



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somewhat oblique at the top. *Ovary* 1-celled with 3 or 5 parietal placentas or 3-5-celled with axile placentas; styles free or connate; ovules usually many. *Capsule* septicidal or, when 1-celled, splitting through the placentas.

Shrubs 4-8 ft. high, with flowers 2-3 in. across:—

Styles exceeding the ovary in length; young branches 4-angled

1. *mysorense*.

Styles much shorter than the ovary; young branches terete

2. *Hookerianum*.

Herbs with flowers under 1 in. across:—

Sepals with gland-tipped teeth .....3. *Wightianum*.

Sepals entire:—

Leaves sessile, auricled, 3-nerved; stamens monadelphous; ovary 1-celled.....4. *japonicum*.

Leaves shortly stalked, penninerved; stamens 3-adelphous; ovary 3-celled .....5. *humifusum*.

1. *HYPERICUM MYSORENSE*, Heyne; F. B. I. i. 253; W. & A. 99.

*Norisca mysorensis*, Wt. Ic. t. 56.

W. Gháts in the Nilgiris Anamalais Pulneys and Travancore Hills, above 5,000 ft.

A large shrub, conspicuous on the open grassy "downs."

2. *HYPERICUM HOOKERIANUM*, W. & A. 99; F. B. I. i. 254; Wt. Ic. 949.

W. Gháts, Nilgiris above 7,000 ft.

A handsome shrub, rather scarce, in Shola forests.

3. *HYPERICUM WIGHTIANUM*, Wall.; W. & A. 99. *H. napaulense*, Dyer in F. B. I. i. 256 (excepting characters of pistil) *not of* Choisy.

W. Gháts in the Nilgiris and Pulneys, about 7,000 ft.

4. *HYPERICUM JAPONICUM*, Thunb.; F. B. I. i. 256; W. & A. 99.

N. Circars, Hills of Ganjam; W. Gháts from Nilgiris to Travancore, above 5,000 ft.

5. *HYPERICUM HUMIFUSUM*, Linn.; F. B. I. i. 255.

W. Gháts, in Nilgiris.

## 2. *Cratoxylon*, Blume.

Shrubs or trees. *Leaves* entire, thin. *Flowers* in terminal or axillary cymes. *Sepals* and *petals* each 5. *Stamens* 3- or 5-adelphous, the bundles separated by fleshy glands. *Ovary* 3-

celled; styles distinct; ovules 4-8 in each cell. *Capsule* dehiscing by 3 loculicidal valves. *Seeds* winged.

CRATOXYLON POLYANTHUM, Korth.; F. B. I. i. 257.

N. Circars, Anakapalle in Vizagapatam (Barber).

A glabrous shrub with fluted stems.

### Family XXII. GUTTIFERAE.

Trees or shrubs with yellow or greenish juice. *Leaves* opposite or, rarely, verticillate, usually coriaceous and exstipulate. *Flowers* solitary or in axillary or terminal fascicles racemes or panicles, white yellow or red, regular, dioecious polygamous or hermaphrodite. *Sepals* and *petals* 4-12, imbricate in 2-3 series. ♂. *Stamens* usually indefinite; filaments 1-6-adelphous or quite free. ♀. *Staminodes* numerous, free or connate. *Ovary* 1-2- or many-celled; style 1 usually short or 0 or rarely styles 2; stigmas free or connate, often peltate, as many as the cells; ovules 1 or 2 or many, axile basal or rarely parietal. *Fruit* usually indehiscent and baccate, occasionally capsular. *Seeds* large; albumen 0; embryo with large radicle and small cotyledons or vice versa.

Ovary of many 1-ovuled cells; style short or 0; cotyledons minute or 0; veins of leaves often close, but never all equal and parallel:—

Calyx of 4-5 sepals .....1. **Garcinia.**

Calyx bursting into 2 valves .....2. **Ochrocarpus.**

Ovary 1-celled 1-ovuled or 2-celled 4-ovuled; styles 1 or 2, slender; cotyledons large; veins of leaves very close and parallel:—

Style 1; stigma peltate:—

Flowers racemose; ovary 1-celled, 1-ovuled .....3. **Calophyllum.**

Flowers solitary; ovary 2-celled, 4-ovuled .....4. **Mesua.**

Styles 2; stigmas acute; ovary 2-celled, 4-ovuled...5. **Poeciloneuron.**

#### 1. **Garcinia**, Linn.

Trees or shrubs, often with yellow juice. *Leaves* coriaceous, sometimes only thinly so; stipules usually 0. *Flowers* solitary fascicled umbelled or paniced, polygamous or dioecious. *Sepals* 4-5. *Petals* 4-5, imbricate. ♂. *Stamens* numerous, free or combined into a ring or an entire or 4-5-lobed mass, often surrounding a rudimentary ovary; filaments short and thick or 0; 2- or 4-celled anthers straight horseshoe-shaped or annular, dehis-



cence longitudinal or circumsciss. ♀. *Staminodes* free or connate in groups. *Ovary* 2-12-celled; stigma sessile, peltate lobed or entire, smooth or tubercled; ovules solitary on the inner angle of each cell. *Berry* with tough rind enclosing several large seeds enclosed in a pulpy aril.

Flowers 4-merous :—

Leaves lanceolate to ovate :—

Stigma rayed :—

Flowers over 1·5 in. across; stamens in 4 masses...1. *Mangostana*.

Flowers under 1 in. across; stamens in 1 mass :—

Leaves oval, obtuse, with very close and parallel nerves

2. *echinocarpa*.

Leaves mostly lanceolate, acuminate, nerves not very close :—

Trees with ♂ flowers :—

Anthers peltate, circumsciss.....3. *Morella*.

Anther-cells contiguous, dehiscing longitudinally :—

Pedicels 1-1·5 in. long.....4. *indica*.

Pedicels ·3-·7 in. long; leaves usually oblanceolate

obtuse .....5. *Cambogia*.

Anther-cells distant, adnate to a thick square connective;

pedicels ·2-·3 in. long .....6. *Cowa*.

Trees with ♀ flowers :—

Staminodes in 4 bundles :—

Flowers shortly peduncled; ovary terete .....4 *indica*.

Flowers sessile; ovary grooved .....6. *Cowa*.

Staminodes in an irregular ring :—

Ovary terete; stigmas sessile .....3. *Morella*.

Ovary grooved; stigmas stalked .....5. *Cambogia*.

Trees with fruit :—

Fruit ·7 in. across .....3. *Morella*.

Fruit over 3 in. across :—

Fruit grooved to about the middle .....5. *Cambogia*.

Fruit grooved to the top .....6. *Cowa*.

Fruit not grooved .....4. *indica*.

Stigma entire; stamens monadelphous; leaves oblanceolate, caudate-acuminate, cuneate at the base; veins close, ascending ...7. *Imberti*.

Leaves linear-lanceolate or linear-oblong :—

Leaves caudate; veins distant, ascending; stigma rayed

8. *Wightii*.

Leaves blunt; veins close, transverse; stigma entire

9. *travancorica*.



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6. *GARCINIA COWA*, Roxb. ; F. B. I. i. 262 ; W. & A. 101.  
 Nilgiris and elsewhere (Brandis) ; occurrence in the Peninsula doubtful (W. & A.)
7. *GARCINIA IMBERTI*, Bourd. in Journ. Bomb. Nat. Hist. Soc. xii. 349, Trees Trav. 24.  
 W. Gháts in S. Travancore above 3,000 ft.  
 A medium-sized tree with grey very hard wood, not used.  
 Vern. *Tam.* Manja kánji.
8. *GARCINIA WIGHTII*, T. Anders. ; F. B. I. i. 265.  
 W. Ghát forests, in Coimbatore and Travancore up to 2,000 ft.  
 A small tree with white moderately hard wood, and a gamboge gum said to be soluble and of good quality.  
 Vern. *Mal.* Pali maranga.
9. *GARCINIA TRAVANCORICA*, Bedd. Fl. t. 173 ; F. B. I. i. 268.  
 W. Gháts, in the evergreen forests of S. Travancore and Tinnevely about 3,500 ft.  
 A medium-sized ornamental tree with yellowish-white wood having a small brown streaked heartwood. Vern. *Mal.* Malampongu.
10. *GARCINIA TINCTORIA*, Dunn. *G. Xanthochymus*, Hook. f. ; F. B. I. i. 269. *Xanthochymus pictorius*, Roxb. Cor. Pl. ii. t. 196 (not *Garcinia pictoria*, Roxb.) ; Bedd. Ic. t. 88. *X. tinctorius*, DC. ; W. & A. 102.  
 N. Circars, Mahendragiri Hill in Ganjam, 4,500 ft. ; W. Gháts in Mysore, Coorg, Nilgiris and N. Travancore up to 3,500 ft.  
 A handsome evergreen tree with greyish-brown very hard wood. Vern. *Mar.* Jharambi ; *Tel.* Iwara mamadi ; *Tam.* Mukki ; *Kan.* Deva garige ; *Mal.* Anavaya.
11. *GARCINIA MALABARICA*, Talbot in Journ. Bomb. Nat. Hist. Soc. xi. 234, t. 1. *G. ovalifolia*, Hook. f. var. *macrantha*, Anders. in F. B. I. i. 269.  
 W. Gháts in S. Canara, Mysore and Coimbatore.  
 A small or moderate-sized tree.
12. *GARCINIA SPICATA*, Hook. f. *G. ovalifolia*, Hook. f. ; F. B. I. i. 269. *Xanthochymus ovalifolius*, Roxb. ; W. & A. 102. *X. spicatus*, W. & A. 102.  
 E. Coast in various places as in Ganjam and Nellore ; common in Striharikota forest, S. Arcot and Pudukota ;

W. Gháts and W. Coast from S. Canara to Travancore at low elevations only.

An elegant moderate-sized evergreen tree with yellowish-white hard wood. Vern. *Mar.* Haldi; *Tam.* Kokottai; *Mal.* Manja nángu.

## 2. Ochrocarpus, Thouars.

Trees with thick leaves and flowers solitary or fascicled on nodes in the axils of fallen leaves. *Calyx* bursting into 2 or 3 valves which are reflexed during flowering. *Petals* 4. *Stamens* many, free or nearly so; anthers erect, oblong. *Ovary* 2-celled; style subulate; stigma 3-lobed; cells 2-ovuled. *Berry* ovoid, mucronate, 1-seeded, stipitate. *Seed* large; embryo with large radicle (tigellus) and cotyledons small or 0.

OCHROCARPUS LONGIFOLIUS, Benth. & Hook. f.; F. B. I. i. 270; Bedd. Fl. t. 89. *Calysaccion longifolium*, Wt. Ic. t. 1999.

A tree with large oblong leaves and clusters of white flowers .7 in. across; berries 1 in. long.

W. Gháts in Malabar and Coimbatore; cultivated in N. Circars and elsewhere.

A large evergreen tree with hard red wood. Vern. *Mar.* Suringi; *Kan.* Wúndi, Punay, Suringi.

## 3. Calophyllum, Linn.

Trees. *Leaves* opposite, coriaceous, with very close numerous parallel nerves at right angles with the midrib. *Flowers* polygamous, solitary fascicled racemed or paniced, axillary or terminal. *Sepals* and *petals* usually 4 each, imbricate. *Stamens* many, free or connate at base; anthers erect, dehiscence longitudinal. *Ovary* 1-celled; style slender; stigma peltate; ovule 1, erect. *Drupe* with a fleshy or crustaceous pericarp. *Seed* ovoid or globose.

Perianth segments 4 only; petioles under .5 in. long; fruit elliptic, .5 in. long.....1. *decipiens*.

Sepals and petals 4 each; petioles .5–1 in. long; fruit 1 in. long:—

Leaves under 2 in. broad; fruit ovoid, apiculate:—

Young parts more or less tomentose; inflorescence pubescent; leaves 3–5 in. long.....2. *elatum*.

Whole tree glabrous; leaves under 2 in. long.....3. *trapezifolium*.

Leaves 2–3 in. broad; whole tree glabrous; fruit 1 in. in diam., globular.....4. *inophyllum*.

1. CALOPHYLLUM DECIPIENS, Wight Ic. t. 106. *C. Wightianum*, Wall.; F. B. I. i. 274; Bedd. Fl. t. 90. *C. spurium*, W. & A. 103 (probably not of Choisy).

Forests of W. Gháts from Mysore to Travancore at low elevations up to 1,000 ft.; banks of rivers and backwaters on W. Coast.

A moderate-sized tree with reddish-brown useful wood. Vern. *Mar.* Bobbi; *Kan.* Irai; *Mal.* Cherupinna.

2. CALOPHYLLUM ELATUM, Bedd. Fl. t. 2. *C. tomentosum*, T. Anders. F. B. I. i. 274 (partly, not of Wight).

W. Gháts from Nilgiris to Travancore and Tinnevelly, at 1,000 to 5,000 ft.; W. Coast from S. Canara southwards.

The Poon Spar tree of India. A tall evergreen tree, unbranched to a great height with deeply cracked yellow bark and reddish-brown wood, used for masts of native vessels, but not in very great demand. Vern. *Tam.* Katta pinnei; *Mal.* Katta pinna, pinnapai.

3. CALOPHYLLUM TRAPEZIFOLIUM, Thw.; F. B. I. i. 275.

Evergreen forests of S. Travancore and Tinnevelly at about 4,000 ft.; S. Canara.

4. CALOPHYLLUM INOPHYLLUM, Linn.; F. B. I. i. 273; W. & A. 103: Wt. Ill. i. t. 77.

E. and W. Coasts, a littoral species, much cultivated and often found run wild, perhaps not truly indigenous in India.

The Alexandrian Laurel. A moderate-sized very ornamental tree with a reddish-brown useful wood. The fruits are collected and sold for the extraction of oil. Vern. *Hind.* Sultana champa; *Ur.* Poonang; *Mar.* Undi; *Tam.* Pinnai; *Tel.* Púna; *Mal.* Pinna.

#### 4. Mesua, Linn.

Trees. *Leaves* opposite, thick, often with transparent dots; nerves very numerous and slender, at right angles to the midrib. *Flowers* polygamous or hermaphrodite, large, solitary or in pairs, axillary, or terminal. *Sepals* 4. *Petals* 4. *Stamens* numerous; anthers large, elongated, erect. *Ovary* 2-celled; style long; stigma peltate; 2 erect ovules in each cell. *Fruit* usually woody, subtended by the lignified sepals, 1-celled, tardily 2-4-valved. *Seeds* 1-4, without an aril.



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W. Gháts of Travancore and Tinnevely at 2,000 to 4,500 ft.

A large evergreen tree with a hard reddish wood. Vern. *Tam.* Puthangkolli; *Mal.* Puli vayila.

### Family XXIII. TERNSTROEMIACEAE.

Trees or shrubs, sometimes climbing. *Leaves* usually coriaceous and simple, alternate, penninerved, serrate or entire, rarely stipulate. *Flowers* axillary, solitary or fascicled, or in terminal or axillary racemes or panicles or springing from the trunk, regular, 2- rarely 1-sexual. *Sepals* usually 5, free or shortly connate, imbricate or very rarely valvate. *Petals* usually 5, usually connate and much imbricate. *Stamens* usually indefinite and adnate to the base of the petals, sometimes monadelphous; 2-locular, erect, basifixed. *Disk* 0. *Ovary* free or rarely  $\frac{1}{2}$ -inferior, 3-5-many-celled; styles as many as the cells, free or connate. *Ovules* 1, 2 or many in each cell. *Fruit* a berry or capsule. *Seeds* with or without albumen.

Leaves entire, obovate, obtuse; flowers .8 in. across; fruit a large berry.....1. **Ternstroemia.**

Leaves crenate or serrate :—

Flowers very small in axillary fascicles; fruit a berry.....2. **Eurya.**

Flowers 1.5 in. across, solitary; fruit dehiscing by 5 valves spreading from a central column .....3. **Gordonia.**

#### 1. **Ternstroemia**, Linn.

Glabrous evergreen trees or sometimes shrubs. *Leaves* coriaceous, usually entire. *Flowers* usually dioecious, solitary or fascicled, axillary or lateral; peduncles often recurved and 2-bracteate. *Sepals* 5. *Petals* 5, connate at the base like the sepals, broadly imbricate. *Stamens* in the  $\sigma$  and bisexual flowers numerous. *Ovary* 2-3-celled, rarely incompletely so; cells usually 2-ovulate; ovules pendulous; stigmas 2-3, sessile, often lobed. *Berry* with a thick rind. *Seeds* large, horseshoe-shaped or oblong; albumen rarely absent.

TERNSTROEMIA JAPONICA, Linn.; F. B. I. i. 280. *Cleyera gymnanthera*, W. & A. 87; Wt. Ic. t. 47; Bedd. Fl. t. 91.

Flowers pale yellow, .7 in. across, in the axils of the leaves or of fallen leaves or lateral on the branchlets. Berries 2-seeded,

reddish, apiculate, .5 in. in diam. Leaves obovate, 2–4 in. long.

W. Gháts, in Shola forests of Nilgiris to Travancore, above 3,000 ft.

A moderate-sized evergreen handsome tree with reddish-brown smooth wood. Vern. *Nilg.* Kiamonu.

## 2. Eurya, Thunb.

Shrubs or small trees. *Leaves* glabrous or slightly pubescent, usually crenate-serrate. *Flowers* dioecious, in small axillary clusters or, rarely, solitary; pedicels short. *Sepals* and *petals* 5 each, imbricate, expanding but little. *Stamens* in ♂ flower 5–15, usually about 12. *Ovary* 2–5-celled, with as many free or united styles; ovules many, from the axis in each cell. *Fruit* a small globular or ovoid berry. *Seeds* usually very small, angled or pitted; albumen fleshy.

EURYA JAPONICA, Thunb.; F. B. I. i. 284; Bedd. Fl. t. 92.

*E. tristyla*, W. & A. 86. *E. Wightiana*, Wt. Ill. i. t. 38.

A shrub or tree with small white flowers, 2 together; ends of twigs sharply angular.

W. Gháts, in Shola forests from S. Canara to Travancore, common above 3,000 ft.

Wood brown, close-grained, a good fuel. Vern. *Nilg.* Huluni.

## 3. Gordonia, Ellis.

Trees, sometimes large, with evergreen leaves. *Flowers* solitary, axillary, usually towards the ends of the branches. *Sepals* usually 5, unequal and often passing gradually into the bracteoles. *Petals* sometimes much larger than the sepals and thin in texture. *Stamens* many, 1- or 5-adelphous, adnate to the base of the petals. *Ovary* 3–6-celled; style usually solitary, ribbed or angled with a spreading stigma; ovules 4–8 in each cell. *Fruit* an oblong, woody, loculicidal capsule with 4–5 flat or grooved valves separating from a persistent axis. *Seeds* winged; albumen 0; embryo with ovate cotyledons.

GORDONIA OBTUSA, Wall.; F. B. I. i. 291; W. & A. 87; Wt. Ill. i. t. 39.

A tall tree with grey bark and large white flowers.

W. Gháts, in all Districts in the drier Shola forests, chiefly



of the E. side, usually from 5,000 to 7,000 ft., lower in Travancore.

Wood reddish, hard and close-grained, but little used. Vern. *Nilg.* Nagetta.

*Camellia Thea*, Link., the Tea Plant, is much cultivated, especially in the Nilgiri and Travancore Mountains.

### Family XXIV. DIPTEROCARPACEAE.

Resinous trees. *Leaves* alternate, entire or rarely crenate, penninerved, usually with small stipules. *Flowers* regular, hermaphrodite, usually sweet-scented, in racemes or panicles. *Calyx* free and campanulate or short and adnate to the ovary. *Petals* contorted. *Stamens* numerous, 15, 10 or 5, variously connate or free; filaments usually short and often dilated below; connective often produced into an appendage above. *Ovary* usually slightly adherent to the calyx, 3 (-1)-celled; style usually quite entire; ovules lateral or basal, 2 in each cell. *Fruit* an indehiscent nut or a 3-valved capsule usually enclosed in the accrescent calyx and often winged by the elongation of 2 or more of the sepals. *Seeds* 1(-2), exalbuminous; cotyledons fleshy.

Stipules amplexicaul, scars encircling the twigs; calyx tubular; fruit with 2 long wings .. .....1. **Dipterocarpus.**

Stipules not amplexicaul; sepals nearly free:—

Bases of the inner sepals nearly hidden by the outer in flower and fruit; sepals erect in fruit and enclosing the nut; anthers with long awns (except in *Shorea robusta* and *S. Tumbuggaia*):—

Sepals developing in fruit into long erect wings:—

Wings 2.....2. **Hopea.**

Wings 3 .....3. **Shorea.**

Sepals accrescent but shorter than the fruit or developing into short spreading wings.....4. **Balanocarpus.**

Bases of the sepals equally exposed in flower and fruit; anther points short or 0:—

Sepals ovate-lanceolate, acuminate; flowers in axillary racemes

5. **Vatica.**

Sepals linear, obtuse; flowers in terminal panicles .....6. **Vateria.**

#### 1. **Dipterocarpus**, Gaertn. f.

Trees, often of great height, more or less clothed with tawny stellate pubescence. *Leaves* coriaceous, margins entire or undu-



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Panicles glabrous; petals pubescent:—

Leaf-nerves 4–5 pairs; bark black, peeling in strips from below upwards; fruit-wings .6–.9 in. broad.....2. *racophloea*.

Leaf-nerves 6–12 pairs; bark brownish; fruit-wings .3–.4 in. wide  
3. *Wightiana*.

1. HOPEA PARVIFLORA, Bedd.; F. B. I. i. 308; Bedd. Fl. t. 7.

Moist forests of the W. Coast and W. Gháts in all Ghát Districts, up to 3,000 ft.; often gregarious in hill forests, sporadic on river banks in plains ones.

A large handsome tree, with brown close-grained hard wood, valuable for building purposes and for railway sleepers Vern. *Kan.* Bovumara, Kiralboghi; *Tam.* Kóngu, Pongu; *Mal.* Thambagam.

2. HOPEA RAÇOPHLOEA, Dyer in F. B. I. i. 310. *H. malabarica*, Bedd. Ic. t. 185.

W. Gháts in the forests of S. Canara, Wynaad, and Travancore, up to 3,000 ft.

A moderate-sized tree with hard brown wood and characteristic bark. Vern. *Tam.* Karung kongu; *Mal.* Neduváli kongu.

3. HOPEA WIGHTIANA, Wall.; F. B. I. i. 309; W. & A. 85. *H. glabra*, W. & A. 85; F. B. I. i. 310; Bedd. Fl. t. 96.

Evergreen forests of the W. Coast from S. Canara southwards, often gregarious, especially in S. Canara.

A large tree with brown hard wood of good quality for timber. Vern. *Mar.* Kavsi; *Kan.* Haiga; *Tam.* Ila pongu.

### 3. Shorea, Roxb.

Resinous trees of great height or rarely of medium size or even shrubs. *Leaves* with the ultimate reticulation often inconspicuous; stipules often large, coriaceous or persistent. *Panicles* axillary or terminal. *Sepals* imbricate, united at the base into a very short tube. *Stamens* often 15 in 3 rows, rarely fewer, sometimes more numerous and occasionally as many as 100; anthers usually ovate or oblong with a subulate extension of the connective. *Ovary* of 3 2-ovuled cells; style subulate; stigma entire or minutely lobed. *Fruit* with a leathery, rarely woody, pericarp, 1-celled, 1-seeded, closely surrounded by the bases of the persistent, usually accrescent, sepals, the 3 outer of which (or rarely 5 or 0) are developed

into 7–10-veined reticulate membranous linear-oblong wings. *Cotyledons* fleshy, unequal.

Calyx glabrous in flower and fruit; stamens usually about 15; leaves elliptic with nerves close, under .25 in. apart .....1. *Talura*.

Calyx pubescent in flower and fruit; stamens usually 30–50; leaves ovate, often cordate at base:—

Peduncle and rachis of panicle densely tomentose; petioles under 1 in. long; wings of fruit 6–8 times as long as the capsule; leaf-nerves usually over .5 in. apart; very gregarious.....2. *robusta*.

Peduncle and rachis of panicle nearly glabrous; petioles 1–2 in. long; wings of fruit 2–3 times as long as the capsule; leaf-nerves usually .25–.35 in. apart; sporadic or only partly gregarious...3. *Tumbuggaia*.

1. SHOREA TALURĀ, Roxb.; F. B. I. i. 304. *S. laccifera*, Heyne; Bedd. Fl. t. 6. *Vatica laccifera*, W. & A. 84; Wt. Ic. t. 164.

Forests of the E. Ghāts and Deccan in Cuddapah, N. Arcot, Anantapur, Mysore, and Salem, up to 3,000 ft.; W. Ghāts in Malabar, Coimbatore, and Madura, sporadic only and in hilly country.

A handsome tree with yellowish-brown valuable wood. Vern. *Tel.* Jalāri; *Tam.* Talura, Talari.

2. SHOREA ROBUSTA, Gaertn.; F. B. I. i. 306; Roxb. Cor. Pl. iii. 312; Bedd. Fl. t. 4; Brand. For. Fl. t. 9.

N. Circars, forming large forests in Gumsūr Surada and the E. Ghāt Range, up to 3,000 ft.; Palkonda Hills and Jeypore forests in Vizagapatam, and south to the Godavari, but scarce. The Sal tree.

A large gregarious forest tree with a brown but rough and rather cross-grained wood, valuable for building purposes and sleepers. Vern. *Hind.* Sal; *Ur.* Salwa; *Tel.* Gugal.

3. SHOREA TUMBUGGAIA, Roxb.: F. B. I. i. 306; Bedd. Fl. t. 5. *Vatica Tumbuggaia*, Wt. Ic. t. 27.

E. Ghāts: forests of the Cuddapah, N. Arcot, and Chingleput Hills, up to 3,000 ft.

A large forest tree, sporadic or only partly gregarious, with a brown hard wood similar to Sal but much smoother and better for carpentry. It is much in demand in Cuddapah and N. Arcot. Vern. *Tam.* Tambagam; *Tel.* Thamba.

#### 4. *Balanocarpus*, Bedd.

Large trees, glabrous except the inflorescence. *Leaves* entire with minute deciduous stipules. *Flowers* in unilateral paniced racemes. *Calyx* lobes imbricate on a flat torus. *Stamens* (10–)15; filaments dilated at the base; anthers short, ovate, exceeded by the apical awn. *Nut* oblong or globose, apiculate, often marked by numerous raised lines, enclosed at the base by the thickened and accrescent sepals which often attain 1 in. in length and spread horizontally.

Leaves unequally cordate at the base; petals bilobed; fruit ovoid

1. *erosa*.

Leaves rounded at the base or acute; petals entire, pubescent, crenulate; fruit globose .....2. *utilis*.

1. *BALANOCARPUS EROSA*, Bedd. For. Man. 237; Fl. t. 329.

Tinnevelly Gháts, at 2,000 to 3,000 ft.

2. *BALANOCARPUS UTILIS*, Bedd. For. Man. 237; Fl. t. 330.

*Hopea longifolia*, Dyer, F. B. I. i. 309.

Tinnevelly Gháts, S. of Courtallum, at 1,000 to 3,000 ft.

#### 5. *Vatica*, Linn.

Large or medium-sized resinous trees. *Leaves* coriaceous, entire or a little undulate, finely reticulate; stipules small and caducous. *Flowers* axillary and terminal, usually paniculate and tomentose. *Calyx-tube* very short, adnate to the base of the ovary; segments slightly imbricate. *Stamens* 15; anthers oblong, apiculate. *Ovary* of 3 2-ovuled cells; style short; stigma entire or shortly 3-toothed. *Capsule* leathery, 3-valved, 1–2-seeded, attached to the spreading and often winged accrescent calyx.

*VATICA CHINENSIS*, Linn. *V. Roxburghiana*, Bl.; F. B. I. i. 302; Bedd. Fl. t. 95. *Vateria Roxburghiana*, Wt. Ic. t. 26.

A large evergreen tree with thin grey bark and ovate to oblong obtuse leaves having 10–14 pairs of nerves; petals 5 times as long as the calyx; stamens in 2 rows; fruit globose, shortly pointed, reticulate, surrounded at the base by the enlarged sepals.

W: Coast and W. Gháts at low elevations on the banks of rivers from S. Canara and Mysore to Travancore.

Wood reddish brown, hard and good, but little used. Vern. *Mal.* Vellei payin, Adakka payin.



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**Ancistrocladus, Wall.**

*Flowers* in branched panicles. *Stamens* 10. Other characters as described under the Family.

ANCISTROCLADUS HEYNEANUS, Wall. ; F. B. I. i. 299 ; Wt. Ic. t. 1987-8.

W. Gháts, in most Districts, in evergreen forests.

**Family XXVI. MALVACEAE.**

Herbs, shrubs or rarely trees ; stellate hairs often present. *Leaves* alternate, usually palmately nerved, simple lobed or digitate ; stipules free, caducous or 0. *Flowers* regular, bisexual or very rarely dioecious or polygamous, axillary, terminal, solitary, clustered or paniculate ; bracteoles 2 or more, free or connate, often forming an involucre, sometimes 0. *Sepals* (3-4-)5, valvate, more or less united into a lobed or truncate calyx. *Petals* 5, more or less adnate to the base of the staminal tube, twisted-imbricate or 0. *Stamens* many, rarely few, usually connate into a tube divided at the apex into numerous single pentadelphous or polyadelphous antheriferous filaments, or emitting from its outer surface sessile or stipitate anthers ; anthers ultimately 1-celled. *Ovary* 2-many-celled, entire or lobed, of 2-many carpels ; ovules 1 or more in each cell on the axis ; styles distinct or connate ; stigmas linear peltate or capitate. *Fruit* of dry indehiscent cocci separating from the central axis, or capsular and loculicidal, or rarely large woody and indehiscent. *Seeds* reniform or obovoid ; albumen scanty or 0 ; embryo curved ; cotyledons usually folded or crumpled.

Plants destitute of peltate scales:—

Leaves simple, entire, lobed, or palmatifid :—

Carpels separating from the axis at maturity :—

Styles as many as the carpels ; staminal tube antheriferous at or to the top :—

Bracteoles 3 :—

Carpels rounded, indehiscent, awnless :—

Leaves orbicular in outline, palmately veined and lobed ; stigmas linear ; flowers purple or whitish .....1. **Malva.**

Leaves lanceolate, pinnately veined stigmas capitate ; flowers yellow .....2. **Malvastrum.**

Carpels truncate, dehiscent, 2-awned .....**Modiola.**

Bracteoles 0:—

Fruiting carpels spreading star-wise with points outwards; fruiting calyx flat; flowers purple ..... **Anoda.**

Fruiting carpels erect, with the fruiting calyx appressed to them; flowers yellow:—

Carpels bursting irregularly, points not spreading; flowers opening in the morning.....3. **Sida.**

Carpels dehiscing by a regular central line, forming a flat-topped fruit with radiating points; flowers opening in the evening .....4. **Abutilon.**

Style-branches twice as many as the carpels; staminal tube antheriferous on the outside not at the top:—

Flowers capitate, 4-6 together in each involucre ..... **Malachra.**

Flowers not in heads:—

Leaves with a large gland at the base of the midrib beneath; bracteoles or lobes of the involucre triangular-lanceolate; ripe carpels often glochidiate .....5. **Urena.**

Leaves eglandular; bracteoles or lobes of the involucre ovate or setaceous; ripe carpels never glochidiate, but 1-3-aristate or bare .....6. **Pavonia.**

Carpels not separating; fruit capsular:—

Bracteoles persistent and forming spreading wings to the fruit; anthers in 5 clusters; flowers polygamous .....7. **Kydia.**

Bracteoles not spreading nor fimbriate (0 at the time of flowering in *Hibiscus ficulneus*):—

Capsule 10-valved .....8. **Decaschistia.**

Capsule 5-valved .....9. **Hibiscus.**

Bracteoles large, cordate, foliaceous, fimbriate or toothed

**Gossypium.**

Leaves digitate; trees:—

Trunk short, thick, unarmed; peduncles pendulous, 6-8 in. long; calyx 5-fid; stamens monadelphous ..... **Adansonia.**

Trunk tall, armed at least when young; peduncles under 2 in. long; calyx truncate; stamens 5-adelphous:—

Flowers over 3 in. long; capsule thick, woody; bark soon grey

10. **Bombax.**

Flowers 1-1.5 long; capsule thin, leathery; bark remaining green for a long time .....11. **Eriodendron.**

All herbaceous parts covered with peltate scales; trees:—

Flowers large, solitary, axillary; leaves cordate, ovate...12. **Thespesia.**

Flowers small (for the Family), densely clustered on the old wood; leaves linear-lanceolate .....13. **Cullenia.**



### 1. *Malva*, Linn.

Pubescent herbs. *Leaves* lobed. *Flowers* axillary, solitary or clustered, pedicelled. *Bracteoles* 3. *Staminal* tube divided at the top into numerous antheriferous filaments. *Ovary* many-celled; ovules 1 in each cell; styles as many as the cells, filiform. *Cocci* forming a round depressed fruit, separating when ripe from each other and from the axis, indehiscent, muticous.

Flowers 1.5 in. across, purple, on long peduncles; plant erect; petals 5 times as long as the sepals .....1. *sylvestris*.

Flowers not more than .5 in. across, shortly stalked; petals scarcely exceeding the sepals:—

Erect plant with bluish flowers in dense axillary clusters; carpels rounded at the edge .....2. *verticillata*.

Low spreading, plant with whitish flowers, few together on short peduncles in the leaf-axils; carpels with interlocking teeth; petal-claws glabrous .....3. *parviflora*.

1. MALVA SYLVESTRIS, Linn.; F. B. I. i. 320. *M. mauritiana*, DC.; W. & A. 45.

Mysore (Heyne 1800); Madras (Bulkley 1703), a weed of cultivation.

2. MALVA VERTICILLATA, Linn.; F. B. I. i. 320. *M. rotundifolia*, Wt. Ic. t. 950 (not of Linn.). *M. neilgherrensis*, Wt. Ic. t. 950 (*in text*).

Nilgiris, Kotagiri, 6,000 ft. (Wight), a weed of cultivation.

3. MALVA PARVIFLORA, Linn.; F. B. I. i. 321.

Mysore, Madura (Wall. Cat. 1884 *f*).

### 2. *Malvastrum*, A. Gray.

Herbs or shrubs. *Leaves* entire or lobed. *Flowers* axillary or in a leafy terminal spike; bracteoles 3, narrow. *Calyx* cup-shaped, 5-parted. *Petals* longer than the sepals. *Staminal* tube bearing anthers on the outside up to the top. *Ovary* 5- or more-celled; styles as many as the cells; stigmas capitate. *Cocci* free at maturity, indehiscent, 1-seeded. *Seeds* ascending.

MALVASTRUM COROMANDELIANUM, Garcke. *M. tricuspdatum*, A. Gray; F. B. I. i. 321. *Malva coromandeliana*, Linn. Sp. Pl. 687.

A small erect branched shrub; stem and branches covered with stiff appressed hairs.

Madras, Kurnool, etc., a weed of roadsides and waste places.



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5. SIDA SCHIMPERIANA, Hochst.; F. B. I. i. 322. *Riedleia truncata*, W. & A. 66 (not of DC.).

E. Coast Districts at Madras, S. Arcot; Deccan, not common.

6. SIDA ACUTA, Burm.; W. & A. 57; Wt. Ic. t. 95. *S. carpinifolia*, Linn. f.; F. B. I. 323.

A weed of waste places, very common in all plains Districts, often also in woods.

7. SIDA RHOMBIFOLIA, Linn.; F. B. I. i. 323 (partly).

A weed of waste places, in all plains Districts.

8. SIDA RHOMBOIDEA, Roxb.; W. & A. 57. *S. rhombifolia*, Linn. var. *rhomboidea*, Masters in F. B. I. i. 324.

W. Coast Districts, S. Canara to Travancore; Mysore.

#### 4. Abutilon, Gaertn.

Tomentose shrubs or herbs. *Leaves* usually cordate and long-petioled, dentate, rarely slightly lobed. *Flowers* solitary or rarely racemose paniculate or umbellate, on axillary peduncles which are jointed near the top, yellow or orange; involucre bracteoles 0. *Calyx* of 5 valvate sepals, united below into a short tube. *Corolla* of 5 imbricate petals, adnate below to the staminal tube. *Stamens* numerous, free above. *Carpels* 5-many; styles as many as the carpels; stigmas small, capitate. *Ripe carpels* ultimately separating from the short central axis, dehiscent, 1-5-seeded, usually acute or mucronate. *Seeds* reniform. Fibre-yielding plants.

Carpels 5, twice as long as the acuminate sepals; staminal tube short, hairy at the top; flowers 1.5 in. across, in terminal panicles

1. *polyandrum*.

Carpels 8-10, hispid, .4 in. long; stem with close thin tomentum

2. *ramosum*.

Carpels 10-20 :—

Carpels pointed or mucronate :—

Stem with smooth close tomentum; carpels with thin tomentum and scattered tufts of stiff hairs, both eventually deciduous; seeds minutely furrowed, glabrous .....3. *indicum*.

Stem with spreading hairs :—

Ripe carpels with dense spreading persistent shaggy hairs

4. *asiaticum*.

Ripe carpels shortly pubescent; seeds with minute white hairs

5. *hirtum*.

Carpels obtuse, without a mucro :—

Corolla 2 in. across ; staminal tube pubescent ; fruit densely silky

6. *glaucum*.

Corolla .5–1 in. across ; staminal tube glabrous :—

Fruit four times longer than the sepals, drooping, membranous,  
wrinkled .....7. *crispum*.

Fruit less than twice as long as the sepals .....8. *neilgherrense*.

1. ABUTILON POLYANDRUM, W. & A. 55 (not of G. Don) ; F. B. I. i. 325.

E. Gháts, Ganjam to Godavari ; W. Gháts, from Mysore to the Pulneys.

A common erect woody herb.

2. ABUTILON RAMOSUM, Guill. & Perr. ; F. B. I. i. 328 ; Cooke, Fl. Bomb. i. 98.

W. Coast, in Cochin (Meebold), a tall shrubby perennial.

3. ABUTILON INDICUM, G. Don ; F. B. I. i. 326 ; W. & A. 56 ; Wt. Ic. t. 12.

Common in all Districts, especially in the hills.

An erect woody herb.

4. ABUTILON ASIATICUM, G. Don ; F. B. I. i. 326 ; W. & A. 56.

E. Coast, in Chingleput District.

An erect herbaceous plant or small shrub.

5. ABUTILON HIRTUM, G. Don ; W. & A. 56. *A. graveolens*, W. & A. var. *hirtum*, Masters in F. B. I. i. 327. *A. graveolens*, W. & A. 56.

Common in almost all Districts.

An erect woody herb of waste places.

6. ABUTILON GLAUCUM, Cav. *A. muticum*, G. Don ; F. B. I. i. 327. *A. tomentosum*, W. & A. 56.

Bellary in the Deccan ; Tinnevelly ; not common.

7. ABUTILON CRISPUM, G. Don ; F. B. I. i. 327 ; W. & A. 56 ; Wt. Ic. t. 68.

Deccan, from Hyderabad southwards ; Coromandel Coast Districts.

A weak diffuse annual.

8. ABUTILON NEILGHERRENSE, Munro ex Wt. Ill. i. 66.

Bellary in the Deccan ; Nilgiri Hills (Munro).

### 5. Urena, Linn.

Herbaceous perennials, covered with harsh tomentum. *Leaves* angled or lobed, with a large gland at the base of the midrib below.

*Flowers* sessile or shortly pedicelled; involucral bracts 5, connate at the base, adnate to the calyx-tube. *Sepals* 5, connate below into a campanulate tube. *Petals* 5, united below to the staminal tube. *Stamens* united into a narrow tube, bearing sessile or shortly stalked anthers below the apex. *Ovary* of 5 1-ovuled cells; style branches 10; stigmas capitate. *Ripe carpels* 5, smooth or covered with glochidiate spines, separating from the short axis, indehiscent.

Ripe carpels glochidiate:—

Leaves with slight obtuse lobes .....1. *lobata*.

Leaves cut to the middle or beyond; lobes narrower at their base

2. *sinuata*.

Ripe carpels smooth; leaves roundish; flowers racemose ...3. *repanda*.

1. *URENA LOBATA*, Linn.; F. B. I. i. 329; W. & A. 46.

In most Districts, a weed of roadsides, forest clearings and waste places.

An undershrub, giving a fibre.

2. *URENA SINUATA*, Linn.; F. B. I. i: 329; W. & A. 46.

In most Districts, in woods and waste places, less common than the preceding.

An undershrub, giving a fibre.

3. *URENA REPANDA*, Roxb.; F. B. I. i. 330; W. & A. 46; Wt. Ill. i. 65.

N. Circars, in Ganjam Sál forests.

## 6. *Payonia*, Cav.

Herbs or small shrubs. *Leaves* subentire, dentate, angled, lobed or pinnatifid. *Flowers* solitary, axillary or in terminal racemes; bracteoles 5 or many, free or a little connate at the base. *Calyx* 5-fid. *Petals* 5, connate at the base and adnate there to the staminal tube. *Stamens* monadelphous, becoming free in groups at various heights on the tube. *Ovary* of 5 1-ovuled cells; styles 10, with capitate stigmas. *Ripe carpels* separating from the axis, indehiscent or 2-valved, never glochidiate.

Bracteoles 5, ovate; carpels glabrous, muricate; flowers yellow

1. *procumbens*.

Bracteoles 8–12, setaceous; flowers pink or white:—

Carpels 3-angled, keeled at the edges, flat at the back, glabrous;



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### 8. *Decaschistia*, W. & A.

Tomentose shrubs. *Leaves* entire, serrate or lobed. *Flowers* shortly peduncled, axillary, solitary or clustered; bracteoles 10. *Sepals* 5, a little coherent at the base, lobes narrow, acute or acuminate. *Petals* connate at the base and adherent to the base of the staminal tube, broader above and twisted in imbrication. *Stamens* becoming free from the staminal tube at various heights. *Ovary* 10-celled, cells 1-ovuled; style divided near the top into 10 branches, with capitate stigmas. *Capsule* loculicidally 10-valved, depressed-globose. *Seeds* reniform.

Middle and lower leaves deeply trilobed; bracteoles not much more than half the length of the calyx .....1. *triloba*.

Middle and lower leaves ovate or lanceolate:—

Leaves ovate, rounded or rarely obtuse at the apex, nearly entire; stem with rough spreading reddish hairs; seeds slightly pubescent

2. *rufa*.

Leaves ovate-lanceolate, acute, serrate or nearly entire, stem usually with short white tomentum; seeds quite glabrous.....3. *crotonifolia*.

1. *DECASCHISTIA TRILOBA*, Wt. Ic. t. 88; F. B. I. i. 332.

W. Gháts in S. Canara and Mysore.

An erect shrub.

2. *DECASCHISTIA RUFA*, Craib in Kew Bull. 1912, 35.

Carnatic, Tiruvallur and Kambakam Hill in Chingleput (Cleghorn), Peninsula (Wall. Cat. 1901 *in part*).

3. *DECASCHISTIA CROTONIFOLIA*, W. & A. 52; F. B. I. i. 332 (partly); Wt. Ic. t. 42.

Deccan, in open forests in Bellary, Mysore, Salem and Cuddapah, up to 2,500 ft.; E. side of W. Gháts in Nilgiris and Pulneys.

An erect shrub with large flowers.

### 9. *Hibiscus*, Medik.

Herbs, shrubs or rarely trees. *Leaves* stipulate, usually palmately lobed or cut. *Flowers* axillary, or rarely in a terminal raceme. *Bracteoles* 4–12 or rarely 0, usually free from each other and from the calyx. *Calyx* 5-lobed or 5-fid, valvate or spathaceous or circumsciss. *Petals* 5, connate at the base and adnate to the

staminal tube. *Staminal tube* truncate or 5-toothed at the top, giving off the free ends of the stamens at various heights. - *Ovary* 5-celled; ovules 3 or more in each cell; styles 5, connate below; stigmas usually capitate. *Capsule* loculicidally 5-valved, 5-celled or rarely spuriously 10-celled. *Seeds* reniform globose or obovoid, glabrous velvety cottony or scaly.

Calyx spathaceous, splitting down one side and falling off at flowering-time; seeds striated; flowers yellow or white:—

Bracteoles linear, more than 6; seeds glabrous:—

Capsules lanceolate, narrowed to the base, 1–3 in. long; peduncles as long as the capsules; seeds .15 in. long, nearly globular

1. *Abelmoschus*.

Capsule elongate, attenuate above, truncate at the base, 6–10 in. long; peduncle many times shorter than the capsule; seeds ovoid, with close opaque striations.....*esculentus*.

Bracteoles ovate-lanceolate, 4–6 or (at the time of flowering) 0:—

Lobes of leaves obtuse, narrowed at their base; upper flowers in terminal leafless racemes; stem with minute thorns; bracteoles 5–6, fugacious .....2. *ficulneus*.

Lobes of leaves acute (or in *H. Manihot* sometimes 0); bracteoles 4:—

Bracteoles persistent, distinct; nerves of leaves with a few arpressed setae on both sides .....3. *Manihot*.

Bracteoles connate nearly to the top at the time of flowering or split down one side, fugacious:—

Nerves of leaves thickly beset with spreading setae

4. *setinervis*.

Nerves of leaves tomentose .....5. *angulosus*.

Calyx with 5 distinct teeth and persistent in flower; seeds glabrous or hairy:—

Stem and sepals with small thorns; sepals eglandular; bracteoles mostly forked or foliaceous at the tip; seeds glabrous:—

Stipules foliaceous, semisagittate .....6. *surattensis*.

Stipules linear or 0 .....7. *furcatus*.

Stem and sepals unarmed, or, if with a few small prickles, then calyx-teeth and midrib of leaves with a large gland below:—

Seeds with long cottony hairs; flowers never yellow:—

Leaves acute, serrate, usually over 2 in. long, with a large gland on the midrib beneath; flowers scarlet; calyx-lobes 4 or 5 times longer than their tube .....8. *hirtus*.

Leaves blunt, dentate, usually under 1 in. long; flowers white; calyx-lobes about twice as long as their tube.....9. *micranthus*.



Seeds exceeded in length by their frill of stiff spreading hairs; flowers red white or blue, never yellow :—

Flowers white, turning to red; leaves orbicular in outline, palmately lobed.....*mutabilis*.

Flowers purplish blue; leaves ovate from a cuneate base or 3-lobed and broader.....*syriacus*.

Seeds with short scattered bulbous-based hairs; flowers crimson; leaves lanceolate, serrate; staminal tube much exerted

*Rosa-sinensis*.

Seeds densely velvety, with short stiff adpressed or spreading hairs; flowers yellow :—

Tree with linear striate bracteoles longer than the calyx; leaves subglabrous above.....10. *canescens*.

Herb; bracteoles shorter than the calyx; leaves densely pubescent above.....11. *panduraeformis*.

Seeds covered with setulose scales; leaves with a large gland on the midrib beneath; bracteoles adnate to the base of the calyx, becoming fleshy and purplish.....*Sabdariffa*.

Seeds glabrous, sometimes with scattered adnate scales :—

Seeds uniformly tubercled :—

Herb with wingless capsules.....12. *Solandra*.

Shrub with winged capsules.....13. *vitifolius*.

Seeds smooth or with a few small tubercles :—

Calyx clothed with close white tomentum and bearing at the base of each lobe a large gland; leaves with a gland on the midrib below, palmatifid, or rarely without lobes...*cannabinus*.

Calyx without white tomentum and eglandular :—

Leaves entire or serrulate, orbicular, often cordate; bracteoles connate into a cup at the base; tree.....14. *tiliaceus*.

Leaves more or less lobed or cut :—

Herbs or a little woody at the base :—

Leaves palmatifid, lobes pinnatifid; calyx inflated, membranous.....15. *Trionum*.

Leaves with short pointed biserrulate lobes; stem, peduncles and acuminate capsules clothed with rigid pungent hairs.....16. *lunariifolius*.

Shrubs or undershrubs; leaves palmately lobed :—

Capsule depressed-globose, hispid; leaf-margins sinuate  
17. *platanifolius*.

Capsule oblong, acuminate; leaf-margins entire

18. *Lampas*.



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11. *HIBISCUS PANDURAEFORMIS*, Burm.; F. B. I. i. 338; W. & A. 50.  
Deccan and Carnatic, not common.  
A tall herbaceous undershrub.
12. *HIBISCUS SOLANDRA*, L'Hérit.; F. B. I. i. 336. *Lagunaea lobata*, Willd.; W. & A. 55.  
N. Circars, in Vizagapatam and Godavari; W. Gháts and Coast from S. Canara to Tinnevelly.  
An erect annual herb.
13. *HIBISCUS VITIFOLIUS*, Linn.; F. B. I. i. 338; W. & A. 50.  
All Districts, common, up to 3,000 ft. in the Deccan.  
An annual or biennial herb with yellow flowers.
14. *HIBISCUS TILIACEUS*, Linn.; F. B. I. i. 343. *Paritium tiliaceum*, W. & A. 52; Wt. Ic. t. 7.  
W. Coast Districts along backwaters and tidal rivers from S. Canara southwards; perhaps also E. Coast in the Deltas of the Godavari and other rivers though not recorded in Herbaria available.  
A much-branched tree with handsome flowers and soft wood. Vern. *Tam.*, *Mal.* Nir paratthi.
15. *HIBISCUS TRIONUM*, Linn.; F. B. I. i. 334. *H. vesicarius*, Cav.; W. & A. 48.  
Deccan, in Anantapur, Mysore, Coimbatore and N. Nilgiris, common on black cotton soil.  
An annual spreading herb.
16. *HIBISCUS LUNARIIFOLIUS*, Willd.; F. B. I. i. 338; W. & A. 49; Wt. Ic. t. 6. *H. sidoides*, W. & A. 49.  
E. Carnatic and W. Gháts from Mysore southwards, up to 3,000 ft.  
A herbaceous erect perennial.
17. *HIBISCUS PLATANIFOLIUS*, Sweet. *H. collinus*, Roxb.; F. B. I. i. 338. *H. eriocarpus*, DC.; W. & A. 51.  
N. Circars in Vizagapatam; Cuddapah forests; Salem, Tinnevelly, sometimes cultivated in gardens.  
A large shrub with handsome flowers. Vern. *Tel.* Kandagang.
18. *HIBISCUS LAMPAS*, Cav.; Wt. Ic. t. 5; W. & A. 48. *Thespesia Lampas*, Dalz. & Gibs.; F. B. I. i. 345.  
N. Circars, Deccan and W. Gháts, in forest glades, up to 3,000 ft

An undershrub up to 4 ft. high, with conspicuous yellow flowers. Vern. *T'el.* Kondapatli.

*H. esculentus*, L., is the "okra" or "bendekai" plant, commonly cultivated for its capsules, which are eaten as a vegetable. *H. Sabdariffa*, L., is the Roselle plant, cultivated for its fleshy enlarged red calyx, which is eaten in tarts or made into a jelly. *H. cannabinus*, L., is the Deccan hemp, cultivated for its valuable fibre. *H. mutabilis*, L., *H. syriacus*, L., *H. Rosa-sinensis*, L., and *H. radiatus*, L., are cultivated as garden plants.

### 10. Bombax, Linn.

Trees with buttressed trunks, clear of branches for a long distance from the ground. *Leaves* digitate; stipules small. *Flowers* out before the leaves appear, clustered towards the ends of the branchlets; bracteoles 0. *Calyx* leathery, cup-shaped, irregularly lobed. *Petals* 5, oblong obovate or linear. *Stamens* polyadelphous, very numerous; filaments often combined so that the cells appear to be 2 instead of 1. *Ovary* 5-celled; ovules numerous in each cell; style clavate, divided into 5 spreading stigmatic branches at the top. *Capsule* dehiscing by 5 leathery or woody deciduous valves. *Seeds* smooth, globose, imbedded in long white wool; albumen scanty; cotyledons crumpled.

Flowers about 3 in. long; stamens normally 80 in all, in 5 phalanges of 12 opposite the petals, with 10 thin ones behind and 5 large central double ones alternate with the petals, filaments flat; tree reaching 130 ft. in height; trunk with hard conical prickles; leaflets lanceolate, long- (about 1 in.) petioluled; capsule velvety.....1. *malabaricum*.  
Flowers 5-7 in. long; stamens about 600, in 5 phalanges opposite to the petals, filaments threadlike; trees reaching 40 ft. in height:—

Leaflets obovate, cuspidate, petiolules under .3 in. long; trunk unarmed; branchlets sometimes prickly; capsule glabrous

2. *insigne*.

Leaflets lanceolate, acuminate, sessile; trunk with prickles in clusters of 1-12; capsule velvety.....3. *scopulorum*.

1. BOMBAX MALABARICUM, DC.; F. B. I. i. 349: W. & A. 61; Wt. Ill. t. 29; Bedd. Fl. t. 82. *B. heptaphyllum*, Roxb. Cor. Pl. iii. t. 247.

In all forest Districts, occasionally in open country, often cultivated. The Red Cotton tree.

A very conspicuous tree, of gigantic size in favourable localities, flowering when bare of leaves in the hot season. The wood is soft and perishable, but is more durable under water, and is therefore in use for sea-going boats. It gives a gum and an exudation used in medicine. The cotton surrounding the seeds is used for stuffing pillows, but is not so good as that of *Eriodendron*. Vern. *Hind.* Simal; *Ur.* Buroh; *Tel.* Buraga; *Tam., Mal.* Ilavu; *Mar.* Sayar; *Kan.* Burla, Sauri.

2. BOMBAX INSIGNE, Wall.; F. B. I. i. 349.

Anamalai Hills (Wight).

3. BOMBAX SCOPULORUM, Dunn. *B. insigne*, Bourd. Trees Trav. 45 (not of Wall.).

Travancore Hills, on rocks.

A small tree resembling *B. malabaricum*, but never attaining its size. Wood soft and white. Vern. *Tam., Mal.* Kal ilavu, Parei ilavu.

### 11. *Eriodendron*, DC.

Trees; trunk prickly when young; branches whorled. *Leaves* digitate, deciduous; stipules small. *Flowers* tufted, in the axils of leaves or appearing before them; bracteoles 0. *Calyx* campanulate, 5-toothed. *Petals* oblanceolate. *Staminal tube* short, dividing into 5 filiform branches, each bearing at the top 2 or 3 sinuous anthers. *Ovary* 5-celled; ovules many in each cell; style dilated into a shortly 5-lobed stigma. *Fruit* an oblong coriaceous 5-valved capsule woolly within. *Seeds* black, globose, enveloped in silky cotton: cotyledons crumpled.

ERIODENDRON PENTANDRUM, Kurz. *Eriodendron anfractuosum*, DC.; F. B. I. i. 350; W. & A. 61; Wt. Ic. t. 400.

A tall tree with smooth green stem and horizontal branches; leaflets 5–8, 3–4 in. long, petiolules very short; flowers white or yellowish, 1.5–2 in. across; capsule cylindrical, 4–5 in. long, green.

Not indigenous but naturalized on the W. Coast and often planted there and elsewhere.

The White Cotton tree, giving the “Kapok” cotton used for pillows and cushions, and of better quality than that of *Bombax*. Vern. *Tam.* Panji; *Mal.* Panya.



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*Anoda hastata*, Linn., is a blue-flowered herbaceous hispid introduced weed which has been found about Madras.

*Malachra capitata*, Linn., is a herbaceous weed occasionally found along the Carnatic coast. It is not indigenous and is recognized by the flowers in dense capitate heads.

Various races of *Gossypium arboreum*, *barbadense*, *herbaceum*, *hirsutum*, *Nanking*, *obtusifolium*, *purpurascens* constitute the cultivated cottons of the Presidency. For their identification and an account of them, reference should be made to Sir George Watt's "Commercial Products of India."

*Adansonia digitata*, Linn., the Baobab tree of Africa is found here and there in cultivation.

### Family XXVII. STERCULIACEAE.

Herbs, shrubs or trees, the herbaceous parts usually clothed with stellate hairs. *Leaves* alternate, simple or digitate, entire toothed or lobed, usually stipulate. *Flowers* usually in axillary cymes, regular, 1- or 2-sexual. *Sepals* valvate, more or less combined below. *Petals* 5, hypogynous, free or connate at the base or 0. *Stamens* 5-many; filaments united into a tube or rarely free; anthers 1-5 together, on or between the teeth of or irregularly arranged in one or more whorls on the outside of the tube; cells 2, parallel or diverging, very rarely confluent; staminodes 5 or 10, co-ordinate with the stamens or 0. *Ovary* free, 4-5- (rarely 10-12-) celled or reduced to a single carpel; ovules 2-many (rarely 1) in each cell, attached to the inner angle; styles as many as the cells of the ovary, distinct or connate. *Fruit* often a 5-valved loculicidal capsule, woody, chartaceous or membranous, sometimes of 1-6 spreading or spirally twisted follicles, rarely dividing into cocci or baccate. *Seeds* sometimes arillate, occasionally winged; albumen fleshy, thin or 0; embryo straight or curved; cotyledons usually foliaceous.

Flowers unisexual; petals wanting:—

Leaves clothed beneath with peltate scales; fruit indehiscent

1. **Heritiera.**

Leaves without peltate scales; fruit follicular:—

Follicles woody or coriaceous:—

Seeds winged; follicles globose, large, woody; leaves cordate ovate, 7-nerved at the base.....2. **Pterygota.**

Seeds not winged; follicles usually coriaceous and oblong, opening when mature; leaves simple lobed or digitate.....3. **Sterculia.**

Follicles membranous, opening long before maturity; leaves palmately lobed .....4. **Firmiana.**

Flowers bisexual; petals present, often deciduous:—

Staminal tube adnate to the gynophore, forming a more or less elongated stalk:—

Fruit a membranous, inflated capsule; trees with cordate 5-nerved leaves .....**Kleinhofia.**

Fruit of straight or spirally twisted follicles; seeds not winged; shrubs.....5. **Helicteres.**

Fruit a woody loculicidal 5-valved capsule; seeds winged; trees or shrubs, usually mealy .....5. **Pterospermum.**

Staminal tube distinct from the carpels and enclosing them:—

Staminal tube elongate, bearing the stamens on its outer surface in a cone; no staminodes .....7. **Eriolaena.**

Staminal tube short, divided into 5 teeth bearing the anthers; petals marcescent; no staminodes:—

Styles or stigmas, cells of ovary and valves of fruit 5 each

8. **Melochia.**

Style or stigma and cell of ovary 1 each, capsule 2-valved, 1-seeded.....9. **Waltheria.**

Staminal tube short, bearing 5 or 10 staminodes with solitary or clustered anthers between them:—

Petals deciduous:—

Trees with 10-15 fertile anthers:—

Leaves scabrid or glabrous above, pubescent beneath; anthers 15, in threes; fruit muricate, many-seeded.....10. **Guazuma.**

Leaves glabrous on both sides; anthers 10, single; fruit rugose, seed 1 .....11. **Leptonychia.**

Climbing shrubs or herbs with 5 fertile anthers; fruit bristly, 5-valved, valves 1-seeded.....12. **Buettneria.**

Petals persistent:—

Leaves ovate or lanceolate, obtuse; bracteoles persistent; anthers 5 .....13. **Melhania.**

Leaves tapering from the truncate base to the caudate tip; bracteoles caducous; anthers 15.....**Pentapetes.**

### 1. **Heritiera**, Ait.

Trees. *Leaves* simple, peltate-scaly beneath, penninerved or 3-nerved. *Flowers* small, 1- or 2-sexual, in axillary panicles. *Calyx* 5-toothed or 5-fid. *Petals* 0. *Staminal column* slender,



bearing in a ring beneath the apex 5-10 adnate anthers with parallel cells. *Carpels of ovary* 5-6, subdistinct, alternating at the base with pairs of staminodes; ovules 1-2 in each carpel; styles short; stigmas 5, thick. *Ripe carpels* woody, indehiscent, beaked or samaroid. *Seeds* exalbuminous; cotyledons thick, radicle next the hilum.

Leaves oblong, exceeding 5 in. long by 2 in. broad, main nerves 10 or more pairs; ripe carpels woody, keeled, with a thin narrow beak; coast tree .....1. *littoralis*.

Leaves lanceolate, less than 5 in. long by 2 in. broad, main nerves about 7 pairs; ripe carpels samaroid, the wing long membranous; tree of hill forests .....2. *Papilio*.

1. HERITIERA LITTORALIS, Dryand.; F. B. I. i. 363; W. & A. 63.

W. Coast at Cochin and perhaps elsewhere, perhaps also on E. Coast in Southern Districts.

Wood dark red, hard, heavy and tough.

2. HERITIERA PAPILIO, Bedd. Fl. t. 218; F. B. I. i. 363.

W. Gháts of Tinnevelly and Travancore extending northwards to Nilgiris, at 2,000 to 4,000 ft.

Wood red, very hard and tough, used in Tinnevelly for building, cart poles, and agricultural implements.

## 2. Pterygota, Endl.

Trees. *Leaves* undivided. *Flowers* in panicles from the axils of fallen leaves, 1-sexual or polygamous. *Calyx* deeply 5-partite. *Petals* 0. *Staminal column* cylindric bearing 4-5 phalanges of about 5 anthers each in ♂ flowers, and staminodes round the base of the ovary in ♀ flowers. *Ovary* of 5 sessile carpels; ovules numerous; styles short, recurved; stigma 2-lobed. *Fruit* of 5 large, globose or obovoid, follicles, hard and woody, opening when ripe only with 1 valve. *Seeds* about 40, furnished with an oblong-obovate wing attached to the margin of the valve; albumen adhering to the cotyledons; radicle small, superior.

PTERYGOTA ALATA, R. Br. *Sterculia alata*, Roxb. Cor. Pl. iii. t. 287; F. B. I. i. 360. *S. Haynii*, Bedd. Fl. t. 230.

A tall evergreen tree with ovate cordate large leaves, reddish-brown flowers and a hard woody fruit 5 in. in diam. Wood white, of good quality but little used. Vern. *Mal.* Kodathani, Anathondi.



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The flowers have a very offensive smell. Vern. *Tam.* Pinári.

2. *STERCULIA URENS*, Roxb. Cor. Pl. i. t. 24; F. B. I. i. 355; W. & A. 63.

Dry forests in most Districts, especially on dry rocky hills, and associated with *Boswellia*.

A large deciduous tree, very conspicuous from its pale smooth bark which peels off in flakes. Wood soft and used only for toys. Vern. *Hind.* Gular; *Tel.* Tabsu; *Tam.* Kávalam; *Mal.* Thondi.

3. *STERCULIA VILLOSA*, Roxb.; F. B. I. i. 355; W. & A. 63; Brand. For. Fl. t. 10.

N. Circars, in Ganjam forests; Deccan in Coimbatore; W. Ghát Districts, S. Canara to Travancore.

A large deciduous tree with soft perishable wood. The bark gives a strong coarse fibre used for elephant ropes. Vern. *Hind.* Udal; *Tam.* Muratthan; *Mal.* Vakka; *Kan.* Savaya.

4. *STERCULIA POPULNIFOLIA*, Roxb.; F. B. I. i. 361; W. & A. 62.

Deccan Hills and E. Gháts, usually among rocks.

A small tree with scarlet flowers and inflated papery follicle. Vern. *Tel.* Delibuda.

5. *STERCULIA GUTTATA*, Roxb.; F. B. I. i. 355; W. & A. 62; Wt. Ic. t. 487; Bedd. Fl. t. 105.

Evergreen forests of W. Gháts up to 2,000 ft., very common; Sandur Hills in Bellary.

A moderate-sized evergreen tree with soft useless wood. Vern. *Tam.* Kávalam; *Mal.* Kithondi.

6. *STERCULIA BALANGHAS*, Linn.; F. B. I. i. 358; Wt. Ill. t. 30; W. & A. 62.

W. Gháts in Malabar, Travancore, and Tinnevely, scarce. A moderate-sized tree with soft wood. Vern. *Mal.* Kávalam.

#### 4. *Firmiana*, Marsigli.

Trees. *Leaves* palmately lobed. *Flowers* in terminal panicles, brightly coloured. *Calyx* tubular, covered with stellate tomentum, lobes short. *Petals* 0. *Staminal column* slender, bearing about 30 sessile anthers. *Ovary* of 5 carpels; ovules 2 in each carpel; styles short, recurved; stigmas acute. *Fruit* of 5 stipitate membranous follicles, opening before maturity. *Seeds* usually 2, one

adhering to each margin of the open follicle, ovoid, smooth; embryo transverse, radicle inferior.

FIRMIANA COLORATA, R. Br. *Sterculia colorata*, Roxb. Cor. Pl. i. t. 25; F. B. I. i. 359; W. & A. 63.

A moderate-sized deciduous tree with conspicuous scarlet flowers, palmately lobed leaves and papery follicles.

N. Circars in Vizagapatam and Godavari; Deccan forests, here and there; W. Gháts forests from S. Canara to Travancore, but not common.

Wood soft and useless. Vern. *Hind.* Bodula; *Tel.* Karaka; *Mar.* Khowsey; *Mal.* Malam paratthi.

### 5. Helicteres, Linn.

Trees or shrubs, more or less stellately pubescent. *Leaves* entire or serrate. *Flowers* axillary solitary or fascicled. *Calyx* tubular, 5-toothed at the apex, teeth often unequal. *Petals* 5, equal or unequal, with long sometimes divided claws, usually zygomorphic. *Staminal column* elongated, adnate to the gynophore, 5-toothed or -lobed; anthers 5–10, in groups at the top of the column between the teeth; cells divergent superposed sometimes confluent. *Ovary* 5-lobed, 5-celled, at the top of the column; ovules many in each cell; styles 5, subulate, more or less united. *Follicles* spirally twisted or straight. *Seeds* tubercled; albumen scanty; cotyledons folded round the radicle.

HELICTERES ISORA, Linn.; F. B. I. i. 365; W. & A. 60; Wt. Ic. t. 180.

A large shrub with obovate obliquely cordate serrate leaves, scabrous above, pubescent beneath; flowers red, fading to lead colour, 1.5 in. across, followed by spirally twisted cylindrical pubescent fruit.

Forests in all Districts, common in undergrowth.

A useful shrub, giving small fuel of value and a strong but coarse fibre from its bark.

Vern. *Hind.* Marorphal; *Ur.* Ovla; *Tam.* Kaiva.

### 6. Pterospermum, Schreb.

Trees or shrubs, scaly or stellately tomentose. *Leaves* coriaceous, often oblique, penninerved. *Flowers* often very long, on short axillary 1- or few-flowered peduncles; bracteoles 3, entire

laciniate pectinate fimbriate or 0. *Calyx* tubular, 5-fid or 5-partite, deciduous. *Petals* 5, deciduous. *Staminal column* adnate to the gynophore, bearing 5 groups of 3 stamens each between the staminodes. *Ovary* within the apex of the column, 5-celled; cells many-ovuled; style entire. *Capsule* woody or leathery, ovoid or oblong, terete or angled, loculicidally 5-valved. *Seeds* ascending, winged above; albumen thin or 0; cotyledons corrugated or folded.

Reticulation of leaves raised, conspicuous:—

Calyx 1–1·5 in. long:—

Bracteoles laciniate; capsule obtusely angled, 3 in. long, acute; cells 4-seeded .....1. *reticulatum*.

Bracteoles ovate or lanceolate, pectinate; capsule tuberculate, 2 in. long, furfuraceous; cells about 4-seeded .....2. *obtusifolium*.

Calyx 2–2·5 in. long; bracteoles ovate, pectinate; capsule obtusely 5-angled, 2 in. long; cells 8–10-seeded .....3. *Heyneanum*.

Calyx 4·5 in. long; capsule acutely 5-angled .....4. *diversifolium*.

Reticulation of leaves obscure:—

Leaves cordate at the base on one side, acute on the other; capsule subclavate acutely angled .....5. *rubiginosum*.

Leaves subequally rounded or subcordate at the base; capsule oblong, terete .....6. *suberifolium*.

1. *PTEROSPERMUM RETICULATUM*, W. & A. 69; F. B. I. i. 369.

Evergreen forests of Malabar and Travancore at low elevations, frequently planted on roadsides.

A handsome tree with reddish-brown hard wood. Vern. *Tam.* Muli polavu; *Mal.* Mala vuram.

2. *PTEROSPERMUM OBTUSIFOLIUM*, Wight; F. B. I. i. 369.

Forests of Tinnevelly and Travancore, apparently scarce.

3. *PTEROSPERMUM HEYNEANUM*, Wall.; F. B. I. i. 369; W. & A. 69; Wt. Ic. t. 489.

Forests of N. Circars and Deccan from Ganjam to Cuddapah and Chingleput.

A beautiful tree, resembling *P. acerifolium*, Willd., of N. India, but with smaller leaves. The young leaves and those of shoots are often much lobed. Wood light red, hard. Vern. *Tam.* Polavu; *Tel.* Tada.

4. *PTEROSPERMUM DIVERSIFOLIUM*, Bl.; F. B. I. i. 369. *P. glabrescens*, W. & A. 69; F. B. I. i. 369.



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2. *ERIOLAENA QUINQUELOCULARIS*, Wight under Wt. Ic. t. 882; F. B. I. i. 371; *Microchlaena quinquelocularis*, W. & A. 71.

Deccan, Sandúr Hills of Bellary, Hills of Coimbatore; W. Gháts from Mysore to Travancore at 2,000 to 4,000 ft., common.

A small tree with grey foliage.

3. *ERIOLAENA HOOKERIANA*, W. & A. 70; F. B. I. i. 70.

E. Gháts from Ganjam to Godavari; hill forests of the Deccan and Carnatic, up to 5,000 ft. in Cuddapah; W. Gháts, in the Pulney Hills.

A small tree with a light red, tough and strong wood. Vern. *Tel.* Nar botku.

### 8. *Melochia*, Linn.

Herbs, shrubs, or rarely trees, stellately pubescent. *Leaves* usually serrate. *Flowers* clustered, paniced or corymbose. *Calyx* 5-toothed or 5-fid, campanulate or inflated. *Petals* 5, spathulate or oblong, marcescent. *Stamens* 5, opposite the petals, connate at the base or beyond the middle. *Staminodes* minute or 0. *Ovary* sessile or shortly stalked with 5 2-ovuled cells; styles 5, free or united at the base. *Capsule* with 5 loculicidal valves. *Seeds* ascending, albuminous; embryo straight; cotyledons flat.

Herb with flowers in densely crowded terminal clusters...1. *corchorifolia*.  
Small tree with flowers in umbellate corymbs .....2. *umbellata*.

1. *MELOCHIA CORCHORIFOLIA*, Linn.; F. B. I. i. 374. *Riedleia corchorifolia*, W. & A. 66.

A weed of roadsides and waste places, found in most Districts.

2. *MELOCHIA UMBELLATA*, Stapf in Kew Bull. 1913, 317. *M. velutina*, Bedd.; F. B. I. i. 374. *Visenia umbellata*, Wt. Ic. t. 509.

Coorg, near Mercara (Hohenacker), elsewhere cultivated in gardens and doubtfully indigenous.

### 9. *Waltheria*, Linn.

Herbs or undershrubs with stellate mixed with simple pubescence. *Leaves* simple, serrate; stipules narrow. *Flowers* small, in dense axillary or terminal clusters. *Sepals* 5, connate below in a tube. *Petals* 5. *Stamens* 5, connate below in a tube,

anther-cells parallel. *Ovary* sessile, 1-celled; ovules 2, ascending; style excentric; stigma club-shaped. *Fruit* a 2-valved, 1-seeded capsule. *Seed* ascending; albumen copious; embryo straight; cotyledons flat.

WALTHERIA INDICA, Linn.; F. B. I. i. 374; W. & A. 67.

An undershrub with much soft pubescence, ovate serrate leaves and small yellow flowers in globose axillary clusters. All Districts, common on roadsides, in waste places, and in forest undergrowth.

#### 10. Guazuma, Plum.

A tree. Leaves simple, tomentose. *Flowers* in axillary cymes. *Sepals* 5, connate below. *Petals* 5, concave at the base, prolonged above into 2 narrow strap-shaped processes. *Stamens* 10, connate into a tube below, divided above into 5 3-anthered filaments alternating with 5 lanceolate staminodes. *Ovary* sessile, 5-lobed, 5-celled; styles more or less connate; ovules many in each cell. *Fruit* globular, woody, tubercled, many-seeded. *Seeds* albuminous, cotyledons folded.

GUAZUMA TOMENTOSA, Kunth.; F. B. I. i. 375; Wt. Ill. t. 31; W. & A. 64; Bedd. Fl. t. 107.

A small tree with obliquely cordate leaves and yellow flowers in large terminal and axillary panicles. Fruit 5-celled, resembling a small ripe mulberry in shape, size, and colour. An introduced tree, often found run wild, usually in the vicinity of towns and villages, indigenous in tropical America.

#### 11. Leptonychia, Turcz.

Shrubs or trees. *Leaves* simple, entire. *Flowers* axillary, cymose. *Sepals* 5, valvate, distinct nearly to the base. *Petals* 5, valvate, short, orbicular, concave. *Staminal* tube short, bearing an outer series of 10–15 ligulate staminodes, a middle one of 10 fertile stamens and an inner one of 5 short fleshy staminodes. *Ovary* sessile, with 3–6 many-ovuled cells; style single, lobed at the top. *Capsule* (1–) 2–3-celled, dehiscing septically or loculicidally or both, or irregularly. *Seeds* black, with an orange-coloured fleshy aril.



LEPTONYCHIA MOACURROIDES, Bedd. Fl. t. 114 ; F. B. I. i. 379.

A small tree with lanceolate-caudate glabrous leaves and cymes shorter than the petioles ; capsule tubercled.

W. Gháts from the Carcoor Ghát in Wynaad, through Coimbatore, Tinnevely, and Travancore, up to 3,000 ft.

## 12. *Buettneria*, Linn.

Herbs, trees or shrubs, often climbing and frequently prickly. *Leaves* often glabrous. *Flowers* minute, in much-branched axillary or terminal cymes. *Sepals* 5, connate below. *Petals* 5, claws concave, limb with a long strap-shaped 2-fid appendage. *Stamens* 10, connate below, bearing 5 stamens alternating with 5 staminodes. *Ovary* sessile, with 5 2-ovuled cells ; style entire or 5-fid. *Capsule* globose, spiny, with 5 1-seeded cells and 5 septicidally deciduous valves. *Seeds* axile, exalbuminous ; cotyledons folded round the superior radicle.

BUETTNERIA HERBACEA, Roxb. Cor. Pl. i. t. 29 ; F. B. I. i. 376 ; W. & A. 65 ; Wt. Ic. t. 488.

A large unarmed herb with glabrous ovate acuminate dentate leaves and small flowers in short cymes followed by thinly bristly fruit.

N. Circars, Deccan and Carnatic, in forest undergrowth and shady places.

## 13. *Melhania*, Forsk.

Herbs, shrubs or undershrubs, with softly tomentose indumentum. *Leaves* simple, linear-oblong ovate or cordate, crenate or serrate. *Flowers* yellow, on 1-few-flowered axillary peduncles ; bracteoles narrow or cordate, often longer than the calyx. *Calyx* 5-partite. *Petals* 5, withering round the growing capsule. *Stamens* 10, of which 5 are sterile, connate below into a short cup ; staminodes ligulate, alternating with the perfect stamens. *Ovary* sessile, 5-celled ; ovules 1-many in each cell ; style short, rarely long, divided into 5 subulate spreading branches. *Capsule* loculicidally dehiscent. *Seeds* albuminous ; cotyledons plicate.

Leaves velvety above ; bracteoles lanceolate or ovate ; shrubs :—

Cymes equal to the petiole ; leaves oblong ; bracteoles lanceolate

1. *cannabina*.



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Fruit a 6-winged 3-celled capsule ; tree with rather large ovate acuminate leaves and flowers in large terminal panicles ..... **Berrya.**

Fruit a 2-4-parted or -lobed or entire unarmed drupe containing 1 or several pyrenes ; usually trees or erect shrubs..... **1. Grewia.**

Fruit a prickly or bristly capsule ; herbs or undershrubs

**2. Triumfetta.**

Fruit a siliquose or globose unarmed capsule ; annuals or prostrate perennials ..... **3. Corchorus.**

### 1. *Grewia*, Linn.

Trees or erect straggling or climbing shrubs, usually stellately pubescent. *Leaves* 3-7-ribbed. *Flowers* usually yellow, in axillary, extra-axillary or terminal cymes, fascicles or panicles. *Sepals* 5, distinct. *Petals* 5, usually with a gland at the base within, generally shorter than the sepals, inserted round the base of the torus, very rarely 0. *Stamens* numerous, inserted on a short or elongated often glandular torus. *Ovary* of 2-4, 2-many-ovuled cells ; style subulate ; stigma short, 2-5-lobed or laciniate. *Fruit* 1-4-pyrened, entire or 2-4-lobed ; pyrenes 1- or 2-many-seeded and spuriously septate between the seeds. *Seeds* ascending or horizontal ; albumen copious, fleshy or rarely scanty ; cotyledons flat, foliaceous or fleshy.

Inflorescence paniculate ; fruit unlobed, pyriform ; leaves ovate- or obovate-lanceolate, acuminate ; trees (Subgenus i. **Microcos**)

**1. Microcos.**

Inflorescence not paniculate, axillary or extra-axillary (Subgenus ii. **Eugrewia**) :—

Peduncles 1-2-flowered, capillary, extra-axillary ; leaves roundish, glabrous or subglabrous ; fruit small, 2-parted, usually with 4 stones (Series 1. **POPULIFOLIAE**) ..... **2. betulaefolia.**

Peduncles many-flowered :—

Leaves 3-ribbed, ovate to lanceolate ; flowering peduncles much longer than the petioles (except in *G. obtusa*, *G. orientalis*, and *G. Barberi*) :—

Leaves glabrous or with spreading pubescence or spreading tomentum :—

Fruit unlobed, depressed-globose, .6-1 in. across, velvety until old ; leaves very finely regularly crenate, glabrous or subglabrous or subscabrous (Series 2. **ALYSICARPAE**) :—

Peduncles shorter than the petioles ; leaves lanceolate ; fruit .8-1 in. across ..... **3. obtusa.**

Peduncles longer than the petioles ; leaves oblong to ovate ; fruit .6–.7 in. across :—

Leaves ovate ; peduncles arcuate ; tomentum of fruit matted .....4. *rhamnifolia*.

Leaves oblong ; peduncles straight ; tomentum of fruit spreading .....5. *Wightiana*.

Fruit slightly or deeply divided into 4 equal lobes ; gonophore manifest ; peduncles stout, extra-axillary, solitary or in pairs, never fascicled ; leaves often scabrous above, margins crenate or crenate-dentate (Series 3. COLUMNARES).

Lobes of fruit large, .4 in. long or more, distinct :—

Buds .25 in. across ; pedicels few together ; leaves densely pubescent beneath :—

Gonophore .25 in. long :—

Twigs and leaves beneath softly tomentose...6. *Gamblei*.

Twigs and leaves beneath harshly tomentose

7. *Lawsoniana*.

Gonophore .4 in. long ; leaves softly pubescent beneath

8. *heterotricha*.

Buds .12 in. across ; pedicels very numerous ; leaves subglabrous .....9. *umbellifera*.

Lobes of fruit small, .3 in. long or less, more or less united ; leaves ovate, obtuse, scabrous above :—

Peduncles equal to or not more than twice as long as the petioles ; leaves glabrous beneath ; fruit slightly 4-lobed, shortly bristly.....10. *orientalis*.

Peduncles 3–6 times longer than the petioles ; leaves with soft spreading tomentum beneath ; fruit deeply 4-lobed, covered at maturity with long soft hairs ...11. *emarginata*.

Fruit normally deeply divided into 2 oval or emarginate lobes ; leaves usually glabrous, apex sharply acuminate, margin sharply serrate (Section 4. SERRULATAE) :—

Peduncles usually 3 times longer than the petioles ; twigs usually glabrous ; leaves ovate-lanceolate .....12. *disperma*.

Peduncles about equal to the petioles ; twigs usually pubescent ; leaves linear- to ovate-lanceolate :—

Pedicels thickened upwards .....13. *Barberi*.

Pedicels capillary .....14. *lanceaefolia*.

Leaves finely densely appressed tomentose beneath (Section 5. BICOLORES) :—

Fruiting pedicels and peduncles long and slender ; fruit unlobed, pisiform ; leaf conspicuously serrate up to the acuminate tip

15. *Rothii*.

Fruiting pedicels and peduncles short and stout; fruit 2-parted; leaf very finely serrate up to the obtuse tip

16. *Damine*.

Leaves 5-ribbed, ovate or orbicular; peduncles axillary much longer than the petioles (or if, as in *G. tiliaefolia*, shorter, then stipules strongly sagittate); fruit didymous, bilobed or unlobed (Series 6. TILIAEFOLIAE):—

Peduncles shorter than the petioles; leaves and fruit usually glabrous at maturity; buds tomentose .....17. *tiliaefolia*.

Peduncles longer than the petioles:—

Leaves finely grey-tomentose beneath, minutely irregularly serrate; fruit tomentose, slightly 2-lobed .....18. *rotundifolia*.

Leaves pubescent beneath:—

Leaves obtuse or shortly acuminate; stipules auriculate; prostrate shrubs:—

Leaves cordate or truncate at the base, somewhat parallel-sided, finely regularly crenate; fruit unlobed, tomentose.....19. *subinaequalis*.

Leaves obtusely cuneate or rounded at the base, elliptic, irregularly coarsely crenate .....20. *sapida*.

Leaves caudate; stipules lanceolate; trees.....21. *pandaica*.

Leaves 3- or 5-ribbed; peduncles shorter or only slightly longer than the petioles:—

Leaves 5-ribbed, roundish:—

Leaves rounded at top, cordate, with raised concentric reticulation, velvety-pubescent below (Series 7. GLOMERATAE)

22. *villosa*.

Leaves usually irregularly lobed at the top, deeply bidentate, scabrous; fruit slightly 4-lobed (Series 8. ASPERAE)...23. *aspera*.

Leaves 3-5-ribbed, linear oblong:—

Buds oval; sepals 2-3 in. long; ovules less than 8 (Series 9. HIRSUTAE):—

Leaves 4-5-ribbed and a little oblique at the base; fruit slightly lobed, epicarp hairy until old, breaking away from the stones

24. *hirsuta*.

Leaves 3-ribbed, equal at the base; fruit distinctly lobed, at length glabrous .....25. *polygama*.

Buds cylindrical; sepals 5-6 in. long; ovules 12-20; fruit slightly 1-4-lobed; pericarp stellately scabrous, breaking away from the fibrous interior (Series 10. CARPINIFOLIAE) .....26. *flavescens*.

1. GREWIA MICROCOS, L.; F. B. I. i. 392; W. & A. 81; Wt. Ill. i. t. 33. *G. ulmifolia*, Roxb.; Wt. Ic. t. 84.



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12. GREWIA DISPERMA, Rottl. *G. laevigata*, Vahl; W. & A. 77; F. B. I. i. 389.  
In all Districts, in scrub forests, hedgerows, etc.  
A small or middle-sized tree with 1-2-lobed drupe, each lobe with 2 nuts.
13. GREWIA BARBERI, J. R. Drumm.  
Deccan, in Mysore, Bellary and Coimbatore; W. Gháts, from S. Canara to N. and E. slopes of Nilgiris, up to 5,000 ft.
14. GREWIA LANCEAEFOLIA, Roxb. *G. diplocarpa*, Thw.; F. B. I. i. 390.  
W. Gháts, from Coimbatore to Tinnevelly and Travancore.
15. GREWIA ROTHII, DC. *G. excelsa*, Mast.; F. B. I. i. 385 (partly, *not of Vahl*).  
N. Circars from Ganjam to Godavari; Deccan, in Kistna, Kurnool and Bellary.
16. GREWIA DAMINE, Gaertn. *G. salvifolia*, Heyne; F. B. I. i. 386 (partly).  
N. Circars, in Vizagapatam; Deccan, Kistna to Bellary.  
A shrub or small tree with small leaves, very grey-pubescent beneath.
17. GREWIA TILIAEFOLIA, Vahl; F. B. I. i. 386 (partly); W. & A. 80; Bedd. Fl. t. 108.  
In all forest Districts, up to about 4,000 ft.  
A medium-sized tree, usually with large leaves; wood brown, strong and flexible, used for shafts of carts, oars, and other implements. Vern. *Hind.* Phalsa, Dhamin; *Ur.* Dhamono; *Tel.* Charachi; *Tam.* Únú; *Mal.* Chádicha.
18. GREWIA ROTUNDIFOLIA, Juss.; W. & A. 80; Wt. Ic. t. 45. *G. orbiculata*, Rottl.; F. B. I. i. 386.  
N. Circars in Vizagapatam and Kistna; Deccan in Kurnool and Cuddapah; Carnatic, in S. Arcot and Tinnevelly.  
A small tree with leaves very grey-tomentose beneath.
19. GREWIA SUBINAEQUALIS, DC. *G. asiatica*, Mast. F. B. I. i. 386 (partly).  
N. Circars, in Vizagapatam, summit of Karaka Konda, 2,000 ft. (Barber).  
A small shrub of forest grass-lands, behaving in similar fashion to *G. sapida*.

**20. GREWIA SAPIDA**, Roxb. ; F. B. I. i. 387.

N. Circars, in Ganjam.

A small shrub of forest grass-lands, usually burnt or dying down yearly and then sending up fresh shoots from a permanent root-stock.

**21. GREWIA PANDAICA**, J. R. Drumm.

Tinnevelly District, at Kanni Katti (Barber).

A tree reaching 60 ft. in height and 14 in. in diam. of trunk.

**22. GREWIA VILLOSA**, Willd ; F. B. I. i. 388 ; W. & A. 79.

Deccan and Carnatic, dry forest scrub from the Kistna southwards.

A shrub with well-marked, 5-ribbed velvety leaves and crustaceous fruit.

**23. GREWIA ASPERA**, Roxb. *G. abutilifolia*, Mast. in F. B. I. i. 390.

N. Circars, Deccan and Carnatic, in hilly regions, and up to 3,000 ft.

A shrub with often large leaves.

**24. GREWIA HIRSUTA**, Vahl ; W. & A. 78 ; Wt. Ic. t. 76 ; F. B. I. i. 391.

N. Circars, Deccan and Carnatic, in all forest Districts.

A common forest undershrub with narrow leaves.

**25. GREWIA POLYGAMA**, Roxb. ; F. B. I. i. 391.

N. Circars, in Ganjam and Godavari.

A forest shrub or small tree.

**26. GREWIA FLAVESCENS**, Juss. *G. carpinifolia*, Mast. in F. B. I. i. 387 (not of Juss.). *G. pilosa*, W. & A. 78.

N. Circars, Deccan and Carnatic, in most forest Districts.

A small tree.

**2. Triumfetta**, Linn.

Herbs or undershrubs with stellate pubescence. *Leaves* serrate dentate or entire, sometimes 3-5-lobed. *Flowers* yellow, axillary or leaf-opposed, few or densely cymose. *Sepals* 5, distinct, frequently mucronate at the apex. *Petals* 5 (rarely 0), glandular, thickened or foveolate at the base, inserted round the base of the torus. *Stamens* indefinite or rarely 10, inserted on the glandular torus, free. *Ovary* 5-celled ; cells 2-ovuled ; style filiform ; stigma 2-5-toothed. *Capsule* globose or ovoid, echinate or setose,



indehiscent or separating into cocci. *Seeds* 1-2 in each cell, pendulous, albuminous; embryo straight; cotyledons flat, foliaceous.

Fruit including bristles 1 in. across, hirsute; leaves ovate-acuminate serrate, softly tomentose beneath; perennial herb .....1. *pilosa*.

Fruit including bristles .5 in. across, glabrous; leaves ovate-caudate, serrate, glabrous; annual herb.....2. *annua*.

Fruit including bristles .2-.25 in. across; pericarp tomentose:—

Fruit ovoid; bristles ciliate down one side; stamens 5-13; leaves subglabrous, irregularly bluntly dentate; lower ones ovate 3-lobed; annual herb .....3. *pentandra*.

Fruit globose; leaves tomentose beneath; herbaceous undershrubs:—

Lower leaves 3-5-lobed; bristles of fruit glabrous; stamens 8-15

4. *rhomboidea*.

Lower leaves orbicular; bristles of fruit puberulous; stamens 15-25

5. *rotundifolia*.

1. TRIUMFETTA PILOSA, Roth; F. B. I. i. 394; W. & A. 74.

In almost all Districts, up to 6,500 ft. in Nilgiris.

2. TRIUMFETTA ANNUA, Linn.; F. B. I. i. 396.

Deccan, in Godavari and Bellary; W. Gháts, in S. Canara and Coorg.

3. TRIUMFETTA PENTANDRA, A. Rich. *T. neglecta*, W. & A. 75; F. B. I. i. 396.

E. Coast in Guntur; Tinnevely.

4. TRIUMFETTA RHOMBOIDEA, Jacq.; F. B. I. i. 395. *T. angulata*, Lam.; W. & A. 74; Wt. Ic. t. 320.

In almost all Districts.

5. TRIUMFETTA ROTUNDIFOLIA, Lam.; F. B. I. i. 395; W. & A. 75.

In all Districts of the Circars, Deccan and Carnatic.

### 3. Corchorus, Linn.

Herbs or undershrubs. *Leaves* serrate, lower pair of teeth usually prolonged into hairs. *Flowers* small, yellow; peduncles very short, axillary or leaf-opposed, 1-few-flowered, bracteate. *Sepals* 4-5. *Petals* 4-5, naked at the base. *Stamens* numerous (or 8-10), inserted on a very short torus. *Ovary* 2-5-celled; ovules many in each cell; style short, the apex stigmatose. *Capsule* siliquiform and even, or subglobose and echinate or



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5. *CORCHORUS OLITORIUS*, Linn.; F. B. I. i. 397; W. & A. 73.

Found run wild in many Districts, but probably not indigenous in S. India. Jute.

6. *CORCHORUS TRILOCULARIS*, Linn.; F. B. I. i. 397; W. & A. 72.

Dry Districts of the Deccan and Carnatic, a weed of waste places, roadsides, etc.

7. *CORCHORUS URTICAEFOLIUS*, W. & A. 73; F. B. I. i. 397.

Dry Districts of the Carnatic, Salem, Chingleput.

8. *CORCHORUS CAPSULARIS*, Linn.; F. B. I. i. 397; W. & A. 73;

Wt. Ic. t. 311.

Found run wild occasionally, but not indigenous, less common than *C. olitorius*. Jute.

*Berrya Ammonilla*, Roxb.; F. B. I. i. 383; W. & A. 86; Bedd. Fl. t. 58 is the Trincomali wood tree of Ceylon, frequently cultivated in Madras and elsewhere, but not yet found wild in S. India.

### Family XXIX. ELAEOCARPACEAE.

Trees or shrubs without mucilage sacs. *Leaves* entire, alternate or verticillate; stipules present, persistent or caducous. *Flowers* usually hermaphrodite, in axillary racemes, regular. *Sepals* 4-6, valvate. *Petals* 4-6, free, valvate, laciniate or rarely entire, inserted outside the disk. *Stamens* indefinite, inserted on the cushion-like disk; anthers linear, opening by terminal pores. *Ovary* sessile, 2-5-celled, ovules 2 or more in each cell, usually pendulous; style columnar. *Fruit* a drupe with a bony usually 3-5- sometimes 1-celled stone. *Seeds* pendulous, 1 to each cell, albumen fleshy, cotyledons flat.

#### *Elaeocarpus*, Linn.

Trees. *Leaves* simple, usually crenate or serrate, sometimes entire. *Flowers* hermaphrodite, rarely polygamous, in axillary or lateral racemes. *Sepals* 4-5, valvate (rarely imbricate), distinct. *Petals* 4-5, laciniate lobed or rarely entire, inserted round the base of a thickened glandular disk. *Stamens* numerous, rarely 8-12, inserted between the glands on the disk; anthers linear, dehiscing by a transverse valve at the top. *Ovary* 2-5-celled; ovules 2 in each cell; style subulate, entire. *Drupe* with a single bony tuberculate stone divided into 1-5 1-seeded cells. *Seeds* pendulous; testa hard; albumen fleshy; cotyledons broad.

Flowers small; sepals under .3 in. long; anthers not awned; ovary 3-celled:—

Anthers more or less ciliate on the longer valve:—

Leaves elliptic or elliptic-obovate, chartaceous, glabrous above, slightly pubescent beneath, crenate-serrate, 2–4 in. long, petiole .5–1 in. long .....1. *serratus*.

Leaves lanceolate, acuminate, chartaceous, glabrous, glandular beneath, much narrowed at base, serrulate, 3–6 in. long, petiole 5 in. long.....2. *lancaefolius*.

Leaves ovate-lanceolate, acuminate, subcoriaceous, glabrous, obtuse at base, mucronulate-serrate, 4–6 in. long, petiole 1 in. long

2. *lucidus*.

Anthers not ciliate on the longer valve; leaves broadly elliptic, coriaceous, glabrous, glandular beneath, serrate, 4–6 in. long, petiole about 1 in. long .....4. *oblongus*.

Flowers medium-sized; sepals .3–.7 in. long; anthers awned with a long bristle; ovary 2–3-celled:—

Sepals ordinarily .4 in. long; leaves chartaceous, ovate or ovate-lanceolate, bluntly long-acuminate at apex, rounded at base, glabrous, 2–4 in. long; petiole slender .75–1.25 in. long; drupe shining, .5 in. long .....5. *Munroii*.

Sepals ordinarily .5 in. long; leaves coriaceous, the 2 halves bent back so as to be boat-shaped, acute at apex, densely softly ferruginous-pubescent beneath, 3–5 in. long; petiole stout, about 1 in. long; drupe shining, .7 in. long .....6. *ferrugineus*.

Sepals ordinarily .6 in. long; leaves subcoriaceous, flat, obovate, obtuse at apex, base rounded, ferruginous-pubescent beneath, especially on the midrib and nerves, 4–8 in. long; petiole stout, .5–2 in. long; drupe smooth, 1.5–2 in. long .....7. *tuberculatus*.

Flowers large; sepals .7–1 in. long; anthers mucronate; ovary 2-celled; leaves coriaceous, elliptic or obovate, glandular beneath, glabrous, 3–4.5 in. long; petiole .5–.75 in. long; drupe 2 in. long

8. *venustus*.

1. ELAEOCARPUS SERRATUS, Linn.; F. B. I. i. 401; W. & A. 82. *E. cuneatus*, Wt. Ill. i. 83; F. B. I. i. 402.

W. Gháts, in all Districts, in evergreen forests up to 5,000 ft. A rather small tree with greyish-white wood and edible fruit. Vern. *Tam.* Ulang Karei; *Mal.* Nalla kara, Valiya kara.

2. ELAEOCARPUS LANCEAEFOLIUS, Roxb.; F. B. I. i. 402; Wt. Ic. t. 65.

E. Gháts, in the Madgol Hills of Vizagapatam, 3,000 ft. (A. W. Lushington).

A large tree with a soft light brown wood.

3. *ELAEOCARPUS LUCIDUS*, Roxb.; F. B. I. i. 403.

E. Gháts, in the Madgol Hills of Vizagapatam, 3,000 ft. (A. W. Lushington).

4. *ELAEOCARPUS OBLONGUS*, Gaertn.; W. & A. 82; F. B. I. i. 403; Wt. Ic. t. 46.

W. Gháts, in all Districts, in evergreen forests up to 6,000 ft.; common in Nilgiri Sholas.

A large tree with whitish wood. The leaves turn red when old. Vern. *Tam.* Bikki; *Mal.* Katta kara.

5. *ELAEOCARPUS MUNROII*, Mast. in F. B. I. i. 407. *Monocera Munroii*, Wt. Ill. i. 84; Ic. t. 952.

W. Gháts, in all Districts from 2,500 to 6,000 ft.; common in Nilgiri Sholas.

A large tree with white or brown moderately hard wood.

A very pretty tree and easily recognized. In young plants and coppice shoots the leaves are often linear-lanceolate.

Vern. *Tam.* Narebikki; *Mal.* Pungári.

6. *ELAEOCARPUS FERRUGINEUS*, Wight; F. B. I. i. 406; Bedd. Fl. t. 112. *Monocera ferruginea*, Wt. Ic. t. 205.

W. Gháts, in the Nilgiris, Anamalais, Pulneys, and the higher hills of Travancore at 6,000 to 7,000 ft.

The characteristic of the curiously folded-back leaves makes this interesting tree easily recognizable.

7. *ELAEOCARPUS TUBERCULATUS*, Roxb.; F. B. I. i. 404; Bedd. Fl. t. 113. *Monocera tuberculata*, W. & A. 83; Wt. Ic. t. 62; Wt. Ill. i. t. 35.

W. Gháts, in all Districts up to 5,000 ft., on river banks and in evergreen forests.

A large tree with grey and white mottled bark and brown wood streaked with darker colour. The rugose seeds are used to make necklace beads. Vern. *Tam.* Rutthracham; *Mal.* Piláhi, Naggara.

8. *ELAEOCARPUS VENUSTUS*, Bedd. Fl. t. 174. *Elaeocarpus Monocera*, Mast. in F. B. I. i. 405 (*not of Cav.*).

W. Gháts, in South Travancore at 3,500 to 4,500 ft.

A large handsome tree, very ornamental with its white flowers, but scarce and little known. The leaves have large glands in the axils of the nerves beneath.



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its oil-seeds. It has large blue flowers, and is occasionally found run wild.

## 2. *Hugonia*, Linn.

Scandent or straggling herbs. *Leaves* stipulate. *Flowers* yellow, the lowest 2 peduncles of each branch often turned into spiral hooks. *Sepals* 5. *Petals* 5, contorted, fugacious. *Stamens* 10, connate into a short tube at the base, and there marked by 5 glandular swellings. *Ovary* 5-celled with 2 collateral ovules in each cell; styles 5, filiform. *Drupe* globose, fleshy. *Seeds* compressed, albuminous; cotyledons flat.

HUGONIA MYSTAX, Linn.; F. B. I. i. 413; W. & A. 72; Wt. Ill. i. 79, t. 32.

A rambling or climbing shrub with tomentose twigs, elliptic-obovate glabrous leaves, and large yellow flowers, usually many together at the ends of the branches.

In almost all Districts in dry forests.

Bark yellowish, corky. Wood hard and close-grained. Vern. *Tam.* Motira kanni.

## 3. *Reinwardtia*, Dumort.

Undershrubs. *Leaves* membranous, usually serrate; stipules minute caducous. *Flowers* large, yellow or white, in short axillary racemes or in terminal corymbs; pedicels bracteate. *Sepals* 5. *Petals* 5, contorted, fugacious. *Stamens* 5, connate at the base, alternating with setiform staminodes. *Glands* 2-3, adnate to the staminal tube. *Ovary* of 3-5 2-locellate cells; ovule 1 in each locellus; styles 3-4 (-7), filiform. *Capsule* globose, 6-8-valved. *Seeds* reniform; albumen thin.

REINWARDTIA TRIGYNA, Planch.; F. B. I. i. 412. *R. tetragyna*, Planch.; F. B. I. i. 412. *Linum trigynum*, Roxb.; W. & A. 134.

A small shrub with elliptic-lanceolate acute glabrous leaves and handsome yellow flowers, with many sexual forms combining styles and stamens of varying number and length. W. Ghát forests of S. Canara and Mysore.

## 4. *Erythroxylon*, Linn.

Shrubs or trees, usually glabrous. *Leaves* alternate, entire, often nearly distichous; stipules intrapetiolar, on the arrested shoots imbricating. *Flowers* axillary, small, whitish, solitary or fascicled. *Sepals* 5-6. *Petals* 5-6, with an erect double ligule

on the inner side. *Stamens* 10–12, monadelphous. *Ovary* 3–4-celled; styles 3–4, united into a style with capitate stigmas; ovules 1–2 in each cell. *Drupe* 1-celled, 1-seeded. *Seed* with a thin testa, and little or no albumen.

Leaves obovate, obtuse, under 2 in. long .....1. *monogynum*.  
 Leaves linear-elliptic, chartaceous .....2. *lanceolatum*.  
 Leaves lanceolate, caudate-acuminate, membranous 3. *acuminatum*.  
 Leaves ovate, obtusely acuminate, coriaceous .....4. *obtusifolium*.

1. ERYTHROXYLON MONOGYNUM, Roxb. Cor. Pl. i. t. 88; F. B. I. i. 414. *E. indicum*, Bedd. Fl. t. 81. *Sethia indica*, DC.; W. & A. 106; Wt. Ill. t. 48.

N. Circars, Deccan and Carnatic, in dry evergreen forests; W. Gháts, in dry hill forests of Travancore, up to 3,000 ft. A small tree with a dark brown rough bark and very hard reddish-brown wood, useful for turning and a good fuel. Vern. *Tam.* Devadara; *Tel.* Adivi gerenta; *Kan.* Devadaram.

2. ERYTHROXYLON LANCEOLATUM, Hook. f.; F. B. I. i. 415. *Sethia lanceolata*, Wt. Ill. i. 136. *S. erythroxyloides*, Wt. Ill. i. 136.

W. Gháts, in the Hills of Tinnevely, at Courtallum (Wight).

3. ERYTHROXYLON ACUMINATUM, Walp. *E. lucidum*, Moon; F. B. I. i. 415. *Sethia acuminata*, Arn.; Wt. Ill. i. 135.

W. Gháts, in Wynaad (Beddome) and Pulney Hills (Bourne).

4. ERYTHROXYLON OBTUSIFOLIUM, Hook. f.; F. B. I. i. 415. *Sethia lanceolata*, var. *obtusifolia*, Wt. Ill. i. 136.

W. Gháts, S. Canara to Nilgiris, up to 4,000 ft., scarce.

### Family XXXI. MALPIGHIACEAE.

Trees or erect or climbing shrubs. *Leaves* usually opposite and entire, often provided with glands on the petiole, on the base of the blade and on the margin; stipules small or 0. *Flowers* bisexual, often irregular; pedicels jointed, bracteate. *Sepals* usually 5, imbricate, one or more usually furnished with large glands. *Petals* 5, usually equal, fimbriate or dentate, often clawed. *Disk* small. *Stamens* usually 10, 1 or more sometimes much longer than the others; filaments free or connate at the base. *Ovary* of 3 1-ovuled cells; styles 1–3. *Fruit* of 1 or more winged samaras, rarely a drupe. *Seeds* exalbuminous, embryo straight or curved, cotyledons often unequal, radicle superior.



Calycine gland single, large; styles 1-2; samaras terminated by 1-3 lanceolate wings .....1. **Hiptage**.  
 Calycine glands 0; styles 3; samaras surrounded by an orbicular or lanceolate wing .....2. **Aspidopterys**.

### 1. *Hiptage*, Gaertn.

Climbing shrubs or rarely small trees. *Leaves* opposite, coriaceous, entire, eglandular, exstipulate. *Racemes* terminal and axillary; peduncles bracteate articulated with the 2-bracteate pedicels. *Flowers* with 4 white, one coloured petal, fragrant. *Calyx* 5-partite with one large gland partly on the pedicel. *Petals* clawed, unequal, silky. *Stamens* 10, declinate, one much longer than the others; filaments connate at the base. *Ovary* 3-lobed; styles 1-2, at first circinate; stigma capitate. *Fruit* of 1-3 2-3-winged samaras. *Seeds* globose, cotyledons unequal.

Leaves 4-9 in. long; flowers .7-1 in. across; wings of samaras about 1.5 in. long .....1. *Madablota*.  
 Leaves about 3 in. long; flowers .5 in. across; wings of samaras about 1 in. long.....2. *parvifolia*.

1. HIPTAGE MADABLOTA, Gaertn. ; F. B. I. i. 418; W. & A. 107.

*Gaertnera racemosa*, Roxb. Cor. Pl. i. t. 18.

N. Circars, Deccan and Carnatic, chiefly in ravines in hill forests, up to 6,000 ft.

A large straggling climbing shrub with pretty flowers and rough reddish wood. Vern. *Ur*. Boromali.

2. HIPTAGE PARVIFOLIA, W. & A. 107; F. B. I. i. 419.

W. Deccan, from Mysore, Tinnevelly and S. Travancore.

A climbing shrub, smaller than *H. Madablota*.

### 2. *Aspidopterys*, A. Juss.

Climbing shrubs. *Leaves* entire, eglandular, exstipulate. *Flowers* paniced or fascicled; peduncles bracteate; pedicels slender. *Sepals* 5, short, eglandular. *Petals* 5, clawed, entire, white or yellow, inodorous. *Stamens* 10; filaments free or connate at the base; anthers ovate. *Ovary* 3-lobed; styles 3. *Fruit* of 1-3 samaras surrounded by a shield-like membranous wing. *Seeds* oblong; cotyledons straight, equal.

Leaves orbicular, suddenly acuminate, deeply cordate, white tomentose beneath; samara wings oval .....1. *cordata*.



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filaments bare. *Ovary* sessile, hirsute, 5-12-lobed, 5-12-celled; ovules 1-5 in each cell; stigmas 5-12. *Fruit* 5-angled, of 5-12 winged spinous or tuberculate cocci. *Embryo* exalbuminous.

TRIBULUS TERRESTRIS, Linn.; F. B. I. i. 423; W. & A. 145; Wt. Ic. t. 98.

A procumbent herb; leaflets 6-12, .2-.5 in. long, oblong, silky; flowers solitary, axillary, .5-1 in. across; fruit of 5 woody cocci, each provided with 2 long hard sharp divaricate spines.

Deccan, in hot dry localities chiefly.

## 2. *Fagonia*, Linn.

Erect or prostrate branching herbs, woody at the base. *Leaves* opposite, 1-3-foliolate; leaflets entire; stipules often spiny. *Flowers* solitary, pseudo-axillary. *Sepals* 5, deciduous, imbricate. *Petals* 5, clawed, caducous, imbricate. *Disk* small. *Stamens* 10, on the disk; filaments bare. *Ovary* sessile, 5-angled, of 5 2-ovuled cells, narrowed into a subulate style; stigma simple. *Fruit* of 5 1-seeded dehiscent cocci. *Seeds* compressed; albumen horny; cotyledons broad.

FAGONIA ARABICA, Linn.; F. B. I. i. 425. *F. mysorensis*, Roth; W. & A. 145; Wt. Ill. i. t. 64.

A small branched woody plant, the small pink flowers and globular capsules immersed in the copious thin straight spines.

Deccan, in dry localities in Kurnool, Anantapur, etc., often on black cotton soil.

## Family XXXIII. GERANIACEAE.

Herbs, shrubs or rarely trees. *Leaves* opposite or alternate, usually 2-stipulate. *Flowers* bisexual, regular or irregular, solitary fascicled umbelled cymose or racemose; peduncles usually axillary. *Sepals* usually 5 and imbricate, posticous sometimes spurred. *Petals* 5 or fewer or 0. *Torus* raised in the centre. *Disk* of 5 glands or 0. *Stamens* 4-5 or 10 (or 15); anthers versatile. *Ovary* (2-) 3-5 lobed, 3-5-celled, prolonged above into a beak bearing <sup>ca</sup>capitate or linear stigmas or into sessile stigmas; ovules 1-2-many in each cell. *Fruit* a 3-5-lobed capsule or a berry, lobes 1-seeded and separating from the axis or many-seeded. *Seeds* usually with little or no albumen.

Flowers regular ; sepals herbaceous, not spurred, imbricate ; stamens 10 ; leaves simple and palminerved or compound :—

Leaves simple, palminerved ; glands on the torus 5, alternating with the petals ; capsules beaked, the valves when dehiscent rolled elastically upwards.....1. **Geranium.**

Leaves compound ; glands on the torus 6 ; capsules not beaked :—

Herbs ; fruit capsular :—

Leaves 3-foliolate ; capsule valves cohering with the axis

2. **Oxalis.**

Leaves abruptly pinnate ; capsule valves detaching from the axis

3. **Biophytum.**

Trees ; leaves pinnate ; fruit indehiscent, fleshy : 5 stamens often reduced to staminodes .....**Averrhoa.**

Flowers irregular ; leaves simple, penninerved ; sepals usually petaloid, the upper spurred ; stamens 5 with subconnate anthers :—

Lateral petals connate in pairs ; fruit capsular, elastically dehiscent

4. **Impatiens.**

Lateral petals free ; fruit a drupe with a bony pyrene...5. **Hydrocera.**

### 1. **Geranium, Linn.**

Herbs or undershrubs. *Leaves* stipulate. *Peduncles* axillary, bracteate, 1-2-flowered or bearing umbels. *Flowers* regular. *Sepals* and *petals* 5 each, imbricate. *Disk* represented by 5 interpetaline glands. *Stamens* 10 ; free or shortly united at the base, anthers 10 (or rarely only 5). *Ovary* beaked, 5-lobed, 5-celled ; styles 5 ; ovules 2-3, superposed. *Capsule* 5-lobed, 5-celled ; cells 1-seeded, usually separated from the axis by the elastic curving of the lower portions of the beak. *Seeds* with albumen usually 0 ; cotyledons induplicate or contorted.

GERANIUM NEPALENSE, Sweet ; F. B. I. i. 430. *G. affine*, W. & A. 133 (not of Ledeb.) ; Wt. Ill. i. t. 59.

A slender diffuse perennial with pentagonal deeply 3-5-lobed leaves, the lobes cut into strap-shaped segments ; flowers 3-5 in. across ; carpels hairy ; seeds shining, smooth.

Nilgiri and Pulney Hills, usually above 6,000 ft.

Various garden species of *Pelargonium* are found run wild about the Nilgiri Hill stations ; one, *Pelargonium grossularioides*, DC., of S. Africa, appears to be fully naturalized, as is *Erodium cicutarium*, Leman, of Europe and N. India.

## 2. *Oxalis*, Linn.

Acid herbs, rarely woody. *Leaves* radical or cauline and alternate, usually digitate, 3-many-foliolate. *Flowers* on axillary or radical 1-many-flowered peduncles, usually umbellate, regular. *Sepals* 5, imbricate. *Petals* 5, hypogynous, contorted. *Disk* without glands. *Stamens* 10, filaments free or united at base. *Ovary* of 5 1-many-ovuled cells; styles 5, distinct. *Capsule* loculicidal. *Seeds* with an outer fleshy coat bursting elastically; albumen fleshy.

OXALIS CORNICULATA, Linn.; F. B. I. i. 436; W. & A. 142; Wt. Ic. t. 18.

A diffuse creeping weed with long-stalked trifoliolate leaves with obcordate leaflets; flowers yellow, umbellate, on slender peduncles.

Common in most Districts and at all elevations, especially troublesome in garden soil.

## 3. *Biophytum*, DC.

Annual or perennial herbs, often with woody stems. *Leaves* crowded at the ends of the stem and branches, abruptly pinnate; leaflets opposite, oblique. *Flowers* dimorphous, in small umbels; peduncles terminal. *Sepals* 5. *Petals* 5, yellow, connate with a salver-shaped corolla. *Stamens* 10, 5 inner ones longer; filaments free. *Ovary* 5-celled; styles 5; stigmas notched or 2-fid. *Capsule* dehiscing loculicidally into 5 spreading valves. *Seeds* like those of *Oxalis*.

Stem simple:—

Leaflet main nerves thick, rarely straight, irregular; sepals usually longer than the capsule:—

Leaflet main nerves numerous, secondary many; leaflets many pairs (8–15); peduncles long; seeds ovoid, acute:—

Leaflets nearly glabrous; seeds prominently ridged, not tubercled; pedicels very short (.1 in.) or 0; stem generally short...1. *sensitivum*.

Leaflets strigosely hirsute; seeds ridged, the ridges with tubercled margins; pedicels short (.1–.2 in.), slender; stem often long, sometimes stout .....2. *Candolleianum*.

Leaflet main nerves very few, secondary almost none; leaflets few (5–7) pairs; peduncles very short or 0; pedicels .2 in. long; seeds flattened, ovate, obtuse, with scattered tubercles and no ridges; stems slender .....3. *Apodiscias*.



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4. *Impatiens*, Linn.

Annual or perennial herbs or rarely a little shrubby at the base. *Leaves* simple. *Flowers* irregular, axillary, solitary fascicled racemed or umbelled or sometimes scapose. *Sepals* 3 (or 5), coloured, imbricate, 2 lateral ones small flat usually green, posterior (*lip*), the lower in the flower, large, petaloid, often spurred. *Petals* 3 (or 5) the anterior (*standard*) erect, the side ones (*wings*) entire or 2-3-lobed, sometimes with a short or long and slender appendage at the base. *Stamens* 5; anthers cohering, nearly sessile. *Disk* 0. *Ovary* oblong, 5-celled; ovules many, 1-seriate in each cell; stigma sessile, 5-toothed. *Capsule* short or long, loculicidally dehiscent; valves 5, elastic. *Seeds* smooth or tubercled; albumen 0.

(*Analysis after Sir J. D. Hooker in Rec. Bot. Surv. Ind. iv. 37, and subsequent descriptions.*)

Scapigerous plants with tuberous rootstock; leaves all radical; flowers racemose; seeds very minute, clothed with spiral hairs (Section 1. SCAPIGERAE):—

Lip with a very long incurved spur:—

Wings 2-lobed .....1. *acaulis*.

Wings 3-lobed .....2. *scapiflora*.

Lip with a short spur; wings 3-lobed:—

Dorsal auricle of wings obscure or 0:—

Spur of lip incurved, tip inflated .....3. *Beddomei*.

Spur of lip incurved, cylindric .....4. *Levingei*.

Spur of lip straight, standard entire .....5. *modesta*.

Spur of lip short, standard crenate.....6. *crenata*.

Dorsal auricle of wings produced into the spur of the lip:—

Dorsal auricle long slender:—

Tall, spur of lip elongate .....7. *Denisonii*.

Dwarf, spur of lip short .....8. *Barberi*.

Dorsal auricle short spiniform .....9. *Lawsoni*.

Lip spurless .....10. *orchioides*.

Epiphytic perennial herbs, succulent, with very short simple or sparingly branched, often annulate or articulate, stems; leaves alternate, usually fascicled at the ends of the branches; flowers on simple or branching few-flowered peduncles; wings very short, thick, almost concealed in the mouth of the lip and concave standard (Section 2. EPIPHYTICAE):—

Lip scarlet:—

Sepals small, elliptic, green; standard and wings yellow

11. *Jerdoniae.*

Sepals large, oblong, pendulous, scarlet; standard green, wings purple .....

12. *auriculata.*

Sepals linear, green; standard green, dorsally broadly winged

13. *parasitica.*

Lip green; sepals linear-oblong; flowers all green .....

14. *viridiflora.*

Annual herbs; leaves opposite; flowers pedicelled, solitary binate or fascicled in the axils of the leaves, without peduncle; ebracteate or minutely bracteate at base; sepals elongate, linear, rarely ovate or lanceolate; seeds glabrous (except *Gardneriana*), usually globose, black and polished (Section 3. ANNUAE) :—

Sepals linear or linear-lanceolate; seeds black and shining :—

Spur of lip slender, usually longer than the wings, sometimes shorter or 0 :—

Stem stiff, usually simple; leaves broad or narrow, coriaceous :—

Spur longer than or at least as long as wings; flowers large; leaves more or less serrate .....

15. *chinensis.*

Spur quite short, incurved; flowers small; leaves nearly entire :—

Flowers .6–.8 in. long, rose or rose-purple .....

16. *rupicola.*

Flowers .2–.4 in. long, violet-blue .....

17. *rivulicola.*

Stem flaccid, usually branched; leaves broad or narrow, subentire

18. *diversifolia.*

Stem slender; basal lobe of wings 0, dorsal auricle filiform

19. *ligulata.*

Stem slender, flaccid; wings long stipitate; basal lobe minute or 0, dorsal auricle 0 :—

Leaves elliptic-lanceolate, 1–2.5 in. long; capsule .5 in. long

20. *Kleinii.*

Leaves oblong-lanceolate, 3–5 in. long; capsule .75 in. long

21. *Rheedi.*

Stem slender, flaccid; leaves oblong, entire; wings long stipitate; basal lobe lanceolate, dorsal auricle small, opposite to it

22. *lenta.*

Stem slender, flaccid; wings shortly stipitate; basal lobe small, dorsal auricle decurved .....

23. *tenella.*

Stem much branched; wings sessile; basal lobe minute, dorsal auricle minute, near the base .....

24. *debilis.*

Spur of lip very short or 0 :—

Lip scaphiform or cymbiform, spur of lip very minute or 0 :—

Flowers white or rose, very small :—

Leaves ovate or oblong .....

25. *pusilla.*



Leaves narrowly linear.....26. *herbicola*.

Flowers medium-sized, yellow; standard winged.....27. *Lawii*.

Lip funnel-shaped; flowers very small, white: standard-costa mucronate .....28. *Nataliae*.

Lip saccate, spur of lip very short:—

Glabrous or scurfy; flowers very small; lip shortly saccate

29. *oppositifolia*.

Often pubescent; flowers rose, very small; lip cymbiform, acute; basal lobe of wing almost 0.....30. *pallidiflora*.

More or less pubescent, flowers medium-sized, lip deeply saccate

31. *tomentosa*.

Sepals ovate or ovate-lanceolate; seeds various:—

Leaves opposite, small, sharply serrate, glandular; spur of lip very short, incurved; seeds glabrous, black, shining .....32. *concinna*.

Leaves opposite and whorled, usually long-glandular-ciliate; seeds hairy .....33. *Gardneriana*.

Shrub or herbs; leaves opposite, alternate or rarely whorled; flowers pedicelled, the pedicels solitary binate or fascicled in the axils of the leaves, without peduncle; sepals small or minute; seeds smooth, rugose or papillose (Section 4. MICROSEPALAE):—

Leaves opposite alternate and whorled on the same plant; seeds obovoid, rugose or papillose:—

Shrubs, basal lobe of wings smaller than the distal; spur of the lip short incurved:—

Leaves 1–2 in. long, petiole short; stems reddish 34. *Leschenaultii*

Leaves 2–4 in. long, petiole long; stems often with sulphury covering .....35. *latifolia*.

Shrubs, basal lobe of wings equalling or larger than the distal:—

Stem and branches glaucous, costa of leaf hairy beneath; spur of lip stout .....36. *cuspidata*.

Stem and branches green; leaves usually glabrous beneath; spur of lip slender:—

Basal lobe of wings much smaller than the distal 37. *floribunda*.

Basal lobe of wings much larger than the distal 38. *macrocarpa*.

Basal lobe of wings equal to the distal, both obcordate

39. *cochinica*.

Herb, annual; lobes of wings subequal; spur of lip very slender

40. *lucida*.

Leaves all alternate:—

Flowers minute; flaccid annuals:—

Leaves ovate; spur of lip 0 .....41. *pendula*.

Leaves lanceolate; spur of lip short .....42. *mysorensis*.



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Leaves oblong or elliptic, subsessile, .25-1 in. long...59. *omissa*.  
Dorsal auricle of wings minute; peduncle 1-flowered; leaves .2-  
.5 in. long, subsessile .....60. *parvifolia*.

Leaves all alternate :—

Leaves scattered on the stem and branches :—

Spur of lip long, slender.....61. *cordata*.

Spur of lip short, stout, tip incurved .....62. *uncinata*.

Spur of lip short, slender, straight .....63. *verecunda*.

Spur of lip 0 .....64. *elegans*.

Leaves rosulate at the top of the simple stem :—

Spur of lip long and slender .....65. *umbellata*.

Spur of lip short, stout .....66. *travancorica*.

Shrubs; leaves alternate; flowers in elongate peduncled axillary  
racemes; pedicels bracteate at the base; sepals orbicular or broadly  
oblong; lip spurred; seeds various (Section 7. RACEMOSAE) :—

Leaves long-petioled, ovate :—

Distal lobe of wings stipitate with a minute basal lobe at the base of  
the stipes.....67. *maculata*.

Distal lobe of wings sessile :—

Lip tubiform, incurved throughout its length .....68. *phoenicea*.

Lip cymbiform or infundibular; spur short, incurved  
.....69. *Wightiana*.

Leaves subsessile, lanceolate.....70. *Tangachee*.

1. *IMPATIENS ACAULIS*, Arn.; F. B. I. i. 443.

W. Gháts, up to 7,000 ft. in Nilgiris.

Flowers rather large, pale pink.

2. *IMPATIENS SCAPIFLORA*, Heyne; F. B. I. i. 443. *I. rivalis*,  
Wt. Ic. t. 751; F. B. I. i. 444.

W. Gháts from S. Canara to Travancore, at 6,000 to  
8,000 ft., usually on dripping rocks.

Flowers pink, darker at the base of the wing.

3. *IMPATIENS BEDDOMEI*, Hook. f. in F. B. I. i. 442.

W. Gháts, at 6,000 to 8,000 ft. in Nilgiris, on the downs.

Flowers white with yellow patches on the wings.

4. *IMPATIENS LEVINGEI*, Gamble ex Hook. f. in Rec. Bot. Surv.  
Ind. iv. 45

W. Gháts, in the Nilgiri Hills, at 6,000 ft., on rocks near  
Coonoor and Hulikal (Gamble, Levinge).

Flowers carmine-red.

5. *IMPATIENS MODESTA*, Wt. Ic. t. 968; F. B. I. i. 442.

W. Gháts, in the Nilgiri, Anamalai and Sivagiri Hills, at 6,000 ft.

Flowers pink.

6. IMPATIENS CRENATA, Bedd.; F. B. I. i. 442.

W. Gháts, in the Anamalai Hills, at 5,000 to 8,000 ft.

Flowers blue inside.

7. IMPATIENS DENISONII, Bedd. Ic. t. 151; F. B. I. i. 444.

W. Gháts, on the Sispara Ghát, Nilgiris, at 3,000 to 5,000 ft.

Flowers pink.

8. IMPATIENS BARBERI, Hook. f. in. Rec. Bot. Surv. Ind. iv. 45.

W. Gháts, at Cadamany in Mysore (Barber).

9. IMPATIENS LAWSONI, Hook. f. in Rec. Bot. Surv. Ind. iv. 45.

W. Gháts, in the Nilgiri Hills.

10. IMPATIENS ORCHIOIDES, Bedd. Ic. t. 152; F. B. I. i. 443.

W. Gháts, on tree-trunks at Avalanché, Nilgiris, 8,000 ft.

Flowers reddish brown, a very small species.

11. IMPATIENS JERDONIAE, Wt. Ic. t. 1602; F. B. I. i. 460, *excl. I. parasitica*, Bedd.

W. Gháts, on tree-branches and moist rocks at Sispara Ghát, 3,000 to 5,000 ft., Anamalai Hills at 7,000 ft.

A succulent epiphyte with thick stems.

12. IMPATIENS AURÍCULATA, Wt.; F. B. I. i. 460.

W. Gháts, on tree-trunks, hills of Tinnevelly and Travancore, above 5,000 ft.

A succulent epiphyte with swollen stem-internodes.

13. IMPATIENS PARASITICA, Bedd. Ic. t. 140. *I. Jerdoniae* var. *parasitica*, Hook. f. in F. B. I. i. 460.

W. Gháts, on tree-trunks on the Anamalai Hills at 5,000 to 7,000 ft.; Hills of Cochin and Travancore.

A very succulent epiphyte, with swollen internodes.

14. IMPATIENS VIRIDIFLORA, Wt.; F. B. I. i. 460; Bedd. Ic. t. 141.

W. Gháts, epiphytic on tree-trunks in the Sivagiri Hills, Tinnevelly, at 5,000 ft. (Wight).

A fleshy epiphyte.

15. IMPATIENS CHINENSIS, Linn.; F. B. I. i. 444. *I. fasciculata*, Lamk.; Wt. Ic. t. 748; W. & A. 128.

E. Gháts, Madgol Hills, at 5,000 ft.; W. Gháts, common in all Districts in wet places and pastures at 5,000 to 8,000 ft.

Flowers rose-purple to white.

16. *IMPATIENS RUPICOLA*, Hook. f. in Kew Bull. 1910, 292.  
Mysore at Shimoga, 2,000 to 3,000 ft. (Meebold).
17. *IMPATIENS RIVULICOLA*, Hook. f. in Kew Bull. 1911, 354.  
W. Gháts, in the Puriar Valley, Travancore, 4,000 ft. (Meebold), borders of streams.
18. *IMPATIENS DIVERSIFOLIA*, Wall.; F. B. I. i. 446; W. & A. 139.  
W. Gháts, from S. Canara to Travancore: in Nilgiris, up to 6,000 ft.  
Flowers rose.
19. *IMPATIENS LIGULATA*, Bedd. Ic. t. 149; F. B. I. i. 446.  
W. Gháts, Anamalai Hills at 1,500 to 2,500 ft., Hills of Malabar, Cochin and Travancore.  
Flowers pink or white.
20. *IMPATIENS KLEINII*, W. & A. 140; F. B. I. i. 445; Wt. Ic. t. 884; Hook. f. in Kew Bull. 1910, 293.  
W. Coast and Gháts, in most Districts, from sea-level up to 6,000 ft.  
A slender plant, scarcely 1 ft. high, flowers violet-purple.
21. *IMPATIENS RHEEDII*, W. & A. 138.  
W. Gháts, in Malabar at low elevations (Barber, Bourne).  
Flowers pink or mauve with darker streaks.
22. *IMPATIENS LENTA*, Hook. f. in Hook. Ic. t. 2913.  
W. Gháts, in the Nilgiri Hills (Perrottet).  
Flowers lilac (?).
23. *IMPATIENS TENELLA*, Heyne; W. & A. 140; F. B. I. i. 447  
*excl. syn. I. rosmarinifolia*, Retz.  
W. Gháts, in the Nilgiris, at 6,000 ft.  
A slender plant scarcely 10 in. high, flowers pink (?).
24. *IMPATIENS DEBILIS*, Turcz. in the Bull. Soc. Imp. Nat. Mosc. xxxii. i. 272; Hook. Ic. t. 2911.  
W. Gháts, in the Nilgiri Hills (Perrottet).  
Flowers small, pink.
25. *IMPATIENS PUSILLA*, Heyne; Hook. f. in Kew Bull. 1910, 293. *I. inconspicua*, Benth.; F. B. I. i. 447; W. & A. 139; Wt. Ic. t. 970. *I. rosmarinifolia*, Wt. Ic. t. 750 (*not of Retz*).  
W. Gháts, in all Districts at 3,000 to 8,000 ft., very common in Ootacamund Cinchona Plantations, under trees. A small herb scarcely 1 ft. high, flowers white streaked with lilac.



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W. Gháts, S. Canara to the Pulney Hills, up to 8,000 ft.

A shrub, flower pale purple.

36. *IMPATIENS CUSPIDATA*, Wt. Ic. t. 741.

W. Gháts, in the Nilgiri Hills at 5,000 to 7,000 ft.

A shrubby plant with conspicuous glaucous-white stem and branches; flowers pink.

37. *IMPATIENS FLORIBUNDA*, Wt. *I. flaccida*, Arn.; F. B. I. i. 457 (*in part*).

W. Gháts, from Nilgiri Hills, 6,000 to 7,000 ft., to Travancore.

38. *IMPATIENS MACROCARPA*, Hook. f. in Kew Bull. 1911, 355.

W. Gháts, in Travancore at about 6,000 ft. (Meebold).

A tall weak subshrubby species.

39. *IMPATIENS COCHINICA*, Hook. f. in Kew Bull. 1911, 355.

W. Gháts, in Cochin, at Kalvalay, near a stream, about 2,000 ft. (Meebold).

A small semishrubby species.

40. *IMPATIENS LUCIDA*, Heyne; F. B. I. i. 451, *excl. syn. I. latifolia*, W. & A.

W. Gháts, from S. Canara to Travancore, up to 4,000 ft.

41. *IMPATIENS PENDULA*, Heyne; F. B. I. i. 455; W. & A. 137.

W. Gháts, in the Bababudan Hills of Mysore (Rottler).

42. *IMPATIENS MYSORENSIS*, Roth; F. B. I. i. 456; W. & A. 137.

W. Gháts, in Mysore (Rottler).

43. *IMPATIENS BALSAMINA*, Linn.; F. B. I. i. 453; W. & A. 135. *I. arcuata*, Wall.; W. & A. 136.

In all Districts, in hilly regions but at low levels.

The wild form of the garden Balsam, very variable in size, leaf and flower; flowers usually pink.

44. *IMPATIENS TRICHOCARPA*, Hook. f. in Hook. Ic. t. 2914.

W. Gháts, in the Nilgiri Hills (Perrottet).

45. *IMPATIENS SCABRIUSCULA*, Heyne; F. B. I. i. 454; Bedd. Ic. t. 144.

W. Gháts, from S. Canara and Coorg to the Wynaad and Nilgiris, up to 6,000 ft.

A small species, sometimes scarcely 6 in., occasionally up to 18 in. high, flowers pink.

46. IMPATIENS FLACCIDA, Arn.; F. B. I. i. 457 *excl.* Bot. Mag. t. 5625, etc.  
W. Gháts, in the Sivagiri Hills of Tinnevelly; W. Coast, in Cochin at Trichoor. Flowers rose-purple.
47. IMPATIENS DASYSERMA, Wt. Ic. t. 742; F. B. I. i. 457.  
W. Gháts, Hills of Mysore, Courtallum in Tinnevelly, up to 3,000 ft.
48. IMPATIENS PULCHERRIMA, Dalz., F. B. I. i. 458.  
W. Gháts, in Mysore (*vide* Hook. f.).  
Flowers rose or violet-purple.
49. IMPATIENS MUNRONII, Wt. Ill. i. 160, Ic. t. 1049; F. B. I. i. 456.  
W. Gháts, in forest round Sispara, Nilgiris, at 5,000 to 6,500 ft.  
An undershrub, up to 2 ft. high, flowers white and red.
50. IMPATIENS HENSLOVIANA, Arn.; F. B. I. i. 458. *I. albida*, Wt. Ic. t. 743.  
W. Gháts, in the Nilgiri, Pulney and Tinnevelly Hills, in ravines and clefts of rocks at 2,000 to 7,000 ft.  
An undershrub with large white flowers and stems with many prominent scars of fallen leaves.
51. IMPATIENS GRANDIS, Heyne; F. B. I. i. 463; W. & A. 137; Bedd. Ic. t. 153.  
W. Gháts, Hills of S. Travancore and Tinnevelly at 1,000 to 4,000 ft.  
Tall and shrubby, flowers white flaked with crimson.
52. IMPATIENS FRUTICOSA, DC.; F. B. I. i. 459; W. & A. 137; Wt. Ic. t. 966.  
W. Gháts, common in the Nilgiri, Pulney and Travancore Hills at 5,000 to 6,000 ft., in Shola forests.  
An erect shrub, reaching 8 ft. in height, flowers pink.
53. IMPATIENS VISCIDA, Wt.; F. B. I. i. 462; Wt. Ic. t. 746.  
W. Gháts, Pulney Hills, in Madura District, at 5,000 to 7,000 ft., in wet swampy ground.  
Stem reaching 2-3 ft. in height, flowers light purple or deep pink.
54. IMPATIENS CAMPANULATA, Wt.; F. B. I. i. 463; Wt. Ic. t. 744.  
W. Gháts in the Nilgiri, Anamalai and Pulney Hills at 6,000 to 7,000 ft.



An erect herb reaching 5 ft. in height, flowers white and yellow, speckled with purple.

55. *IMPATIENS DISOTIS*, Hook. f. in Rec. Bot. Surv. Ind. iv. 48.  
W. Gháts, in the Hills of Travancore and Tinnevelly at 4,000 ft.  
An erect herb, flowers white.
56. *IMPATIENS VERTICILLATA*, Wt. ; F. B. I. i. 452.  
W. Gháts, in the Anamalais, the Hills of Cochin, the Sivagiri Hills of Tinnevelly, in gravelly beds of streams at 3,000 ft., and the Travancore Hills at 4,000 to 5,000 ft.  
A herb, up to 18 in. high; flowers bright red or scarlet.
57. *IMPATIENS GOUGHII*, Wt. Ill. i. 160 ; Wt. Ic. t. 1603 ; F. B. I. i. 452. *I. anamallayensis*, Bedd. Ic. t. 150. *I. microtheca*, Hook. f. in Hook. Ic. t. 2910.  
W. Gháts, in the Nilgiri, Anamalai, Pulney and Travancore Hills at 5,000 to 8,000 ft.  
A slender annual, reaching about 12 in. in height at most; flowers pink, on long filiform peduncles.
58. *IMPATIENS VISCOSA*, Bedd. ; F. B. I. i. 453.  
W. Gháts, in the Anamalai Hills and the Hills of Malabar, Cochin and Travancore at 3,000 to 4,000 ft.
59. *IMPATIENS OMISSA*, Hook. f. in Rec. Bot. Surv. Ind. iv. 48.  
W. Gháts, Anamalai and Pulney Hills at 6,000 to 7,000 ft.  
A very small slender plant.
60. *IMPATIENS PARVIFOLIA*, Bedd. ; F. B. I. i. 453 ; Bedd. Ic. t. 142.  
W. Gháts, on rocks on the top of Akka Mountain, Anamalais, at 8,000 to 8,600 ft. (Beddome).  
A very small species, scarcely 6 in. high, flowers pale pink with crimson blotches.
61. *IMPATIENS CORDATA*, Wt. ; F. B. I. i. 462.  
W. Gháts, in the Wynaad, the Anamalai Hills at 3,000 to 5,000 ft., Sivagiri Hills of Tinnevelly and Hills of Travancore.  
A small plant about 1 ft. high; flowers lilac with a purple centre.
62. *IMPATIENS UNCINATA*, Wt. ; F. B. I. i. 465 ; Wt. Ic. t. 747.  
W. Gháts, in dense moist forests about Courtallum in Tinnevelly (Wight).  
A small plant scarcely 10 in. high with the spur of the lip hooked.



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### 5. *Hydrocera*, Blume.

Erect aquatic herbs. *Leaves* narrow, alternate; stipules 0. *Flowers* irregular, on short axillary 1-2-flowered peduncles. *Sepals* 5, petaloid, imbricate, the 2 lateral outer flat, the posterior spurred. *Petals* 5, anterior outermost in bud large, concave. *Disk* 0. *Stamens* 5; filaments short, broad; anthers connate. *Ovary* 5-celled; stigmas 5, sessile; ovules 2-3 in each cell. *Fruit* an indehiscent drupe with a bony, truncate, 5-celled stone. *Seed* in each cell solitary, curved, corrugated; albumen 0; cotyledons thick; radicle short, superior.

HYDROCERA TRIFLORA, W. & A. 140; F. B. I. i. 483.

An annual water-weed with fistular floating stems rooting at the nodes, linear-lanceolate leaves and red globose succulent fruit.

Ditches and tanks in the Carnatic.

### Family XXXIV. RUTACEAE.

Trees or shrubs, sometimes climbing, rarely herbs, abounding in pellucid glands filled with essential oil. *Leaves* opposite or alternate, usually compound, exstipulate. *Flowers* usually hermaphrodite and regular, in axillary or terminal cymes or panicles, never in spikes, rarely in racemes. *Calyx* of 4-5, rarely 3, small lobes. *Petals* 4-5, rarely 3, hypogynous, valvate or imbricate. *Disk* annular, crenate or lobed, sometimes elongate. *Stamens* usually either as many as the petals or twice as many, sometimes more; filaments usually free, inserted around the disk; anthers 2-celled, introrse. *Ovary* of 4-5, sometimes 3, sometimes more, free or connate carpels; styles as many as the carpels, free or more or less connate; stigmas terminal, entire or lobed; ovules usually 2 in each cell, sometimes numerous. *Fruit* a capsule berry or drupe, or of 1-4 capsular cocci. *Seeds* usually solitary in the cells, sometimes numerous; testa various; albumen fleshy or 0; embryo straight or curved; radicle superior.

Seeds albuminous; flowers usually polygamous or monoecious:—

Fruit dehiscent, of 1-5 separate 1-seeded carpels:—

Leaves opposite; unarmed trees or shrubs:—

Stamens 4-5; leaves 2-foliolate .....1. **Evodia.**

Stamens 8; leaves 1-foliolate .....2. **Melicope.**

Leaves alternate ; trees or shrubs, usually armed ; stamens 3-5 ; leaves 3- or more-foliolate.....3. **Zanthoxylon.**

Fruit indehiscent, syncarpous :—

Stamens as many as the petals ; fruit 4-6-celled ; monoecious ; prickly shrubs, usually climbing.....4. **Toddalia.**

Stamens usually double as many as the petals ; fruit 2-4-celled ; unarmed trees :—

Dioecious ; petals usually 2 ; fruit 2-celled ; leaves 3-foliolate

5. **Yepris.**

Polygamous ; petals 4 ; fruit 4-celled ; leaves 1-foliolate

6. **Acronychia.**

Seeds exalbuminous ; flowers usually hermaphrodite :—

Fruit dehiscent, capsular, 3-celled, each cell about 4-seeded ; trees with pinnate leaves and small leaflets .....7. **Chloroxylon.**

Fruit indehiscent, a berry :—

Ovules 1 or 2 in each cell :—

Style short, persistent ; ovule 1 in each cell ; leaves 1-foliolate to pinnate .....8. **Glycosmis.**

Style articulate at top of ovary, deciduous :—

Unarmed plants ; leaves pinnate with alternate leaflets :—

Petals usually valvate ; cotyledons much crumpled ; stamens 10 .....9. **Micromelum.**

Petals imbricate ; cotyledons plano-convex :—

Filaments dilated below ; stamens 8-10, anthers rather large .....10. **Clausena.**

Filaments subulate ; stamens 10, anthers small

11. **Murraya.**

Armed plants ; leaves 1-3-foliolate or pinnate with opposite leaflets :—

Leaves 3-foliolate or imparipinnate with opposite leaflets :—

Calyx distinctly lobed :—

Calyx 3-lobed ; stamens 6 ; leaves always 3-foliolate

12. **Triphasia.**

Calyx 4-5-lobed ; stamens 8 or 10 ; leaves imparipinnate or 3-foliolate .....13. **Limonia.**

Calyx cupular, entire or obscurely 4-6-lobed ; stamens 8-10 ; leaves always 3-foliolate .....14. **Luvunga.**

Leaves 1-foliolate :—

Anthers linear-oblong ; stamens 8-10 ; disk columnar

15. **Paramignya.**

Anthers ovate-cordate or rarely linear-oblong ; stamens 6-8 ; disk annular or cupular.....16. **Atalantia.**

Ovules more than 2 in each cell; stamens 10 or more; armed trees with large fruits:—

Stamens 10–12; ovary 5–6-celled, at length 1-celled; leaves pinnate; rind of fruit woody; flowers polygamous

17. **Feronia.**

Stamens 20–60; ovary usually many-celled; flowers hermaphrodite:—

Leaves 3-foliolate; stamens 30–60; ovary 8- or more-celled; rind of fruit woody .....18. **Aegle.**

Leaves 1-foliolate; stamens 20–60; ovary many-celled; rind of fruit leathery .....19. **Citrus.**

1. **Evodia, Forst.**

Trees or shrubs, unarmed. *Leaves* opposite, simple or 1–3-foliolate or imparipinnate; leaflets entire, pellucid-punctate. *Flowers* small, unisexual, in axillary paniculate cymes. *Sepals* 4–5, imbricate. *Petals* 4–5, sessile, valvate or slightly imbricate. *Disk* 4–5-lobed. *Stamens* 4–5, inserted at the base of the disk, in ♀ replaced by staminodes; filaments subulate; anthers oblong. *Ovary* deeply 4-lobed, 4-celled; ovules 2 in each cell; style basilar; stigma 4-lobed. *Fruit* of 4 coriaceous, 3-valved, 1-seeded cocci; endocarp horny, elastically separable, 2-lobed. *Seeds* oblong; testa bony or crustaceous, shining; hilum linear; albumen fleshy; embryo straight, cotyledons ovate.

EVODIA LUNUR-ANKENDA, Merr. *E. Roxburghiana*, Benth.; F. B. I. i. 487. *Zanthoxylum triphyllum*, Juss.; Wt. Ic. t. 204.

A small tree with smooth grey bark; leaves 3-foliolate, petioles up to 4 in. long; leaflets glabrous, shining, obovate or lanceolate, obtuse or acuminate, 2–5 in. long or longer in young plants; nerves 10–18 pairs; cymes variable, sometimes large and spreading; seeds black, shining.

W. Gháts, from Mysore to Tinnevely, up to 7,000 ft., in evergreen and secondary forests; E. Gháts, Rumpa Hills in Godavari.

Wood white, close-grained. Vern. *Mal.* Kanalei.

2. **Melicope, Forst.**

Shrubs. *Leaves* usually opposite, 1–3-foliolate, pellucid-punctate. *Flowers* in axillary cymes or panicles. *Sepals* 4. *Petals* 4, sessile, valvate or imbricate. *Disk* large, entire or 8-lobed or



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Leaflets crenate, glandular in the crenatures, slightly unequal-sided ; small tree or treelet .....5. *Budrunga*.

1. ZANTHOXYLUM ALATUM, Roxb. ; F. B. I. i. 493.

E. Gháts, Hills of Ganjam and Vizagapatam, at about 4,500 ft.

2. ZANTHOXYLUM OVALIFOLIUM, Wt. Ill. i. 169 ; F. B. I. i. 492.

W. Gháts, from S. Canara to Tinnevelly, up to 4,000 ft.

3. ZANTHOXYLUM TETRASPERMUM, W. & A. 148 ; F. B. I. i. 494.

W. Gháts, in Coorg, Nilgiris and Anamalais at 4,000 to 6,000 ft.

4. ZANTHOXYLUM RHETSA, DC. ; F. B. I. i. 495 ; W. & A. 148.

E. Gháts, from Ganjam to the Godavari, up to 3,000 ft ;

W. Gháts, in S. Canara, Mysore, Malabar, Anamalais and Travancore at low elevations.

A striking large deciduous tree having cream-coloured corky bark with conical spines. Wood yellowish-grey, moderately hard. The fruits are aromatic, tasting of pepper. Vern. *Tel.* Rhesta máu ; *Mal.* Katta murrakku, Mulillam.

5. ZANTHOXYLUM BUDRUNGA, Wall. ; F. B. I. i. 495.

E. Gháts, Madgol Hills of Vizagapatam at 3,500 ft. (A. W. Lushington).

#### 4. *Toddalia*, Juss.

Shrubs, erect or climbing, generally armed with recurved prickles. *Leaves* alternate, trifoliolate, the leaflets obovate, sessile, gland-dotted. *Flowers* small, unisexual, in axillary or terminal cymes or panicles. *Calyx* short, 5-lobed. *Petals* 5-6, oblong, valvate. *Stamens* in ♂ flowers as many as the petals and slightly longer, filaments slender, anthers oblong, introrse, with a small gland on the back ; in ♀ flowers reduced to staminodes with minute rudimentary anthers. *Ovary* in ♂ flowers rudimentary with columnar style : in ♀ flowers oblong or globose, 5-6-celled ; style 0 ; stigma capitate ; ovules in each cell 2, superposed. *Fruit* subglobose, 4-6-celled, fleshy. *Seeds* one in each cell, angled, reniform, testa crustaceous ; albumen fleshy ; embryo curved, cotyledons oblong.

TODDALIA ASIATICA, Lamk. *T. aculeata*, Pers. ; F. B. I. i. 497 ; W. & A. 149 ; Wt. Ill. t. 66.

A very variable plant with three varieties, and occasional intermediates:—

A stout climbing shrub, very prickly; leaflets abruptly obtusely acuminate at apex, 2–4 in. long and 1–1·5 in. broad; flowers rather large; fruit large, fleshy, hardly lobed .....1. *floribunda*.

A slender very prickly climbing shrub; leaflets narrow, obtusely acute, 1–2 in. long, ·5–·75 in. broad; flowers small, usually in elongate panicles; fruit small, much lobed.....2. *gracilis*.

An erect bush, unarmed or only slightly prickly; leaflets obtuse at apex, 1–1·5 in. long, ·5–·75 in. broad; flowers small, in short dense panicles; fruit as in 2 .....3. *obtusifolia*.

Variety 1 is found in forests in almost all Districts, and is conspicuous by the corky protuberances bearing spines on the stems; variety 2 occurs in dry Districts, chiefly in the Circars and Carnatic; variety 3 is only found in the Nilgiris at about 6,000 ft.

#### 5. *Vepris*, Comm.

Trees or shrubs, unarmed. *Leaves* alternate, 1–3-foliolate, the leaflets usually petiolulate, gland-dotted. *Flowers* small, in terminal or axillary panicles. *Calyx* small, saucer-shaped, 2- or more-lobed. *Petals* 2–4, lanceolate or ovate, more or less imbricate. *Stamens* in ♂ flowers twice or three times as many as the petals, inserted under the disk, filaments slender, anthers ovate; in ♀ flowers reduced to minute staminodes with small rudimentary anthers. *Ovary* in ♂ flowers small, ovoid, 2-cleft at apex: in ♀ flowers globose, 2–4-celled; styles 0; stigma capitate; ovules in each cell 2, collateral. *Fruit* globose or oblong, 2–4-celled, fleshy. *Seeds* one in each cell, flattened, oblong, testa crustaceous; albumen fleshy; embryo flat, cotyledons thick, ovate; radicle stout.

VEPRIS BILOCULARIS, Engl. *Toddalia bilocularis*, W. & A. 149; F. B. I. i. 497; Bedd. Ic. t. 167.

A large handsome evergreen tree with trifoliolate leaflets up to 9 in. long and about 3 in. broad, with many close parallel nerves and an intramarginal nerve; petals 3; stamens 6; fruit oblong, ·5 in. long, 2-celled.

Forests of Malabar, the Anamalais and Travancore, up to 4,000 ft.

#### 6. *Acronychia*, Forst.

Trees. *Leaves* opposite or alternate, 1- rarely 3-foliolate; leaflets entire, pellucid-punctate. *Flowers* polygamous, in axil-



lary or terminal cymes or corymbs. *Calyx* 4-lobed, lobes imbricate. *Petals* 4, spreading, valvate. *Disk* thick, 8-angled, tomentose. *Stamens* 8, inserted under the disk, filaments subulate, the alternate ones longer. *Ovary* 4-celled, inserted on the hollowed top of the disk; style terminal; stigma 4-grooved; ovules 2 in each cell, superposed. *Fruit* a 4-celled drupe or 4-valved loculicidal capsule. *Seeds* 1-2 in each cell; testa black; albumen copious; embryo straight; cotyledons oblong, flat.

Branchlets rather stout, grey; leaflet 3-9 in. long, thick; flowers in rather stout long-pedunculate corymbs, 3-6 in. long; petals .2 in. long, the base inside with white retrorse hairs .....1. *laurifolia*.  
Branchlets slender, reddish; leaflet 1-3 in. long, thin; flowers in slender panicles of cymes under 1 in. long; petals under .2 in. long, nearly glabrous within .....2. *Barberi*.

1. *ACRONYCHIA LAURIFOLIA*, Blume; F. B. I. i. 498. *Cyminosma pedunculata*, DC.; W. & A. 147; Wt. Ill. i. t. 65.

N. Circars in the Hills of Vizagapatam; S. Deccan slopes in Salem; W. Gháts, common in hill forests up to 6,000 ft. A small evergreen tree, drupes subglobose, apiculate. Wood greyish-white, smooth. Vern. *Tam.* Mutta nári; *Mal.* Vidu Kanalei.

2. *ACRONYCHIA BARBERI*, Gamble in Kew Bull. 1915, 345. *A. laurifolia* var. 4; F. B. I. i. 498.

Anamalai Hills of Coimbatore (Barber); Pulneys (Wight).

### 7. *Chloroxylon*, DC.

A deciduous tree. *Leaves* pinnate; leaflets numerous, very oblique, entire, gland-dotted. *Flowers* small, in terminal and axillary pubescent panicles. *Calyx* short, 5-lobed. *Petals* 5, clawed, imbricate. *Disk* thick, 10-lobed, pubescent. *Stamens* 10, free, inserted between the lobes of the disk. *Ovary* pubescent, sunk in the disk, 3-lobed, 3-celled; style short, slender, glabrous; stigma capitate; ovules 8 in each cell. *Fruit* an oblong, 3-celled, loculicidal capsule. *Seeds* about 4 in each cell, imbricate, compressed, winged especially above, their margins angular, attached to the edges of the septa; albumen 0; cotyledons fleshy, flattened; radicle short.

- CHLOROXYLON SWIETENIA*, DC.; F. B. I. i. 569; W. & A. 123;



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and longer. *Ovary* seated on the disk, 5-, rarely 2-6-celled; style thick, articulate, deciduous; stigma capitate or obtuse; ovules 2 in each cell, superposed. *Fruit* a 1-2-seeded berry; septa spirally twisted. *Seeds* oblong; testa membranous; albumen 0; cotyledons leafy, much crumpled; radicle long.

MICROMELUM PUBESCENS, Blume; F. B. I. i. 501.

N. Circars, Hills of Ganjam and Vizagapatam (Beddome, Barber).

A small tree with pinnate leaves up to 18 in. long and distant pinnules very unequal at base. Wood yellowish-white, hard and close-grained.

### 10. Clausena, Burm.

Unarmed shrubs or trees. *Leaves* imparipinnate; leaflets alternate, glandular-dotted, usually crenate. *Flowers* small, in terminal or axillary cymes panicles or compound racemes. *Calyx* 4-5-lobed. *Petals* 4-5, free, membranous, imbricate, gland-dotted. *Disk* elongated. *Stamens* 8-10, inserted round the disk; filaments dilated below the tip, alternately longer and shorter; anthers rather large, usually glandular on the back. *Ovary* 4-5- (rarely 2-3-) celled; style thick, articulate, deciduous; stigma obtuse, entire or lobed; ovules 2 in each cell, collateral or superposed. *Fruit* an oblong or globose berry, 2-5-celled, pericarp very glandular. *Seeds* oblong; testa membranous; albumen 0; cotyledons equal, plano-convex; embryo minute.

Ovary glabrous:—

Flowers usually 5-merous; ovary with conspicuous glandular papillae:—

Inflorescence terminal, paniculate with corymbose branches up to 5 in. long; leaflets membranous, rhomboid, oblique, nearly black when dry, with raised glands, reticulation obscure; ovules collateral

1. *indica*.

Inflorescence subterminal or axillary in thyrsoid panicles up to 8 in. long; leaflets chartaceous, lanceolate to obovate, yellowish when dry with immersed glands, reticulation conspicuous; margins often crenate; ovules superposed .....

2. *heptaphylla*.

Flowers 4-merous; inflorescence axillary, in slender compound racemes up to 4 in. long; leaflets membranous, ovate-lanceolate, oblique, greenish when dry and profusely glandular-dotted; ovary with obscure glands; ovules superposed.....3. *Willdenovii*.

Ovary hirsute; leaves and inflorescence pustular; flowers 4-5-merous  
Wampi.

1. *CLAUSENA INDICA*, Oliver; F. B. I. i. 505.

W. Gháts, in evergreen forests of the Anamalais and Travancore at 3,000 to 5,000 ft., not common.

2. *CLAUSENA HEPTAPHYLLA*, W. & A. 95 (in note); F. B. I. i. 504.

N. Circars, Hills of Ganjam and Vizagapatam to 5,000 ft.; W. Gháts in Wynaad, Malabar, Anamalais, Pulneys and Travancore at 3,000 to 5,000 ft.

A branching bush or small tree, strongly aromatic.

3. *CLAUSENA WILLDENOVII*, W. & A. 96; Wt. Ic. t. 14; F. B. I. i. 506. *C. pubescens*, W. & A. 96.

Carnatic, in Chingleput, S. Arcot, Pudukota and Tanjore; Shevaroy Hills of Salem; W. Gháts from Mysore through Nilgiris to Travancore at low levels.

A small tree with glabrous or pubescent leaves, black bark and white close-grained wood. The fruit is good and worth cultivation. Vern. Tam. Potti.

*C. Wampi*, Blanco, is a Chinese species cultivated for its orange-flavoured small fruit.

### 11. *Murraya*, Linn.

Shrubs or small trees, unarmed. *Leaves* pinnate; leaflets alternate, petiolulate, oblique or cuneate at base. *Flowers* solitary, axillary or in terminal corymbs or axillary cymes. *Calyx* 5-lobed. *Petals* 5, free, imbricate. *Disk* stipitiform. *Stamens* 10, inserted outside the disk; filaments linear-subulate, alternately shorter and longer; anthers small. *Ovary* seated on the disk, 2-5-celled; style elongate, articulate, deciduous; stigma capitate; ovules solitary or 2 superposed in each cell. *Fruit* a 1-2-celled berry, oblong or ovoid. *Seeds* with a woolly or glabrous testa; albumen 0; cotyledons thick, plano-convex; embryo small.

Flowers few, rather large, axillary; petals .5 in. long; leaflets 3-7; berry red .....1. *exotica*.  
Flowers many; in terminal corymbs; petals .2 in. long; leaflets 10-20; berry black .....2. *Königii*.

1. *MURRAYA EXOTICA*, Linn.; F. B. I. i. 502; W. & A. 94; Wt. Ic. t. 96.

In almost all Districts, especially in the hills; common in underwood and especially in ravines; often planted in gardens.

A large shrub or small tree with scented flowers. Wood very hard, resembling boxwood. Vern. *Hind.* Marchula; *Tel.* Naga golunga.

2. MURRAYA KÖNIGII, Spreng.; F. B. I. i. 503. *Bergera Königii*, Linn.; W. & A. 94; Wt. Ic. t. 13.

In most Districts, chiefly in the N. Circars and Deccan, less frequent on the W. Coast, but nowhere very common. A small tree with very aromatic leaves which are eaten in curries. Wood greyish-white, softer than that of the last. Vern. *Hind.* Katnīm; *Tel.* Karepaku; *Tam.* Karivempu, Kátta veppilei; *Kan.* Kari bévu.

### 12. *Triphasia*, Lour.

A shrub, armed with strong straight spines. *Leaves* alternate, sessile, 3-foliolate; leaflets small, obtuse, crenate, the lateral ones smaller than the terminal. *Flowers* solitary or in 2-3-flowered cymes, axillary, sweet-scented. *Calyx* 3-lobed. *Petals* 3, free, imbricate, oblong. *Disk* fleshy. *Stamens* 6, free, inserted round the disk; filaments long, subulate, dilated below; anthers oblong. *Ovary* seated on the disk, ovoid-oblong, narrowed into the articulate style; stigma capitate, 3-lobed; cells 3; ovules 1 in each cell. *Fruit* an ovoid fleshy gland-dotted berry 1-3-celled and -seeded. *Seeds* ovoid-oblong, immersed in mucilage; testa coriaceous; albumen 0; cotyledons flattened, plano-convex, often unequal or lobed; embryo minute.

TRIPHASIA AURANTIOLA, Lour. *T. trifoliata*, DC.; F. B. I. i. 507; W. & A. 91.

Cultivated and found run wild as at Madras and Cochin; apparently introduced from China.

### 13. *Limonia*, Linn.

Shrubs or small trees, often armed with spines. *Leaves* alternate, 3-foliolate or imparipinnate with usually opposite leaflets; petiole and rhachis winged. *Flowers* in fascicles racemes or panicles. *Calyx* 4-5-lobed or -partite. *Petals* 4-5, imbricate. *Disk* annular or stipitiform. *Stamens* 8-10, free, subequal, inserted round the disk; filaments subulate; anthers cordate or



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### 15. *Paramignya*, Wight.

Shrubs, erect or climbing, unarmed or with axillary spines. *Leaves* 1-foliolate, entire, subcoriaceous. *Flowers* rather large, axillary, solitary or fascicled. *Calyx* cupular or small and 4-5-lobed. *Petals* 4-5, free, imbricate or rarely valvate. *Disk* thick, columnar. *Stamens* 8-10, free; filaments linear, equal or subequal, inserted round the disk, usually hairy; anthers linear-oblong. *Ovary* 3-5-celled; style elongate, articulate, deciduous; stigma capitate; ovules in each cell 1 or 2 obliquely superposed. *Fruit* an ovoid or subglobose berry, often contracted at base; 1-5-seeded; rind thick. *Seeds* large, oblong, compressed; testa membranous; cotyledons fleshy, equal.

Leaflets ovate-oblong or elliptic, obtuse or acute at apex, rounded at base, 2-5 in. long, 1-2 in. broad; calyx 5-lobed, pubescent; pedicels rather stout:—

Calyx cupular with broad lobes; petals thick, very imbricate, .4-.5 in. long .....1. *monophylla*.

Calyx small with acute lobes; petals thin, induplicate-valvate, .3 in. long .....2. *Griffithii*.

Leaflets ovate or ovate-lanceolate, acuminate at apex, rounded at base, 2-3 in. long, 1-1.5 in. broad; calyx with 4 minute teeth, glabrous; pedicels long slender .....3. *armata*.

1. *PARAMIGNYA MONOPHYLLA*, Wt. Ill. i. 109, t. 42; F. B. I. i. 510.

N. Circars, Hills of Ganjam, Rumpa Hills up to 3,000 ft. or more; W. Gháts from S. Canara to Tinnevelly up to 6,000 ft., thorny climber.

2. *PARAMIGNYA GRIFFITHII*, Hook. f.; F. B. I. i. 510.

E. Gháts in Madgol Hills of Vizagapatam 4,000 ft. (A. W. Lushington), thorny climber.

3. *PARAMIGNYA ARMATA*, Oliv.; F. B. I. i. 511; Bedd. Ic. t. 275.

W. Gháts in Wynaad, Atapadi Hills of Malabar, Hills of Tinnevelly, thorny climber.

### 16. *Atalantia*, Correa.

Evergreen shrubs or trees, armed or unarmed. *Leaves* alternate, 1-foliolate; leaflet coriaceous, entire or crenulate; stipule-like scales often present, representing undeveloped leaf-buds. *Flowers* in axillary, rarely terminal, fascicles racemes or panicles, rarely

solitary. *Calyx* 3-5-lobed or -partite, sometimes irregularly split. *Petals* 3-5, free or adnate to the stamens and united with them in a tube, imbricate. *Disk* annular or cupular. *Stamens* 6-8 (rarely 15-20) inserted outside the disk; filaments free or connate in a tube, subequal or the alternate shorter; anthers short, ovate-oblong or cordate (linear-oblong in *A. missionis*). *Ovary* 2-4- (rarely 3-5-) celled; style stout, articulate, deciduous; stigma capitate; ovules 1 or 2 in each cell, if 2 collateral. *Fruit* a large subglobose berry with thick rind, 1-5-celled and -seeded. *Seeds* ovoid or oblong; testa membranous; albumen 0; cotyledons fleshy, plano-convex, sometimes unequal.

Stamens usually combined in a tube; leaflet emarginate:—

Calyx irregularly lobed; flowers in umbels or corymbs; leaflet ovate, obtuse, 1-3 in. long.....1. *monophylla*.

Calyx regularly lobed; flowers in racemes; leaflet elliptic, obtusely acute, 2-4 in. long .....2. *racemosa*.

Stamens free:—

Leaves with conspicuous reticulation and prominent parallel main nerves (12-14 pairs) olive-green when dry, emarginate; filaments flat, anthers cordate; flowers in short cymes .....3. *ceylanica*.

Leaves with inconspicuous reticulation and main nerves (8-10 pairs), dull greyish-brown when dry, not emarginate; filaments dilated below only; anthers linear-oblong; flowers in racemes, 1-2 in. long.

4. *missionis*.

1. ATALANTIA MONOPHYLLA, Correa; F. B. I. i. 511; W. & A. 91. *A. floribunda*, Wt. Ic. t. 1611. *Limonia monophylla*, Linn.; Roxb. Cor. Pl. i. t. 82.

N. Circars, Deccan and Carnatic in dry forests in almost all Districts; W. Coast and W. Gháts, scarce.

A small thorny tree with yellowish very hard close-grained wood, of boxwood character. Vern. *Ur.* Kata narunga; *Tel.* Yerra munukudu; *Tam.* Katta naragam.

2. ATALANTIA RACEMOSA, W. & A. 91; F. B. I. i. 512. *Sclerostylis parvifolia*, Wt. Ic. t. 71.

Hills of the Deccan, Nandidrúg in Mysore, Horsley Konda in Cuddapah, etc., up to 4,000 ft.; W. Gháts, chiefly on eastern side from Mysore to Travancore, up to 3,000 ft.

A small thorny tree, resembling No. 1, but with shorter staminal tube and leaves often crenulate. Vern. *Tam.* Katta naragam.



3. *ATALANTIA CEYLANICA*, Oliv.; F. B. I. i. 512.

W. Gháts in Wynaad, Malabar, Nilgiris, Anamalais and Travancore, up to 5,000 ft.

A small thorny tree or branching shrub, not common.

4. *ATALANTIA MISSIONIS*, Oliv.; F. B. I. i. 513. *Limonia missionis*, Wt. Ic. t. 175; W. & A. 92.

Deccan Hills in Chingleput, Cuddapah, etc.; also E. slopes of Nilgiris and Anamalais; W. Coast, Quilon in Travancore.

A small very thorny *Citrus*-like tree with yellowish-white hard wood. Vern. *Tam.* Kuruntu.

17. *Feronia*, Gaertn.

A tree, armed with spines. *Leaves* alternate, imparipinnate; leaflets opposite, subsessile, entire; petiole and rhachis winged or not. *Flowers* polygamous, in terminal or lateral racemes or panicles. *Calyx* small, flat, 5-toothed, deciduous. *Petals* 5, rarely 4 or 6, imbricate, spreading. *Disk* short. *Stamens* 10–12, a few sometimes imperfect, inserted round the disk; filaments dilated below, villous on face and margins, slender above; anthers linear-oblong. *Ovary* oblong, 5–6-celled, at length 1-celled; style 0; stigma oblong, fusiform, deciduous; ovules numerous, many-seriate, crowded on the at length parietal placentas. *Fruit* a large, globose, 1-celled, many-seeded berry with rough woody rind. *Seeds* oblong, compressed, imbedded in pulp; albumen 0; cotyledons thick, fleshy.

*FERONIA ELEPHANTUM*, Corr.; F. B. I. i. 516; W. & A. 96; Wt. Ic. t. 15; Roxb. Cor. Pl. ii. t. 141; Bedd. Fl. t. 121.

N. Circars, Deccan and Carnatic, in dry open forests, often cultivated both there and on W. Coast. The Wood-apple.

A small deciduous spiny tree with yellowish-white hard wood. The pulp of the fruit is much eaten. Vern. *Hind.* Kat-bél; *Ur.* Koito; *Tel.* Velaga; *Tam., Mal.* Vila, Vilatti; *Kan.* Bilwar.

18. *Aegle*, Corr.

Trees, armed with spines. *Leaves* alternate, 3-foliolate; leaflets membranous, subcrenulate, glabrous or pubescent. *Flowers* hermaphrodite, rather large, white, in axillary panicles. *Calyx* small, 4–5-lobed, deciduous. *Petals* 4–5, oblong, imbricate, spreading. *Disk* inconspicuous. *Stamens* numerous (30–60) inserted round the disk; filaments subulate; anthers elongate, erect. *Ovary* ovoid,



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*Citrus Aurantium*, Linn., the Orange, and *C. decumana*, Linn., the Pumelo, or Shaddock, are also much cultivated, the former frequently found run wild.

### Family XXXV. SIMARUBACEAE.

Trees or shrubs, usually with bitter bark and sometimes wood. *Leaves* alternate, pinnate, rarely simple ; stipules 0 or deciduous. *Flowers* regular, small, 1-sexual or polygamous rarely hermaphrodite, in axillary cymes racemes or panicles. *Calyx* 3-5-lobed. *Petals* 3-5, rarely 0, valvate or imbricate. *Disk* annular or elongated, simple or lobed, rarely 0. *Stamens* as many as or twice as many as the petals, rarely indefinite, inserted at the base of the disk ; filaments free, often with a scale at the base ; anthers oblong, usually introrse, dehiscing longitudinally. *Ovary* free, 1-6-celled, usually deeply lobed ; styles 2-5, free or united ; stigmas capitate plumose or minute ; ovules usually 1 in each cell. *Fruit* usually of 2-6 distinct carpels, sometimes samaroid sometimes indehiscent drupaceous. *Seeds* usually solitary, erect or pendulous ; albumen fleshy scanty or 0 ; cotyledons planoconvex or flat ; radicle superior.

Ovary deeply divided :—

Leaves pinnate ; fruit samaroid ; large trees .....1. **Ailanthus**.

Leaves simple ; fruit drupaceous, winged, small trees...2. **Samadera**.  
Ovary entire ; leaves 2-foliolate, small ; flowers small, green, fruit a large one-seeded drupe ; small thorny trees .....3. **Balanites**.

#### 1. **Ailanthus**, Desf.

Tall trees. *Leaves* very large, alternate, imparipinnate ; leaflets alternate or subopposite, unequal-sided. *Flowers* small, polygamous, in terminal or axillary branched panicles, bracteolate. *Calyx* short, 5-lobed. *Petals* 5-6, valvate. *Disk* 10-lobed. *Stamens* in ♂ flowers 10-12, in ♀ fewer, in ♀ wanting, inserted at the base of the disk ; filaments short or filiform ; anthers ovate or oblong, introrsely or laterally dehiscing. *Ovary* in ♂ rudimentary, in others 2-5-celled, the carpels compressed, more or less distinct ; styles from below the apex, connate above ; stigmas plumose ; ovule 1 in each cell, semianatropous. *Fruit* of 1-5, single-seeded, oblong samaras with large membranous wings. *Seed* pendulous, compressed ; testa membranous ; albumen very scanty or 0 ; cotyledons flat, fleshy ; radicle small, superior.

Leaflets coarsely toothed, very tomentose when young; petals usually reflexed; filaments shorter than the oblong anthers; samara narrow, **twisted** .....1. *excelsa*.  
 Leaflets entire, glabrous; petals erect; filaments longer than the ovate cordate anthers; samara broad, not twisted ... .....2. *malabarica*.

1. AILANTHUS EXCELSA, Roxb. Cor. Pl. i. 24, t. 23; F. B. I. i. 518; W. & A. 150; Wt. Ill i. t. 67.

N. Circars, forests of Ganjam and Vizagapatam; scarce in Deccan and Carnatic; often planted.

A beautiful tree with rough bark and soft white wood, used for catamarans and sword-sheaths. Vern. *Hind.* Maharukh; *Ur.* Mahanim; *Tel.* Peddamán; *Tam.* Peru.

2. AILANTHUS MALABARICA, DC.; F. B. I. i. 518; W. & A. 150; Wt. Ic. t. 1604; Bedd. Fl. t. 122.

W. Gháts from S. Canara and Mysore to Travancore, up to 3,000 ft., often planted.

A lofty deciduous tree with grey rough bark and soft white wood. Vern. *Kan.* Dhúp; *Tam.* Peru; *Mal.* Pongilyam, Mattipál.

## 2. Samadera, Gaertn.

Small glabrous trees. *Leaves* alternate, simple, oblong, coriaceous, shining, with 2 glands at the base. *Flowers* hermaphrodite, in axillary or terminal long-peduncled umbels. *Calyx* small, 3-5-lobed, imbricate. *Petals* 3-5, coriaceous, elongate, imbricate. *Disk* large, obconic. *Stamens* 6-10, with short basal scales; filaments slender, twisted; anthers oblong. *Ovary* of 4-5 distinct free carpels; styles free at the base, more or less united above; stigmas acute; ovule 1 in each cell, pendulous. *Fruit* of 1-5 large dry compressed drupes with a narrow wing. *Seed* solitary; testa membranous; cotyledons plano-convex, fleshy; radicle very short.

SAMADERA INDICA, Gaertn.; F. B. I. i. 519; W. & A. 151; Wt. Ill. t. 68.

W. Coast in evergreen forests and along backwaters in Malabar and Travancore.

A small tree with elliptic-oblong shining leaves reaching 10 in. by 3-4 in., large smooth red fruit and light yellow soft bitter-tasting wood. Vern. *Mal.* Karingotta.

### 3. *Balanites*, Delile.

Small trees or shrubs armed with strong sharp spines, often ending arrested branchlets. *Leaves* alternate, 2-foliolate; leaflets entire. *Flowers* small, green, fragrant, in axillary cymes. *Sepals* 5, imbricate, deciduous. *Petals* 5, oblong, spreading, imbricate. *Disk* thick, conical, 10-grooved, hollowed at the apex. *Stamens* 10, inserted in the furrows at the base of the disk; filaments slender, subulate; anthers inserted at the back. *Ovary* entire, globose, 1-celled; style short; stigmas minute; ovules 1 in each cell, pendulous from below the apex. *Fruit* a large fleshy oily 1-seeded drupe; putamen bony, 5-angled, 1-seeded. *Seed* pendulous; testa fibrous; albumen 0; cotyledons thick, oblong, plano-convex; radicle superior.

BALANITES ROXBURGHII, Planch.; F. B. I. i. 522. *B. aegyptiaca*, Wt. Ic. t. 274.

N. Circars in Vizagapatam; Deccan, common in Hyderabad, Ceded Districts and Mysore, in dry forests, characteristic also of black-cotton soils.

A small tree with ashy-grey foliage, grey bark and yellowish-white wood of peculiar structure. Vern. *Hind.* Hingu; *Tel.* Gari; *Tam.* Nanjunda.

### Family XXXVI. OCHNACEAE.

Trees or shrubs. *Leaves* alternate, glabrous, simple or rarely pinnate; stipules 2. *Flowers* regular, hermaphrodite, conspicuous, in racemes panicles or umbels rarely solitary, terminal axillary or on short lateral branchlets. *Sepals* 4-5, free, imbricate, persistent. *Petals* 5, rarely 4-10, free, deciduous, imbricate. *Disk* thick, enlarged in fruit, sometimes 0. *Stamens* 4, 5, 8, 10 or indefinite, inserted at the base of the disk; anthers dehiscing longitudinally or by terminal pores. *Ovary* short and 2-celled or elongate and 1-10-celled; placentas axile or parietal; styles simple, subulate, straight or incurved; stigmas terminal; ovules 1-2 in each cell or indefinite, erect or rarely pendulous. *Fruit* indehiscent, drupaceous or baccate, each drupe or pyrene 1-4-seeded, or capsular and 1-5-celled with septicial dehiscence. *Seeds* solitary or few, rarely numerous; albumen fleshy or 0; embryo usually straight.

Stamens indefinite anthers opening longitudinally .....1. **Ochna.**  
Stamens 10, anthers opening by terminal pores.....2. **Ouratea.**



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and Carnatic, less common, but widespread from Hyderabad to Tinnevely in fairly damp places.

A small tree with thin brown bark and reddish-brown wood of pretty grain, conspicuous for its yellow flowers with persistent sepals. Vern. *Tel.* Sunari; *Tam.* Chilanti; *Kan.* Narole.

2. *OCHNA GAMBLEI*, King; Brandis Ind. Trees 128.

Deccan and Carnatic, in dry places and on rocky hills in Hyderabad, the Ceded Districts and Hills of Chingleput; W. Coast at Quilon in Travancore (*Wight*—small-leaved var.).

A small tree with thick bark and reddish wood, conspicuous for its tufted very glaucous leaves and large yellow flowers. Vern. *Tel.* Kuka-moi.

3. *OCHNA BEDDOMEI*, Gamble in Kew Bull. 1916, ined.

Forests of Kurnool Cuddapah and Mysore, apparently scarce; perhaps also in N. Circars.

A small tree (?), but little known.

4. *OCHNA PUMILA*, Ham.; F. B. I. i. 524.

Madras Presidency (Beddome), perhaps S. Canara.

A dwarf undershrub with perennial rootstock, throwing up annually, usually after jungle fires, shoots with large bright yellow flowers.

5. *OCHNA WIGHTIANA*, Wall.; Wt. Ic. t. 220 (*as to description only except stigma*); W. & A. 152; F. B. I. i. 524, *in part*. Travancore (*Wight*); Dimbham Ghát, Coimbatore (A. W. Lushington).

A shrub or small tree with small coriaceous leaves and small flowers in racemes of 1–3 together.

6. *OCHNA HEYNEANA*, W. & A. 152. *O. Wightiana*, Wt. Ic. t. 223 (*plate only*).

W. Gháts, Hills of Tinnevely and Travancore.

A small tree with oblong-lanceolate leaves and small flowers. Vern. *Tam.* Silimbi.

## 2. *Ouratea*, Aubl.

Small trees, glabrous. *Leaves* alternate, simple, coriaceous, shining, many-nerved, finely serrate; stipules 2. *Flowers* yellow, in axillary or terminal racemes or umbels. *Sepals* 5, usually coloured, persistent. *Petals* 5, imbricate. *Disk* thick, lobed.

*Stamens* 10, inserted at the base of the disk; filaments very short; anthers linear, dehiscing by terminal extrorse pores. *Ovary* deeply 5–6-lobed, lobes 1-celled; styles basal, connate; stigmas simple; ovule 1 in each cell, erect. *Fruit* of 5 or fewer distinct drupes seated on the enlarged disk. *Seed* erect; testa membranous; albumen 0; cotyledons fleshy, plano-convex; radicle very short.

OURATEA ANGUSTIFOLIA, Gilg. *Gomphia angustifolia*, Vahl; F. B. I. i. 525; W. & A. 152.

W. Coast and lower slopes of W. Gháts from S. Canara to Tinnevely, up to 3,000 ft., in evergreen forests.

A small tree with shining leaves and an intramarginal nerve; drupes reniform, reticulate; wood reddish-brown, even-grained, hard. Vern. *Tam.* Ramanchi; *Mal.* Chavakampu.

### Family XXXVII. BURSERACEAE.

Trees or shrubs with balsaminous juice. *Leaves* alternate, very rarely opposite, imparipinnate, 3-foliolate or rarely 1-foliolate, exstipulate or rarely stipulate. *Flowers* regular, hermaphrodite or polygamous, usually small, in racemes or panicles. *Calyx* 3–6-lobed, imbricate or valvate. *Petals* 3–6, free or rarely connate, imbricate or valvate. *Disk* annular or cupular, free or adnate to the calyx-tube. *Stamens* as many as or twice as many as the petals, inserted below or on the disk; filaments free, rarely connate; anthers 2-celled, dehiscing longitudinally. *Ovary* free, 2–5-rarely 1-celled; style simple; stigma undivided or 2–5-lobed; ovules 2, rarely 1 in each cell, axile, usually pendulous. *Fruit* drupaceous, indehiscent with 2–5 pyrenes or dehiscent and pseudo-capsular. *Seeds* solitary, pendulous; testa membranous; albumen 0; embryo with membranous usually contortuplicate cotyledons; radicle superior.

Drupe dehiscent valvately, trigonous, the pyrenes separating; seeds compressed, winged .....1. **Boswellia.**

Drupe indehiscent, globose or ovoid.

Disk cupshaped:—

Disk adnate to the calyx; pyrenes 1–5, bony, pitted, 1-seeded

2. **Garuga.**

Disk free; pyrenes combined, one only seed-bearing

3. **Commiphora.**



Disk annular, usually lobed :—

Petals valvate ; pyrenes 1–3, free, covered with arilliform pulp

4. **Protium.**

Petals usually imbricate ; pyrenes 1–3, combined, without pulp

5. **Canarium.**

1. **Boswellia, Roxb.**

Trees with papery bark. *Leaves* deciduous, alternate, imparipinnate, crowded at the ends of the branches ; leaflets opposite, usually more or less crenate or serrate ; stipules 0. *Flowers* hermaphrodite, small, white or pink, in axillary racemes or panicles. *Calyx* small, 5-lobed, persistent. *Petals* 5, distinct, imbricate. *Disk* annular, fleshy, crenate. *Stamens* 10, alternately long and short, inserted on or outside under the disk ; filaments subulate ; anthers oblong or ovate. *Ovary* sessile, 3-celled ; style short ; stigma 3-lobed ; ovules 2 in each cell, collateral, pendulous. *Fruit* a trigonous drupe containing 3 pyrenes, valves septicidal ; pyrenes 1-seeded, bony, cordate with a long apex, surrounded by a broad membranous wing. *Seeds* compressed, pendulous ; testa membranous ; cotyledons multifid, contortuplicate.

Leaflets deeply broadly crenate, oblong-lanceolate, pubescent ; racemes usually paniced ; drupes ovoid .....1. *serrata*.

Leaflets entire or shallow-crenate, lanceolate, obtuse, glabrous or only puberulous on the nerves ; racemes usually simple ; drupes oblong-obovoid

2. *glabra*.

1. **BOSWELLIA SERRATA**, Roxb. ; F. B. I. i. 528, *excl. var. glabra*.  
*B. thurifera*, Colebr. ; W. & A. 174.

Deccan, in Hyderabad, perhaps also Bellary, common in N. and C. India.

A large tree of dry rocky places, with ash-coloured bark of papyraceous texture, conspicuous especially in the hot season. Vern. *Hind.* Salai.

2. **BOSWELLIA GLABRA**, Roxb. ; Roxb. Cor. Pl. iii. t. 207 ; W. & A. 174 ; Bedd. Fl. t. 174. *B. serrata*, Roxb. var. *glabra*, F. B. I. i. 528.

Deccan and Carnatic from the Godavari to Mysore, in dry forests on poor rocky soil.

A large and conspicuous tree, with yellowish bark which exfoliates in thin flakes, and moderately hard white or brownish wood. It gives a fragrant gum-resin. Vern. *Tam.* Kungli, Gugulu ; *Tel.* Anduga ; *Kan.* Chitta.



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entire crenate or serrate, lateral ones often small; stipules 0. *Flowers* polygamous, small, fascicled or in paniculate dichasia. *Calyx* cupular urceolate or tubular, 4- rarely 5-6-lobed, valvate, persistent. *Petals* 4, rarely 5-6, inserted on or under the margin of the disk. *Disk* cupshaped. *Stamens* 8-10, inserted on or under the margin of the disk, alternately long and short; filaments subulate or filiform, sometimes dilated at base; anthers ovate or oblong, dehiscing longitudinally. *Ovary* ovoid, sessile, 2-4-celled; style short; stigma 3-4-lobed; ovules 2 in each cell, collateral. *Fruit* an ovoid or subglobose fleshy drupe, 2-6-valved; pyrenes crustaceous or bony, one only seed-bearing. *Seed* with membranous testa; cotyledons contortuplicate, very thin.

Armed; flowers few, in fascicles or solitary, leaves small, 3-foliolate, the side leaflets smaller than the end one:—

Calyx-lobes as long as the tube, glandular; leaflets 1-3, dentate above, obovate; branches ending in a sharp spine.....1. *Mukul*.

Calyx-lobes shorter than the tube, glabrous; leaflets 3, entire or broadly crenate, obtuse; many branchlets, all ending in sharp spines  
2. *Berryi*.

Unarmed; flowers many, in long-peduncled paniculate dichasia up to 5 in. long; leaves imparipinnate with 2-5 pairs of leaflets, the side ones not much smaller than the end one:—

Leaflets glabrous, ovate or orbicular, acute or long-acuminate, usually abruptly, the end one long-petioled; calyx-tube glabrous without  
3. *caudata*.

Leaflets pubescent, ovate or obovate, shortly acuminate, the end one subsessile; calyx-tube pubescent without .....4. *pubescens*.

1. COMMIPHORA MUKUL, Engl. *Balsamodendron Mukul*, Hook.; F. B. I. i. 529.

Bellary and Mysore (Wight).

A small tree or shrub, with greenish-yellow bark and soft white wood. The gum is used in medicine.

2. COMMIPHORA BERRYI, Engl. *Balsamodendron Berryi*, Arn.; F. B. I. i. 529; Bedd. Fl. t. 126. *Protium gileadense*, W. & A. 177.

Dry forests of the N. Coimbatore Hills, planted to make hedges from thence southwards in the Carnatic; Tinnevely District (Barber).

A good-sized tree (Beddome) with many sharp spines. It gives a gum-resin.

3. COMMIPHORA CAUDATA, Engl. *Protium caudatum*, W. & A. 176; F. B. I. i. 530; Bedd. Fl. t. 125.

Dry forests of the Deccan and Carnatic in Bellary, Cuddapah, Mysore, S. Arcot, rare in Travancore and Coimbatore. A deciduous tree with papery bark and greyish soft wood. Vern. *Tel.* Konda mamidi; *Kan.* Konda mavu; *Tam.* Kiluvai.

4. COMMIPHORA PUBESCENS, Engl. *Protium pubescens*, W. & A. 176; F. B. I. i. 530.

W. Gháts, in the Anamalai Hills (Beddome).  
A middling-sized tree.

#### 4. *Protium*, Burm.

Trees. *Leaves* alternate, imparipinnate, rarely 1-foliolate; leaflets opposite, petiolulate; stipules 0. *Flowers* small, hermaphrodite or polygamous, in short branched panicles. *Calyx* small, 4-6-lobed, imbricate. *Petals* 4-6, inserted under and outside the disk, valvate. *Disk* annular, crenately lobed, fleshy. *Stamens* 8-12, nearly equal, inserted at the base of the disk within the petals, filaments subulate, anthers ovate. *Ovary* ovoid or subglobose, 4-5-celled; style short; stigma 4-5-lobed; ovules 2 in each cell, collateral. *Fruit* a globose or ovoid drupe with usually 1-3 pyrenes covered with a fibrous arilliform pulp; pyrenes very hard, bony. *Seed* conform to the pyrene; testa membranous; cotyledons contortuplicate.

PROTIUM SERRATUM, Engl. *Bursera serrata*, Colebr.; F. B. I. i. 530. *Icica indica*, W. & A. 177.

N. Circars, Hills of the E. Gháts from Ganjam to the Godavari, in ravines and along streams; Deccan, in Hyderabad.

A large evergreen tree with serrate leaves, very small flowers, a subacid 1-3-lobed fruit and a reddish close-grained wood. Vern. *Ur.* Sorupotri moi; *Tel.* Chitreka.

#### 5. *Canarium*, Linn.

Tall trees. *Leaves* large, alternate, imparipinnate; leaflets usually petiolulate, opposite, often unequal, stipulate or exstipulate. *Flowers* hermaphrodite or polygamous, in terminal or axillary often elongate panicles. *Calyx* cupular or urceolate, 3-lobed, valvate, persistent. *Petals* 3, imbricate or valvate, ovate or oblong, inserted outside the disk. *Disk* annular, entire or

lobed. *Stamens* 6, rarely only 3, inserted outside the disk; filaments free or connate at the base; anthers oblong-triangular, dorsifixed, introrse. *Ovary* ovoid, in ♂ flowers reduced to a pistillode, 2-3-celled; style stout; stigma capitate, 2-3-lobed. *Fruit* an ovoid or ellipsoid, often trigonous drupe with a 1-3-celled, 1-3-seeded stone. *Seed* conform to the cell; testa membranous; cotyledons contortuplicate, often divided.

CANARIUM STRICTUM, Roxb.; F. B. I. i. 534; W. & A. 175; Bedd. Fl. t. 128.

W. Gháts, common in moist evergreen forests, up to about 5,000 ft.

A very large, handsome tree with straight white cylindrical stem. The large pinnate leaves when very young are bright yellow turning velvety crimson, when older they are rusty tomentose and at length subglabrous. The flowers are polygamous and the stamens have the filaments combined in a tube. The wood is soft and of little value. The tree gives a black resin. Vern. *Tam.* Karapu kangiliam, Karang kunthrikam; *Mal.* Kunthirikka payin, Thalli; *Kan.* Manda dhup.

*Canarium commune*, Linn., is a large tree occasionally found in cultivation.

### Family XXXVIII. MELIACEAE.

Trees or shrubs. *Leaves* alternate; usually pinnate, rarely simple or bipinnate; leaflets opposite or alternate, generally oblique at the base; stipules 0. *Flowers* regular, hermaphrodite or polygamo-dioecious, in terminal or axillary panicles. *Calyx* usually small, 3-6-lobed, rarely entire or with free sepals, usually imbricate. *Petals* 3-6, free or rarely connate at the base, sometimes adnate below to the staminal-tube, valvate imbricate or contorted. *Disk* tubular or annular, free or adnate to the ovary or obsolete. *Stamens* 4-12; filaments connate in a tube or rarely free; anthers erect, usually sessile on the tube, included or exerted, 2-celled, longitudinally dehiscent. *Ovary* usually free, 2-5-celled; style simple; stigma disciform or capitate; ovules 2, rarely more, collateral or superposed, rarely solitary. *Fruit* dehiscent or indehiscent, capsular baccate or drupaceous. *Seeds* sometimes arillate, sometimes winged; exalbuminous or with fleshy albumen, embryo usually flat, cotyledons fleshy.



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Seeds with wings; leaves pinnate or sometimes bipinnate; cells of ovary with numerous ovules:—

Staminal-tube cupshaped; disk conspicuous; seeds albuminous, winged at both ends .....15. **Soymida.**

Staminal-tube urceolate; disk annular; seeds albuminous, winged at the upper end.....**Swietenia.**

Staminal-tube cylindric; disk 0; seeds winged below only, exalbuminous.....16. **Chukrasia.**

Stamens distinct on a fleshy torus, sometimes with alternating staminodes; cells of ovary with 8–12 ovules; seeds albuminous, winged at both ends or only below .....17. **Cedrela.**

### 1. Turraea, Linn.

Trees or shrubs. *Leaves* simple, alternate, entire or obtusely lobed. *Flowers* hermaphrodite, in axillary clusters or short racemes, bracteate. *Calyx* campanulate, 4–5-lobed. *Petals* 4–5, free, elongate, linear-spathulate. *Disk* annular or obsolete. *Staminal-tube* cylindric, elongate, toothed at the apex; anthers 8–10, short, inserted just within the mouth of the tube, alternating with the teeth. *Ovary* 5- or more-celled; style elongate, exsert; stigma urceolate or capitate; ovules 2 in each cell, superposed. *Fruit* a 4- or more-celled capsule; cells 1–2-seeded; valves woody or coriaceous, separating from the winged axis. *Seeds* oblong, with a broad ventral hilum; albumen fleshy; cotyledons foliaceous; radicle superior.

TURRAEA VILLOSA, Benn.; F. B. I. i. 542; Wt. Ic. t. 1593.

W. Gháts in the Anamalai Hills up to 4,000 ft. (Beddome, Fischer); hills of Travancore (Wight), not common.

A large shrub with membranous ovate acuminate entire leaves up to 4 in. long and large white fragrant flowers up to 2 in. long.

### 2. Naregamia, W. & A.

A small branching undershrub. *Leaves* alternate, 3-foliolate, petiole winged. *Flowers* solitary or 2 together, axillary. *Calyx* 5-lobed, imbricate. *Petals* 5, free, elongate, linear-spathulate. *Disk* annular. *Staminal tube* long, slender, cylindric below, inflated near the top and sometimes cleft in two parts, obscurely 10-crenate at the mouth; anthers 10, appendaged at the apex. *Ovary* 3-celled; style filiform; stigma capitate; ovules 2 in each cell, collateral, pendulous. *Fruit* an ovoid-globose capsule,

loculicidally 3-valved, the valves separating from the 3-winged axis, the cells 2-seeded. *Seeds* pendulous, curved, truncate at both ends, muricate, with a short double membrane along the side next the axis; albumen fleshy; cotyledons flat, foliaceous.

NAREGAMIA ALATA, W. & A. 117; F. B. I. i. 542; Wt. Ic. t. 90.

W. Gháts, in all Districts, up to 3,000 ft., in forest undergrowth.

An undershrub with pretty white flowers 1-1½ in. long, the leaflets small, cuneate-ovate. Vern. *Mal.* Nelanáregam.

### 3. Munronia, Wt.

Shrubs or undershrubs. *Leaves* alternate, imparipinnate; leaflets opposite, entire or coarsely toothed. *Flowers* hermaphrodite, elongate, in few-flowered bracteate axillary cymes. *Calyx* usually with elongate tube, 5-lobed, lobes subfoliaceous. *Petals* 5, elongate-spathulate, free or partly cohering, spreading. *Disk* tubular, membranous, sheathing the ovary and base of the style. *Staminal-tube* cylindrical, 10-toothed at the apex; anthers 10, terminal, apiculate. *Ovary* 5-celled; style elongate, slender; stigma capitate; ovules 2 in each cell, superposed. *Fruit* a depressed-globose, 5-lobed, loculicidal capsule; valves separating from the 5-winged axis. *Seeds* plano-convex, the hilum ventral, hollowed, the margins fringed with incurved laciniae; albumen thin; cotyledons flat, foliaceous; radicle short.

MUNRONIA WALLICHII, Wt. Ill. i. 147; F. B. I. i. 543. *M. neelgherrica*, Wt. Ill. i. 147, t. 54.

W. Gháts from S. Canara to the Anamalais and Pulneys, up to 4,000 ft.

A low shrub in thick forest undergrowth. Flowers conspicuous, pink; leaflets 5-9, lanceolate or ovate, pubescent; capsule pubescent, about .5 in. in diam.

### 4. Melia, Linn.

Trees or shrubs. *Leaves* alternate, 2-3-pinnate; leaflets toothed, serrate or entire. *Flowers* hermaphrodite, in large many-flowered axillary panicles. *Calyx* 5-lobed, imbricate. *Petals* 5, free, much longer than the calyx-lobes. *Disk* annular. *Staminal-tube* a little shorter than the petals, cylindric, slightly dilated and laciniate at the mouth; anthers 10, within the tube at its apex, apiculate. *Ovary* 5-8-celled; style cylindric, elongate;



stigma capitate, sometimes lobed; ovules 2 in each cell, superposed. *Fruit* a fleshy drupe with hard woody endocarp; cells 1-seeded. *Seeds* pendulous, elliptic; testa crustaceous; albumen fleshy or scanty; cotyledons foliaceous; radicle terete, superior.

Flowers lilac; anthers nearly equalling the laciniae of the purple staminal tube; drupe ellipsoid-globose, .5–.7 in. in diam....1. *Azedarach*.  
Flowers white; anthers exceeding the laciniae of the white staminal tube; drupe ovoid or ellipsoid, 1–1.5 in. long .....2. *composita*.

1. MELIA AZEDARACH, Linn.; F. B. I. i. 544; W. & A. 117; Wt. Ic. t. 160; Bedd. Fl. t. 13.

Cultivated in most Districts and occasionally found run wild. The Persian Lilac.

A pretty but not very big tree with a soft red-cedar-like wood, useful for furniture, but little used as it is not a forest tree properly speaking. Vern. *Hind.* Bakain; *Tel.* Taraka vepa; *Tam.* Mallay vembu; *Kan.* Bévu.

2. MELIA COMPOSITA, Willd.; W. & A. 117; Bedd. Fl. t. 12. *M. dubia*, Hiern in F. B. I. i. 545 (not of Cav.).

N. Circars, Hills of Ganjam; Deccan in the Nallamalai Hills of Kurnool at 2,000 ft.; W. Gháts from S. Canara to Tinnevely at low elevations.

A large deciduous tree with a soft reddish-white wood. Vern. *Tam.* Mallay vembu; *Kan.* Heb bévu.

### 5. Cipadessa, Blume.

Small trees or shrubs. *Leaves* alternate or subopposite, imparipinnate; leaflets opposite or nearly so, entire or coarsely serrate; stipules 0. *Flowers* small, hermaphrodite, in axillary peduncled panicles. *Calyx* 5-lobed. *Petals* 5, oblong, free, spreading, valvate. *Disk* cupular, adnate to the base of the staminal tube. *Stamens* 5–10; filaments united below in a short tube, free above, 2-toothed at the apex; anthers inserted between the teeth, short, apiculate. *Ovary* 5-celled; style short; stigma clavate-capitate; ovules 2 in each cell, collateral. *Fruit* a 5-ribbed, 5-celled, hardly fleshy drupe; cells 1–2-seeded. *Seeds* angled; albumen fleshy; embryo curved, the cotyledons oblong; radicle superior.

- CIPADESSA BACCIFERA, Miq. *C. fruticosa*, Bl.; F. B. I. i. 545. *Mallea Rothii*, W. & A. 118.

N. Circars, common on laterite hills, near villages and in dry



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capitate; ovules 1-2 in each cell, superposed or collateral. *Fruit* a globose or pyriform 1-4-celled loculicidal capsule; valves coriaceous. *Seeds* without, rarely with, an arillus; testa coriaceous; albumen 0; cotyledons thick, fleshy; plumule often hirsute, enclosed between the cotyledons.

Calyx cupshaped, subentire, nearly half the length of the petals; leaflets reticulately nerved; disk tubular, acutely lobed; ovary 3-5-celled; capsule reddish .....1. *binectariferum*.

Calyx very shortly 4-lobed; leaflets not prominently nerved and reticulate; disk tubular, slightly toothed:—

Ovary 2-celled; capsule yellow, rough .....2. *Beddomei*.

Ovary 4-celled; capsule purple, smooth .....3. *ficiforme*.  
Calyx deeply 4-lobed; leaflets with impressed nerves not prominently reticulate but with regular main nerves; disk cupshaped, entire, only just enclosing the 4-celled ovary; capsule yellow, longitudinally furrowed.....4. *malabaricum*.

1. DYSOXYLUM BINECTARIFERUM, Hook. f.; F. B. I. i. 546.  
*D. macrocarpum*, Bedd. Fl. t. 150.

W. Gháts from Coorg to the Anamalais and Tinnevely, in moist forests, but apparently absent from Travancore.

A tree with leaves up to 18 in. long and flowers in racemiform panicles. Vern. *Kan.* Agil.

2. DYSOXYLUM BEDDOMEI, Hiern; F. B. I. i. 548.

Evergreen forests of Peermerd and the Cardamom Hills in Travancore, up to 3,400 ft.

A large tree with leaves 12-15 in. long and yellow ribbed capsule. Vern. *Tam.* Adanthei.

3. DYSOXYLUM FICIFORME, Gamble. *D. purpureum*, Bourd. in Journ. Bomb. Nat. Hist. Soc. xii. 349, t. 2. *Amoora ficiformis*, Wt. Ill. 147; F. B. I. i. 546 in note under *D. binectariferum*.

Evergreen forests of the Koni and Rani valleys in Travancore, at 1,000 to 2,000 ft.

A large tree with leaves 12-15 in. long and purple smooth capsule. Wood reddish-brown, close-grained. Vern. *Mal.* Kar agil, Puvil agil.

4. DYSOXYLUM MALABARICUM, Bedd.; F. B. I. i. 548.

W. Gháts from Mysore to the Anamalais and Travancore, up to 3,000 ft. White Cedar.

A very large tree, reaching 120 ft. in height and 5 ft. in

girth, with pale green leaves and flowers in axillary panicles. Bark grey with white warts. Wood yellowish or light orange, hard and elastic, used in Cochin for oil-casks. Vern. *Mal.* Vella agil.

**8. Aglaia, Lour.**

Trees or shrubs, glabrous stellately-pubescent or -lepidote. *Leaves* alternate, pinnate; leaflets entire, opposite or subopposite; stipules 0. *Flowers* polygamo-dioecious, minute or small, globose, in axillary branching panicles. *Calyx* 5-lobed, imbricate. *Petals* 5, free, concave, imbricate. *Staminal tube* urceolate or subglobose, entire or more or less 5-toothed at the apex; anthers usually 5, erect, included or partly exerted. *Disk* 0 or inconspicuous. *Ovary* ovoid, 1-2- rarely 3-celled; style very short; stigma simple or lobed; ovules 1-2 in each cell. *Fruit* a 1-2-celled and -seeded berry with a coriaceous pericarp. *Seeds* with a fleshy aril-like testa; albumen 0; cotyledons thick, superposed, enclosing the minute villous embryo (corculus).

Stamens quite included in the tube; leaflets with main nerves nearly at right angles with the midrib:—

Leaflets 3-7, flowers in close panicles under 6 in. long:—

Leaflets usually more or less elliptic, sometimes lanceolate or oblanceolate; berry ovoid, not depressed; branches of ♀ panicle spicate, flowers sessile, of ♂ cymose, flowers shortly pedicelled; staminal tube usually somewhat contracted at base, stamens small, on the middle of the tube.....1. *Roxburghiana*.

Leaflets usually lanceolate, sometimes elliptic; berry depressed-globose; branches of panicle cymose, flowers pedicelled; staminal tube not contracted at base, stamens nearly as long as tube

2. *Barberi*.

Leaflets about 13; flowers in lax panicles up to about 15 in. long:—

Leaflets lanceolate, black when dry, unequally acute at base; flowers glabrous, pedicelled, black when dry; calyx-lobes acute ...3. *Maiae*.

Leaflets lanceolate, olive-brown when dry, obtusely acute or even rounded at base; flowers lepidote, sessile, brown when dry; calyx-lobes obtuse, ciliate .....4. *canarensis*.

Stamens exert from the tube:—

Leaflets 3-7, oblanceolate, densely scaly beneath with very prominent oblique main nerves; flowers in close panicles under 6 in. long, pedicels short .....5. *Bourdillonii*.

Leaflets up to about 15, conspicuously but not very obliquely nerved, densely stellately tomentose; flowers in spreading panicles up to 18 in. long; pedicels long, slender .....6. *minutiflora*.

1. *AGLAIA ROXBURGHIANA*, Hiern; F. B. I. i. 555, *in part*.  
*Milnea Roxburghiana*, W. & A. 119; Wt. Ic. t. 166.

South Deccan; W. Gháts, in S. Canara and Malabar.

A tree with 5–7 leaflets, which are oblong, nearly sessile, and up to 6 in. long and 2 in. broad.

Apparently a rather scarce tree, well figured in Ic. t. 166.

But there are also two well-marked varieties:—

var. 1. *Beddomei*, *A. Roxburghiana*, Bedd. Fl. t. 130A.

Leaflets usually 7, narrow lanceolate, rarely oblanceolate, pale beneath and drying grey, up to 4 in. long and 1 in. broad; flowers pedicelled (in ♂ at any rate); berry globose, 1.5 cm. in diam.

E. Gháts, from Ganjam to Godavari; Hills of the Deccan; Travancore up to 3,000 ft.

A tree with bright red hard wood and light brown bark.

Vern. *Tel.* Yerra aduga; *Tam.* Chokkala; *Mal.* Punyáva.

Var. 2. *courtallensis*, leaflets usually 5, small, oblanceolate, very grey when dry, 1–2.5 in. long and .5–1 in. broad; berry small.

W. Gháts, in the Hills of Tinnevelly.

2. *AGLAIA BARBERI*, Gamble in Kew Bull. 1915, 346.

W. Gháts, in the Anamalai Hills and those of Travancore and Tinnevelly, at about 3,000 ft.

3. *AGLAIA MAIAE*, Bourdillon in Journ. Bomb. Nat. Hist. Soc. xii. 349.

W. Gháts, in the Hills of Travancore, up to 1,200 ft. (Bourdillon).

A handsome evergreen tree with dark reddish-brown bark and sweet-scented wood. The leaves and flower panicles are black when dry.

4. *AGLAIA CANARENSIS*, Gamble in Kew Bull. 1915, 347.

W. Gháts of S. Canara.

5. *AGLAIA BOURDILLONII*, Gamble in Kew Bull. 1915, 346. *A. Roxburghiana*, Bedd. Fl. t. 130B, *not of* W. & A.

W. Gháts, in the Hills of Travancore, above 3,500 ft. (Beddome, Bourdillon).



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A moderate-sized evergreen tree with a red useful hard wood, little used. Vern. *Hind.* Harin-hara; *Mal.* Chemmaram.

2. *AMOORA LAWII*, Bedd. Fl. t. 133; F. B. I. i. 561.

W. Gháts, in Malabar (Wight), Tinnevelly (Brasier).

A moderate-sized tree, apparently scarce.

3. *AMOORA CANARANA*, Hiern in F. B. I. i. 560.

W. Gháts, in the Anamalais (Beddome), Travancore Hills in evergreen forests up to 3,500 ft.

A large evergreen tree.

### 10. *Lansium*, Rumph.

Trees or shrubs. *Leaves* imparipinnate, leaflets alternate or opposite, shortly petiolulate, entire. *Flowers* polygamo-dioecious, 5-merous, the ♂ usually in panicles, the ♀ in spikes or racemes. *Calyx* of 5 rounded imbricate sepals. *Petals* 5, concave, connivent, imbricate. *Disk* inconspicuous. *Staminal tube* globose, crenulate; anthers 10, usually in two rows, the lower included, the upper partly exerted, sometimes apiculate, the attached filaments prominent. *Ovary* globose, 3-5-celled; style very short, thick; stigma 3-5-lobed, truncate; ovules 1-2 in each cell, attached to the axis. *Fruit* a 1-5-celled corky or fleshy berry. *Seeds* solitary or 2, collateral, oblong, imbedded in a pulpy aril; albumen 0; cotyledons transverse; radicle superior.

*LANSIUM ANAMALLAYANUM*, Bedd.; F. B. I. i. 558; Bedd. Ic. t. 105, Fl. t. 131.

W. Gháts, in the Anamalais and the Hills of Malabar, Travancore and Tinnevelly at 1,500 to 3,000 ft.

A handsome medium-sized tree of the evergreen forests, said to have a pink, sweet-scented wood and edible fruit. Vern. *Tam.* Santhana viri; *Mal.* Vandakamin.

*Lansium domesticum*, Jack, the "Doekoe" tree of Java, is sometimes cultivated for its excellent fruit.

### 11. *Walsura*, Roxb.

Trees. *Leaves* imparipinnate; leaflets 1-5, usually opposite, entire; stipules 0. *Flowers* small, hermaphrodite, in axillary and terminal panicles. *Calyx* small, 5-lobed, the lobes imbricate. *Petals* 5, oblong, slightly imbricate or subvalvate. *Stamens* 8 or 10, linear or subulate, free or partly connate in a tube, the apex

usually notched; anthers terminal or inserted in the notches of the filaments. *Disk* usually annular, fleshy. *Ovary* short, 2-3-celled, sunk in the disk; style short, obconic; stigma turbinate-capitate, 2-3-toothed at apex; ovules in each cell 2, collateral. *Fruit* an indehiscent tomentose berry, 1- rarely 2-celled, 1-2-seeded. *Seed* enclosed in a fleshy arillus; albumen 0; cotyledons thick, fleshy, plano-convex; radicle superior.

WALSURA PISCIDIA, Roxb.; F. B. I. i. 564; W. & A. 120.

*W. ternata*, Roxb.; F. B. I. i. 563; W. & A. 120.

N. Circars and Carnatic, in dry evergreen forests, especially near the coast, as at Vizagapatam, Striharikota in Nellore, Pulicat, and in S. Arcot; Hills of the Deccan, in Cuddapah and Chingleput; W. Gháts, in the Anamalais, Pulneys and Travancore.

A moderate-sized tree with trifoliolate leaves, corymbosely paniced flowers, ovoid fruit, .5 in. long, with a white aril and hard dark red black-streaked wood. Vern. *Tel.* Walursi; *Tam.* Walsura; *Mal.* Pér illa piccha.

## 12. Heynea, Roxb.

Trees or rarely shrubs. *Leaves* imparipinnate; leaflets 5-11, opposite, petiolulate, entire. *Flowers* small, hermaphrodite, in long-peduncled terminal and axillary panicles. *Calyx* short, 4-5-lobed, lobes imbricate. *Petals* 4-5, free, oblong, suberect, subimbricate. *Stamens* 8-10; filaments connate more or less in a tube, linear, 2-toothed at apex; anthers ovate, attached between the teeth, mucronate. *Disk* annular, fleshy. *Ovary* sunk in the disk, 2-3-celled; style slightly obconic; stigma 2-3-toothed with a thickened base; ovules 2 in each cell, collateral, pendulous. *Fruit* a 1-celled, 2-valved capsule. *Seeds* surrounded by a fleshy white aril; testa membranous; albumen 0; cotyledons hemispheric, plano-convex; radicle superior.

HEYNEA TRIJUGA, Roxb.; F. B. I. i. 565. *H. affinis*, Juss.; W. & A. 121; Bedd. Fl. t. 134.

E. Gháts, in the forests of Godavari and Vizagapatam, to 4,500 ft.; W. Gháts, common from Mysore through Nilgiris and Anamalais to Travancore, up to 6,000 ft.

A small pretty tree with pinnate long-petiolulate leaves, corymbose panicles of small flowers and white arillate seeds. Wood grey, moderately hard. Vern. *Kan.* Kora; *Mal.* Korakadi.



**13. *Beddomea*, Hook. f.**

Trees or shrubs, usually lepidote- or stellate-pubescent. *Leaves* alternate, simple or pinnate; leaflets entire. *Flowers* hermaphrodite, in axillary panicles of racemes. *Calyx* 4-6-lobed, imbricate. *Petals* 5-6, free, concave, much imbricate. *Staminal tube* globose, crenulate at the small mouth; anthers 5-6, included or partly exserted, their connectives thick, attached broadly to the tube at their back. *Disk* inconspicuous or 0. *Ovary* short, villous, 3-celled; style short; stigma 3-lobed; ovules 2 in each cell, collateral. *Fruit* an ovoid or obovoid, beaked, furrowed, stellate-pubescent capsule, finally dehiscent in 2-3 cells. *Seeds* 3-5, exarillate; albumen 0; cotyledons fleshy, superposed, enclosing the radicle.

Leaflets 3-5; calyx small, spreading; staminal tube thick, enclosing the large anthers; capsule obovoid .....1. *indica*.  
 Leaflet 1; calyx usually large, enclosing the petals; staminal tube thin, the anthers small, inserted near the top and partly exsert; capsule oblong  
 2. *simplicifolia*.

**1. *BEDDOMEA INDICA*, Hook. f.; F. B. I. i. 566.**

W. Gháts on the E. slopes of Nilgiris and Hills of Malabar, up to 3,000 ft.

A shrub of the evergreen forest undergrowth.

**2. *BEDDOMEA SIMPLICIFOLIA*, Bedd. Fl. t. 135; F. B. I. i. 566.**

W. Gháts from Coorg to Travancore and Tinnevely, at 2,000 to 4,000 ft.

A small tree with rather variable inflorescence, separable into three varieties: (1) large flowers in long stout racemes, (2) small flowers in short panicles, and (3) medium flowers in long slender racemes, but they all agree in foliage.

**14. *Xylocarpus*, Koen.**

Trees, always littoral. *Leaves* alternate, paripinnate; leaflets 1-3 pairs, sometimes solitary. *Flowers* hermaphrodite, in lax few-flowered axillary panicles. *Calyx* 4-lobed, short. *Petals* 4, free, spreading, contorted. *Staminal tube* urceolate-globose, 8-toothed at apex, the teeth again bilobed; anthers 8, included just under the teeth of the tube and alternate with them. *Disk* cupular, fleshy. *Ovary* 4-celled; style thick, short; stigma discoid; ovules 2-12 in each cell. *Fruit* a large globose 4-celled capsule. *Seeds*



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usually pubescent or even velvety. *Flowers* hermaphrodite, rather large, in terminal panicles. *Calyx* short, 4-5-lobed, with obtuse lobes. *Petals* 4-5, oblong, free, erect, contorted. *Staminal tube* cylindric, with 8-10 short crenate lobes at the apex; anthers erect, inserted within the crenatures and entirely exsert above them. *Disk* 0. *Ovary* shortly stipitate, cylindric-ovoid, 3-5-celled; style stout; stigma cylindric-capitate; ovules many in each cell, biseriate. *Fruit* a 3-5-celled, septifragally 3-5-valved capsule, the valves 2-lamellate separating from the 3-winged axis and often cleft at apex. *Seeds* many, flattened, broadly winged below; albumen 0; cotyledons orbicular.

CHUKRASIA TABULARIS, ADr. Juss.; F. B. I. i. 568 (*Chikrassia*); W. & A. 123; Wt. Ill. t. 56; Bedd. Fl. t. 9.

Hills of the Deccan up to 4,500 ft., Horsley Konda in Cuddapah, Sandúr Hills of Bellary, Hills of Mysore and Salem; W. Gháts, from Mysore to Tinnevely in evergreen forests at rather low elevations.

A very large and beautiful tree with a reddish-brown bark and yellowish-brown to reddish-brown wood resembling Mahogany. Vern. *Hind.* Chikrasi; *Tel.* Madagari vembu; *Tam.* Aglay, Malei veppu; *Mar.* Pabba.

### 17. *Cedrela*, Linn.

Tall trees. *Leaves* imparipinnate; leaflets numerous, opposite or subopposite, entire or serrate. *Flowers* hermaphrodite, small, white, in terminal or subterminal panicles. *Calyx* short, 5-lobed. *Petals* 5, oblong, suberect, free, imbricate. *Stamens* 4-6, free, inserted on a 4-6-lobed raised *disk*, sometimes with alternating staminodes; filaments subulate; anthers oblong, versatile. *Ovary* sessile on the disk, 5-celled; style slender; stigma discoid; ovules in each cell 8-12, biseriate, pendulous. *Fruit* a coriaceous septifragally 5-valved capsule; valves 2-lamellate. *Seeds* compressed, winged below or at both ends; albumen fleshy; cotyledons flat subfoliaceous; radicle superior.

CEDRELA TOONA, Roxb. Cor. Pl. iii. t. 238; F. B. I. i. 568; W. & A. 124; Wt. Ic. t. 161; Bedd. Fl. t. 10; Brand. For. Fl. t. 14.

E. Gháts in valleys and moist forest localities, fairly common in Ganjam, less so southwards; Hills of the Deccan in Kurnool, Sandúr and Mysore; W. Gháts, common in evergreen forests up to 4,000 ft., especially in the Nilgiris and Anamalais,

Often planted for ornament, or in avenues, or for its wood.  
The Toon tree.

A large and beautiful tree with pinnate leaves, lanceolate long acuminate leaflets, a reddish-brown bark and even-grained red soft scented wood, useful for building and furniture, cigar-boxes, etc. Vern. *Hind.* Tún; *Ur.* Mahalimbu; *Tam.* Santhana vembu, Thevatharam; *Mal.* Mathagiri vembu; *Kan.* Tundu.

Var. *latifolia*, C. DC. in Rec. Bot. Surv. Ind. iii. 365, with larger and wider leaflets, rounded at the base but finally acute, the margins often somewhat crenate.

W. Gháts in the Nilgiris and Anamalais, at about 6,000 ft.

A large tree and a fairly well-marked variety.

*Swietenia Mahagoni*, Linn., the Mahogany tree of the W. Indies, is sometimes found in gardens and avenues, and has been planted in some forest localities for its timber.

### Family XXXIX. DICHAPETALACEAE, Engler.

Small trees or shrubs. *Leaves* alternate, simple, entire; stipules 2, deciduous. *Flowers* small, unisexual or polygamous, rarely hermaphrodite, in corymbose cymes; peduncles sometimes adnate to petiole. *Sepals* 5, free or connate, often unequal, imbricate. *Petals* 5, free, subperigynous, notched or bifid, with often an inflexed plate adnate to their faces. *Stamens* 5, subperigynous; filaments free or adnate to the petals; anthers oblong, connective often thickened behind, dehiscence longitudinal. *Disk* of 5 glands or scales or a 5-glandular or -lobed cup. *Ovary* free, 2-3-celled; ovules in collateral pairs, pendulous from the apex of each cell, anatropous. *Fruit* a pubescent drupe, oblong or compressed or didymous; epicarp sometimes dehiscent and disclosing the putamen; putamen 1-3-celled, the cells 1-seeded. *Seeds* pendulous; testa membranous; albumen 0; cotyledons thick; radicle small, superior.

#### *Dichapetalum*, Dup. Thouars.

Trees or shrubs. *Flowers* polygamo-monoecious. *Sepals* 5, unequal, connate at the base. *Petals* 5, 2-fid. *Stamens* 5, slightly adnate at base to the petals. *Disk* of 5 quadrate scales, placed opposite the petals. *Ovary* 2-3-celled. *Fruit* a 1-2-celled, subdidymous drupe with 1-2-seeded stone.

DICHAPETALUM GELONIOIDES, Engl. *Chailletia gelonioides*, Bedd.; F. B. I. i. 570.

W. Gháts from S. Canara to Anamalais and Travancore, up to 4,000 ft.

A small tree with elliptic or elliptic-lanceolate leaves reaching 6 in. long by 2 in. broad and usually a transversely oblong or obcordate drupe with a soft grey epicarp, scarlet fleshy mesocarp and crustaceous endocarp, enclosing 2 seeds with fleshy cotyledons.

### Family XL. OLACACEAE.

Trees or shrubs, sometimes straggling or climbing. *Leaves* usually alternate, entire; stipules 0. *Flowers* small, hermaphrodite. *Calyx* small, sometimes accrescent. *Petals* 5-6, free or slightly connate at base. *Stamens* as many as and opposite to or twice as many as the petals, sometimes with as many or twice as many staminodes alternate with them. *Disk* usually embracing the base of the ovary. *Ovary* free, 1-5-celled; style simple; ovules solitary or 2-3 in each cell. *Fruit* a 1-seeded drupe; albumen copious, fleshy; embryo minute, near the apex of the albumen.

Stamens twice as many as the petals, staminodes 0; erect thorny shrubs or small trees .....1. **Ximenia.**

Stamens as many as the petals:—

Staminodes present:—

Staminodes slender, bifid, usually twice as many as the generally 3 stamens; straggling often thorny shrubs .....2. **Olox.**

Staminodes short, thick, as many as the stamens; climbing shrubs with tendrils.....3. **Erythropalum.**

Staminodes absent; trees:—

Calyx adherent to the fruit; anthers oblong, incurved, filaments very short .....4. **Strombosia.**

Calyx not adherent to the fruit; anthers globose, very small, filaments slender .....5. **Anacolosa.**

#### 1. **Ximenia**, Linn.

Shrubs or small trees with spinous branches. *Leaves* alternate, simple, entire, shortly petioled. *Flowers* usually hermaphrodite, rather large, racemose. *Calyx* small, 4-5-lobed. *Petals* 4-5, valvate, bearded within, reflexed. *Stamens* twice as many as



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leaves ovate or lanceolate, acute or acuminate, 2-5 in. long; flowers  
 ·4 in. long in racemes or short panicles under 1 in. long; drupe up to  
 ·7 in. long .....3. *Wightiana*.  
 Erect unarmed undershrub; leaves narrow, about 1·5 in. long by ·25 in.  
 broad; flowers solitary, about ·2 in. long; drupe small, globose...4. *nana*.

1. OLAX ZEYLANICA, L.; F. B. I. i. 576; W. & A. 88.

Peninsula (Wight 302).

An erect shrub or small tree.

2. OLAX SCANDENS, Roxb.; Roxb. Cor. Pl. ii. t. 102; F. B. I. i.  
 575; W. & A. 89.

N. Circars, Deccan and Carnatic, usually in ravines and  
 near streams.

A rambling or climbing shrub of considerable size, the  
 thorns on old wood. Wood yellowish-white, soft. Vern.  
*Ur.* Boderia; *Tel.* Kurpodur; *Tam.* Kadalranchi; *Mar.*  
 Harduli.

3. OLAX WIGHTIANA, Wall.; F. B. I. i. 575; W. & A. 89.

W. Gháts, in the Anamalai, Pulney and Tinnevelly Hills.

A small tree (Bedd.) or climbing shrub with many branches,  
 and usually ovate obtusely acute olive-brown leaves (when  
 dry).

Var. *nigrescens*, Gamble. Leaves lanceolate, acuminate,  
 usually nearly black when dry, branchlets with prominent  
 lenticels.

W. Gháts in the Anamalai Hills (Barber), Sivagiri Hills  
 (Wight).

4. OLAX NANA, Wall.; F. B. I. i. 576.

N. Circars, at Karaka Konda, Vizagapatam (Barber).

A small undershrub giving herbaceous shoots from a woody  
 rootstock, and growing up yearly like those of *Grewia*  
*sapida* and similar plants when killed down by fire or  
 other causes.

### 3. *Erythropalum*, Blume.

Climbing cirrhose shrubs. *Leaves* alternate, entire, 3-ribbed,  
 petiolate; tendrils axillary. *Flowers* small, in lax axillary cymes  
 with filiform peduncles and pedicels. *Calyx* adherent, 4-5-lobed.  
*Petals* 5, valvate. *Stamens* 5, opposite to and inserted on the  
 petals; filaments very short; anthers incurved, 2-celled, the cells  
 opening longitudinally; connective thick. *Staminodes* 5, alternate

with the stamens. *Ovary* half immersed in the disk, 1-celled; style short, conical; stigma minute, 3-lobed; ovules 1-3, pendulous from the apex of the cell. *Fruit* an oblong or obovoid drupe, surmounted by the remains of the calyx; putamen crustaceous. *Seed* pendulous; albumen copious, fleshy; embryo minute.

**ERYTHROPALUM POPULIFOLIUM**, Mast. ; F. B. I. i. 578.

W. Gháts in Malabar, Anamalais and Tinnevelly Hills, at low elevations.

A climbing shrub with long-petioled poplar-like subpeltate leaves, usually with 3 prominent ribs and 2 smaller basal ones; the fruit oblong-obovoid, yellowish, .7 in. long.

#### 4. **Strombosia**, Blume.

Evergreen trees or shrubs, usually glabrous. *Leaves* alternate, simple, entire, coriaceous. *Flowers* small, regular, hermaphrodite, in axillary cymes. *Calyx* cupshaped, more or less 5-lobed. *Petals* 5, free, valvate, hairy within. *Stamens* 5, opposite the petals and adnate to them; anthers 2-celled, introrse. *Staminodes* 0. *Ovary* inferior or superior, imperfectly 4-5-celled, surrounded by a lobed disk; ovules 4-5, pendulous from a central placenta; style short. *Fruit* a drupe, surmounted by the remains of the calyx-lobes and style; stone crustaceous. *Seed* pendulous; albumen copious, fleshy; embryo minute.

**STROMBOSIA CEYLANICA**, Gardn. ; F. B. I. i. 579; Bedd. Fl. t. 137.

W. Gháts, from S. Canara southwards, especially in Travancore, but always scarce.

A large tree with oblong-lanceolate leaves up to 6 in. long by 2 in. broad, very small flowers and a pyriform purple drupe about 1 in. long.

#### 5. **Anacolosa**, Blume.

Trees or shrubs. *Leaves* alternate, simple, entire, petiolate. *Flowers* in axillary cymes. *Calyx* cupshaped, 5-7-lobed. *Petals* 5-6, free, valvate, hairy within. *Stamens* as many as and opposite to the petals at their base; filaments slender; anthers very small, globose, basifixed, the 2 cells dehiscing longitudinally. *Staminodes* 0. *Disk* cupshaped, surrounding the base of the ovary. *Ovary* 1-celled; style conical; stigma shortly lobed; ovules 2-3, pendulous from a central placenta. *Fruit* a drupe



surrounded by the accrescent disk; stone crustaceous, 1-seeded. *Seed* pendulous; albumen fleshy; embryo minute; radicle superior, thicker than the cotyledons.

ANACOLOSA DENSIFLORA, Bedd.; F. B. I. i. 580; Bedd. Fl. t. 138.

W. Gháts in the Anamalai and Travancore Hills, up to 2,500 ft.

A lofty straight-stemmed tree with oblong leaves up to 6 in. long and 2 in. broad, and many fragrant white flowers. Wood reddish-brown, moderately hard. Vern. *Tam.* Kattai ockkali; *Mal.* Kal manikkam.

### Family XLI. OPILIACEAE.

Trees or erect or climbing shrubs. *Leaves* alternate, entire. *Flowers* hermaphrodite or dioecious, small, in axillary spikes or racemes. *Calyx* small or minute, obscurely 4-5-lobed. *Petals* 4-5, free or connate in a gamopetalous corolla. *Disk* fleshy entire or of glands as many as the petals and alternate with them. *Stamens* as many as the petals and opposite to them. *Ovary* 1-celled; ovule 1, pendulous. *Fruit* a drupe. *Seed*; albumen fleshy; embryo imbedded in the albumen, cotyledons linear, sometimes 3, sometimes combined; radicle superior.

Petals free; flowers in bracteate racemes .....1. **Opilia.**

Petals combined in a gamopetalous corolla; flowers in spikes

2. **Cansjera.**

#### 1. **Opilia**, Roxb.

Low trees or climbing shrubs. *Leaves* alternate, entire, penninerved. *Flowers* small, 1-3 together in the axils of peltate deciduous bracts, in axillary racemes, the racemes in bud cone-like. *Calyx* minute, annular, obscurely 5-lobed. *Petals* 5, oblong, valvate. *Disk* of 5 fleshy clubshaped glands alternate with the petals. *Stamens* 5, opposite the petals, filaments slender; anthers small, 2-celled. *Ovary* superior, oblong; style very short; ovule solitary, pendulous. *Fruit* a drupe with fleshy pericarp and thin stone. *Seed* large; albumen copious, fleshy; embryo linear in the centre of the upper part of the albumen; cotyledons joined together, long; radicle superior.

OPILIA AMENTACEA, Roxb. Cor. Pl. iii. t. 158; F. B. I. i. 583; Wt. Ill. t. 40. *Ximenia*? *olacioides*, W. & A. 89.

A rather scarce weak climbing shrub with pale brown branch-



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albuminous, sometimes exalbuminous ; cotyledons various, radicle superior.

Albumen copious :—

Cotyledons small ; petals glabrous within ; erect trees or shrubs :—

Filaments usually with short clubshaped hairs on the back ; anthers short, pendulous ; ovary erect ; petals connate ...1. **Gomphandra**.

Filaments glabrous ; anthers long, bipartite at base ; ovary oblique ; petals free .....2. **Apodytes**.

Cotyledons large, foliaceous :—

Erect trees, usually hermaphrodite ; petals villous within ; flowers in corymbose cymes ; cotyledons cordate.....3. **Mappia**.

Climbers, usually dioecious ; cotyledons orbicular or elliptic :—

Leaves palminerved, dentate :—

Flowers subcapitate on supra-axillary peduncles ...4. **Miquelia**.

Flowers in pendulous extra-axillary racemes.....5. **Natsiatum**.

Leaves entire or coarsely toothed, penninerved ; ♂ flowers in filiform spikes, ♀ in capitate heads .....6. **Pyrenacantha**.

Albumen 0 ; cotyledons large, fleshy, connate ; climbing shrubs with simple entire reticulate leaves and flowers in pendulous spikes

7. **Sarcostigma**.

### 1. **Gomphandra**, Wall.

Small trees or shrubs. *Leaves* alternate, entire, penninerved. *Flowers* small, polygamo-dioecious, in axillary or lateral cymes. *Calyx* minute, cupshaped, 4-5-lobed. *Petals* 4-5, more or less connate into a campanulate corolla, free at apex, valvate, the lobes incurved and hooked. *Stamens* 4-5, hypogynous, alternate with the petals ; filaments thick, fleshy, often connate, usually with a tuft of clubshaped hairs on the back at the apex ; anthers pendulous from the interior apex of the filaments, dehiscing longitudinally. Hypogynous *disk* thick, annular or 0. *Ovary* in ♂ flowers sunk in the disk : in ♀ flowers oblong, 1-celled ; style conic ; stigma small or discoid ; ovules 2, collateral. *Fruit* an elongate drupe, topped with the remains of the stigma, pericarp smooth, somewhat ribbed, endocarp leathery. *Seed* pendulous, longitudinally surrounded by the raphe ; albumen fleshy, hollowed ; embryo minute with very small cotyledons.

Leaves membranous, lanceolate, acuminate, main nerves about 6, joining in loops ; inflorescence axillary ; filament hairs conspicuous.

1. *polymorpha*.

Leaves subcoriaceous, very variable in shape, obtuse or obtusely acute, main nerves about 4, irregular, not obviously joining in loops; inflorescence usually leaf-opposed rarely axillary; filament hairs few or none.

2. *coriacea*.

1. GOMPHANDRA POLYMORPHA, Wt. Ill. 103; F. B. I. i. 586, *in part*.

W. Gháts, in Wynaad, Nilgiris and Anamalais in low-level Sholas up to 4,000 ft.

2. GOMPHANDRA CORIACEA, Wt. Ill. 103. *G. polymorpha*, Wt. Ic. tt. 953, 954; F. B. I. i. 586, *in part*.

W. Gháts, common in Sholas of the Nilgiris, Pulneys, Anamalais and Travancore Hills at from 3,000 to 6,000 ft.

2. **Apodytes**, E. Meyer.

Trees or shrubs. *Leaves* alternate, entire, usually turning black in drying. *Flowers* hermaphrodite, in terminal or axillary corymbose cymes. *Calyx* small, cupshaped, 5-toothed. *Petals* 5, hypogynous, free, valvate. *Disk* 0. *Stamens* 5, alternate with the petals; filaments dilated; anthers oblong, bipartite at base, 2-celled, the cells dehiscing longitudinally. *Ovary* 1-celled, obliquely gibbous; style slender; stigma small; ovules 2, pendulous, superposed. *Fruit* an obliquely ovoid compressed drupe; stone crustaceous, 1-celled, 1-seeded. *Seed* pendulous; embryo small, in the apex of fleshy albumen; cotyledons narrow.

Leaves oblong, obtuse, with revolute margins, coriaceous; petals .25 in. long; ovary hairy.....1. *Benthiana*.

Leaves broadly ovate, acute or acuminate, with flat margins, membranous; petals .15 in. long; ovary glabrous.....2. *Beddomei*.

1. APODYTES BENTHAMIANA, Wt. Ic. t. 1153; F. B. I. i. 588; Bedd. Fl. t. 140, var. *α*.

W. Gháts in the Nilgiris, Anamalais, Travancore and Tinnevelly Hills above 5,000 ft.

A medium-sized tree reaching 40 ft. in height.

2. APODYTES BEDDOMEI, Mast. in F. B. I. i. 588. *A. Benthiana*, Bedd. Fl. t. 140, var. *β*.

W. Gháts in the evergreen forests of Nilgiris, Anamalais and Travancore up to 3,000 ft.

A medium-sized tree.

3. *Mappia*, Jacq.

Trees. *Leaves* alternate, simple, penninerved. *Flowers* hermaphrodite or polygamous in terminal corymbose cymes. *Calyx* small, 5-toothed. *Petals* 5, hypogynous, valvate, villous within, apex inflexed. *Stamens* 5, hypogynous, alternate with the petals; anthers oblong, dorsifixed, dehiscing longitudinally. *Disk* cup-shaped surrounding the ovary. *Ovary* 1-celled; style short; stigma thickened; ovules 2, pendulous, collateral. *Fruit* a drupe with thinly crustaceous more or less rugose putamen. *Seed* pendulous with dorsal raphe; albumen fleshy; embryo large with foliaceous cordate cotyledons; radicle superior.

Leaves subcoriaceous, ovate, acute at apex, rounded or subcordate and unequal at base, more or less densely stellate-tomentose beneath; petiole stout 1-1.5 in. long; drupe .5 in. long, putamen rugose, flowers fetid, rather large .....1. *tomentosa*.

Leaves thickly membranous, glabrous or glabrescent; flowers medium-sized:—

Flowers not fetid; leaves ovate or obovate, abruptly acuminate, transverse nervules prominent and pale beneath; drupe 6 in. long, flattened, putamen scarcely rugose .....2. *ovata*.

Flowers fetid; transverse nervules of leaves slender, not very prominent:—

Leaves elliptic-ovate or oblong, more or less puberulous beneath and pale; rounded at base; petiole under 1 in. long .....3. *foetida*.

Leaves oblong or elliptic-oblong, glabrous, acute at base; petiole 1-1.5 in. long .....4. *oblonga*.

Leaves thinly membranous, glabrous, pale beneath, lanceolate-oblong, acuminate both at apex and base; flowers small .....5. *Wightiana*.

1. *MAPPIA TOMENTOSA*, Miers; F. B. I. i. 589.

W. Gháts, in the Nilgiri and Pulney Hills, usually above 5,000 ft.

2. *MAPPIA OVATA*, Miers; F. B. I. i. 589 *in part*.

W. Gháts, in the Nilgiri, Anamalai, Pulney and Tinnevelly Hills.

3. *MAPPIA FOETIDA*, Miers; F. B. I. i. 589. *Stemonurus?* *foetidus*, Wt. Ic. t. 955.

W. Gháts, in the Nilgiri Hills up to 7,000 ft.

A tree with greenish-grey bark and white soft wood.

4. *MAPPIA OBLONGA*, Miers; F. B. I. i. 589.

W. Gháts, in Wynaad and Malabar, up to 4,000 ft.



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A soft climber with long-petioled cordate dentate leaves and slender whitish racemes of minute flowers.

### 6. *Pyrenacantha*, Hook.

Climbing shrubs. *Leaves* alternate, entire or coarsely toothed, penninerved. *Flowers* minute, dioecious, ♂ in filiform axillary spikes, ♀ in capitate heads, monochlamydeous. *Perianth* deeply 4-lobed, lobes oblong, inflexed at tip. *Stamens* 4, alternate with the perianth-lobes; filaments short; anthers small, dehiscing longitudinally. *Ovary* in ♂ a villous pistillode, in ♀ oblong, 1-celled; style 0; stigma sessile with many radiating branches; ovules 2, pendulous, collateral. *Fruit* a drupe with thin stone provided on the inner surface with numerous obtuse horizontal spines penetrating the albumen. *Seed* solitary; albumen fleshy; cotyledons large, foliaceous.

PYRENACANTHA VOLUBILIS, Hook. Bot. Misc. ii. 108; Wt. Ill. Suppl. tt. 9. 10.

W. Gháts, in the Pulney Hills (Bourne) and Hills of Tinnevely (Beddome, etc.).

A much-branched climbing shrub with slender branchlets, narrowly rhomboid lanceolate leaves, 3-5 in. long with a pair of glands at the base, male flowers in filiform spikes, female in pedunculate capitate heads, drupe ovoid orange-red.

### 7. *Sarcostigma*, W. & A.

Climbing shrubs. *Leaves* alternate, simple. *Flowers* dioecious, minute, in distant sessile fascicles on elongate interrupted pendulous lateral spikes. *Calyx* cupshaped, unequally 4-6-lobed. *Petals* 4-6, free or united at base into a short tube, valvate, at length reflexed. *Stamens* 4-6, hypogynous, alternate with the petals: filaments slender; anthers versatile: in ♀ reduced to short subulate staminodes. *Ovary* in ♂ conical, ovules none; in ♀ sessile, 1-celled, superior; stigma umbonate, sessile; ovules 2 pendulous from the apex of the cell with thickened funicle. *Fruit* an oblong somewhat flattened drupe with woody putamen. *Seeds* pendulous; albumen 0; cotyledons fleshy, connate; radicle small, superior.

SARCOSTIGMA KLEINII, W. & A.; F. B. I. i. 594; Wt. Ic. t. 1854.

W. Gháts, in the Wynaad, Anamalais and Travancore Hills, at low elevations.

A climbing shrub with entire coriaceous oblong-lanceolate leaves up to 10 in. long, prominently reticulate, slender flowering spikes and drupe 1-1.5 in. long.

### Family XLIII. AQUIFOLIACEAE.

Trees or shrubs. Leaves alternate, simple, usually coriaceous and evergreen; stipules 0 or 2 minute. *Flowers* regular, small, usually dioecious, ♂ with imperfect ovary, ♀ with imperfect stamens, in axillary cymes fascicles or umbels. *Calyx* persistent, 3-6-lobed, the lobes imbricate. *Petals* 4-5, rarely more, connate below in both ♂ and ♀ or in ♂ only, deciduous, imbricate. *Stamens* isomerous with the petals and alternate with them, inserted on the base of the corolla; filaments subulate; anthers shortly oblong, dorsifixed. *Disk* 0. *Ovary* free, 3-6—or rarely more—celled; ovules 1 or 2 in each cell, collateral, pendulous; style 0 or very short; stigma capitate or discoid. *Fruit* a drupe with 2 or more, 1-seeded, free or connate, stones. *Seed* with a membranous testa; albumen copious, fleshy; embryo minute.

#### Ilex, Linn.

Trees or shrubs. *Calyx* 4-6-lobed. *Corolla* rotate, petals 4-6, free or connate at the base. *Stamens* isomerous with the petals, adhering to the base of the corolla in ♂, imperfect and often hypogynous in ♀. *Ovary* subglobose, 2-12-celled; stigmas free (usually so in ♂ but ovary imperfect) or confluent on the top of the ovary. *Drupe* usually globose with 2-12 stones; pericarp thick, bony, often grooved.

Leaves entire or rarely with few serratures near the apex, subcoriaceous or almost membranous:—

Flowers usually 6-merous; leaves acute at apex; drupe .15 in. in diam., tipped by prominent stigmas; large tree.....1. *malabarica*.

Flowers usually 5-merous; leaves coriaceous:—

Leaves elliptic-obovate, 1-2 in. long, mucronate or emarginate at apex, pale beneath, the midrib prominently impressed; small tree with sessile umbellules.....2. *Thwaitesii*.



Leaves elliptic or elliptic-oblongate, acuminate at apex, narrowed at base, 2-3 in. long, the midrib slightly impressed; large tree with sessile umbellules .....3. *Wightiana*.  
 Leaves ovate-lanceolate, long-acuminate at apex, rounded at base, 2-3 in. long, the midrib slightly impressed; shrub with peduncles about .5 in. long.....4. *Gardneriana*.  
 Leaves denticulate-serrate, coriaceous, elliptic, 2-4 in. long; flowers usually 4-merous, ♀ larger than ♂; large tree.....5. *denticulata*.

1. ILEX MALABARICA, Bedd. Fl. t. 143; F. B. I. i. 600.

W. Gháts, in Wynaad and lower Nilgiris, Anamalais and Pulneys at about 3,000 ft.

A large tree.

2. ILEX THWAITESII, Loesener. *I. Walkeri*, Wt. & Gardn.; F. B. I. i. 600 *in part*.

W. Gháts, in the Pulney Hills.

A small densely branched tree, with small leaves.

3. ILEX WIGHTIANA, Wall.; F. B. I. i. 603; Wt. Ic. t. 1216.

W. Gháts, common in the Sholas of the Nilgiri Hills at 6,000-8,000 ft., less so southwards to the Hills of Travancore.

A large handsome tree with white flowers and red berries. Wood greyish-white, soft but useful in building and in turnery. Vern. *Badaga* Horralu; *Tam.* Velloday.

4. ILEX GARDNERIANA, Wt. Ic. t. 1217; F. B. I. i. 603.

W. Gháts, in the Nilgiri Hills about Sispara, 6,000 ft., scarce.

A small tree or large shrub.

5. ILEX DENTICULATA, Wall.; F. B. I. i. 600; Wt. Ill. t. 142; Bedd. Fl. t. 142.

W. Gháts, Sholas of the Nilgiris, Anamalais and Pulneys at 6,000-8,000 ft.

A large tree, conspicuous in Nilgiri Sholas, by its denticulate leaves and rather large drupes. Wood grey, soft, apt to warp and shrink.



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## INTRODUCTION TO PART II.

AFTER the Introduction to Part I was in print, it was found advisable to extend the Part to 200 pages so as to end with a Family and avoid the inconvenience of stopping in the middle of a genus. The present Part, similarly, instead of ending at p. 384, has been extended to p. 390 so as to complete the first Sub-Family of the Leguminosae, and end at a definite point.

Owing to its having, in consequence of the war, been found advisable not to have the valuable Madras collections sent home, the later genera have had to be done at home without them. Fortunately, the Calcutta specimens had already been sent home and were available. It is proposed to continue Part III with such material as is available in this country.

J. S. GAMBLE.

LISS : March 1918.

# FLORA OF MADRAS.

## Family XLIV. CELASTRACEAE.

Trees or erect or climbing shrubs, sometimes thorny. *Leaves* opposite or alternate, simple; stipules caducous or 0. *Flowers* regular, hermaphrodite or polygamous, usually in dichasia. *Calyx* small, 4-5-lobed, persistent; lobes imbricate. *Petals* 4-5, inserted below the disk or continuous with its margin, imbricate. *Disk* usually conspicuous, flattened or pulvinate, lobed or entire, rarely 0. *Stamens* as many as petals and alternate with them, inserted under on or on the margin of the disk; filaments subulate; anthers 2-celled. *Ovary* on the disk or immersed in it, 2-5-celled; style short or 0; stigma simple or lobed; ovules 1-2 in each cell. *Fruit* capsular or drupaceous. *Seed* usually arillate; albumen fleshy or 0; cotyledons, when present, foliaceous.

Fruit a dehiscent capsule:—

Leaves opposite, rarely alternate:—

Petals free; disk flattened, broad, thick, 4-5-lobed:—

Ovules 2 in each cell; petals not pitted.....1. **Euonymus**

Ovules 1 in each cell; petals pitted.....2. **Glyptopetalum.**

Ovules 4 or more in each cell; petals usually crested

3. **Lophopetalum.**

Petals more or less combined with the annular disk; ovules 2 in each cell ..... 4. **Microtropis.**

Leaves alternate:—

Inflorescence paniculate or racemose:—

Flowers hermaphrodite; large trees; capsule deeply 2-lobed

5. **Kurrimia.**

Flowers polygamous; climbing shrubs; capsule 1-3-celled

6. **Celastrus.**

Inflorescence axillary, cymose; small trees or shrubs, often thorny; capsule 2-3-celled.....7. **Gymnosporia.**

Fruit indehiscent:—

Seeds albuminous, arillate; leaves small, entire; style lateral in fruit.....8. **Pleurostyliia.**

Seeds exalbuminous, exarillate; leaves usually crenate; style terminal in fruit ..... 9. **Elaeodendron.**



1. *Euonymus*, Linn.

Trees or shrubs, usually glabrous, sometimes climbing by means of stem rootlets. *Leaves* opposite; stipules deciduous. *Flowers* hermaphrodite, in axillary dichasioid cymes. *Calyx* 4-5-lobed, spreading or recurved, the lobes imbricate. *Petals* 4-5, imbricate. *Stamens* as many as the petals and alternate with them, inserted on the disk; filaments short; anthers broad, 2-celled. *Disk* large, fleshy, 4-5-lobed. *Ovary* sunk in the disk, 3-5-celled; style short, thick; stigma 3-5-lobed; ovules 2 in each cell. *Fruit* a 3-5-celled loculicidal capsule, lobed angled or winged, sometimes echinate; cells 1-2-seeded. *Seeds* enclosed in a fleshy aril; testa thick; albumen copious, oily; cotyledons broad, foliaceous; radicle inferior.

Cymes 1-3-flowered, peduncles and pedicels stout; flowers .4-.5 in. in diam., petals fimbriate; leaves entire; capsule-valves deeply obcordate ..... 1. *indicus*.

Cymes 3-7- (rarely 9-) flowered, peduncles and pedicels moderately stout; flowers .3-.4 in. in diam.; petals not fimbriate but sometimes crispate; leaves crenulate towards the apex; capsule-valves slightly obcordate ..... 2. *crenulatus*.

Cymes usually more than 7-flowered, peduncles and pedicels slender; flowers usually under 3 in. in diam.; petals entire:—

Leaves entire or nearly so; capsule-valves more or less obcordate, elongate:—

Branchlets terete; flowers .2 in. in diam.; leaves thin, oblong-lanceolate, obtusely acuminate, sometimes obscurely crenate

3. *dichotomus*.

Branchlets quadrangular; flowers .3 in. in diam.; leaves thick, ovate-lanceolate, acute, thickened on the margin, quite entire

4. *angulatus*.

Leaves prominently toothed; branchlets terete:—

Leaves lanceolate, prominently serrate, acuminate; capsule globose ..... 5. *serratifolius*.

Leaves elliptic, crenate-serrate, acute.....6. *paniculatus*.

1. *EUONYMUS INDICUS*, Heyne ex Wall.; F. B. I. i. 608; W. & A. 160. *E. Goughii*, Wt. Ic. t. 215.

W. Gháts, in S. Canara, Coorg, Wynaad and W. Nilgiris at 3,000 ft., rarely higher.

A small tree of the evergreen forests with reddish flowers.



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Cyme-peduncles 1-1.5 in. long, 5-7-flowered; capsule small, under .5 in. in diam. :—

Leaves membranous, ovate-lanceolate, serrate except at the very base, acute at apex, cuneate at base, 4-6 in. long, 1.5-2.5 in. broad, nerves slender, hardly prominent; petals oblong, about .2 in. long, the pits near the apex.....1. *zeylanicum*.

Leaves coriaceous, elliptic-obovate, entire or with few serratures at apex, more or less obtuse at apex, cuneate at base, 2-3.5 in. long, 1-2.5 in. broad, nerves thick, prominent; petals ovate, obtuse, about .1 in. long, pits oblique .....2. *Lawsonii*.

Cyme-peduncles 3-6 in. long, 3-flowered; capsule large, about .75-1 in. in diam.; leaves thinly coriaceous, elliptic-oblong, entire, 4-6 in. long, 2-2.5 in. broad; petals obovate, .3-.4 in. long, without or with obscure pits .....3. *grandiflorum*.

1. **GLYPTOPETALUM ZEYLANICUM**, Thw.; F. B. I. i. 612.

W. Gháts, Anamalai Hills and Hills of Tinnevelly and Travancore at 2,000-3,000 ft.

A large shrub or small tree, with white hard wood.

2. **GLYPTOPETALUM LAWSONII**, Gamble in Kew Bull. 1916, 131.

W. Gháts, N. slopes of Nilgiris at low elevations (Wight, Lawson), Geddesala Ghát in Coimbatore (A.W. Lushington).

A large shrub or small tree, with prominently-nerved coriaceous leaves.

3. **GLYPTOPETALUM GRANDIFLORUM**, Bedd. Ic. t. 102; F. B. I. i. 613.

W. Gháts, in Sholas below Devala, S.-E. Wynaad, at 2,000-3,000 ft.

A large shrub with oblong entire leaves, large flowers on long peduncles and a large, pale, smooth, rounded, usually 4-seeded capsule.

**3. Lophopetalum, Wight.**

Trees or shrubs. Leaves opposite or alternate, exstipulate. Flowers rather large, hermaphrodite, in axillary or terminal dichasioid cymes. Calyx broadly flattened at the base; lobes 5, broad, obtuse, very short. Petals 5, continuous with the disk, persistent, the upper surface usually cristate or lamellate. Disk large, flat, 5-lobed. Stamens 5, inserted on the disk; filaments

subulate; anthers oblong. *Ovary* small, immersed in the disk and continuous with it, triquetrous; style short; stigma capitate; ovules 4 or more in each cell, in 2 series. *Fruit* a coriaceous 3-4-angled, 3-4-celled, loculicidal capsule. *Seeds* few or many, rarely winged; arillate; albumen fleshy; embryo small.

LOPHOPETALUM WIGHTIANUM, Arn.; F. B. I. i. 615; Wt. Ic. t. 162; Bedd. Fl. t. 145.

W. Gháts, in evergreen forests and on river banks at low elevations and up to 3,000 ft., from S. Canara southwards.

A lofty evergreen tree, with oblong, entire, abruptly acuminate leaves up to 6 in. long, dull reddish flowers and capsule 4 in. long, sharply triangular in section; seeds thin, 2 in. long. Bark smooth, mottled brown and white; wood reddish-grey, close-grained, useful in carpentry, but not durable. Vern. *Tam.* Venkottei; *Mal.* Venkotta; *Kan.* Balpalé.

#### 4. *Microtropis*, Wall.

Trees or shrubs, glabrous, evergreen. *Leaves* opposite, entire, exstipulate. *Flowers* in sessile clusters or peduncled dichasioid cymes, axillary or supra-axillary, sometimes unisexual. *Sepals* 5, imbricate, often unequal. *Petals* 5, more or less connate at the base with the back of the disk. *Disk* annular, sometimes 0. *Stamens* 5, inserted on the disk. *Ovary* free, ovoid or conical, imperfectly 2-3-celled; style short; stigma minutely 2-4-lobed; ovules 2 in each cell, collateral. *Fruit* an ovoid or oblong, 1-celled, 2-valved, 1-seeded capsule, surrounded at the base by the persistent calyx. *Seed* erect, oblong; testa more or less fleshy; albumen thickly fleshy; cotyledons foliaceous; radicle cylindrical, inferior.

Flowers sessile, clustered at the axils of the leaves or of fallen leaves:—

Leaves scarcely coriaceous, elliptic or oblanceolate, obtusely acute at apex, long-attenuate at base, 1.5-4 in. long, 1-2 in. broad; flowers very small, in clusters under .3 in. in diam; capsule .5-.7 in. long; branchlets yellowish, youngest darker .....1. *Wallichiana*.  
Leaves coriaceous, elliptic or somewhat oblanceolate, obtusely acute at apex, cuneate at base, margins reflexed, nerves prominent on lower less so on upper surface, 3-6 in. long, 1-2.5 in. broad; flowers small, in clusters about .5 in. in diam.; capsule oblong, .7-.8 in. long; branchlets black-purple.....2. *Stocksii*.

Leaves very coriaceous, margins thickened; branchlets black-purple, rough :—

Leaves elliptic-ovate, acuminate at apex, cuneate to almost rounded at base, prominently rugulose above, the nerves obscure on both surfaces, 4–7 in. long, 2–4·5 in broad; flowers small, in clusters ·5–·6 in. in diam.; capsule ellipsoid, ·7 in. long ..... 3. *latifolia*.

Leaves broadly elliptic or obovate, rounded or slightly emarginate at apex, rounded or subcordate at base, margins revolute, cucullate, slightly rugulose above, 2–5 in. long, 1–2·5 in. broad; flowers small, in clusters ·6 in. in diam.; capsule cylindrical when young, ellipsoid when old, channelled, ·8 in. long

4. *ramiflora*.

Flowers in axillary or extra-axillary peduncled cymes; leaves more or less elliptic, obtuse :—

Peduncles very short, ·3–·4 in. long, stout; cyme-branches short; leaves up to 3 in. long 1·5 in. broad; capsule narrowly oblong, ·75 in. long. .... 5. *densiflora*.

Peduncles ·6–1·5 in. long, slender :—

Leaves when dry olive-grey, usually under 2 in. long; petals orbicular, not clawed, scarcely adherent to the narrow disk; stamen-filaments short, anthers orbicular, large; seed testa rusty-brown (Wt.) ..... 6. *microcarpa*.

Leaves when dry greenish-brown, dark above, pale beneath, usually 2–3 in. long; petals long-clawed, the claws adherent to the rather broad disk; stamen-filaments subulate, anthers ovoid; seed testa crimson (Wt.) ..... 7. *ovalifolia*.

1. *MICROTROPIS WALLICHIANA*, Wt.; F. B. I. i. 613.

W. Gháts, Sampagi Ghát, Coorg (Beddome), evergreen forests of Travancore about 4,000 ft. (Bourdillon).

A small tree about 30 ft. high.

2. *MICROTROPIS STOCKSII*, Gamble in Kew Bull. 1916, 132.

W. Gháts, in Coorg (Hohenacker), Nilgiris, Anamalai Hills (Barber); Tinnevely Hills at 5,000 ft. (Beddome); Concan (Stocks).

A small tree with blackish branches and leaves pale and reticulate beneath.

3. *MICROTROPIS LATIFOLIA*, Wt.; F. B. I. i. 613.

W. Gháts, in Malabar, W. Nilgiris, Bolampatti Hills, at 2,000–6,000 ft.



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W. Gháts, in the Anamalai Hills and Hills of Tinnevelly and Travancore, in evergreen forests, at 3,000–6,000 ft.

A very large tree with coriaceous conspicuously-nerved large leaves, pale yellow flowers and a capsule with 2 oblong equal (when both fertile) lobes 1.5 in. long. The wood is pale greyish-brown and moderately hard. Vern. *Tam.* Kadaplá.

### 6. Celastrus, Linn.

Climbing unarmed shrubs. *Leaves* alternate, entire or crenulate; stipules 0 or minute and deciduous. *Flowers* polygamous, in terminal or axillary racemes or panicles. *Calyx* 5-lobed, lobes imbricate. *Petals* 5, spreading. *Disk* broad, concave, 5-lobed. *Stamens* 5, inserted on the margin of the disk, in ♀ more or less rudimentary; filaments short; anthers oblong. *Ovary* in ♂ flowers rudimentary, conical, 3-lobed; in ♀ flowers globose, 3-celled; style short, thick; stigmas 3, recurved; ovules 2 in each cell, collateral, erect. *Fruit* a globose or ovoid, 1–3-celled, loculicidal capsule, 1–6-seeded. *Seeds* erect, enclosed in a fleshy aril; testa-chartaceous; albumen copious, fleshy; embryo erect with leafy cotyledons.

CELASTRUS PANICULATA, Willd.; F. B. I. i. 617; W. & A. 158; Wt. Ill. t. 72, Ic. t. 158.

In all Districts, chiefly in deciduous forests.

A large climbing shrub with ovate or obovate crenulate leaves, small white flowers in pendent panicles and yellow capsules opening to show the brown seeds covered with a scarlet aril. Vern. *Hind.* Malkagni; *Ur.* Korsano; *Kan.* Kariganne; *Tam.* Valuluvai.

### 7. Gymnosporia, W. & A.

Shrubs or small trees, usually thorny. *Leaves* alternate, exstipulate. *Flowers* hermaphrodite, in axillary, solitary or fascicled dichotomous cymes, sometimes on the thorny branchlets. *Calyx* 4–5-lobed. *Petals* 4–5, spreading. *Disk* broad, lobed or sinuate. *Stamens* as many as petals, inserted below the disk; filaments slender; anthers broad. *Ovary* attached by a broad base to or sunk in the disk, 2–3-celled; style usually short; stigmas 3, capitate or spreading; ovules 2 in each cell. *Fruit* a globose or obovoid 2–3-celled 1–4-seeded capsule. *Seeds* usually arillate,

rarely exarillate; testa coriaceous; albumen fleshy; cotyledons foliaceous; radicle inferior.

Aril of seed thin, membranous:—

Aril embracing about half of the seed or more, sometimes 0; leaves obovate, obtuse, minutely crenate, grey when dry; flowers minute, in cymes under 1 in. long; capsules globose, .2 in. in diam.

1. *montana*.

Aril usually embracing nearly the whole seed; leaves ovate-lanceolate, obtusely acute, minutely crenate-serrate, reddish when dry; flowers rather large, in capillary cymes about 1 in. long fascicled on the branches; capsules obovoid; .3 in. in diam. .... 2. *rufa*.

Aril of seed fleshy, embracing only the base of the seed:—

Leaves lanceolate, acuminate, up to 6 in. by 2 in.; capsule obcordate, .3 in. by .4 in. .... 3. *acuminata*.

Leaves ovate, obtusely acute, up to 4 in. by 2.5 in.:—

Flowers large, in paniced cymes up to 4 in. long; capsule slightly obcordate, nearly .5 in. long; leaves serrate, cuneate at base

4. *Heyneana*.

Flowers very small. Cymes up to 1.5 in. long; capsule obovoid, .4–.5 in. long; leaves crenulate, reticulate, rounded or subcordate

5. *ovata*.

Leaves obovate, entire, emarginate, 1–2 in. long; flowers very small, in fascicles .5 in. long; capsule pale, slightly obcordate, .3 in. long}..... 6. *emarginata*.

Aril flat, very small, attached to the base of the seed; leaves obovate, obtuse or emarginate, crenate, cuneate at base; flowers small, in fascicles of cymes under 1 in. long; capsule large, slightly obcordate, .5 in. long..... 7. *Wallichiana*.

1. GYMNOSPORA MONTANA, Benth.; F. B. I. i. 621. *Celastrus montana*, W. & A. 159; Wt. Ic. t. 382.

N. Circars and Deccan, common in dry forests; N. slopes of Nilgiris.

A small tree or large shrub with prominent straight thorns often bearing leaves and flowers. Wood light reddish-brown, close-grained. Vern. *Hind.* Baikal; *Tel.* Danti; *Kan.* Tandras.

2. GYMNOSPORA RUFA, Lawson; F. B. I. i. 620.

E. Gháts, in Ganjam and Vizagapatam, up to 4,500 ft. on Mahendragiri; Hills of N. Coimbatore.

A small tree with few straight thorns and red close-grained wood.



3. *GYMNOSPORA ACUMINATA*, Hook. f.; F. B. I. i. 619.  
E. Gháts, Mahendragiri Hill in Ganjam at 4,500 ft. (Gamble); Hills of Vizagapatam at 3,500–4,500 ft. (A. W. Lushington).  
A large shrub with small straight sharp thorns and rather thin leaves.
4. *GYMNOSPORA HEYNEANA*, Lawson; F. B. I. i. 620.  
*Celastrus Heyneana*, W. & A. 159.  
W. Gháts, in N. Nilgiris, Pulneys and Travancore Hills, in dry deciduous forest.  
A shrub with rather large leaves, rather large flowers, and few straight stout thorns. Vern. *Tam.* Nandunarai.
5. *GYMNOSPORA OVATA*, Lawson; F. B. I. i. 619, *Celastrus ovata*, Wall.; W. & A. 159.  
W. Gháts, in the Nilgiri and Pulney Hills at 3,000–6,000 ft., most frequent in Nilgiris, N. slopes.  
An unarmed shrub with coriaceous, ovate or orbicular leaves and very small flowers, in dense fascicles .5 to 1.5 in. long.
6. *GYMNOSPORA EMARGINATA*, Lawson; F. B. I. i. 621.  
*Celastrus emarginata*, Willd.; W. & A. 160.  
N. Circars, Deccan and Carnatic, in dry deciduous forests, often on laterite, extending west to the slopes of the Nilgiris and Anamalais.  
A shrub with pale leaves, long straight thorns frequently bearing leaves and flowers, whitish-grey bark and white hard wood. Vern. *Ur.* Gouro kosai; *Tel.* Chinta.
7. *GYMNOSPORA WALLICHIANA*, Lawson; F. B. I. i. 621.  
*Celastrus Wallichiana*, W. & A. 159.  
Deccan, in Mysore (G. Thomson); S. Carnatic, in the Tinnevelly Hills (Wight, Barber, Fischer).  
A shrub with zigzag branches and long straight thorns frequently bearing leaves and flowers.

#### 8. *Pleurostyli*a, W. & A.

Shrubs or small trees. Leaves opposite, entire, coriaceous, exstipulate. Flowers in axillary few-flowered cymes. Calyx 5-lobed, very small. Petals 5. Disk thick, crenulate. Stamens 5, attached below the margin of the disk; filaments short, flat; anthers with the connective broad at the back. Ovary half



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A graceful tree with a grey bark and light brown close-grained wood, useful for cabinet work. Vern. *Hind.* Jamrási; *Tel.* Nirija; *Tam.* Karuváli.

2. ELAEODENDRON PANICULATUM, W. & A. 157. *E. glaucum*, Pers. F. B. I. i. 623 *in part*.

W. Gháts, N. slopes of Nilgiri and Anamalai Hills up to 3,000 ft.

A large tree.

### Family XLV. HIPPOCRATEACEAE.

Small trees or erect or climbing shrubs. *Leaves* opposite or alternate, simple, somewhat coriaceous. *Flowers* usually very small, in axillary dichotomous cymes. *Calyx* 5-lobed, lobes imbricate. *Petals* 5, inserted under the disk, imbricate, or valvate. *Disk* fleshy, cupshaped, sometimes ringed at the base. *Stamens* 3, inserted on or within the top of the disk, at first erect, then recurved. *Ovary* more or less sunk in the disk, 3-celled; style 1; stigmas 1-3; ovules 2 or more in each cell, on an axile placenta. *Fruit* of samaroid carpels or fleshy and 1-3-celled. *Seeds* usually many, often angular, sometimes winged; albumen 0; embryo straight; cotyledons fleshy.

Fruit samaroid, flattened, dehiscent, the seeds winged below

1. **Hippocratea.**

Fruit globose, indehiscent, seeds not winged.....2. **Salacia.**

#### 1. Hippocratea, Linn.

Climbing shrubs. *Leaves* opposite, petioled, more or less crenate-serrate; stipules small, caducous. *Flowers* in axillary, rarely terminal, cymes or panicles, white or greenish. *Calyx* small, 5-lobed. *Petals* 5, spreading, imbricate or valvate. *Disk* cylindrical or cuplike. *Stamens* 3, at first erect, then recurved, inserted on or within the top of the disk; filaments dilated at base; anthers 2-celled, cells opening transversely. *Ovary* 3-celled, sunk in the disk; style short; stigmas 1-3; ovules 2-seriate, 2-10 in each cell, on the inner angle. *Fruit* of three flattened carpels, connate below, each 2-valved or indehiscent. *Seeds* compressed, usually winged below; albumen 0; embryo with fleshy connate cotyledons; radicle inferior.

Flowers 3-5 in. in diam. :—

Petals triangular lanceolate, valvate; leaves under 4 in. long :—

Petals not mucronate at back, glabrous within; leaves sub-coriaceous, elliptic-ovate or -obovate, attenuate at base, margins not recurved; samaras obovate, emarginate, striate, 1.5-2 in. long, broad.....1. *obtusifolia*.

Petals mucronate at back, puberulous within; leaves coriaceous, oblong, rounded at base, margins recurved; samaras not yet known ..... 2. *Bourdillonii*.

Petals orbicular, with a narrow claw, imbricate; leaves coriaceous, elliptic, up to 7 in. long; samaras oblanceolate, narrow, obtuse, striate, up to 3 in. long ..... 3. *Arnottiana*.

Flowers 2 in. in diam.; leaves membranous, under 2 in. long; samaras 1.5 in. long, narrow, acute ..... 4. *indica*.

1. HIPPOCRATEA OBTUSIFOLIA, Roxb.; F. B. I. i. 623; W. & A. 104.

E. Coast, from Nellore to Tanjore in sandy forest tracts; Deccan, in dry forests of Cuddapah and Kurnool, extending to E. slopes of Nilgiri and Pulney Hills; W. Coast, scarce.

A climbing shrub with corky bark and wood of peculiar structure. Vern. *Mar. Danshir*.

2. HIPPOCRATEA BOURDILLONII, Gamble in Kew Bull. 1916, 132.

Travancore, near Colatoorpolay, 300 ft. (Bourdillon).

A climbing shrub.

3. HIPPOCRATEA ARNOTTIANA, Wt. Ill. t. 46-47; F. B. I. 624.

W. Coast and W. Gháts forests from S. Canara to Malabar and Travancore.

A climbing shrub with rather large leaves and long, narrow samaras, at once recognized by the orbicular clawed petals.

4. HIPPOCRATEA INDICA, Willd.; F. B. I. i. 624; Roxb. Cor. Pl. ii. 130; W. & A. 104.

N. Circars, in Vizagapatam; Carnatic, in S. Arcot and Tanjore; E. slopes of W. Gháts, in Coimbatore, Madura and Tinnevely.

A climbing shrub with rather small leaves and small fruit samaras.

2. *Salacia*, Linn.

Small trees or climbing or sarmentose shrubs. *Leaves* opposite, rarely alternate, exstipulate. *Flowers* small, axillary or extra-axillary, in fascicles or cymes. *Calyx* small, 5-lobed. *Petals* 5, imbricate. *Disk* thick, broad. *Stamens* 3, inserted on the inner margin of the disk; filaments at length recurved, usually broadened at base. *Ovary* conical, more or less sunk in the disk, 3-celled; style very short; stigma capitate or 3-lobed; ovules 2-8 in each cell in 1-2 series. *Fruit* an indehiscent 1-3-celled berry; rind usually coriaceous. *Seeds* large, angular; testa thick; albumen 0; cotyledons thick, usually conferruminate; radicle inferior.

Flowers fascicled on axillary tubercles; ovary enclosed in the disk; anther-cells dehiscing transversely:—

Calyx-lobes not fringed:—

Petals clawed at the base; pedicels .15-.2 in. long; branchlets more or less angled; leaves elliptic-lanceolate, crenate-serrate, up to 3 in. long; fruit small.....1. *prinoides*.

Petals broad at the base; branchlets more or less prominently lenticellate, terete:—

Pedicels .25 in. long; petals .15 in. long, thick; calyx-lobes short, obtuse; leaves coriaceous, ovate- or obovate-oblong, reticulate, 2.5 to 3.5 in. long by 1.5-2 in. broad; fruit large, tuberculate.....2. *reticulata*.

Pedicels .5 in. long; petals .1 in. long, with white margins; calyx-lobes short, ovate; leaves chartaceous, oblong, 4-6 in. long by 1.5-2 in. broad.....3. *malabarica*.

Calyx-lobes fringed; pedicels very short; branchlets lenticellate; leaves coriaceous:—

Leaves elliptic-oblong or -ovate, 2-3 in. long by 1.5 in. broad, main nerves irregular, oblique; calyx-lobes shortly fringed; fruit large, smooth.....4. *macrosperma*.

Leaves elliptic oblong, 5-6 in. long by 2-2.5 in. broad, main nerves regular, nearly horizontal; calyx-lobes long and prominently fringed.....5. *Beddomei*.

Flowers in axillary pedunculate heads or branching cymes; anther-cells dehiscing longitudinally:—

Peduncles very short; ovary elongate, conical, much exsert from the disk; leaves elliptic-oblong or -oblanceolate, yellowish when dry; calyx-lobes entire; fruit large, tuberculate.....6. *oblonga*.



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rarely 0, inserted on the throat of the calyx-tube and shorter than its lobes, cucullate, often clawed. *Disk* fleshy and filling the calyx-tube or membranous and lining it, glabrous or tomentose. *Stamens* as many as and opposite to the petals, often enclosed within them; anthers 2-celled, dehiscing longitudinally, rarely laterally. *Ovary* sessile, free or immersed in the disk, 3- rarely 2- or 4-celled; style short, simple or 2-4-lobed; stigmas terminal, usually capitate. *Fruit* superior or inferior, 3-, rarely 4-celled, free or girt more or less by the adnate calyx-tube, capsular or a dry or fleshy drupe, sometimes winged. *Seeds* solitary in each cell, erect, usually compressed; albumen fleshy, scanty or rarely 0; embryo large, the cotyledons flat.

Fruit superior or only partly enclosed in the calyx-tube:—

Fruit 1-seeded, the style enlarged in a linear-oblong wing; unarmed climbing shrubs; seeds exalbuminous.....1. **Ventilago.**

Fruit a dry or fleshy drupe with 1-4-seeded stone; armed or unarmed trees or shrubs with 3-5-ribbed leaves; seeds with scanty albumen or none.....2. **Zizyphus.**

Fruit baccate with 2-4 pyrenes; seeds albuminous, the albumen often thin:—

Disk thin, lining the calyx-tube; trees or shrubs usually unarmed, leaves alternate.....3. **Rhamnus.**

Disk fleshy, filling the calyx-tube; leaves opposite or sub-opposite:—

Glabrous shrub with many sharp hooked thorns and small coriaceous shining leaves; flowers in axillary fascicles or umbels.....4. **Scutia.**

Straggling, more or less pubescent, shrubs with few but often large thorns; leaves rather large, chartaceous; flowers in spicate panicles.....5 **Sageretia.**

Fruit when ripe capsular; leaves alternate; unarmed, erect or sarmentose shrubs; flowers in short axillary cymes...6. **Colubrina.**

Fruit inferior, crowned with the persistent calyx; climbing shrubs with tendrils:—

Fruit of 3 winged indehiscent mericarps; flowers in spikes or racemes; disk lobed between the stamens.....7. **Gouania.**

Fruit of 3 ovoid dehiscent cocci; flowers in axillary pedunculate umbels; disk merely angular.....8. **Helinus.**

1. *Ventilago*, Gaertn.

Climbing shrubs. Leaves alternate, bifarious, usually crenate; stipules very small, caducous. Flowers small, in axillary or terminal panicles, rarely fascicles; bracteoles many, small. Calyx 5-lobed; lobes spreading, keeled within. Petals 5, deltoid or obcordate, cucullate. Stamens 5, adnate to the base of the petals and opposite to them; connective of anthers thickened and produced above. Disk flattened, 5-angled. Ovary sunk in the disk, 2-celled; style very short; stigmas 2, short; ovules solitary in each cell. Fruit a subglobose, 1- (rarely 2-) seeded nut, prolonged above by the style enlarged in a linear-oblong coriaceous wing, ending in the remains of the stigmas, the base more or less enclosed in the adherent calyx-tube. Seed subglobose; testa thin; albumen 0; cotyledons thick, fleshy.

Flowers in axillary and subterminal panicles:—

Calyx-tube adnate to the lower part of the nut:—

Branchlets stout, grey-puberulous; leaves ovate or elliptic-ovate, usually unequally rounded at base, 3-6 in. long by 1.5-3 in. broad; panicles dense, flowers rather large, disk villous; nut and its wing yellow-pubescent, the calyx-tube covering more than half the nut.....1. *calyculata*.

Branchlets rather slender, minutely puberulous; leaves oblong-lanceolate, subobtuse, attenuate at base, 2-3 in. long by about 1 in. broad; panicles slender, flowers small, disk glabrous or nearly so; nut and its wing greyish, the calyx-tube covering about one-third of the nut.....2. *Goughii*.

Calyx-tube adnate only to the base of the nut; disk glabrous or nearly so:—

Branchlets slender, usually pale; leaves ovate or ovate-lanceolate, obtuse or acute, 1.5-3.5 in. long by 1-1.5 in. broad; panicles minutely grey-pubescent, flowers small; nut with grey nearly glabrous wing, the calyx-tube small, adnate to the base of the nut.....3. *maderaspatana*.

Branchlets stout, dark; leaves oblong-lanceolate, long-acuminate, strongly crenate, 2.5-4 in. long, by 1-1.5 in. broad; panicles long-golden-villous pubescent, flowers very small; nut with brown tomentose wing, the calyx-tube saucer-like, embracing the base of the nut.....4. *lanceolata*.

Flowers in axillary fascicles; branchlets slender, pubescent; leaves oblong, 1.5-4.5 in. long by 0.5-1.5 in. broad; disk slightly villous;



calyx-tube saucer-like, embracing the base of the nut, wings with golden-velvety pubescence.....5. *bombaiensis*.

1. *VENTILAGO CALYCVLATA*, Tul.; F. B. I. i. 631. *V. maderaspatana* var.  $\beta$ ; W. & A. 164.

N. Circars, from Ganjam to Godavari in forest tracts; Deccan, in Kurnool forests; W. Coast, in dry forests of Malabar and E. Nilgiris.

A large and conspicuous forest climber. Vern. *Tel.* Surati chekka.

2. *VENTILAGO GOUGHII*, Gamble in Kew Bull. 1916, 134.

W. Gháts in Coorg and Nilgiris (Gough, Lawson).

A climbing shrub.

3. *VENTILAGO MADERASPATANA*, Gaertn.; F. B. I. i. 631; Wt. Ic. t. 163; W. & A. 164, var. *a*.

Deccan forests from Kistna to Mysore and Coimbatore; W. Gháts, chiefly on E. slopes.

A climbing slender shrub. The root bark gives a dye. The leaves are very variable in shape, but always distinguishable from those of *V. calyculata* both in size and venation. Vern. *Tel.* Surati chekka; *Tam.* Vempadam.

4. *VENTILAGO LANCEOLATA*, Gamble in Kew Bull. 1916, 134.

W. Gháts, in Malabar and Tinnevely (Barber, Lawson).

A climbing shrub with nearly black branches.

5. *VENTILAGO BOMBAIENSIS*, Dalz.; F. B. I. i. 631; Bedd. Ic. t. 114 (under *Zizyphus wynadensis*, Bedd. corrected in Index p. iii).

Moist woods in Wynaad at 3,000 ft. (Beddome).

## 2. *Zizyphus*, Juss.

Trees or erect or climbing shrubs, usually armed with sharp straight or hooked thorns, which are transformed stipules thorns solitary or in pairs, usually one straight, the other curved. *Leaves* alternate, subdistichous, 3-5-ribbed. *Flowers* small, greenish or yellowish, in axillary fascicles or in sessile or peduncled cymes. *Calyx* with broadly obconic tube and 5 triangular acute lobes keeled within, lobes valvate. *Petals* 5, or rarely 0, cucullate, deflexed. *Stamens* 5, opposite to and enclosed in the petals and usually longer than them. *Disk* 5-10-lobed, flat or pitted, the margin free. *Ovary* sunk in or adnate at the



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cultivated in and near villages and thence run wild on waste lands.

A low much-branched thorny tree with erect often thick stem and rounded head, the leaves suborbicular, fulvous-tawny beneath. Bark dark grey, nearly black, with irregular cracks. Wood hard, reddish, tough and strong, in regular use for saddle-trees and many other purposes and a good fuel. The fruit is edible. Vern. *Hind.* Bér; *Ur.* Borokoli; *Tel.* Rengha; *Tam.* Yellande, Ilantha; *Kan.* Yelchi; *Mal.* Cherumali.

Var. *fruticosa*, Haines, a shrub with small leaves, smooth very thorny branches and small fruit. Much used for fencing purposes.

Circars, Deccan and Carnatic, from Godavari to Tinnevely, chiefly on stony waste lands.

2. *ZIZYPHUS NUMMULARIA*, W. & A. 162; F. B. I. i. 633.

Deccan and Carnatic, in dry stony scrub forests, common on black cotton soil.

A small shrub with small leaves, divaricating very thorny zigzag branches and small fruit. The stems are cut for fencing purposes.

3. *ZIZYPHUS TRINERVIA*, Roxb. *Z. glabrata*, Wt. Ic. t. 282; W. & A. 162; F. B. I. i. 633.

W. Gháts on the E. side, in Coimbatore, Nilgiris and Anamalais to S. Travancore at low elevations, in dry localities.

A small unarmed tree up to 30 ft. high with a hard olive-brown wood. Vern. *Tam.* Kottei, Karukava; *Mal.* Karkala.

4. *ZIZYPHUS OENOPLIA*, Mill.; F. B. I. i. 634; W. & A. 163.

Almost all Districts, especially in dry forest localities and open bushy places.

A large, very thorny, straggling or climbing shrub. The branches are used in fencing, and the small black fruits are pleasant to eat. Vern. *Hind.* Makoh; *Ur.* Barokoli; *Tel.* Paranu, Pariki; *Tam.* Kottei; *Mal.* Múlli.

5. *ZIZYPHUS XYLOPYRUS*, Willd.; F. B. I. i. 634; W. & A. 162.

Almost all Districts in dry deciduous forests.

A large straggling shrub or small tree with globose,

velvety, sometimes nearly glabrous, fruit and 3-celled hard nut. The leaves are very white woolly when young but nearly glabrous when old. Wood reddish-brown, hard, similar to but not quite so good as that of *Z. Jujuba*. Vern. *Hind.* Kathér; *Ur.* Goto; *Tel.* Got; *Tam.* Kottel; *Mal.* Kotta.

Var. *acuta*, Gamble. *Leaves* ovate-acuminate, 3-3.5 by 1.5-2 in., very unequal at base. *Berry* ovoid, acute at apex, .75 in. long, velvety.

Upper Godavari Forests (Gamble).

6. *ZIZYPHUS HORRIDA*, Roth; F. B. I. i. 636; W. & A. 163.

Deccan, in Kurnool and Mysore in dry forests and scrub lands.

A shrub with very thorny branches, occasionally a small tree, the thorns with very broad bases. Leaves sub-orbicular, ovate or elliptic, serrate, nearly glabrous.

7. *ZIZYPHUS RUGOSA*. Lamk.; F. B. I. i. 636; W. & A. 162; Wt. Ic. t. 339.

All Forest Districts and up to 6,000 ft. in the W. Gháts, chiefly in dry deciduous forest localities.

A large straggling thorny shrub or small tree with large elliptic usually cordate leaves, paniculate flowers and small fruit. Wood reddish, moderately hard. Vern. *Hind.* Suran; *Ur.* Chunu koli; *Tam.* Charai; *Mal.* Thodali.

### 3. *Rhamnus*, Linn.

Small trees or shrubs. *Leaves* alternate, rarely subopposite, penninerved; stipules small, deciduous. *Flowers* hermaphrodite or polygamous, in axillary fascicles or in simple or compound racemes. *Calyx*-tube urceolate, lobes 4-5, keeled within. *Petals* 4-5 or 0, flat or cucullate. *Disk* lining the calyx-tube, the margin thin. *Stamens* as many as and opposite to the petals; filaments short; anthers oblong, in ♀ flowers very small. *Ovary* free, globose or ovoid, 3-4-celled; styles distinct or somewhat connate; stigmas small, papillose. *Fruit* a fleshy berry-like drupe, seated on the persistent calyx-tube; pyrenes 2-4, crustaceous. *Seed* obovoid; testa membranous or crustaceous; albumen fleshy; cotyledons flat, recurved at the margins; radicle short.

Branchlets ending in spines; flowers usually 4-merous, long-pedicel-

late, fascicled in the axils of the also usually fascicled membranous leaves; drupe 1-2-celled .....1. *virgatus*.  
Branchlets without spines; flowers 5-merous, short-pedicelled, in cymes or racemes; leaves not fascicled; drupe 3-celled:—

Leaves subcoriaceous, ovate-oblong, closely serrate, usually acute at base, nerves prominent, about 8 pairs.....2. *Wightii*.

Leaves chartaceous, elliptic-oblong, distantly crenate-serrate, usually rounded at base, nerves hardly prominent, about 6 pairs

3. *nepalensis*.

1. *RHAMNUS VIRGATUS*, Roxb. *R. dahuricus* var. *hirsutus*, Lawson; F. B. I. i. 639. *R. hirsutus*, W. & A. 165.

W. Gháts, in the Nilgiris, Pulneys and the Hills of Tinnevely at 5,000-7,000 ft.

A shrub or small tree of forest undergrowth with leaves usually small but sometimes reaching 3 in. in length.

2. *RHAMNUS WIGHTII*, W. & A. 164; Wt. Ic. t. 159; F. B. I. i. 639.

W. Gháts in the Nilgiri and Pulney Hills, up to 7,000 ft.

A large shrub.

3. *RHAMNUS NEPALENSIS*, Lawson; F. B. I. i. 640.

E. Gháts, Mahendragiri Hill in Ganjam, 4,500 ft. (Gamble), Madgol Hills of Vizagapatam at 3,000 ft. (A. W. Lushington).

A large shrub.

#### 4. *Scutia*, Commers.

Glabrous shrubs, usually armed with sharp-hooked thorns which are abortive branchlets, from the leaf-axils. Leaves opposite or subopposite, coriaceous, penninerved. Flowers hermaphrodite, small, in axillary fascicles or short-peduncled umbels. Calyx-tube turbinate; lobes 5, ovate, acute, thickened at the apex. Petals 5, clawed, emarginate, flat or cucullate. Disk adnate to the calyx-tube, cupshaped, the margin free, undulate. Stamens 5, as long as the petals. Ovary ovoid or globose, sunk in the disk, 2-4-celled; style short; stigmas 2-4, papillose. Fruit obovoid or subglobose, dry or slightly fleshy, girt at the base by the persistent calyx-tube; pyrenes 2-4, crustaceous, compressed; seeds compressed; testa membranous; albumen thin or 0; cotyledons plano-convex, fleshy.



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cymes. *Calyx*-tube hemispheric, lobes 5, keeled within. *Petals* 5, inserted below the disk, clawed, cucullate. *Disk* fleshy, 5-angled, filling the calyx-tube. *Stamens* 5, enclosed within the petals; filaments filiform. *Ovary* subglobose, sunk in the disk, 3-celled; style 3-cleft; stigmas obtuse, papillose. *Fruit* a 3-celled subglobose drupe, surrounded below the middle by the remains of the calyx-tube, later on capsular, loculicidally dehiscing, cells 1-seeded. *Seeds* obovoid compressed; testa coriaceous; albumen thin; cotyledons suborbicular, cordate, flattened.

Glabrous shrub; leaves ovate, obtusely acuminate at apex, rounded or cordate at base, 1.5-3 in. long, 1-2 in. broad; cymes slender

1. *asiatica*.

Large shrub with young branches, young leaves and inflorescence golden-pubescent; leaves oblong-lanceolate, acuminate at apex, rounded at base, 3-6 in. long, 1.5-2.5 in. broad; cymes rather stout

2. *travancorica*.

1. COLUBRINA ASIATICA, Brongn.; F. B. 1. i. 642; W. & A. 166; Wt. Ill. i. t. 74.

Coimbatore District (Beddome), often planted, especially near the coast.

2. COLUBRINA TRAVANCORICA, Bedd. Ic. t. 188; F. B. I. i. 643. E. Coast, in Travancore (Wight, Bedd., Bourdillon).

### 7. *Gouania*, Linn.

Unarmed shrubs, climbing by means of tendrils on the branchlets and at the base of the inflorescence. *Leaves* alternate, penninerved, petiolate; stipules lanceolate, deciduous. *Flowers* small, polygamous, in fascicles in interrupted axillary or terminal spikes or racemes. *Calyx*-tube short, obconic; lobes 5. *Petals* 5, inserted below the margin of the disk, cucullate. *Disk* flat or concave, filling the calyx-tube, with 5 rounded or horn-like lobes alternate with the stamens. *Stamens* 5, enclosed within the petals. *Ovary* sunk in the disk, 3-celled; style 3-cleft; stigmas minute, papillose; ovules solitary. *Fruit* coriaceous, inferior, tipped by the persistent calyx-lobes, of 3 separable indehiscent dry mericarps, attached to a central filiform receptacle, and produced on each side in rounded wings. *Seeds* plano-convex, obovate; testa hard, shining; albumen fleshy; cotyledons ovate, cordate at base, retuse at apex; radicle small.

Disk villous, the lobes rounded; leaves elliptic-ovate, gradually acuminate, rounded at base; entire or slightly crenate-serrate; inflorescence densely whitish-pubescent; mericarps small, .4 in. broad, .3 in. high .....1. *microcarpa*.

Disk glabrous, the lobes stellately horned; leaves ovate, abruptly acuminate, subcordate at base, crenate-serrate; inflorescence merely puberulous; mericarps larger, .5-.6 in. broad, .4-.5 in. high

2. *leptostachya*.

1. *GOUANIA MICROCARPA*, DC.; F. B. I. i. 643; W. & A. 167.

W. Gháts, in all Districts from S. Canara and Mysore southwards, up to about 3,000 ft.

A large climbing shrub. Wt. Ic. t. 974 does not agree with either this or the next.

2. *GOUANIA LEPTOSTACHYA*, DC.; F. B. I. i. 643; W. & A.

166. *G. tiliaefolia*, Roxb. Cor. Pl. i. t. 98.

Forests of the N. Circars (see Roxb. W. & A., etc.).

A large climbing shrub. Vern. *Tel.* Penki tiga.

### 8. *Helinus*, E. Meyer.

Unarmed shrubs, climbing by means of tendrils; branches slender, angular. *Leaves* alternate, petiolate, entire; stipules small, deciduous. *Flowers* small, umbellate, on long slender axillary peduncles. *Calyx*-tube broadly obconic; lobes 5, superior. *Petals* 5, inserted on the margin of the disk, cucullate. *Disk* epigynous, filling the calyx-tube, 5-angled. *Stamens* 5, as long as the petals. *Ovary* inferior, 3-celled; style short, 3-cleft; stigmas small, recurved; ovules solitary. *Fruit* obovoid-globose, 3-celled, tardily separating into 3 crustaceous cocci attached to a central axis, the cocci dehiscent interiorly. *Seeds* plano-convex, shining; testa leathery, shining; albumen fleshy; cotyledons large, flat, obtuse; radicle very short.

*HELINUS LANCEOLATUS*, Brand.; F. B. I. i. 644.

E. Gháts, hilly country of Ganjam (Barber), Godavari (Beddome).

A slender climber with ovate-lanceolate entire leaves, 1-2.5 in. long, and flowers in long-stalked umbels.

*Noltia africana*, Harv. & Sond. is a Cape shrub which has been introduced into and has more or less run wild in the Nilgiris.



Species of *Pomaderris* and *Ceanothus* are grown in hill gardens as ornamental shrubs.

### Family XLVII. VITACEAE.

Small trees or erect or climbing shrubs, the latter usually tendril-bearing, stems and branches nodose. *Leaves* alternate, simple lobed digitate or pedate, sometimes pinnate or bipinnate; petiole usually thickened at the articulate base; stipules 2. *Flowers* regular, hermaphrodite or unisexual, in paniced umbelled or spicate cymes usually opposite the leaves, peduncles often transformed into tendrils or tendril-bearing. *Calyx* small, entire or 4-5-toothed or -lobed. *Petals* 4-5, valvate, free or connate, caducous. *Disk* free or connate with the petals stamens or ovary, annular or expanded. *Stamens* 4-5, opposite the petals, inserted at the base of the disk or between its lobes; filaments subulate; anthers free or connate, 2-celled, introrse. *Ovary* usually sunk in the disk, 2-6-celled; ovules 1-2 in each cell, ascending, anatropous; style short; stigma small, capitate or slightly lobed. *Fruit* an indehiscent 1-6-seeded berry, often watery. *Seeds* erect, often rugulose; albumen cartilaginous sometimes ruminant; embryo basal; cotyledons ovate or cordate; radicle short, inferior.

Scandent, rarely erect, usually tendril-bearing, shrubs or herbs; stamens free; ovary 2 celled, cells 2-ovuled —:

Flowers polygamo-dioecious:—

Petals 5, deciduous in a calyptra; stigma obtuse; flowers in leaf-opposed thyrses often bearing tendrils on the peduncles; leaves simple, lobed; seeds pyriform, 2-furrowed on the face, 1-furrowed on the back with a prominent chalaza .....1. **Vitis.**

Petals 4, spreading or recurved in flower; stigma 4-lobed; flowers in corymbiform cymes without tendrils on the peduncles; leaves pedately 5- or sometimes 1-3-foliolate; seeds globose, oblong or pyriform, 2-furrowed on face, chalaza on back prominent

2. **Tetrastigma.**

Flowers polygamo-monoecious; petals 4-5, spreading or recurved in flower; stigma small or discoid; flowers in leaf-opposed cymes or thyrses with tendrils on the peduncle; leaves simple or lobed, sometimes digitate or pedate; seeds oblong or obovoid, convex on back, 2-furrowed on face .....3. **Ampelocissus.**



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2. *Tetrastigma*, Planch.

Climbing shrubs with simple or forked tendrils, the stems and branches often flattened. *Leaves* usually pedate with 5–7 leaflets, sometimes 1- or 3-foliolate. *Flowers* polygamo-dioecious, in axillary rarely leaf-opposed cymes, the cymes corymbose, 2–3-chotomous, puberulous. *Calyx* cupular, scarcely lobed, very small. *Petals* 4, spreading or recurved in flower, the tip usually mucronate-hooded. *Stamens* 4, in ♀ flowers very much reduced and staminodial. *Disk* hypogynous, more or less persistent in fruit. *Ovary* 2-celled with 2 ovules in each cell; style short; stigma 4-lobed. *Fruit* a 1–4-seeded berry, usually succulent, sometimes nearly dry. *Seeds* globose, oblong or pyriform, convex on the back with a prominent chalaza, 2- or forked-furrowed on the face, often crenately channelled on the sides, albumen ruminant.

Berry small, about .25 in. in diam., seed smooth, globose; stems not or little tuberculate:—

Leaves usually pedately 5-foliolate, leaflets lanceolate or oblanceolate, sharply acuminate, distantly but prominently serrate, more or less fleshy, not prominently reticulate ..... 1. *lanceolarium*.

Leaves 3-foliolate, leaflets elliptic, obtusely acuminate, entire or nearly so, submembranous, prominently reticulate..... 2. *canarense*.

Berry rather large, over .5 in. in diam.; seed oblong or pyriform, crenate on margin; stems tuberculate:—

Seed oblong, with a clavate chalaza on back and 2 deep furrows on face, crenatures slight; leaves large, pedately 5-foliolate, acuminate, crenate on margins ..... 3. *sulcatum*.

Seed pyriform, chalaza on back oblong, furrows on face shallow, marginal crenatures deep; leaves small, 3-foliolate or sometimes pedately 5-foliolate, uppermost often 3-foliolate, acute, glabrous, margins shortly serrate ..... 4. *muricatum*.

1. **TETRASTIGMA LANCEOLARIUM**, Planch. *Vitis lanceolaria* Roxb.; F. B. I. i. 660; W. & A. 128; Wt. Ic. t. 177. *V. serratifolia*, W. & A. 128.

N. Circars and Deccan to the E. slopes of the Nilgiris up to 5,000 ft.

\*A large climber with flattened stems and dry fruit.

2. **TETRASTIGMA CANARENSE**, Gamble n. comb. *Vitis canarenensis*, Dalz.; F. B. I. i. 655.

W. Gháts, in Wynaad at 3,000 ft. (Lawson).

A climber with trifoliolate leaves and red (or dead white *Dalzell*) berry, liked by monkeys.

3. TETRASTIGMA SULCATUM, Gamble, n. comb. *Vitis sulcata*; Laws.; F. B. I. i. 661.

W. Gháts, from Malabar and W. Nilgiris to the Anamalais and Travancore Hills up to 4,500 ft.

A large climber with thick stems and large green berry.

4. TETRASTIGMA MURICATUM, Gamble n. comb. *Vitis muricata*, Wall.; W. & A. 660; Wt. Ic. t. 740. *V. lanceolaria*, Laws. in F. B. I. i. 660 *in part*; Wt. Ic. t. 28 *not of* Roxb. W. Gháts, in most Districts and up to 6,000 ft., fairly common.

A large climber with prominently warted branchlets.

### 3. Ampelocissus, Planch.

Climbing shrubs, with tendrils on the peduncles. *Leaves* simple, entire or lobed, sometimes digitate or pedate or biternate. *Flowers* polygamo-monoecious, ♂ pseudo-hermaphrodite, in leaf-opposed pedunculate cymes or thyrses, the peduncles tendril-bearing. *Calyx* cupular, with 4-5 obscure teeth. *Petals* 4-5, spreading or recurved in flower. *Stamens* 4-5, inserted without the disk; filaments slender. *Disk* annular, erect, often vertically 5-10-furrowed. *Ovary* 2-celled, immersed more or less in the disk; 2 ovules in each cell; style short, conical, often 10-furrowed; stigma small in ♂, discoid in ♀. *Fruit* a 2-3-seeded succulent berry. *Seeds* oblong or obovoid, convex on the back, 2-furrowed, with a broad keel (raphe) on the face, often crenately cleft on the margins.

Disk short, thin, embracing merely the base of the ovary, not furrowed:—

Cyme thick-branched, woolly:—

Leaves orbicular-cordate or 3-7-angled or -lobed, cinnamomeous-tomentose beneath, seeds obcordate, crenate on the margins, 2-furrowed and keeled on the face, pitted on the back and with prominent ray-like clefts ..... 1. *tomentosa*.

Leaves 3-foliolate, the side leaflets semi-cordate, the middle one ovate, greyish brown-tomentose beneath; seeds obovate but not crenate on the margins, broadly ridged on the face, pitted and with shallow rays on the back ..... 2. *araneosa*.

Cyme nearly or quite glabrous; leaves thin, 3- rarely 5-foliolate

the side leaflets semicordate, the end one lanceolate, thinly grey-pubescent beneath .....3. *divaricata*.

Disk short, thick, 5-furrowed; leaves orbicular or cordate, rounded or 3-5-angled or -lobed, glabrous; inflorescence a small compact puberulous thyrses; seed oblong, crenate on the margin .....4. *latifolia*.

Disk elongate, thickened, embracing most of the ovary, 5-furrowed; leaves orbicular cordate, the margins denticulate-serrate with hard points :--

Flowers in often very large very thick compound cymes, sessile or subsessile in the middle of copious wool; calyx also with long hairs .....5. *eriolada*.

Flowers in sessile umbels with slender pedicels in short racemes, woolly at base at first, later on nearly free from it; calyx without long hairs .....6. *Arnottiana*.

1. AMPELOCISSUS TOMENTOSA, Planch. *Vitis tomentosa*, Heyne; F. B. I. i. 650; W. & A. 130; Wt. Ill. t. 57.

N. Circars, Deccan and Carnatic, in hill forests; W. Gháts, from Coorg to the Anamalais up to 5,000 ft.

A large climbing vine with scarlet flowers; young shoots and leaves and stems with much cinnamomeous wool, the leaves variable in shape and lobes.

2. AMPELOCISSUS ARANEOSA, Planch. *Vitis araneosus*, Lawson; F. B. I. i. 657.

W. Gháts, in the Nilgiri, Pulney and Anamalai Hills, Shevaroy Hills of Salem, up to 4,500 ft.

A slender far-climbing shrub, the leaves sometimes merely lobed.

3. AMPELOCISSUS DIVARICATA, Planch. *Vitis divaricata*, Wall.; F. B. I. i. 657.

E. Gháts in the Madgol Hills of Vizagapatam at 3,500 ft. (A. W. Lushington).

A slender climber with thin long-acuminate usually 3-foliolate leaves.

4. AMPELOCISSUS LATIFOLIA, Planch. *Vitis latifolia*, Roxb.; F. B. I. i. 652; W. & A. 130.

N. Circars, Deccan and Carnatic in hill forest regions, westwards to the Nilgiri and Anamalai slopes.

A rather slender herbaceous climbing vine with thin broad variable glabrous leaves, only the young shoots and inflorescence pubescent.



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## 5. *Cissus*, Linn. (modified).

Shrubs, erect or climbing, with tendrils opposite to the leaves, occasionally absent in erect species. *Leaves* simple or lobed; rarely trifoliolate. *Flowers* hermaphrodite, tetramerous, in umbellately divided cymes opposite to the leaves, the branches ending in umbellules. *Calyx* cupshaped, entire or obscurely lobed. *Petals* 4, triangular-ovate, induplicate-valvate, at first connivent in a calyptrate corolla, afterwards separating. *Stamens* 4; filaments slender; anthers usually oblong. *Disk* small, 4-lobed, adnate to the base of the ovary. *Ovary* 2-celled, with 2 ovules in each cell; style subulate; stigma small. *Fruit* usually 1-seeded, occasionally with 2 or more, a fleshy berry. *Seeds* ellipsoid or pyriform, with an encircling raphe, smooth or faceted or pitted on either side, the testa crustaceous with two interior ridges at the base; albumen with 3 vertical lobes; cotyledons reniform, sometimes 3; radicle rather large.

Seeds smooth except for encircling raphe :—

Seeds ellipsoid, pale; berry globose, red; stems 4-winged, fleshy, contracted at the nodes; leaves broadly reniform, entire or lobed

1. *quadrangularis*.

Seeds more or less pyriform; stems not winged :—

Leaves usually trifoliolate, rarely only lobed or entire, leaflets lanceolate, the side ones very unequal-sided; berry black; slender climbers.....2. *trilobata*.

Leaves ovate acuminate, deeply cordate at base, green when dry, membranous; berry black; slender trailers with glaucous-white stems .....3. *repens*.

Leaves more or less orbicular, cordate at base :—

Erect glabrous shrubs with grey bark and glaucous branchlets, rarely with tendrils; leaves large, cordate, with shallow incurved serratures; fruiting pedicels thick; berry top globose; seeds smooth.....4. *pallida*.

Climbing shrubs with tendrils :—

Glabrous, the stems pale, smooth, leathery, branchlets glaucous; leaves thick and leathery, poplar-like, cordate, obscurely crenate-serrate, pale when dry; fruiting pedicels clavate; berry-top globose, seeds smooth on the face

5. *Heyneana*.

Tomentose, the stems soft, wrinkled, branchlets terete, soft, subglaucous; leaves shallowly cordate, repand-crenate, dark

when dry; fruiting pedicels slender; berry-top oblong, seeds with a faint crescent ridge on the face .....6. *repanda*.

Seeds tessellated on either side of the raphe with angular facets:—

Very tomentose; pedicels usually recurved in fruit:—

Tomentum grey; leaves broadly cordate, 5-angled or sometimes -lobed, conspicuously blunt-serrate; berry blue, glaucous

7. *vitiginea*.

Tomentum ferruginous; leaves broadly cordate, acuminate, with inconspicuous bristly serratures; berry black .....8. *adnata*.

Glabrous, the branchlets glaucous; pedicels erect in fruit; leaves cordate, rounded above with an abrupt acumen, bristly serrate, nearly black when dry.....9. *glauca*.

Seeds with pits in lines on either side of the raphe:—

Slender climbing plants, glabrous or nearly so; berries glabrous:—

Seeds obovoid; branchlets subangular, red, herbaceous; leaves ovate, cordate, acuminate, blotched with pink and white on the upper surface, purple on the lower; berry reddish-purple

10. *discolor*.

Seeds obtriangular; branchlets 4-winged, soft; leaves ovate, truncate-cordate at base, green; berry black-purple

11. *glyptocarpa*.

Fleshy herbaceous plants, very bristly setose, especially the berries; leaves trifoliolate, the leaflets sharply serrate; berry bright red, the seeds deeply pitted and crenate on the margins .....12. *setosa*.

1. CISSUS QUADRANGULARIS, Linn. *Vitis quadrangularis*, Wall.; F. B. I. i. 645; W. & A. 125; Wt. Ic. t. 51.

N. Circars, Deccan and Carnatic, in dry regions, extending west to the lower E. slopes of W. Gháts and south to S. Travancore.

A much rambling shrub, the branches climbing over bushes to a long distance. Vern. *Tel.* Nalleru; *Mal.* Changalaparanda.

2. CISSUS TRILOBATA, Lamk. *Vitis Rheedii*, W. & A. 127; F. B. I. i. 653.

W. Coast and W. slopes of W. Gháts in Malabar and Travancore up to 3,000 ft.

A weak fleshy-stemmed climbing shrub with white berries.

3. CISSUS REPENS, Lamk. *Vitis repens*, W. and A. 125; F. B. I. i. 646.

W. Coast and W. Gháts from S. Canara to the Anamalais and Travancore, up to 4,000 ft.



A weak trailing shrub, the stems glaucous and glabrous, with ovate-cordate thin leaves.

4. *CISSUS PALLIDA*, Planch. *Vitis pallida*, W. & A. 125; F. B. I. i. 647.

N. Circars, Deccan and W. Gháts in dry forests, especially in the Ceded Districts.

An erect shrub with large leaves and woody stem, occasionally tendril-bearing and perhaps somewhat scandent.

5. *CISSUS HEYNEANA*, Planch. *Vitis Heyneana*, Wall.; F. B. I. i. 647; W. & A. 125.

W. Gháts, from the Nilgiris to the Pulneys and the Hills of Travancore, at low levels, scarce.

A coarse climber with thick fleshy stems and ovate-cordate pale green poplar-like leaves scarcely serrate.

6. *CISSUS REPANDA*, Vahl. *Vitis repanda*; W. & A. 125; F. B. I. i. 648.

Deccan, in the Hills of Cuddapah, Anantapur and Mysore up to 4,500 ft., Hills of Chingleput; E. slopes of W. Gháts from Nilgiris to Tinnevely.

A climbing shrub with branched and twisted tendrils and pyriform fruit.

7. *CISSUS VITIGINEA*, L. *Vitis Linnaei*, Wall.; F. B. I. i. 649; W. & A. 126.

N. Circars, in Vizagapatam and Godavari; Deccan and Carnatic, in hill scrub forests chiefly, up to 4,500 ft. and west to the lower slopes of the Pulney Hills; W. Coast, in Travancore, in secondary forests.

A small, erect trailing or climbing, grey-tomentose shrub, with blue single-seeded berries.

8. *CISSUS ADNATA*, Roxb.; Wt. Ic. t. 144. *Vitis adnata*, Wall. F. B. I. i. 649; W. & A. 126.

W. Coast and W. slopes of Gháts, at low levels.

A slender far-climbing shrub with ferruginous tomentum on leaves.

9. *CISSUS GLAUCA*, Roxb. *Vitis glauca*, W. & A. 126; F. B. I. i. 648.

W. Coast and W. Gháts up to 4,000 ft.

A stout rambling shrub with glaucous stems and cordate cuspidate leaves.



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Section of albumen with nearly circular outline, not grooved within, face-cavity deep; leaves trifoliolate, leaflets large, glabrous, entire or undulate-dentate; fruiting peduncles 2 in. long, fruit dry

1. *Roxburghii*

Section of albumen somewhat flattened, 2-grooved within, slightly angled on sides, face cavity round, small; leaves pedately 7-9-foliolate, usually softly pubescent, leaflets oblong-lanceolate, acuminate; fruiting peduncles 1-1.5 in. long, fruit rather dry, white

2. *pedata*.

Section of albumen rectangular with incurved ends, 2-grooved within, face cavity the whole length of seed; leaves 3-foliolate, long and softly villous as are the branchlets and fruit; fruit fleshy, white, nearly 1 in. in diam .....3. *mollissima*.

Seed pyriform, small, section of seed-albumen T-shaped:—

Seed very acute at base, much rugose above, chalaza on back round; leaves pedately 5-foliolate, glabrous or pubescent, leaflets sharply serrate .....4. *japonica*.

Seed trigonous, the plane faces pitted, chalaza on back linear with shallow bars on either side; leaves pedately 3-foliolate, usually pubescent, leaflets dentate, rounded or acute .....5. *carnosa*.

Seed with sharp angles, the base rounded, the face keeled, section of seed-albumen subrectangular; fruit black; leaves pedately 5-foliolate, glabrous, leaflets small, sharply serrate; flower-peduncles and pedicels filiform .....6. *tenuifolia*.

Seed obovate-oblong, furrowed and transversely ridged on the back, 2-pitted on the face, the section showing 3 vertical lobes in the albumen; fruit red; leaves digitate, the leaflets obovate, acuminate, serrate, the stipules falcate; flower-peduncles and pedicels fleshy

7. *auriculata*.

1. *CAYRATIA ROXBURGHII*, Gagnep. *Vitis Roxburghii*, W. & A. 127; F. B. I. i. 655.

Tinnevelly Hills, at Courtallum (Wight).

A glabrous climbing shrub with smooth black shining bark.

2. *CAYRATIA PEDATA*, Juss. *Vitis pedata*, Vahl; F. B. I. i. 661; W. & A. 128.

N. Circars, in the Hills of Vizagapatam and Godavari; W. Gháts and W. Coast in all Districts.

A large but weak climbing shrub with soft pubescent leaves.

Var. *glabra*, Gamble.

Nilgiri Hills at 3,000 to 6,000 ft.

A small variety with thin glabrous long-acuminate leaflets.

3. CAYRATIA MOLLISSIMA, Gagnep. *Vitis mollissima*, Wall.; F. B. I. i. 656.

W. Gháts, in Malabar and Nilgiris, in evergreen forest, up to 3,000 ft. (Lawson).

4. CAYRATIA JAPONICA, Gagnep. *V. tenuifolia*, W. & A. 129, *in part*; F. B. I. i. 660, *in part*.

W. Gháts, in S.E. Wynaad, W. Nilgiri slopes, at 3,000 ft. (Lawson).

A very slender climber.

5. CAYRATIA CARNOSA, Gagnep. *Vitis carnosu*, Wall.; F. B. I. i. 654; W. & A. 127; Wt. Ic. t. 171.

N. Circars, in Vizagapatam and Godavari; Deccan and Carnatic, but less common and chiefly in hills; W. Coast and W. Gháts, common.

A somewhat fleshy twining shrub with usually pubescent but often nearly glabrous leaves and white berries with trigonous seeds.

6. CAYRATIA TENUIFOLIA, Gagnep. *Vitis tenuifolia*, W. & A. 129 *in part*; F. B. I. i. 660 *in part*. *Cissus tenuifolia*, Heyne; Planch. Monog. 563.

W. Gháts, in S.E. Wynaad, at 3,000 ft., Hills of Tinnevelly (Barber).

A very slender graceful little vine with characteristic seeds.

7. CAYRATIA AURICULATA, Gamble n. comb. *Vitis auriculata*, Wall.; F. B. I. i. 658; W. & A. 129, *in part*; Wt. Ic. t. 145.

N. Circars, in Godavari (Barber); W. Gháts, in the Anamalai Hills, at 3,000 ft. (Gamble).

A large climber with spongy stems and red succulent berries, the seed-structure more like that of *Cissus*.

## 7. Leea, Linn.

Small trees, shrubs or herbs; branches striate or furrowed, the pith often very large; no tendrils. *Leaves* alternate, usually large, simple or 1-2-3-pinnate; petiole dilated at the base into sheathing stipules. *Flowers* small, red yellow white or greenish, in leaf-opposed or subterminal peduncled corymbose cymes. *Calyx* cupshaped or funnel-shaped, 5-lobed. *Petals* 5, connate at the base and adhering to the staminal tube, afterwards revolute,

induplicate-valvate, hooded at apex and connate in bud. *Disk* or staminal tube cylindrical with 5 lobes, connate at the base with the ovary, furnished within with a dependant toothed membranous fold; lobes entire or more or less prominently notched, sometimes apiculate. *Stamens* 5, the filaments inserted between the lobes of the disk, inflexed; anthers attached by their middles within the tube, introrse, free or connate at their margins in bud, dehiscing longitudinally; connective thick, oblong. *Ovary* inserted on the base of the disk, 3-6-celled; style short; stigma scarcely thickened; ovule 1 in each cell. *Fruit* a 3-6-celled, usually succulent, depressed-globular, lobed, berry with 3-6 seeds attached to the centre. *Seeds* wedge-shaped with a hard external and membranous inner testa, the latter deeply protruded in about 6 folds into the albumen; embryo basal with small ovate cotyledons, radicle long.

Flowers red; anthers united in bud; lobes of staminal tube notched; leaves bipinnate, leaflets ovate-lanceolate, long acuminate, dark brown to nearly black when dry, main nerves curved upwards with 3-4 serratures each, transverse nervules irregularly subparallel

1. *Wightii*.

Flowers white or greenish white:—

Leaves simple or with few large pinnules; anthers united in bud; herbaceous undershrubs:—

Leaves simple, cordate, hoary puberulous beneath, very large, main nerves distant, slightly curved, branching near the margin into 3-4 small serratures; transverse nervules irregular; lobes of staminal tube entire or slightly cleft; fruit black

2. *macrophylla*.

Leaves with 3-5 large pinnules, the lower ones sessile or nearly so, hoary puberulous beneath, main nerves distant, branching towards the margin into 3-5 serratures; transverse nervules subparallel, branched; lobes of staminal tube notched ..3. *latifolia*.

Leaves pinnate, sometimes bipinnate, main nerves close and parallel, as also the transverse nervules; anthers not united in bud; lobes of staminal tube notched; undershrubs:—

Stems, petioles and inflorescence branches with crisp wings; leaflets usually oblong, with one main nerve to each serrature and sometimes an intermediate small one, nearly glabrous; ripe fruits steel-grey .....

4. *crispa*.

Stems, etc., without crisp wings; ripe fruits black:—



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3. *LEEA LATIFOLIA*, Wall.; C. B. Clarke l.c. 138. *L. cinerea*, Laws. in F. B. I. i. 665. *L. coriacea*, Laws. l.c.  
W. Gháts, in Malabar (Wight, Barber).
4. *LEEA CRISPA*, Linn.; F. B. I. i. 665; C. B. Clarke l.c. 135.  
W. Gháts, in Malabar and W. Nilgiri slopes.  
A low undershrub, easily recognized by the crispations of the branchlets and petioles.
5. *LEEA ASPERA*, Edgew.; F. B. I. i. 665; C. B. Clarke l.c. 136.  
N. Circars, in the Hills of Ganjam and Godavari; W. Gháts, in Wynaad and Anamalais up to 3,000 ft.  
A large undershrub of Teak and other rather dry forests.
6. *LEEA HERBACEA*, Ham.; C. B. Clarke l.c. 137.  
Deccan, Sandur Hills of Bellary at 3,000 ft.  
A large undershrub, hardly distinct from *L. aspera*.
7. *LEEA ROBUSTA*, Roxb.; W. & A. 132. *L. diffusa*, Laws. in F. B. I. i. 667.  
E. Gháts, Hills of N. Circars to the Godavari, up to 3,000 ft.; W. Gháts, in Malabar and W. Nilgiris up to 3,000 ft.  
A large shrub with thick often hollow stems and thin leaves.
8. *LEEA VENKOBAROWII*, Gamble in Kew. Bull. 1917, 26.  
W. Gháts, in the Anamalais at 3,000 ft. (Gamble), Hills of Travancore (Venkoba Row).
9. *LEEA SAMBUCINA*, Willd.; C. B. Clarke l.c. 139; F. B. I. i. 666 *in part*. *L. Staphylea*, Roxb.; W. & A. 132; Wt. Ic. t. 78.  
E. Gháts, in the Hills of the N. Circars, up to 4,000 ft.; Deccan, Seshachellam Hills of Cuddapah at 3,000 ft.; W. Gháts, in all Districts in evergreen forests up to 4,000 ft.  
Usually a large shrub, but occasionally growing into a small tree up to 30 ft. high. Vern. *Tam.* Nyekki, Otta náli; *Mal.* Nyeru, Maniporandi; *Mar.* Dino.
10. *LEEA AEQUATA*, Linn.; C. B. Clarke l.c. 163. *L. hirta*, Roxb.; F. B. I. i. 668.  
N. Circars, in Ganjam forests (Gamble).  
A large shrub with scurfy pubescent leaves, the glands on their undersurface, rather scarce.

## Family XLVIII. STAPHYLEACEAE.

Trees or shrubs. *Leaves* opposite or alternate, usually trifoliolate or imparipinnate, stipulate. *Flowers* in terminal or axillary panicles, regular, hermaphrodite. *Calyx* of 5 free or nearly free imbricate sepals. *Petals* 5, imbricate. *Disk* annular, attached to the base of the calyx, usually lobed. *Stamens* 5, opposite the sepals; anthers 2-celled, the cells introrse. *Ovary* of 3 carpels, free or combined; styles short; stigmas capitate; ovules 2 or more in each cell. *Fruit* of 3 dehiscent capsules or follicles or an indehiscent berry. *Seeds* 4, arillate or exarillate, albuminous; embryo oblique; cotyledons flat.

## Turpinia, Vent.

Trees or shrubs with terete branches. *Leaves* opposite, imparipinnate, the leaflets opposite, stipellate, serrate. *Flowers* small, regular, in terminal and axillary panicles with opposite branches. *Calyx* of 5 sepals. *Petals* 5, imbricate. *Disk* an erect ring, lobed or crenate. *Stamens* 5, inserted outside the disk. *Ovary* sessile, 3-lobed, 3-celled; ovules 2 collateral or several 2-seriately superposed. *Fruit* a subglobose, fleshy berry, 3-celled. *Seeds* angular without arillus; testa hard, shining, often mottled; hilum large; albumen fleshy; cotyledons flat or plano-convex.

Leaflets lanceolate, long-acuminate; flowers small, about .2 in. in diam.; drupe size of a pea, 1-3-lobed; filaments glabrous; disk deeply lobed.....1. *nepalensis*.  
 Leaflets elliptic; abruptly obtuse-acuminate; flowers about .4 in. in diam.; drupe size of a cherry, 1-3 pointed but not lobed; filaments shortly villous; disk evenly crenate .....2. *malabarica*.

1. TURPINIA NEPALENSIS, Wall.; W. & A. 156; Wt. Ic. t. 972; Bedd. Fl. t. 159. *T. pomifera*, DC.; F. B. I. i. 698 *in part*.

W. Gháts, common in Nilgiri Shola forests at high levels, usually about 5,000 ft.; Pulneys and Travancore Hills, less common.

A moderate-sized tree with a soft grey useless wood.  
 Vern. *Badaga*, *Nila*.

2. TURPINIA MALABARICA, Gamble in Kew Bull. 1916, 135.

W. Coast; W. Gháts in the Anamalai Hills and Hills of Travancore at low levels.



A large tree with bright yellow young leaves. Vern. *Tam.* Kanali; *Mal.* Pamba vetti.

### Family XLIX. ACERACEAE.

Trees or shrubs. *Leaves* opposite, petioled; stipules 0. *Flowers* regular, polygamous. *Sepals* and *petals* isomerous, sometimes wanting. *Disk* annular or lobed, sometimes small or 0. *Stamens* 4-10, more usually 8, inserted outside or upon, rarely inside, the disk; filaments free. *Ovary* of 2 carpels, each 1-2-ovuled. *Fruit* of 2 indehiscent samaroid mericarps; albumen 0.

#### *Acer*, Linn.

Trees or shrubs; buds with many scales, the outer short, coriaceous, the inner oblong, membranous, developing later. *Leaves* entire or palmately lobed or divided or pinnately 3-5-foliate. *Flowers* regular, in terminal or lateral racemes or corymbs. *Calyx* usually 5-, sometimes 4-12-lobed, the lobes imbricate, deciduous. *Petals* as many as the calyx-lobes, or 0, erect, shortly clawed. *Disk* thick, annular or cupshaped. *Stamens* usually 8, inserted on the disk; filaments usually shorter in ♂ than in ♀ flowers. *Ovary* 2- rarely 3-lobed and -celled, laterally compressed; cells 2-ovuled; style bipartite, the divisions linear, stigmatose on the inner face. *Fruit* a double samara, indehiscent, the wing large, membranous, thickened at the back. *Seeds* exalbuminous; cotyledons irregularly folded; radicle generally long.

*ACER NIVEUM*, Blume; F. B. I. i. 693.

N. Circars, Madgol Hills of Vizagapatam, about 3,000 ft. (A. W. Lushington).

A large tree with undivided, entire, oblong, acuminate leaves up to 7 in. long, rounded at base and white-glaucous beneath. Samaras incurved so as to be nearly parallel.

*Acer oblongum*, Wall., also with undivided leaves, has been introduced from N. India and planted in the Nilgiris with some success.

### • Family L. SAPINDACEAE.

Trees, shrubs or rarely climbing herbs. *Leaves* alternate, pinnate or rarely simple trifoliolate or unifoliolate. *Flowers* regular or zygomorphic, generally polygamous. *Calyx* 4-5-lobed



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Leaves small, sometimes bifoliolate; seeds without aril

9. **Aphania.**

Drupes tubercled or muricate; seeds with a thick fleshy aril

10. **Nephelium.**

Ovules 2 in each cell; fruit a large inflated, 2-lobed capsule; leaves paripinnate with 2-4 pairs of membranous leaflets

11. **Harpullia.**

Stamens inserted outside the disk when present; petals 0; ovules 2 in each cell; fruit a membranous winged capsule; leaves simple, shining, oblanceolate .....12. **Dodonaea.**

1. **Cardiospermum, Linn.**

Climbing tendril-bearing herbs with wiry stems and branches. Leaves alternate, biternate; leaflets coarsely dentate. Flowers irregular, polygamo-dioecious, in axillary racemes or corymbs, the lowest pair of pedicels transformed into spiral tendrils. Sepals 4, concave, the outer pair small, the inner large. Petals 4, in 2 pairs, the two upper near the stamens with a supra-basal scale, the two lower remote from the stamens with a crested inflexed appendage. Disk unilateral, of 2 glands opposite to the lower petals. Stamens 8, excentric; filaments unequal, free or connate below. Ovary 3-celled; style short, 3-fid, the segments bearing inner stigmatic surfaces; ovule 1 in each cell. Fruit a membranous, inflated, trigonous capsule, loculicidally 3-valved the valves reticulate. Seeds globose, usually with a conspicuous hilum at the base; testa crustaceous; cotyledons large, transversely conduplicate.

Capsules depressed, pyriform, winged at the angles; leaves nearly glabrous, leaflets acuminate at apex; flowers small; seeds black with a large, white, heart-shaped hilum .....1. *Halicacabum*.

Capsules at first ovate acute, afterwards globose, not winged; leaves pubescent, leaflets usually obtuse, the end one mucronate; flowers moderate-sized; seeds black with a small, orbicular, slightly emarginate hilum.....2 *canescens*.

1. **CARDIOSPERMUM HALICACABUM, Linn; F. B. I. i. 670; W. & A. 109; Wt. Ic. t. 508.**

N: Circars and Carnatic, along the whole Coromandel Coast from Ganjam to Tinnevely; West Coast, in Malabar and Travancore.

The capsules are sometimes small (var. *microcarpum*, Bl.).

2. *CARDIOSPERMUM CANESCENS*, Wall. Pl. As. Rar. i. t. 14; F. B. I. i. 670; W. & A. 109; Wt. Ic. t. 74.

Deccan and Carnatic from the Kistna through Mysore to S. Arcot, usually inland, extending to the N. and E. slopes of Nilgiris.

2. *Allophylus*, Linn.

Shrubs or small trees. *Leaves* alternate, 1- or 3-foliolate; leaflets entire or serrate; stipules 0. *Flowers* small, irregular, polygamodioecious, pedicelled, in fascicles in simple or branched axillary thyrses. *Sepals* 4 in opposite pairs, cucullate, imbricate, the outer pair smaller than the inner. *Petals* 4, small or almost obsolete, generally declinate, naked inside or with a reflexed shaggy scale above the claw. *Disk* unilateral, usually with 4 glands opposite the petals. *Stamens* 8, inserted on the receptacle inside the disk, in ♂ flowers surrounding the ovary. *Ovary* usually 2-lobed and 2-celled, in ♂ flowers merely a pistillode; styles 2, free or connate below, stigmatose on the inner face above; ovule 1 in each cell. *Fruit* indehiscent, 1-2-lobed; lobes subglobose. *Seeds* erect, with a short aril; embryo curved, the cotyledons plicate.

Leaves in all trifoliolate:—

Thyrses shorter than the leaves, sometimes shorter than the petiole, not branched; bark of branchlets whitish; leaflets about 2-5 in. long, serrate crenate-serrate or dentate, usually hoary-tomentose beneath; drupes small .....1. *serratus*.

Thyrses equalling or longer than the leaves, not or very rarely branched:—

Bark of branchlets brown, young ones and leaves beneath usually tomentose; leaflets about 3-8 in. long, mucronulate-serrate, the nerves reddish; thyrses single, but sometimes one short branch

2. *serrulatus*.

Bark of branchlets white; leaflets glabrous, about 5-7 in. long, ovate-lanceolate, long acuminate; thyrses single or in pairs; drupes rather large, 4 in. long .....3. *distachys*.

Thyrses longer than the leaves, with few branches chiefly near the base; bark of branches yellowish-brown, the young ones and leaves beneath densely ferruginous-tomentose; side leaflets ovate, end one obovate, all acuminate, 3-6 in. long .....4. *Rheedii*.

Thyrses longer than the leaves, much branched; bark of branchlets

brown with conspicuous reddish lenticels; leaflets subcoriaceous, glabrous, broadly ovate or lanceolate, obtusely short-acuminate

5. *concanicus*.

1. ALLOPHYLUS SERRATUS, Radlk. *A. Cobbe*, Bl.; F. B. I. i. 673, *in part*. *Ornitrophe serrata*, Roxb. Cor. Pl. i. t. 61. *Schmidelia serrata*, var. *a*; W. & A. 110.

Deccan, in the Hills of Kistna, Kurnool and Cuddapah; Carnatic, in Chingleput and Hills westward to the foot of the Pulneys and southwards to Cape Comorin; perhaps on Malabar Coast.

2. ALLOPHYLUS SERRULATUS, Radlk. in Rec. Bot. Surv. Ind. iii. 341. *Schmidelia Cobbe*, Wight Ic. t. 964/2.

W. Gháts, in the Nilgiri and Pulney Hills up to 5,000 ft.; probably throughout the W. Gháts but more scarce.

3. ALLOPHYLUS DISTACHYS, Radlk. *A. Cobbe*, Bl.; F. B. I. i. 673 *in part*.

W. Gháts, in Coorg, Wynaad and elsewhere, scarce.

4. ALLOPHYLUS RHEEDII, Radlk. *A. Cobbe*, Bl.; F. B. I. i. 673 *in part*. *Schmidelia Rheedii*, Wt. Ic. t. 964.

Deccan, Hills of N. Arcot, Bellary, Mysore and Coimbatore at 3,000 ft.; W. Gháts, in the Nilgiris, Anamalais and Travancore Hills up to 5,000 ft.

A large shrub or small tree, very ferruginous-tomentose. Vern. *Mal*. Mukannen peru.

5. ALLOPHYLUS CONCANICUS, Radlk.

W. Ghats, in S. Canara (Barber), Malabar (Beddome) and Travancore (Bourdillon).

Var. *lanceolatus*, Gamble, leaflets lanceolate or oblanceolate, coarsely serrate near the apex, obtusely acuminate.

Nilgiris, Anamalai and Pulney Hills (Saulière) up to 4,000 ft.

### 3. *Lepisanthes*, Bl.

Trees or shrubs. *Leaves* alternate, paripinnate; leaflets entire, subopposite; stipules 0. *Flowers* regular or irregular, polygamodioecious, in axillary or lateral racemes or panicles. *Sepals* 5, widely imbricate, in 2 rows, outer smaller. *Petals* 4, sometimes 5, the 5th small, erect, clawed, each furnished with 1-2 hooded or reflexed, often cristate scales attached to the claw. *Disk* regular or irregular, if the latter, crenately lobed and opposite to the



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ERIOGLOSSUM RUBIGINOSUM, Bl. *E. edule*, Bl.; F. B. I. i. 672. *Sapindus rubiginosus*, Roxb. Cor. Pl. i. 44, t. 62; W. & A. 112.

Eastern Gháts, in the Hills of Ganjam and Vizagapatam, up to 2,000 ft.

A good-sized tree, the branchlets young leaves and inflorescence covered with dense golden-brown tomentum. Leaves up to 2 ft. long with about 6 pairs of leaflets. Vern. *Tel.* Ishi rashi.

### 5. *Schleichera*, Willd.

Trees. *Leaves* alternate, paripinnate, exstipulate, leaflets opposite or subopposite, usually 3 pairs. *Flowers* regular, polygamo-dioecious, small, fascicled in interrupted slender racemes or panicles; pedicels slender. *Calyx* small, cupular; lobes 4-6, usually valvate. *Petals* 0. *Disk* flat, undulate on the margin. *Stamens* 5-8, inserted within the disk; filaments slender, pubescent; anthers oblong. *Ovary* ovoid, narrowed to the rigid style, 3-celled; stigma 3-4-lobed; ovules erect, solitary; in ♂ flowers a villous pistillode. *Fruit* dry, crustaceous, indehiscent, ovoid, acute, tipped with the style, smooth or sometimes more or less echinate. *Seeds* erect, with a fleshy aril; cotyledons con-duplicate, unequal.

SCHLEICHERA TRIJUGA, Willd.; F. B. I. i. 681; W. & A. 114; Bedd. Fl. t. 119; Brand. For. Fl. t. 20.

All forest Districts, chiefly in deciduous forests and up to 3,000 ft., common and important.

A large deciduous tree with large leaflets, which are bright red when young. The aril of the fruit, which is about .7 to 1 in. long, is eaten, and the seeds give an oil. The bark is grey and the wood very hard, light reddish-brown, strong and durable and used for rice-pounders, in oil and other mills and for carts. The best lac is produced on its twigs. Vern. *Hind.* Kusam; *Ur.* Kusamo; *Tel.* Puska; *Tam.* Puvan; *Mal.* Puvam; *Kan.* Chakota.

### 6. *Filicium*, Thw.

Tree, branchlets angular, covered, like the leaves, with waxy scales. *Leaves* alternate, subcoriaceous, imparipinnate; leaflets 6-8 pairs, subopposite, entire, articulate with the broadly-winged

rhachis. *Flowers* small, polygamous, in axillary panicles. *Calyx* 5-lobed; lobes imbricate, deciduous. *Petals* 5, small, imbricate, without scales. *Disk* 5-lobed, tomentose. *Stamens* 5, inserted within the disk; filaments subulate; anthers ovate. *Ovary* sessile, globose, 2-celled, in ♂ flowers merely a pistillode; style hooked; stigma simple or bilobed; ovules solitary, pendulous. *Fruit* a fleshy drupe, 1-2-celled and -seeded; putamen membranous. *Seeds* oblong; testa membranous; cotyledons foliaceous, much crumpled; radicle ascending.

FILICIUM DECIPIENS, Thw.; F. B. I. i. 539; Bedd. Fl. t. 129.

*Rhus decipiens*, Wt. Ill. i. t. 75; W. & A. 172.

W. Gháts, from Malabar and Nilgiris to Travancore and Tinnevely, up to about 5,000 ft., in somewhat dry localities, sometimes planted for ornament.

A handsome tree with elegant fern-like leaves up to 15 in. long, the rhachis prominently winged. Wood hard and strong, red. Vern. *Tam.* Ningal; *Mal.* Val muriccha, Niroli.

### 7. Sapindus, Linn.

Trees or shrubs. *Leaves* alternate, paripinnate; leaflets entire, subopposite; stipules 0. *Flowers* regular, polygamous, in terminal and axillary panicles. *Sepals* 5, unequal, in 2 series, much imbricate. *Petals* 4-5 with or without scales on the inner face. *Disk* annular, lobed. *Stamens* usually 8, inserted within the disk; filaments free, usually pilose; anthers oblong. *Ovary* entire or 2-4-lobed, 2-4-celled; style terminal; stigma 2-4-lobed; ovule solitary; in ♂ flowers a villous pistillode with usually 3 styles. *Fruit* fleshy or coriaceous, of 1-3 indehiscent drupes; the drupes ovoid or globose, indehiscent, with saponaceous fibrous pericarp, brittle when dry. *Seeds* usually globose with two integuments, the outer very hard, the inner membranous; cotyledons thick, fleshy, unequal, spirally convolute; radicle inferior, pointed.

Leaflets 2-3 pairs, lanceolate, acuminate at apex, shining above, glabrous or very slightly pubescent beneath; petals softly woolly on the inner surface except the claw, scales minute or absent; fruit of 3 ferruginous-velvety drupes, almost completely combined

1. *laurifolius*.



Leaflets 2-3 pairs, oblong, emarginate at apex, dull above, softly pubescent beneath and on nerves above; petals glabrous on the inner surface except for 1-2 tufts of white hair above the claw; fruit of 3 drupes, combined about half-way up, and then separating, smooth and slightly pubescent when young, later glabrous and wrinkled

2. *emarginatus*.

1. *SAPINDUS LAURIFOLIUS*, Vahl; W. & A. 111. *S. trifoliatus*, Hiern in F. B. I. i. 682 *in part, not of* Linn.

W. Gháts, from S. Canara and Mysore to the Anamalais and Hills of Madura, in evergreen and open forests at low elevations.

A stout shady tree. The fruit is used, like that of the next, for soap. Vern. *Mal.* Pasakotta.

2. *SAPINDUS EMARGINATUS*, Vahl; W. & A. 111; Bedd. Fl. t. 154. *S. trifoliatus*, Hiern in F. B. I. i. 682 *in part, not of* Linn.

N. Circars, Deccan and Carnatic, extending to the E. slopes of the Nilgiris and Pulneys and the Hills of Tinnevely, in deciduous and dry evergreen forests, frequent on the coast as at Striharikota in Nellore; frequently planted. The Soapnut.

A common tree, often of large size, chiefly known for its fruits, which are in universal use as a substitute for soap. Bark grey with rough scales. Wood yellow, hard, but little used. Vern. *Hind.* Ritha; *Ur.* Makta maya; *Tel.* Konkudu; *Tam.* Pounanga; *Kan.* Aratala.

### 8. *Thraulococcus*, Radlk.

Trees or shrubs. *Leaves* large, alternate, paripinnate or reduced to 1 leaflet; leaflets lanceolate, opposite or subopposite. *Flowers* polygamous, in terminal panicles. *Sepals* 5, unequal, concave, imbricate, pubescent. *Petals* 5, obovate, shortly clawed, furnished with a shaggy scale above the claw. *Disk* annular. *Stamens* 8, inserted within the disk; filaments pilose; anthers oblong. *Ovary* 2-3-celled; style short; stigma 3-lobed; ovules solitary. *Fruit* of 1-3 ellipsoidal drupes only slightly connected at the base; pericarp crustaceous, yellow, finely tomentose. *Seed* oblong, covered with a white fleshy aril; testa thin; cotyledons thick, fleshy, unequal, transverse; radicle inferior, pointed.



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long, glaucescent beneath; calyx deeply lobed, brown-tomentose; fruit with round tubercles or sometimes nearly smooth, red or purple, .5-.7 in. in diam. ....1. *Longana*.

Petals 0:—

Leaves 3-9 in. long with 2-8 pairs of lanceolate acuminate leaflets, the lowest pair not stipuliform; calyx merely dentate, with golden tomentum; fruit with conical sharp tubercles, red, 1 in. in diam. or more .....*Litchi*.

Leaves 6-15 in. long with 4-6 pairs of elliptic obtuse leaflets, the lowest pair small, very unequally reniform, stipule-like, the rest large; calyx deeply lobed, villous; fruit densely covered with soft weak prickles, .75 in. in diam. .... ..2. *stipulaceum*.

1. *NEPHELIUM LONGANA*, Camb.; F. B. I. i. 688; W. & A. 113. *Euphoria Longana*, Lamk.; Bedd. Fl. t. 156.

W. Gháts, from S. Canara and Mysore to Tinnevelly, common in evergreen forests up to 5,000 ft. The Longan tree.

A large handsome evergreen tree, the young leaves red and conspicuous. Bark smooth, yellowish-grey; wood red, moderately hard but little used. The aril of the seed is edible. A common form has the leaflets narrow, linear-lanceolate and the pericarp nearly smooth, but is not distinct. Vern. *Tam.* Puvatti, Katta puvan; *Mar.* Wumb; *Kan.* Kanakindeli; *Mal.* Pasakotta.

2. *NEPHELIUM STIPULACEUM*, Bedd.; F. B. I. i. 690; Bedd. Ic. t. 103, Fl. t. 155.

W. Gháts, in the evergreen forests of Malabar, Travancore and Anamalais up to 3,000 ft.

A moderate-sized handsome tree noticeable for the stipule-like pair of lower leaflets. The wood is reddish-brown and hard. Vern. *Mal.* Paviri mulei.

*Nephelium Litchi*, Camb., is the tree which gives the delicious fruit Lichi, the transparent aril being the edible part. The tree comes from China and is sometimes planted in gardens.

#### • 11. Harpullia, Roxb.

Trees. *Leaves* alternate, paripinnate, exstipulate; leaflets opposite and alternate, entire. *Flowers* regular, dioecious or polygamous, in axillary or subterminal racemes or panicles. *Sepals* 4-5, erect, equal, imbricate. *Petals* 4-5, usually clawed,

narrowly obovate, without scales. *Disk* obscure. *Stamens* 5-8, inserted inside the disk; filaments slender; anthers oblong. *Ovary* ovoid, 2-celled; style elongate; stigma linear, usually more or less twisted; ovules 2 in each cell, superposed. *Fruit* an inflated, coriaceous, 2-lobed, 2-celled, loculicidally 2-valved capsule; cells 1-2-seeded. *Seeds* subglobose, usually arillate; embryo with thick hemispheric cotyledons.

**HARPULLIA IMBRICATA**, Thw.; F. B. I. i. 692; Bedd. Fl. t. 158.

W. Gháts, in evergreen forests from S. Canara to the Anamalais and Travancore, up to 4,000 ft.

A large tree with pinnate leaves up to 16 in. long, 3-4 pairs of membranous, usually lanceolate leaflets up to 7 in. long, flowers with delicate clawed greenish petals and brilliant orange-scarlet inflated 2-lobed capsules. Bark smooth, greenish; wood white, soft. Vern. *Tam.* Nei kottei; *Mal.* Chittila madakku.

## 12. Dodonaea, L.

Shrubs or small trees. *Leaves* alternate, simple or pinnate, exstipulate. *Flowers* small, polygamous, in axillary or terminal racemes or panicles. *Sepals* 2-5, imbricate or valvate. *Petals* 0. *Disk* none in ♂ flowers, small in ♀. *Stamens* 5-10, usually 8, inserted without the disk in ♀ flowers, in ♂ round a small pistillode; filaments short; anthers linear-oblong. *Ovary* 3-6-angled and -celled; style 3-6-sided, 3-6-cleft at top; ovules 2 in each cell, collateral or superposed. *Fruit* a 2-6-sided membranous or coriaceous capsule, septicidally 2-6-valved, the valves winged at the back; cells 1-2-seeded. *Seeds* lenticular or subglobose, compressed, exarillate; funicle thickened; testa crustaceous or coriaceous; cotyledons spirally convolute.

**DODONAEA VISCOSA**, Linn.; F. B. I. i. 697. *D. Burmanniana*, DC.; W. & A. 114; Wt. Ill. i. t. 52.

N. Circars, Deccan and Carnatic, a common shrub often more or less gregarious; W. Gháts, in Shola forests up to 8,000 ft. and often then a small tree; sometimes planted as a hedge-plant.

A stiff shrub or a small tree with shining simple oblanceolate leaves and 2-3-winged capsules. Bark thin, grey; wood

dark brown, very hard and heavy and useful for tool-handles and walking-sticks. Vern. *Hind.* Sanatta; *Tam.* Virali; *Tel., Kan.* Bhandaru; *Mal.* Vrali.

*Blighia sapida*, Koen., the Akee fruit, is occasionally cultivated in Madras Gardens.

### Family LI. SABIACEAE.

Trees or erect or climbing shrubs. *Leaves* alternate, simple or compound, stipules 0. *Flowers* small, hermaphrodite or polygamous, usually paniced. *Calyx* 4-5-partite, imbricate. *Petals* 3-5, equal or unequal, opposite to or alternate with the sepals, valvate or imbricate. *Disk* usually small, annular. *Stamens* 4-5, opposite to the petals, inserted at the base of or on the disk; all perfect or 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. *Fruit* of 1-2 dry or fleshy, globose or compressed drupes. *Seeds* compressed or globose, basilar; hilum broad; testa membranous or coriaceous; albumen 0; cotyledons often contorted; radicle deflexed.

Stamens 4-5 all perfect and equal; drupes compressed; climbing shrubs with simple entire leaves .. ..... 1. **Sabia**.  
Stamens 5, 2 only fertile, unequal; drupes subglobose; trees with simple or pinnate leaves, entire or serrate ..... 2. **Meliosma**.

#### 1. **Sabia**, Colebr.

Shrubs, sarmentose or climbing. *Leaves* alternate, simple, entire. *Flowers* usually hermaphrodite, 2-bracteolate, axillary and solitary or in axillary simple or paniced cymes, the bracts, calyx-lobes, petals and stamens all opposite. *Calyx* 4-5-partite. *Petals* 4-5. *Disk* annular, 4-5-lobed. *Stamens* 4-5, inserted at base of the disk. *Carpels* 2, rarely 3, very slightly connate; styles 2, erect, terminal, slightly connate; ovules 2 in each carpel. *Fruit* of 1-2 dry or drupaceous ripe carpels, usually compressed and gibbous with a sub-basal style. *Seeds* reniform, testa coriaceous; embryo curved.

SABIA MALABARICA, Bedd. Ic. t. 177; F. B. I. ii. 2.

W. Gháts, in the Palghat and Anamalai Hills at 3,000-4,000 ft. (Beddome).



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Ovary glabrous; leaflets 7–15, oblong-lanceolate or -obovate, serrate, nearly glabrous; panicles puberulous; stone rugose

4. *pinnata*.

1. MELIOSMA SIMPLICIFOLIA, Walp.; F. B. I. ii. 5. *Millingtonia simplicifolia*, Roxb. Cor. Pl. iii. t. 254; W. & A. 115.

E. Gháts, Madgol Hills of Vizagapatam at 4,500 ft. (A. W. Lushington); W. Gháts, at low elevations and up to 3,000 ft. in evergreen forests in Malabar, Nilgiris, Anamalais to Travancore.

A small tree with reddish moderately hard wood.

2. MELIOSMA WIGHTII, Planch.; F. B. I. ii. 4. *Millingtonia pungens*, Wall.; W. & A. 115; Wt. Ic. t. 964, 3.

W. Gháts, at high elevations, usually above 5,000 ft. in the Nilgiri, Anamalai, Pulney and Travancore Hills in Shola forests.

A medium-sized tree with a dark reddish-brown soft wood of little value. Vern. *Badaga* Tode.

3. MELIOSMA ARNOTTIANA, Walp.; F. B. I. ii. 6; Bedd. Fl. t. 160. *Millingtonia Arnottiana*, Wt. Ill. i. t. 53. *Sapindus* ? *microcarpus*, W. & A. 112.

W. Gháts, at 4,000–7,000 ft. in Shola forests from S. Canara to Tinnevelly, common and conspicuous.

A large tree with thick brown bark and dark reddish-brown soft wood. Vern. *Tam.* Kusavi, Thagari; *Badaga* Huli Makay; *Mal.* Kalavi.

4. MELIOSMA PINNATA, Roxb.; F. B. I. ii. 6.

E. Gháts, Madgol Hills of Vizagapatam at 3,000–4,000 ft. (A. W. Lushington).

A medium-sized tree.

### Family LII. ANACARDIACEAE.

Trees or shrubs, usually with acrid or resinous juice. *Leaves* alternate or rarely opposite, simple or trifoliolate or imparipinnate, exstipulate. *Flowers* small, regular, hermaphrodite polygamous or unisexual, in a generally paniculate terminal or axillary inflorescence. *Calyx* of 3–5 sepals, sometimes accrescent, sometimes spathaceous. *Petals* 3–5, alternate with the sepals, free, rarely 0, imbricate or valvate. *Disk* flat, cupular or annular, entire or lobed, rarely obsolete. *Stamens* as many as the petals, rarely twice as many, inserted under or rarely on the disk; fila-

ments usually subulate; anthers 2-celled basi- or dorsi-fixed. *Ovary* superior, rarely half inferior, 1- or 2-6-celled, rudimentary or 2-3-fid in the ♂, sometimes of 5-6 free carpels; styles usually combined; stigmas sessile or capitate; ovules solitary, pendulous from the top or side of the cell or from an ascending basal funicle. *Fruit* superior, rarely inferior, a 1-5-celled, 1-5-seeded drupe; the stone sometimes dehiscent. *Seed* exalbuminous or very nearly so, embryo straight or curved; cotyledons plano-convex; radicle short.

Carpels 5 or 1 only; style lateral; ovule suspended from a basal funicle; leaves simple:—

Carpels 5, 1 only fertile; drupe lenticular, 2-valved 1. **Buchanania.**

Carpel 1:—

Stamens 5-10, 1 only or more fertile:—

Fruit a fleshy drupe; 1 stamen usually only fertile

2. **Mangifera.**

Fruit a reniform nut on a fleshy hypocarp, all or most of the

8-10 stamens fertile .....3. **Anacardium.**

Stamens 5 fertile; fruit a globose or ovoid drupe... .....4. **Gluta.**

Carpels 4-5, rarely 1; style apical; leaves pinnate:—

Petals valvate; leaves usually with an intramarginal nerve:—

Carpels 5; drupe usually large, 1-5 seeded, pericarp fibrous

5. **Spondias.**

Carpel 1; drupe small, 1-seeded, pericarp oily...6. **Solenocarpus.**

Petals imbricate; leaves without intramarginal nerve; drupe com-

pressed.....7. **Odina.**

Carpels 3, rarely 1; style apical or lateral; leaves trifoliolate

8. **Rhus.**

Carpels 3, forming a unilocular ovary; styles apical, free or connate; leaves simple:—

Styles short, terminal; stigma 3-lobed; flowers tetramerous

9. **Nothopegia.**

Styles 3, divergent; stigmas capitate; flowers usually pentamerous:—

Ovary in ♀ or ♂ semi-inferior or superior; petiole without spur-like appendages; fruit with a basal hypocarp ..10. **Semecarpus.**

Ovary in ♀ or ♂ inferior; petiole with 2-4 spur-like appendages; fruit partly or wholly enclosed in a hypocarp

11. **Holigarna.**

1. **Buchanania**, Spreng.

Trees. Leaves alternate, petioled, simple, usually coriaceous;



quite entire; stipules 0. *Flowers* small, white, hermaphrodite, in terminal and axillary branched panicles. *Calyx* short, 3-5-toothed or -lobed, persistent, imbricate. *Petals* 4-5, ovate or oblong, imbricate, at length recurved. *Disk* thick, urceolate or cupular, 5-lobed. *Stamens* 8-10, free, inserted at the base of the disk; filaments linear; anthers ovate. *Ovary* of 5-6 free carpels, seated in the cavity of the disk, one fertile, the rest imperfect; style short; stigma truncate; ovule 1, pendulous from a basal funicle. *Fruit* a small slightly fleshy lenticular drupe; stone crustaceous or bony, 2-valved. *Seed* gibbous, acute at one end; albumen 0; cotyledons thick; radicle superior.

Inflorescence pubescent; leaves coriaceous:—

Leaves broadly oblong, obtuse or emarginate, over 6 in. long and 2 in. broad, petiole stout, main nerves straight and parallel; flowers 3 in. in diam., the petals oblong; drupe black, 3-6 in. in diam. .... 1. *Lanzan*.

Leaves narrowly oblong, under 6 in. long, 2 in. broad; petiole rather slender:—

Leaves elliptic-oblong, obtuse or very slightly acute at apex, rusty villous beneath when young, main nerves regular, sub-horizontal, straight and parallel; flowers 25-3 in. in diam., the petals oblong ..... 2. *Barberi*.

Leaves oblong-lanceolate, acuminate at apex, glabrous beneath, main nerves ascending, curved and branched; flowers 15 in. in diam., the petals ovate obtuse; drupe red, 6 in. in diam.

3. *lanceolata*.

Inflorescence glabrous; leaves scarcely coriaceous, obtuse and emarginate, under 6 in. long, 2 in. broad, main nerves curved, irregular, petiole slender; flowers 2 in. in diam., petals obtuse; drupe black, 5 in. in diam. .... 4. *angustifolia*.

1. **BUCHANANIA LANZAN**, Spreng. *B. latifolia*, Roxb.; F. B. I. ii. 23; W. & A. 169; Bedd. Fl. t. 165.

Deciduous forests in all Districts, common, up to 4,000 ft. A tree with conspicuous rough bark tessellated in prominent squares, and a greyish-brown moderately hard wood of little value. It gives a copious gum and the kernels of the seeds are collected and eaten. Vern. *Hind.* Piar; *Mar.* Chironji; *Ur.* Charu; *Tam.* Morala; *Tel.* Morli, Sara; *Kan.* Nurkul; *Mal.* Munga péra.



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of the branches; the flowers in dense terminal panicles. Cultivated for its edible, very important fruit, which is eaten fresh, or made into preserves or pickles. Bark rough, dark grey; wood grey, often streaked, moderately hard, used for planking, packing cases, boats, and other purposes. Vern. *Hind.* Am.; *Ur.* Ambo; *Mar.* Ambi; *Tam.* Maá; *Tel.* Mamadi; *Kan.* Mavu.

### 3. *Anacardium*, Linn.

Shrubs or trees. *Leaves* alternate, petioled, simple, entire; stipules 0. *Flowers* small, polygamous, in terminal bracteate panicles. *Calyx* 5-partite; segments erect, imbricate, deciduous. *Petals* 5, linear-lanceolate, recurved, imbricate. *Disk* filling the base of the calyx, erect. *Stamens* 8-10, all fertile or some sterile, one usually longer than the others; filaments connate at the base and adnate to the disk. *Ovary* obovoid or obcordate, 1-celled; style filiform, excentric; stigma minute; ovule solitary, ascending from a lateral funicle. *Fruit* a reniform nut seated on a large pyriform fleshy body formed of the enlarged disk and top of the peduncle; pericarp cellular and full of oil. *Seed* reniform, ascending; testa membranous, adherent; albumen 0; cotyledons semilunar, radicle short, curved upwards.

ANACARDIUM OCCIDENTALE, Linn.; F. B. I. ii. 20; W. & A. 168; Bedd. Fl. t. 163.

Native of America, cultivated and run wild, especially on the sea coast. The Cashew-nut.

A small tree with short thick trunk, obovate rather large leaves, flowers yellow streaked with pink, in terminal, prominently bracteate, panicles and a greenish-grey nut on a yellow or scarlet fleshy peduncle. Wood reddish-brown, of little use. The nuts are roasted and the kernels eaten for dessert, the peduncles are sometimes eaten but are astringent. The pericarp gives an acrid caustic oil. Vern. *Hind.* Kaju; *Tel.* Jidi mamidi; *Tam.* Kola mávu; *Kan.* Godambe; *Mal.* Paringi mávu.

### 4. *Gluta*, Linn.

Evergreen trees, with acrid resinous juice. *Leaves* alternate, simple, entire, coriaceous, crowded at the ends of the branches. *Flowers* small, hermaphrodite, in axillary or terminal panicles,

*Calyx* gamosepalous, spathaceous, splitting irregularly, deciduous. *Petals* 4–6, inserted on the disk and adnate with it below, imbricate, spreading in flower. *Disk* usually elongate, cylindrical. *Stamens* as many as the petals and alternate with them; filaments capillary. *Ovary* sessile on the disk or stipitate, oblique; 1-celled; style lateral, filiform; stigma simple; ovule 1, pendulous from a basal funicle. *Fruit* dry, stalked, more or less globose, sometimes furrowed; pericarp thick. *Seed* conform to the pericarp; testa adherent to the pericarp; albumen 0; cotyledons large, thick, plano-convex; radicle short, obtuse, incurved.

GLUTA TRAVANCORICA, Bedd. Fl. t. 60; F. B. I. ii. 22.

W. Gháts, evergreen forests of South Travancore and Tinnevely up to 3,500 ft.

A very large tree reaching 120 ft. in height and 5 ft. in diameter of bole, with spatulate leaves up to 6 in. long and cream-coloured flowers. The bark is smooth, pinkish-grey, and the heartwood dark red, mottled with orange and black streaks, valuable for furniture and house-fittings. Vern. *Tam.* Shencurani; *Mal.* Thodappei.

### 5. Spondias, Linn.

Deciduous glabrous trees. *Leaves* usually crowded at the ends of the branches, alternate, imparipinnate; leaflets subopposite, usually caudate-acuminate; stipules 0. *Flowers* small, polygamous, in terminal spreading panicles. *Calyx* small, 4–5-lobed, deciduous, lobes imbricate. *Petals* 4–5, spreading, valvate. *Disk* thick, annular, 8–10-crenated. *Stamens* 8–10, inserted below the disk, filaments slender. *Ovary* shortly ovoid or subglobose, 4–5-celled, immersed in the disk; styles 4–5, conniving above; stigmas spreading; ovule 1 in each cell, pendulous. *Fruit* a fleshy drupe with woody endocarp surrounded by longitudinal interwoven fibres, 1–5-seeded. *Seeds* pendulous, oblong; testa membranous; albumen 0; cotyledons elongate, plano-convex; radicle short, superior.

SPONDIAS MANGIFERA, Willd.; F. B. I. ii. 42; W. & A. 173; Wt. Ill. t. 76; Bedd. Fl. t. 169.

Deciduous forests in almost all Districts, up to about 2,000 ft., but not very common; frequently planted. The Indian Hog-plum.

A large tree in good soil with large leaflets, sometimes 9 in.

by 4 in., but small and with smaller leaflets in poor localities. The leaflets have parallel nerves meeting in an intramarginal nerve. The fruit is eaten. Bark smooth, grey; wood light grey, useless. Vern. *Hind.* Amra; *Ur.* Ambota; *Mar.* Amb.; *Tel.* Aravi mamadi; *Tam.* Kat maá, Mám pulicchi; *Mal.* Ambalam.

*S. acuminata*, Roxb., seems to be only a small-leaved form of the above.

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

A tree. *Leaves* alternate, imparipinnate, crowded towards the ends of the branches; leaflets opposite or subopposite, crenulate. *Flowers* small, white, hermaphrodite, in branched panicles terminal on old branches. *Calyx* minute, 5-lobed, imbricate, deciduous. *Petals* 5, ovate, valvate, recurved. *Disk* annular, crenately lobed, surrounding the base of the ovary. *Stamens* 10, inserted at the base of the disk; filaments slender; anthers oblong. *Ovary* free, sessile, 1-celled; style thick, furrowed; stigma oblique, truncate; ovule 1, pendulous from one side near the apex of the cell. *Fruit* a small obliquely oblong, truncate, compressed drupe; pericarp cellular, oily; stone bony. *Seed* linear, compressed; cotyledons linear, plano-convex; radicle very short, superior.

SOLENOCARPUS INDICA, W. & A. 171; F. B. I. ii. 27; Bedd. Fl. t. 233.

W. Gháts, from Coorg to the Anamalais and Hills of Travancore and Tinnevely, up to 2,500 ft., not common.

A tree with about 5–7 pairs of oblong acuminate leaflets up to 4 in. long and 1 in. wide with an intramarginal nerve, white small flowers in conspicuous masses and small fruit.

### 7. *Odina*, Roxb.

Deciduous trees with stout soft branches. *Leaves* alternate, imparipinnate, clustered at the ends of the branchlets; leaflets opposite, entire; stipules 0. *Flowers* small, monoecious or dioecious, fascicled, shortly pedicelled, in simple or panicled, terminal, fascicled, racemes. *Calyx* 4-lobed, persistent; lobes rounded, imbricate. *Petals* 4, imbricate. *Disk* annular, 8-lobed. *Stamens* 8, inserted below the disk; filaments in ♂ unequal, subulate, the anthers ovate or sagittate, in ♀ very short and



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1. *RHUS MYSORENSIS*, Heyne; F. B. I. ii. 9; W. & A. 172.

Dry stony lands in the Deccan Hill country extending to the N. slopes of the Nilgiris.

A small shrub with hard reddish-yellow wood. The branches are used for fencing.

2. *RHUS PANICULATA*, Wall; F. B. I. ii. 10.

E. Gháts, Rumpa Hills of Godavari, to 3,000 ft. (Gamble).

A small tree with hard reddish-brown wood.

### 9. *Nothopegia*, Bl.

Small trees. *Leaves* alternate, opposite or subopposite, coriaceous, entire, petiolate; stipules 0. *Flowers* small, polygamous, bracteate, in short axillary racemes or panicles of racemes. *Calyx* small, 4-lobed, persistent, the lobes imbricate. *Petals* 4, spreading, imbricate. *Disk* annular, 4-lobed. *Stamens* 4, inserted under the margin of the disk; filaments subulate, short in ♂; anthers shortly oblong, introrse, longitudinally dehiscing. *Ovary* abortive in ♂, in ♀ sessile, ovoid, 1-celled; style short; stigma capitate; ovule pendulous from near the top of the cell from a flattened funicle. *Fruit* a globose, acute or depressed, fleshy drupe, tipped with the style, the flesh cellular containing resin. *Seed* pendulous; testa membranous; albumen 0; cotyledons thick, plano-convex; radicle very short, usually basal.

*Leaves* alternate:—

Drupe with thick pericarp filled with black resin-cells, ovoid, acute at apex; ultimate branchlets pubescent:—

Leaves coriaceous, obovate, shortly and bluntly apiculate, 3–4 in. long by 1–1.5 in. broad, nerves 12–15 pairs, petiole stout, .3 in. long; ♂ racemes up to 1 in. long, dense, fascicled or paniculate, ♂ shorter; drupe .5 in. in diam. .... 1. *Colebrookiana*.

Leaves thinly coriaceous, variable, from linear to lanceolate or elliptic, obtusely acute, 1.5–5 in. long by .5–1 in. broad, nerves from 15–25 pairs, petiole slender, .1–.2 in. long; ♂ racemes slender, up to .5 in. long, ♀ rather long, both sometimes sub-terminal; drupe under .4 in. in diam., blue ..... 2. *Heyneana*.

Drupe with thin pericarp, transversely oblong, striate, depressed at apex:—

Leaves and branchlets glabrous:—

Leaves oblong, acuminate, up to 8 in. long by 3 in. broad, nerves strong and parallel, about 20 pairs; petiole twisted,

·5-1 in. long; racemes slender, 2-3 in. long, paniculate; petals glabrous; filaments glabrous or slightly pubescent; drupe red (?) .....3. *Dalzellii*.

Leaves lanceolate, acuminate or caudate, 3-5 in. long by 1-1.5 in. broad, nerves rather obscure, up to 20 pairs; petiole slender, 2-4 in. long; racemes slender, 1-2 in. long, often paniculate; petals glabrous, filaments villous; drupe purple (?)

4. *Beddomei*.

Leaves and branchlets rusty-villous, leaves linear-oblong or lanceolate, abruptly long acuminate; nerves parallel, 25-30 pairs; petiole 3-5 in. long; racemes very short, petals densely villous within, filaments villous; drupe blue .....5. *travancorica*.

Leaves subopposite, linear-oblong or oblong-lanceolate, gradually long acuminate; nerves parallel, 25-30 pairs; petiole stout, very shaggy, 3 in. long; racemes very short, petals glabrous, filaments slightly villous .....6. *aureo-fulva*.

1. **NOTHOPEGIA COLEBROOKIANA**, Blume; F. B. I. ii. 41 *in part only*. *Pegia? Colebrookiana*, Wt. Ic. t. 236.

W. Gháts, in the Sivagiri Hills of Tinnevelly (Wight); Nilgiris (Bourne).

2. **NOTHOPEGIA HEYNEANA**, Gamble. *N. Colebrookiana* var. *Heyneana*, Hook. f. in F. B. I, ii. 40.

W. Gháts, in the Anamalais and Hills of Tinnevelly (Beddome, Bourne); Mahendragiri Hill in Ganjam at 4,000 ft. ? (Gamble).

3. **NOTHOPEGIA DALZELLII**, Gamble. *N. Colebrookiana*, Hook. f. in F. B. I. ii. 40, *in part only*. *Glycyarpus racemosus*, Dalz.; Hook. Ic.t. 842.

W. Gháts, from S. Canara southwards to Nilgiris, Pulneys, Anamalais and Travancore, rising to 5,000 ft.

A small tree with pinkish-yellow hard wood.

*Var. angustifolia*, Gamble. Leaves narrower and less prominently nerved; inflorescence shorter.

Nilgiri and Pulney Hills (Bourne).

4. **NOTHOPEGIA BEDDOMEI**, Gamble. *N. Colebrookiana*, Hook. f. in F. B. I. ii. 40 *in part*; Bedd. Fl. t. 164.

W. Gháts in the Nilgiri, Coimbatore, Anamalai, Pulney and Tinnevelly Hills, up to 5,000 ft.

5. **NOTHOPEGIA TRAVANCORICA**, Bedd.; F. B. I. ii. 40.

W. Gháts, from S. Canara to Malabar, Travancore and Tinnevelly, in hills, up to 3,000 ft.



## 6. NOTHOPEGIA AUREO-FULVA, Bedd. ; F. B. I. ii. 40.

W. Gháts, in hills of Courtallum in Tinnevely (Beddome).

## 10. Semecarpus, Linn. f.

Trees. *Leaves* alternate, simple, entire, coriaceous; stipules 0. *Flowers* small, polygamous or dioecious, in terminal rarely axillary panicles, the ♂ flowers smaller than the ♀ or ♂. *Calyx* usually 5-, sometimes 3-lobed, the segments deciduous. *Petals* 5, rarely 3, ovate or oblong-ovate, imbricate. *Disk* broad, annular. *Stamens* inserted below the disk; filaments filiform, in ♂ flowers as long as or longer than the petals, in ♀ flowers short; anthers usually oblong, in ♂ flowers small and imperfect. *Ovary* in ♂ flowers rudimentary or 0, in ♀ or ♂ flowers superior, 1-celled; styles 3, divergent; stigmas capitate or bilobed, rather large; ovule pendulous from a basal funicle. *Fruit* an oblong or subglobose oblique drupe seated on a fleshy receptacle (hypocarp) formed of the accrescent disk and calyx-base; pericarp thick, with cavities filled with an acrid resin. *Seed* pendulous; testa membranous or subcoriaceous; cotyledons plano-convex; radicle superior.

Leaves and inflorescence pubescent; ovary densely villous:—

Petals 5 in all flowers; leaves obovate-oblong, obtuse at apex, rounded at base, glaucous reticulate and more or less hairy beneath, up to 2 ft. long, 1 ft. broad; drupe black, .75 in. long, on an orange hypocarp as long as the drupe.....1. *Anacardium*.

Leaves and inflorescence glabrous; ovary glabrous or with a few scattered hairs:—

Petals 5 in all flowers; leaves thick, obovate-oblong, obtuse at apex, usually acute at base, dark green reticulate and glabrous beneath, up to 20 in. long, 6 in. broad; drupe very oblique, black, 1 in. long, on a short broad furrowed hypocarp .....2. *travancorica*.

Petals 3 sometimes 4 in ♂ flowers, 5 in ♀; leaves thin, oblanceolate, auricled at base, acuminate at apex, up to 15 in. long, 3 in. broad; drupe oblique, black, .5 in. long, on a short broad cuplike hypocarp .....3. *auriculata*.

## 1. SEMECARPUS ANACARDIUM, Linn. f. ; F. B. I. ii. 30; W. &amp; A. 168; Roxb. Cor. Pl. i. t. 12; Wt. Ic. t. 558; Bedd. Fl. t. 166.

Deciduous forests in all forest Districts. The Marking-nut tree.

A moderate-sized tree with brown bark and brownish-grey



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Tomentum of inflorescence pale golden-brown; leaves obtusely acute at apex, up to 10 in. long, oblanceolate, main nerves 16–20 pairs; drupe ellipsoid.....1. *Arnottiana*.

Tomentum of inflorescence dark purple-brown; leaves obtuse or emarginate at apex:—

Petals of ♂ flowers very short, rounded; leaves obovate, up to 7 in. long, 3 in. broad, olive-brown when dry, main nerves about 12 pairs; drupe obovoid .....2. *ferruginea*.

Petals of ♂ flowers nearly 2 in. long, acute; leaves spatulate, up to 5 in. long, 1.5–2 in. broad, usually nearly black when dry, main nerves 6–9 pairs .....3. *nigra*.

Leaves pubescent beneath, oblanceolate, suddenly broadened above the middle, usually long acuminate, petiole-spurs persistent; hypocarp enclosing about two-thirds or three-fourths of drupe:—

Leaves up to 18 in. long, 8 in. broad, midrib on upper surface glabrous or only puberulous even when young; petiole-spurs short, golden-tomentose.....4. *Grahamii*.

Leaves up to about 15 in. long, 5 in. broad, midrib on upper surface ciliate with long hairs as are margins, at any rate when young; petiole-spurs slender, long-villous-pubescent .....5. *Beddomei*.

1. *HOLIGARNA ARNOTTIANA*, Hook. f.; F. B. I. ii. 36. *H. longifolia*, W. & A. 169; Bedd. Fl. t. 107 *not of* Roxb.

W. Coast and W. Gháts, from S. Canara to Malabar and Travancore in low-level forests.

A large tree with black caustic juice which raises blisters and can be used as a varnish. Bark rough; wood greyish-white, soft and useless. Vern. *Kan.* Holigar; *Tam.* Karun charei; *Mal.* Chera.

2. *HOLIGARNA FERRUGINEA*, March.; F. B. I. ii. 37.

W. Gháts, in S. Canara (Beddome), Coorg, Anamalais (Barber).

A large tree of evergreen forests. Vern. *Tam.* Charei.

3. *HOLIGARNA NIGRA*, Bourd. in Ind. For. xxx. 95.

W. Gháts, evergreen forests of Travancore, at 2000–4000 ft. A large tree reaching 100 ft. in height and 2 ft. in diam. of stem. Bark smooth, grey; wood greyish-white, soft and useless. The juice is black and caustic, and can be used as a varnish. Vern. *Mal.* Chéri.

4. *HOLIGARNA GRAHAMII*, Hook. f.; F. B. I. ii. 37. *Semecarpus Grahamii*, Wt. Ic. t. 235.

W. Gháts, in the Hills of Mysore (Barber); Wynaad (Beddome).

A large tree with large conspicuous leaves.

5. *HOLIGARNA BEDDOMEI*, Hook. f.; F. B. I. ii. 38.

W. Gháts, in the Hills of Malabar, W. Nilgiris, Anamalais and Travancore, in moist forests up to 3,000 ft.

A lofty tree (Beddome), with black juice. Bark smooth; wood light grey, soft and perishable. Vern. *Tam.* Pál vidinyán.

**Family LIII. MORINGACEAE.**

Trees with soft white wood. *Leaves* deciduous, alternate, 2-3-pinnate, the pinnae and leaflets imparipinnate, opposite, glandular at the base; stipules 0. *Flowers* large, irregular, hermaphrodite, in axillary panicles. *Calyx* cup-shaped, 5-cleft, the segments unequal, petaloid, imbricate. *Petals* 5, unequal, the 2 upper small, the lowest largest. *Disk* lining the calyx-tube. *Stamens* inserted on the margin of the disk, declinate, 5 perfect opposite the petals with 5-7 alternate sterile antherless; filaments free, thickened at base; anthers 1-celled, dorsifixed. *Ovary* stipitate, 1-celled; style slender, tubular; stigma truncate, perforated; ovules many, biseriate, on 3 parietal placentas. *Fruit* an elongate, 1-celled, loculicidally 3-valved, beaked capsule, corky and pitted within. *Seeds* many, in the pits of the valves; testa corky, winged or not, albumen 0; cotyledons plano-convex; radicle very short, superior, plumule many-leaved.

**Moringa, Lamk.**

Characters of the Family:--

Leaves usually 3-pinnate; leaflets elliptic or obovate, rounded at apex, 5-7 in. long, main nerves obscure; flowers white; seed wings short .....1. *oleifera*.

Leaves usually 2-pinnate; leaflets broadly elliptic or orbicular, emarginate at apex, 1-1.5 in. long, main nerves distinct; flowers yellow streaked with red; seed wings elongate .....2. *concanensis*.

1. *MORINGA OLEIFERA*, Lamk. *M. pterygosperma*, Gaertn.; F. B. I. ii. 45; W. & A. 178; Wt. Ill. t. 77; Bedd. Fl. t. 80.

N. Circars, in Ganjam and Godavari, probably, elsewhere cultivated near villages in the plains, wild in N. India.

The Horse-radish tree.

A graceful tree with corky grey bark and soft white wood. The root has the flavour of horse-radish and the seeds are eaten in curries, and give a valuable oil. Vern. *Hind.* Sohajna; *Ur.* Munigha; *Tam.* Moringa; *Tel.* Múnga.

2. *MORINGA CONCANENSIS*, Nimmo; F. B. I. ii. 45; Hook. Ic. t. 2596.

N. Circars and Deccan, from Vizagapatam to Guntur, Kurnool and Coimbatore.

A tree with thick corky bark and white soft wood. Vern. *Tel.* Konda múnga; *Tam.* Kattu moringa.

## II. CALYCIFLORAE.

*Sepals* herbaceous, partially or completely connate in a tube adnate to or enclosing the ovary, persistent or with the upper portion deciduous, rarely free. *Disk* adnate to the calyx-tube and free from the ovary, or adnate both to ovary and calyx-tube, bearing the stamens on its apex; rarely epigynous and within the stamens. *Petals* as many as the sepals or sometimes fewer by suppression, inserted at the apex of the calyx-tube or on the disk lining the calyx, sometimes absent. *Stamens* variously definite or indefinite, inserted on the margin or inner face of the disk, rarely outside the epigynous disk. *Carpels* free or connate, usually inferior or enclosed in the calyx-tube.

### Family LIV. CONNARACEAE.

Trees or shrubs, erect or climbing. *Leaves* alternate, 1-3-foliate or imparipinnate; leaflets entire; stipules 0. *Flowers* usually hermaphrodite, regular or somewhat irregular, in racemes or panicles. *Calyx* usually 5-lobed, generally persistent; lobes imbricate or valvate. *Petals* 5, free or slightly connate below, imbricate or rarely valvate. *Disk* small or none, annular or imperfect. *Stamens* 5 or 10, perigynous or hypogynous, sometimes declinate, those opposite the petals usually shorter; filaments filiform, often connate below; anthers short, didymous. *Carpels* 5, rarely fewer or more, 1-celled; styles subulate or filiform; stigmas capitellate, simple or 2-lobed; ovules 2, collateral, ascending, orthotropous. *Fruit* of 1-, rarely 2- or more, sessile or stalked, 1- rarely 2-seeded follicles, dehiscing ventrally.



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shorter and sometimes without anthers. *Ovaries* 5, densely pubescent, 4 usually imperfect or obsolete, the fifth with a slender style and capitate stigma. *Fruit* an oblique, stipitate, inflated follicle, the valves glabrous or pubescent within, usually nearly straight on the dorsal, curved on the ventral suture. *Seed* solitary, girt with a fleshy aril at the base; testa smooth, shining; albumen 0; cotyledons plano-convex, fleshy; radicle small.

Valves of the follicle glabrous within, rather thin:—

Follicle scarlet, turning brown when dry, 1·5–2 in. long, acute at apex, narrowed at base into the pedicel, not striate; leaflets elliptic, obtusely acuminate at apex, rounded at base, with 3–5 pairs of main nerves, not prominently reticulate.....1. *monocarpus*.

Follicle bright red, turning brown when dry, 1·5 in. long, keeled on the sutures; acute at apex, narrowed at base into the pedicel, striate; leaflets elliptic-ovate with 5–6 pairs of main nerves, prominently minutely reticulate.....2. *Wightii*.

Follicle light brown when dry, turgidly inflated, oblong, ·75–1 in. long, obtuse at apex, cordate at base on the top of the pedicel, striate; leaflets elliptic-lanceolate or oblong-lanceolate, acuminate, with 7–8 pairs of main nerves .....3. *Ritchiei*.

Valves of the follicle velvety within:—

Follicle obovoid, woody, obtuse at apex, narrowed at base into the thick pedicel, 1·5–2 in. long; leaflets coriaceous, coarsely reticulate, elliptic, with about 5 pairs of main nerves, the lowest pair rib-like from the base; panicles thickly rusty-pubescent.....4. *sclerocarpus*.

Follicle oblong, obtuse at apex, rounded at base with a short thick pedicel, much inflated, 1–1·5 in. long, striate; leaflets elliptic-ovate, acuminate, with 5–6 pairs of rather obscure main nerves; panicles thinly rusty-pubescent .....5. *paniculatus*.

1. *CONNARUS MONOCARPUS*, Linn.; F. B. I. ii. 50. *C. pin-natus*, Lamk.; W. & A. 143.

W. Coast, from S. Canara to Travancore, in open forests and waste places.

A low straggling shrub. Vern. *Tam.* Chettupulukodi; *Mal.* Nai kuriel.

2. *CONNARUS WIGHTII*, Hook. f.; F. B. I. ii. 51.

W. Coast in Travancore and W. Gháts to 1,200 ft. (Bourdillon) in evergreen forest.

A large woody climbing shrub.

3. **CONNARUS RITCHIEI**, Hook. f. ; F. B. I. ii. 51.

W. Coast and W. Gháts from S. Canara and Coorg to Travancore.

A climbing shrub or small tree.

4. **CONNARUS SCLEROCARPUS**, Schellenb. *Rourea? sclerocarpa*, W. & A.

W. Gháts, scarce in the North as S. Canara, common in the Anamalai and Tinnevelly Hills up to 3,000 ft.

A large climbing shrub.

5. **CONNARUS PANICULATUS**, Roxb. ; F. B. I. ii. 52.

N. Circars, in Vizagapatam (Beddome).

A large climbing shrub.

3. **Ellipanthus**, Hook. f.

Trees or shrubs. *Leaves* with 1 leaflet, entire. *Flowers* in short axillary racemes, hermaphrodite or polygamous. *Sepals* 5, valvate. *Petals* 5, imbricate, pubescent, longer than the sepals. *Stamens* 10, 5 long and anther-bearing alternating with 5 short without anthers; filaments subulate, connate in a tube at the base. *Ovary* ovoid, densely villous, attenuate into a short style and lobed stigma. *Fruit* a stalked oblique velvety follicle, valves glabrous within. *Seed* oblong, girt at the base by a fleshy aril; testa of two integuments, outer blackish shining, inner brown leathery; albumen 0; cotyledons plano-convex.

**ELLIPANTHUS NEGLECTUS**, Gamble in Kew Bull. 1917, 26.

W. Gháts, in the Hills of Travancore and Tinnevelly, up to 2,000 ft.

A small tree with elliptic acuminate much reticulate coriaceous leaves, flowers in short rusty-villous racemes fascicled in the leaf-axils and velvety capsule with a large blue-black seed having a pink aril. Vern. *Mal.* Padappen.

Family **LV. LEGUMINOSAE.**

Herbs, shrubs or trees. *Leaves* alternate, rarely opposite, usually compound; stipules 2, usually free; leaflets often stipellate. *Flowers* usually irregular, hermaphrodite, rarely regular or polygamous, in axillary leaf-opposed or terminal racemes or panicles, rarely solitary, bracteate and usually 2-bracteolate. *Sepals* 5, combined or free, often unequal, sometimes combined



in 2 lips. *Petals* 5, rarely fewer, usually free and unequal. *Stamens* normally 10, rarely fewer, sometimes indefinite, perigynous or subhypogynous; filaments free or variously combined; anthers 2-celled. *Ovary* free, with one or more ovules on the ventral suture; style simple, usually declinate; stigma capitate, terminal or oblique. *Fruit* usually dry, a pod splitting open along both sutures, sometimes continuous and indehiscent, sometimes separating into 1-seeded joints. *Seeds* usually exalbuminous; testa usually hard or leathery, occasionally strophiolate: cotyledons fleshy or leafy, the radicle straight or accumbent.

#### ANALYSIS OF SUBFAMILIES.

Flowers zygomorphic; stamens definite:—

Corolla papilionaceous; petals imbricate, the uppermost (standard) the outermost, the 4 others in 2 opposite pairs; stamens usually combined.....I. **Papilionatae.**

Corolla not papilionaceous; petals imbricate, the uppermost the innermost, the rest similar to each other; stamens usually free

II. **Caesalpinioideae.**

Flowers regular; stamens definite or indefinite; petals valvate, usually united above the base .....III. **Mimosoideae.**

#### Subfamily I. PAPILIONATAE.

Herbs, shrubs, or trees. *Leaves* alternate, simple or digitately or pinnately compound, rarely bipinnate, sometimes ending in tendrils. *Flowers* irregular, zygomorphic, rarely subregular, hermaphrodite. *Calyx* gamosepalous, 5-toothed or -lobed or the upper lobes more or less connate, or bilabiate the 2 upper opposed to the 3 lower, rarely spathaceous. *Corolla* papilionaceous, petals 5, free or adnate to the staminal tube, the posterior (standard) outside in bud, the 2 lateral (wings) intermediate, the 2 lower inside and usually cohering by their lower margins (keel). *Stamens* 10, diadelphous (usually 9 and 1, the one (vexillary) opposite the standard), monadelphous or free. *Ovary* free; embryo with an inflexed radicle, cotyledons accumbent.

**Tribe I. GENISTEAE.**—Herbs or shrubs; leaves simple or digitately 3-many-foliolate; stamens monadelphous; pod dehiscent, not jointed:—

Stamens combined in a tube cleft above:—

Anthers uniform; keel petals scarcely cohering .....1. **Rothia.**



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scandent; leaves imparipinnate; stamens diadelphous or monadelphous; pod jointed if more than 1-seeded:—

Leaflets exstipellate:—

Stamens monadelphous:—

Anthers uniform; leaflets 4; slender herb with large ciliate bracts.....14. **Geissaspis**.

Anthers dimorphous:

Calyx-tube short; joints of pod glochidiate, 2-6

15. **Zornia**.

Calyx-tube elongate, slender:—

Joints of pod small, 1-2, rugose, concealed among upper leaves ..... 16. **Stylosanthes**.

Joints of pod large, 1-3, netted, not separating, ripening in the earth..... .. **Arachis**.

Stamens diadelphous, 9 and 1; anthers uniform:—

Ovule solitary; pod 1-jointed; leaves 3-foliolate...17. **Lespedeza**.

Ovules 2-4; pod 1-4-jointed; leaves 1-3-foliolate

18. **Taverniera**.

Stamens diadelphous, in 2 bundles of 5 each:—

Pod twisted, enclosed in the calyx, the joints orbicular, turgid or flat; calyx conspicuous, 2-lipped, usually bristly

19. **Smithia**.

Pod straight, exerted from the calyx:—

Calyx 2-lipped; water plants with many close leaflets; joints of pod close together.....20. **Aeschynomene**.

Calyx 5-toothed; dry shrubs with few leaflets; joints of pod oblong, far apart .....21. **Ormocarpum**.

Leaflets stipellate; stamens diadelphous, 9 and 1, sometimes (*Desmodium*) monadelphous:—

Seed solitary, pod flattened; leaflets small, 1-3-foliolate:—

Racemes in terminal, capitate, plumose heads; leaflets longer than broad ..... 22. **Leptodesmia**.

Racemes axillary, lax, with distant flowers; leaflets broader than long ..... 23. **Eleiotis**.

Seeds 2 or more:—

Pod not distinctly jointed, continuous within:—

Pod inflated; leaflets 3, obovate, small ..... 24. **Pycnospora**.

Pod flat, very viscid-pubescent; leaflets 3, rhomboid, large

25. **Pseudarthria**.

Pod distinctly jointed:—

Pod twisted so that the joints come face to face:—

Calyx accrescent, the teeth lanceolate, subequal 26. **Lourea**.

- Calyx not accrescent, the teeth setaceous-pointed, especially  
 the lower lip ..... 27. **Uraria.**  
 Pod not twisted so that the joints come face to face :—  
 Joints of pod turgid ..... 28. **Alysicarpus.**  
 Joints of pod flattened :—  
 Tree ; racemes fascicled on the old wood.....29. **Ougeinia.**  
 Herbs or shrubs ; racemes simple or paniced, from the year's  
 shoots, flowers sometimes axillary ..... 30. **Desmodium.**

**Tribe V. VICIEAE.**—Herbs, low or climbing ; leaves paripinnate, the leaflets ending in a tendril or bristle ; stamens diadelphous or (in *Abrus*) 9 monadelphous ; pod dehiscent, not jointed :—

Stems herbaceous ; stamens diadelphous, 9 and 1, or monadelphous, the vexillary one joined to the sheath :—

Leaflets entire ; style bearded ; seeds with short funicle :—

Staminal tube oblique at mouth ; pod compressed :—

Style with dorsal tuft of hairs or bearded round the tip ; ovules usually more than 2.....31. **Vicia.**

Style longitudinally bearded along inner face ; ovules less than 2 .....**Lens.**

Staminal tube truncate at mouth ; style bearded along inner face :—

Pod compressed ; style flat, dilated at tip .....**Lathyrus.**

Pod turgid ; style 3-cornered, dilated upwards throughout  
**Pisum.**

Leaflets toothed ; style not bearded ; seeds with a slender funicle ; pod turgid.....**Cicer.**

Stems woody ; stamens monadelphous, the vexillary stamen absent ; style not bearded.....32. **Abrus.**

**Tribe VI. PHASEOLEAE.**—Climbing or prostrate, rarely erect, herbs or shrubs, rarely trees ; leaves pinnately trifoliolate, rarely 1- or 5-7-foliolate ; stamens monadelphous or diadelphous ; pod dehiscent, not jointed :—

Leaves not gland-dotted ; leaflets stipellate :—

Style not bearded below the stigma :—

Nodes of raceme not swollen ; petals about equal in length :—

Stamens diadelphous ; stipules and bracts conspicuous, persistent ; leaves 3-foliolate :—

Calyx-teeth distinct ; style filiform, without a flattened part in the middle .....33. **Shuteria.**

Calyx truncate ; style filiform with a flattened part in the middle .....34. **Dumasia.**

Stamens monadelphous, at first at any rate; stipules and bracts small, deciduous :—

Pod not hooked at the apex; anthers all fertile; leaves 3-7-foliolate ..... 35. **Glycine.**

Pod conspicuously hooked at the apex; 5 alternate anthers sterile; leaves 3-foliolate ..... 36. **Teramnus.**

Nodes of raceme more or less swollen, scarcely apparent in *Galactia* :—

Petals very unequal in length :—

Trees; anthers uniform; standard exceeding the keel and wings ..... 37 **Erythrina.**

Climbing shrubs; anthers dimorphous; keel exceeding the wings and standard ..... 38. **Mucuna.**

Petals nearly equal in length :—

Stamens diadelphous :—

Herbs; pod linear, 2-valved, many-seeded 39. **Galactia.**

Trees or shrubs; pod woody, lower part thin, seedless, indehiscent, end part 1-seeded, subdehiscent :—

Flowers large, racemose ..... 40. **Butea.**

Flowers small, paniced ..... 41. **Spatholobus.**

Stamens monadelphous :—

Upper lip of calyx large, lower minute ... 42. **Canavalia.**

Calyx campanulate, teeth subequal, the upper 2 connate  
43. **Pueraria.**

Style bearded below the stigma; stamens diadelphous :—

Stigma oblique :—

Keel spiral ..... 44. **Phaseolus.**

Keel not spiral ..... 45. **Vigna.**

Stigma terminal :—

Petals very unequal in length; flowers large, blue

46. **Clitoria.**

Petals equal in length; flowers yellow, pink or purple

47. **Dolichos.**

Leaves gland-dotted beneath; stipels often wanting; nodes of raceme not swollen; style not bearded below the stigma :—

Ovules 3 or more :—

Pod depressed outside between the seeds :—

Seeds with a large grooved strophiole ..... 48 **Atylosia.**

Seeds without strophiole, the hilum large ..... **Cajanus.**

Pod not depressed outside between the seeds ... 49. **Dunbaria.**

Ovules 1-2 :—

Calyx accrescent ..... 50. **Cylista.**



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A much branched annual with straight flat pods about 2 in. long and small 3-foliolate leaves.

## 2. *Heylandia*, DC.

A prostrate herb. *Leaves* simple, alternate, entire; stipules 0. *Flowers* small, solitary, axillary. *Calyx*-tube turbinate; teeth lanceolate, 3 lower longer than the 2 subconnate upper. *Corolla* yellow, much exerted; standard orbicular with 2 basal scales at the top of the short claw; wings obovate-oblong; keel petals connate along the back, narrowed to an incurved beak. *Stamens* monadelphous; filaments united in a tube cleft above; anthers alternately short versatile and long basifixed. *Ovary* sessile, 2-ovuled; style abruptly incurved at base, longitudinally bearded above; stigma terminal. *Pod* flat, oblong, 1-2-seeded. *Seeds* reniform on filiform funicles.

HEYLANDIA LATEBROSA, DC.; F. B. I. ii. 65; W. & A. 180.

All dry Districts, on waste land and in open forest.

A prostrate often very silky-hairy herb with small cordate-ovate leaves, pale yellow flowers and small slightly inflated pod.

## 3. *Crotalaria*, Linn.

Herbs or shrubs, or more or less herbaceous undershrubs. *Leaves* simple or trifoliolate or sometimes 5-7-digitate; with or without stipules, the stipules sometimes decurrent in wings on the branches. *Flowers* in terminal or leaf-opposed racemes, rarely solitary, usually yellow but sometimes blue, often large and showy. *Calyx*-tube short; lobes linear or lanceolate, subequal or more or less connate in 2 lips. *Corolla* equal to or exceeding the calyx; standard with a short claw and callus above it, usually orbicular or ovate; wings obovate or oblong, shorter than the standard, clawed and usually with minute transverse folds; keel as long as the wings, its petals connate, much incurved, beaked. *Stamens* monadelphous, connate in a sheath cleft above; anthers dimorphous, alternately short versatile with slender filaments and long basifixed with flattened filaments. *Ovary* sessile or stalked, 2-many-ovuled; style long, abruptly incurved at the base, bearded upwards; stigma small, oblique. *Pod* sessile or stalked, usually globose or oblong, turgid or inflated, continuous within. *Seeds* usually many, rarely 1 or 2, without strophiole; funicle filiform.

Leaves simple, the petiole not articulated :—

Stipules decurrent as a persistent wing to the branchlets ; flowers yellow ..... **Alatae.**

Shrub reaching 3–4 ft. in height or more ; leaves up to 4 in. long and 3·5 in. broad, elliptic-obovate, obtuse and mucronate at apex, covered with appressed golden shining velvety pubescence ; stipular wing gradually expanding to a triangular hooked apex ; flowers 1 in. long ; pod nearly 2 in. .... 1. *Wightiana.*

Erect undershrubs up to about 2 ft. in height :—

Leaves densely rusty velvety-pubescent :—

Leaves ovate, acute or obtuse, mucronate, up to 1·5 in. long by 1 in. broad ; stipular wing widened upwards into a broad recurved point ; flowers ·7 in. long ; pod 1 in. long

2. *scabrella.*

Leaves elliptic-oblong, acute, up to ·9 in. long by ·3 in. broad ; stipular wing narrow with a small sharp point ; flowers ·5 in. long ; pods up to 1 in. long. .... 3. *conferta.*

Leaves thinly rusty- or grey-pubescent, somewhat glaucous beneath :—

Lower leaves ovate, up to 2 in. long by 1 in. broad, upper ones narrowly linear-oblong, about 1 in. long by ·1 in. broad ; stipular wing with long erect or slightly recurved auricles ; racemes few-flowered ; flowers ·5 in. long ; pod 1·8 in. long

4. *Bidiei.*

Leaves obovate, obtuse or acute, grey-pubescent, up to 3 in. long by 1 in. broad ; stipular wing broad, its top shortly auricled ; racemes elongate, many-flowered ; flowers ·5 in. long ; pods 1·2 in. long. .... 5. *alata.*

Prostrate or diffuse small undershrubs ; racemes few-flowered :—

Stems wiry ; leaves ovate elliptic or orbicular, sparsely pubescent, up to 1·2 in. long by ·7 in. broad ; stipular wing narrow, the auricle triangular ; flowers ·5 in. long ; pod 1–1·3 in. long

6. *ovalifolia.*

Stems almost filiform ; leaves orbicular, emarginate, sparsely villous, up to ·8 in. long by ·6 in. broad ; stipular wing very narrow with a short recurved auricle ; flowers ·6 in. long ; pod 1 in. .... 7. *Bourneae.*

Stipules none or small, not decurrent :—

Racemes all lateral, leaf-opposed, few- often only 1-flowered ; mostly prostrate trailing herbs. .... **Diffusae.**

Pod almost globose, hairy ; racemes 1–2-flowered, flowers yellow, stipules minute or none :—



Leaves orbicular-ovate to oblong, up to 1 in. long; pod .4 in. by .3 in., covered sparsely with long stiff golden hairs, seeds up to about 20, rather small.....8. *biflora*.

Leaves orbicular, up to .6 in. long and broad; pod .25-.3 in. by nearly .25 in., covered thickly with short stiff pale hairs, seeds few, 1-4, large.....9. *globosa*.

Pod oblong:—

Pod glabrous:—

Stipules absent; flowers yellow:—

Pod .25 in. long, 8-10-seeded, shortly stalked; branches long, slender; leaves ovate-cordate, prominently nerved, .3-.4 in. long, sparsely hirsute; peduncles and pedicels filiform, 1-3-flowered ..... 10. *filipes*.

Pod .75 in. long, 16-20-seeded, nearly sessile; branchlets wiry; leaves ovate-oblong, not prominently nerved, .5-1.5 in. long, densely appressed-hirsute; peduncles slender, 1-4-flowered.....11. *prostrata*.

Stipules present:—

Small prostrate herbs with small flowers about .25 in. long; pod small, about .25 in. long, many-seeded:—

Stipules minute, subulate; leaves round, the base cuneate, those in the centre about 1 in. long, those on the radiating branchlets smaller, all glaucous beneath; flowers about 3-6 at the ends of slender peduncles, sparsely hairy.....12. *humifusa*.

Stipules lanceolate; leaves orbicular-oblong; subcordate and unequal at base, up to 1 in. long, glaucous beneath; flowers in many-flowered, densely silky-haired racemes with short peduncles.....13. *acicularis*.

Larger suberect herb with larger flowers .5 in. long, rusty villous; pod over 1 in. long, very many-seeded:—

Stipules lanceolate, long acuminate; leaves obovate-oblong, obtuse, mucronate, pale beneath, up to 2 in. long; flowers in lax racemes 4-5 in. long.

.....14. *ferruginea*.

Pod hairy, except var. of *C. Fysonii*; leaves stipulate:—

Flowers small, under .3 in. long, the corolla longer than calyx; trailing herbs with stems up to 2 ft. long and very variable membranous leaves from orbicular to oblong and even lanceolate, usually obtuse; racemes 3-8-flowered; pod .75 in. long, reflexed, softly hairy.

.....15. *evoluloides*.



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Stipules and bracts minute, filiform; leaves obtuse or retuse at apex, white-puberulous beneath; pod narrowed at base.....22. *retusa*.

Stipules and bracts ovate-acuminate, reflexed:—

Leaves usually acute at apex, softly grey-pubescent beneath; pod rounded at base and flatly stalked .....23. *sericea*.

Leaves obtuse at apex, densely ferruginous-silky-pubescent beneath; pod narrowed at base to a flat stalk.....24. *Leschenaultii*.

Woody shrub; racemes dense, short, under 3 in. long; branches, racemes and leaves beneath densely ferruginous-silky; leaves obtuse or retuse; stipules and bracts lanceolate, small .....25. *formosa*.

Leaves villous on the upper surface:—

Racemes shortly stalked; hairs on the branches and leaves dark brown; pod scarcely 1·5 in. long:—

Leaves oblanceolate-oblong, subacute, mucronate, subcordate at base, up to 3·5 in. long, 1 in. broad, thinly silky above, densely so beneath, margins slightly reflexed; racemes 6–12-flowered, flowers 1 in. long .....26. *barbata*.

Leaves elliptic, obtuse, up to 1·2 in. long, ·7 in. broad, strigosely stiff-hairy on both surfaces, especially beneath, margins prominently reflexed; racemes 3–4-flowered, flowers ·75 in. long

27. *scabra*.

Racemes few-flowered, on long stalks; hairs on the branches and leaves golden-brown, shining; leaves oblong or lanceolate, obtuse or acute, up to 2 in. long by ·7 in. broad, margin not reflexed; pod about 2 in. long, very broad.....28. *salicifolia*.

Pods shorter or only little longer than calyx, rarely twice as long; diffuse annuals or low shrubby plants

### Calycinae.

Upper calyx-lobes connate except at the tip:—

Flowers very small, under ·25 in. long, in terminal or leaf-opposed umbels; corolla shorter than calyx:—

Leaves oblong, obtuse, ·2–·7 in. long: umbels few-usually 3-flowered, mostly leaf-opposed; pod ·25 in. long, oblong, 10–12-seeded ..... 29. *nana*.

Leaves oblong, usually acute, up to 1·6 in. long;

umbels many- (6-8-) flowered, terminal or with axillary flowers below the terminal umbel also; pod .25 in. in diam., globose, 6-8-seeded ..30. *umbellata*. Flowers over .25 in. long, in elongate terminal racemes; corolla equal to or slightly longer than calyx:—

Leaves oblanceolate or linear, obtuse or retuse, mucronate, .1-.3 in. broad; flowers .3 in. long, in slender racemes 4-6 in. or even more long; pod ovoid-oblong, up to .3 in. long, 8-10-seeded

31. *linifolia*.

Leaves obovate, cuneate, emarginate, up to .6 in. broad; flowers .6 in. long, in strong racemes up to 9 in. long; pod oblong, .5-.6 in. long, many- (up to 25-) seeded ..... 32. *tecta*.

Upper calyx-lobes not connate or only connate below:—

Pods longer than the calyx:—

Plants with long silky hairs, brown at any rate when dry:—

Low suffruticose plants with ascending branches; racemes short, subcapitate, few-flowered; flowers .4 in. long; pod oblong, .5 in. by .3 in., seeds 15-20; leaves oblong or oblanceolate, obtuse, up to 2.5 in. long, .7 in. broad, stipules 0 or minute...33. *hirta*.

Erect suffruticose plants; racemes long, with distant flowers; flowers .8 in. long; pod obovoid, 1-1.2 in. by .5 in., seeds very many, more than 30; leaves linear oblong, up to 3 in. long, .4 in. broad, stipules linear, conspicuous ..... 34. *mysorensis*.

Plants with short appressed silky pubescence, grey when dry; stipules 0; pods few-seeded, .4-.5 in. long:—

Low diffuse undershrubs, branched from low down; flowers in racemes terminal on the branches; leaves thick, cuneate, obtuse or emarginate, pellucid-punctate, grey-pubescent, .5-1 in. long by .1-.2 in. broad; flowers .4 in. long

35. *albida*.

Erect subglabrous slender undershrubs; flowers in leafy panicles of racemes; leaves membranous, oblanceolate, obtuse, mucronate, not conspicuously pellucid-punctate, up to 3 in. long by .8 in. broad; flowers .3 in. long ..... 36. *epunctata*

Pods equal to or shorter than the calyx: —

Flowers large, in terminal racemes, the calyx .7–1 in. long; leaves very variable, with minute subulate stipules; standard obovate, rounded or emarginate, with a tuft of hairs at the back, otherwise glabrous; pod 20–30-seeded; whole plant densely appressed-silky.....37. *calycina*.

Flowers moderately large, in terminal heads, the calyx .5 in. long:—

Standard glabrous at the back except for a tuft of hairs near the top; stipules 0; pod about equal to the calyx:—

Standard apiculate; leaves linear-oblongate, up to 2 in. long, clothed like the branches with long pale brown silky hairs; erect plants

38. *chinensis*.

Standard emarginate; leaves suborbicular-obovate, .5–.6 in. long, silky-brown-hairy like the branches; low trailing plants, nearly black when dry ..... 39. *priestleyoides*.

Standard and keel densely golden-silky-hairy at the back, like the flowers, leaves and branches; stipules minute; heads densely capitate; leaves 1–1.5 in. long, oblong, obtuse; pod very small, much shorter than the calyx; plant sub-shrubby ...40. *speciosa*.

Flowers small, in oblong dense terminal heads, the calyx .25 in. long; standard oblong, emarginate, glabrous at the back except for a few hairs; stipules minute; pod .25 in. long by .15 in., 6–8-seeded; leaves membranous, obovate, cuneate, 2–3 in. long, 1–1.5 in. broad; erect annuals 1–2 ft. high..... ..41. *dubia*.

Pod hairy (except No. 46, *lanata*) ..... **Eriocarpeae**.

Flowers in single racemes, terminal or terminal and lateral:—

Annual; very small plants, scarcely 6 in. high; calyx .1 in. long, the corolla slightly larger; pod .2 in. long, oblong, silky-villous; leaves linear, oblong, up to .75 in. long, .1 in. broad; stipules 0 ..... 42. *pusilla*.

Slender undershrubs up to about 2 ft. high, the branches 3–4-angled; stipules present, ovate or lanceolate:—

Branches 3-angled, very slender; racemes 2–3-flowered, the flowers under .5 in. long; leaves membranous; pod .5–.8 in. long, appressed-silky-villous.....43. *triquetra*.



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branches furrowed; corolla yellow, large, in long terminal racemes; pod densely dark-brown-velvety:—  
 Stipules lanceolate, curved or deflexed; a densely brown-silky-tomentose shrub; leaves elliptic-ovate or lanceolate, 1·5–2 in. broad, mucronate; standard slightly villous; pod 1·5–2 in. long .....50. *obtecta*.  
 Stipules subulate erect or 0; a thinly pale-brown-silky-pubescent shrub; leaves linear-lanceolate or -oblong, ·25–1·5 in. broad, obtuse and mucronate or acute; standard glabrous; pod 1–1·25 in. long.....51. *juncea*.

Flowers in panicles:—

Pods long, much longer than the calyx:—

Pods long-stalked, stalk ·4 in. long:—

Pedicels of flowers alternate; leaves obovate-oblong, silky-villous with shining hairs; pods nearly glabrous, more than 1 in. long:—

Pods 1 in. long without the stalk; bracts and bracteoles ovate-lanceolate, spreading, more or less deciduous, not shining on upper surface, the bracteoles close under the calyx; calyx-lobes not marginally revolute.....52. *longipes*.

Pods 1–1·5 in. long without the stalk; bracts and bracteoles cordate, acute, reflexed, persistent, shining and viscous on upper surface, the bracteoles ·2–·3 in. from the calyx; calyx-lobes marginally revolute

53. *shevaroyensis*.

Pedicels of flowers opposite or alternate; leaves oblanceolate, dully pale-brown-villous; pods softly puberulous nearly 2 in. long; bracts and bracteoles broadly ovate, acuminate, recurved, persistent, the bracteoles ·1 in. from the calyx; calyx-lobes marginally revolute

54. *subperfoliata*.

Pods sessile or very nearly so, 1–1·2 in. long; leaves golden-silky, often large; bracteoles close under the calyx:—

Bracts and bracteoles ovate-acuminate, more or less deciduous, spreading, not shining and black (when dry) on upper surface; calyx-lobes not prominently revolute.....55. *madurensis*.

Bracts and bracteoles broadly cordate, acute, persistent, shining viscous and black (when dry) on upper surface; calyx-lobes prominently revolute

56. *candicans*.

Pods .8 in. long, longer than the .5 in. calyx; leaves lanceolate, long-villous, 2.5–3 in. long by .5 in. broad; stipules minute or 0; bracts and bracteoles subcordate, acuminate, recurved; seeds 5–7.....57. *sandoorensis*.

Pods short, scarcely, if at all, longer than the calyx:—

Leaves obovate or oblanceolate, densely shining silky, 3–4 in. long by 1–1.5 in. broad; stipules subulate small, or 0; erect shrubs:—

Bracts and bracteoles ovate, erect; upper calyx-lobes obtuse; pods ovoid, .4 in. long with recurved persistent styles, seeds 2.....58. *fulva*.

Bracts and bracteoles ovate, cuspidate, recurved; upper calyx-lobes acuminate; pods oblong, .6–.7 in. long with erect persistent styles, seeds 7–8

59. *pulcherrima*.

Leaves oblong-lanceolate or oblanceolate, mucronate, fulvous-villous, 2–3 in. long by .5 to 1 in. broad; stipules like the bracts; erect undershrubs:—

Bracts and bracteoles lunulate, recurved; pods ovoid, .4 in. long with curved persistent styles, 1–2-seeded

60. *lunulata*.

Bracts and bracteoles very many, conspicuous, linear with reflexed margins, curved; pods ovoid, .4 in. long with recurved styles, 1–2-seeded.....61. *paniculata*.

Leaves linear-cuneate, obtuse, densely soft fulvous villous, up to 1.5 in. long, .25 in. broad; stipules linear, usually 0; bracts and bracteoles ovate, recurved; pods .3 in. long, ovoid, 1-seeded; woody herb...62. *ramosissima*.

Leaves trifoliolate, the petiole articulate.....**Trifoliolatae.**

Seeds 2, the pod obliquely subglobose, small, sessile, beaked:—

Low diffuse perennial herbs, the branches trailing or (in some forms) somewhat ascending; racemes short, few-flowered; leaflets small, obtuse, emarginate, scarcely up to .5 in. long, on very short petioles; corolla .2 in. long; pod .2 in. in diam....63. *medicaginea*.

Erect herbaceous or shrubby perennials:—

Racemes long, 6–10 in., many-flowered; leaflets obovate, emarginate, up to 1 in. long on petioles up to 1.5 in.; stipules minute; corolla .4 in.; pod .2 in. in diam.....64. *trifolium*.

Racemes short, rarely to 6 in. long; stipules linear:—

Branches and leaves softly grey-pubescent; leaflets oblanceolate, obtuse at apex, up to .75 in. long; flowers .3 in. long; pods .2 in. in diam. ....65. *Willdenowiana*.



Branches and leaves softly yellow-pubescent; leaflets obovate, rounded at apex, up to 1·5 in. long; flowers ·4 in. long; pods ·3 in. in diam. .... 66. *Notonii*.

Diffuse woody almost spinescent shrubs; leaflets small (·15 in.), obcordate; racemes short, 2-6-flowered; flowers ·3 in. long, standard ovate; pod very small.....67. *rigida*.

Seeds many:—

Pod short, ·5-·7 in. long, stalked; seeds 8-11; leaflets obovate:—  
Flowers small, ·2 in. long, keel shortly beaked, rounded at base; bracts ovate, acuminate, reflexed; leaflets all equal or nearly so; pods cylindric, obtuse at both ends, glabrous, stalk ·2 in.....68. *orixensis*.

Flowers medium-sized, ·5-·7 in. long, keel long-beaked, narrow; bracts minute, setaceous; mid-leaflet larger than the side ones; pods oblong, narrowed at both ends, acute and beaked at apex, minutely puberulous, stalk ·25 in.....69. *laevigata*.

Pod 1 in. or more long, stalked, seeds more than 10; leaflets usually obovate; bracts small:—

Stalk of pod short, the pods deflexed; flowers medium-sized with prominent curved keel, in elongate stiff terminal racemes:—

Pod and its stalk 1 in. long, clavate, recurved, minutely silky-pubescent, 10-12-seeded; leaflets thick, rather fleshy, emarginate, up to 1·25 in. long ..... 70. *clavata*.

Pod and its stalk 1·5-2 in. long, cylindric-falcate, recurved, puberulous when young, at length glabrous, many-seeded; leaflets membranous, obovate-emarginate or ovate-acute, mucronate, up to 4 in. long ..... 71. *striata*.

Stalk of pod about 1 in. long, the pod cylindric, glabrous, 1·5-2 in. long, 20-30-seeded; flowers very large with prominent incurved keels, in lax racemes; leaflets membranous, 1-2 in. long

72. *laburnifolia*.

Leaves usually 5-, sometimes 3-7-foliolate; pods large, much inflated, hooked at apex, glabrous.....**Multifoliolatae**.

Leaflets 5, linear-oblong or rarely narrow oblanceolate; petioles slender with slender narrowly lanceolate stipules; flowers ·5 in. long in slender erect terminal racemes, the bracts linear-lanceolate, reflexed, pedicels ·2 in.; pods more or less acute at apex, 2-2·5 in. long by 1 in. broad.....73. *quinquefolia*.

Leaflets 5-7, obovate; petioles long, stout:—

Leaflets glabrous above, appressed silky beneath; stipules and bracts slender, lanceolate, reflexed; flowers ·7 in. long, closely



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8. *CROTALARIA BIFLORA*, Linn.; F. B. I. ii. 66; W. & A. 190.  
Deccan and Carnatic, chiefly in open forest lands, up to 3,000 ft., westwards to the E. slopes of the W. Gháts.  
A trailing annual.
9. *CROTALARIA GLOBOSA*, W. & A. 190; F. B. I. ii. 66.  
Hills of the S. Carnatic, from Dindigal southwards.  
A trailing annual, scarcer than the former which it resembles.
10. *CROTALARIA FILIPES*, Benth.; F. B. I. ii. 66.  
W. Coast, in S. Canara (Beddome).  
A very slender trailer with small bifarious leaves and filiform peduncles.
11. *CROTALARIA PROSTRATA*, Roxb.; F. B. I. ii. 67; W. & A. 189.  
E. Coast, on pasture land, especially in N. Circars, but down to Cape Comorin; more scarce in Deccan and on W. Coast.  
A somewhat shrubby perennial trailing herb.
12. *CROTALARIA HUMIFUSA*, Grah.; F. B. I. ii. 67.  
W. Coast and W. Gháts, in Wynaad, Anamalais and Travancore, in dry forest undergrowth, up to 3,000 ft.
13. *CROTALARIA ACICULARIS*, Ham.; F. B. I. ii. 68.  
N. Circars, in Ganjam, in dry forest lands; W. Gháts, in the Anamalai Hills and Travancore, up to 3,000 ft.
14. *CROTALARIA FERRUGINEA*, Grah.; F. B. I. ii. 68. *C. evoluloïdes*, Wt. Ic. 31, probably.  
W. Coast, in S. Canara (Beddome).
15. *CROTALARIA EVOLVULOIDES*, Wt.; F. B. I. ii. 68; W. & A. 188, *excl. syn.*  
Carnatic, in Salem and Coimbatore Districts; W. Gháts, in Nilgiris, Malabar, Pulneys and Travancore, up to 5,000 ft., in dry localities.  
Var. *acutifolia*, Gamble. Leaves elliptic, acute, mucronate, rather prominently nerved.  
W. Gháts, in S.-E. Wynaad.
16. *CROTALARIA FYSONII*, Dunn in Kew Bull. 1914, 26; Fyson Hillt. Fl. 101, t. 74.  
W. Gháts, in grass or by roadsides on the downs in the Pulney Hills, up to 7,000 ft., Anamalai Hills (Beddome).  
A trailing perennial subshrubby herb.  
Var. *glabra*, Gamble. Leaves, flowers, and pod glabrous.  
W. Gháts, on the Pulney Downs (Bourne).

- 17. CROTALARIA BIFARIA**, Linn.; F. B. I. ii. 69; W. & A. 188, *excl. syn.*; Wt. Ic. t. 30.  
Deccan, in Mysore and Bellary; Carnatic, in Tanjore (Wight).  
A straggling perennial herb with weak stems and conspicuously inflated and very obtuse pod. The corolla is yellow or blue.
- 18. CROTALARIA HIRSUTA**, Willd.; F. B. I. ii. 68; W. & A. 188.  
Deccan, from the Godavari through Kistna and Guntur to Cuddapah.  
A subshrubby species with rather large very membranous leaves and stems covered with spreading hairs, the stipules and bracts reflexed.
- 19. CROTALARIA MULTIFLORA**, Benth.; F. B. I. ii. 69.  
W. Gháts, in the Anamalai Hills, at 5,000 ft. (Beddome).  
A subshrubby species with large flowers, apparently scarce.
- 20. CROTALARIA LUTESCENS**, Dalz.; F. B. I. ii. 74.  
W. Coast, in S. Canara, at Karkal (? Karikal) (Lawson).  
An erect annual, reaching 3 ft. in height. It is common in the Konkan so is likely to occur in S. Canara. Flowers yellow.
- 21. CROTALARIA PEDUNCULARIS**, Grab., F. B. I. ii. 74; W. & A. 186. *C. elegans*, Bedd. Ic. t. 106.  
W. Gháts, in Coimbatore, Nilgiris, Anamalais and Travancore, up to 5,000 ft., in grassy places.  
An erect annual with grass-like leaves and yellow flowers.
- 22. CROTALARIA RETUSA**, Linn.; F. B. I. ii. 75; W. & A. 187.  
In all Districts, in fields, waste places and open forest lands.  
An erect herbaceous undershrub reaching 3-4 ft. in height with conspicuous yellow flowers. It gives a fibre.
- 23. CROTALARIA SERICEA**, Retz.; F. B. I. ii. 75; W. & A. 186.  
N. Circars, in Ganjam, in forest regions up to 2,500 ft.  
An erect herbaceous undershrub, corolla yellow with a purple tinge.
- 24. CROTALARIA LESCHENAULTII**, DC.; F. B. I. ii. 76; W. & A. 186.  
W. Gháts, in the Nilgiri and Pulney Hills at elevations above 5,000 ft.; Shevaroy Hills of Salem (Lawson).

An erect herbaceous undershrub with yellow flowers tinged outside with brown or red.

25. *CROTALARIA FORMOSA*, Grah.; F. B. I. ii. 76; W. & A. 181; Wt. Ic. t. 980; Fyson Hillt. Fl. 107. t. 79.

W. Gháts, on the Nilgiris in Sholas and on the open downs above 7,000 ft.

A low-growing handsome shrub with yellow flowers and dense tawny pubescence.

26. *CROTALARIA BARBATA*, Grah.; F. B. I. ii. 76; W. & A. 181; Wt. Ic. t. 980; Fyson Hillt. Fl. 108, t. 80.

W. Gháts, in the higher Shola forests of the Nilgiris at 6,000–8,000 ft.

A large shrub with conspicuous bright yellow flowers and characteristic dark brown silky pubescence.

27. *CROTALARIA SCABRA*, Gamble in Kew Bull. 1917, 28.

W. Gháts, on Agastyamalai Peak, Tinnevely (Barber) at about 6,000 ft.

Apparently a good-sized shrub.

28. *CROTALARIA SALICIFOLIA*, Heyne; F. B. I. ii. 77; W. & A. 182.

W. Gháts, from Coorg through Wynaad to Travancore.

An erect herbaceous undershrub with bright yellow flowers and much golden-brown pubescence.

29. *CROTALARIA NANA*, Burm.; W. & A. 191; F. B. I. ii. 71 *in part*.

Carnatic, near the coast; W. Coast and W. Gháts, at low levels in dry localities.

A prostrate annual plant, with often erect branches.

30. *CROTALARIA UMBELLATA*, Wight; W. & A. 191. *C. nana*, Burm.; F. B. I. ii, 71 *in part*.

W. Gháts, in the Hills from S. Canara and Mysore southwards, up to 6,000 ft.; Shevaroy Hills of Salem.

An erect bushy plant, apparently perennial.

31. *CROTALARIA LINIFOLIA*, Linn. f.; F. B. I. ii. 72; W. & A. 190 *excl. syn.*

N. Circars, in Godavari; Deccan, in Mysore; Carnatic, in Chingleput and S. Arcot.

An annual slenderly-branched plant.

32. *CROTALARIA TECTA*, Roth; F. B. I. ii. 72. *C. viminea*, Grah.; W. & A. 189.



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Group 3 (*crinita*).—Low plants with erect branches, leaves linear-oblong, 1–2 in. long, 1–2 in. broad, strigosely hairy above.

Group 4.—Low plants, branches scarcely 6 in. long, leaves oblong, 5–8 in. long, 1–3 in. broad, strigosely hairy above.

The last group is only found at high levels. Fyson says it is called “Rabbits’ ears” on the Pulneys.

38. *CROTALARIA CHINENSIS*, Linn.; F. B. I. ii. 73.

W. Gháts, in Malabar and Coorg, in scrub forest up to 4,000 ft.

An erect annual about 2 ft. high, with yellow flowers and golden-brown hairs.

39. *CROTALARIA PRIESTLEYOIDES*, Benth.; F. B. I. ii. 74.

W. Gháts, in the Nilgiri and Anamalai Hills (Wight, Beddome), Bababudan Hills of Mysore, up to 5000 ft.

A low trailing undershrub with long dark hairs and capitate flowers.

40. *CROTALARIA SPECIOSA*, Heyne; F. B. I. ii. 73.

Deccan Hills, in the Ceded Districts and Mysore; Nagari Hills of N. Arcot and Kambakam Hills of Chingleput.

An erect woody undershrub with beautiful silky leaves and capitate flowers having a silky standard and large lanceolate bract and bracteoles.

41. *CROTALARIA DUBIA*, Grab.; F. B. I. ii. 73.

W. Gháts, in Wynaad and Anamalais and Hills of Cochin at about 3,000 ft., in dry forest undergrowth.

An easily recognised species with dense heads of small flowers and rather large leaves.

42. *CROTALARIA PUSILLA*, Heyne; F. B. I. ii. 70; W. & A. 189.

Deccan and Carnatic, on dry waste lands.

The smallest species of the genus.

43. *CROTALARIA TRIQUETRA*, Dalz.; F. B. I. ii. 71.

W. Gháts, in S. Mysore and Nilgiris, at about 3,000 ft.

A very slender plant with white or pale yellow flowers.

44. *CROTALARIA CLARKEI*, Gamble in Kew Bull. 1917, 27.

W. Gháts, in the Nilgiri, Pulney and Tinnevelly Hills, up to 5,500 ft.

A much stouter plant than the preceding, with yellow flowers and thicker leaves.

45. *CROTALARIA VERRUCOSA*, Linn.; F. B. I. ii. 77; W. & A. 187; Wt. Ic. t. 200.  
 Almost all Districts, a weed of roadsides, waste places, gardens and fields.  
 A much-branched herbaceous, usually annual, plant with blue, sometimes white, flowers.
46. *CROTALARIA LANATA*, Bedd. Ic. t. 105; F. B. I. ii. 77.  
 W. Gháts, Anamalai, Pulney and Travancore Hills at 3,000 to 4,000 ft.  
 A shrub, reaching 12–15 ft. in height.
47. *CROTALARIA SEMPERFLORENS*, Vent.; F. B. I. ii. 78; W. & A. 187. *C. Wallichiana*, W. & A. 187; Wt. Ic. t. 982.  
 W. Gháts, in the Nilgiri and Pulney Hills, at high levels, above 6,000 ft.  
 A very conspicuous shrub on the borders of Sholas and by roadsides.
48. *CROTALARIA WALKERI*, Arn.; Trimen Fl. Ceyl. ii. 16, t. 26. *C. semperflorens* var. *Walkerii*, Baker in F. B. I. ii. 78.  
 W. Gháts, in the Nilgiri and Pulney Hills, at low levels, up to 6,000 ft.  
 A low undershrub with yellow flowers and smaller leaves than the preceding.
49. *CROTALARIA HEYNEANA*, Grab.; F. B. I. ii. 78; W. & A. 187.  
 W. Coast, in Malabar and Travancore; W. Gháts, in S. Canara, S. Mysore, Wynaad and Anamalais, to 3,000 ft.  
 A low undershrub with blue flowers, very membranous leaves and terete branches.
50. *CROTALARIA OBTECTA*, Grab.; F. B. I. ii, 79; W. & A. 185; Wt. Ic. t. 208 and t. 383.  
 W. Gháts, in Nilgiris, above 4,000 ft.  
 A large shrub with conspicuous flowers and pods and velvety foliage.  
 Var. *glabrescens*, Baker, branches and leaves glabrescent.  
 W. Gháts, in the Tinnevelly Hills, about Courtallum, Sispara Ghát in Nilgiris, etc.
51. *CROTALARIA JUNCEA*, Linn.; F. B. I. ii. 79; W. & A. 185; Roxb. Cor. Pl. ii. t. 193.  
 All Districts, possibly wild in the Circar Hills and W. Gháts,



but more usually found run wild; cultivated especially in the Circars and Deccan. Sun-hemp.

A tall shrub reaching 8 ft. in height, with prominently grooved and striated stems; cultivated for its valuable fibre. Vern. *Hind.* Sunn; *Tel.* Shanama; *Tam.* Janupa, Wuckoo.

52. *CROTALARIA LONGIPES*, W. & A. 183; F. B. I. ii. 76.

Carnatic, in the Kollaimalai Hills of Salem (Wight).

53. *CROTALARIA SHEVAROYENSIS*, Gamble in Kew Bull. 1917, 28.

Shevaroy Hills of Salem (Bidie, Bourne); Madura District (Beddome).

54. *CROTALARIA SUBPERFOLIATA*, Wight; F. B. I. ii. 79; W. & A. 184.

W. Gháts, on the E. slopes of the Pulney and Tinnevelly Hills, Hills of Travancore.

A tall species, at once recognised by the slender racemes with obtuse opposite bracts and usually opposite pedicels.

55. *CROTALARIA MADURENSIS*, Wight; F. B. I. ii. 79; W. & A. 184.

W. Gháts, in the Nilgiri and Pulney Hills, on open downs, up to 6,000 ft.

A very fine tall-growing handsome plant with yellow flowers.

56. *CROTALARIA CANDICANS*, W. & A. 184. *C. madurensis*, Wt.; F. B. I. ii. 79 *in part*.

W. Gháts, in the Nilgiris, at about 6,000 ft.

57. *CROTALARIA SANDOORENSIS*, Bedd.; Gamble in Kew Bull. 1917, 29.

Deccan, Sandúr Hills of Bellary (Beddome).

An erect viscous undershrub with very short fulvous hair.

58. *CROTALARIA FULVA*, Roxb.; F. B. I. ii. 80; W. & A. 183.

Deccan, Hills of Mysore; W. Gháts, in Wynaad and Nilgiris, up to 6,000 ft., scarcer to south.

A handsome shrub with golden silky hairs, erect bracts and yellow flowers in close panicles.

59. *CROTALARIA PULCHERRIMA*, Roxb.; F. B. I. ii. 80; W. & A. 184; Wt. Ic. t. 481.

Hills of the Deccan and Carnatic, from Kambakam in Chingleput to Ramandrug in Bellary, up to 4,500 ft.; Nilgiris.



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Branches very long, prostrate, racemes terminal, about 8-flowered; leaflets obcordate, about .25 in. long ;

var. 3. *herniarioides*.

Variety 1 seems to be scarce and chiefly confined to the coast of the Carnatic; variety 2 is common in the Deccan and Carnatic to the Eastern slopes of the W. Gháts, in dry localities and up to 3,000 ft.; variety 3, the best marked, chiefly occurs on sandy tracts near the sea coast of Coromandel, making large flat rosettes of some size from a thick rootstock.

64. *CROTALARIA TRIFOLIASTRUM*, Willd.; F. B. I. ii. 82; W. & A. 191; Wt. Ic. t. 421.

N. Circars and Carnatic, near the coast, from Ganjam to Madras.

An erect perennial with yellow flowers in long racemes, reaching 2-3 ft. in height.

65. *CROTALARIA WILLDENOWIANA*, DC.; F. B. I. ii. 81; W. & A. 191.

Carnatic, in the plains and low hills from the Kistna southwards.

An erect perennial with soft grey-villous foliage and yellow flowers.

66. *CROTALARIA NOTONII*, W. & A. 192; F. B. I. ii. 82; Wt. Ic. t. 752. *C. rostrata*, W. & A. 191.

W. Gháts, in the Nilgiri and Anamalai Hills, at elevations of 4,000 to 6,000 ft.

A pretty erect shrub with yellowish pubescence and bright yellow flowers.

67. *CROTALARIA RIGIDA*, Heyne; F. B. I. ii. 82; W. & A. 191.

Sea coast of the Carnatic from the Kistna to Negapatam, rarer inland from Coimbatore to Tinnevelly.

A rigid stiff shrub with many thorny-looking branches.

68. *CROTALARIA ORIXENSIS*, Rottl.; F. B. I. ii. 83; W. & A. 193.

N. Circars and Carnatic, scarce.

A diffuse herbaceous much-branched perennial.

69. *CROTALARIA LAEVIGATA*, Lamk.; F. B. I. ii. 83. *C. stipitata*, W. & A. 193.

W. Gháts, from S. Canara to Nilgiris and Anamalais, up to 3,000 ft.

A small erect shrub with yellow flowers.

70. *CROTALARIA CLAVATA*, W. & A. 194; F. B. I. ii. 83.

Carnatic, from Coimbatore southwards, on and near the eastern slope of the Gháts, up to 2,000 ft.

A low shrub, flowers yellow.

71. *CROTALARIA STRIATA*, DC.; F. B. I. ii. 84.

N. Circars, at Chatrapur in Ganjam; W. Coast, in Travancore.

An erect herbaceous shrub, reaching 4 ft. in height, with flowers yellow striped with red.

*Var. acutifolia*, Trim. in Fl. Ceyl. ii. 19. Stems stouter, leaflets larger, ovate, acute, mucronate, on long stout petioles; racemes more densely flowered.

W. Coast in S. Canara (Beddome, Barber); Nilgiris below Coonoor (Fischer); Bangalore, in Mysore (Cameron).

An erect shrub, reaching 5 ft.; flowers yellow striped with purple.

72. *CROTALARIA LABURNIFOLIA*, Linn.; F. B. I. ii. 84; W. & A. 193.

N. Circars and Carnatic, especially near the coast; Deccan, in Mysore; W. Coast at Quilon, Travancore.

An erect shrubby perennial with large yellow flowers and conspicuously long-stalked pod.

73. *CROTALARIA QUINQUEFOLIA*, Linn.; F. B. I. ii. 84; W. & A. 194; Wt. Ic. t. 16.

Carnatic, W. Coast and W. Gháts, up to 3,000 ft., chiefly growing in wet rice fields.

An erect annual with fairly large yellow flowers.

74. *CROTALARIA GRAHAMIANA*, W. & A. 194; F. B. I. ii. 85.

W. Gháts, in the Anamalai and Pulney Hills and Hills of Travancore and Tinnevely, up to 6,000 ft.

An erect undershrub with yellow flowers and shining silky pubescence.

75. *CROTALARIA DIGITATA*, Hook. Bot. Misc. ii. t. 16; F. B. I. ii. 85; W. & A. 194.

Carnatic, Kollaimalai Hills of Salem District (Wight).

A low erect very velvety shrub with yellow flowers.

*Ulex europaeus*, Linn., the "Gorse" or "Furze," has become completely naturalized on the Nilgiri and Pulney Hills at high levels. Two species of *Cytisus*—*C. albus*, Link., the White Broom, with white flowers, and *C. monspessulanus*, Linn., a soft-

leaved shrub with yellow flowers and silky pod—are found run wild on the Nilgiri Hills. The former is a native of Algeria; the latter common in the S. of France and other Mediterranean regions.

#### 4. *Trifolium*, L.

Herbs. *Leaves* digitately trifoliolate, the stipules adnate to the petiole. *Flowers* usually red or white, sometimes yellow, in dense axillary heads spikes or umbels, rarely solitary. *Calyx*-tube campanulate; lobes 5, subequal, the lower ones sometimes longer. *Corolla* adnate to the calyx-tube and fading without falling; standard and wings narrow; keel straight, obtuse. *Stamens* diadelphous; filaments more or less dilated; anthers uniform. *Ovary* sessile or stalked, with few ovules; style filiform, incurved above the base; stigma oblique. *Pod* minute, included, membranous, indehiscent, 1- or few-seeded.

Flowers red, in dense rounded heads about 1 in. in diam., subtended by a pair of opposite leaves; leaflets oblong, stipules broad

1. *pratense*.

Flowers white or pinkish, in globose heads about .7 in. in diam., without leaves and long-stalked; leaflets obovate, emarginate, stipules narrow..... 2. *repens*.

Flowers yellow, in leafless stalked heads about .2 in. in diam.; leaflets very small, obcordate, stipules small ..... 3. *dubium*.

1. **TRIFOLIUM PRATENSE**, Linn.; F. B. I. ii. 86.

Nilgiri Hills near the stations at 6,000–8,000 ft., introduced and run wild, “Red Clover.”

A perennial erect herb, a useful forage plant.

2. **TRIFOLIUM REPENS**, Linn.; F. B. I. ii. 86.

Nilgiri Hills, in pastures at high levels, introduced and run wild, “White or Dutch Clover.”

A perennial creeping herb, also a useful forage plant.

3. **TRIFOLIUM DUBIUM**, Sibth. *T. minus*, Sm.; F. B. I. ii. 86.

Nilgiri Hills, on roadside and waste lands on the plateau, introduced and run wild; N. Circars (Beddome).

An annual herb.

#### 5. *Parochetus*, Hamilt.

A slender, creeping herb, rooting at the nodes. *Leaves* trifoliolate; stipules free or shortly adnate to the petiole. *Flowers*



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herb cultivated occasionally, as a pot-herb and medicinal plant. *Medicago sativa*, Linn., the Lucerne, is occasionally cultivated as a fodder-crop.

### 7. *Cyamopsis*, DC.

Erect herbs with appressed laterally attached hairs. *Leaves* pinnately 3-foliolate (Indian species); leaflets toothed; stipules small, setaceous; stipels 0. *Flowers* in axillary racemes, small, purplish; bracts caducous; bracteoles 0. *Sepals* 5, connate in an oblique tube, lowest tooth longest, setaceous. *Petals* caducous; standard obovate; wings oblong, free; keel obtuse, subincurved, the petals connate above. *Stamens* monadelphous in a tubular sheath; anthers uniform, the connective apiculate. *Ovary* sessile, many-ovuled; style incurved at tip; stigma capitate. *Pod* linear, subquadrangular, acuminate, septate within. *Seeds* square, compressed, strophiole 0.

CYAMOPSIS TETRAGONOLOBA, Taub. *C. psoralioides*, DC; F. B. I. ii. 92; W. & A. 197; Wt. Ic. t. 248.

Eastern plains Districts, cultivated and occasionally found run wild. Cluster-bean.

A stout annual, 2-3 ft. high, with rather large leaflets and beaked pod. The pods are eaten as a vegetable, and the whole plant is cultivated for cattle-fodder. Vern. *Tam.* Koth-averay; *Tel.* Goor chikurkai.

### 8. *Indigofera*, Linn.

Herbs, undershrubs or shrubs, with appressed laterally attached hairs, sometimes mixed with basifixed hairs, frequently silvery-canescens. *Leaves* simple, trifoliolate or imparipinnate, the side leaflets usually opposite, but sometimes alternate, entire; stipules usually small, shortly adnate to the petiole; stipels setaceous or 0. *Flowers* generally very small, usually reddish or purple, in axillary racemes or spikes, rarely solitary, rarely paniced, each flower pedicelled in the axil of a caducous bract; bracteoles 0. *Calyx* minute, campanulate, teeth subequal or the lowest longest. *Corolla* more or less caducous; standard ovate or orbicular, sessile or slightly clawed; wings oblong, slightly adherent to the keel; keel petals erect, obtuse, with a downward spur on each side near the base. *Stamens* diadelphous, the vexillary stamen free, the others with connate filaments; anthers uniform, apiculate. *Ovary* sessile or subsessile, 1-2- or

many-ovulate; style glabrous; stigma capitate, sometimes pedicellate. *Pod* usually linear-cylindric, rarely oblong or globose, straight or curved, sometimes angled, sometimes muricate, often torulose, septate within between the seeds. *Seeds* globose or cylindric and truncate; strophiole 0.

Pod 1-seeded; leaves simple; annuals with very small flowers:—

Pod short, recurved, sickle-shaped, prickly on the broadened ventral suture; green plants nearly glabrous with broadly obovate obtuse leaves ..... 1. *echinata*.

Pod very small, globose, smooth; silvery-hoary plants with linear to obovate leaves ..... 2. *linifolia*.

Pod 2-many-seeded, linear or oblong or 4-angled; leaves simple or pinnate:—

Leaves simple, ovate-cordate, densely covered with long white soft hairs; flowers very small, the setaceous calyx-lobes longer than the corolla; pod minute, 2-seeded ..... 3. *cordifolia*.

Leaves imparipinnate:—

Flowers solitary, pedicellate; pods slender, cylindric:—

Herbaceous perennial with slender prostrate reddish branches; leaflets usually 5, thin, oblanceolate, flat; pedicels filiform, .3-.4 in. long; pod .4 in. long ..... 4. *uniflora*.

Erect much-branched stiff undershrub, young branches silvery pubescent; leaflets usually 3, thick, oblanceolate, folded; pedicels slender, .2 in. long; pod .6 in. long ... 5. *aspalathoides*.

Flowers in axillary racemes:—

Racemes very short, subcapitate; pod oblong, 2-seeded:—

Leaves trifoliolate, leaflets up to 1 in. or more long, black-glandular beneath; pod pubescent, dentately winged on either side of the sutures, .2 in. long, sometimes 1-seeded

6. *glandulosa*.

Leaves 7-9-or more-foliolate, leaflets scarcely .5 in. long, not glandular, alternate; pod sparsely white-hirsute, not winged; .15 in. long ..... 7. *enneaphylla*.

Racemes more or less elongate, not capitate; pod linear, flattened or cylindric, several-seeded:—

Leaves trifoliolate, the under-surface of the leaflets usually with round glands:—

Racemes slender, subcorymbose, up to 1 or 1.5 in. long, with pedicellate flowers; pods .6-.8 in. long, not deflexed; leaflets apiculate, the glands large and prominent

8. *pedicellata*.



Racemes short with densely packed shortly pedicellate flowers; pods deflexed:—

Plants densely clothed with short spreading brownish hairs; pod cylindric, .3-.4 in. long, .1 in. thick, not torulose; racemes short, scarcely up to 4 in. long

9. *vestita*.

Plants with sparse appressed brownish pubescence; racemes very short:—

Pods somewhat stout, .4-.5 in. long, .1 in. thick, narrowly winged on both sides of the sutures; not torulose, about 4-6-seeded; leaflets oblanceolate emarginate, the end one almost or quite sessile.

10. *trifoliata*.

Pods very slender, .6 in. long, under .05 in. thick, very faintly winged at the sides of the sutures, slightly torulose, about 8-seeded; leaflets obovate, obtuse or acute, apiculate, the end one very shortly petiolulate .....

11. *prostrata*.

Plants with white appressed pubescence; end leaflets petiolulate:—

Pods .5-.6 in. long, brown, with appressed white pubescence, torulose, the sharp apex upcurved, seeds 2-4; leaflets membranous, obovate, mucronate, sparsely villous, glands prominent; racemes up to .4 in. long .....

12. *Barberi*.

Pods about 1 in. long, tetragonous, appressed grey-pubescent, not torulose, the sharp apex straight, seeds 6-10; leaflets thick, obovate, obtuse, much appressed pubescent, no glands; racemes up to 1 in. long, usually less, the upper flowers not fertile .....

13. *trita*.

Leaflets 1-4 rarely 5, alternate, densely covered, as the branches and inflorescence, with white appressed hairs; racemes many-flowered, elongate, up to 4 in. long; pods slender, deflexed and then curved upwards, torulose, 6-8-seeded .....

14. *oblongifolia*.

Leaflets 5, sometimes 7, thin, the side ones opposite; racemes slender, pods not torulose:—

Leaflets obovate, obtuse, .5 rarely .7 in. long, stipules lanceolate; racemes slender, 2-5-flowered, under 2 in. long; pods spreading, subcylindric, smooth, slender, .75 in. long, 10-12-seeded.....

15. *glabra*.

Leaflets elliptic obovate, usually acute, up to 1 in. or even



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Pods stout, over .1 in. thick, obtuse at apex with a small mucro, slightly torulose, 8-10-seeded; racemes usually longer than the leaves

24. *sumatrana*.

Pods stout, .5-.75 in. long, about .1 in. thick, nearly straight, shortly mucronate, not torulose, about 6-seeded; racemes slender, up to 7 in. long

25. *longeracemosa*.

Pods more or less tetragonous:—

Pods straight, imbricately deflexed, densely clothed with soft spreading hairs, .5 to .75 in. long, seeds 6-8; racemes densely-flowered, 2-6 in. long, pedicels very short; leaflets rather large.....26. *hirsuta*.

Pods linear, curved, much constricted between the elongate joints, 1.5-2 in. or more long; slightly appressed silky; racemes slender, about 2 in. long, buds canescent; leaflets 7-11, elliptic oblong, slightly appressed-pubescent, up to 1 in. long

27. *constricta*.

Leaflets usually more than 13, occasionally less; flowers .3 in. long or longer:—

Flowers .3 in. long; stiff shrubs with appressed silvery pubescence; branches striated; leaflets elliptic-oblong or -obovate, emarginate or mucronate, coriaceous, .25-.75 in. long; pods straight, cylindric, acuminate, 1-1.5 in. long, grey-pubescent, 8-12-seeded..... 28. *Wightii*.

Flowers over .3 in. long; shrubs nearly glabrous, not silvery pubescent; pods glabrous:—

Pods up to 3 in. long, straight, prominently beaked; flowers .4-.5 in. long; leaflets elliptic-oblong, membranous, up to 1 in. long..... 29. *galegoides*.

Pods up to 2 in. long, straight, shortly beaked; flowers .4-.7 in. long; leaflets obovate-oblong, obtuse or emarginate, apiculate, subcoriaceous, up to 1 in. long..... 30. *pulchella*.

Flowers in paniced bracteate racemes, the bracts leaflet (1-3)-like, stipulate, the true leaves sessile with up to 10 pairs of opposite elliptic-oblong softly pubescent side leaflets, each .25-.5 in. long; pod cylindric, pubescent, .3-.5 in. long, 3-4-seeded

31. *mysorensis*.

1. INDIGOFERA ECHINATA, Willd.; F. B. I. ii. 92; W. & A. 198; Wt. Ic. t. 316.

N. Circars and Carnatic, along the East Coast.

A diffuse annual herb with pink flowers and prickly pod.

2. INDIGOFERA LINIFOLIA, Retz ; F. B. I. ii. 92 ; W. & A. 198 ; Wt. Ic. t. 313 ; Roxb. Cor. Pl. ii. t. 195.

Circars, Deccan and Carnatic, common, often on black cotton soil ; W. Coast, in S. Canara.

A prostrate annual branching from the ground and lying flat on it or only erect among grass. It has bright red flowers, a minute silvery pod, narrow leaves, and a somewhat 2-edged stem.

Var. *Campbellii*, Wt. Stem prominently 2-edged ; leaves broader, obovate, mucronate.

Deccan Districts, Kistna to Cuddapah.

3. INDIGOFERA CORDIFOLIA, Heyne ; F. B. I. ii. 93 ; W. & A. 199.

Deccan and Carnatic, on stony ground and black-cotton soil.

A prostrate silky annual with minute red flowers.

4. INDIGOFERA UNIFLORA, Buch.-Ham. ; F. B. I. ii. 94 ; W. & A. 199 ; Wt. Ic. t. 333.

W. Coast from Malabar to Travancore ; Coimbatore.

A very slenderly-branched prostrate plant with minute red flowers and cylindric pod.

5. INDIGOFERA ASPALATHOIDES, Vahl ; F. B. I. ii. 94 ; W. & A. 199 ; Wt. Ic. t. 332.

E. Coast of the Carnatic from Nellore to Cape Comorin and Nagarcoil, on sandy lands ; rarer inland.

A stiff silvery hoary undershrub with minute red flowers and straight cylindric pod.

6. INDIGOFERA GLANDULOSA, Willd. ; F. B. I. ii. 94 ; W. & A. 199 ; Wt. Ic. t. 330.

Circars and Deccan from the Godavari to Salem, on wet lands, scarcer in Carnatic.

A stout undershrub with thick rootstock and long prostrate branches. Flowers red. Vern. *Tel.* Baragadam.

7. INDIGOFERA ENNEAPHYLLA, Linn. ; F. B. I. ii. 94 ; W. & A. 199 ; Wt. Ic. t. 403.

Circars, Deccan and Carnatic, up to 3,000 ft. in hills, on pasture lands, common.

An undershrub with thick rootstock and prostrate branches. Flowers bright red. Vern. *Tel.* Cheragadam.

8. *INDIGOFERA PEDICELLATA*, W. & A. 200; F. B. I. ii. 95; Wt. Ic. t. 983.

W. Gháts, in the Nilgiri, Anamalai and Pulney Hills from 5,000 ft. upwards; Shevaroy Hills of Salem; in pasture lands and on roadsides.

An undershrub with thick rootstock and many slender branches, the flowers bright brick-red.

9. *INDIGOFERA VESTITA*, Baker in F. B. I. ii. 96.

W. Gháts, in the Nilgiri, N. Coimbatore, S. Malabar and Pulney Hills at 3,000 to 4,000 ft.

An undershrub with thick rootstock and very brown-hairy leaves and pods.

10. *INDIGOFERA TRIFOLIATA*, Linn.; F. B. I. ii. 96 *in part*; W. & A. 201 *in part*; Wt. Ic. t. 314.

Deccan, in Kurnool, Bellary and Mysore, up to 3,000 ft.; Anamalai Hills.

An undershrub with long trailing branches; flowers red.

Var. *multicaulis*, Gamble. *I. multicaulis*, DC. A larger plant with stiff erect branches and thicker, more numerous pods, nearly glabrous.

Deccan, in Mysore and Bellary, up to 3,000 ft.

11. *INDIGOFERA PROSTRATA*, Willd. *I. trifoliata*, Baker in F. B. I. ii. 96 *in part*; W. & A. 201 *in part*.

Deccan and Carnatic in hilly regions from the Kistna southwards; W. Coast and hills of the W. Gháts, rising to 3,000 ft., chiefly in grassy lands.

An undershrub with long very slender trailing branches, red flowers and almost filiform pods.

12. *INDIGOFERA BARBERI*, Gamble in Kew Bull. 1918.

Deccan and Carnatic from Cuddapah to S. Arcot and the Shevaroy Hills.

An erect canescent undershrub with slender branches.

13. *INDIGOFERA TRITA*, Linn. f.; F. B. I. ii. 96; W. & A. 203; Wt. Ic. t. 315, 386.

S. Circars, Deccan and Carnatic from the Godavari to Travancore, inland to Coimbatore and Madura, roadsides and waste places, common.

A stiff very grey undershrub up to 3 ft. high, with salmon-pink flowers and long tetragonous sharply-pointed pod.

Vern. *Tel.* Nakanaru.



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Deccan and Carnatic from Mysore to Madura and up to 3,000 ft., often in wet places.

A much-branched annual plant up to 2 ft. high with slender stems, long narrow leaflets and lilac flowers.

22. *INDIGOFERA ARTICULATA*, Gouan.; Prain and E. Baker in Journ. Bot. 1902, 141. *I. caerulea*, Roxb.: W. & A. 203; Wt. Ic. t. 365. *I. argentea* var. *caerulea*, Baker in F. B. I. ii. 99. Circars, Deccan and Carnatic, often on black cotton soil. Surat Indigo.

An erect shrub, up to 3 ft. high, flowers reddish-yellow, gives an indigo dye. Vern. *Tel.* Karunili.

23. *INDIGOFERA TINCTORIA*, Linn.; F. B. I. ii. 99 *in part*; W. & A. 202 *in part*; Wt. Ic. t. 365.

Circars, Deccan and Carnatic, also West Coast, cultivated and run wild. Madras Indigo.

A branching shrub, up to about 6 ft. high. Vern. *Hind.* Jinjini; *Tel.* Nili; *Tam.* Averi; *Kam.* Ajara; *Mal.* Amari.

24. *INDIGOFERA SUMATRANA*, Gaertn. *I. tinctoria*, F. B. I. ii. 99 *in part*; W. & A. 202 *in part*, not of Linn.

Circars and Deccan chiefly, occasionally elsewhere, cultivated and perhaps run wild. Bengal Indigo.

A twiggy shrub up to about 6 ft. high. Vern. *Hind.* Nil.

25. *INDIGOFERA LONGERACEMOSA*, Boivin; Prain and E. Baker in Journ. Bot. 1902, 144.

South Travancore (Beddome, Lawson, Barber).

A slender shrub with woody branches and leaves with rather small very thin leaflets.

26. *INDIGOFERA HIRSUTA*, Linn.; F. B. I. ii. 98; W. & A. 204.

Almost all Districts, common.

An annual or biennial densely pubescent erect herb with pink flowers hidden by long subulate calyx lobes, rather large leaflets and conspicuous filiform stipules.

27. *INDIGOFERA CONSTRICTA*, Trimen. *I. flaccida* var. *constricta*, Thw.; F. B. I. ii. 99 *in note under I. tinctoria*.

Cochin, at Kavalay, 2,000 ft. (Meebold), but extends probably northwards to N. Kanara (coll. Talbot), though rare as in Ceylon.

An erect shrub, up to about 3 ft. high, with characteristic constricted pod and leaves like those of indigo, though with large leaflets.

28. INDIGOFERA WIGHTII, Grab.; F. B. I. ii. 99; W. & A. 202.  
Madgol Hills of Vizagapatam, 4,500 ft. (A. W. Lushington);  
Deccan Hills in Mysore, Coimbatore and Salem; W. Gháts,  
up to 4,000 ft., in Nilgiris, Anamalais and Pulneys.  
A stiff silvery shrub with small leaflets and yellowish-red  
flowers.
29. INDIGOFERA GALEGOIDES, DC.; F. B. I. ii. 100.  
W. Coast and W. Gháts, Malabar to Travancore, up to  
2,000 ft.  
A tall shrub with pale red flowers and very long-beaked  
pods.
30. INDIGOFERA PULCHELLA, Roxb.; F. B. I. ii. 101; W. & A.  
203; Wt. Ic. t. 367.  
Hills of N. Circars, Deccan and W. Gháts, up to 5,000 ft.,  
in dry forests.  
A large shrub with handsome purple-red flowers, reaching  
6 ft. in height. Vern. *Ur.* Girili; *Tel.* Siralli; *Tam.*  
Narinci.
31. INDIGOFERA MYSORENSIS, Rottl.; F. B. I. ii. 102; W. & A.  
202.  
Hills of the Deccan in Chingleput and Mysore, up to  
4,000 ft.; W. Gháts, on dry Nilgiri slopes, but scarce.  
An erect much-branched, softly grey-pubescent shrub with  
red flowers and small cylindric pods. The leafy bracts  
make it appear as if the flowers were solitary in the leaf-  
axils. Vern. *Tel.* Bapanga.

I found *Indigofera anabaptista*, Steud.; F. B. I. ii. 102 in the  
Fort at Bellary. It had probably come from a seed casually  
imported from Sind or Arabia.

### 9. Psoralea, Lind.

Herbs or undershrubs, punctate with black or pellucid glands.  
*Leaves* unifoliolate or imparipinnate, often dentate, stipulate.  
*Flowers* capitate spicate subracemose or fascicled, rarely solitary,  
in the axils of reduced floral leaves; bracts membranous, often  
with 2-3 flowers each; bracteoles 0. *Calyx*-tube campanulate,  
lobes subequal or the lowest the longest, the 2 upper often connate.  
*Corolla* little exserted; standard ovate or orbicular, clawed;  
wings oblong, falcate; keel petals obtuse, slightly connate.  
*Stamens* diadelphous or the vexillary filament sometimes connate



with the rest; anthers small, uniform or slightly dimorphous. *Ovary* sessile or shortly stalked, 1-ovuled; style filiform or dilated at base; stigma terminal. *Pod* ovoid or oblong, 1-seeded, indehiscent, the pericarp usually adherent to the seed.

*PSORALEA CORYLIFOLIA*, Linn.; F. B. I. ii. 103; W. & A. 198.

Deccan and Carnatic, in most Districts, a weed of roadsides and waste places.

An erect annual, 1-3 ft. high, with blue flowers in dense long-peduncled heads and ovoid pitted pods. Leaves unifoliolate, broadly elliptic, dentate, petioled, covered with large black glands and a few white hairs. The seeds are used medicinally.

Vern. *Hind.* Babachi; *Tel.* Bapunga; *Tam.* Karporgam.

A South African shrub, *Psoralea pinnata*, Linn., has established itself about Ootacamund. It has blue flowers and very narrow leaflets.

#### 10: *Mundulea*, DC.

Shrubs or small trees, usually silky-pubescent. *Leaves* imparipinnate, the leaflets reticulate and penninerved; stipules small. *Flowers* in terminal racemes, the pedicels fascicled; bracts small; bracteoles 0. *Calyx* campanulate, lobes short, the two upper often subconnate. *Corolla* much exserted; standard large, with 2 calluses at the base above the claw; wings falcate-oblong, long-clawed; keel petals incurved, obtuse at apex, clawed at base. *Stamens* monadelphous, the vexillary filament free only at base, alternate filaments slightly dilated above; anthers uniform. *Ovary* sessile; ovules many; style incurved, glabrous; stigma capitate. *Pod* large, linear, flat, subindehiscent, the sutures thickened. *Seeds* reniform, estrophiolate.

*MUNDULEA SUBEROSA*, Benth.; F. B. I. ii. 110. *Tephrosia suberosa*, DC.; W. & A. 210; Wt. Ill. t. 79.

Circars, Deccan and Carnatic, from Vizagapatam to Tinnevely, in dry forests on rocky hills and up to 4,000 ft.

A pretty little tree with thick corky yellow bark, close-grained yellow wood resembling satinwood, pink rather large flowers and silky shining leaves. Vern. *Tam.* Pilavaram.

#### 11. *Tephrosia*, Pers.

Herbs or undershrubs, rarely shrubs. *Leaves* imparipinnate, sometimes reduced to one leaflet; side leaflets opposite, usually



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stipules and bracts subulate, persistent; pod clothed with coarse cottony villi, ashy-brown to grey; seeds lenticular, .16 by .125 in., margin bluntly keeled, strophiole dull brown, anvil-shaped.....4. *fusca*.

Pod less than 2.5 in. long, usually 1.5–2 in.; inflorescence elongate; stipules long filiform; leaflets 1–1.5 in. long

5. *noctiflora*.

Calyx-teeth narrowly deltoid or lanceolate below, cuspidate above, all equalling or exceeding the tube (at aestivation); pedicels not manifestly articulate upon the axis:—

Septa of pod manifest, persistent:—

Flowers very few, axillary; leaflets narrowly oblong-cuneate, terminal .5 in. or more long, upper surface pale green, lower cinereo-canescens; pod 1.5 in. long, .15 in. broad, falcate from above the middle, hairs on the valves closely appressed-canescens, on sutures ascending, fulvous; seed oblong-elliptic, .16 in. long, clay-coloured flecked with brown

6. *pentaphylla*.

Septa of pod evanescent or obscure:—

Pod entirely covered with dense villous tomentum, arcuately curving from the very base; flowers in fascicles on a long spiciform rhachis . . . . .7. *hirta*.

Pod pilose or glabrescent, but never when mature covered with thick villous tomentum:—

Flowers in racemes (casually reduced to few in the axils or at the ends of branches):—

Racemes axillary; style bearded:—

Leaflets obovate-cuneate, terminal .75–1 in. by .125–.25 in., under-surface not silvery.....8. *maxima*.

Leaflets obovate, oblong or elliptical, base obtuse or (less frequently) bluntly cuneate, terminal .75–5 in. long, under-surface more or less silvery (casually glabrescent):—

Stipules broadly ovate-deltoid, .25 by .125 in., conspicuously carinate-striate, brown-scarious; bracts and bracteoles similar; leaflets with a distinct (but not indurated) margin; pod densely clothed with laxly appressed-silky fulvous hairs

9. *pulcherrima*.

Stipules linear-lanceolate, .25 by .04 in., obscurely striate, herbaceous; bracts and bracteoles subulate or almost setaceous; leaflets not marginate; pod

sparsely furnished with strigose cottony white hairs :—

Pod at least 2 in. long :—

Pod about 3 in. long ; standard .75 in. long  
seeds mottled.....10. *canarensis*.

Pod under 2.5 in. long ; standard .35 in. or less ;  
seeds not mottled :—

Stem and peduncles densely clothed, particularly on the angle, with ascending hairs ; longest calyx-tooth about .125 in. long

11. *tinctoria*.

Stem and peduncles sparsely furnished with appressed hairs ; longest calyx-tooth about .075 in. long .....12. *senticosa*.

Pod less than 2 in. long ; standard .4–.5 in. long

13. *Roxburghiana*.

Racemes extra-axillary ; style not bearded :—

Stem not procumbent ; racemes normally more than 3-flowered :—

Pod parchment-like or horny, normally more than 1 in. long :—

Leaflets lanceolate, normally acute 14. *lanceolata*.

Leaflets never truly lanceolate :—

Floral bracts not longer than the pedicels before aestivation, subulate ; pubescence of pedicel and calyx appressed :—

Stem ascending, subulate, glabrescent ; flowers less than .3 in. long, bluish-purple

15. *purpurea*.

Stem erect, branches zigzag, angled, hairy ; flowers more than .3 in. long, rose-coloured or scarlet .....16. *Hamiltonii*.

Floral bracts longer than the pedicels, setaceous ; pubescence of calyx spreading...17. *Hookeriana*.

Pod papery, less than 1 in. long ; leaves less than 3 by 1.5 in. ; side leaflets 3–4 pairs, cuneate-obcordate.....18. *Barberi*.

Stems procumbent or (rarely) ascending ; racemes 1–3-flowered ; pod 9–12 (casually fewer-) seeded, valves closely pilose, the hairs short, white, ascending ; seed irregularly trapezoidal, the testa bony, aril obsolete

19. *procumbens*.

Flowers in axillary fascicles; stipules spinose; pod drepaniform, obscurely pubescent, up to 1.25 in. long; leaflets obovate-cuneate, terminal .5 in. long or less....20. *spinosa*.

1. *TEPHROSIA TENUIS*, Wall.; F. B. I. ii. 111.

East Coast, in the Kistna District, in sandy places.

A slender caespitose plant with filiform stems and linear oblong membranous leaflet 1-2 in. long; flowers pink, on capillary pedicels.

2. *TEPHROSIA CALOPHYLLA*, Bedd. Ic. t. 166; F. B. I. ii. 111.

N. Coimbatore, on dry rocky hills above the Gazulhati Pass, at 3,000 ft. (Beddome).

A woody perennial with coriaceous strongly nerved leaflet 3-5 in. long, purplish-red flowers in elongate racemes and glabrous pod 2-3 in. long.

3. *TEPHROSIA WYNAADENSIS*, J. R. Drumm.

W. Gháts, Tambracheri Ghát, Wynaad (Barber).

An erect undershrub, resembling *T. candida*, DC., end. leaflets up to 1.5 in. long.

4. *TEPHROSIA FUSCA*, W. & A. 210; F. B. I. ii. 114.

Carnatic, Hills of Dindigal in Madura District (Wight).

Apparently a shrub and perhaps not indigenous. Though more woolly it resembles, like the preceding, the North Indian *T. candida*, DC. often cultivated in Madras Hill gardens.

5. *TEPHROSIA NOCTIFLORA*, Bojer. *T. Hookeriana*, Baker; F. B. I. ii. 113 *not of* W. & A.

Madras Presidency (?) (Walker).

An undershrub with golden-silky deflexed pods and narrowly oblong-ob lanceolate emarginate leaflets.

6. *TEPHROSIA PENTAPHYLLA*, Sweet. *T. senticosa*, Wt. Ic. t. 370. *Galega pentaphylla*, Roxb. Fl. Ind. iii. 384.

Deccan, in Bellary District, on black cotton soil (Wight).

A stout much branched undershrub, with very coriaceous stems and leaves.

7. *TEPHROSIA HIRTA*, Ham. *T. villosa*, W. & A. 212; F. B. I. ii. 113 *excl. some synonyms*. *T. argentea*, W. & A. 212 *excl. synonyms*. *T. incana*, W. & A. 212.

All plains Districts, on waste lands and by roadsides, ascending the hills to 3,000 ft.

An erect silky-villous undershrub with pale red flowers.



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F. B. I. ii. 112 *in part* (*Galega lanceaefolia*, Roxb. Fl. Ind. iii. 386).

N. Circars, on sandy lands near the coast, as far south as the Godavari.

An undershrub with bright purple flowers.

15. *TEPHROSIA PURPUREA*, Pers.; F. B. I. ii. 112 *in part*; W. & A. 213 *in part*.

In all plains Districts, on waste lands and by roadsides, very common.

An erect perennial undershrub with small red flowers. Said to give a blue dye resembling indigo. Vern. *Tam.* Kat-kolingi.

16. *TEPHROSIA HAMILTONII*, J. R. Drumm. *T. purpurea*, Pers.; F. B. I. ii. 212 *in part* (*Galega tinctoria*, Roxb. Fl. Ind. iii. 386 *not of* Linn.).

Deccan, in Northern and Western areas, on sandy soils (Wight 898).

A gregarious undershrub with large bright rose-coloured flowers.

17. *TEPHROSIA HOOKERIANA*, W. & A. 212; *not of* F. B. I. W. Gháts, on dry soils at Sigúr, N. Nilgiris, at 3,000 ft. (Lawson, Gamble); Carnatic, at Trichinopoly (Wight).

A shrub with brownish silky stems and leaves and small flowers on short pedicels in elongated racemes.

18. *TEPHROSIA BARBERI*, J. R. Drumm.

S. Carnatic at Kudiramalai Teri, Tinnevely (Barber); Tuticorin (Wight).

A distinct-looking undershrub with reddish flexuose branchlets and small obovate obtuse leaflets, softly villous.

19. *TEPHROSIA PROCUMBENS*, Ham. *T. purpurea* var. *pumila*, Baker in F. B. I. ii. 113. *T. diffusa*, W. & A. 213.

Circars, Deccan and Carnatic, on waste lands in open forest and among grass in pastures, up to 3,000 ft. in the hills.

A slender herbaceous perennial with white flowers.

20. *TEPHROSIA SPINOSA*, Pers.; F. B. I. ii. 112; W. & A. 214 *excl. cert. syn.*; Wt. Ic. t. 372.

Carnatic, from the Kistna southwards, on dry barren lands on the coast and inland to the Hills of Coimbatore, Madura and Tinnevely.

A stiff thorny grey-canescient low shrub.

## 12. Millettia, W. &amp; A.

Trees or large shrubs, usually climbing. *Leaves* imparipinnate, stipulate, the side leaflets opposite, usually stipellate, penninerved. *Flowers* rather large, showy, fascicled, rarely scattered, on the rhachis of axillary or terminal racemes or panicles; bracts and bracteoles usually small, caducous. *Calyx* campanulate, the teeth short. *Corolla* much exserted; standard ovate or orbicular, emarginate, spreading or reflexed, glabrous or silky on the back; wings obliquely oblong; clawed; petals of keel incurved, obtuse, clawed. *Stamens* monadelphous, sometimes diadelphous by the vexillary filament being quite free; anthers uniform, ovate. *Ovary* sessile or rarely stalked, few-ovuled; style inflexed, glabrous; stigma capitate. *Pod* linear or oblong or oblanceolate, flat or turgid, coriaceous or woody, late in dehiscing. *Seeds* few, orbicular or reniform, estrophiolate.

Standard not auricled at the base:—

Leaves very silky-pubescent beneath, especially when young; stamens monadelphous; pods velvety, the endocarp not separable:—

Pubescence very shining, silvery; leaflets 7-9, oblanceolate, obtuse at apex, -main nerves 15-25 pairs; calyx distinctly toothed; pods flattened, 3-4 in. long, .75 in. broad...1. *splendens*.

Pubescence ferruginous; leaflets 5-7, obovate, acute at apex, main nerves 8-10 pairs; calyx-teeth very indistinct; pods thick, oblong or trapezoid, turgid, 2-4 in. long, 1-1.5 in. broad

2. *rubiginosa*.

Leaves not silky, merely slightly pubescent; leaflets 11-15, obovate, obtuse; calyx-teeth short; stamens diadelphous; pods glabrous, linear, torulose, the endocarp separable, 4-10 in. long, .5 in. broad

3. *racemosa*.

Standard auricled at the base; leaflets 7-9 pairs, obovate, obtuse; calyx shortly toothed; stamens monadelphous; pod linear, flattened, velvety, 6-9 in. long, 1 in. broad, the sutures thickened

4. *auriculata*.

1. MILLETTIA SPLENDENS, W. & A. 263; F. B. I. ii. 104; Bedd. Ic. t. 295.

W. Gháts, in the Nilgiri and Anamalai Hills, up to 4,000 ft. A large, very handsome climbing shrub with reddish flowers.



2. *MILLETTIA RUBIGINOSA*, W. & A. 263; F. B. I, ii. 104; Wt. Ic. t. 207.

W. Gháts, in the forests of Tinnevely and Travancore, up to 5,000 ft.

A large climbing shrub with reddish flowers.

3. *MILLETTIA RACEMOSA*, Benth.; F. B. I. ii. 105. *Tephrosia racemosa*, W. & A. 210.

N. Circars and Deccan, in dry hill forests at low levels, from Ganjam to Bellary and Coimbatore.

A large climbing shrub with thick brown rough bark, large leaves, torulose pods and whitish flowers. Vern. *Tel.* Galuga.

4. *MILLETTIA AURICULATA*, Baker; F. B. I. ii. 108.

Forests of Ganjam and Vizagapatam, chiefly with Sál, up to 4,000 ft.

A large climber with light brown bark and wood in alternate layers of soft woody and bast tissue. It is sometimes found as a nearly erect shrub. Flowers whitish. The bark gives a rough fibre. Vern. *Hind.* Ganj; *Ur.* Rekorlo.

### 13. *Sesbania*, Scop.

Herbs, shrubs or small soft-wooded trees, often prickly. *Leaves* abruptly pinnate, long, narrow; leaflets numerous, linear-oblong, mucronate, deciduous; stipules lanceolate or setaceous, deciduous. *Flowers* in lax axillary racemes; bracts and bracteoles setaceous, usually early deciduous. *Calyx* campanulate, with 5 short equal teeth. *Corolla* much exserted, the petals all with long claws; standard orbicular or ovate, spreading or reflexed; wings falcate-oblong; keel petals obtuse or subrostrate. *Stamens* diadelphous; anthers uniform. *Ovary* linear, usually stipitate, many-ovuled; style incurved, glabrous; stigma capitate. *Pod* long, linear, narrow, flattened or 4-angled, septate within between the seeds. *Seeds* transversely oblong, strophiole 0.

Flowers under .75 in. long, buds straight:—

Stems without prickles; standard with 2 appendages at the base which run as keels into the claw; pods twisted, pendulous:

Flowers usually .5–.6 in. long, standard appendages long-tailed; pods torulose, 6–9 in. long ..... 1. *aegyptiaca*.

Flowers usually .75–1 in. long, standard appendages triangular; pods slightly torulose, 10–12 in. long ..... 2. *paludosa*.



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14. *Geissaspis*, W. & A.

Slender diffuse annual herbs. *Leaves* abruptly pinnate; leaflets 2 pairs, obovate; stipules membranous, produced below the insertion; stipels 0. *Flowers* very small, yellow or purplish, in long-peduncled axillary racemes; bracts large, oblique, veined, imbricate, persistent, more or less concealing the flowers and fruit. *Calyx* deeply 2-lipped, the upper entire, the lower obscurely 3-toothed. *Corolla* longer than the calyx; standard suborbicular, shortly clawed; wings oblong or obovate; keel petals incurved, obtuse, slightly united at the back. *Stamens* monadelphous, the filaments free in the upper third; anthers uniform. *Ovary* shortly stalked; ovules 2; style incurved; stigma minute, terminal. *Pods* 1-2-jointed, the joints turgid in the middle at first with a flat border, reticulately veined, indehiscent. *Seeds* subreniform.

Flowers much shorter than the bracts; bracts orbicular, the margins with many long stiff brown hairs, the bases long-sagittate; stipules lanceolate, long-spurred, long-ciliate, persistent; corolla purplish; leaflets 4-5 in. long ..... 1. *cristata*.

Flowers as long as or longer than the bracts; bracts ovate, mucronate-dentate, the bases shortly sagittate; stipules oblanceolate, shortly spurred, spinous-ciliate, deciduous; corolla yellow; leaflets 2-3 in. long ..... 2. *tenella*.

1. *GEISSASPIS CRISTATA*, W. & A. 218; F. B. I. ii. 141; Bedd. Ic. t. 293.

W. Coast, from S. Canara to Travancore; W. Gháts, in Mysore, lower Nilgiris and Malabar, up to 3,000 ft., usually in rice-fields.

A very pretty plant, conspicuous for its beautiful long-ciliate imbricate bracts.

2. *GEISSASPIS TENELLA*, Benth.; F. B. I. ii. 141.

W. Coast, plains of S. Canara, in rice-fields.

A much smaller plant than the preceding, the bracts only mucronate-dentate.

15. *Zornia*, Gmel.

Herbs. *Leaves* digitately 2-4-foliolate; leaflets gland-dotted; stipules subfoliaceous, gland-dotted, usually peltate; stipels 0. *Flowers* in interrupted spikes or solitary, on terminal or axillary

peduncles; bracts geminate, stipular, foliaceous, each pair enclosing a sessile flower; bracteoles 0. *Calyx* small, membranous or hyaline, the 2 upper lobes connate in a lip, the 2 lateral small, the lowest as long as the upper. *Corolla* exserted, the petals clawed; standard suborbicular; wings obliquely oblong; keel petals incurved, acute. *Stamens* monadelphous in a closed tube, the free part of filaments about one-third of their length; anthers dimorphous. *Ovary* sessile; ovules many; style filiform; stigma minute, terminal. *Pod* a compressed lomentum of several, smooth or with glochidiate prickles, 1-seeded joints. *Seeds* subreniform, estrophiolate.

Leaflets usually lanceolate acuminate, glabrous, rarely ovate, up to 1 in. long, dotted with scattered black glands; standard cordate above the claw; joints of lomentum .1 in. in diam., the prickles retrorsely scabrous.....1. *diphylla*.

Leaves ovate mucronate, up to .6 in. long, glabrous or more or less white-villous, dotted with many minute white glands; standard narrowed above the claw; joints of lomentum .2 in. in diam., the prickles glabrous ..... 2. *zeylonensis*.

1. ZORNIA DIPHYLLA, Pers.; F. B. I. ii. 147. *Z. angustifolia*, Sm.; W. & A. 217.

All dry Districts especially near the coast; inland up to 3,500 ft., often on rocks.

A diffuse wiry herb with yellow flowers. Leaves usually lanceolate, but those near the base are often ovate and even emarginate. The bracts and stipules are very characteristic.

2. ZORNIA ZEYLONENSIS, Pers.; W. & A. 217. *Z. diphylla* var. *zeylonensis*, Baker; F. B. I. ii. 118.

East Coast Districts from Ganjam to Travancore, in sandy places near the sea.

A diffuse herb with longer branches and stouter rootstock than the former.

## 16. Stylosanthes, Swartz.

Stiff undershrubs. *Leaves* pinnately trifoliolate; stipules large, adnate to the base of the petiole; stipels 0. *Flowers* small, usually yellow, in dense terminal heads, imbricate with the leaf-stipules and linear lanceolate scarious bracts. *Calyx*-tube very

long, slender, filiform ; lobes obtuse, membranous, ciliate, unequal, the upper 4 connate. *Petals* inserted at the throat of the calyx-tube ; standard orbicular ; wings oblong, free ; keel petals incurved, obtuse. *Stamens* monadelphous ; anthers dimorphous. *Ovary* sessile at the base of the calyx-tube ; ovules 2-3 ; style elongate, filiform ; stigma minute, terminal. *Pod* sessile, compressed, hooked at the apex with the persistent base of the style ; joints 1-2, reticulate or muricate. *Seeds* compressed, lenticular, estrophiolate.

STYLOSANTHES MUCRONATA, Willd. ; F. B. I. ii. 148 ; W. & A. 218 ; Bedd. Ic. t. 294.

N. Circars, Deccan and Carnatic, in dry localities, up to 3,000 ft. in the hills.

A stiff undershrub with trifoliolate sharply mucronate leaves and conspicuous sheathing stipules, the pods small, hard, reticulate, flowers yellow. Vern. *Tel.* Saillee kumpa.

*Arachis hypogaea*, Willd. is the "Ground nut" or "Monkey nut," largely cultivated for its edible seed, from which a valuable oil is expressed. It is an article of considerable trade.

### 17. *Lespedeza*, Michx.

Herbs or shrubs. *Leaves* pinnately 3- rarely 1-foliolate ; leaflets entire without stipels ; stipules free, small. *Flowers* purple pink white or yellow, in axillary fascicles or racemes or terminal panicles ; bracts small ; bracteoles 2 at the base of the calyx-tube. *Calyx-tube* campanulate, teeth 5 subequal or the 2 upper slightly connate, lanceolate or linear. *Corolla* exserted ; standard obovate, narrowed to a claw ; wings falcate ; keel petals incurved, obtuse or beaked. *Stamens* diadelphous, 9 and 1 ; anthers uniform. *Ovary* sessile or stalked, 1-ovuled ; style filiform, incurved ; stigma capitate. *Pod* small, orbicular or ovate, compressed, 1-seeded, flattened, indehiscent. *Seeds* suborbicular, strophiole 0.

LESPEDEZA SERICEA, Miq. ; F. B. I. ii. 142.

W. Gháts, in the Pulney Hills, at 6,000-7,000 ft. (Bourne, Fischer).

An erect undershrub with long slender virgate branches, small white flowers tinged with purple, linear cuneate silky leaflets and very small orbicular pod.



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Calyx rigid, with close parallel simple veins; flowers yellow:—

Stems not bristly; calyx-lips equal, acute:—

Lomentum joints papillose:—

Flowers in short racemes; lower calyx-lip with a few scattered bristles; leaflets 3–10 pairs, each .2–.4 in. long, bristly only on margins and midrib beneath ... 1. *sensitiva*.

Flowers in pairs or single from the leaf-axils; lower calyx-lip with a tuft of bristles near the apex; leaflets 4–7 pairs, each .3–.6 in. long, very bristly on margins and midrib with smaller ones between ... 2. *geminiflora*.

Lomentum joints smooth; flowers in pairs in the axils of leaves crowded at the ends of the branches; lower calyx-lip bristly along the keel at the back; leaflets 4–7 pairs, .2–.4 in. long, very bristly all over on the back ... 3. *conferta*.

Stems conspicuously bristly; calyx-lips obtuse, the upper much the longer, both very yellow-bristly; flowers in terminal panicles of racemes; leaflets glabrous with few bristles, 4–12 pairs, 1–1.5 in. long; lomentum joints reticulate ... 4. *setulosa*.

Calyx membranous, with anastomosing veins:—

Flowers yellow:—

Flowers in loose racemes with filiform peduncles and pedicels:—

Leaflets usually 2 pairs; calyx-lips equal, the upper truncate, the lower 3-lobed; lomentum joints reticulate and papillose, very small, under .1 in. in diam. ... 5. *bigemina*.

Leaflets 3 pairs; calyx-lips equal in length, the upper broad with 3 parallel nerves in the middle, the lower acute scarcely lobed; lomentum joints reticulate with flat margins, .1 in. in diam. or more ... 6. *gracilis*.

Flowers in close more or less corymbose racemes with short pedicels, lomenta with 4–7 reticulate joints; leaflets 3–4 pairs:—

Calyx-lips bristly and ciliate with yellow hairs not on black bases, upper lip truncate, retuse, lower smaller, obscurely 3-lobed; racemes short ... 7. *racemosa*.

Calyx-lips with conspicuous bristles on black bulbous bases, upper lip truncate, emarginate, lower smaller, acute, obscurely 3-lobed; racemes elongate, one-sided ... 8. *hirsuta*.

Flowers in subcapitate heads on peduncles 1–1.5 in. long, in pairs or threes in the upper leaf axils; leaflets 4 pairs, up to 1 in. long by .3 in. broad; lomentum with 3–6 reticulate bordered joints; calyx-lips merely short-ciliate on the edges, upper lip broad, emarginate, lower 3-lobed ... 9. *Venkobarowii*.

Flowers in terminal panicles of corymbose racemes one-sided in

- fruit; leaflets 4-5 pairs, often very bristly like the stems; calyx-lips obtuse, upper emarginate, lower 3-lobed, softly yellow-bristly; lomentum joints reticulate, bordered .....10. *blanda*.  
Flowers in dichotomously branched lax few-flowered corymbose panicles; leaflets 2-4 pairs, glabrous, with very few bristles; calyx-lips accrescent in fruit, the lower the longer, ciliate and with very few bristles; lomentum joints margined on one side papillose.....11. *salsuginea*.  
Flowers blue or purplish, in terminal spherical heads, very numerous; leaflets 9-15 pair, ciliate on the margins and midrib, bristly on the rhachis; calyx-lips broadly obovate, obtuse, long-bristly toothed on the margins; bracteoles long; lomentum joints smooth .....12. *capitata*.

1. *SMITHIA SENSITIVA*, Ait.; F.B. I. ii. 148; W. & A. 220 *in part*, var. *a*.

W. Coast, in S. Canara (Hohenacker); W. Gháts, in the Anamalai Hills (Wight).

A diffuse weed with somewhat woody stems, "bi- or triennial (Roxb.)."

2. *SMITHIA GEMINIFLORA*, Roth; F. B. I. ii. 149; W. & A. 220. *in part*, var. *β*.

W. Coast and W. Gháts, from S. Canara southwards, eastwards to Mysore and Coimbatore Hills, up to 4,500 ft.

An erect herbaceous plant of grassy places and open forest undergrowth.

3. *SMITHIA CONFERTA*, Sm. *S. geminiflora* var. *conferta*, Baker in F. B. I. ii. 149.

N. Circars, Hills of Ganjam, up to 4,500 ft. on Mahendragiri; W. Coast and W. Gháts, from S. Canara to Travancore, eastwards to Mysore and Coimbatore, up to 4,000 ft.

A much branched herbaceous undershrub of open forest undergrowth.

4. *SMITHIA SETULOSA*, Dalz.; F. B. I. ii. 149; Bedd. Ic. t. 243.

W. Coast and W. Gháts, in S. Canara, Mysore and Wynaad, up to 3,000 ft.

A tall annual herb up to 4 ft. high.

5. *SMITHIA BIGEMINA*, Dalz.; F. B. I. ii. 149.

W. Gháts, eastern side, in Mysore at 3,500 ft. (Meebold).

A much branched annual with very slender wiry stems.



6. *SMITHIA GRACILIS*, Benth. ; F. B. I. ii. 150.  
W. Gháts, in the Nilgiri and Pulney Hills at 5,000 to 7,000 ft. on grassy slopes.  
A diffuse slender herbaceous plant.
7. *SMITHIA RACEMOSA*, Heyne; W. & A. 221. *S. blanda* var. *racemosa*, Bak. in F. B. I. ii. 151 *in part*.  
W. Gháts, Bababudan Hills of Mysore (Talbot), Anamalai Hills of Coimbatore at 3,000 to 4,000 ft. (Beddome, Fischer).  
A small diffuse herbaceous plant.
8. *SMITHIA HIRSUTA*, Dalz. *S. blanda* var. *racemosa*, Baker in F. B. I. ii. 151 *in part*. *S. blanda* var. *humilis*, Prain in Journ. As. Soc. Beng. LXVI. 66.  
W. Gháts, in Wynaad, Nilgiri, Anamalai and Pulney Hills, at 3,000 to 7,000 ft. in wet places; Hills of Vizagapatam in E. Gháts 3,500 to 5,000 ft. (?).  
An erect diffuse plant with rather few branches.
9. *SMITHIA VENKOBAROWII*, Gamble in Kew Bull. 1918, ined.  
Travancore Hills, at Peermade (K. Venkoba Row.).  
A trailing herb with rather large bright orange-yellow flowers.
10. *SMITHIA BLANDA*, Wall. ; W. & A. 221; F. B. I. ii. 151; Wt. Ic. t. 986 except fig. 6 (*S. hirsuta* ?).  
W. Gháts, in the Mysore, Nilgiri, Anamalai, Travancore and Cochin Hills, at 4,000 to 6,000 ft.  
A tall almost shrubby plant reaching 2 ft. or more in height and conspicuous for its bright yellow rather large flowers.
11. *SMITHIA SALSUGINEA*, Hance. *S. dichotoma*, Dalz. ; F. B. I. ii. 150.  
W. Coast, in S. Canara (Hohenacker, K. Rungachari).  
An erect annual with reddish branches. The calyx-lips are about equal in fruit, in flower the lower is the longer.
12. *SMITHIA CAPITATA*, Dalz. ; F. B. I. ii. 150; Bedd. Ic. t. 244.  
W. Gháts, in the Hills of Mysore, S.-E. Wynaad, the Bolampatti valley and the Anamalais, at 2,000–3,000 ft., in open grass lands.  
A pretty branching annual at once recognised by the bluish flowers and capitate heads.



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axillary racemes; bracts small, scarious; bracteoles 2, at the base of the calyx-tube. *Calyx*-tube campanulate; lobes 5, the 2 upper subconnate broad, the median ones similar, the lowest longer and narrow. *Corolla* exserted, petals all clawed; standard orbicular, short; wings obliquely obovate; keel petals incurved, usually obtuse, equal to the wings. *Stamens* at first monadelphous, the tube cleft above, later on in two bundles of 5 each; anthers uniform. *Ovary* linear, few-ovuled; style filiform; stigma minute, terminal. *Pod* stalked, compressed, striate longitudinally and prickly-warted, the joints oblong, narrow at both ends. *Seeds* narrowly oblong.

ORMOCARPUM SENNOIDES, DC.; F. B. I. ii. 152; W. & A. 216; Wt. Ic. t. 297.

Deccan, in Cuddapah, N. Arcot and Chingleput, in woods and hedges and on waste lands, scarce.

A low shrub with oblong obtuse membranous leaflets, yellow flowers, and prickly pods with 2-4 distant joints. Vern. *Tel.* Nal kashina.

## 22. *Leptodesmia*, Benth. & Hook. f.

Diffuse perennial herbs. *Leaves* 1- or 3-foliolate; leaflets small, stipellate; stipules free. *Flowers* small, crowded in short terminal capitate racemes; bracts scarious, imbricate, deciduous. *Calyx* of 5 subequal setaceous lobes. *Corolla* small, included; standard suborbicular, clawed; wings obliquely oblong; keel-lobes obtuse. *Stamens* diadelphous, 9 and 1; anthers uniform. *Ovary* sessile, 1-ovuled; style filiform, incurved; stigma capitate. *Pod* small, membranous, 1-seeded, included in the calyx, the valves opening widely. *Seed* estrophiolate.

LEPTODESMIA CONGESTA, Benth.; F. B. I. ii. 152. *Nicolsonia congesta*, Wt. Ic. t. 1056.

W. Gháts, in the Nilgiri and Pulney Hills, at 4,000 to 7,000 ft. A small trailing perennial with orbicular or orbicular-oblong leaves up to .75 in. long, small reticulate pods and crowded capitate flower-heads yellow or white plumose with the long hairs on the setaceous sepals.

## 23. *Eleiotis*, DC.

Annual procumbent slender herbs with triquetrous stems. *Leaves* 1-3-foliolate; leaflets stipellate; stipules striate. *Flowers*

single or in pairs, distant, in slender axillary racemes; bracts large, scarious, striate, deciduous; bracteoles minute or 0. *Calyx*-tube campanulate, 5-toothed. *Corolla* exserted; standard obovate, emarginate; wings oblong; keel petals obtuse. *Stamens* diadelphous, 9 and 1, persistent; anthers uniform. *Ovary* subsessile, 1-2-ovuled; style short, inflexed above; stigma capitate. *Pod* a single, boat-shaped, membranous, reticulate, compressed joint, the dorsal margin straight. *Seed* transversely oblong, subreniform; strophiole 0.

ELEIOTIS SORORIA, DC.; F. B. I. ii. 153; W. & A. 231.

Deccan and Carnatic, westwards to the Shevaroy Hills and the lower E. slopes of the Nilgiris and Pulneys.

A long-trailing plant with usually a single leaflet about .5 in. long and .75 in. broad, emarginate at apex, cordate at base, sometimes with a pair of small leaflets above the petiole; very small flowers and pod.

#### 24. Pycnospora, R. Br.

A low shrub with slender stems. *Leaves* pinnately trifoliolate; leaflets stipellate; stipules free, membranous, striate. *Flowers* small, purplish, in slender terminal or axillary racemes; bracts membranous, deciduous; bracteoles 0. *Calyx* deeply cleft, the teeth subulate, the 2 upper connate except at apex. *Corolla* exserted; standard orbicular, clawed; wings oblong, oblique, adherent to the obtuse slightly curved keel petals. *Stamens* diadelphous, 9 and 1; anthers uniform. *Ovary* sessile, many-ovuled; style inflexed; stigma minute, capitate. *Pod* oblong, inflated, 2-valved, continuous within, the thin valves transversely veined, 6-10-seeded. *Seeds* small, subreniform, with a minute strophiole.

PYCNOSPORA HEDYSAROIDES, R. Br.; F. B. I. ii. 153. *P. nervosa*, W. & A. 197.

Hills of the Carnatic, Shevaroy and Sirumalais to Tinnevely; W. Gháts and W. Coast from S. Canara southwards, and to 3,000 ft. in Nilgiris and Pulneys.

A slender often trailing plant with the habit of *Desmodium* and the pod of *Crotalaria*; leaflets obovate, prominently nerved, reaching 1.5 in. long.

25. *Pseudarthria*, W. & A.

Herbs and undershrubs, villous or viscid-pubescent. *Leaves* pinnately trifoliolate; leaflets large, stipellate; stipules free, subulate, striate. *Flowers* small, in pairs or fascicled along the rhachis of a terminal or axillary slender raceme, occasionally paniculate; bracts and bracteoles subulate like the stipules. *Calyx*-tube campanulate, cleft to the middle in 2 obscure lips, the 2 upper lobes connate. *Corolla* exserted; standard suborbicular; wings obliquely oblong; keel petals obtuse, not spurred. *Stamens* diadelphous, 9 and 1, anthers uniform. *Ovary* sessile; ovules many; style subulate, inflexed; stigma small, capitate. *Pod* linear-oblong, flat, continuous within and not jointed, the valves transversely veined. *Seeds* compressed, reniform.

PSEUDARTHRIA VISCIDA, W. & A. 209; F. B. I. ii. 154; Wt. Ic. t. 286.

Nearly all Districts from the Godavari southwards, up to 3,000 ft. in the hills, common in somewhat damp forest undergrowth.

A viscid *Desmodium*-like undershrub with leaflets rhomboid-ovate, repand sinuate on the margins, the pods very sticky and adherent, .72 in. long. .25 in. broad, the flowers pink.

26. *Lourea*, Neck.

Erect or prostrate herbs. *Leaves* 1-3-foliolate; leaflets often broader than long, stipellate; stipules free, subulate. *Flowers* white or reddish, usually in pairs in lax terminal racemes; bracts acuminate, caducous; bracteoles 0. *Calyx* campanulate, reticulately veined, accrescent, persistent, subequally 5-lobed, the uppermost two lobes sometimes partly connate, all lanceolate. *Corolla* short; standard obovate or obcordate; wings obliquely oblong, adnate to the obtuse keel. *Stamens* diadelphous, 9 and 1; anthers uniform. *Ovary* sessile or stipitate, few-ovuled; style subulate, inflexed; stigma capitate. *Pod* a lomentum of 2 or more 1-seeded indehiscent turgid joints folded up within the calyx, the joints thin and reticulately-valved. *Seeds* reniform or subglobose, strophiole 0.

Erect; end leaflets transverse with two divaricating oblong-lanceolate falcately-recurved 3-nerved obtuse lobes, .5 in. long, 2-3 in. broad, side ones obliquely obcordate .....1. *Vespertilionis*.



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Racemes in panicles, slender, up to 1 ft. long, the flowers distant; calyx-teeth subequal, deltoid-cuspidate; lomentum joints 4-6, brown or black, minutely hispid .....4. *hamosa*.

1. *URARIA PICTA*, Desv.; F. B. I. ii. 155; W. & A. 221.

N. Circars, in the Sál forests of Ganjam (Gamble).

An erect undershrub reaching 3 ft. in height, recognised by the narrow white-clouded upper leaflets and white joints to the pod.

2. *URARIA LAGOPODIODES*, Merr. *U. lagopoides*, DC.; F. B. I. ii. 156; W. & A. 222; Wt. Ic. t. 289.

W. Gháts, E. slopes of the Pulney Hills (Bourne).

A trailing perennial of grassy lands, the flower racemes short and dense, the leaflets rather small and obtuse.

3. *URARIA ALOPECUROIDES*, Wt. Ic. t. 290. *U. repanda*, Wall.; F. B. I. ii. 156.

N. Circars, in the Ganjam Sál forests; Hills of Mysore, about 3,000 ft.

An erect undershrub of forest undergrowth, the flower racemes elongated, dense; the leaflets often cordate at base.

4. *URARIA HAMOSA*, Wall.; F. B. I. ii. 156; W. & A. 222; Wt. Ic. t. 284.

N. Circars, Deccan and W. Gháts, in dry forest undergrowth, up to 3,500 ft., common.

A straggling undershrub with elongate racemes in panicles and often rather large subacute leaflets.

### 28. *Alysicarpus*, Neck.

Diffuse or erect herbs. *Leaves* 1-foliolate, sometimes 3-foliolate also; stipules scarious, acuminate, free or connate; stipels subulate. *Flowers* small, in terminal, rarely axillary, racemes or spikes; pedicels usually in pairs; bracts scarious, usually deciduous; bracteoles 0. *Calyx* glumaceous, slightly campanulate, deeply 4-cleft, the upper segment bifid. *Corolla* not exserted; standard obovate or orbicular, narrowed to a claw; wings obliquely oblong, adnate to the keel; keel slightly incurved, obtuse, usually with a lateral appendage on each petal. *Stamens* diadelphous, 9 and 1; anthers uniform. *Ovary* sessile or shortly stipitate, many-ovuled; style filiform, incurved at tip; stigma

capitate. *Pod* a terete or turgid lomentum of several indehiscent 1-seeded joints. *Seeds* suborbicular, strophiole 0.

*Calyx* shorter or very slightly longer than the first joint of the pod, under .15 in. long:—

*Pod* moniliform, the joints turgid, subglobose, downy with minute hooked hairs; stem with rather short bristly hairs; leaflets variable in shape, elliptic or lanceolate, obtuse, mucronulate, often cordate at base .....1, *monilifer*.

*Pod* not or only occasionally moniliform, the joints turgid, tetragonous, reticulate, nearly glabrous; stems glabrescent; leaflet variable in shape from linear-oblong or -lanceolate to orbicular, usually cordate at base .....2. *vaginalis*.

*Pod* not moniliform, curved, the joints flattened, reticulate, with both straight and hooked hairs; stem with long bristly hairs; leaflet orbicular, mucronate, pubescent.....3. *hamosus*.

*Calyx* much longer than the first joint of the pod, at least .2 in. long:—

*Calyx-teeth* imbricate in fruit:—

*Pod* slightly moniliform, joints not transversely ribbed:—

Joints of pod smooth, glabrous; leaflet linear or linear-oblong 1-3 in. long, narrow; racemes 3-6 in. long, very slender

4. *bupleurifolius*.

Joints of pod reticulate, puberulous; leaflet linear-lanceolate, 3-6 in. long, narrow; racemes 6-12 in. long, rather stout

5. *longifolius*.

*Pod* moniliform, the joints strongly and closely ribbed transversely; leaves usually 1-, sometimes 3-foliolate, variable

6. *rugosus*.

*Calyx-teeth* not imbricate in fruit:—

Flowers in dense terminal white-silky spikes; leaflets linear-oblong or -lanceolate, 3-ribbed from near the base; pods moniliform, the joints 3-4, strongly reticulate .....7. *pubescens*.

Flowers in terminal or axillary racemes on long pedicels; upper leaves often 3-foliolate:—

*Pod* only slightly exsert from the lanceolate golden-pilose calyx-teeth, which are .3 in. long, the joints 3-4, large; leaflets ovate, under 1 in. long; racemes rather close, the pedicels .5 in. long or less.....8. *racemosus*.

*Pod* much exsert from the setaceous pilose calyx-teeth, which are .2 in. long, the joints 5-6, small; leaflets often up to 1.5 in. long and oblong; racemes lax, the pedicels .5 in. long or more

9. *parviflorus*.



1. *ALYSICARPUS MONILIFER*, DC. ; F. B. I. ii. 157; W. & A. 232.  
In all dry Districts, especially the E. Coast, on pasture land.  
A small prostrate much-branched perennial herb; flowers pink. Vern. *Tel.* Amera.
2. *ALYSICARPUS VAGINALIS*, DC. ; F. B. I. ii. 158; W. & A. 233.  
In all dry Districts and on both Coasts, on pasture land.  
A suberect much-branched herbaceous plant.  
Var. *nummularifolius*, Baker in F. B. I. ii. 158. *A. nummularifolius*, W. & A. 232.  
As widely distributed as the type from which it differs in the short dense racemes; flowers pink.
3. *ALYSICARPUS HAMOSUS*, Edgew. ; F. B. I. ii. 157.  
East Coast, at Masulipatam (Bourne); Deccan, at Bellary (Wight).  
A slender, diffuse, very hairy, herbaceous plant; flowers bluish-purple.
4. *ALYSICARPUS BUPLEURIFOLIUS*, DC. ; F. B. I. ii. 158; W. & A. 233. *Hedysarum bupleurifolium*, Linn. ; Roxb. Cor. Pl. t. 194.  
In most forest Districts, chiefly among long grass, and up to 3,000 ft. in hilly country.  
A very slender perennial with narrow acute leaflets, usually linear, but basal ones sometimes elliptic or even orbicular. Flowers with orange standard and keel and crimson wings; pod with 4-6 joints.  
Var. *gracilis*, Baker in F. B. I. ii. 158.  
Deccan, Hills of Cuddapah and Coimbatore up to 3,500 ft. ; W. Gháts, in the lower Pulneys (Bourne).  
Leaves linear-oblong, broader and obtuse at apex; joints of pod 1-3.
5. *ALYSICARPUS LONGIFOLIUS*, W. & A. 233; F. B. I. ii. 159; Wt. Ic. t. 251.  
Northern Division (Cleghorn); "cornfields near Ongole, Circars" (W. & A.); "not infrequent in black cotton soil in the Ceded Districts and Circars" (Wight).  
A stout erect undershrub reaching 4-5 ft. in height; leaflet 3-6 in. long, reticulate, prominently nerved; pod 3-6-jointed.
6. *ALYSICARPUS RUGOSUS*, DC. ; F. B. I. ii. 159; *A. Wallichii*, W. & A. 234.  
Hills of the Deccan, in Mysore and Coimbatore up to



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### 29. *Ougeinia*, Benth.

A tree. *Leaves* pinnately 3-foliolate; leaflets large, stipellate; stipules free, deciduous. *Flowers* in densely fascicled racemes in leaf-axils and on old wood; pedicels filiform, fascicled along the rhachis; bracts small, scale-like; bracteoles beneath the calyx, minute, persistent. *Calyx-tube* campanulate, the lobes obtuse, in 2 lips, the upper of 2 connate, the lower of 3. *Corolla* exserted, rose-coloured or white, the petals clawed; standard suborbicular; wings obliquely oblong, spurred, slightly adnate to the obtuse incurved keel. *Stamens* diadelphous, 9 and 1; anthers uniform. *Ovary* sessile, many-ovuled; style incurved, subulate; stigma capitate. *Pod* linear, elongate, flat, of 2 or more oblong, large, more or less distinct, scarcely dehiscent joints. *Seeds* compressed, reniform; cotyledons foliaceous; strophiole 0.

OUGEINIA DALBERGIOIDES, Benth.; F. B. I. ii. 161; Bedd. Fl. t. 36; Brand. For. Fl. t. 23. *Dalbergia oojeinensis*, Roxb.; Wt. Ic. t. 391.

Northern Circars, forests of Ganjam, Vizagapatam and Godavari, up to 4,000 ft; Deccan, scarce in the forests of Mysore to the N. slopes of the Nilgiris; sometimes planted for ornament.

A moderate-sized, often gregarious tree, very pretty when its masses of rose-coloured flowers are open before the new leaves appear. Bark light brown; wood hard, close-grained and tough, with a light brown heartwood, useful for carts and implements. Vern. *Hind.* Sandan; *Ur.* Bandhona; *Mar.* Tiwas; *Tel.* Tella motku.

### 30. *Desmodium*, Desv.

Herbs or shrubs, rarely small trees. *Leaves* pinnately 1-3-rarely 5-foliolate; stipules usually striate, dry, free or united into one leaf-opposed one; stipels subulate. *Flowers* usually small, purple or red or white, in copious usually dense, terminal or axillary racemes, sometimes in axillary umbels or fascicles; bracts single or in threes, striate or subulate and persistent or membranous and deciduous; bracteoles large and persistent or minute or wanting. *Calyx-tube* short, campanulate or turbinate, the 2 upper teeth more or less connate, the 3 lower acute or acuminate. *Corolla* exserted; standard obovate or orbicular,

usually narrowed at the base; wings obliquely oblong, more or less adhering to the keel, the petals of which are obtuse, often incurved, sometimes spurred towards the claw. *Stamens* usually diadelphous, 9 and 1, sometimes monadelphous, sometimes with the vexillary filament free in the upper half; anthers uniform. *Ovary* sessile or stalked, 2-many-ovuled; style incurved, sometimes sharply; stigma capitate. *Pod* a lomentum of several 1-seeded joints, the joints usually indehiscent and easily separating, less often dehiscent at one suture, in one section dehiscent along the whole ventral suture. *Seeds* compressed, usually reniform, estrophiolate.

Pods distinctly divided into several 1-seeded joints:—

Flowers in short dense peduncled axillary umbels; shrubs with triquetrous stems and 3-foliolate leaves; stamens monadelphous; pods curved, 4–6-jointed.....1. *Cephalotes*.

Flowers in elongated racemes:—

Joints of pods indehiscent:—

Pods with 1–3 usually 2 joints, the joints round, reticulate; stamens monadelphous, the vexillary one free above the middle; leaves 3-foliolate:—

Racemes with flower fascicles in the axils of conspicuous bifarious floral leaves each with 2 round leaflets and a terminal bristle or rarely an oblong leaflet; leaves large, membranous .....2. *pulchellum*.

Racemes with flower fascicles in the axils of stipular bracts, not leafy; leaves small, coriaceous.....3. *biarticulatum*.

Pods with oblong compressed joints, 2–4 times longer than broad, with sticky hooked hairs; stamens diadelphous, 9 and 1; racemes slender:—

Leaves 3-foliolate:—

Joints of pod 6–8, each twice longer than broad; leaflets chartaceous, lanceolate .....4. *laburnifolium*.

Joints of pod 6–10, each 3–4 times as long as broad; leaflets membranous, ovate or ovate-lanceolate.....5. *laxiflorum*.

Leaves 1-foliolate, the leaflet subcoriaceous, ovate or lanceolate; joints of pod 6–8, each 4–5 times as long as broad

6. *ormocarpoides*.

Pods with 1–3 scimitar- or crescent-shaped joints, the lowest stalked; leaves 3-foliolate, membranous, the lowest pair of nerves starting from the base and prominent; flowers in few-flowered very lax racemes; stamens monadelphous:—

Joints of pod 2-3, 3 times as long as broad, narrowed at base, the upper margin concave, the stalk about .5 in. long; leaflets ovate acuminate.....7. *laxum*.

Joint of pod 1, 3 times as long as broad, dolabriform, reticulate, the stalk about .15 in. long; leaflets ovate-rhomboid, elongate above, the apex obtuse.....8. *dolabriforme*.

Joints of pod 1-3, semi-oblong, more or less crescent-shaped, puberulous, the stalk short, about .1 in. long; leaflets broadly ovate-rhomboid, acute at apex, the margins usually repand

9. *Scalpe*.

Pods slightly curved, with 6-8 square joints, the ventral suture very slightly indented; leaflet 1, lanceolate, cordate, the petiole broadly winged; stamens monadelphous, the vexillary one free above the middle.....10. *triquetrum*.

Pods with several moniliform joints, each semicircular; stamens diadelphous:—

Pod straight or slightly indented on the dorsal suture; stipules subulate with a broad base:—

Leaflet 1; calyx-lobes short, triangular:—

Leaflet ovate or lanceolate, acute, glabrescent on upper surface, membranous; stems angular; joints of pod sparsely pubescent with hooked hairs, reticulate

11. *gangeticum*.

Leaflet broadly ovate or deltoid, repand, coriaceous, obtuse or subacute, densely pubescent; stems round, fulvous-hairy; joints of pod densely pubescent with hooked hairs.....12. *latifolium*.

Leaflets 3, the end one rhomboid-lanceolate, the side ones ovate, all acuminate, membranous; racemes very slender, lax; pod 4-6-jointed, slightly indented on the dorsal suture, joints glabrous, pale, reticulate.....13. *Wightii*.

Pod somewhat deeply indented on the dorsal suture as on the ventral, 5-6-jointed, hispid with hooked hairs; stipules broad, amplexicaul, auricled; leaflets elliptic or orbicular, pubescent; racemes many, corolla minute.....14. *diffusum*.

Joints of pods 6-9, reticulate, more or less dehiscent on the ventral suture, the dorsal not or only slightly indented; leaflets 3; stamens diadelphous:—

Pedicels not filiform, deflexed, .2 in. long; flowers large; leaflets elliptic or obovate, obtuse at apex, mucronate, indistinctly nerved, under-surface with innovations very silvery-silky or



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lanceolate, up to 4 in. long, the side ones very small and moving in jerks ; flowers large ; stamens diadelphous.....24. *gyrans*.

1. **DESMODIUM CEPHALOTES**, Wall. ; F. B. I. ii. 161 ; W. & A. 244 ; Wt. Ic. t. 373.

Var. *congestum*, Prain. *D. congestum*, Wall. ; W. & A. 224 ; Wt. Ic. t. 209.

Northern Circars, Hills of the Deccan and Carnatic, and W. Gháts, up to 3,000 ft., in forest undergrowth, especially with teak in the South, with Sál in the North.

A shrub, with white silky triquetrous branchlets, white or yellowish flowers, and 4-6-jointed, nearly glabrous curved pods. Vern. *Tel.* Chetenda.

2. **DESMODIUM PULCHELLUM**, Benth. ; F. B. I. ii. 162. *Dicerna pulchellum*, DC. ; W. & A. 230 ; Wt. Ic. t. 418.

In most dry forest Districts, in forest undergrowth, up to 4,000 ft.

A shrub, easily recognized by its conspicuous floral leaves, and large ovate-lanceolate repand leaflets ; flowers pale yellow ; pod usually 2-jointed, long-apiculate.

3. **DESMODIUM BIARTICULATUM**, Benth. ; F. B. I. ii. 163. *Dicerna biarticulatum*, W. & A. 230 ; Wt. Ic. t. 419.

E. Coast Districts from the Chilka Lake to Cape Comorin and on W. Coast as far North as Quilon, in sandy places chiefly ; rare inland, Cuddapah and Salem.

A slender shrub with small coriaceous cinereous leaves, bright red flowers and 2-jointed reticulate pod, the floral leaves reduced to chaffy stipules.

4. **DESMODIUM LABURNIFOLIUM**, DC. ; F. B. I. ii. 163.

E. Gháts, Hills of Vizagapatam at about 4,000 ft. (A. W. Lushington).

A slender shrub with lanceolate leaflets, whitish flowers in long racemes and slender pods with oblong sticky joints very easily separable.

5. **DESMODIUM LAXIFLORUM**, DC. ; F. B. I. ii. 164. *D. recurvatum*, Grah. ; W. & A. 226 ; Wt. Ic. t. 374. *D. diffusum*, DC. Prodr. ii. 335, No. 88 ; Wt. Ic. t. 409.

W. Gháts, in Mysore, Coimbatore, Nilgiris and Travancore, up to 3,000 ft.

An erect undershrub up to 5 ft. high with angular stems,

rather large leaves and flowers in fascicles on a long slender raceme, the standard white, wings and keel blue.

6. *DESMODIUM ORMOCARPOIDES*, DC.; F. B. I. ii. 164.

W. Gháts, in Mysore, the Anamalais, Tinnevelly and Travancore, up to 3,500 ft.

A slender erect undershrub with a single lanceolate acuminate leaflet reaching .7 in. long, and pale violet flowers in few-flowered distant fascicles in lax racemes.

7. *DESMODIUM LAXUM*, DC. *D. podocarpum* var. *laxum*, Bak. in F. B. I. ii. 165. *D. Gardneri*, Benth.; F. B. I. ii. 165.

W. Gháts, in the Atapadi, Anamalai and Sivagiri Hills, up to 3,000 ft.

An erect, usually single-stemmed undershrub with pink flowers and scimitar-shaped joints to the pod.

8. *DESMODIUM DOLABRIFORME*, Benth.; F. B. I. ii. 165.

W. Gháts, in the Hills of Tinnevelly.

An undershrub with short erect stem, crowded leaves, slender erect racemes and single-jointed pod.

9. *DESMODIUM SCALPE*, DC.; F. B. I. ii. 165. *D. strangulatum*, W. & A. 228; Wt. Ic. t. 985.

W. Gháts, from Mysore and Coimbatore southwards at 3,000 to 7,000 ft., in shady woods; Shevaroy Hills in Salem.

An erect herbaceous undershrub with rather large brick-red flowers and usually pubescent leaves with prominent stipules.

10. *DESMODIUM TRIQUETRUM*, DC.; F. B. I. ii. 163; W. & A. 224.

N. Circars, forests from Ganjam to Godavari; W. Gháts, from S. Canara to Travancore, up to 3,000 ft.

An erect shrub with leaflets up to 6-8 in. long and triquetrous stems; flowers purple; pod appressed-pubescent.

11. *DESMODIUM GANGETICUM*, DC.; F. B. I. ii. 168; W. & A. 225; Wt. Ic. t. 271. *D. collinum*, Wt. Ic. t. 272.

N. Circars, forests in the hills, to 3,000 ft. on Mahendragiri; W. Gháts, in dry forests at low levels; Shevaroy Hills of Salem; in forest undergrowth.

An erect undershrub reaching 3-4 ft. with white or lilac-tinged flowers.

Var. *maculatum*, Bak. in F. B. I. ii. 668.

N. Circars, in Ganjam Sál forests (Gamble).



A dwarf undershrub reaching about 1 ft. in height; leaflets ovate, obtuse or cordate at base, usually under 1 in. long.

12. *DESMODIUM LATIFOLIUM*, DC.; F. B. I. ii. 168; W. & A. 225; Wt. Ic. t. 270.

N. Circars, forests in the Hills of Godavari; W. Gháts, in dry forests, up to 3,000 ft., chiefly on the east side; usually in open glades.

An erect undershrub, up to 6 ft. high, with purple flowers, pod sometimes 1-jointed.

13. *DESMODIUM WIGHTII*, Grah.; F. B. I. ii. 169; W. & A. 226.

W. Gháts, in the Nilgiri and Pulney Hills, at low levels.

A slender erect herbaceous plant with long racemes.

14. *DESMODIUM DIFFUSUM*, DC. Prod. ii. 336; W. & A. 226; Wt. Ic. t. 208. *D. quinquangulare*, Wt. Ic. t. 293.

Deccan, in Guntur, also rising to 3,000 ft. in Mysore.

A diffuse straggling plant with angled stems and broad stipules, the flowers very small.

15. *DESMODIUM RUFESCENS*, DC.; F. B. I. ii. 171; W & A. 228; Wt. Ic. t. 984, Ill. t. 79.

W. Gháts, in the Nilgiri, Anamalai and Pulney Hills, common from 4,000 to 7,000 ft.; Hills of Coimbatore and Shevaroy Hills of Salem.

An erect pretty shrub with purple flowers and silvery silky branches and foliage.

16. *DESMODIUM WYNAADENSE*, Bedd. M.S. ex Gamble in Kew Bull. 1918, ined.

W. Gháts, Nilgiri, Anamalai and Travancore Hills, at 2,000 to 5,000 ft.

A handsome erect undershrub with large purple flowers, lanceolate leaflets and curved rather broad reticulate pod with dehiscent joints.

17. *DESMODIUM POLYCARPUM*, DC.; F. B. I. ii. 171; W. & A. 277; Wt. Ic. t. 406. *D. patens*, Wt. Ic. t. 407.

In all Districts, rising to 3,000 ft. in the hills.

An erect or suberect, sometimes trailing undershrub, with leaflets variable in shape and size, usually obovate, purple-blue flowers and very easily disarticulated pods, strongly ciliate on the sutures. Vern. *Tel.* Adivi utchinta.

Var. *trichocaulon*, Bak. in F. B. I. ii. 172.



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23. *DESMODIUM PARVIFOLIUM*, DC.; F. B. I. ii. 174; W. & A. 229.

W. Gháts, in the Nilgiri and Pulney Hills, usually above 5,000 ft., in grass and on banks.

A pretty densely caespitose trailer with blue or pink flowers.

24. *DESMODIUM GYRANS*, DC.; F. B. I. ii. 174; W. & A. 227; Wt. Ic. t. 294.

N. Circars, Deccan and Hills of Carnatic, also W. Gháts, up to about 3,000 ft., in grass lands and forest undergrowth, widespread, but nowhere very common. The Semaphore plant.

An erect undershrub with pink flowers, reaching 3-4 ft. in height: the gyrating side leaflets are sometimes absent.

### 31. *Vicia*, Linn.

Annual or perennial herbs. Leaves paripinnate, the rhachis ending in a twisted tendril; stipules semisagittate; stipels 0. Flowers subsessile or in peduncled axillary racemes; bracts small, caducous; bracteoles 0. Calyx-tube campanulate; teeth long, often unequal. Corolla more or less exserted; standard obovate, emarginate, with a broad claw; wings oblong, oblique adnate in their middle to the shorter keel. Stamens diadelphous, 9 and 1, the vexillary one sometimes slightly connate with the rest. Ovary nearly sessile, 2-many-ovuled; style inflexed, usually with a dorsal tuft of hairs or ring of hairs below the apex; stigma capitate. Pod compressed, continuous within. Seeds globose or compressed.

*VICIA SATIVA*, Linn.; F. B. I. ii. 178.

Nilgiri Hills, about Ootacamund, run wild. Common Vetch or Tare.

A slender climbing herb with reddish-blue flowers.

The following species also occur only in cultivation, or as escapes, or as casual weeds:—

*VICIA FABA*, Linn. “Bean.” cultivated in gardens.

*LENS ESCULENTA*, Moench. “Lentil.” Vern. *Hind.* Masúr, rare in cultivation.

*LATHYRUS SATIVUS*, Linn. “Chikling Vetch.” Vern. *Hind.* Kasári, also rare.

LATHYRUS APHACA, Linn. has been found as a weed in the Nilgiris.

PISUM SATIVUM, Linn. "Pea," and PISUM ARVENSE, Linn. "Field Pea." are found in cultivation.

CICER ARIETINUM, Linn. "Gram." Vern. *Hind.* Chana, sometimes cultivated.

### 32. Abrus, L.

Climbing shrubs. *Leaves* abruptly pinnate with many pairs of leaflets, the rhachis ending in a bristle; stipules subscarious, deciduous; stipels minute. *Flowers* in fascicles in dense thickened racemes on axillary peduncles or short branches; bracts small, deciduous; bracteoles under the calyx 2, deciduous. *Calyx*-tube small, campanulate, truncate, the teeth very short. *Corolla* much exserted; standard broadly ovate, narrowed into a short claw, slightly adherent to the staminal tube; wings narrow, oblong-falcate; keel curved. *Stamens* 9, in a sheath, the vexillary one absent, anthers uniform. *Ovary* sessile, many-ovuled; style short, incurved, not bearded; stigma capitate. *Pod* oblong or linear, more or less compressed, thinly septate between the seeds, early dehiscent. *Seeds* globose or compressed, hilum near the top.

Leaflets large, ligulate-oblong:—

- Leaflets up to .75 in. long, .25 in. broad; pod thick, 1–1.5 in. long, .5 in. broad, wrinkled; seeds rounded, hard, scarlet or white with a black spot or white only ..... 1. *precorius*.  
 Leaflets up to 1.5 in. long, .5 in. broad; pod thin, flat, 2–2.5 in. long, .5 in. broad, smooth; seeds compressed, black ... 2. *pulchellus*.  
 Leaflets very small, linear-ligulate, about .25 in. long, under .1 in. broad; pod compressed, linear-oblong, 1–1.25 in. long, .3 in. broad; seeds rounded ..... 3. *fruticulosus*.

1. ABRUS PRECATORIUS, Linn.; F. B. I. ii. 175; W. & A. 236.

Most Districts, in hedges and among bushes, on open lands.

A rather conspicuous wiry climber with pink flowers and usually scarlet seeds with a black end. They are very hard, used for jeweller's weights and for necklaces and other ornaments. Vern. *Hind.* Gunchi, Rakti; *Ur.* Kaincho; *Tam.* Kuntumani; *Mal.* Kunni.

## 2. ABRUS PULCHELLUS, Wall.; F. B. I. ii. 175.

S. Canara (Barber).

A wiry climber similar to the last, but with different pods.

## 3. ABRUS FRUTICULOSUS, Wall.; F. B. I. ii. 176; W. &amp; A. 236; Wt. Ic. t. 33.

Malabar and Tinnevely, scarce.

A wiry climber with slender branches and very small Acacia-like leaves.

## 33. Shuteria, W. &amp; A.

Slender climbing herbs. *Leaves* pinnately 3-foliolate; stipules scarious, striate; stipels subulate. *Flowers* in axillary racemes, solitary or in pairs on the rhachis; bracts persistent, striate; bracteoles 2, small. *Calyx*-tube gibbous, teeth distinct, the 2 upper connate, the lateral ones shorter than the others. *Corolla* exserted; standard obovate, narrowed at the base into a claw; wings oblique, sharply spurred, slightly adherent to the shorter obtuse keel. *Stamens* diadelphous, anthers uniform. *Ovary* sessile, many-ovuled; style incurved, not bearded; stigma capitate. *Pod* linear, flat, recurved, the valves thin, twisted when open, slightly septate. *Seeds* oblong-reniform, estrophiolate.

SHUTERIA VESTITA, W. & A. 207; F. B. I. ii. 181, *excl.* vars. 2 and 3; Wt. Ic. t. 165. *S. glabrata*, W. & A. 207.

N. Circars, on Mahendragiri at 4,500 ft.; W. Gháts, Hills of Mysore, Nilgiris and Pulneys at 2,000 to 6,000 ft.; Shevaroy Hills of Salem.

A slender climber with ovate slightly acute mucronate leaflets, the end one subrhomboid, the flowers purplish-red, the seeds brown.

## 34. Dumasia, DC.

Slender twining herbs. *Leaves* pinnately 3-foliolate; stipules setaceous; stipels minute. *Flowers* yellow, in axillary racemes, solitary or in pairs on the rhachis; bracts small, narrow; bracteoles minute. *Calyx*-tube gibbous, cylindrical, mouth very oblique, truncate. *Corolla* exserted; standard obovate, erect, auricled on both sides above the rather long claw; wings and keel slightly adherent, very long-clawed, the blades small, obtuse. *Stamens* diadelphous; anthers uniform. *Ovary* substipitate,



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racemes, usually 7-foliolate leaves and oblong lanceolate mucronate leaflets, the end one much the longest.

### 36. *Teramnus*, Sw.

Slender twining herbs. *Leaves* pinnately 3-foliolate; stipules small; stipels subulate. *Flowers* very small, in very slender axillary racemes, solitary or fascicled on the rhachis, sometimes in fascicles or pairs; bracts small; bracteoles linear or lanceolate. *Calyx*-tube campanulate, teeth distinct or the 2 upper connate to the middle. *Corolla* little exserted; standard obovate, narrowed into the claw; wings oblong, narrow, adherent to the obtuse keel, both long-clawed. *Stamens* monadelphous; anthers alternately perfect and small and sterile. *Ovary* sessile, many-ovuled; style short, thick, not bearded; stigma capitate. *Pod* linear, compressed, narrow, septate between the seeds, ending in a hook formed by the persistent style. *Seeds* slightly oblong, estrophiolate.

Leaflets ovate, acute, nearly glabrous, end one up to 2 in. long, side ones 1.5 in.; racemes very slender, nearly glabrous; pod glabrous except a few acicular hairs ..... 1. *labialis*.

Leaflets ovate-lanceolate, acute, strigosely hairy, end one up to 6 in. long, side ones as long or slightly shorter; racemes slender, villous with tawny spreading hairs; pod also villous with tawny hairs

2. *mollis*.

1. *TERAMNUS LABIALIS*, Spr.; F. B. I. ii. 184. *Glycine labialis*, Linn.; W. & A. 208; Wt. Ic. t. 168.

N. Circars, in Godavari; Deccan, in Mysore and Coimbatore; Carnatic, about Madras and in S. Travancore, widespread but not common.

A twining herb with ovate acute leaflets, minute reddish flowers and narrow elongate papery hooked pods which open early and twist in spirals.

2. *TERAMNUS MOLLIS*, Benth. *T. labialis* var. *mollis*, Baker in F. B. I. ii. 184. *Glycine mollis*, W. & A. 209.

Brumagiri Hills, Malabar (Beddome); Tinnevely Hills (Wight).

A twining herb.

## 37. Erythrina, Linn.

Trees or rarely undershrubs, the branches, sometimes also the stems, usually studded with prickles. *Leaves* pinnately 3-foliate; stipules small; stipels gland-like. *Flowers* large and showy, scarlet or sometimes white, in dense peduncled axillary or terminal racemes, in pairs or fascicles on the rhachis; bracts and bracteoles small or 0. *Calyx* oblique at the mouth, spathaceous or campanulate with very short teeth. *Corolla* long-exsert, the petals very unequal, the standard much exceeding the wings and keel. *Stamens* 10, the vexillary filament free in the upper two-thirds, sometimes altogether, the rest free above, alternately longer and shorter; anthers uniform. *Ovary* stipitate, many-ovuled; style curved, subulate at the apex, not bearded; stigma capitate. *Pod* stipitate, falcate, turgid, torulose, dehiscing as a follicle. *Seeds* ovoid, hilum lateral, oblong, strophiole 0.

Calyx spathaceous, oblique, split on one side:—

Calyx split to the base, recurved, 5-toothed at the tip; flowers very large, the standard 2–2·5 in. long, wings and keel subequal, ·5–·7 in. long, the keel petals free; pod 6–12 in. long, thick, torulose, 6–8-seeded; prickles on branches nearly black; leaflets broadly deltoid, acute, membranous .....1. *indica*.

Calyx split half-way down, erect; flowers large, the standard 1–1·25 in. long:—

Tip of calyx entire; wings minute, ·2 in. long, keel petals combined, ·75 in. long; pod stalked, 6–8 in. long, thin, 2–5-seeded; prickles on branches pale green; leaflets broadly deltoid-ovate, abruptly acuminate, membranous.....2. *stricta*.

Tip of calyx minutely toothed: wings and keel about equal, ·5 in. long, the keel petals free; stamens diadelphous; leaflets broadly ovate, abruptly acuminate, subcoriaceous ..3. *mysorensis*.

Calyx not spathaceous, splitting into two lips; flowers large, standard 1·5–2 in. long, wings minute, ·25 in. long, keel petals combined, ·6 in. long; pod 3–6 in. long, thin, torulose, 2–5-seeded; prickles on branches yellowish-white; leaflets rhomboid ovate, entire or sinuate-lobed, obtuse, densely tomentose beneath.....4. *suberosa*.

1. ERYTHRINA INDICA, Lam.; F. B. I. ii. 188; W. & A. 260; Wt. Ic. t. 58.

Planted in hedges and as a support for pepper, perhaps wild on the E. Coast. Coral-tree.



A striking tree in flower. Bark yellowish, smooth, shining, papery; wood very soft and white but fairly durable and in use like that of *E. suberosa*. Vern. *Hind.* Mandara. Pangra.

2. *ERYTHRINA STRICTA*, Roxb.; F. B. I. ii. 189; W. & A. 260; Bedd. Fl. t. 175.

West Coast, in Malabar and Travancore.

A moderate-sized tree with corky bark armed with prickles, the wood white, soft and spongy but tough, used for fishing-net floats. Vern. *Tam. Mal.* Murukku.

3. *ERYTHRINA MYSORENSIS*, Gamble in Kew Bull., 1918, ined. Mysore at Chikanhalli, 3,000 ft. (Meebold).

Apparently a small tree with few or no prickles.

4. *ERYTHRINA SUBEROSA*, Roxb.; F. B. I. ii. 189; W. & A. 260. *E. sublobata*, Roxb.; W. & A. 261.

N. Circars and Deccan, in dry forests, up to 3,000 ft.

A moderate-sized deciduous tree with thick corky grey bark and white soft wood, fibrous but tough. The wood is used for scabbards, boxes and jars, and for covering with lacquer, it weighs about 19 lbs. per c. ft. Vern. *Hind.* Pangra; *Ur.* Paldua, Chaldua; *Tel.* Mulu modugu.

### 38. *Mucuna*, Adams.

Large twining shrubs or herbs. *Leaves* pinnately 3-foliolate; stipules deciduous; stipels minute, subulate. *Flowers* large, purple or greenish, turning black when dried, fasciculately racemed on usually long axillary or lateral peduncles, sometimes subcymose, the rhachis nodose; bracts deciduous; bracteoles small. *Calyx*-tube widely campanulate, the lowest tooth long, the lateral short, the upper 2 connate. *Corolla* much exserted; standard about half the length of the wings and keel, folded, auricled at base; wings oblong or ovate, incurved, semisagittate at base; keel as long as or longer than the wings, incurved, acute or beaked. *Stamens* diadelphous; anthers dimorphous, the longer basifixed, the shorter ovate and bearded. *Ovary* sessile, villous, few- or many-ovuled; style filiform; stigma capitate. *Pod* very variable in shape and sculpture, usually covered with fine brittle needle-like irritant bristles. *Seed* orbicular with long linear hilum or transversely oblong with short hilum; strophiole 0.



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5. *MUCUNA PRURITA*, Hook. Bot. Misc. ii. 348, t. xiii; W. & A. 255. *M. pruriens*, Bak. in F. B. I. ii. 187 not of DC.

East and West Coast regions, twining among hedges and bushes. Cowhage.

A slender climber with annual shoots, leaves pubescent. The irritant hairs are very troublesome. Vern. *Hind.* Kiwách; *Tel.* Piliadagu kaila; *Tam.* Poonaykali.

### 39. *Galactia*, P. Browne.

Prostrate or twining herbs. *Leaves* pinnately 3-foliolate, rarely 1-5 or -7-foliolate; stipules small, deciduous; stipels subulate. *Flowers* small or moderate-sized, in axillary racemes, paired or fascicled at the very slightly swollen nodes; bracts setaceous; bracteoles minute. *Calyx*-tube short; teeth lanceolate or linear, the 2 upper connate into one. *Corolla* slightly exserted; standard ovate or orbicular, slightly auriculate; wings narrowed, adnate to the nearly straight obtuse keel. *Stamens* diadelphous; anthers uniform. *Ovary* subsessile, many-ovuled; style filiform, beardless; stigma capitate. *Pod* linear, straight or incurved, subseptate between the seeds. *Seeds* somewhat compressed; strophiole 0. Leaflets elliptic, almost membranous, thinly grey-silky beneath, obtuse or emarginate, mucronate, up to 1.5 in. long, .7 in. broad, main nerves about 6; calyx-lobes narrow, lanceolate, glabrescent; pod 1 in. long, thinly grey-silky.....1. *tenuiflora*. Leaflets linear-oblong, subcoriaceous, very slightly appressed-villous beneath, obtuse, mucronate, up to 2.5 and even 5 in. long, .5-.7 in. broad, main nerves about 10; calyx-lobes rather broad, acuminate, glabrescent; pod 1.5 in. long, glabrous .....2. *longiflora*. Leaflets oblong-lanceolate, submembranous, densely villous beneath, obtuse, mucronate, up to 3.5 in. long, 1.2 in. broad, main nerves about 7-8; calyx-lobes broad, acuminate, very villous; pod villous

3. *villosa*.

1. *GALACTIA TENUIFLORA*, W. & A. 206; F. B. I. ii. 192.

N. Circars, Deccan and Carnatic, not common.

A slender wiry climber with reddish flowers and small leaves.

2. *GALACTIA LONGIFOLIA*, Benth.; Wt. Ic. t. 482. *G. tenuiflora*, var. *lucida*, Bak. in F. B. I. ii. 192.

W. Gháts, in the Hills of Coimbatore, the Nilgiris and Pulneys, up to 3,000 ft.

A slender climber distinguished by its narrow leaflets.

3. GALACTIA VILLOSA, W. & A. 207. *G. tenuiflora* var. *villosa*, Bak. in F. B. I. ii. 192.

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

A slender climber but stouter and with larger leaflets than the others.

#### 40. Butea, Roxb.

Trees or large climbing shrubs. *Leaves* pinnately 3-foliolate, leaflets large; stipules small, caducous; stipels subulate. *Flowers* large, showy, densely fascicled in axillary or terminal racemes or panicles; bracts and bracteoles narrow, caducous. *Calyx* broadly campanulate, the teeth deltoid, short, the 2 upper connate in an entire or emarginate lip. *Corolla* much exserted; standard ovate or lanceolate, acute, recurved, equal to or shorter than the keel; wings falcate, adnate to the much incurved acute keel. *Stamens* diadelphous; anthers uniform. *Ovary* sessile or shortly stalked, 2-ovuled; style long, incurved, beardless; stigma very small, terminal. *Pod* an oblong follicle, the base flat, wing-like and indehiscent, the tip splitting round the single apical seed. *Seed* obovate, compressed; hilum small; strophiole 0.

An erect tree; lowest calyx-tooth much shorter than the side ones base of pod rounded, almost semi-cordate, breadth of pod 1.5 in.

1. *frondosa*.

A large climbing shrub; lowest calyx-tooth equal to the side ones; base of pod narrowed; breadth of pod 1 in.....2. *superba*.

1. BUTEA FRONDOSA, Koen.; Roxb. Cor. Pl. t. 21; F. B. I. ii. 194; W. & A. 261; Bedd. Fl. t. 176.

In all dry Districts both in open country and deciduous forests, frequently gregarious, less common in the Circars than in the Deccan. Common on black cotton soil, also on salt lands.

A deciduous tree, very conspicuous when in flower before the leaves appear, the large flowers being orange-scarlet set in dark velvety calyces, the large leaflets broadly obovate, coriaceous and reticulate. The wood is grey, soft, and said to be durable under water. It yields a red "Kino" gum and the lac insect is grown upon it. Vern. *Hind.* Dhák, Palás; *Ur.* Porásu; *Tel.* Modugu; *Tam.* Porasu; *Mal.* Palasin samatha.

2. BUTEA SUPERBA, Roxb. Cor. Pl. t. 22; F. B. I. ii. 195; W. & A. 261.

N. Circars, in the forests of Ganjam and Vizagapatam.

An immense climbing shrub, the leaves and flowers and pods very like those of *B. frondosa*, but the flowers rather more yellow and slightly larger. Like it also, it gives a "Kino" gum and the flowers a red dyé.

#### 41. *Spatholobus*, Hassk.

Large climbing shrubs. *Leaves* pinnately 3-foliolate; stipules small, deciduous; stipels small, subulate. *Flowers* small, in large terminal panicles extending to the axils of the upper leaves; pedicels fascicled; bracts and bracteoles small, deciduous. *Calyx* campanulate; teeth lanceolate or deltoid, the two upper connate. *Corolla* exserted, the petals subequal, clawed; standard ovate or orbicular; wings obliquely oblong, free; keel straight, obtuse, auricled above the claw. *Stamens* diadelphous; anthers uniform. *Ovary* sessile or stalked, 2-ovuled; style subulate, incurved, beardless; stigma capitate. *Pod* an oblong, often somewhat falcate, follicle, the base flat, wing-like, reticulate and indehiscent, the tip splitting round the single apical seed. *Seed* compressed; hilum small; strophiole 0.

Leaflets large, the terminal one reaching sometimes 12 in. long by 9 in. broad, usually shining silky pubescent beneath; corolla cream-coloured; pod tomentose, stalked, 3-4 in. long by 1-1½ in. broad

1. *Roxburghii*.

Leaflets rather small, up to 5 in. long by 2.5 in. broad, glabrous beneath; corolla purple; pod glabrous, sessile, 4 in. long by .75 in. broad.....2. *purpureus*.

1. SPATHOLOBUS ROXBURGHII, Benth.; F. B. I. ii. 193. *Butea parviflora*, Roxb.; W. & A. 261; Wt. Ic. t. 210.

N. Circars and Deccan, in hill forests; W. Gháts, from S. Canara to Travancore, up to 3,000 ft.

A large climbing shrub with dark brown rough bark and wood in concentric layers of very porous tissue and bast tissue exuding a red gum. It is very damaging to forest trees. The bark gives a coarse fibre. Vern. *Hind.* Maula; *Ur.* Poráso; *Tam.* Piláccchi valli; *Mal.* Athambu.



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W. Gháts, Hills of Mysore, Coimbatore, Nilgiris and Pulneys, at 4,000 to 5,000 ft.

Branches, leaves and calyx more or less densely hairy.

3. *CANAVALIA LINEATA*, DC. *C. obtusifolia*, Bak. in F. B. I. ii. 196.

Coast sands of the Coromandel and lower Malabar coast.

A trailing plant, valuable as a sandbinder (*cf.* Clegh. Madr. Journ. i. t. 4) and rooting at the nodes, often in company with *Ipomaea biloba*, Forsk. Flowers pink or lilac, leaflets rather small and orbicular.

4. *CANAVALIA OBTUSIFOLIA*, DC. *C. ensiformis* var. *turgida*, Bak. in F. B. I. ii. 196.

Banks of canals and backwaters near Quilon in Travancore (K. Venkoba Rao).

A climber, probably biennial, with pink flowers.

#### 43. *Pueraria*, DC.

Climbing shrubs or herbs, sometimes with tuberous roots. *Leaves* pinnately 3-foliolate, the leaflets broadly ovate or rhomboid, sometimes palmately lobed; stipules herbaceous, basifixed or peltate; stipels subulate. *Flowers* purplish or blue, in long often compound axillary racemes, fascicled on the nodose rhachis; bracts small, deciduous; bracteoles small. *Calyx* campanulate, teeth 5, the two upper connate in an entire or 2-lobed lip. *Corolla* exsert; standard obovate or orbicular with auricles above the claw; wings oblong or falcate, equalling the obtuse keel. *Stamens* monadelphous, the axillary one free at the base, sometimes quite free; anthers uniform. *Ovary* sessile, many-ovuled; style filiform, curved, beardless; stigma capitate. *Pod* linear, more or less flattened, continuous or septate within, sometimes jointed. *Seeds* suborbicular or transversely oblong; hilum oblong; strophiole small or 0.

*PUERARIA TUBEROSA*, DC.; F. B. I. ii. 197; W. & A. 205, 449; Wt. Ic. t. 412.

Hill forests of the N. Circars, Deccan and W. Gháts, up to about 3,000 ft., down to Travancore, nowhere very common.

A large climber with huge tuberous roots, blue flowers which appear in the hot season when the plant is leafless, large leaflets with cordate peltate stipules and jointed pods up to 3 in. long, covered with long reddish bristly hairs. The

tubers are sometimes eaten. Vern. *Hind.* Tirra; *Tel.* Dari, Gumodi.

#### 44. Phaseolus, Linn.

Herbs, rarely undershrubs, twining or suberect, often prostrate. *Leaves* pinnately 3-foliolate; stipules membranous, lanceolate, basifixed or peltately attached; stipules subulate. *Flowers* in axillary racemes, fascicled on the rhachis; bracts and bracteoles often conspicuous, usually persistent. *Calyx* campanulate, the lowest tooth the longest, the upper two connate or free. *Corolla* exserted; standard orbicular, subauriculate at base; wings obovate, adnate to the keel, often large; keel petals prolonged into a spiral beak. *Stamens* diadelphous; anthers uniform. *Ovary* sessile, many-ovuled; style enclosed in the beak of the keel and twisted with it, conspicuously bearded down the side below the oblique stigma. *Pod* linear or falcate, terete or compressed, more or less septate between the seeds. *Seeds* smooth, the hilum punctate or shortly linear; strophiole 0.

Stipules basifixed; corolla red white or purple, not yellow; leaflets usually entire:—

Pods narrow, subcylindric, almost straight, many-seeded; flowers dull purplish-red ..... 1. *semierectus*.

Pods broad, subcompressed, more or less recurved:—

Racemes dense; flowers large, the standard cream-coloured, the wings purple; pods linear, 10–15-seeded, 4–6 in. long, .4–.5 in. broad ..... 2. *adenanthus*.

Racemes lax:—

Pods few-seeded:—

Flowers small, yellowish-green or dirty white; pods broad and scimitar-shaped, 2–4-seeded .. ..... *lunatus*.

Flowers medium-sized:—

Racemes shorter than the leaves; flowers lilac to white; pod linear, smooth, .5 in. broad ..... *vulgaris*.

Racemes as long or longer than the leaves; flowers scarlet or white; pod curved, scabrous, 1 in. broad.....*multiflorus*.

Pods many-seeded, 3–4 in. long, .1–.2 in. broad, bordered; flowers violet-purple, medium-sized.....3. *Grahamianus*.

Stipules peltately fixed; corolla yellow:—

Pods glabrous:—

Pods cylindric; leaflets distinctly lobed:—



Stipules ovate or oblong, bracteoles ovate; leaflets 3-lobed, the lobes various in shape.....4. *trilobus*.

Stipules lanceolate as also bracteoles; leaflets deeply 3-lobed the lobes again variously cut ..... 5. *aconitifolius*.

Pods more or less compressed; leaflets entire or only obscurely lobed:—

Stems glabrous or nearly so; stipules minute, lanceolate, .15 in. long, glabrous; bracteoles linear, .25 in. long; leaflets ovate, under 2 in. long, often slightly lobed, acute

6. *Dalzellii*.

Stems clothed with stiff deflexed hairs; stipules lanceolate, .2 in. long, hispid; bracteoles linear, .15 in. long; leaflets broadly ovate, 2–4 in. long, scarcely ever lobed, acuminate

7. *calcaratus*.

Pods hirsute, slightly compressed:—

Stems erect; leaves large, leaflets entire or rarely slightly lobed:—

Pods erect or suberect; seeds black..... *Mungo*.

Pods spreading; seeds green ..... *radiatus*.

Stems twining; leaves rather small, leaflets obtuse or acute, the side ones and sometimes the terminal lobed.....8. *sublobatus*.

1. PHASEOLUS SEMIERECTUS, Linn.; F. B. I. ii. 201. *P. psoraleoides*, W. & A. 244; Wt. Ic. t. 249.

Carnatic, especially near Madras, a weed of waste land, probably introduced.

An erect herbaceous plant with very narrow pods and many rectangular seeds.

2. PHASEOLUS ADENANTHUS, G. F. Mey.; F. B. I. ii. 200. *P. rostratus*, Wall.; W. & A. 244; Wt. Ic. t. 34.

W. Coast, in Malabar and Travancore.

A twining perennial with large showy flowers and flat many-seeded pod. The tuberous root is sometimes eaten.

Vern. *Tam.* Karalsona.

3. PHASEOLUS GRAHAMIANUS, W. & A. 244; F. B. I. ii. 201.

W. Gháts, in the Nilgiri, Pulney and Tinnevelly Hills, up to 4,000 ft., also Hills of Coimbatore (Fischer).

A slender climber with rather small deltoid leaflets and very narrow, flat, many-seeded pod.

4. PHASEOLUS TRILOBUS, Ait.; F. B. I. ii. 201; W. & A. 246 Wt. Ic. t. 94.



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45. *Vigna*, Savi.

Twining, rarely suberect, herbs or undershrubs. *Leaves* pinnately 3-foliolate; stipules basifixed or rarely peltate; stipels subulate. *Flowers* in racemes at the end of an axillary peduncle, fascicled on a nodose rhachis; bracts small, deciduous; bracteoles sometimes large and subpersistent. *Calyx* campanulate, the teeth distinct or the 2 upper more or less connate. *Corolla* exserted; standard orbicular, auricled at base; wings obovate falcate, slightly adnate to the keel; keel petals equalling the wings, incurved, acute or if beaked not spirally. *Stamens* diadelphous; anthers uniform. *Ovary* sessile, many-ovuled; style filiform or thickened upwards, longitudinally bearded on the inner face; stigma oblique. *Pod* linear, straight or incurved, usually acuminate, septate between the seeds. *Seeds* reniform or subquadrate, the hilum short, lateral; strophiole 0.

Keel not beaked, a suberect or twining annual with white, pink or yellowish flowers and long glabrous pods with many seeds...*Catjang*.

Keel beaked but not spiral as in *Phaseolus*:—

Flowers large, 1 in. or more long; calyx-teeth subequal, about .25 in. long, as long as the tube; leaflets rather small:—

Calyx strigosely hirsute; petals long-clawed; leaflets ovate or lanceolate, acute; pod with nearly black hairs, later glabrous

1. *vexillata*.

Calyx softly villous; petals short-clawed; leaflets ovate, mucronate, subobtuse; pod with pale brown hairs..... 2. *Wightii*.

Flowers medium-sized, under .75 in. long:—

Calyx-teeth unequal, the upper pair short, connate, the lowest the longest; keel petals very long-clawed; leaflets large, ovate, acute, the end one deltoid at base; pod densely brown-villous, long-acuminate..... 3. *pilosa*.

Calyx-teeth subequal, the upper pair rounded, connate; keel petals short-clawed; leaflets large, ovate, acuminate, densely tawny villous on both sides, the end one deltoid or rounded; pod at first densely villous; afterwards glabrescent...4. *Bourneae*.

1. *VIGNA VEXILLATA*, Benth.; F. B. I. ii. 206. *Phaseolus palniensis*, Wt. Ic. t. 202.

W. Gháts, in the S. Canara, Nilgiri and Pulney Hills, up to 7,000 ft.

A very pretty climber with large reddish-purple flowers.

Var. *Stocksii*, Benth. Leaflets broadly ovate, often cordate at base, with more abundant brown silky hairs.

Kadur Hills of Mysore, at 5,500 ft. (Talbot).

2. *VIGNA WIGHTII*, Benth.; F. B. I. ii. 206; Bedd. Ic. t. 296.

W. Gháts, in the Wynaad, Coimbatore and Pulney Hills, in grass lands, at about 5,000 ft. "Wynaad Sweet Pea (Beddome)."

Similar to the last, with pink flowers.

3. *VIGNA PILOSA*, Bak. in F. B. I. ii. 207. *Dolichos pilosus*, Roxb.; W. & A. 249.

W. Gháts, in evergreen forests, S. Canara to Travancore, at low levels.

A slender climber with reddish flowers and very long-pointed velvety pods.

4. *VIGNA BOURNEAE*, Gamble in Kew Bull. 1918, ined.

W. Ghats, in the Pulney Hills at low elevations (Bourne).

A stout climber with prominent oblong-lanceolate peltate stipules, very thickly villous branches and leaves and long peduncled very nodose racemes. Flowers larger than those of *V. pilosa* apparently reddish-purple.

*Vigna Catjang*, Walp. is a suberect annual plant cultivated for its pods, which are eaten like French beans, and for its seeds Vern. *Hind.* Lobia; *Tam.* Karamani.

#### 46. *Clitoria*, Linn.

Herbs or shrubs, erect or climbing. *Leaves* pinnate, 3-many-foliolate; stipules persistent, striate; stipels small, subulate. *Flowers* showy, axillary, solitary fascicled or racemose; bracts persistent, stipule-like; bracteoles usually large, persistent. *Calyx* membranous, tubular, the 2 upper teeth subconnate. *Corolla* much exserted; standard large, erect, emarginate, narrowed at base; wings falcate-oblong, spreading, adnate in the middle to the keel; keel shorter than the wings, incurved, acute. *Stamens* usually diadelphous, the vexillary one sometimes connate with the others; anthers uniform. *Ovary* stipitate, many-ovuled; style elongate, incurved, bearded along the inner side. *Pod* linear-oblong, flattened or turgid, many-seeded. *Seeds* subglobose or compressed; strophiole 0.

*CLITORIA TERNATEA*, Linn.; F. B. I. ii. 208; W. & A. 205.

Cultivated in gardens everywhere, but also common self-sown in hedges and thickets.

A very pretty climber with large bright blue prominently bracteolate flowers, the standard having an orange centre. Vern *Hind.* Khagin; *Tel.* Nalla-ghentana; *Tam.* Karka kartun.

#### 47. *Dolichos*, Linn.

Twining prostrate or suberect herbs. Leaves pinnately 3-foliolate; stipules basifixed, subpersistent; stipels subulate. Flowers in axillary racemes or fascicles or solitary; bracts and bracteoles minute, striate, subpersistent. Calyx-tube campanulate, the teeth short or long, the 2 upper connate. Corolla exserted; standard orbicular, auricled at base and with projecting appendages above the claw; wings oblong or obovate, slightly adnate to the keel; keel much incurved, usually with a straight beak. Stamens diadelphous; anthers uniform. Ovary sessile, many-ovuled; style thickened upwards and bearded down the inner face or filiform and bearded round the terminal stigma. Pod flat, linear or oblong, recurved, usually tipped with the persistent style. Seeds thick or somewhat flattened, hilum short with slender funicle or elongate with thickened subpersistent funicle.

Style thickened upwards, bearded down the inner edge; large climbing herbs with elongate racemes on tumid nodes .....*Lablab*.

Style filiform, bearded only round the stigma; nodes not tumid:—

Twining herbs with tuberous roots, perennial:—

Flowers about 2–8, lilac or pink, on slender peduncles varying up to 2 in. long; calyx-teeth short; leaflets broadly deltoid-ovate, the end one often 3-lobed; pod linear, glabrous, 2–3 in. long, .35 in. broad, 6–8-seeded .....1. *falcatus*.

Flowers about 3–6, yellow, in short cymes under .5 in. long, the petals striate; calyx-teeth long; leaflets elliptic-ovate, obtuse, prominently ciliate on the margins; pod linear-oblong, glabrous, 1–1.5 in. long, .4–.5 in. broad, 3–4-seeded .....2. *ciliatus*.

Erect or somewhat twining herbs, the roots not tuberous, annual; flowers 1–3 together in leaf-axils, yellow, softly hairy, wings narrow; calyx-teeth setaceous; leaflets ovate, acute; pod linear, 1.5–2 in. long, .25 in. broad, 5–6-seeded .....*biflorus*.

1. *DOLICHOS FALCATUS*, Klein; F. B. I. ii. 211; W. & A. 249.

All Districts, and up to 6,000 ft. in the hills.

A slender twiner with pretty lilac or pink flowers.



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silky-pubescent beneath; pod oblong, .5–.75 in. long by .25 in. broad, thinly grey-silky, 2–3-seeded..... 2. *lineata*.  
 Leaflets thick, linear-oblongate, up to 1.5 in. long, densely white-silky-pubescent; pod small, white-silky, .5 in. long by .25 in. broad, 2-seeded..... 3. *sericea*.

Climbing shrubs; pod distinctly depressed between the seeds:—

Flowers in lax rather stout racemes; depressions of pod oblique; leaflets stipellate:—

Petals exserted, marcescent; bracts large, elliptic, conspicuous in season of bud, then deciduous; leaflets coriaceous, densely grey-pubescent beneath..... 4. *volubilis*.

Petals included, not marcescent; bracts ovate cuspidate, deciduous; leaflets chartaceous, thinly pubescent beneath..... 5. *goensis*.

Flowers in slender short racemes; depressions of pod straight or slightly oblique; leaflets exstipellate:—

Calyx-teeth short; pod more than 1 in. long, 5–7-seeded, thinly white-hoary; leaflets broadly obovate, obtuse, grey-canescens

6. *albicans*.

Calyx-teeth long; pod under 1 in. long, with brown hairs:—

Leaflets broadly obovate, rugose above, prominently reticulate beneath and white-canescens; pod 3–4-seeded, shortly villous, the apex hooked..... 7. *rugosa*.

Leaflets obovate-oblong, only slightly rugose and reticulate, slightly grey-canescens beneath; pod 4–6-seeded with golden spreading hairs, the apex straight..... 8. *scarabaeoides*

1. *ATYLOSIA TRINERVIA*, Gamble n. comb. *A. Candollei*, W. & A. 257; F. B. I. ii. 212; Wt. Ic. t. 754.

W. Gháts, in the Nilgiri Hills, above 5,000 ft., Hills of Travancore, at 7,000 ft.

A handsome shrub with bright yellow flowers.

• Var. *major*, Prain. *A. major*, W. & A. 257. Flowers larger, on longer peduncles; leaflets larger and more silky as are the branchlets.

W. Gháts, in the Nilgiri Hills, about 6,000 ft.; Atapadi Hills of Malabar, at 5,500 ft. (Fischer).

2. *ATYLOSIA LINEATA*, W. & A. 258; F. B. I. ii. 213. *A. Lawii*, Wt. Ic. t. 93.

W. Gháts, from S. Canara and Mysore to Travancore, at 3,000 to 5,000 ft.

A compact ashy-grey bush with yellow flowers.

## 3. ATYLOSIA SERICEA, Benth.; F. B. I. ii. 213.

E. Gháts, in the Hills of Vizagapatam, at 4,000 ft. and higher (A. W. Lushington).

An erect white silky shrub with red flowers.

4. ATYLOSIA VOLUBILIS, Gamble n. comb. *A. crassa*, Prain in Journ. As. Soc. Beng. lxvi, 45. *A. mollis*, Benth.; F. B. I. ii. 213 *in part.* *Cytisus volubilis*, Blanco.

E. Gháts, in the Hills of Ganjam and Vizagapatam, up to 3,000 ft.

A climbing shrub with densely rusty tomentose foliage and yellow flowers.

5. ATYLOSIA GOENSIS, Dalz. *A. barbata*, Bak. in F. B. I. ii. 216.

W. Gháts, from S. Canara to Travancore, at low elevations and up to 3,500 ft.

A climbing grey-pubescent shrub with yellow flowers.

6. ATYLOSIA ALBICANS, Benth.; F. B. I. ii. 215. *Cantharospermum albicans*, W. & A. 256 *in part.*

E. Gháts, Hills of Vizagapatam, at 1,500 ft.; Hills of W. Deccan; W. Gháts from Mysore to Travancore, up to 5,000 ft., usually in somewhat dry localities.

A climbing shrub easily known by its bluish grey striate stems and leaflets. Flowers yellow.

## 7. ATYLOSIA RUGOSA, W. &amp; A. 257; F. B. I. ii. 215.

W. Gháts, in the Nilgiri, Anamalai and Pulney Hills, from 5,000 to 7,000 ft.; Shevaroy Hills of Salem.

A climbing shrub with reticulate leaflets grey-canescens beneath, and yellow flowers.

8. ATYLOSIA SCARABAEOIDES, Benth.; F. B. I. ii. 215. *Cantharospermum pauciflorum*, W. & A. 255.

N. Circars, from Ganjam to Godavari; Deccan, in Mysore and Coimbatore; W. Gháts, at low levels on the E. side, from Nilgiris to Cape Comorin.

A slender twining shrub with softly golden-villous pods and yellow flowers.

*Cajanus indicus*, Spreng., is the "Pigeon pea"—an erect shrub with corolla yellow or yellow veined with red, cultivated for its seeds especially in forest regions. The leaves are used for cattle-fodder. Vern. *Hind.* Arhar dál; *Tam.* Tuvarai; *Tel.* Kandalu.



49. *Dunbaria*, W. & A.

Prostrate or twining woody herbs. *Leaves* pinnately 3-foliolate, glandular beneath; stipules setaceous or lanceolate; stipels small or 0. *Flowers* in axillary peduncled racemes, solitary or paired on the rhachis; bracts membranous, usually broadly ovate, very early deciduous; bracteoles 0. *Calyx*-tube campanulate, the teeth lanceolate or triangular, the lowest the longest, the 2 upper ones connate in an entire or bifid lobe. *Corolla* exserted, sometimes marcescent; standard obovate or orbicular with auricles at the base and 2 callosities above it; wings obliquely obovate or oblong, auricled; keel petals incurved, obtuse. *Stamens* diadelphous; anthers uniform. *Ovary* sessile or shortly stipitate, many-ovuled; style inflexed, filiform or thickened, beardless; stigma capitate. *Pod* oblong, compressed, subseptate within, not depressed between the seeds outside. *Seeds* suborbicular, the funicle expanded but scarcely strophiolate.

Corolla large, marcescent:—

Stems and leaves tawny-pubescent, the leaflets thick, broadly ovate, acute or acuminate; stipels generally 0; calyx-lobes lanceolate; standard over 1 in. long, emarginate; pod softly tawny-pubescent

1. *ferruginea*.

Stems and leaves with scattered strigose hairs, the leaflets thin, end one obovate, side ones unequally lanceolate, all acuminate; stipels present; calyx-lobes short except the lowest; standard .75 in. long, obtuse; pod with long villous hairs ..... 2. *Heynei*.

1. *DUNBARIA FERRUGINEA*, W. & A. 258; F. B. I. ii. 217.

*D. latifolia*, W. & A. 258.

Deccan, Hills of Cuddapah and N. Coimbatore; W. Gháts, in the Nilgiri, Pulney and Travancore Hills, up to 3,000 ft.

A stout climber with large yellow flowers.

2. *DUNBARIA HEYNEI*, W. & A. 258; F. B. I. ii. 217.

W. Gháts, in Mysore, Wynaad and the Anamalais, up to 3,000 ft.

A climber with yellow flowers; stipules and stipels prominent.

50. *Cylista*, Ait.

A twining shrub. *Leaves* pinnately 3-foliolate, with resinous glands beneath; leaflets ovate or rhomboidal, acuminate; stipules



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Calyx not accrescent :—

Calyx-lobes linear, the lowest longest; leaflets obtuse; trailing undershrubs or herbs :—

Pod 1-seeded, orbicular, with few branching transverse veins; flowers small, in elongate racemes; leaflets broadly ovate-cuneate, the end one truncate or emarginate, 1–2 in. in diam.

3. *nummularia*.

Pod 2-seeded; flowers moderate-sized :—

Flowers in racemes; pod with close transverse wrinkles on the faces :—

Racemes few-flowered, the peduncle shorter than the leaves, naked; standard yellow striped with purple; leaflets suborbicular, deltoid, .3–.4 in. in diameter

4. *aurea*.

Racemes many-flowered, capitate, the peduncle longer than the leaves with a slender leafless shoot near the middle; standard yellow, not striped; leaflets orbicular-ovate, deltoid, up to 2 in. in diam.....5. *capitata*.

Flowers solitary on thread-like pedicels with bracts a short way below the calyx; leaflets coriaceous, obovate, white-velvety beneath and reticulate, mucronate, up to 2.5 in. long; pod oblong, .5 in. long, softly pubescent, not wrinkled on the faces .....6. *filipes*.

Calyx-lobes lanceolate, acuminate, nearly equal; leaflets acute; erect undershrubs with 2-flowered axillary peduncles; seeds 2 :—

Viscous-pubescent, yellowish when dry; pod indented without between the seeds and with a partition within; leaflets ovate acuminate, up to 3 in. long.....7. *suaveolens*.

Glandular-pubescent but not viscous, greyish-green when dry; pod slightly indented without between the seeds but with no partition within; leaflets ovate acute or almost obtuse, up to 2 in. long.....8. *cana*.

Calyx-lobes oblong, obtuse, longer than the corolla, the lowest shortest; erect undershrub with white-silky, coriaceous, reticulate, ovate or lanceolate leaflets up to 1.25 in. long; flowers in short racemes; pod suborbicular, .2–.3 in. in diam., seed 1

9. *Beddomei*.

Seeds estrophiolate :—

Calyx-lobes large, foliaceous, .75 in. long; flowers large, in long racemes with large ovate-cuspidate deciduous bracts; pod as long as the calyx, densely velvety, with 2 blue-black seeds

10. *cyanosperma*.

Calyx-lobes acuminate, not foliaceous :—

Leaflets small, usually obtuse, under 1·5 in. in diam. :—

Racemes slender, lax, 1–3 in. long; flowers small, ·2 in. long; pod ·5–·6 in. long, ·2 in. broad, nearly glabrous, slightly curved

11. *minima*.

Racemes short, cymose, about ·5 in. long; flowers larger, ·5 in. long; pod 1–1·25 in. long, ·4 in. broad, slightly puberulous, much curved.....12. *velutina*.

Leaflets moderately large to large, acute or acuminate, at any rate over 1 in. in diam. even at the ends of the branchlets :—

Flowers in more or less lax racemes; pod much longer than the calyx, tipped with the persistent base of the style :—

Pod acute at apex below the base of the style :—

Pod with bulbous-based setose hairs, as well as pubescence :—

Corolla yellow; pubescence glandular; leaflets broadly deltoid, shortly acuminate, rarely over 3 in. long; bracts minute, deciduous; pod sparsely pubescent

13. *viscosa*.

Corolla purple; pubescence silky; leaflets broadly ovate, acute, the end one rhomboid, usually over 3 in. long; bracts lanceolate, subpersistent; pod tawny-villous

14. *sericea*.

Pod softly grey-tomentose without setose hairs; corolla yellow veined with red; pubescence very short, fulvous; leaflets rhomboid-ovate, very long acuminate, 3–5 in. long

15. *acutissima*.

Pod obtuse at apex below the curved style, minutely pubescent; corolla yellow; pubescence softly fulvous; bracts lanceolate, deciduous; leaflets deltoid, shortly acuminate, coriaceous, up to 4 in. long .....16. *bracteata*.

Flowers in dense almost capitate racemes; pod only slightly longer than the calyx, acute at tip, slightly villous; calyx-lobes lanceolate, acuminate, silky-villous and dotted with red glands bracts lanceolate, persistent; leaflets rhomboid ovate, acute, membranous, 1–2 in. long..... ..17. *densiflora*.

1. RHYNCHOSIA RUFESCENS, DC.; F. B. I. ii. 220; W. & A. 239.  
N. Circars, from Ganjam to Godavari, at low levels Deccan, in Mysore and Bellary; Carnatic, dry hills of S. Arcot and Chingleput; W. Gháts, in N. Nilgiris, E. Anamalais and Pulneys, up to 3,000 ft.

An erect shrub with trailing branches, yellow flowers and conspicuous calyx hiding the flowers and pod.

2. *RHYNCHOSIA HEYNEI*, W. & A. 240; F. B. I. ii. 220.  
*R. codoorensis*, Bedd. Ic. t. 297.

Deccan, in Mysore, Cuddapah and Bellary, in hilly country.  
A herbaceous trailing undershrub with yellow flowers.

3. *RHYNCHOSIA NUMMULARIA*, DC.; F. B. I. ii. 221. *Nomismia nummularia*, W. & A. 237; Wt. Ic. t. 283.

Carnatic, in Tinnevelly, also Shevaroy Hills of Salem.  
A trailing annual herb.

4. *RHYNCHOSIA AUREA*, DC.; F. B. I. ii. 221 *in part*. *Nomismia aurea*, W. & A. 237.

Carnatic, not uncommon near Madras; Deccan, in Coimbatore.

A slender trailing annual herb.

5. *RHYNCHOSIA CAPITATA*, DC. *R. aurea*, DC.; F. B. I. ii. 221 *in part*. *Nomismia capitata*, W. & A. 237; Wt. Ic. t. 295.

Deccan, in the Hills of Cuddapah, Anantapur and Coimbatore, up to 1,500 ft.; E. Coast, at Masulipatam (Bourne).

A slender climber with flowers in many-flowered heads, softly villous.

6. *RHYNCHOSIA FILIPES*, Benth.; F. B. I. ii. 221.

W. Gháts, in the Nilgiri and Pulney Hills, at low levels; Shevaroy Hills of Salem.

A slender wide-trailing undershrub with filiform stems and peduncles.

7. *RHYNCHOSIA SUAVEOLENS*, DC.; F. B. I. ii. 221; W. & A. 240.

Deccan and Carnatic, in dry forest localities, up to 3,000 ft. in Coimbatore.

A viscous hairy undershrub with yellow flowers.

8. *RHYNCHOSIA CANA*, DC.; F. B. I. ii. 222; W. & A. 240.

Deccan and Carnatic, in dry forest localities from the Godavari southwards, up to 4,000 ft.; W. Gháts, in the Nilgiri, Pulney and Travancore Hills, up to 5,000 ft.

A glandular undershrub with yellow flowers.

9. *RHYNCHOSIA BEDDOMEI*, Bak. in F. B. I. ii. 222.

Deccan, on rocks on Horsleykonda, at 4,000 ft., and other hills in Cuddapah and Bellary.

A stiff undershrub with bright yellow flowers.



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16. *RHYNCHOSIA BRACTEATA*, Benth. ; F. B. I. ii. 225.

Deccan, Mantralakanama Pass in Kurnool, 2,000 ft. (Gamble).

A rather stiff climber with tawny pubescence and yellow flowers.

17. *RHYNCHOSIA DENSIFLORA*, DC. ; F. B. I. ii. 226 ; W. & A. 239.

W. Gháts, in the Nilgiris, Anamalais and Pulneys, up to 5,000 ft.

A slender twiner, softly villous, with yellow flowers, the standard often streaked with red.

52. *Flemingia*, Roxb.

Shrubs or undershrubs, rarely herbs, erect or trailing. *Leaves* 1-foliolate or digitately 3-foliolate ; stipules striate, often deciduous ; stipels 0. *Flowers* in axillary or terminal simple or compound racemes panicles or sometimes heads ; bracts foliaceous or scarious, persistent or caducous ; bracteoles 0 or minute. *Calyx*-tube short, teeth subequal or the lowest the longest, usually lanceolate. *Corolla* little or not exerted ; standard obovate or orbicular, auricled at base ; wings obliquely oblong or obovate, sometimes short, adnate to the obtuse or slightly rostrate keel. *Stamens* diadelphous, anthers uniform. *Ovary* subsessile, short, 2-ovuled ; style filiform or thickened above ; stigma capitate. *Pod* small, oblique, turgid, usually 2-seeded. *Seeds* suborbicular, estrophiolate.

Leaves unifoliolate ; flowers in axillary and terminal distichous racemes of small cymes, each of which is hidden within a large folded persistent cordate floral leaf, the cymes with many bracteoles :—

Leaflet lanceolate ; flowers 2–3 in. long ; rhachis of inflorescence flexuose :—

Branchlets terete ; floral leaves up to 1 in. long, glabrescent, usually very shortly cuspidate ; lateral nerves of leaflets close, usually more than 8 pairs ..... 1. *strobilifera*.

Branchlets angular ; floral leaves up to .75 in. long, softly hirsute, usually emarginate ; lateral nerves of leaflets distant, usually less than 6 pairs ..... 2. *bracteata*.

Leaflet orbicular, cordate, cuspidate, 2–4 in. in diam. ; flowers

·3-·4 in. long; floral leaves much broader than long, deeply emarginate; rhachis of inflorescence straight ..... 3. *Chappar.*

Leaves 3-foliolate:—

Flowers very small, in lax panicles of racemes; leaflets oblanceolate, cuneate, plicate, with strong oblique nerves, 1·5-2·5 in. long; pods oblong, glandular-pubescent, under ·5 in. long.....4. *lineata.*

Flowers fairly large, in subspicate axillary racemes; erect shrubs with scariose bracts and 3-ribbed leaflets:—

Branches prominently triquetrous; bracts linear-lanceolate, ·5-·75 in. long, much exceeding the buds; leaflets oblong-lanceolate, up to 1 ft. long, the ribs not very distinguishable from the other nerves; calyx-lobes white-silky, not glandular, short, the lowest the longest.....5. *stricta.*

Branches terete or slightly triquetrous; bracts not exceeding the buds; calyx-lobes linear, elongate; leaflet ribs prominent:—

Leaflets thin, acuminate, glabrous except on the nerves beneath:—

Racemes short, 1·5-2·5 in. long; calyx-lobes white-silky, prominently dotted with black glands as is the almost glabrous under-surface of the leaflets; petiole not or only slightly winged ..... 6. *congesta.*

Racemes long, up to 4 or even 6 in.; calyx-lobes tawny-silky, without glands; under-surface of leaflets villous on the nerves, not or only slightly glandular; petiole winged

7. *semialata.*

Leaflets thick, acute or obtuse, pubescent or tomentose beneath:—

Calyx-lobes and pod densely covered with red glands (black when dry):—

Leaflets obovate, obtuse or subacute, reticulate, grey- or tawny-silky beneath..... 8. *Grahamiana.*

Leaflets oblanceolate, acuminate, densely softly golden-villous beneath..... 9. *Wightiana.*

Calyx-lobes covered with hairs springing from yellow glands; pods not glandular; leaflets small, strongly ribbed and nerved and reticulate..... 10. *Wallichii.*

Flowers in capitate terminal heads; trailing herbs with small ovate acute leaflets; calyx-lobes with hairs on yellow bulbous bases; pod very small, membranous, 1-seeded ..... 11. *nilgheriensis.*

1. FLEMINGIA STROBILIFERA, R. Br.; F. B. I. ii. 227 *excl. vars.*; W. & A. 243; Wt. Ic. t. 267.



E. Gháts, Hills of Vizagapatam; Deccan, Hills of Kurnool; W. Gháts, Mysore to Malabar and Travancore, up to 3,000 ft.

An erect branching shrub, 4–6 ft. high with white flowers.

2. *FLEMINGIA BRACTEATA*, Wt. Ic. t. 268. *F. strobilifera* var. *bracteata*, Bak. in F. B. I. ii. 227.

W. Gháts, in the Nilgiris, Anamalais and Hills of Malabar, up to 4,000 ft.; Shevaroy Hills of Salem.

An erect branching shrub, 1–3 ft. high, with pink or purple flowers.

3. *FLEMINGIA CHAPPAR*, Ham.; F. B. I. ii. 227.

N. Circars, Sál forests of Ganjam at low levels (Gamble).

An erect shrub with conspicuous floral leaves and white flowers, often gregarious.

4. *FLEMINGIA LINEATA*, Roxb.; F. B. I. ii. 228; W. & A. 242; Wt. Ic. t. 327.

E. Gháts, in the forests of the Upper Godavari (Gamble); W. Gháts, Nilgiri Hills, *vide* DC.

A small erect shrub, with small pinkish flowers.

5. *FLEMINGIA STRICTA*, Roxb. Cor. Pl. t. 248; F. B. I. ii. 228; W. & A. 241; Wt. Ic. t. 329.

E. Gháts, in hill forests from Ganjam to Godavari, up to 2,000 ft.

A tall shrub with triquetrous branches, very large stipules and bracts, and flowers striped with pink, yellow and violet. Vern. *Tel.* Guidda.

6. *FLEMINGIA CONGESTA*, Roxb.; F. B. I. ii. 228; W. & A. 241; Wt. Ic. t. 390.

N. Circars, Sál forests of Ganjam; Deccan, in Mysore.

An erect shrub, 4 ft. high or higher; flowers streaked with purple and yellow.

7. *FLEMINGIA SEMIALATA*, Roxb. Cor. Pl. t. 249; W. & A. 241 Wt. Ic. t. 326. *F. congesta* var. *semialata*, Bak. in F. B. I. ii. 229.

N. Circars, Hills of Vizagapatam; W. Gháts, in Malabar, Coimbatore, Cochin and Travancore, up to 5,000 ft.

An erect shrub; flowers pink with purple and orange streaks.

8. *FLEMINGIA GRAHAMIANA*, W. & A. 242; F. B. I. ii. 228.

W. Gháts, in the Nilgiri, Anamalai and Pulney Hills and the Hills of Travancore, 4,000 to 7,000 ft.



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Flowers minute ; bracteoles usually persistent ; inflorescence dichotomously cymose ; small, erect or climbing shrubs :—

Pod thickened, reniform-falcate ; branchlets ending in spines ; flowers in axillary racemes ; leaflets 5–9, .4–.7 in. long, obovate, obtuse or retuse ; seeds 1, rarely 2 .....1. *spinosa*.

Pod samaroid ; flowers in axillary cymose panicles :—

Pod pubescent, broadly oblong ; stem armed, branchlets unarmed ; leaflets 11–15, .2–.6 in. long, elliptic-oblong, emarginate ; seeds 1, rarely 2 or 3 ..... 2. *multiflora*.

Pod glabrous, narrowly ovate ; branchlets ending in spines ; leaflets 7–11, .3 in. long, elliptic, obtuse or retuse ; pod ovate, acute at both ends, seed 1 .....3. *coromandeliana*.

Flowers small ; bracteoles deciduous ; inflorescence cymosely paniculate ; leaflets few, suborbicular, cuspidate ; pod narrowly ligulate, 1- 2- or rarely 3-seeded ; tree .....*Sissoo*.

Standard refract or reflexed, wings hastate or sagittate at base, keel petals hastate, style slender ; stamens variously arranged :—

All petals with a slender claw ; stamens usually monadelphous ; standard refract ; climbing shrubs :—

Pod thickened, reniform-falcate ; leaflets 5–7, emarginate, under 1 in. long ; bracteoles obtuse.....4. *candenatensis*.

Pod samaroid, broadly ligulate ; leaflets 3–5 or fewer, abruptly cuspidate and retuse at apex, up to 4 in. long, 2 in. broad ; bracteoles subulate ..... 5. *rostrata*.

Pod samaroid, oblong, netted-veined ; leaflets 3–5, obtuse or emarginate at apex, up to 2.5 in. long, 1.25 in. wide ; bracteoles obtuse .....6. *rubiginosa*.

Pod samaroid, ovate :—

Leaflets 5–11, cuneate at base, retuse at apex, .75–1.75 in. long, prominently nerved, ferruginous-pubescent beneath when young ; pod smooth but reticulate opposite the seeds, shortly stalked.....7. *congesta*.

Leaflets rounded at base and apex, obscurely nerved :—

Leaflets 7–11, .5–.75 in. long, shining above, densely rusty-tomentose beneath ; stalk of pod .25 in. long...8. *Gardneriana*.

Leaflets 21–31, .5 in. long, elliptic-oblong, rusty-pubescent beneath ; pod with .75 in. filiform stalk.....9. *malabarica*.

Pod samaroid, narrowly ligulate ; leaflets very many, small, .6–.8 in. long, .25 in. wide, linear-oblong, obtuse ; pod long-stipitate ..... 10. *acaciaefolia*.

All petals except the cuneate standard with a slender claw, standard reflexed :—

Stamens usually monadelphous, 9 or 10; trees:—

Flowers in corymbose panicles fascicled on old wood below the upper leaves or in the axils of older leaves; leaflets orbicular, obtuse or emarginate, curved to the petiole at base; pod usually obtuse at apex with a minute apicule, .7 in. broad; young leaves green .....11. *latifolia*.

Flowers in loose single panicles terminal or axillary to leaves of new shoots; leaflets obovate acute, rarely suborbicular or obtuse, more or less cuneate at base; pod acute at apex with a longish apicule, .5 in. broad; young leaves yellowish

12. *sissoides*.

Stamens isodiadelphous, 5 and 5:—

Standard narrow, obovate-oblong, slightly auricled at base with a rather long claw and not thickened above it; flowers in dense panicles; leaflets 9–13, elliptic, retuse, nerves not prominent; pod short-stipitate, coriaceous, narrowed at both ends, 1–2-seeded; tree ..... 13. *paniculata*.

Standard broad, obovate, thickened above the very short claw:—

Tree; leaflets 7–11, ovate-oblong, rarely suborbicular, nerves usually prominent; flowers in loose panicles; pod long-stipitate, oblong, tapering to both ends, 1–3-seeded

14. *lanceolaria*.

Climbing shrub; leaflets 11–13, obovate- or ovate-oblong, obtuse, mucronulate, nerves fairly prominent; pod short-stipitate, oblong, obtuse at apex, 1- rarely 2-seeded

15. *volubilis*.

1. DALBERGIA SPINOSA, Roxb.; F. B. I. ii. 238; Prain Ann. Calc. x. 35, t. 9.

Coast forests of S. Arcot (Wooldridge); Tuticorin (Wight). A stiff, often climbing shrub with whitish small flowers. Bark blackish-grey, rough; wood in alternate layers of wood and bark tissue.

2. DALBERGIA MULTIFLORA, Heyne; Prain Ann. Calc. x. t. 18. *D. sympathetica*, Nimmo; F. B. I. ii. 234.

W. Gháts, lower hills from S. Canara to Travancore and Tinnevely.

A large climbing shrub, often with curiously twisted branches bearing spines; flowers white; leaflets pubescent or glabrous.

3. *DALBERGIA COROMANDELIANA*, Prain Ann. Calc. x. 46, t. 21.  
W. Gháts, Sivagiri Hills of Tinnevelly (Wight).  
An erect spinous shrub with very small leaves and sub-acute pod.
4. *DALBERGIA CANDENATENSIS*, Prain. *D. torta*, Grab.; Prain Ann. Calc. x. 54, t. 42. *D. monosperma*, Dalz.; F. B. I. ii. 237.  
Coast of Travancore and Malabar, in Mangrove swamps.  
A stout climbing shrub with the twigs often twisted into spiral hooks; flowers white.
5. *DALBERGIA ROSTRATA*, Grah.; Prain Ann. Calc. x. 60, t. 36. *D. Championii*, Thw.; F. B. I. ii. 231.  
W. Gháts, Tambraparni river (Beddome).  
A shrubby climber with cream-coloured flowers, the leaflets cuspidate with a retuse tip.
6. *DALBERGIA RUBIGINOSA*, Roxb.; Cor. Pl. t. 115; F. B. I. ii. 232; W. & A. 265; Prain Ann. Calc. x. 63, t. 40.  
N. Circars, in the hills (*vide* Roxburgh); Mangalore in S. Canara (Wight); Coimbatore Hills, at 4,000 ft. (A. W. Lushington, Fischer).  
A large climbing shrub.
7. *DALBERGIA CONGESTA*, Grah.; F. B. I. ii. 232, excl. syn. *D. Gardneriana*; W. & A. 265; Prain Ann. Calc. x. 66, t. 43.  
W. Gháts, in the Nilgiri Hills, at 5,000 ft.  
A large climbing shrub with white flowers and 1-seeded coriaceous pod.
8. *DALBERGIA GARDNERIANA*, Benth.; Prain Ann. Calc. x. 66, t. 44. *D. congesta*, Bak. in F. B. I. ii. 232 *in part*.  
W. Gháts, in the Nilgiri Hills, at 5,000 to 7,000 ft.  
A climbing shrub with white flowers, rusty-tomentose branchlets and 1-seeded thin pod.
9. *DALBERGIA MALABARICA*, Prain Ann. Calc. x. 67, t. 46. *D. tamarindifolia* var. *pubescens*, Bak. in F. B. I. ii. 235.  
W. Coast, in dry forests of S. Canara, S. Travancore and Tinnevelly.  
A climbing shrub with white flowers and 1-seeded ovate-oblong thinly coriaceous pod.
10. *DALBERGIA ACACIAEFOLIA*, Dalz.; Prain Ann. Calc. x. 68, t. 47. *D. tamarindifolia* var. *acaciaefolia*, Bak. in F. B. I. ii. 235.



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A large and pretty deciduous tree with grey smooth bark and white moderately hard wood of no great value. Flowers pinkish or bluish-white. Vern. *Tel.* Yerra patsaru; *Tam.* Erigei.

15. *DALBERGIA VOLUBILIS*, Roxb. Cor. Pl. t. 191; F. B. I. ii. 235; W. & A. 265; Prain Ann. Calc. x. 100, t. 85.

All dry Districts, in deciduous forests.

A large woody climber with light brown hard wood, the flowers pale blue.

*Dalbergia Sissoo*, Roxb., a tree of river beds in the Subhimalayan tract of N. India and valuable for its hard dark brown wood used for furniture and Ordnance purposes, is often planted in S. India and may sometimes be found run wild.

#### 54. *Pterocarpus*, Linn.

Trees. *Leaves* alternate, imparipinnate; leaflets alternate, usually coriaceous; stipules small, deciduous; stipels 0. *Flowers* yellowish, in terminal or axillary racemes or panicles; bracts small, deciduous; bracteoles 2, caducous. *Calyx*-tube campanulate, somewhat curved; teeth short, the 2 upper often subconnate. *Corolla* exserted, the petals all long-clawed; standard orbicular, crisped at the margin; wings oblique, the margins also crisped; keel-petals oblique, smaller, slightly connate. *Stamens* 10, the filaments connate in a tube split above, sometimes split in 2 bundles of 5, sometimes the vexillary filament free; anthers uniform. *Ovary* sessile or stalked; ovules 2-6; style filiform, incurved, beardless; stigma capitate. *Pod* orbicular, compressed, with a broad wing, the style turned down towards the stipe. *Seeds* 1 rarely 2, oblong or subreniform; hilum small.

Flowers axillary, in simple or sparingly branched racemes; leaflets usually 3, rarely 4-5, broadly ovate or nearly orbicular, slightly emarginate; pod with .35 in. long stipe, concavely curved between the stipe and style.....1. *santalinus*.

Flowers in terminal panicles; leaflets 5-7 from elliptic-oblong, obtuse emarginate or even bilobed at apex to ovate acuminate; pod with .2 in. long stipe, convexly curved between the stipe and style

2. *Marsupium*.

1. *PTEROCARPUS SANTALINUS*, Linn. f.; F. B. I. ii. 239, W. & A. 266; Bedd. Fl. t. 22.

Deccan, in the Hills of Cuddapah, S. Kurnool, N. Arcot and Chingleput, up to 1,500 ft. Red Sanders.

A very pretty and valuable moderate-sized tree, found only on a limited area. Bark blackish-brown deeply cleft into rectangular plates; wood extremely hard, dark claret red to nearly black, used for house-posts, carvings and as a dye. Vern. *Tel.* Yerra chandanuni.

2. *PTEROCARPUS MARSUPIUM*, Roxb. Cor. Pl. t. 116; F. B. I. ii. 239; W. & A. 266; Bedd. Fl. t. 21.

All forest Districts, chiefly in deciduous forest, up to 4,500 ft.

A large deciduous tree, one of the most valuable in the Madras forests. Bark thick, grey, with vertical cracks. Wood very hard, yellowish-brown with darker streaks, used for building, furniture, agricultural and railway purposes. It gives a red gum-resin "Kino," used in medicine. Vern. *Hind.* Bijasal; *Ur.* Byása; *Tel.* Yegi; *Tam.* Vengai; *Kan.* Honné; *Mal.* Venga.

Var. *canus*, Gamble. Branchlets, leaves beneath, calyx and rhachis softly white-silky pubescent; leaves much smaller; flowers small, in shorter racemes.

Hills of the Kistna District (Beddome).

55. *Pongamia*, Vent.

A tree. *Leaves* alternate, imparipinnate; leaflets opposite; stipules small; stipels 0. *Flowers* in lax axillary racemes, the flowers in fascicles of 2-4 on the rhachis; bracts small, caducous; bracteoles minute. *Calyx* campanulate, truncate; teeth obsolete. *Corolla* much exserted; standard suborbicular with curved folds above the claw; wings obliquely oblong, slightly adnate above the claws to the obtuse keel petals which are joined near the tip. *Stamens* 10 monadelphous, the vexillary stamen free below and above; anthers uniform. *Ovary* sessile; ovules 2; style incurved, beardless; stigma capitate. *Pod* obliquely oblong, attenuated at both ends, curved at apex, thick, more or less compressed, indehiscent. *Seed* 1, reniform, rather thick; hilum small.

*PONGAMIA GLABRA*, Vent.; F. B. I. ii. 240; W. & A. 262; Wt. Ic. t. 59; Bedd. Fl. t. 177.

Coast forests and on tidal river banks; inland chiefly along



streams and rivers in most Districts, in the hills up to 3,000 ft. Often planted in gardens and avenues.

A moderate-sized nearly evergreen tree with 5 or more rather large ovate acuminate leaflets and pinkish-white flowers. Bark thick, greyish-brown, tubercled; wood white, moderately hard, used for cart-wheels and other purposes. The seeds give an oil, used for burning and in medicine. Vern. *Hind.* Karanj; *Ur.* Koranjú; *Tel.* Kanuga; *Tam.* Ponga.

### 56. Derris, Lour.

Climbing shrubs, rarely erect trees. *Leaves* alternate, imparipinnate; leaflets opposite; stipules small; stipels usually 0. *Flowers* in fascicles, rarely solitary, on the rhachis of axillary or terminal racemes or panicles; bracts small, caducous; bracteoles ovate or orbicular, small, often caducous. *Calyx*-tube campanulate, nearly truncate; teeth very short. *Corolla* much exerted; standard obovate or orbicular, broad, not auricled and rarely callose; wings obliquely oblong, often spurred above the long claw, slightly adnate to the incurved obtuse keel. *Stamens* usually monadelphous, the vexillary filament free below, rarely quite free; anthers uniform, versatile. *Ovary* sessile or shortly stipitate, few-ovuled; style incurved; stigma capitate. *Pod* usually thin, sometimes thickened, indehiscent, oblong or obliquely orbicular, winged along the upper or both sutures. *Seeds* solitary or few, compressed, reniform or orbicular; hilum small.

Pod winged along the upper suture only:—

Pod narrow, ligulate, acute at both ends, up to 4 in. long and 5-seeded; leaflets many, elliptic-oblong, oblong-lanceolate or the end one obovate or oblanceolate, coriaceous, shining above, 1–2 in. long ..... 1. *scandens*.

Pod broad, obliquely ovate or orbicular, obtuse at both ends, 1–1.5 in. long, 1 in. broad, 1–2-seeded; leaflets usually 5–7, ovate, acuminate, subcoriaceous, dull, 2.5–4 in. long ..... 2. *uliginosa*

Pod winged on both sutures:—

Wings of pod narrow, the pods more or less flattened:—

Pods usually pointed at both ends:—

Pods glabrous, 1–3-seeded, up to 3.5 in. long, 1 in. broad, the tip hooked; leaflets oblong-lanceolate or -oblanceolate, up to 4 in. long, .5–1.5 in. broad..... 3. *canarensis*.

Pods ferruginous-tomentose, 1–2 in. long, .5–.6 in. broad, the



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5. *DERRIS BREVIPES*, Bak. in F. B. I. ii. 244.

W. Gháts, from the Nilgiris to the Hills of Travancore, up to 5,000 ft., common.

A large climbing shrub with red flowers, the pods very little known.

6. *DERRIS HEYNEANA*, Benth.; F. B. I. ii. 244.

W. Gháts, Hills of Travancore, up to 5,000 ft.

A large climber with small rose-red flowers in large panicles.

7. *DERRIS EUALATA*, Bedd. Ic. 42, t. 186, *doubtfully of* F. B. I. ii. 244. *D. platyptera*, Bak. in F. B. I. ii. 245.

W. Gháts and W. Coast, from S. Canara and Coorg to Travancore, at low levels.

A very large climbing shrub, with rather large white flowers and broadly-winged flat pods. The flowers solitary and not fascicled on the rhachis, the diadelphous stamens and reticulate leaves easily characterize this species.

57. *Sophora*, Linn.

Trees or shrubs. *Leaves* imparipinnate; leaflets opposite or subopposite; stipules lanceolate, deciduous; stipels setaceous or 0. *Flowers* showy, in terminal racemes or panicles; bracts linear, caducous; bracteoles 0. *Calyx*-tube widely campanulate, oblique at mouth; teeth short, deltoid. *Corolla* much exerted, the petals clawed; standard oblong obovate or orbicular; wings oblong, obtuse, sagittate or hastate above the claw; keel petals obtuse, cohering, sometimes with a mucro. *Stamens* 10, free; anthers versatile. *Ovary* stipitate, many-ovuled; style incurved; stigma terminal, minute. *Pod* moniliform, dehiscent or indehiscent, the joints turgid, sometimes with 4 wings. *Seeds* obovoid or globose; strophiole 0.

Pod not winged; standard narrow; attenuate into a broad claw:—

Pod velvety, 1-6-seeded, not much constricted between the seeds; standard obovate; leaflets more than 21, close, elliptic-oblong, subacute, mucronate, .75-1.25 in. long, densely golden-silky beneath; seeds white .....1. *glauca*.

Pod pubescent, 2-4-seeded, much constricted between the seeds; standard oblong; leaflets 11-15, distant, lanceolate, long-acuminate, 2-3 in. long, slightly brown silky beneath; seeds red.....2. *Wightii*.

Pod crisply 4-winged, especially opposite the seeds, much narrowed between them; standard orbicular with a slender claw; leaflets more than 19, elliptic, obtuse or emarginate, .75–1.25 in. long, prominently reticulate above, very slightly pubescent beneath.....3. *interrupta*.

1. SOPHORA GLAUCA, Lesch.; F. B. I. ii. 249; W. & A. 179; Wt. Ic. t. 979. *Edwardsia maderaspatana*, Wt. Ic. t. 1054, *except the pods*.

N. Circars, Mahendragiri Hill in Ganjam, at 3,000 ft. (Fischer and Gage); W. Gháts, common on open downs in the Nilgiri Hills, at 5,000 to 8,000 ft.; Hills of Travancore at Peermade, etc.; Shevaroy Hills of Salem.

A pretty shrub with white pink or purplish flowers.

2. SOPHORA WIGHTII, Bak. in F. B. I. ii. 250. *S. heptaphylla*, Wt. Ic. t. 1155, *not of Linn.*

W. Gháts, in the Nilgiri Hills, at about 4,000 ft.

A small tree with yellow flowers.

3. SOPHORA INTERRUPTA, Bedd. Ic. t. 165; F. B. I. ii. 251. *Edwardsia maderaspatana*, Wt. Ic. t. 1054, *Pods only*.

Deccan, Hills of Cuddapah and N. Arcot, at 2,500–3,000 ft. (Wight, Beddome).

A large shrub or small tree, with corky bark, yellow flowers and curiously winged and jointed pod.

### 58. Calpurnia, E. Mey.

Shrubs or trees. *Leaves* imparipinnate; leaflets many, opposite; stipules small; stipels 0. *Flowers* yellow, in racemes, axillary or paniced at the ends of the branchlets; bracts very small; bracteoles 0. *Calyx*-tube broadly campanulate, the teeth short and broad, the 2 upper subconnate. *Corolla* much exserted, the petals clawed; standard suborbicular, erect or recurved; wings falcate-oblong; keel petals incurved, obtuse, cohering at the back. *Stamens* 10, free; anthers versatile. *Ovary* stalked, linear, many-ovuled; style subulate, incurved; stigma capitate. *Pod* linear, flat, membranous, indehiscent, with a narrow wing on the dorsal suture, many-seeded. *Seeds* oblong, compressed, transverse; strophiole 0.

CALPURNIA AUREA, Bak. in F. B. I. ii. 251. *Virgilia aurea*, Lam.; W. & A. 179.

Deccan, in the Hills of Mysore and Coimbatore and the

Denkincottah Hills of Salem, up to 5,000 ft.; W. Gháts, in the Courtallum Hills of Tinnevelly.

A large showy shrub with yellow flowers, leaves with many ovate oblong leaflets 1-1.5 in. long, and flat pods about 3 in. long and .5 in. broad with 3-6 seeds.

### 59. *Ormosia*, Jacks.

Erect trees. *Leaves* imparipinnate; leaflets opposite; stipules small; stipels usually 0. *Flowers* in terminal panicles or in racemes from upper leaf-axils; bracts small; bracteoles minute, linear. *Calyx*-tube shortly campanulate, deeply cleft, the upper teeth the shortest. *Corolla* little exserted, the petals with short claws; standard suborbicular; wings oblong, often more or less sagittate at base; keel petals free, somewhat incurved. *Stamens* 10, free, unequal; anthers versatile. *Ovary* sessile, 2-many-ovuled; style subulate, involute; stigma oblique. *Pod* thick, often woody, oblong or elongate, dehiscent, not winged. *Seeds* obovate or oblong, shining, the testa scarlet or brown-red, sometimes arillate.

ORMOSIA TRAVANCORICA, Bedd. Fl. t. 45; F. B. I. ii. 253.

W. Gháts, from S. Canara and Mysore to the Anamalais and the Hills of Travancore and Tinnevelly, up to 3,000 ft., in evergreen forests, scattered and not common.

A lofty tree with stem unbranched for a considerable height, grey smooth bark and white moderately hard wood. The flowers are purple striped with green, the pod red with one red seed and the leaves have 7-9 ovate obtusely cuspidate coriaceous leaflets 2-3 in. long. Vern. *Tam.*, *Mal.* Malei manchádi.

*Virgilia capensis*, Lam., is a pretty Cape shrub with silvery leaves and pinkish flowers, cultivated in gardens on the Nilgiri Hills.



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# FLORA

OF THE

# PRESIDENCY OF MADRAS

BY

J. S. GAMBLE, C.I.E., M.A., F.R.S., F.L.S.

LATE OF THE INDIAN FOREST DEPARTMENT

PART III

*LEGUMINOSAE-CAESALPINIOIDEAE TO  
CAPRIFOLIACEAE*

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

London

1919

## INTRODUCTION TO PART III.

As indicated in my Introduction to Part II, this one has had to be prepared with such material as was available in this country, chiefly the Herbaria at Kew and the British Museum and my own collections. But I have recently had, by the courtesy of the Regius Keeper, the use of the South Indian specimens in the Herbarium of the Royal Botanic Gardens, Edinburgh, among which are many of those collected by Roxburgh, Wight, Sir Walter Elliot, Dr. H. Cleghorn, Sir G. Watt and others. I have also been able to use, by the kindness of the Sherardian Professor of Botany at Oxford, the Dubois Collection made more than 200 years ago.

For the future, I am glad to say that the Madras and Calcutta and Travancore collections will again be available for the work.

I have thought it best to close this Part without breaking into the large Family of the Rubiaceae, but Parts I, II and III together will, by ending at p. 577, be still one page ahead of the proper number, 576.

J. S. GAMBLE.

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**Tribe X. CASSIEAE.**—Leaves simply pinnate; calyx-lobes usually free to the base:—

Petals 5; stamens 10, sometimes some reduced to staminodes; anthers usually dehiscing by a terminal pore; leaves abruptly pinnate .....67. **Cassia.**

Petals 0; stamens 2, anthers dehiscing longitudinally; leaves imparipinnate .. ..... 68. **Dialium.**

**Tribe XI. BAUHINIEAE.**—Leaves of 2 leaflets, usually joined together for a portion of their length, sometimes free; calyx gamosepalous:—

Petals unequal, erect or patent; stamens 10, sometimes reduced to 3 or even 1, the rest usually sterile .....69. **Bauhinia.**

**Tribe XII. AMHERSTIEAE.**—Leaves usually abruptly pinnate; calyx-lobes free to the disk, usually imbricate; ovary 3-many-ovuled, the ovary stalk adnate to the disk:—

Petals wanting; stamens 3-9; calyx-lobes 4..... 70. **Saraca.**

Petals 3-5:—

Stamens monadelphous, only 3 developed; leaflets many

71. **Tamarindus.**

Stamens 5, free, equal, alternating with 5 staminodes

72. **Humboldtia.**

**Tribe XIII. CYNOMETREAE.**—Leaves abruptly pinnate, 2-many-foliolate; calyx-lobes free to the disk, imbricate or valvate; ovary 1-2 ovuled; seed 1:—

Petals wanting:—

Leaflets 1 pair; stigma large, peltate; pod samaroid below

73. **Hardwickia.**

Leaflets 4-7; stigma minute; pod thickened below

74. **Kingiodendron.**

Petals 5; leaflets 1-3 pairs; stigma capitate .....75. **Cynometra**

### 60. **Caesalpinia, Linn.**

Trees or shrubs or climbers, armed or unarmed. *Leaves* abruptly bipinnate; pinnae abruptly pinnate; leaflets many small or fewer and larger; stipules various; stipels 0 or converted into thorns. *Flowers* often showy, yellow or red, in axillary or terminal racemes or panicles; bracts caducous; bracteoles 0. *Calyx* of 5 sepals, connate at base in a disk-lined tube; the lowest sepal concave outermost. *Petals* 5, orbicular or oblong, clawed, the uppermost smallest. *Stamens* 10, free, declinate; anthers uniform. *Ovary* sessile, few-ovuled; style filiform; stigma ter-

minal. *Pod* oblong or ovoid, thin, flattened or turgid, sometimes spiny, sometimes torulose. *Seeds* transverse, ovate to orbicular.

Pod covered with wiry prickles, oblong, inflated; petals narrow; seeds 1-3, hard, globose, grey:—

Leaves with large foliaceous pinnate stipules; leaflets elliptic-oblong, obtuse, mucronate, 1-2 in. long; bracts lanceolate, acuminate, .5 in. long; pods 2-3.5 in. long, 1.5-2 in. broad.....1. *crista*.

Leaves without stipules; leaflets elliptic-oblong, acute, 2-3 in. long; bracts subulate, .25 in. long; pods 4-5 in. long, 2 in. broad

2. *Jayabo*.

Pod with minute bristles, obovoid-falcate, turgid, shortly beaked, 1.5-2 in. long, .7 in. broad, 2-seeded; stems leaf-rhachises and pedicels densely prickly; leaves with many short pinnae each with 10-20 pairs of small leaflets; racemes 1-2.5 ft. long .....3. *mimosoides*.

Pod without prickles or bristles, usually glabrous:—

Pod flattened, not twisted or torulose:—

Pod obliquely ovoid, beaked, 2-2.5 in. long, 1.25 in. broad, 1-seeded; stems recurved prickly; pinnae 3-4 pairs, leaflets 2-3 pairs, ovate, acute, up to 2 in. long, 1 in. broad; flowers in panicles of racemes..... 4. *Nuga*.

Pod obliquely-oblong, truncate at apex and prominently beaked on the upper suture, 3-4 in. long, 1.5 in. broad, 3-4-seeded; stem with few prickles; pinnae 8-12 pairs, leaflets 10-18 pairs, oblong-falcate; 5 in. long; flowers in panicles of racemes.....*Sappan*.

Pod oblong, sometimes slightly winged on the upper suture, prominently beaked 3-4 in. long, 1 in. broad, 6-8-seeded; stems etc., with many recurved thorns; pinnae 5-10 pairs, leaflets 8-12 pairs, .5-.7 in. long; flowers in racemes with long pedicels

5. *sepiaria*.

Pod oblong, straight, thin, 2-3 in. long, .7 in. broad, shortly beaked; stems nearly unarmed, erect; pinnae 6-8 pairs, leaflets about 10, obovate, .5-.7 in. long; flowers in subcorymbose racemes

*pulcherrima*.

Pod torulose, thick, oblong, with a short recurved beak, 1.5-2 in. long, .7 in. broad, 2-4-seeded; prickles few; pinnae about 10 pairs, leaflets 8-10 pairs, .3-.4 in. long; flowers in racemes ..... 6. *digyna*.

Pod twisted, thin; stems unarmed; pinnae 7-8 pairs, leaflets 25-30, very narrow, .25 in. long; flowers small, in short dense panicles.....*Coriaria*.

1. CAESALPINIA CRISTA, Linn. *C. Bonducella*, Flem.; F. B. I. ii. 254. *Guilandina Bonduc*; W. & A. 280 in part var. *minor*, DC.



In most Plains Districts, in hedges and on waste lands near villages, especially near the coast.

A large straggling very thorny shrub with yellow flowers. The hard grey seeds are used in medicine to give a bitter tonic. Vern. *Hind.* Kat karanj.; *Tel.* Getsakeia; *Tam.* Kalichikai.

2. CAESALPINIA JAYABO, Maza; Merr. in Interp. Herb. Amb. 261. *C. Bonduc*, Baker in F. B. I. ii. 255. *Guilandina Bonduc.*, W. & A. 280 in part var. *major*, DC.

Carnatic, near the coast (?) (G. Thomson).

A large straggling shrub with yellow flowers and larger leaflets than the last.

3. CAESALPINIA MIMOSOIDES, Lamk.; F. B. I. ii. 256; W. & A. 281; Wt. Ic. t. 392.

W. Coast and W. Gháts at low levels and up to 4,000 ft.

A very prickly climbing shrub with bright yellow flowers.

4. CAESALPINIA NUGA, Ait.; F. B. I. ii. 255. *C. paniculata*, Roxb.; W. & A. 281; Wt. Ic. t. 36.

W. Coast, on river banks.

A large climbing shrub with yellow fragrant flowers.

5. CAESALPINIA SEPIARIA, Roxb.; F. B. I. ii. 256; W. & A. 282; Wt. Ic. t. 37.

Circars, Deccan and Carnatic in hedges and open bushy places; W. Gháts, up to 6,000 ft. The Mysore Thorn.

A large straggling thorny shrub with bright yellow flowers, usually very pubescent, but sometimes in the Deccan nearly glabrous as in N. India. Vern. *Hind.* Aila; *Ur.* Gilo; *Mar.* Chillari.

6. CAESALPINIA DIGYNA, Rottl.; F. B. I. ii. 256; W. & A. 281.

N. Circars, from Ganjam to Godavari, chiefly near villages.

A prickly climbing shrub, with yellow flowers, the upper petal streaked with red. The seeds give an oil and the pods are said to give a very valuable tanning material.

*Caesalpinia Sappan*, Linn., is the Sappan Wood, a tree with an orange-red hard heartwood, which besides being useful in turnery gives a red dye. It is only found in cultivation. *C. pulcherrina*, Swartz, is an erect shrub with yellow or scarlet flowers with long stamens, very common in gardens. *C. Coriaria*, Willd., the "Divi-divi," is a small branching South American tree, cultivated for its pods, which are a valuable tanning material.



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63. *Delonix*, Raf.

Erect unarmed trees. *Leaves* abruptly bipinnate; leaflets many, small; stipules small; stipels 0. *Flowers* large, showy, in terminal corymbs; bracts small, caducous; bracteoles 0. *Calyx*-tube very short; lobes 5, valvate, subequal. *Petals* 5, orbicular, imbricate, clawed, subequal or the uppermost dissimilar; margins fimbriate. *Stamens* 10, free, declinate, long-exserted; filaments villous below; anthers uniform. *Ovary* subsessile, many-ovuled; style filiform; stigma truncate, ciliolate. *Pod* elongate, flat, woody, dehiscent. *Seeds* transverse, oblong.

Petals yellowish-white, turning orange; leaflets .5 in. long; pod 6-8 in. long, 1 in. broad.....1. *elata*.

Petals crimson, the claws yellow, the upper petal white streaked with red and yellow; leaflets .25 in. long; pod up to 2.5 ft. long, 2 in. broad..... *regia*.

DELONIX ELATA, Gamble n. comb. *Poinciana elata*, Linn.; F. B. I. ii. 260; W. & A. 282; Bedd. Fl. t. 178.

Planted as an avenue tree and run wild; rare, but found in forests on both sides of the Peninsula according to Roxburgh, Brandis and Beddome, but this is very doubtful.

A pretty medium-sized tree with a yellowish-white wood. The branches and leaves are cut for leaf-manure. Vern. *Tel.* Sankesula; *Tam.* Padenarayan.

*Delonix regia*, Raf., the Gul Mohr or Flamboyant tree is an introduction, said to come from Madagascar, and is planted in gardens and avenues for ornament and for the shade given by its rounded head, bright green leaves and magnificent trusses of crimson flowers. The wood is soft and white, of no value.

64. *Parkinsonia*, Linn.

Small armed trees. *Leaves* bipinnate with a very short main rhachis; pinnae long, with flattened rhachis bearing many very small leaflets; stipules spinescent, straight; stipels 0. *Flowers* in short lax axillary racemes, pedicels long; bracts small, caducous; bracteoles 0. *Calyx*-tube short, disk-lined; lobes membranous, slightly unequal, subvalvate. *Petals* 5, spreading, with short broad claws, that of the uppermost longer. *Stamens* 10, free; filaments villous; anthers uniform. *Ovary* shortly stalked, many-ovuled; style filiform; stigma small, terminal.

*Pod* linear, torulose, turgid at the seeds, finally dehiscent. *Seeds* oblong, elongate.

PARKINSONIA ACULEATA, Linn.; F. B. I. ii. 260; W. & A. 284.

In all dry Districts, a native of Tropical America, run wild, often on black cotton soil.

A small tree or shrub with showy yellow flowers and narrow pods, the very small leaflets often early deciduous. Vern. *Teb. Sinia tumana*.

### 65. Wagatea, Dalz.

A climbing shrub with scattered prickles. *Leaves* abruptly bipinnate, pinnae 4–6 pair, leaflets 6–7 pair, oblong; stipules small. *Flowers* subsessile in long simple or paniced spicate racemes; bracts minute. *Calyx*-tube campanulate; lobes 5, subvalvate, the lowest rather the largest. *Petals* 5, subequal, erect, oblong, obtuse, imbricate. *Stamens* 10, free; filaments pilose at the base; anthers uniform, alternate ones shorter. *Ovary* subsessile, free, many-ovuled; style slightly clavate; stigma oblique. *Pod* oblong, indehiscent, subtorulose, turgid at the seeds. *Seeds* ovoid.

WAGATEA SPICATA, Dalz.; F. B. I. ii. 261; Wt. Ic. t. 1995.

W. Gháts, in S. Canara, Mysore and Malabar, up to 3,000 ft.

A prickly climber with scarlet calyx and orange petals.

### 66. Acrocarpus, Wt.

An erect unarmed tree. *Leaves* bipinnate, pinnae 3–5 pairs, each with 5–6 pairs of large leaflets, paripinnate; stipules deciduous; stipels 0. *Flowers* in dense axillary racemes, usually deflexed, pedicels short; bracts small, caducous, like the small lanceolate bracteoles. *Calyx*-tube campanulate, disk-lined; lobes 5, lanceolate, equal, as long as tube. *Petals* 5, narrow, subequal. *Stamens* 5, free, exserted, anthers versatile. *Ovary* stipitate, many-ovuled; style short, incurved; stigma minute. *Pod* flat, ligulate, dehiscent, the upper suture winged, 5–10-seeded. *Seeds* obovate, oblique, compressed.

ACROCARPUS FRAXINIFOLIUS, Wt. Ic. t. 254, *excl. leaf*; F. B. I. ii. 292; Bedd. Fl. t. 44.

W. Gháts, in the Nilgiri, Anamalai, Travancore and Tinnevely hills, in evergreen forest up to 4,000 ft.; often planted.

A very large and lofty deciduous tree with large buttresses,

the flowers green with crimson stamens, the leaflets elliptic-lanceolate, 3–4 in. long, bright red when young. Bark light grey; wood light red, useful for building and furniture. Vern. *Tam.* Malam konné; *Mal.* Kurangan.

### 67. *Cassia*, Linn.

Trees, shrubs or herbs. *Leaves* abruptly pinnate, the rhachis often furnished with glands between the leaflets or on the petiole below them; stipules various; stipels 0. *Flowers* usually yellow, often large and showy, in axillary racemes, terminal panicles or supra-axillary fascicles of 1 or more; bracts and bracteoles present, various. *Calyx*-tube very short; lobes 5, imbricate. *Petals* 5, imbricate, subequal or the lower the largest. *Stamens* normally 10 but rarely all perfect and equal, 2–5 usually the uppermost, being sometimes wanting or reduced to staminodes; anthers of the 3 lowest stamens often the longest, all dehiscing by terminal pores or by a short slit. *Ovary* sessile or stalked, many-ovuled; style incurved; stigma terminal, usually truncate, sometimes ciliolate. *Pod* variable, dehiscent or indehiscent, terete or flat, usually septate between the seeds. *Seeds* transverse, rarely longitudinal, usually compressed, albuminous.

Sepals broad, obtuse:—

Stamens all antheriferous, but the 2–3 lowest larger than the others and with longer filaments; pods long, terete, indehiscent, cylindrical, transversely septate:—

Leaflets 4–8 pairs, ovate, acute, 2–6 in. long; petals yellow; pod 1–2 ft. long .....1. *Fistula*.

Leaflets 10–20 pairs, oblong, obtuse, 1–2 in. long; petals rose-coloured; pod under 6 in. long .....2. *marginata*.

Stamens with 6–7 antheriferous, the rest reduced to staminodes pods usually dehiscent, transversely septate:—

Leaves with 1 gland just above the base of the petiole, none between the leaflets:—

Leaves almost glabrous; pods compressed, torulose, the margins thickened:—

Leaflets 3–5 pairs, ovate, acuminate, 1–3 in. long; pods flat .....3. *occidentalis*.

Leaflets 5–10 pairs, oblong-lanceolate, about 1 in. long; pods more or less turgid .....4. *Sophera*.

Leaves and pods hirsute; leaflets about 4 pairs, lanceolate, 2–4 in. long; pods slender, flattened .....5. *hirsuta*.



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Pods 1·5-2 in. long, ·6-·7 in. broad, slightly curved, not crested; racemes long with large flowers; leaves with 5-8 pairs of lanceolate acute leaflets .....*angustifolia*.

Stamens 10, all equal, the two lowest with longer filaments; leaflets 4-6 pairs, ovate, acute or obtuse, glaucous; 1·5-4 in. long, 1-1·5 in. broad, usually with glands on the rhachis between the leaflets; pods straight, flat, thin, transversely barred, 6-8 in. long, ·5-·7 in. broad, stalked .....14. *glauca*.

Sepals narrow, usually acute, pod small, ligulate, dehiscent; fertile stamens 5 or 10:—

Leaflets 2 pairs, ovate, membranous, oblique, about 1 in. long; flowers axillary; fertile stamens 5, equal; pod 1-2 in. long by ·25 in. broad, ligulate, viscous, glandular like the stems and branches .....15. *Absus*.

Leaflets very many, small, narrow, with a gland on the petiole below them; stipules conspicuous; flowers supra-axillary:—

Gland on the petiole stipitate, peltate; midrib close to the upper margin of the leaflet:—

Stamens 5, fertile, staminodes 0; leaflets 20-40 pairs, usually very crispate-villous; flowers very small, solitary...16. *pumila*.

Stamens 10, alternately long and short; leaflets 10-20 pairs, usually glabrous, the rhachis crispate-villous; flowers rather large, 1-3 together in a large bract .....17. *Kleinii*.

Gland on the petiole sessile:—

Midrib nearer the upper than the lower margin of the sub-falcate leaflet:—

Leaves usually 3-4 in. long, less at base and in young plants; leaflets 40-60 pairs; stamens 10, alternately long and short, narrow; pod 1-2 in. long, 16-25-seeded.....18. *mimosoides*.

Leaves usually only 1-2 in. long, leaflets 16-24 pairs; stamens sometimes 10, usually 1-3 wanting or reduced to staminodes, broad at top; pod 1-2 in. long, 8-16-seeded

19. *Leschenaultiana*.

Midrib nearly central on the oblong leaflet; leaves 2-3 in. long with about 15 pairs of mucronate leaflets ·6 in. long by ·1-·15 in. broad; stamens 10, all perfect or 1-3 reduced; pods 1-1·5 in. long, appressed-pubescent, about 10-seeded.....20. *nigricans*.

1. CASSIA FISTULA, Linn.; F. B. I. ii. 261; W. & A. 285. *C. rhombifolia* Roxb.; Wt. Ic. t. 269.

Deciduous forests in all Districts, frequently planted in gardens and avenues. The Indian Laburnum.

A moderate-sized tree with pale smooth bark when young, darker and rough when old, at once recognised by its long racemes of bright yellow flowers and long cylindrical pod. The wood is very hard, reddish-brown, strong and durable, especially useful for agricultural work. Vern. *Hind.* Amaltas; *Ur.* Sunari; *Tel.* Rela; *Tam.* Konnei; *Mal.* Konna; *Kan.* Kakke.

2. *CASSIA MARGINATA*, Roxb.; F. B. I. ii. 262. *C. Roxburghii*, DC.; W. & A. 286; Wt. Ill. t. 83; Bedd. Fl. t. 180.

Carnatic, in forests from S. Arcot to Travancore, elsewhere often planted for ornament.

A small deciduous tree with brown bark, short axillary racemes of rose-coloured flowers and a pod like that of the first, only shorter and more torulose. Vern. *Tam.* Yakai; *Mal.* Kada konna.

3. *CASSIA OCCIDENTALIS*, Linn.; F. B. I. ii. 262; W. & A. 290.

All plains Districts, by roadsides and on waste lands, perhaps introduced from W. Indies.

A diffuse undershrub with yellow flowers. Vern. *Hind.* Kasondi; *Tel.* Cashanda; *Tam.* Payaverai.

4. *CASSIA SOPHERA*, Linn.; F. B. I. ii. 262; W. & A. 287.

All plains Districts, by roadsides and on waste lands.

A diffuse undershrub with yellow flowers. Vern. *Hind.* Kasondi; *Tel.* Pydi-tangedu; *Tam.* Ponaveri.

5. *CASSIA HIRSUTA*, Linn.; Prain in Journ. As. Soc. Beng. lxvi. 2. 474.

Deccan, in the Babubudan Hills of Mysore, 4,000 ft. (Talbot); Ramandrug, Bellary (Lushington), also in the Carnatic near Madras; an introduction from America now run wild.

A diffuse undershrub with flowers in pairs in the leaf-axils.

6. *CASSIA TORA*, Linn.; F. B. I. ii. 263 *in part*; W. & A. 290 *in part*.

All plains Districts, on waysides, waste places, fallow lands and in forest undergrowth, also in the hills at low elevations, up to 4,000 ft.

An annual weed, almost an undershrub, with small yellow flowers and very long curved pods with rhombohedral seeds which give a blue dye. Vern. *Hind.* Chakunda; *Tel.* Tantipu; *Tam.* Tagerai.



7. *CASSIA LAEVIGATA*, Willd.; Prain in Journ. As. Soc. Beng. lxvi. 2.476.

Nilgiri and Pulney Hills at 4,000–6,000 ft., introduced from tropical America and now run wild.

A conspicuous shrub with large yellow flowers.

8. *CASSIA TOMENTOSA*, Willd.; F. B. I. ii. 263; W. & A. 286.

Nilgiri and Pulney Hills, above 6,000 ft., introduced from tropical America and now run wild.

A conspicuous shrub with large yellow flowers.

9. *CASSIA AURICULATA*, Linn.; F. B. I. ii. 263; W. & A. 290; Trim. Fl. Ceyl. t. xxxiii.

Circars from Chicacole southwards, but not common; Deccan and Carnatic, in most Districts on dry stony hills and on black cotton soil, often gregarious.

A beautiful shrub with large bright yellow flowers. The bark gives a valuable tanning material, the collection of it forming an important forest industry. Vern. *Hind.* Tarwar; *Tel.* Tangedu; *Tam.* Avaram.

10. *CASSIA MONTANA*, Heyne; F. B. I. ii. 264; W. & A. 289.

Deccan and Carnatic, on dry stony hills and up to 3,000 ft.

A handsome shrub with yellow flowers. Vern. *Tel.* Pagadi tangedu, Konda tangedu.

11. *CASSIA SIAMEA*, Lamk.; F. B. I. ii. 264. *C. florida*, Vahl; W. & A. 288; Bedd. Fl. t. 179.

Carnatic, from the Shevaroy Hills southwards—common in forests (Beddome). Much planted in avenues, etc., and now naturalized.

A moderate-sized tree with yellow flowers in bracteate corymbs forming a large terminal panicle. Bark grey; wood dark brown to nearly black, hard and durable. Vern. *Tam.* Manja Konnei.

12. *CASSIA TIMORIENSIS*, DC.; F. B. I. ii. 265.

W. Gháts, on the Carcoor Ghát (Lawson) up to about 3,000 ft., low country of Travancore (Bourdillon).

A small tree or large shrub with pubescent leaflets and calyx, flowers yellow.

13. *CASSIA OBTUSA*, Roxb.; W. & A. 288; Wt. Ic. t. 757. *C. obovata*, Collad.; F. B. I. ii. 264.

Deccan and Carnatic, in dry places on open lands and pastures.



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W. Coast, in S. Canara (Hohenacker); Carnatic, near Tuticorin in Tinnevelly (Wight), a coast species apparently. A shrub or undershrub with yellowish-red flowers, 2-5 together on rather stout pedicels some distance above the leaves.

*Cassia alata*, Linn., is a handsome shrub or small tree which has been introduced probably from the W. Indies, and is cultivated in gardens and possibly sometimes found run wild. *C. angustifolia*, Vahl; F. B. I. ii. 264 (*C. lanceolata*, W. & A. 288) is the Tinnevelly senna cultivated in S. India for its leaves, which afford a purgative drug. *C. grandis*, Linn. f., is a large tree sometimes cultivated for ornament and in avenues.

### 68. *Dialium*, Linn.

Trees. *Leaves* imparipinnate, leaflets subopposite or alternate; stipules small; stipels 0, *Flowers* small, in axillary or terminal panicles of small cymules; bracts and bracteoles small, caducous. *Calyx*-tube very short; lobes 5, petaloid, imbricate. *Petals* small or 0. *Stamens* 2, rarely 3, free, with short filaments; anthers erect, oblong, longitudinally dehiscent. *Ovary* sessile, 2-ovuled; style subulate; stigma small, terminal. *Pod* ovoid-globose, indehiscent, 1-seeded; exocarp hard or fragile; endocarp usually pulpy. *Seed* 1, more or less compressed, albuminous; cotyledons flat.

**DIALIUM TRAVANCORICUM**, Bourd. in Ind. For. xxx. 243 with fig.

W. Gháts, in the forests of S. Travancore near Ponmudi at 1,000-2,000 ft.

A very large evergreen tree with globose pods and leaves with 7-11 caudate-acuminate leaflets 2-3 in. long by about 1 in. broad. The bark is pale brown and smooth and the wood brownish-grey with darker lines, likely to be useful. Vern. *Mal.* Malam puli.

### 69. *Bauhinia*, Linn.

Trees or shrubs, erect or climbing, the latter often with circinate tendrils. *Leaves* of 2 leaflets, free or more usually adnate into one entire leaf more or less deeply cleft at the apex and palmately ribbed; stipules usually small, caducous. *Flowers* more or less zygomorphic, in terminal or rarely axillary racemes

or in spreading or corymbose terminal panicles; bracts and bracteoles present, small, often caducous. *Calyx*-tube cylindric or turbinate, lined by the disk; limb entire and spathaceous with 5 teeth or cleft into lobes. *Petals* 5, slightly unequal, erect or spreading, imbricate, usually clawed, the upper petal innermost. *Stamens* 10 or reduced to 5 or 3 or even 1 fertile, the rest sterile or wanting; filaments free, filiform; anthers versatile, dehiscing longitudinally. *Ovary* stalked, many-ovuled; style short or filiform; stigma small or large and peltate, subterminal or oblique. *Pod* linear or oblong, flattened, continuous within or rarely septate, dehiscent or indehiscent. *Seeds* orbicular or ovate, compressed, albuminous.

Fertile stamens 10:—

Calyx spathaceous, 5-toothed at apex, the tube short; trees or shrubs:—

Pod dehiscent, thin, .5–.7 in. broad; flowers large:—

Flowers yellow, the standard with a red blotch; calyx-limb ovate, .5 in. long; leaflets 1–2 in. long, rounded at apex, connate for about half their length; pod 4–5 in. long, not ridged along the upper suture.....1. *tomentosa*.

Flowers white; calyx-limb long acuminate, 1–1.5 in. long; leaflets 3–6 in. long, acute at apex, connate for nearly two-thirds with a mucro; pod 4–5 in. long, ridged on each side along the upper suture.....*acuminata*.

Pod indehiscent, thick, falcate; flowers in lax racemes, small:—

Leaflets connate for two-thirds of their length, 1–2 in. long, rounded at apex; filaments .25 in. long, slender; pod 6–12 in. long, .7–1 in. broad.....2. *racemosa*.

Leaflets free or very shortly connate, under .75 in. long, rounded at apex; filaments .5 in. long, thick; pod 3–4 in. long, .4 in. broad, twisted.....*rufescens*.

Calyx-tube long, thin, pubescent, with 5 short lobes; tree with coriaceous, suborbicular, semicordate leaflets, glaucous beneath, connate for three-fourths of length or even more; flowers small in axillary corymbs; pod nearly straight, flattened, reticulate, beaked, 12–18 in. long, .75–1 in. broad.....3. *malabarica*.

Calyx-tube very long, leathery, as are the 5 narrow lobes, 1–1.5 in. long; climbing shrub with tendrils and free, rounded, ovate, semicordate leaflets 2–3-in. long; flowers large, in lax axillary racemes, the petals narrow, the anthers very long; pod very large, flat

*diphylla*.

Fertile stamens 3, sometimes 4 or 5:—

Trees:—

Flowers small, in large terminal panicles, the petals yellow with purple streaks; leaflets connate almost to the apex, coriaceous, 4–6 in. long; pods 5–6 in. long, 1.5 in. broad, flattened, gradually widening to an obtuse tip ..... 4. *retusa*.

Flowers large, the petals purple-pink or white; pod 6 in.–1 ft. long, .75–1 in. broad, flat:—

Flowers white or pink, the uppermost petal darker and variegated, usually appearing before the leaves; leaflets ovate, rounded at apex, connate for about two-thirds up

5. *variegata*.

Flowers purple or rose, petals all similar, appearing with the leaves; leaflets oblong, obtuse or subacute at apex, connate about half way up and sometimes overlapping.....6. *purpurea*.

Climbers:—

Flowers rather large, in corymbose racemes:—

Fertile stamens 3; branchlets, leaves beneath, conspicuous tendrils and corymbs densely tawny villous; leaflets often very large, up to 18 in. long, connate for two-thirds up or higher; pod large, velvety, 9–18 in. long by 2–3 in. broad, the seeds flat . .....7. *Vahlia*.

Fertile stamens 4–5; no tendrils; branchlets, leaves beneath, and corymbs finely ferruginous pubescent; leaflets oblong, connate for about three-fourths up, about 5 in. long; pod flat, up to 6 in. long by 1 in. broad, slightly pubescent, ridged along the upper suture ..... 8. *phoenicea*.

Flowers very small, in panicles of cylindric racemes; fertile stamens 3; glabrous, with many tendrils; leaflets small, when young long caudate-acuminate, when older joined in a nearly entire cordate leaf; pod thin, flat, oblong, 1.5–2 in. long 9. *anguina*.

Fertile stamen 1; calyx-limb spathaceous; leaflets ovate, semi-cordate, subacute at apex, up to 8 in. long, connate for nearly three-fourths up; pod flat, narrow, long-beaked.....*monandra*.

1. BAUHINIA TOMENTOSA, Linn.; F. B. I. ii. 275; W. & A. 295.

Circars and Carnatic, in dry forests from the Chilka Lake to Tinnevely, especially in Kistna and Guntur Districts, often planted for ornament.

A shrub with pretty flowers and a tough, nearly black wood. Vern. *Hind.* Kachnar; *Tam., Tel.* Kanchini.

2. BAUHINIA RACEMOSA, Lamk.; F. B. I. ii. 276; W. & A. 295; Bedd. Fl. t. 182.



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7. *BAUHINIA VAHLII*, W. & A. 297; F. B. I. ii. 279.

N. Circars, in forests down to the Godavari.

A gigantic climber with very thick stem and long branches bearing cream-coloured flowers with shortly-clawed petals. It is destructive to forest trees and has to be cut. The leaves are used as plates and for many other purposes; the seeds are roasted and eaten. Vern. *Hind.* Maljan; *Ur.* Shiali; *Tel.* Adda.

8. *BAUHINIA PHOENICEA*, Heyne; F. B. I. ii. 283; W. & A. 296. *B. Benthami*, Bedd. Ic. t. 107.

W. Gháts, from Coorg and Mysore to the Anamalais and Travancore, in evergreen forests.

A very large climber with brick-red flowers, the petals with long slender claws, the anthers long. It is very destructive to forest trees and has to be cut.

9. *BAUHINIA ANGUINA*, Roxb. Cor. Pl. t. 285; F. B. I. ii. 284 W. & A. 298.

Malabar and Travancore, near the coast, apparently scarce. Snake climber.

A large very long climber with curious stems alternately twisted one way and the other between the straight margins. Vern. Naga-mu-valli (Rheede).

*Bauhinia acuminata*, Linn., is a pretty shrub often found in gardens in the plains. I have seen no specimens from wild plants. *B. rufescens*, Lamk., is a tropical African species, cultivated and perhaps run wild on the coast near Madras. *B. diphylla*, Ham., is an extensively climbing Burmese species sometimes found in Madras Gardens, and at once recognised by its very small leaflets. *B. monandra*, Kurz, is a Madagascar shrub or small tree, grown in gardens in Madras.

70. *Saraca*, Linn.

Trees or large shrubs. Leaves abruptly pinnate; leaflets of few pairs, coriaceous; stipules connate, intrapetiolar; stipels 0. Flowers showy, yellow orange or red, in short dense often lateral corymbose panicles; bracts small, deciduous; bracteoles sub-persistent, coloured. Calyx petaloid, tube elongate, cylindrical, enclosing a lobed disk; lobes 4, ovate or oblong, imbricate. Petals 0. Stamens usually 7, rarely 3-4; filaments long, filiform;

anthers versatile, dehiscing longitudinally. *Ovary* stipitate, the stipe adnate below to one side of the disk, many-ovuled; style long, filiform; stigma small, capitate. *Pod* flat, oblong, coriaceous or almost woody, continuous within. *Seeds* obovate-orbicular, compressed, exalbuminous.

SARACA INDICA, Linn.; F. B. I. ii. 271; Bedd. Fl. t. 57. *Jonesia Asoca*, Roxb.; W. & A. 284; Wt. Ic. t. 206.

N. Circars, in Ganjam and Vizagapatam, in hill forests; S. Canara, Mysore and Travancore, scarce in a wild state, but frequently planted. The Asoka tree.

A small tree with brilliant orange-scarlet flowers and 2-3 pairs of oblong-lanceolate leaflets. Wood reddish-brown, soft. Vern. *Hind.* Asok; *Ur.* Oshoko; *Kan.* Ashunkar.

### 71. Tamarindus, Linn.

A tree. *Leaves* abruptly pinnate; leaflets many, small, opposite; stipules minute, caducous; stipels 0. *Flowers* in racemes at the ends of branches; bracts and bracteoles ovate-oblong, coloured, caducous. *Calyx*-tube turbinate, lined by the disk; lobes 4, lanceolate, membranous, imbricate. *Petals* 3, imbricate, the two lower reduced to scales. *Stamens* 3, perfect, the filaments connate about half-way up in a sheath split above, the rest reduced to bristle-like staminodes; anthers versatile, dehiscing longitudinally. *Ovary* stipitate, the stalk adnate to the disk, many-ovuled; style filiform; stigma capitate. *Pod* linear-oblong, incurved, thick, somewhat compressed, with brittle epicarp, pulpy mesocarp and leathery septate endocarp. *Seeds* obovate-orbicular, compressed, testa hard, albumen 0.

TAMARINDUS INDICA, Linn.; F. B. I. ii. 273; W. & A. 285; Bedd. Fl. t. 184.

All plains Districts, cultivated and self-sown, probably indigenous in Central Africa. The Tamarind.

A large evergreen tree of great importance, having rather small pink yellow-striped flowers, small acid leaflets and a pod whose pulp is made into preserves and also exported as a drug. The bark is dark grey and the wood, very hard and heavy, is of a dark purplish-brown colour and used for many household and agricultural purposes. Vern. *Hind.* Imli; *Ur.* Tentúli; *Tam.* Puli; *Tel.* Chinta.



72. *Humboldtia*, Vahl.

Trees. *Leaves* abruptly pinnate; leaflets 1 to 6 pairs, large, with prominent nerves connected by intramarginal loops; stipules persistent, usually leafy, of two parts—the erect stipules proper and a basal usually recurved appendage; stipels 0. *Flowers* in racemes, axillary to the upper leaves or on the branches or the stem; bracts ovate or oblong; bracteoles large, coloured, persistent. *Calyx*-tube turbinate or narrow, lined by the disk; lobes 4, subequal, coloured, imbricate. *Petals* 5 or 3, spatulate, clawed, exsert. *Stamens* 5 perfect alternating with 5 minute staminodes; filaments filiform; anthers oblong, versatile, dehiscent longitudinally. *Ovary* stipitate, the stalk adnate to the disk, few-ovuled; style long, filiform; stigma capitate. *Pod* oblong, oblique or falcate, compressed, dehiscent, coriaceous. *Seeds* transverse, compressed, albumen 0.

Leaflets 1 pair, subsessile, lanceolate, acuminate, with a broad gland at base, 5–6 in. long, 1–2 in. broad; stipules lanceolate, the appendages absent; racemes very short, on old wood .....1. *unijuga*.

Leaflets 2 pairs, subsessile, obovate-oblong, obtusely cuspidate, 4–7 in. long, 1.5–2 in. broad; stipules lanceolate, the appendages broadly reniform; racemes peduncled, about 6 in. long, axillary; branchlets sometimes swollen .....2. *Brunonis*.

Leaflets 3 or more pairs:—

Rhachis of leaves terete; leaflets reticulate:—

Internodes of the branchlets swollen and hollow; leaflets 3–5 pairs, elliptic-ovate, cuspidate, subcoriaceous, 3–4 in. long, 1–2 in. broad; stipules ovate, the appendages acuminate at ends; racemes about 3 in. long, axillary, erect ..... 3. *laurifolia*.

Internodes not swollen; leaflets 3–4 pairs, oblong-lanceolate, acuminate, coriaceous, 5–10 in. long, 1.5–2.5 in. broad; stipules ovate, the appendages reniform; racemes peduncled, 5–6 in. long, tawny-velvety, axillary ..... 4. *Vahlia*.

Rhachis of leaves flattened; leaflets 3–4 pairs, lanceolate, acuminate, chartaceous; 3–4 in. long, 1–1.5 in. broad; stipules ovate, the appendages small, falcate; racemes short, tawny-velvety, corymbose, in fascicles on the stems.....5. *Bourdillonii*.

Rhachis of leaves winged, the wings obcordate; leaflets 4–6 pairs, oblong-lanceolate, long-acuminate, subcoriaceous, 6–15 in. long, 1.5–5 in. broad; stipules lanceolate falcate, the appendages ovate or reniform; racemes short, axillary or from old wood, corymbose, tawny-velvety ..... 6. *decurrens*.



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73. *Hardwickia*, Roxb.

Large tree. *Leaves* paripinnate, leaflets 1 pair with a minute bristle between; stipules small, caducous; stipels 0. *Flowers* small, numerous, in paniced racemes; bracts minute; bracteoles scale-like. *Calyx*-tube scarcely any; lobes usually 5, orbicular, petaloid, round the small basal disk, much imbricate. *Petals* 0. *Stamens* 10, alternately longer and shorter; filaments filiform; anthers versatile, dehiscing longitudinally. *Ovary* sessile, free, 2-ovuled; style filiform; stigma large, peltate. *Pod* a dry 1-seeded follicle, the seed at the apex where the pod dehisces, the base samaroid. *Seed* pendulous, obovate, compressed, 2-furrowed; testa crustaceous; albumen 0; cotyledons large, 2-grooved.

HARDWICKIA BINATA, Roxb. Cor. Pl. iii. 6, t. 209; F. B. I. ii. 270; W. & A. 284; Bedd. Fl. t. 26.

Deccan and Carnatic, in the Upper Godavari forests, Kistna and Guntúr, in the Ceded Districts, Mysore, Coimbatore and Salem, often forming gregarious forests.

A large deciduous tree with small yellowish flowers and *Bauhinia*-like leaflets. Bark dark grey, rough; wood extremely hard and heavy, dark red, streaked with black or purple, used for agricultural and many other purposes, but difficult to work. The leaves are cut for manure and the branchlets for the fibre of their bark. Vern. *Hind.* Anjan; *Tel.* Yepi; *Tam.* Acha; *Kan.* Kamra.

74. *Kingiodendron*, Harms.

Large tree. *Leaves* abruptly pinnate, the lower leaflets alternate, leaflets 4–7; stipules minute, caducous; stipels 0. *Flowers* very small, numerous, in panicles of racemes; bract ovate, very small, as are the 2 minute bracteoles. *Calyx*-tube almost wanting, disk very small; lobes 5, orbicular, gland-dotted, imbricate. *Petals* 0. *Stamens* 10 equal; filaments filiform, villous at base; anthers versatile, dehiscing longitudinally. *Ovary* sessile, villous at base, 2-ovuled; style subulate; stigma minute, oblique. *Pod* coriaceous or nearly woody, obovate, 1-seeded, the seed at the apex when the pod dehisces. *Seed* pendulous, compressed; testa membranous; cotyledons with balsam-bearing cells.

KINGIODENDRON PINNATUM, Harms in Engl. & Prantl Naturl. Pfl. Nacht. 194. *Hardwickia pinnata*, Roxb., F. B. I. ii. 270; W. & A. 284; Bedd. Fl. t. 255.

W. Gháts, in the evergreen forests of S. Canara (Beddome), Malabar, Travancore and Tinnevelly up to 3,000 ft.

A very large handsome evergreen tree reaching 100 ft. in height, with very small white flowers. Bark dark brown and green, rough; wood dark red or reddish-brown with a sticky resin, used for planking and furniture. The resin, like copaiba balsam, is of value. Vern. *Tam.* Madayan sampráni; *Mal.* Shuráli.

### 75. *Cynometra*, Linn.

Trees. *Leaves* abruptly pinnate, the leaflets usually few; stipules caducous; stipels 0. *Flowers* small, in short corymbs or racemes fascicled in the axils of the leaves or on old wood; bracts ovate, dry, imbricate, at length deciduous, smaller upwards; bracteoles none or membranous, coloured. *Calyx*-tube very short, enclosing the disk; lobes 4 or 5, oblong, imbricate, at length reflexed. *Petals* 5, oblanceolate, almost included. *Stamens* 10, rarely many; filaments filiform; anthers small, versatile, dehiscing longitudinally. *Ovary* sessile or shortly stalked, 2-ovuled; style slender; stigma capitate. *Pod* variously shaped, turgid or flattened, indehiscent, the pericarp thick, 1-seeded. *Seed* thick or compressed; cotyledons fleshy; albumen 0.

Leaflets 1 pair, lanceolate, falcate, acuminate, 1·5–3 in. long, ·5–1·25 in. broad, very unequal sided; pod flat, semicircular, rugose, orange when dry, ·75 in. long on the inner or straight side ..... 1. *travancorica*.

Leaflets 2 pairs, oblanceolate, falcate, acute, the end ones the longest, 3–6 in. long, 1·5–2 in. broad, very unequal-sided; pod turgid, very rugose, ·5–1 in. long ..... 2. *mimosoides*.

Leaflets 3 pairs:—

Leaflets obliquely obovate-oblong, obtusely acuminate and emarginate, 2·5–3·5 in. long, 1–1·25 in. broad, unequal-sided, the lowest pair the smallest, often only 1 in. long ..... 3. *Beddomei*.

Leaflets obovate, emarginate at the blunt apex, cuneate at base, 1–1·5 in. long, ·5 in. broad, slightly unequal-sided, all pairs about equal; pod reniform globose, contracted in the middle, smooth, broader than long, ·6 in. in diam..... 4. *Bourdillonii*.

1. CYNOMETRA TRAVANCORICA, Bedd. Fl. t. 316; F. B. I. ii. 267.

W. Gháts, in S. Travancore and Tinnevelly, at 2,000 to 3,000 ft. (Beddome); Tambracheri Ghát, Wynaad (Beddome, Barber).

A lofty tree with rosy-white flowers and only 1 pair of leaflets, which when young are very thin and creamy-pink in colour.

2. **CYNOMETRA MIMOSOIDES**, Wall. *C. ramiflora*, Linn.; F. B. I. ii. 267 *in part*; W. & A. 293; Bedd. Fl. t. 315.

W. Gháts, in S. Travancore (Beddome), apparently very scarce.

A moderate-sized tree with large leaflets and curiously wrinkled pods.

3. **CYNOMETRA BEDDOMEI**, Prain in Journ. As. Soc. Beng. lxvi. ii. 478. *C. malabarica*, Bedd. MS. in Herb. Kew.

W. Gháts, Tambracheri Ghát, Wynaad (Beddome).

A large tree with crimson young leaves and flowers in clusters from conspicuous imbricate bracts.

4. **CYNOMETRA BOURDILLONII**, Gamble in Kew Bull. 1908; 446.

W. Gháts, banks of the Parapár river, S. Travancore, at 500 ft. (Bourdillon).

A handsome moderate-sized tree with large clusters of flowers, small foliage and remarkable didymous small pod.

Wood hard, yellow; bark blackish-green.

*C. cauliflora*, Linn., with 2 leaflets and flower racemes from the branches is sometimes found in gardens.

### Subfamily III. MIMOSOIDEAE.

Trees or shrubs, sometimes climbing, rarely herbs. *Leaves* bipinnate or less commonly simply pinnate. *Flowers* small, regular, usually 5-merous, usually hermaphrodite, sometimes polygamous, generally in heads or spikes; bracts small, at the base of or on the peduncle, usually deciduous; bracteoles 0 or very small and usually deciduous. *Calyx* more or less campanulate with usually 5, sometimes 3, 4 or 6 valvate lobes, sometimes free. *Petals* as many as the sepals, valvate, free or connate in a lobed corolla. *Stamens* definite or indefinite; if definite as many as or twice as many as the sepals and petals, if indefinite usually very many, free or monadelphous. *Ovary* free, at the bottom of the calyx. *Pod* dehiscent or indehiscent, sometimes jointed. *Seeds* sometimes arillate, albuminous or exalbuminous; cotyledons flat.



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pinnate; leaflets many, small, sensitive; stipules persistent; stipels 0. *Flowers* small, sessile, in oblong or globose peduncled axillary heads; upper flowers ♀, lower ♂, lowest neuter with flattened staminodes; bracts minute. *Calyx* campanulate, small, 5-toothed. *Petals* 5, valvate, free or connate at the base. *Stamens* in ♀ and ♂ flowers 10, free, exserted; filaments slender; anthers gland-crested; staminodes in neuter flowers flattened. *Ovary* stalked, many-ovuled; style filiform; stigma minute, terminal, concave. *Pod* flat, membranous, oblong, 2-valved. *Seeds* transverse, compressed; with a filiform funicle.

A floating water-plant; leaves with 2–3 pairs of pinnae each with 8–15 pairs of leaflets, no gland on the rhachis; flower heads oblong, .5 in. long; pods .5–1 in. long, .3–.5 in. broad, obtuse, cuspidate

1. *oleracea*.

Land undershrubs; rhachis with a gland between the lowest pair of pinnae:—

Erect and moderately stout; leaves with 3–5 pairs of pinnae each with 10–30 pairs of leaflets; flower heads oblong, .5 in. long; pods 1–2 in. long, .3 in. broad, obtuse, apiculate . . . . . *plena*.

Prostrate, diffuse and slender; leaves with 1–3 pairs of pinnae each with about 15 pairs of leaflets; flower heads globose, .2 in. in diam.; pods .5–1 in. long, .25 in. broad, subacute. . . . . 2. *triquetra*.

1. NEPTUNIA OLERACEA, Lour.; F. B. I. ii. 285. *Mimosa natans*, Roxb. Cor. Pl. t. 119. *Desmanthus natans*, W. & A. 270.

Circars and Carnatic, in ponds and tanks of fresh water.

An annual water-plant, the branches zig-zag, bearing radical fibres at the nodes and spongy floats on the internodes.

Vern. *Tel.* Niru tavulupu, Nidra yung.

2. NEPTUNIA TRIQUETRA, Benth.; F. B. I. ii. 286. *Desmanthus triquetrus*, W. & A. 270; Wt. Ic. t. 756.

Circars, Deccan and Carnatic, in most Districts, in pasture lands.

Flowers yellow.

*N. plena*, Benth.; F. B. I. ii. 286 is a stouter plant, an introduction from America; Shevaroy Hills of Salem (Perrottet).

## 77. *Xylia*, Benth.

Trees. *Leaves* bipinnate, pinnae 1 pair; leaflets of few pairs, large; stipules small, deciduous; stipels 0. *Flowers* sessile in globose peduncled heads, the peduncles axillary, fascicled or

racemose; bracts 0; bracteole club-shaped. *Calyx* tubular-campanulate, 5-lobed. *Petals* 5, valvate, slightly connate at the base. *Stamens* 10, free, exserted; filaments slender; anthers tipped with a stalked gland which is early deciduous. *Ovary* sessile, many-ovuled; style filiform; stigma minute, terminal. *Pod* large, woody, flat, broadly falcate, septate between the seeds. *Seeds* oblong, compressed.

*XYLIA XYLOCARPA*, Taub. *X. dolabriformis*, Benth.; F. B. I. ii. 286; Bedd. Fl. t. 186. *Inga xylocarpa*, DC.; W. & A. 269.

Forests of the N. Circars, on the hills from Ganjam to Godavari, the chief tree of some forests; Deccan, in Hyderabad and Mysore, but scarce; W. Gháts, from S. Canara to N. Travancore.

A deciduous tree with 2 pairs of oblong lanceolate leaflets, the end pair up to 8 in. long, white flowers in globose heads and large woody dolabriform pods. Bark reddish-grey; wood hard, reddish-brown, durable and useful for sleepers and building purposes but difficult to work. Vern. *Hind.* Jambu; *Ur.* Boja, Kongora; *Tel.* Konda tangedu; *Tam.* Irúl; *Mal.* Irumalla.

### 78. Entada, Adans.

Large woody unarmed tendril-bearing climbers. *Leaves* bipinnate, the ultimate pinnae sometimes reduced to tendrils; *stipules* small, setaceous; *stipels* 0. *Flowers* very small, sessile, in long narrow spikes, polygamous. *Calyx* minute, campanulate, shortly 5-toothed. *Petals* free or slightly connate at the base, valvate. *Stamens* 10, free; filaments filiform or slightly expanded above; anthers shortly oblong, gland-crested. *Ovary* subsessile, many-ovuled; style filiform; stigma terminal, concave. *Pod* flat, woody, very large, of many discoid 1-seeded joints which with the persistent endocarp breakaway from each other and from the persistent thickened sutures. *Seeds* large, circular, compressed.

*ENTADA SCANDENS*, Benth.; F. B. I. ii. 286. *E. Pursaetha*, DC.; W. & A. 267.

Hill forests of the N. Circars; Deccan, in the Nallamalai Hills of Kurnool; W. Gháts, from S. Canara to Travancore, in evergreen forests.

A gigantic climber with very small yellowish flowers and huge



Pods; the leaflets 1-3 in. long, oblong, shining, obtuse or emarginate. The thick stems are spirally twisted, and the climber is bad for forest trees and has to be cut. The round flat shining seeds are eaten and may be hollowed out into small boxes and other articles. Vern. *Hind.* Gila; *Ur.* Geredi; *Mal.* Kaka valli.

### 79. *Adenantha*, Linn.

Trees. *Leaves* bipinnate, the pinnae opposite; leaflets many, alternate; stipules minute, caducous; stipels 0. *Flowers* in slender spiciform racemes, either solitary and axillary or terminal and paniced; bracts minute, bracteoles 0. *Calyx* short, campanulate, 5-lobed. *Petals* 5, connate below, valvate. *Stamens* 10, free, scarcely exerted, alternately long and short; anthers oblong, ending in a stipitate gland. *Ovary* sessile, many-ovuled; style filiform; stigma small, terminal. *Pod* linear, torulose, curved, septate within, the valves much twisted after dehiscence. *Seeds* thick, with a hard shining scarlet or scarlet and black testa.

ADENANTHERA PAVONINA, Linn.; F. B. I. ii. 287; W. & A. 271; Wt. Ill. t. 84; Bedd. Fl. t. 46.

Commonly cultivated in gardens and avenues, doubtfully wild.

A handsome deciduous tree with many ovate-oblong leaflets about 1 in. long, pale yellow flowers and conspicuous pods with scarlet lenticular seeds. Bark grey; wood hard, close-grained, red, useful for building and furniture. The red seeds are used as ornaments and for jewellers' weights. Vern. *Tel.* Bandi gurivenda; *Tam.* Ani kundamani; *Mal.* Manchadi.

### 80. *Prosopis*, Linn.

Shrubs or trees with thorns. *Leaves* bipinnate, pinnae usually few-paired; leaflets many, small, narrow; stipules small or 0, sometimes spinescent; stipels 0. *Flowers* small, in narrow spikes or subspicate racemes; bracts and bracteoles 0. *Calyx*-tube campanulate, shortly toothed or subentire. *Petals* 5, valvate, connate at base, at length free. *Stamens* 10, free, slightly exerted; filaments filiform; anthers with a deciduous gland. *Ovary* sessile or stalked, many-ovuled; style filiform; stigma minute, terminal. *Pod* cylindrical or linear, flat or turgid, often



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acute leaflets and flat strap-shaped pods. Probably North American in origin, it is frequently found in hedges and near villages in India.

### 82. *Mimosa*, Linn.

Herbs, shrubs or small trees, usually prickly. *Leaves* bipinnate; leaflets small, more or less sensitive, caducous, the rhachis usually prickly; stipules small; stipels small, often 2 to each pinna. *Flowers* small, polygamous, in globose heads on axillary, solitary or fascicled peduncles, the upper peduncles often forming a terminal raceme; bracts small, deciduous; bracteole 1, minute. *Calyx* very small, campanulate, shortly 4-toothed. *Petals* 4, connate below, valvate. *Stamens* as many or twice as many as the petals, exserted; filaments filiform; anthers small. *Ovary* stipitate, many-ovuled; style filiform; stigma minute, terminal. *Pod* flat, membranous, of several 1-seeded joints that separate when ripe from each other and from the persistent sutures. *Seeds* ovoid or orbicular, flattened, albuminous.

Pinnae of the leaves 1-2 pairs digitately arranged; stamens as many as the petals; bracteoles stiff, bristly; pods under 1 in. long, .1-.2 in. broad, the sutures with many spreading bristles..... 1. *pudica*.

Pinnae of the leaves more than 2 pairs, pinnate; stamens twice as many as the petals; bracteoles spathulate; pods more than 1 in. long, .3 in. broad:—

Leaves under 1 in. long with 3-5 pinnae; leaflets 7-8 pairs, shortly oblong, semicordate, .05-.15 in. long, under .1 in. broad, pubescent; peduncles usually longer than the leaves; pods grey-puberulous, the sutures spinose; seeds 5-6..... 2. *hamata*.

Leaves much over 1 in. long, longer than the peduncles; pods glabrous:—

Leaflets semicordate at base; sutures of pod with strong recurved prickles:—

Pods usually acutely pointed at tip, 3-6-seeded, .6 in. broad; leaves 3-4 in. long, pinnae 3-5 pairs about .75 in. apart; leaflets oblong to obovate, up to .25 in. long, the 4-5 pairs distant 2 or more in apart; ovary glabrous ... 3. *polyancistra*.

Pods obtuse at tip, 6-8-seeded, .4-.5 in. broad, sometimes slightly pubescent; leaves 2-3 in. long, pinnae 5-7 pairs about .5 in. apart; leaflets oblong, the end ones subobovate, up to .3 in. long, the 7-8 pairs touching, .1-.2 in. apart; ovary minutely pubescent ..... 4. *Prainiana*.

Leaflets semirectangular at base ; sutures of pod with few small or no prickles : —

Pods little curved, 2–3 in. long, .6–.7 in. broad, sessile or shortly stalked, rounded or rarely acute at apex, seeds 5–7; leaves with 5–6 pairs of pinnae 2–3 in. long, pinnules 10–15 pairs, .4–.7 in. long.....5. *rubicaulis*.

Pods much curved, 3–3.5 in. long, .3–.4 in. broad, long stalked, acute at apex and base; leaves with 6–8 pairs of pinnae, 1–1.5 in. long, pinnules 12–18 pairs, .2–.3 in. long.....6. *angustisiliqua*.

1. MIMOSA PUDICA, Linn.; F. B. I. ii. 291.

All hot moist localities in the low country, probably introduced from tropical America. The Sensitive Plant. A diffuse undershrub with very sensitive leaves, pink flowers and bristly pods. It spreads very fast and is most troublesome and difficult to eradicate. Vern. *Hind.* Lajwati; *Tam.* Total vadi.

2. MIMOSA HAMATA, Willd.; F. B. I. ii. 291; W. & A. 268.

Deccan, from the Kistna southwards, often on black cotton soil.

A straggling prickly shrub with minute leaves and pink flowers.

3. MIMOSA POLYANCISTRA, Benth. in Trans. Linn. Soc. xxx. 422.

Deccan, in the Kurnool and Cuddapah Districts.

A straggling thorny shrub with pink flowers and distant rounded leaflets.

4. MIMOSA PRAINIANA, Gamble in Kew Bull. 1919, *ined.*

East Coast, in the Kistna District; Deccan, in Hyderabad to Anantapur.

A straggling thorny shrub with pink flowers and rounded leaflets, the pinnae in regular subequal pairs.

5. MIMOSA RUBICAULIS, Lamk.; F. B. I. ii. 291, *in part*; W. & A. 268; Hook. Ic. Pl. t. 156. *M. octandra*, Roxb. Cor. Pl. t. 200.

Deccan, forests of Cuddapah, Mysore, Coimbatore and Madura, usually in grassy savannahs and second-growth forests; W. Gháts, on eastern slopes.

A large, very prickly shrub, the flowers pink.

6. MIMOSA ANGUSTISILIQUA, Gamble in Kew Bull. 1919, *ined.*

E. Gháts, at Tummularu, Godavari Agency (Barber).

A shrub with pink flowers, few prickles and very small hirsute leaflets.

83. *Acacia*, Willd.

Trees or erect or climbing shrubs, usually armed. *Leaves* bipinnate, the pinnae even-pinnate; leaflets usually small, opposite; leaves sometimes transformed into phyllodes; stipules various, often spinescent; stipels 0. *Flowers* small, hermaphrodite or polygamous, usually 5-merous, in globose heads or cylindric spikes; peduncles axillary, solitary or fascicled or in terminal panicles; bracts 1 or 2, on the peduncle; bracteoles 1 to each flower, spatulate or subpeltate. *Calyx* campanulate, shortly lobed. *Petals* exserted, more or less united, rarely free. *Stamens* indefinite, free or very shortly connate at base; anthers small. *Ovary* sessile or stalked, 2-many-ovuled; style filiform; stigma small, terminal. *Pod* variable, ligulate or oblong, flat and dry or rarely turgid or coriaceous, continuous or septate within but not disarticulating. *Seeds* transverse or longitudinal, usually ovate or compressed; funicle often long and conspicuous.

Erect trees or shrubs with stipular spines, and without prickles:—

Flowers in globose heads, the peduncles 2-bracteate:—

Flower-heads on axillary peduncles:—

Pod grey-downy, compressed, deeply indented on both sides between the seeds; flower-heads .5 in. in diam., peduncle bracteate above the middle; leaves 2–4 in. long with 4–9 pairs of pinnae; leaflets linear-oblong, obtuse, .2 in. long; spines straight, large ones slender, white, up to 2 in. long... 1. *arabica*.

Pod cylindric, turgid, usually curved:—

Peduncles bracteate at the apex:—

Pod 2–3 in. long, .5 in. in diam.; flower-heads .5 in. in diam.; leaves 1–2 in. long with 4–8 pairs of pinnae; leaflets linear-oblong, acute, .15–.2 in. long, .1 in. broad; spines straight, short, rarely over .5 in. long..... 2. *Farnesiana*.

Pod 3–4 in. long, .3 in. in diam.; flower-heads .2 in. in diam.; leaves 1–1.5 in. long with about 8 pairs pinnae; leaflets linear-oblong, obtuse, .12 in. long, .03–.04 in. broad; spines short and slender or stout and strong, up to 1.5 in. long..... *tortuosa*.

Peduncles bracteate near the base; pod circinate, about 2 in. long, .25 in. in diam.; flower-heads .2 in. in diam.; leaves under 1 in. long with 3–4 pairs of pinnae; leaflets linear-oblong, minute, .06 in. by .01 in., obtuse, glabrous; spines both short and recurved and long, straight, slender, up to 2 in. long, white with brown spots..... 3. *planifrons*.



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pairs of pinnae; leaflets oblong, .2 by .04 in.; pods flat, up to 3 in. long by .8 in. broad, curved, obtuse, reticulate ..... 10. *Latronum*. Spines short, hooked; flower-spikes 2-4 in. long:—

Leaflets 30-50 pairs, linear-oblong, pubescent, nerves obscure; calyx and petals white-villous, petals twice as long as calyx:—

Bark white; branchlets white-pubescent; leaflets .25-.35 in. long; petals narrow; pod 3-5 in. long, .5 in. broad, acute at both ends, grey, many-seeded ..... 11. *Suma*.

Bark brown; branchlets brown, glabrous; leaflets .1 in. long petals broad; pod 2-3 in. long, .4 in. broad, acute at both ends, brown, few-seeded ..... 12. *Catechu*.

Leaflets 20-40 pairs, linear-oblong, glabrous, .125 in. long, nerves prominent; branchlets red; petals 3 times as long as calyx, both glabrous; pod 2-2.5 in. long, brown, obtuse at apex with a point, few-seeded ..... 13. *Sundra*.

Leaflets 10-20 pairs, .25-.3 in. long; .1 in. broad, oblong, glaucous; petals rather more than twice the .05 in. calyx, both glabrous or the calyx minutely white pubescent; pods 3-5 in. long, .75-1 in. broad, apiculate, 4-7-seeded ..... 14. *ferruginea*.

Leaflets 6-8 pairs, .75-1.25 in. long, .4-.5 in. broad, obovate-oblong, glaucous; petals about twice the .1 in. calyx, both glabrous; pods 6-8 in. long, 1 in. broad, thick, 6-9-seeded

15. *lenticularis*.

Climbing shrubs, with prickles on stems and leaf rachises, no stipular spines; peduncles bracteate:—

Pods thin, flat, coriaceous, the sutures straight, often thickened; stipules and bracts lanceolate:—

Leaflets more or less distant, not overlapping; flowers sessile:—

Glands near the base of the petiole flat; leaflets glabrous:—

Petiole gland oblong, up to .3 in. long; pinnae 5-6 pairs, leaflets 20-30 pairs, .15 in. apart, oblong, obtuse, truncate at base, .5-.6 in. long, .125 in. broad; pod 7 in. long, 1.25 in. broad, the sutures thick ..... 16. *Hohenackeri*.

P<sub>eti</sub>ol<sub>e</sub> gland elliptic, .1-.2 in. long, somewhat convex; pinnae 6 pairs, leaflets 10-12 pairs, .2 in. apart, oblong-falcate, acute, subcordate at base, .4-.75 in. long, .1-.3 in. broad; pod 4-5 in. long, 1 in. broad, obtuse, the sutures slender ..... 17. *caesia*.

Glands near the base of the petiole conical; pinnae 10-14 pairs, leaflets 25-40 pairs, touching but not overlapping, oblong-falcate, apiculate, truncate at base, pubescent beneath, .2-.3 in. long, .1-.2 in. broad; pod 5-6 in. long, .5-.75 in. broad, brown-velvety when young ..... 18. *torta*.

Glands near the base of the petiole columnar; pinnae 8 pairs, leaflets 10–17 pairs, oblong, apiculate upwards, obliquely and subequally truncate at base, .4 in. long, .1–.15 in. broad; pod 4–5 in. long, .75–1 in. broad, thin, glabrous

19. *columnaris*.

Leaflets closely set and overlapping, semi-truncate at base; flowers pedicellate:—

Leaflets .3–.4 in. long, .04–.07 in. broad, linear-oblong, obtuse or acute, ciliate on the margins, otherwise glabrous; pedicels very short; pod 6–8 in. long, .75–1.25 in. broad, the sutures thick ..... 20. *pennata*.

Leaflets .2–.3 in. long, .03–.04 in. broad, linear, acute, slightly pubescent beneath; pedicels longer; pod about 4 in. long, .5 in. broad, the sutures only slightly raised ..... 21. *canescens*.

Pods thick, fleshy, much wrinkled when dry, depressed between the seeds and often indented on the sutures; stipules and bracts ovate-cordate:—

Pinnae 4–6 pairs, leaflets about 18 pairs, .5–.75 in. long, .15–.2 in. broad; ovary pubescent; pod 1–1.25 in. broad ..... 22. *rugata*.

Pinnae 8 pairs or more, leaflets more than 20 pairs, .25–.5 in. long, .04–.1 in. broad; ovary glabrous; pod .75 in. broad

23. *concinna*.

1. ACACIA ARABICA, Willd.; F. B. I. ii. 293; W. & A. 277; Roxb. Cor. Pl. t. 149; Bedd. Fl. t. 47.

Circars, Deccan and Carnatic, in dry localities. Either gregarious in patches of forest, especially on old tank beds and black cotton soil, or in groups or single trees among fields. Often cultivated and perhaps, although so common, not truly indigenous. The Babúl tree.

A moderate-sized tree with golden-yellow flowers, long white thorns and characteristic whitish-tomentose torulose pods which are eaten by cattle. Bark dark brown, rough; wood reddish-brown, hard and strong, useful for agricultural and many other purposes. Vern. *Hind.* Babúl, Kikar; *Tel.* Nalla túma; *Tam.* Karuvelam.

2. ACACIA FARNESIANA, Willd.; F. B. I. ii. 292; Bedd. Fl. t. 52. *Vachellia Farnesiana*, W. & A. 272; Wt. Ic. t. 300.

Circars, Deccan and Carnatic, cultivated and run wild, quite naturalized even up to 5,000 feet.

A thorny shrub with bright yellow very fragrant flowers



giving the perfume "Cassie." Vern. *Hind.* Wilayati kihar; *Tel.* Kusturi; *Tam.* Vedda vala; *Kan.* Jali.

*Acacia tortuosa*, Willd., is a large thorny shrub or small tree, native of S. America, occasionally found in cultivation in gardens in the low country.

3. ACACIA PLANIFRONS, W. & A. 276; F. B. I. ii. 293 *in part*; Trim. Fl. Ceyl. t. 35.

South Carnatic, in Madura, Tinnevelly and S. Travancore, gregarious; cultivated in Bellary and elsewhere. The Umbrella thorn.

A small tree with white flowers and very minute leaflets, having spreading branches which form an umbrella-shaped top. Bark greyish-brown; wood pale yellow, hard and heavy, used for implements and as fuel. Vern. *Tam.* Odai.

4. ACACIA EBURNEA, Willd.; W. & A. 276; F. B. I. ii. 273 *in part*.

Deccan and Carnatic, from Mysore to Coimbatore and Tinnevelly.

A small tree with red-purple corolla and yellow stamens and large ivory-white thorns, the pods papery, the leaflets few and comparatively large. Vern. *Tam.* Chilodai.

5. ACACIA ROXBURGHII, W. & A. 276. *A. planifrons*, W. & A.; F. B. I. ii. 293 *in part*. *Mimosa eburnea*, Roxb. Cor. Pl. t. 199.

Deccan, from Mysore and Bellary southwards.

A small thorny tree, with apparently yellow flowers on very slender peduncles.

6. ACACIA CAMPBELLII, Arn. in Nov. Act. Nat. Cur. xviii. 333. Circars, in forests near the coast from Godavari to Nellore; Deccan and Carnatic, especially in Cuddapah; often on black cotton soil.

A small branchy tree with apparently pink flowers and a yellowish-white hard wood. Vern. *Tel.* Marmati; *Tam.* Udai vél.

7. ACACIA TOMENTOSA, Willd.; F. B. I. ii. 294; W. & A. 276.

N. Circars, from Ganjam to Godavari; Deccan, in Coimbatore, scarce.

A small tree with greenish-white flowers and large broad-based spines. Vern. *Tam.* Anaimalli.



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13. *ACACIA SUNDRA*, DC.; F. B. I. ii. 295; W. & A. 273; Bedd. Fl. t. 50. *Mimosa Sundra*, Roxb. Cor. Pl. t. 225.  
Deccan and Carnatic, from the Kistna southwards to Cape Comorin, but most common in the Ceded Districts.  
A moderate-sized tree with yellowish-white flowers, red branchlets and leaves with fewer leaflets than Nos. 11 and 12. Bark rusty brown; wood reddish-brown, hard and tough and useful for agricultural purposes, rice-pounders, fuel and "cutch." Vern. *Tel.* Sandra; *Tam.* Karangali.
14. *ACACIA FERRUGINEA*, DC.; F. B. I. ii. 295; W. & A. 273; Bedd. Fl. t. 51.  
N. Circars, Deccan and Carnatic, in dry forests, to the E. slopes of the W. Gháts.  
A large, deciduous, pretty tree with pale yellow flowers, glaucous leaves, *Albizzia*-like pods and few spines. Wood olive-brown, very hard, used for building and agricultural purposes. Vern. *Tel.* Ansandra; *Tam.* Velvelam.
15. *ACACIA LENTICULARIS*, Buch.-Ham.; F. B. I. ii. 296.  
N. Circars, forests of Ganjam (Fischer).  
A deciduous tree with greyish-white flowers, glaucous leaves, large pods with thickened sutures and few spines. Wood very hard, olive-brown.
16. *ACACIA HOHENACKERI*, Craib in Kew Bull. 1915, 408.  
W. Gháts, Kundahs range of Nilgiris (Hohenacker), Coonoor (Bourne).  
A climbing shrub with small recurved prickles and large thick pod.
17. *ACACIA CAESIA*, Willd. *A. Intsia*, W. & A. 278 *excl. most synonyms*.  
Deccan, Hills of Cuddapah; W. Gháts, in the Anamalais.  
A climbing shrub with rather large prickles and few rather large leaflets.
18. *ACACIA TORTA*, Craib. *A. caesia*, W. & A. 278 *not of Willd.* *Mimosa torta*, Roxb.  
N. Circars, hills of Ganjam and Godavari; Deccan, in Hyderabad, Bellary, Mysore and Coimbatore; W. Gháts, in dry forest southwards to S. Travancore.  
A large prickly climbing shrub, sometimes very pubescent, occasionally nearly glabrous.

19. ACACIA COLUMNARIS, Craib in Kew Bull. 1915, 410.

W. Coast and W. Gháts in S. Canara and Mysore (Hohenacker, etc.).

A prickly climbing shrub.

20. ACACIA PENNATA, Willd.; F. B. I. ii. 297 *in part*; W. & A. 277 *in part*.

N. Circars, Deccan and E. slopes of W. Gháts, up to 5,000 ft., in moderately dry forest, in ravines and along streams.

A large very prickly climbing shrub, nearly glabrous.

21. ACACIA CANESCENS, Grah. *A. pennata* var. *canescens*, F. B. I. ii. 298.

Deccan and Carnatic, in dry forests and scrub lands up to 5,000 ft., southwards to S. Travancore.

A large prickly climbing shrub, recognised by its minute, very narrow leaflets and pubescent branchlets and inflorescence.

22. ACACIA RUGATA, Ham. *A. concinna*, DC. var. *rugata*, Baker in F. B. I. ii. 297.

N. Circars, in Ganjam (Barber).

A stout, prickly, straggling or climbing shrub, chiefly of waste lands, the pods large and fleshy, used like those of *A. concinna*.

23. ACACIA CONCINNA, DC.; F. B. I. ii. 296; W. & A. 277.

Deccan and Carnatic and W. Coast.

A stout very prickly climbing shrub, chiefly of open waste lands, the calyx red and corolla white, the pods fleshy and rugose, used as a substitute for soap. Vern. *Hind.* Banritba; *Tel.* Sigekai.

Several species of *Acacia* have been introduced from Australia and planted about the hill stations of the W. Gháts. Most of them are, however, only garden plants, but two have been so largely grown to supply timber and fuel that they deserve special notice. They are:

1. ACACIA MELANOXYLON, R. Br. The Black Wattle. A large tree, easily recognised by its leaves, bipinnate when young, very soon being transformed into oblong-falcate or lanceolate phyllodes. The flowers are white and the pods narrow and much curved. It is largely grown for its excellent timber and as a good fuel tree.

2. ACACIA DEALBATA, Link. The Silver Wattle. A small

tree with silvery foliage of bipinnate leaves which do not change into phyllodes, yellow very sweet-scented panicles and heads of flowers and narrow pods, the sutures not or little constricted between the seeds. It is largely grown in coppice as a fuel, and the bark is a useful tan, not so valuable, however, as that of the very closely allied *A. decurrens*, Willd., which has also been planted to a small extent. It differs by the foliage not being silvery and the pods distinctly constricted between the seeds.

#### 84. *Albizzia*, Durazz.

Trees or shrubs without thorns or prickles, rarely climbing. *Leaves* evenly bipinnate; pinnae even-pinnate; leaflets of various sizes; stipules usually small, sometimes large and foliaceous; stipels 0. *Flowers* in globose heads, rarely in spikes; peduncles distinct, axillary or in terminal panicles; bracts 2 or none; bracteoles under the flowers very small, caducous. *Calyx* campanulate or tubular, 5-lobed. *Petals* 5, connate in a funnel-shaped corolla. *Stamens* indefinite, monadelphous at the base, filaments long exserted; anthers very small. *Ovary* sessile or shortly stalked, many-ovuled; style filiform; stigma minute. *Pod* large, thin, flat, straight, continuous within, indehiscent or subdehiscent. *Seeds* ovate or orbicular, compressed, exalbuminous, the funicle filiform.

Flowers in globose heads; trees:—

Leaflets large, usually more than .75 in. long:—

Flowers sessile:—

Leaflets obliquely ovate, broad and rounded at base on the upper, narrower and attenuate on the lower side of the midrib, 1–1.5 in. long; .75–1 in. broad, slightly villous beneath; calyx tubular, glabrous, .1 in. long; pods thin, orange-brown, .8 in. broad .....1. *procera*.

Leaflets oblong, curved upwards, broadest on the lower side of the midrib, rounded or semicordate at base, .75–1 in. long, .25–.5 in. broad, pubescent beneath; calyx campanulate, .05 in. long, glabrous; pods moderately thick, brown, 1–1.5 in. broad.

2. *odoratissima*.

Flowers pedicelled:—

Leaflets broadly oblong, curved upwards, broadest on the lower side of the midrib, obtuse or retuse at apex, rounded at base, the end ones semicordate, slightly pubescent beneath, 1–2 in.



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Fl. t. 54. *Mimosa odoratissima*, Roxb. Cor. Pl. t. 120.  
*Acacia odoratissima*, Willd.; W. & A. 275.

Mixed forests in all Forest Districts, up to 3,000 ft. in the hills.

A large tree, almost deciduous though never quite leafless, with sweet-scented white flowers with yellow anthers. Bark dark grey with irregular cracks; wood dark brown, hard and close-grained, useful for many purposes, especially for wheels, oilmills and furniture. Vern. *Hind.* Kala siris; *Ur.* Sirsi tentura; *Tel.* Chinduga; *Tam.* Karu vagei; *Mal.* Puli vaga.

var. *mollis*, Benth. Leaflets and leaf rhachises densely grey or tawny-velvety. Coimbatore forests (Cleghorn).

3. ALBIZZIA LEBBECK, Benth.; F. B. I. ii. 298; Bedd. Fl. t. 53.  
*Acacia speciosa*, Willd.; W. & A. 275.

All plains Districts, cultivated and run wild, but doubtfully indigenous. Siris.

A large deciduous tree, with rather large white flowers and very long greenish stamens, the pods characteristic and long remaining on the tree when ripe. Bark brownish-grey; wood dark brown, streaked, hard and useful for building and agricultural purposes. Vern. *Hind.* Siris; *Ur.* Tinia; *Tel.* Dirasana; *Tam.* Vagei; *Mal.* Vága.

4. ALBIZZIA THOMPSONI, Brandis in Ind. For. xxv. 284.

N. Circars, in Ganjam forests; Deccan, in Cuddapah and Coimbatore, up to 3,000 ft.

A large deciduous tree with pale-yellow flowers and pink anthers. Vern. *Hind.* Sailari; *Tel.* Kondala.

5. ALBIZZIA LATHAMII, Hole in Ind. For. Records iv. 4. 153.

S. Carnatic, in Tinnevelly and Ramnad, up to 1,200 ft. (Wight, Latham, Hole), in dry deciduous forest.

A much-branched small tree with purplish-red white-lenticellate bark, short leaves and small pods.

6. ALBIZZIA AMARA, Boivin; F. B. I. ii. 301; Bedd. Fl. t. 61.  
*Acacia amara*, Willd.; W. & A. 274. *A. Wightii*, Grab.; W. & A. 274. *Mimosa amara*, Roxb. Cor. Pl. t. 122.

N. Circars, in Vizagapatam and Godavari; Deccan and Carnatic, in dry forest lands to S. Travancore and up to 3,000 ft.

A moderate-sized deciduous tree with pinkish-white flowers

and leaves with very many very small leaflets, the young shoots yellow-pubescent. The wood is purplish-brown with lighter bands, very hard and strong, used in building and agricultural work. Vern. *Tel.* Nalla renga; *Tam.* Wúnja; *Mal.* Varacchi.

7. *ALBIZZIA MARGINATA*, Merr. *A. stipulata*, Boiv.; F. B. I. ii. 300; Bedd. Fl. t. 55. *Acacia stipulata*, DC.; W. & A. 274.

N. Circars and Deccan, in hill forests; W. Gháts, in deciduous forests and up to 3,000 ft. or higher; sometimes planted as a shade tree for coffee.

A large deciduous tree with white flowers with pink filaments and leaves with very many falcate leaflets. Bark grey, horizontally furrowed; wood brown, soft, of less value than that of the other species. Vern. *Hind.* Siran; *Tel.* Konda chiragu; *Tam.* Pili vagei; *Mal.* Potta vaga.

*Albizzia lophantha*, Benth. is an Australian shrub, cultivated and run wild on the Nilgiris and Pulneys.

### 85. *Pithecolobium*, Mart.

Erect trees or shrubs, unarmed or with spinescent stipules or axillary spines. Leaves bipinnate, pinnae even-pinnate; stipules various; stipels 0. Flowers usually hermaphrodite, in globose heads on solitary fascicled or racemed peduncles, axillary at the ends of branches; bracts small; bracteoles under the calyx caducous or sometimes persistent. Calyx campanulate, shortly 5-toothed. Petals 5, rarely 6, connate in a tubular corolla with 5 valvate lobes. Stamens monadelphous, much exserted; anthers small. Ovary sessile or stalked, many-ovuled; style filiform; stigma minute. Pod strap-shaped, circinate or falcate, sometimes coriaceous, sometimes moniliform, usually dehiscent and much twisted, the sutures not thickened. Seeds ovate or orbicular, compressed, sometimes arillate.

Stipules, spinose:—

Pinnae 1 pair, each with 1 pair of leaflets reaching 2 in. in length; flowers in close heads in long narrow terminal panicles; pods twisted, coriaceous, the seeds with a white edible aril. .... 1. *dulce*.  
Pinnae 1–2 pairs, each with 5–8 pairs of oblong leaflets reaching .75 in. in length; flowers in axillary heads on long peduncles; pods curved, not twisted, thick, with 6–8 moniliform rounded joints with flat circular seeds..... 2. *umbellatum*.



Unarmed :—

Leaflets numerous, small, trapezoid, coriaceous, tawny-villous beneath, the margins incurved, .3–.5 in. long, glands many, 1–3 on the petiole, 1 half-way between each pair of the 3–12 pairs of pinnae; calyx and corolla golden-pubescent; pod 3–4 in. long, curved in a circle, orange within with 4–7 black seeds

3. *subcoriaceum*.

Leaflets few, large, 1–4 pairs; glands 1 on the petiole, 1 each at the base of each pinna and leaflet; bracteoles lanceolate, persistent :—

Pinnae 1–2 pairs, leaflets up to 4 pairs, lanceolate, acuminate, glabrous, black when dry, reaching 7 in. long, 2 in. broad, unequal at base; calyx campanulate, .075 in. long; corolla twice as long, lobes recurved; pod spirally curved, the valves .5–.7 in. broad, red within.....4. *bigeminum*.

Pinnae 1 pair, leaflets 1–3 pairs, ovate, abruptly caudate-acuminate, glabrous, reticulate, green when dry, reaching 6 in. long, 3 in. broad, nearly equal at base; calyx short-campanulate, .05 in. long; corolla twice as long, lobes spreading..... 5. *gracile*.

1. *PITHECOLOBIUM DULCE*, Benth.; F. B. I. ii. 302; Bedd. Fl. t. 188. *Mimosa dulcis*, Roxb. Cor. Pl. t. 99. *Inga dulcis*, Willd.; W. & A. 268; Wt. Ic. t. 198.

All dry plains Districts, cultivated as a hedge plant and run wild, native of tropical America.

A tree which, when allowed to grow, reaches a good size and gives a useful strong reddish-white wood, a good fuel, pods which are eaten by cattle and foliage which is eaten by goats. It makes a good strong hedge. Vern. *Tam.* Karkapilly.

2. *PITHECOLOBIUM UMBELLATUM*, Benth.; F. B. I. ii. 303. *Inga umbellata*, W. & A. 270.

Eastern Districts (Wight, Cleghorn) scarce.

A low tree with thick moniliform pods, and heads of rather few pedicelled creamy-white flowers with very long stamens, thorns scarce. Vern. *Tam.* Iyamalai.

3. *PITHECOLOBIUM SUBCORIACEUM*, Thw.; F. B. I. ii. 305. *P. anamallayanum*, Bedd. Fl. t. 189.

W. Gháts, in the Anamalais and the Hills of Travancore above 4,000 ft., in evergreen forests.

A small tree with pretty greenish-white flowers, foliage and pods. Wood yellowish, soft. Vern. *Tam.* Malei vágei.



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rarely 0. *Flowers* usually regular and hermaphrodite. *Calyx-tube* free or adnate to the ovary, usually 5-lobed, often bracteolate. *Disk* lining the calyx-tube or forming a ring at its base. *Petals* 5, rarely 0, inserted under the margin of the disk, usually imbricate. *Stamens* perigynous, usually indefinite. in one or more series; filaments generally incurved in bud; anthers small, didymous. *Ovary* of one or more free or connate carpels; ovules 1 or more in each carpel; styles basal lateral or subterminal, free or connate; stigmas simple, penicillate or capitate. *Fruit* variable, of achenes berries or drupes, rarely capsular. *Seeds* erect or pendulous, exalbuminous; testa membranous or coriaceous; cotyledons plano-convex; radicle short.

Ovary superior; the ripe carpels not enclosed in the calyx-tube:—

Flowers irregular; ovules 2, ascending; carpel 1, style basal

1. **Parinarium.**

Flowers regular; ovules 2, pendulous:—

Carpel 1:—

Drupe erect; style terminal:—

Petals large; endocarp hard, bony.....**Prunus.**

Petals very small; endocarp coriaceous .....2. **Pygeum.**

Drupe inverted; style subbasal; endocarp coriaceous

**Prinsepia.**

Carpels many:—

Ovules 2; pendulous; calyx ebracteolate; prickly shrubs:—

3. **Rubus.**

Ovule 1, erect; calyx bracteolate; herbaceous plants:—

Achenes on a fleshy receptacle.....4. **Fragaria.**

Achenes on a dry receptacle .....5. **Potentilla.**

Ovary inferior; the ripe carpels enclosed in the calyx-tube:—

Carpel 1; petals 0; herbaceous.....6. **Alchemilla.**

Carpels more than 1; petals present; trees or shrubs:—

Carpels not confluent when ripe; prickly shrubs with compound leaves and adnate stipules.....7. **Rosa.**

Carpels confluent when ripe; erect unarmed trees or shrubs with simple leaves and small stipules:—

Flowers in panicles; ovary 5-celled.....**Eriobotrya.**

Flowers corymbose or fascicled:—

Ovary 5-celled; endocarp cartilaginous.....**Pyrus.**

Ovary 2-3-celled; endocarp thin; evergreen trees

8. **Photinia.**

Ovary 2-5-celled; endocarp bony; rigid shrubs

9. **Cotoneaster.**

1. *Parinarium*, Juss.

Trees. *Leaves* simple, alternate, evergreen, quite entire; stipules subulate or lanceolate. *Flowers* hermaphrodite, white or pink, in corymbose racemes, bracteate. *Calyx-tube* campanulate or funnel-shaped; lobes 5, imbricate. *Petals* 5, inserted on the mouth of the calyx-tube, sessile or clawed, deciduous. *Stamens* numerous; filaments connate at the base in a ring or unilateral bundle, filiform; anthers small. *Ovary* adnate to the side of the calyx-tube, 2-celled, the ovules erect; style basal, filiform; stigma truncate. *Fruit* an ovoid or spherical drupe, the stone 1-2-seeded, woody or bony. *Seeds* erect; testa membranous; cotyledons fleshy.

Leaflets 8-9 in. long, 3 in. broad, elliptic-lanceolate, glabrous racemes stout, axillary or terminal, slightly pubescent, about 4 in. long; flowers white ..... 1. *indicum*.  
Leaves 4-5 in. long, 1-1.5 in. broad, lanceolate, glabrous except the silky midrib beneath; racemes slender, drooping, usually axillary, silky-villous, about 2 in. long; flowers pink.....2. *travancoricum*.

1. *PARINARIUM INDICUM*, Bedd. Ic. t. 109, Fl. t. 191; F. B. I. ii. 311.

W. Gháts, about the Carcoor Ghát, S.-E. Wynaad, in moist woods at 2,000-3,000 ft. (Beddome).

A middling-sized evergreen tree.

2. *PARINARIUM TRAVANCORICUM*, Bedd. Ic. t. 189; F. B. I. ii. 311.

W. Gháts, in the Travancore Hills, in evergreen forests at 2,000 ft. (Beddome, Bourdillon).

A small graceful evergreen tree with straight cylindrical stem. Bark smooth, mottled brown and white; wood hard, smooth, pink.

2. *Pygeum*, Gaertn.

Evergreen shrubs or trees. *Leaves* simple, alternate, persistent, entire or rarely toothed, sometimes with pitted glands near the base; stipules small, deciduous. *Flowers* small, in racemes, sometimes ♂ only by suppression of the ovary; bracts deciduous, in early bud forming a cone. *Calyx-tube* obconic urceolate or campanulate, usually villous within, deciduous usually in a ring

at the middle; lobes 5-6, very small. *Petals* 5-6, sometimes undistinguishable from the calyx-lobes with which they alternate, usually villous. *Stamens* normally 10, 20 or 30, in one or two rows, often irregular by the absence of some; filaments slender, incurved; anthers small. *Carpel* solitary at the base of the calyx-tube, ovoid or globose; style subulate; stigma capitate; ovules 2, collateral, pendulous. *Fruit* a transversely oblong obscurely 2-lobed indehiscent drupe; pericarp thin, dry or fleshy; cotyledons hemispheric; radicle minute, superior.

Leaves entire:—

Calyx-lobes and petals unequal, the latter the longer:—

Leaves ovate to broad-lanceolate, acuminate at apex, 4-6 in. long, 1.5-3 in. broad, not pitted; racemes slender, 2-3 in. long, pedicels .1 in.; stamens more than 30 with long filaments; ovary glabrous with long slender style; drupe .5 by .7 in., dark purple, top slightly retuse.....1. *acuminatum*.

Leaves lanceolate, acute at apex, 2-4 in. long, 1-1.5 in. broad, rarely pitted; racemes under 2 in. long, pedicels .1 in.; stamens about 20 with short filaments; ovary glabrous with short style; drupe .5 by .8 in., purple, top slightly retuse ..... 2. *sisparense*.

Leaves ovate, obtusely acute at apex, rounded or subcordate at base and usually pitted; 4-6 in. long, 2.5-3 in. broad; racemes reaching 5 in. long, pubescent, pedicels .1-.25 in. long; stamens about 20; ovary glabrous, with thick style; drupe .6 by .7 in., top not retuse.....3. *Wightianum*.

Calyx-lobes and petals nearly equal, similar, but the latter more obtuse; stamens normally 30; racemes 2-4 in. long, pubescent, pedicels .1 in.; leaves lanceolate, long acuminate, up to 7 in. long, 2-3 in. broad; basal glands present or more often absent; drupe .6 by 1 in., black, slightly retuse at top ..... 4. *Gardneri*.

Leaves crenate-serrate, ovate or ovate-oblong, attenuate at base; petals oblong, .1 in. long, glandular-ciliate, twice the length of the calyx-lobes; stamens 10-15, usually 10..... 5. *Andersoni*.

1. *PYGEUM ACUMINATUM*, Coleb. in Trans. Linn. Soc. xii. 360, t. 18; F. B. I. ii. 318.

E. Gháts, Rumpa Hills of Godavari at 2,500 ft. (Gamble).

An evergreen tree, with fairly large leaves.

2. *PYGEUM SISPARENSE*, Gamble in Kew Bull. 1918, 238.

W. Gháts, about Sispara in W. Nilgiris at 6,000-7,000 ft. (Gamble).



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Bracts boat-shaped or obovate, entire or dentate at apex; leaves up to 4 in. long, 3 in. broad, the lobes short, acute, again lobulate

1. *Wightii*.

Bracts broadly ovate or obovate, laciniate at apex:—

Leaves thick, deeply cordate, prominently and minutely rugose on both surfaces with very small areoles; bracts and stipules long-flabellately laciniate:—

Leaves orbicular in outline, up to 6 in. in diam., the lobes rounded, scarcely lobulate, the sinuses shallow; tomentum thick, fulvous; inflorescence dense...2. *rugosus* var. *Thwaitesii*.

Leaves ovate in outline, up to 9 in. long by 7 in. broad, the lobes acute, the end one long and usually again lobulate; tomentum short, white or pale fulvous; inflorescence loose

3. *Fairholmianus*.

Leaves thin, shallowly cordate, not minutely rugose, up to 6 in. long by 5 in. broad, the areoles rather large; bracts and stipules shortly laciniate; tomentum very thin, tawny; inflorescence lax

4. *Gardnerianus*.

Bracts pectinately laciniate with linear segments; leaves deeply cordate, not lobulate, rugose with small areoles:—

Petals very small, less than half the length of the calyx-lobes; leaves up to 5 in. long by 4.5 in. broad, the lobes, especially the end one, acute, the sinuses deep; inflorescence short or shortly paniculate .....5. *micropetalus*.

Petals nearly as long as the calyx-lobes; leaves up to 6 in. in diam., the lower lobes rounded or subacute, the end lobe acute; inflorescence large, in spreading panicles .....6. *fulvus*.

Leaves pinnately 3-foliolate, wrinkled, the end leaflet the largest; stipules subulate; petals white, as long as or longer than the calyx-lobes; fruit globose, orange .....7. *ellipticus*.

Leaves pinnately 5–7 foliolate, usually white beneath:—

Branches glabrous, glaucous, not glandular; leaves usually 7-foliolate, stipules subulate; petals pink, shorter than the calyx-lobes; fruit globose, black with white tomentum.....8. *niveus*.

Branches covered with glandular bristles and hairs; leaves usually 5-foliolate, stipules lanceolate; petals red, longer than the calyx-lobes; fruit globose, purple with white tomentum.....9. *racemosus*.

1. RUBUS WIGHTII, Gamble. *R. rugosus*, Wt. Ic. t. 225 not of Sm. *R. moluccanus*, Hook. f. in F. B. I. ii. 330 in part only (var. *a*. Thwaites Enum. Pl. Zeyl.).

Sivagiri hills, Tinnevely (Wight).

A small species with pretty vine-like leaves and red fruits.

2. RUBUS RUGOSUS, Sm. in Rees Cycl. xxx. *R. moluccanus*, Linn.; F. B. I. ii. 330 *in part*.

Var. *Thwaitesii*, Focke. W. Gháts, in the Nilgiri Hills at high levels, common on Dodabetta at 8,000 ft.

A large strongly-growing shrub with large purple-black fruits.

3. RUBUS FAIRHOLMIANUS, Gardn. in Calc. Journ. Nat. Hist. viii. 6. *R. moluccanus*, Hook. f. in F. B. I. ii. 330 *in part only* (var.  $\gamma$ . Thwaites Enum. Pl. Zeyl.).

W. Gháts, in the Pulney Hills at 5,000–7,000 ft.

A large shrub with white tomentum and red fruits.

4. RUBUS GARDNERIANUS, O. Kze. *R. moluccanus*, Hook. f. in F. B. I. ii. 330 *in part only* (var.  $\delta$ . Thwaites Enum. Pl. Zeyl.). *R. macrocarpus*, Gardn.

W. Gháts, at Udambadsholay, Travancore Hills, at 5,000 ft. (Meebold); E. Gháts, Madgol Hills of Vizagapatam at 4,500 ft. *probably*.

A good-sized shrub with thin leaves, open reticulations to the leaves, many prickles and black fruit.

5. RUBUS MICROPETALUS, Gardn. in Calc. Journ. Nat. Hist. viii. 6. *R. moluccanus*, Hook. f. in F. B. I. ii. 330 *in part only* (var.  $\beta$ . Thwaites Enum. Pl. Zeyl.).

Tinnevelly District, at Kalivayalpil (Barber).

Apparently a small species, perhaps climbing, with deeply-lobed leaves, small petals and red fruit.

6. RUBUS FULVUS, Focke in Biblioth. Bot. lxxii. 81 (1909).

W. Gháts, in W. Nilgiris, Bababudan Hills of Mysore, Atapadi Hills of Malabar, hills of Coimbatore, at 3,000–6,000 ft. (King, Fischer and others).

A strong-growing, perhaps climbing, species with large flower panicles and black-purple fruit.

7. RUBUS ELLIPTICUS, Sm.; F. B. I. ii. 336. *R. Gowreephul*, Roxb.; W. & A. 298; Wt. Ic. t. 230. *R. Wallichianus*, W. & A. 298; Wt. Ic. t. 231.

N. Circars and Deccan, in the hills above 4,000 ft.; W. Gháts, in all Districts, in open places, usually above 6,000 ft.

A large straggling shrub with stiff red hairs and prickles. The orange raspberry-like fruit is edible and good, it can be made into preserves.



8. *RUBUS NIVEUS*, Thunb. Dissert. 9, fig. 3 *not of* Wall.  
*R. lasiocarpus*, Sm.; F. B. I. ii. 339; W. & A. 299; Wt. Ic.  
 t. 232.

N. Circars, Deccan and Carnatic, in hills above 4,000 ft.;  
 W. Gháts, in all Districts, on Shola margins and in open  
 forest.

A straggling shrub, the leaves usually very white beneath;  
 fruit edible but dry and the seeds with a woolly coat.

- Var. *subglaber*, Thw. Leaves not white beneath, glabrous  
 except on the nerves; thorns large, recurved from broad  
 bases.

Nilgiri and Pulney Hills, at high elevations.

9. *RUBUS RACEMOSUS*, Roxb.; F. B. I. ii. 340.

Nilgiri hills, at high elevations, above 6,000 ft.

A straggling shrub very closely allied to *R. niveus*, chiefly  
 differing in the glandular hairs, especially on the calyx-  
 tube.

*Rubus Iduus*, Linn., the Raspberry, is found in cultivation in  
 hill stations.

#### 4. *Fragaria*, Linn.

Perennial scapigerous herbs with creeping stolons. *Leaves*  
 digitately 3- rarely 5-foliolate, rarely pinnate or simple; stipules  
 adnate to the petiole. *Flowers* white or yellow, often polygamous,  
 cymose on erect scapes; bracts leafy; bracteoles 5, close under  
 the calyx. *Petals* 5. *Stamens* many, 1-seriate, persistent; fila-  
 ments filiform; anthers didymous. *Carpels* many, on a convex  
 receptacle; styles lateral; ovules 2, collateral, pendulous. *Fruit*  
 of many achenes, sunk in the surface of the fleshy receptacle.  
*Seeds* minute; cotyledons plano-convex; radicle superior.

Flowers yellow, solitary, bracteoles broad, 3-5-fid at apex; leaflets  
 3-5, obovate, usually crenate; peduncles shortly whitish-villous,  
 .25-1 in. long; slender plants with the ripe receptacles red...1. *indica*.  
 Flowers white, in cymes, bracteoles deeply bifid in 2 lanceolate lobes;  
 leaflets 3, obovate, coarsely dentate; peduncles densely golden-villous,  
 1-1.5 in. long; robust plants with the ripe receptacles white tinged  
 with pink.....2. *nilgerrensis*.

1. *FRAGARIA INDICA*, Andr.; F. B. I. ii. 343; W. & A. 300;  
 Wt. Ic. t. 989.



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### 6. *Alchemilla*, Linn.

Annual or perennial herbs. *Leaves* alternate, orbicular, lobed or deeply divided; stipules adnate to the petiole, sheathing the stem. *Flowers* minute, in corymbose cymes; bracts many; bracteoles 4-5, under the calyx-lobes. *Calyx-tube* campanulate, lobes 4-5, valvate. *Disk* adnate to the calyx-tube, large and thick at its mouth. *Stamens* 4-5, on the mouth of the calyx-tube. *Carpels* 1-5, stalked or sessile in the calyx-tube; style basal; stigma capitate. *Fruit* of 1-4 achenes enclosed in the membranous persistent calyx-tube.

ALCHEMILLA INDICA, Gardn.; F. B. I. ii. 361. *A. vulgaris*, Wt. Ic. t. 229.

Nilgiri and Pulney Hills, above 7,000 ft., chiefly at high elevations as on the top of Dodabetta, on open grass-land.

A perennial silky herb with prostrate stems covered with the dry remains of the stipules; flowers very small, green; leaves orbicular, 7-11-lobed, serrate.

### 7. *Rosa*, Linn.

Erect, sarmentose or climbing shrubs, usually prickly. *Leaves* alternate, imparipinnate; leaflets serrate; stipules adnate to the petiole. *Flowers* terminal, solitary or corymbose, white, yellow or red; bracts rarely persistent; bracteoles 0. *Calyx-tube* globose, ovoid or flask-shaped, the mouth contracted; lobes 4-5, imbricate. *Petals* 4-5, usually large. *Disk* lining the calyx-tube, thickened in a ring at the mouth. *Stamens* many, inserted on the disk. *Carpels* many, rarely few, in the bottom of the calyx-tube; styles sub-terminal, free or connate above; stigma thickened; ovule solitary, pendulous. *Fruit* a fleshy calyx-tube (rose-hip) enclosing a cluster of coriaceous or bony achenes. *Seeds* small, pendulous; cotyledons plano-convex; radicle superior.

ROSA LESCHENAULTIANA, W. & A. 301; F. B. I. ii. 368; Wt. Ic. t. 38.

W. Gháts, in the Nilgiri Hills above 5,000 ft., in Shola Forest; said to occur also in the Pulney Hills.

A large climbing shrub with pink flowers, very glandular leaf-rhachises and peduncles and globose fruit, the styles

united in a long-exserted column. Bark papery, purplish-red; wood reddish-brown.

Roses, of many species and garden varieties, are to be found in cultivation, especially in the Hills.

### 8. Photinia, Lindl.

Evergreen trees or shrubs. *Leaves* simple, coriaceous, entire or toothed; stipules subulate, deciduous. *Flowers* small, white, in corymbose terminal panicles; bracts deciduous. *Calyx*-tube obconic; lobes 5, short, persistent. *Petals* 5, spreading. *Stamens* 20, inserted on the mouth of the calyx. *Ovary* half-adhering, 2-rarely more-celled; styles 2, rarely more, free or connate at the base; stigmas truncate; ovules 2 in each cell, collateral, ascending. *Fruit* a small globose or ovoid drupe with 2 pyrenes each in a crustaceous endocarp, each with 2 seeds. *Seeds* obovoid, triquetrous or compressed; testa coriaceous; cotyledons planoconvex; radicle inferior.

Leaves elliptic—ovate or—lanceolate, mucronate at apex, crenulate, 3-6 in. long, the nerves prominent beneath; flowers 3 in. broad, the claw of the petals usually villous; seeds triquetrous ... 1. *Lindleyana*.  
Leaves elliptic or obovate, obliquely acuminate at apex, entire, 3-6 in. long, 1-2.5 in. broad, nerves not prominent; flowers 1.5 in. broad, the claw of the petals usually glabrous; seeds compressed

2. *Notoniana*.

1. PHOTINIA LINDLEYANA, W. & A. 302; F. B. I. ii. 380; Wt. Ic. t. 228.

W. Gháts, in Shola Forests of the Nilgiri Hills at about 6,000 ft.

A small tree with dark brown bark and light brown close-grained wood, used only for fuel.

var. *tomentosa*, Gamble. Petioles, undersurface of young leaves and inflorescence softly tawny-tomentose; leaves almost entire, serrate towards the apex.

Nilgiris, chiefly in Sholas towards Sispara at and above 7,000 ft.

2. PHOTINIA NOTONIANA, W. & A. 302; F. B. I. ii. 380; Wt. Ic. t. 991; Ill. t. 86; Bedd. Fl. t. 192.

W. Gháts, in the Nilgiri and Pulney hills and the hills

of Malabar and Travancore above 4,000 ft., in evergreen forests.

A good-sized tree with reddish-brown scaly bark and light red close-grained wood.

### 9. *Cotoneaster*, Rupp.

Small trees or shrubs, erect or decumbent. *Leaves* alternate, simple, usually downy beneath; stipules subulate, deciduous. *Flowers* small, solitary or in axillary or terminal cymes, white or pink; bracts and bracteoles small. *Calyx*-tube turbinate or campanulate; lobes 5, short, persistent. *Petals* 5, imbricate in bud. *Stamens* indefinite, usually 20, inserted at the mouth of the calyx. *Carpels* 2-5, adnate to the calyx-tube; styles free; stigma truncate; ovules 2 in each cell, erect. *Fruit* an ovoid globose or turbinate drupe with 2-5 1-seeded bony pyrenes. *Seeds* compressed, cotyledons plano-convex; radicle inferior.

*COTONEASTER BUXIFOLIA*, Wall.; F. B. I. ii. 387; W. & A. 302; Wt. Ic. t. 992.

W. Gháts, Nilgiri and Pulney Hills, above 5,000 ft.

A rigid, intricately branched shrub with elliptic-ovate acuminate apiculate small leaves, tomentose beneath, white flowers and scarlet fruit. Beddome says the hard, tough wood is used by the Todas to make clubs for killing buffaloes.

*Prunus Persica*, Benth. and Hook. f., the Peach; *Prunus Avium*, Linn., the Cherry; *Pyrus Malus*, Linn., the Apple; *Pyrus communis*, Linn., the Pear, are cultivated in hill stations for their fruit.

*Prinsepia utilis*, Royle, a thorny shrub, introduced from the Himalaya, is now found run wild in the Nilgiri Hills.

*Eriobotrya japonica*, Lindl., the Loquat, is occasionally cultivated in the Nilgiri Hills for its fruit.

### Family LVII. SAXIFRAGACEAE.

Trees, shrubs or herbs. *Leaves* alternate with stipules adnate to the petiole or 0, or opposite exstipulate. *Flowers* usually hermaphrodite, regular. *Calyx* usually 5-merous, more or less



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radical, petioled. *Calyx*-tube free or adnate to the ovary; lobes 5, imbricate. *Petals* 5, white or pale yellow. *Stamens* 5, perigynous or nearly hypogynous, opposite the calyx-lobes, alternating with 5 staminodes opposite the petals; filaments subulate; anthers ovate. *Ovary* 1-celled, ovoid; style short; stigmas 3-4; ovules numerous, on parietal placentas opposite the stigmas. *Fruit* a capsule, loculicidally 3-4-valved. *Seeds* numerous, smooth, albumen scarcely any.

Scapes 6-12 in. high; leaves broadly ovate, cordate, 1-1.5 in. long; petals obovate, conspicuously fimbriate on the margins; staminodes 3-5-lobed, the lobes cylindric-clavate.....1. *Wightiana*.  
 Scapes 3-6 in. high; leaves orbicular, cordate, .5-.75 in. long; petals obovate, not or slightly fimbriate on the margins; staminodes clavate, entire or more or less 3- or even 5-lobed .....2. *mysorensis*.

1. *PARNASSIA* WIGHTIANA, Wall. in W. & A. 35; F. B. I. ii. 402; Wt. Ill. t. 21, Ic. t. 945.

Boggy places on the Nilgiri plateau at 6,000-8,000 ft.

2. *PARNASSIA* MYSORENSIS, Heyne in W. & A. 35; F. B. I. ii. 402; Wt. Ill. t. 21.

W. Gháts, in the Mysore, Malabar, Nilgiri and Pulney Hills, above 5,000 ft., in damp places or among rocks. The Nilgiri specimens have the staminodes more prominently lobed than those from the Pulneys. The two species are closely allied and are more distinguishable by the difference of size than by other characters.

### Family LVIII. CRASSULACEAE.

Herbs, with often a woody rootstock, or undershrubs, usually succulent. *Leaves* alternate or opposite, simple or sometimes pinnate; stipules 0. *Flowers* regular, hermaphrodite or unisexual, usually in cymes. *Calyx* free, 4-5-, rarely 6-8-lobed. *Petals* as many as the calyx-lobes and alternate with them, free or connate. *Stamens* as many or twice as many as the petals, hypogynous or epipetalous. *Carpels* as many as and opposite to the petals, free or connate below, narrowed into the styles with a hypogynous scale at the base of each; ovules numerous, 2-many-seriate, rarely few. *Fruit* of usually 4-5, rarely fewer, follicles dehiscing at the ventral suture. *Seeds* many, rarely few or solitary, albuminous.

Stamens as many as the petals ; leaves opposite ; small herbs

1. **Tillaea.**

Stamens twice as many as the petals ; tall erect fleshy herbs :—

Calyx with a long inflated tube and shortly 4-fid limb ; corolla with a much constricted tube ; leaves bulbiferous in the crenatures, opposite, sometimes pinnate ..... **Bryophyllum.**

Calyx with a short tube and deeply 4-partite limb ; corolla with a flask-shaped tube ; leaves opposite or the upper alternate, sometimes pinnatifid, not bulbiferous ..... **2. Kalanchoe.**

1. **Tillaea, Linn.**

Small glabrous herbs. *Leaves* opposite, entire. *Flowers* minute, axillary, solitary or fascicled or cymose, white or red. *Calyx* 4-5-lobed. *Petals* 4-5, free or connate at the base. *Stamens* 4-5, filaments filiform. *Hypogynous scales* 4-5 or 0. *Carpels* 4-5, free ; styles short ; stigmas minute. *Follicles* 2-many-seeded, rarely 1-seeded.

**TILLAEA PENTANDRA**, Royle ; F. B. I. ii. 412.

Deccan, in Mysore (Lobb) ; Nilgiris (Hohenacker), usually on walls or rocks.

A small tufted plant with angular stem, stem-clasping leaves and minute scarious flowers.

2. **Kalanchoe, Adans.**

Erect perennial herbs with stout fleshy stems and leaves. *Leaves* opposite or the upper alternate, entire crenate or pinnatifid. *Flowers* large, erect, in many-flowered paniculate bracteate cymes. *Calyx* 4-partite or 4-fid half way down, shorter than the corolla. *Petals* 4, connate in a flask-shaped corolla tube, the lobes spreading, persistent. *Stamens* 8, in 2 series, adnate to the corolla-tube. *Hypogynous scales* 4. *Carpels* 4, adnate to the base of the corolla-tube, attenuate into long subulate styles ; stigmas obliquely truncate ; ovules many. *Follicles* 4. *Seeds* very many, oblong-ellipsoid, ribbed longitudinally.

Calyx divided not more than half-way down ; leaves obovate, nearly entire, up to 6 in. long, much narrowed at base ; calyx tubular, very glandular-pubescent ; flowers yellow, in elongate panicles of cymes corolla lobes ovate-oblong ..... 1. *glandulosa.*  
Calyx divided nearly to the base :—

Leaves simple, crenate, the crenatures broad :—



Calyx-lobes narrow, lanceolate :—

Flowers yellow, in large corymbose bracteate panicles, the inflorescence glandular or glabrous; leaves obovate-spathulate especially the upper ones, up to 4 in. long, 1 in. broad; corolla-tube in fruit shining, white.....2. *floribunda*.

Flowers white :—

Calyx and corolla glandular-hairy; inflorescence in compact corymbs; leaves obovate, obtuse, up to 5 in. long, 2 in. broad, dotted with red spots (Cooke).....3. *olivacea*.

Calyx and corolla not glandular-hairy; inflorescence in spreading panicles of cymes; leaves elliptic, narrowed at base, more or less acute, up to 6 in. long, 3 in. broad, tinged with red (Cooke) ..... 4. *Bhidei*.

Calyx-lobes large, ovate; leaves orbicular-obovate, cuneate at base, up to 3 in. long, 2 in. broad; flowers yellow, in compact corymbose cymes, the inflorescence glabrous; corolla-lobes obovate, mucronate ..... 5. *grandiflora*.

Leaves pinnatifid, the segments, especially in upper leaves, usually narrow and even linear, sometimes broader; flowers pale yellow, in paniculate cymes with linear bracts; calyx-lobes lanceolate, glandular; corolla-lobes oblong-lanceolate, mucronate 6. *laciniata*.

1. *KALANCHOE GLANDULOSA*, Hochst.; F. B. I. ii. 414.

Deccan, in hilly country in Mysore (Wight) on dry rock soil.

A thick-stemmed succulent plant reaching 2 ft. in height.

2. *KALANCHOE FLORIBUNDA*, W. & A. 359; F. B. I. ii. 414.

Deccan, on dry hills in Coimbatore at 2,000–4,000 ft. (Fischer, etc.)

An erect succulent-leaved plant with glandular inflorescence.

Var. *glabra*, C. B. Clarke in F. B. I. ii. 415.

W. Gháts, on dry slopes from Mysore and N. Nilgiris to the Anamalais and hills of Travancore, at 2,000–4,000 ft.

An erect succulent, the inflorescence not glandular, and prominently corymbose.

3. *KALANCHOE OLIVACEA*, Dalz.; Cooke Bomb. Fl. i. 467.

W. Gháts, in the Anamalai Hills at Attakatti and Kadamparai, 3,500–4,000 ft. among rocks (Fischer).

An erect succulent of an olive-brown colour when fresh.

4. *KALANCHOE BHIDEI*, T. Cooke Bomb. Fl. i. 467.

Deccan, in the hills of Coimbatore at Dimbam and Anai-



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Rootstock not bulbous:—

Leaves all radical, rosulate, round-spathulate; scapes leafless; styles 5, undivided..... 1. *Burmanni*.

Leaves cauline, alternate, linear; styles 3, bifid to the base

2. *indica*.

Rootstock bulbous; leaves cauline, semilunate; styles 3, short, fimbriate ..... 3. *peltata*.

1. *DROSERA BURMANNI*, Vahl; F. B. I. ii. 424; W. & A. 34; Wt. Ill. t. 20; Ic. t. 944.

All Districts, in suitable damp places and to the highest points in the hills.

An erect plant with leafless scapes about 4-6 in. high from the rosulate cushion of leaves at the base.

2. *DROSERA INDICA*, Linn.; F. B. I. ii. 424; W. & A. 34; Wt. Ill. t. 20.

N. Circars, especially in Ganjam; Deccan, in wet places in the Hills; W. Coast, S. Canara to Travancore, in swampy places.

A straggling leafy plant, the stems usually 3-4 in., sometimes up to 12 in. long.

3. *DROSERA PELTATA*, Sm.; F. B. I. ii. 424; W. & A. 34; Wt. Ill. t. 20.

W. Gháts, on open downs in the Nilgiri and Pulney Hills above 5,000 ft.

An erect, pretty plant with slender stems reaching 12 in. high and over, the leaves peltate with upturned cusps. When being dried it stains the paper red.

#### Family LX. HALORRHAGIDACEAE.

Herbs, often aquatic. *Leaves* opposite or whorled, sometimes partly alternate, when submerged often pectinately pinnatifid; stipules 0. *Flowers* hermaphrodite or unisexual, small, axillary, solitary or fascicled, sessile or pedicelled. *Calyx*-tube adnate to the ovary, lobes usually 4. *Petals* 4, sometimes 2 or 0, valvate or slightly imbricate. *Stamens* 8, 4 or 1; anthers 2-celled, dehiscing longitudinally and laterally. *Ovary* 4-, 2- or 1-celled; ovules 4, pendulous; styles as many as cells; stigmas papillose or plumose. *Fruit* small, dry or drupaceous, 4-, 2- or 1-celled, indehiscent or separating into carpels. *Seeds* pendulous, 4 or rarely 1.

Terrestrial plants with monoecious flowers, ♂ flowers pedicelled; petals 4 in ♂ flowers; stamens 8; fruit 1-celled, 1-seeded

1. **Serpicula.**

Aquatic plants; petals 0:—

Flowers hermaphrodite or monoecious, axillary or in spikes; stamens 2–8; fruit 4-furrowed or separating into carpels; seeds 2 or 4

2. **Myriophyllum.**

Flowers unisexual, usually monoecious, axillary; stamen 1; fruit indehiscent, 4-celled; seeds 4 .....3. **Callitriche.**

1. **Serpicula, Linn.**

Small decumbent branching herbs. *Leaves* opposite or alternate, entire or toothed. *Flowers* monoecious, axillary, ♂ pedicelled, ♀ sessile. *Calyx-tube* adnate to the ovary; lobes 4. *Petals*: in ♂ flowers 4, cucullate; in ♀ flowers 0. *Stamens* 8, filaments filiform, anthers linear-oblong. *Ovary* 1-celled; ovules 4, pendulous; styles 4, short, stigmas plumose; in ♂ flowers pistillodes 4. *Fruit* a minute, indehiscent nut, 1-celled, 1-seeded, the enclosing calyx-tube ribbed or smooth.

Glabrous, little branching; leaves spatulate, entire or 3-toothed at apex; pedicels short, scarcely 4 in. long; petals acute at apex; fruit glabrous, ribbed and warted .....1. *brevipes*.  
Hirsute with crisped hairs, much branched; leaves obovate, 3–5-toothed at apex; pedicels long, usually 6 to 8 in. long; petals obtuse at apex; fruit hairy, not ribbed.....2. *hirsuta*.

1. SERPICULA BREVIPES, W. & A. 338. *S. indica*, Thw.; F. B. I. ii. 431 *in part*.

W. Gháts, in Nilgiris and Pulneys, at 6,000–7,000 ft., in wet places.

2. SERPICULA HIRSUTA, W. & A. 338; Wt. Ic. t. 1,001. *S. indica*, Thw.; F. B. I. ii. 431 *in part*.

W. Gháts, in the Nilgiri Hills at 6,000–8,000 ft., on banks, common.

2. **Myriophyllum, Linn.**

Glabrous aquatic herbs with floating stems. *Leaves* opposite or whorled, the floating ones usually linear-serrate, the submerged ones pectinately pinnatifid. *Flowers* very small, hermaphrodite or monoecious, axillary or in nearly naked spikes; ♂ very shortly

pedicelled or sessile, ♀ sessile. *Calyx* in ♂ minute, 4- rarely 2-lobed, sometimes 0; in ♀ adnate to the ovary, 4-furrowed, lobes 0 or 4 minute. *Petals* in ♂ 2 or 4, concave, sessile; in ♀ usually 0. *Stamens* 2, 4 or 8. *Ovary* of 4, rarely 2, carpels; ovules solitary, pendulous; styles short, plumose. *Fruit* 4-furrowed, separating into 4 or 2 cocci; embryo straight or curved.

Floral leaves short, up to .5 in. long, submerged leaves long and much pectinate; fruit carpels spreading stellately, tubercled; stamens 8

1. *indicum*.

Floral leaves long, up to 1 in. long or longer, submerged leaves short, often absent; fruit carpels erect, columnar, muricate; stamens 4

2. *intermedium*.

1. MYRIOPHYLLUM INDICUM, Willd.; F. B. I. ii. 433; W. & A. 339.

E. Coast, from Ganjam southwards, in ponds and canals; W. Coast, more scarce.

A floating aquatic, with very long stems and many submerged leaves.

2. MYRIOPHYLLUM INTERMEDIUM, DC.; F. B. I. ii. 433. *M. indicum*, Wt. Ill. t. 102 *except the fruit*. *Haloragis oligantha*, W. & A. 338; Wt. Ic. t. 1,061.

W. Gháts, especially Nilgiris, in wet places and ponds, above 5,000 ft.

Sometimes floating, with short submerged leaves, more often rooted in mud with only the upper leaves apparent.

3. *Callitriche*, Linn.

Small glabrous aquatic annual herbs. *Leaves* opposite, linear or obovate-spathulate, entire, the upper ones often rosulate. *Flowers* minute, axillary, usually monoecious, solitary or sometimes one ♂ and one ♀ together; bracteoles white, membranous, caducous. *Calyx* and *petals* 0. *Stamen* 1, forming ♂ flower. *Ovary* in ♀ flower 4-celled with 4 pendulous ovules; styles 2, long, subulate. *Fruit* indehiscent, of 4 carpels combined in 2 pairs, at length separating. *Seeds* pendulous; testa membranous; albumen fleshy; cotyledons short; radicle superior.

CALLITRICHE STAGNALIS, Scop.; F. B. I. ii. 434. *C. Wightiana*, Wall.; W. & A. 339; Wt. Ic. t. 1,947.



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### 1. *Rhizophora*, Linn.

Trees; branches thick, marked by leaf-scars; aërial roots descending from the stem and branches. *Leaves* opposite, coriaceous, glabrous, mucronate, entire; stipules large. *Flowers* rather large, in axillary 2-3-choromously divided, few-flowered cymes; bracteoles connate at the base of the calyx. *Calyx* 4-lobed; lobes coriaceous, valvate. *Petals* 4, entire, inserted on a fleshy disk. *Stamens* 8-12; filaments short; anthers linear. *Ovary* 2-celled, 2 ovules in each cell; style conical, subulate; stigma bifid. *Fruit* coriaceous, 1-celled, 1-seeded, ovoid, the persistent reflexed calyx-lobes surrounding its base. *Seed* pendulous, germinating on the tree, the radicle elongate, perforating the apex of the fruit.

Leaves elliptic, long-mucronate, up to 4 in. broad; cymes 3-7-flowered on peduncles 1-1.25 in. long; petals fleshy, lanate on the faces within

1. *mucronata*.

Leaves oblong-lanceolate, short-mucronate, up to about 2 in. broad; cymes 2-flowered, on stout peduncles about .2 in. long; petals thin, glabrous..... 2. *Candelaria*.

1. RHIZOPHORA MUCRONATA, Lamk.; F. B. I. ii. 435; Wt. Ic. t. 238. *R. Candelaria*, W. & A. 310.

Tidal forests on both E. and W. Coasts. The Mangrove. A glabrous evergreen tree, often appearing buttressed by the mud being washed away from the branching aerial roots, the lower part of the stem dying off; usually also sending up conical excrescences from the roots, looking like inverted tent-pegs. Bark brown, with vertical clefts, a valuable tanning material; wood dark red, very hard, an excellent fuel. Vern. *Tel.* Upoo-poma; *Tam.* Kandal.

2. RHIZOPHORA CANDELARIA, DC. *R. conjugata*, Hensl.; F. B. I. ii. 436 *not of* Linn.

Tidal forests on both coasts; more scarce than the preceding; common in the Kistna Delta.

A glabrous small evergreen tree, similar to *R. mucronata*. Vern. *Tam.* Kandal.

### 2. *Ceriops*, Arn.

Shrubs or small trees with aërial roots from the stem and branches. *Leaves* opposite, ovate or obovate, entire, coriaceous.

*Flowers* small, in short rather dense axillary cymes; bracteoles connate under the calyx. *Calyx* 5-6-lobed, the tube adnate to the ovary. *Petals* 5-6, inserted at the base of a 10-12-lobed fleshy disk; emarginate, the apex more or less ciliate. *Stamens* 10-12, inserted between the lobes of the disk; filaments slender; anthers oblong. *Ovary* semi-inferior, 3-celled, 2 pendulous ovules in each cell; style short; stigma simple. *Fruit* coriaceous, 1-celled, 1-seeded, with persistent reflexed calyx-lobes. *Seed* as in *Rhizophora*, the radicle grooved and angular.

Petals tipped with 3-4 capitate bristles.....1. *Candolleana*.  
 Petals tipped with many ciliae.....2. *Roxburghiana*.

1. CERIOPS CANDOLLEANA, Arn.; F. B. I. ii. 436; Wt. Ic. t. 240.

Tidal forests of the W. Coast; Quilon in Travancore (Wight). A small evergreen tree with many buttresses at base and root excrescences as in *Rhizophora*. Leaves obovate, usually emarginate. Bark dark red, giving a good tanning material; wood orange-red, hard, an excellent fuel. Vern. *Mal.* An kandal.

2. CERIOPS ROXBURGHIANA, Arn.; F. B. I. ii. 436.

Tidal forests of the E. Coast, Godavari and Kistna Deltas and elsewhere.

A small evergreen tree similar to the preceding, the leaves obovate. Vern. *Hind.* Goran; *Tel.* Gatharu; *Tam.* Chiru kandal.

3. **Kandelia**, W. & A.

A small tree with aërial roots from the stem and branches. *Leaves* opposite, coriaceous, oblong, obtuse, entire. *Flowers* few, large, in axillary pedunculate dichotomously branched cymes, white; bracteoles connate round the base of the calyx. *Calyx* 5-6-lobed; tube short, adnate to the ovary; lobes linear, valvate. *Petals* 5-6, thin, bifid, the lobes multifid. *Stamens* many; filaments capillary; anthers small, oblong. *Ovary* semi-inferior, 1-celled; ovules 6, affixed in pairs to a central column; style slender; stigma 3-lobed. *Fruit* 1-celled, 1-seeded, girt with the persistent reflexed calyx-lobes. *Seed* as in *Rhizophora*.

KANDELIA RHEEDII, W. & A. 311; F. B. I. ii. 437; Wt. Ill. t. 89.

Tidal forests of the W. Coast; less common on E. Coast.



A small tree with pretty flowers, the pendulous radicle of the seed very slender, cylindrical. Bark reddish-brown; wood soft, reddish-brown, used only for firewood. Vern. *Tel.* Thuvar kandan.

#### 4. *Bruguiera*, Lam.

Trees or shrubs with aërial roots from the stem and branches. *Leaves* opposite, coriaceous, entire. *Flowers* solitary or cymose on axillary peduncles; bracteoles 0. *Calyx*-tube obconic or campanulate, coriaceous, adnate to the ovary; lobes 8-14, linear-lanceolate, valvate. *Petals* 8-14, oblong, 2-lobed or emarginate, involute, with a bristle in the sinus and others, usually 2-4, at the tip of each lobe. *Stamens* twice the number of the petals, in pairs within the petals; filaments filiform; anthers linear, mucronate. *Ovary* inferior, 2-4-celled, cells 2-ovuled; style filiform; stigma 2-4-lobed. *Fruit* 1-celled, 1-seeded, indehiscent, coriaceous, crowned with the calyx-lobes. *Seed* as in *Rhizophora*.

Flowers large, solitary, calyx-lobes erect in fruit; radicle grooved:—  
 Petals glabrous except at the base; leaves elliptic, acute, up to 6 in. long by 2.5 in. broad.....1. *conjugata*.  
 Petals densely hirsute on the margins; leaves elliptic-oblong, acute or acuminate, up to 5 in. long by 2 in. broad.....2. *eriopetala*.  
 Flowers small, in axillary cymes; calyx-lobes recurved in fruit; petals short, obtuse, slightly hairy; leaves elliptic-lanceolate, acute, up to 4 in. long, 1.5 in. broad; radicle almost terete.....3. *cylindrica*.

1. BRUGUIERA CONJUGATA, Merr. in Philipp. Journ. Sc. ix. 118. *B. gymnorhiza*, Lam.; F. B. I. ii. 437; W. & A. 311; *B. Rheedii*, Bl.; Wt. Ic. t. 293A.

Tidal forests of both coasts.

A rather large evergreen tree with short stout grooved rugose radicle; root excrescences frequent. *Wood* red, extremely hard, used for building and fuel. Vern. *Hind.* Kankra; *Tel.* Thuddu ponna.

2. BRUGUIERA ERIOPETALA, W. & A.; F. B. I. ii. 438; Wt. Ic. t. 239B.

Tidal forests of Travancore on W. Coast.

A small tree, similar to the preceding but scarce.



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### 6. Weihea, Spreng.

Trees or shrubs. *Leaves* opposite, petioled, entire or obtusely serrate. *Flowers* axillary, solitary or fascicled; bracteoles 2, connate in a cup, at length a short distance below the calyx. *Calyx*-tube shortly turbinate, adnate to the ovary; lobes 4-5, spreading, valvate. *Petals* 4-5, inserted under the margin of an obscure disk, clawed, spathulate, fimbriate. *Stamens* 16-30, inserted on the disk; filaments filiform; anthers oblong. *Ovary* superior, 3-celled, 2 pendulous ovules in each cell; style filiform; stigma 2-4-lobed. *Fruit* globose, fleshy, splitting in 3-4 valves, 3-4-celled, the cells 1-2-seeded. *Seeds* ovoid, arillate, albuminous; cotyledons flat; radicle terete.

WEIHEA ZEYLANICA, Baill.; F. B. I. ii. 441; Bedd. Fl. t. 194.

W. Gháts, in the hills of Travancore and Tinnevelly, at low elevations.

A small tree with thin ovate acuminate leaves and white flowers. Vern. *Tam.* Kanun.

### 7. Blepharistemma, Wall.

A tree. *Leaves* opposite, petioled, membranous, elliptic-oblong, acuminate, crenate. *Flowers* polygamo-dioecious, in many-flowered axillary cymes; bracteoles 0. *Calyx*-tube campanulate, adnate to the base of the ovary; lobes 4, erect. *Petals* 4, clawed, spathulate, lacerate at apex, inserted round an 8-lobed disk, the disk lobes long in ♂, shorter in ♀. *Stamens* 8, inserted on the margin of the disk, small in ♀; filaments ciliate; anthers oblong. *Ovary* free, 3-celled, 2 ovules in each cell; style short in ♂, longer in ♀; stigma shortly 3 lobed. *Fruit* a fleshy capsule.

BLEPHARISTEMMA CORYMBOSUM, Wall.; F. B. I. ii. 441.

W. Coast and W. Gháts, from Coorg to Travancore, up to 2,500 ft., in evergreen forest.

A handsome straight-stemmed tree, in favourable situations reaching a considerable size, with white flowers and greenish-black fruit. Wood pale greenish-yellow, moderately hard. Vern. *Mal.* Nir kurunda.

## Family LXII. COMBRETACEAE.

Trees or shrubs, often climbing. *Leaves* alternate subopposite or opposite, sometimes ternate, entire; stipules 0. *Flowers* hermaphrodite, rarely unisexual or polygamous, in spikes or racemes often panicled; bracteolate. *Calyx*-tube adnate to the ovary and produced above it, the limb 4-5-lobed, the lobes valvate. *Petals* 4-5 or 0, inserted on the calyx, alternate with its lobes. *Stamens* as many as, or twice as many as the calyx-lobes, in 2 series; filaments filiform or subulate; anthers usually didymous. *Ovary* inferior, 1-celled, usually crowned with a lobed disk; ovules usually 2-3, sometimes more; style subulate; stigma simple. *Fruit* coriaceous or drupaceous, generally indehiscent, angular or winged, sometimes crowned by the persistent calyx. *Seed* 1; albumen 0; cotyledons convolute plicate or plano-convex.

Petals 0:—

Calyx-limb deciduous; erect trees or shrubs:—

Flowers in spikes or racemes .....1. **Terminalia.**

Flowers in capitate heads .....2. **Anogeissus.**

Calyx-limb accrescent in fruit; straggling shrubs...3. **Calycopteris.**

Petals 4-5:—

Calyx-limb persistent; leaves alternate; trees or shrubs

4. **Lumnitzera.**

Calyx-limb deciduous; leaves opposite; climbers:—

Calyx-tube not or only shortly produced beyond the ovary

5. **Combretum.**

Calyx-tube produced more than 5 in. beyond the ovary

6. **Quisqualis.**

### 1. **Terminalia**, Linn.

Trees. *Leaves* alternate or subopposite, entire or slightly crenulate, often with glands on the petiole or on the lower part of the midrib beneath; stipules 0. *Flowers* small, green or white, in spikes, the spikes solitary or in panicles; hermaphrodite or sometimes the upper flowers of the spike ♂, the lower ♂; bracteoles small, usually soon deciduous. *Calyx*-tube ovoid or cylindric, constricted above the ovary; limb campanulate with 5 triangular valvate lobes. *Petals* 0. *Stamens* 10 in 2 series, the 5 upper alternate with the calyx lobes, the 5 lower opposite them; filaments subulate, exserted; anthers small. *Disk* inside the

stamens, 5-lobed; villous. *Ovary* inferior, 1-celled; ovules 2-3, pendulous; style subulate; stigma small. *Fruit* ovoid, smooth or angular or winged with 2-5 equal or unequal wings, indehiscent. *Seed* solitary, exalbuminous; cotyledons convolute.

Fruit not winged, ovoid or subcompressed:—

Flowers in simple spikes; leaves clustered at the ends of the branchlets, alternate, obtuse:—

Leaves green, thin, obovate, base cordate, petiole very short; fruit ellipsoid, more or less compressed, 2-ridged when dry, glabrous ..... 1. *Catappa*.

Leaves greyish-green, thick, broadly elliptic, cuneate at base, petiole very long; fruit subglobose, very faintly 5-ridged when dry, minutely brown-tomentose ..... 2. *bellerica*.

Leaves glaucous, thick, ovate, rounded or attenuate at base, obtuse or emarginate at apex, petiole short; fruit obovoid, very faintly 5-ridged when dry, glabrous ..... 3. *pallida*.

Flowers in simple spikes or short terminal panicles; leaves not clustered at the ends of the branchlets, opposite or subopposite:—

Fruit minutely brown-tomentose, ovoid or ellipsoid, faintly 5-ridged when dry; leaves coriaceous, ovate or ovate-oblong, tawny-pubescent, up to 5 in. long by 3 in. broad, nerves irregular; spikes densely tawny-pubescent, as are the branchlets.... 4. *Gella*.

Fruit glabrous, shining:—

Leaves ovate elliptic or obovate, obtuse and usually apiculate at apex, usually rounded at base, under surface glabrous to tawny-villous, up to 7 in. long by 3-3.5 in. broad, nerves regular, parallel; spikes nearly glabrous; fruit obovoid, faintly angled, up to 1.5 in. long, 1 in. in diam..... 5. *Chebula*.

Leaves ovate-lanceolate, acuminate at apex, unequally attenuate or rounded at base, pubescent when young, glabrous when old, up to 4 in. long, 1-2 in. broad, nerves fairly regular; spikes slender, rusty-puberulous; fruit ovoid, covered with round spots, .75-1.25 in. long, .5 in. in diam.... 6. *travancorensis*.

Fruit with 5 equal angles or wings; flowers in panicles of spikes with linear bracteoles; leaves often more or less crenate or serrate:—

Fruit with short hard angles or wings, usually notched near the top, the lines on the wings oblique and curving upwards; leaves oblong or elliptic, usually crenulate; bark smooth..... 7. *Arjuna*.

Fruit with long thin papery wings, usually rounded at top, the lines on the wings straight and horizontal.

Fruit softly and minutely yellowish brown-velvety as are the



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is the Belleric myrabolam used in tanning, but of less value than that of *T. Chebula*. Vern. *Hind.* Bahera; *Ur.* Thara; *Tel.*, *Tam.* Tani; *Mal.* Thani.

3. *TERMINALIA PALLIDA*, Brand. Ind. Trees, 308.

Deccan, in dry deciduous forest, in Cuddapah, Kurnool, N. Arcot and Chingleput, chiefly on rocky hills, up to 2,000 ft.

A small subevergreen tree with glaucous leaves, glabrous flowers and fruit similar in character and uses to that of *T. Chebula*. Vern. *Tel.* Tella karaka.

4. *TERMINALIA GELLA*, Dalz. in Hook. Journ. Bot. iii. 27; Bedd. Fl. ciii.

Deccan, Ramandrúg Hills of Bellary, Nandidrúg in Mysore; W. Gháts, in the lower E. Nilgiris, Pulneys and Ayamalai Hills, up to 3,000 ft.

A tree, probably of large size, with large velvety fruit, dense spikes and coriaceous leaves, the petioles .5–1 in. long, with two glands at apex below the blade.

5. *TERMINALIA CHEBULA*, Retz; Roxb. Cor. Pl. t. 197; F. B. I. ii. 446 *in part*; Brand. For. Fl. t. 29.

N. Circars and Deccan, in deciduous forests; W. Coast and W. Gháts, on dry slopes up to 3,000 ft. The Myrabolam tree.

A large tree in good soil, a small one in dry rocky places and at high elevations, the leaves usually tawny-pubescent with short petioles up to .5 in. long, bearing 2 glands below the blades, the fruit very variable in size and shape. These fruits, Chebulic myrabolams, give a valuable tanning material and a yellow dye. Bark dark brown; wood brownish-grey, very hard, used in building and for agricultural work. Vern. *Hind.* Harra; *Ur.* Karedha; *Tel.* Karaka; *Tam.* Kadakai.

Var. *tomentella*, C. B. Clarke in F. B. I. ii. 446. Under surface of leaves villous beneath with reddish hairs.

N. Circars, in the hills of Ganjam and Godavari.

6. *TERMINALIA TRAVANCORENSIS*, W. & A. 314. *T. angustifolia*, Roxb.; F. B. I. ii. 449; Bourd. in Journ. Bomb. Nat. Hist. Soc. xii. 351, t. 4.

W. Gháts, evergreen forests of Travancore, up to 2,000 ft. (Bourdillon).

A lofty tree with glabrous lanceolate leaves, the petiole .75 in. long, without glands. Bark pale brown, smooth; wood pale brown, hard. Vern. *Tam.* Pei kadakai, Morgatchie; *Mal.* Kotta kadakai.

7. *TERMINALIA ARJUNA*, W. & A. 314 (in note); F. B. I. ii. 447; Bedd. Fl. t. 28. *T. Berryi*, W. & A. 314.

N. Circars and Deccan, more scarce in Carnatic except in Tinnevelly and on the W. Coast, on the banks of rivers and streams, often planted.

A large and handsome deciduous tree usually with narrow oblong leaves, the stems often buttressed. Bark pinkish-grey, smooth; wood brown, variegated with darker streaks, very hard and useful. Vern. *Hind.* Arjuna; *Ur.* Arjuno; *Tel.* Yermaddi; *Tam.* Vella marda, Kula maruthu.

8. *TERMINALIA CORIACEA*, W. & A. 315. *T. tomentosa* var. *coriacea*, C. B. Clarke in F. B. I. ii. 448.

Deccan, on dry hills in deciduous forest, chiefly in the Ceded Districts and up to 4,500 ft. as at Horsleykonda.

A large tree in suitable localities, otherwise often stunted. Noticeable for the abundant yellowish velvety down. Bark deeply cracked; wood hard, dark brown. Vern. *Tel.* Tani.

9. *TERMINALIA TOMENTOSA*, W. & A. 314. *T. tomentosa* var. *typica*, C. B. Clarke in F. B. I. ii. 447; Wt. Ic. t. 195 probably.

N. Circars, deciduous forests of Ganjam and Godavari; Deccan, in Hyderabad and Bellary.

A large tree with the under-surface of the leaves villous, also the inflorescence; the fruit large, glabrous. Bark rough, much fissured; wood as in the preceding. Vern. *Hind.* Asan, Saj; *Ur.* Sahaju; *Tel.* Tani.

10. *TERMINALIA CRENULATA*, Roth; W. & A. 314. *T. tomentosa*, var. *crenulata*, C. B. Clarke in F. B. I. ii. 448.

W. Coast and W. Gháts, from S. Canara southwards, up to 2,000 ft.

A large tree with nearly glabrous rather thin leaves and glabrous fruit. Bark greyish-black; wood dark brown, streaked with black, hard and useful for building and agricultural purposes. Vern. *Tam.* Karu maruthu; *Mal.* Thembava.

11. *TERMINALIA PANICULATA*, Roth; F. B. I. ii. 448; W. & A. 315; Bedd. Fl. t. 20.



S. Deccan, in the deciduous forests of Cuddapah and Bellary; W. Gháts, in deciduous forests from S. Canara to Travancore, common up to 2,000 ft.

A large deciduous tree with characteristic fruit. Bark dark brown, cracked; wood pale brown, smooth, very hard, a useful building wood. Vern. *Tel.* Neemeeri; *Tam.* Pe-karakai, Vem-marúthu; *Mal.* Pillai marúthu.

## 2. *Anogeissus*, Wall.

Trees or shrubs. *Leaves* alternate or subopposite, petioled, entire. *Flowers* in dense globose heads on short axillary peduncles or in short cymes; bracts on the peduncles or at the cyme branches often leafy; bracteoles minute. *Calyx*-tube slender above the ovary; limb cup-shaped with 5 lobes. *Petals* 0. *Stamens* 10, in 2 series; anthers small. *Ovary* inferior, 1-celled; ovules 2, pendulous; style subulate. *Fruits* packed in dense heads, compressed, 2-winged, ending in the persistent calyx-tube and sometimes limb. *Seed* 1; cotyledons convolute.

Leaves elliptic or suborbicular, up to 3 in. long, 2-2.5 in. broad, obtuse at apex, rounded or sometimes cordate at base; flower-heads usually in cymes; calyx-tube rather short, about .1 in. long, lobes reflexed; fruit broadly winged, the wings rounded, entire.....1. *latifolia*.

Leaves elliptic-lanceolate, up to 2.5 in. long, 1 in. broad, acute at apex, narrowed at base; flower-heads usually solitary on bracteate peduncles; calyx-tube long and slender, about .25 in., lobes spreading; fruit fairly broadly winged with dentate wings .....2. *acuminata*.

1. *ANOGEISSUS LATIFOLIA*, Wall.; F. B. I. ii. 450; Bedd. Fl. t. 15. *Conocarpus latifolia*, DC.; W. & A. 316; Wt. Ic. t. 994.

N. Circars, Deccan and Carnatic to S. Travancore, in dry deciduous forests and up to 4,000 ft.

A large deciduous tree, conspicuous by its smooth grey bark and by the leaves turning red before falling. Wood grey, hard, with a small purplish heartwood, strong and tough and useful for agricultural implements, carts, building and fuel. It gives a gum and the leaves are used in tanning. Vern. *Hind.* Bakli; *Ur.* Dohu; *Tel.* Chiriman; *Tam.* Vellay naga; *Mal.* Maru kanchiram.

var. *villosa*, C. B. Clarke. Leaves densely rusty-villous.

S. Deccan, in Mysore and N. Nilgiris.



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LUMNITZERA RACEMOSA, Willd.; F. B. I. ii. 452; W. & A. 316. E. and W. Coasts, in mangrove swamps.

An evergreen tree of shrubby growth with rather small leaves and white flowers. Bark thick, brown, rough; wood hard, greyish-brown with a darker heartwood, used for posts and as fuel. Vern. *Tel.* Kadivi, Thandara; *Tam.* Tipparathai.

### 5. Combretum, Linn.

Shrubs, usually straggling or climbing. *Leaves* entire, opposite, petiolate, sometimes alternate or ternate. *Flowers* polygamodioecious, spicate, the spikes often paniced; bracteoles small. *Calyx*-tube constricted above the ovary; limb campanulate or funnel-shaped; lobes 4-5. *Petals* as many as the calyx-lobes and inserted between them, sometimes 0. *Stamens* twice as many as the calyx-lobes, in 2 series; filaments slender; anthers small, didymous. *Ovary* inferior, 1-celled; ovules 2-5, pendulous; style subulate; stigma simple. *Fruit* dry, usually indehiscent, with 5 ridges or wings, the wings chartaceous. *Seed* usually solitary; testa membranous, protruded into the angles of the wings; cotyledons plicate, rarely convolute; radicle superior.

Flowers small, with campanulate calyx-limb and 5 calyx-lobes and petals, bracteoles linear, as long as flowers; leaves oblong, abruptly acuminate, up to 6 in. long, 2 in. broad, the transverse nervules many, horizontal, floral leaves cream-white; fruit with 5 papery wings, oblong, 1 in. long.....1. *decandrum*.  
Flowers with 4 calyx-lobes and petals, bracteoles minute; leaves all green, transverse nervules of leaves irregular, branching:—

Calyx-tube above the ovary widely campanulate; leaves ovate to lanceolate, often nearly orbicular, pale and thin when dry, variable in size; fruit with 4 papery wings, nearly globose in outline, .75 in. in diam.....2. *ovalifolium*.

Calyx-tube above the ovary funnel-shaped; leaves ovate to nearly orbicular with a short abrupt acumination, up to 5 in. long, 4 in. broad, coriaceous, greenish and shining when dry; fruit with 4 papery striate wings, globose in outline, 1.5 in. in diam.

3. *extensum*.

1. COMBRETUM DECANDRUM, Roxb. Cor. Pl. t. 59; F. B. I. ii. 452. *Poivreia Roxburghii*, DC.; W. & A. 317.

N. Circars, from Ganjam to Godavari, abundant in open forest land.

A large climbing shrub with white honey-scented flowers and cream-coloured conspicuous floral leaves, a troublesome forest climber, difficult to destroy. Vern. *Ur.* Atundi; *Tel.* Arikota.

2. *COMBRETUM OVALIFOLIUM*, Roxb.; F. B. I. ii. 458; W. & A. 317.

N. Circars, Deccan and Carnatic, in deciduous forest, up to 2,000 ft.; W. Coast, in S. Canara.

A large climbing shrub with large panicles of small flowers and rather small fruit. The branches are used for cattle-ropes. Vern. *Tam.* Verragay.

3. *COMBRETUM EXTENSUM*, Roxb.; F. B. I. ii. 458. *C. Wightianum*, Wall.; W. & A. 317; Wt. Ic. t. 227.

W. Coast, in S. Canara (Wight).

A large climbing shrub with large leaves and fruit and flowers in panicles of rather dense spikes.

## 6. *Quisqualis*, Linn.

Large straggling or climbing shrubs. *Leaves* opposite, oblong or obovate, entire. *Flowers* in short axillary or terminal spikes, white or red; bracteoles small. *Calyx*-tube produced above the ovary; limb 5-lobed. *Petals* 5. *Stamens* 10, short. *Ovary* 1-celled; ovules 3-4, pendulous; style filiform, somewhat adnate to the calyx-tube; stigma subcapitate. *Fruit* dry, coriaceous, 5-angled or 5-winged. *Seed* 1; cotyledons not convolute.

*QUISQUALIS MALABARICA*, Bedd. Ic. t. 155; F. B. I. ii. 460.

W. Gháts, Carcoor Ghát in Wynaad (Beddome) at 1,500 ft.; Travancore forests at 300 ft. (Bourdillon).

A large climbing shrub with calyx-tube about 5 in. long, pink petals, elliptic-ovate or -lanceolate acuminate leaves reaching 5 in. in length, the petioles hardening as rigid spines, and a *Combretum*-like 5-winged fruit about 1 in. long.

*Quisqualis indica*, Linn., is a large straggling or climbing shrub from the Malay Archipelago, with showy long-tubed flowers changing colour from white to orange and red, commonly cultivated in gardens in the plains.

### Family LXIII. MYRTACEAE.

Trees or shrubs, rarely herbs. *Leaves* entire, opposite or alternate, usually with an intramarginal nerve, and dotted with pellucid glands; stipules none or minute, deciduous. *Flowers* regular, hermaphrodite or rarely polygamous, axillary or terminal, solitary or in cymes or corymbs; bracteoles usually 2, sometimes 0. *Calyx*-tube adnate to the ovary and sometimes produced above it, sometimes with a disk at the mouth; limb of 4 or 5 persistent or deciduous lobes, often closed in bud. *Petals* as many as the lobes of the calyx and alternate with them, inserted on the margin of the disk or the mouth of the calyx-tube, imbricate, sometimes connate and falling as a calyptra. *Stamens* many, inserted within the petals in one or more rows, often bent inwards in bud; anthers 2-celled, dehiscing longitudinally. *Ovary* inferior or semi-inferior, 1- or more- but usually 2-celled, with many ovules, the ovules usually axile, sometimes pendulous; style simple; stigma small. *Fruit* crowned with the calyx-limb, a berry or capsule with many seeds, sometimes only 1, by arrest. *Seeds* exalbuminous.

Leaves opposite or very rarely alternate:—

Leaves with 3–5 ribs, very tomentose; ovary 3–6-celled, many-seeded.....1. **Rhodomyrtus.**

Leaves penninerved:—

Calyx-limb closed in bud, the lobes in flower valvate; ovary many-celled .....2. **Psidium.**

Calyx-limb 4–5-lobed, the lobes free; ovary usually 2-celled:—

Calyx-tube produced beyond the ovary; flowers in cymes, the stamens bent back inwards in bud at the middle:—

Calyx-tube with a thickened staminal disk at the mouth; flowers usually large, the petals falling free.....3. **Jambosa.**

Calyx-tube without a thickened staminal disk; flowers usually small, the petals falling off either free or more often as a calyptra .....4. **Syzygium.**

Calyx-tube not produced beyond the ovary; flowers solitary or fascicled or in short racemes, the stamens not bent inwards at the middle in bud, but only erect or incurved:—

Ovary with 2 cells and many axile ovules; flowers axillary or subterminal.....5. **Eugenia.**



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*PSIDIUM* GUAJAVA, Linn.; F. B. I. ii. 468.

An American plant, cultivated and run wild in most Districts.  
The Guava.

A small tree, much cultivated for its fruit. Bark smooth, thin, greenish-grey; wood greyish-brown. Vern. *Hind.* Amrud; *Tel.* Jama; *Tam.* Segapu; *Kau.* Sebe; *Mal.* Pela.

### 3. *Jambosa*, DC.

Trees. *Leaves* opposite, entire, pellucid-dotted, petioles short. *Flowers* large, 4-merous, jointed with the top of the pedicel, in terminal or rarely lateral cymes, the branches 3-chotomously divaricate; bracteoles 0. *Calyx*-tube more or less turbinate, usually attenuate at the base, the mouth produced beyond the ovary and furnished with a thickened staminal disk; lobes rounded, persistent. *Petals* 4, inserted on the top of the mouth of the calyx, broad, concave, obtuse, falling singly. *Stamens* very numerous, free, longer than the petals, bent inwards in the middle regularly when in bud, later unfolding. *Ovary* 2-celled, many-ovuled; style slender; stigma slightly acute. *Fruit* a 1-2-seeded fleshy berry, crowned by the calyx-limb and thickened disk. *Seeds* large, angled; cotyledons thick, fleshy; radicle small, concealed between the cotyledons.

Flowers pedicelled:—

Leaves rounded or cordate at base:—

Flowers in terminal corymbose cymes:—

Leaf-nerves and intramarginal nerve conspicuous, regular; leaves cordate at base:—

Leaves lanceolate, long-acuminate, 6-9 in. long, 1.5-2.5 in. broad; calyx-tube slender, .5-.75 in. long; fruit 1.5 in. in diam.....1. *Munroni*.

Leaves elliptic-oblong, acute or obtuse, 6-9 in. long, 3-3.5 in. broad; calyx-tube stout, .4 in. long; fruit 1 in. in diam.

2. *Mundagam*.

Leaf-nerves and intramarginal nerve not conspicuous, the latter irregular and often double; leaves elliptic, obtusely acute, rounded at base, 3-4.5 in. long, 1.5-2.5 in. broad; calyx-tube thick, subcylindric, .5 in. long ..... 3. *courtallensis*.

Flowers in lateral cymes on the old wood; leaves elliptic-ovate or -lanceolate, long acuminate, the nerves and intramarginal

nerve very conspicuous, 4-7 in. long, 2-4 in. broad; calyx-tube short, thick; fruit 1.5 in. in diam., spherical.....4. *Rama-Varma*.  
Leaves narrowed at base; flowers in terminal corymbose cymes:—  
Leaves elliptic or ovate:—

Leaf-nerves and intramarginal nerve somewhat obscure:—

Leaves ovate or elliptic, bluntly acuminate, 2.5 in. long, 1-2 in. broad; calyx-tube slenderly funnel-shaped below, suddenly broadening above, about .75 in. long; fruit ovoid, 1 in. in diam.....5. *laeta*.

Leaves elliptic, acute to caudate-acuminate, 3-7 in. long, 1-3 in. broad; calyx-tube shortly and stoutly obconic, about .4 in. long; fruit hemispherical, 1 in. in diam.

6. *hemispherica*.

Leaf-nerves and intramarginal nerve prominent; leaves narrowly elliptic-ob lanceolate, acuminate at both ends, the apex blunt, 3-4.5 in. long, 1-1.5 in. broad; calyx-tube campanulate, later hemispheric, .2 in. long; fruit apparently small

7. *Bourdillonii*.

Leaves linear or lanceolate, acuminate at both ends:—

Leaves 1.5-2 in. broad, the nerves and intramarginal nerve fairly prominent; calyx-tube funnel-shaped, .5 in. long; fruit globose, 1-2 in. in diam. ....8. *vulgaris*.

Leaves .5-.75 in. broad, the nerves and intramarginal nerve faint; calyx-tube very slender at base, broadly turbinate above, .7 in. long; fruit globose, .75 in. in diam... 9. *occidentalis*.

Flowers sessile; leaves broadly ovate, very coriaceous, obtuse at apex, shining, nerves and intramarginal nerve prominent but irregular, 4-5 in. long, 3 in. broad; calyx-tube narrowed below....10. *Beddomei*.

1. JAMBOSA MUNRONII, Walp. *Eugenia Munronii*, Wt.; F. B. I. ii. 472; Wt. Ic. t. 546.

W. Gháts, from S. Canara southwards, up to 5,000 ft., in evergreen forests.

A handsome tree with large reddish or white flowers and purplish-green fruit. Vern. *Tam.* Ilambili.

2. JAMBOSA MUNDAGAM, Gamble n. comb. *Eugenia Mundagam*, Bourd. For. Trees Trav. 182.

W. Gháts, in the evergreen forests of Travancore, up to 4,000 ft.

A medium-sized tree with white fragrant flowers. Bark smooth, brown; wood brown, rough, used for posts. Vern. *Tam.* Katta samba; *Mal.* Mundagam.



3. *JAMBOSA COURTALLENSIS*, Gamble in Kew Bull., 1918, 239.  
W. Gháts, hills of Tinnevelly (Wight).  
A tree.
4. *JAMBOSA RAMA-VARMA*, n. comb. *Eugenia Rama-Varma*,  
Bourd. in Ind. For. xxx, 147. t. 2.  
W. Gháts, in the evergreen forests of Travancore and  
Tinnevelly, above 4,000 ft.  
A medium-sized rare tree with white flowers, large leaves  
and greenish-pink fruit.
5. *JAMBOSA LAETA*, Bl. *Eugenia laeta*, Ham.; F. B. I. ii. 479.  
*E. pauciflora*, Wt. Ic. t. 526.  
W. Gháts, in evergreen forests from S. Canara southwards,  
up to 4,000 ft.  
A medium-sized pretty tree with rather small leaves, white  
petals and very long crimson stamens. Bark smooth,  
white; wood brownish-grey, hard.
6. *JAMBOSA HEMISPHERICA*, Walp. *Eugenia hemispherica*,  
Wt.; F. B. I. ii. 477; Wt. Ic. t. 525; Bedd. Fl. t. 203.  
W. Gháts, from S. Canara southwards, up to 3,000 ft., in  
evergreen forests.  
A large tree with white or rose-coloured flowers and purple  
fruit. Bark smooth, blackish; wood brown, hard. Vern.  
*Tam.* Vellei nyaral; *Mal.* Ven nyára.
7. *JAMBOSA BOURDILLONII*, Gamble in Kew Bull., 1918, 239.  
W. Gháts, hills of Travancore at 2,000 ft. (Bourdillon).  
A medium-sized tree.
8. *JAMBOSA VULGARIS*, DC. W. & A. 332; Wt. Ic. t. 435.  
*Eugenia Jambos*, Linn.; F. B. I. ii. 474.  
Cultivated in gardens and sometimes found run wild—  
chiefly on old cultivations. The Rose-apple.  
A small pretty tree with greenish-white flowers and pinkish-  
white fruit, edible but not very good. Vern. *Hind.* Gulab  
jaman.
9. *JAMBOSA OCCIDENTALIS*, Gamble n. comb. *Eugenia occi-*  
*dentalis*, Bourd. in Ind. For. xxx. 195, t. 3.  
W. Gháts, banks of the Periyar river and elsewhere, always  
near water.  
A small handsome bushy tree with large white flowers,  
numerous stamens and greenish-pink globose fruit. Vern.  
*Tam.* Atta sámba.



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the nerves rather close and parallel; petals often many; fruit .5 in. long, scarlet.....4. *Wightianum*.  
Flowers in many-flowered terminal and axillary panicles of umbellules; calyx-tube under .3 in. long, greyish and gland-dotted :—

Leaves ovate, long-acuminate, up to 4 in. long, 1.5 in broad, usually rounded at base, petiole .1-.2 in. long; flower pedicels short, slender; fruit .2 in. in diam.....5. *zeylanicum*.

Leaves linear-lanceolate, acuminate, up to 3 in. long, .5 in. broad, narrowed at base, petiole .5 in. long; flower pedicels elongate, slender.....6. *lineare*.

Flowers in umbels of 5-10 at the ends of the branchlets; calyx-tube resinous-scaly, about .2 in. long, the lobes minute; leaves elliptic-oblong, obtuse, narrowed at base, .3-.5 in. long, .2 in. broad, petiole .1 in. long; pedicels very short...7. *microphyllum*.

Petals usually falling in one piece, calyptrate :—

Cymes terminal, more or less corymbose, sometimes also axillary to upper leaves :—

Branchlets tetragonous; flowers small; calyx-tube scarcely .1 in. in diam., turbinate :—

Leaves very coriaceous, elliptic to obovate or even orbicular, up to 6 in. long, 3 in. broad, nerves distant and prominent, but scarcely parallel, petiole very short, thick; inflorescence branches stout; fruit small, globose.....8. *montanum*.

Leaves coriaceous, ovate-lanceolate, caudate-acuminate, up to 3 in. long, 1-1.5 in. broad, nerves close and parallel, petiole very short; inflorescence branches slender; fruit small, globose .....9. *rubicundum*.

Branchlets terete :—

Leaves more than 1 in. broad :—

Leaves membranous, elliptic-ovate or -lanceolate, caudate-acuminate, green when dry, up to 3.5 in. long, 1.5 in. broad, petiole slender, nerves parallel, close and regular; inflorescence branches slender, divaricate nearly at right angles

10. *Gardneri*.

Leaves coriaceous, obovate, obtuse or emarginate, dark brown when dry, up to 4 in. long, 1.5 in. broad, petiole very short, stout, nerves parallel, reticulate between them; inflorescence branches moderately thick, ascending

11. *caryophyllaeum*.

Leaves less than 1 in. broad :—

Leaves suborbicular or obovate, often slightly emarginate,

very coriaceous, up to 1 in. long, .75 in. broad, the nerves close; flowers in close terminal corymbs; calyx-tube ovoid, .15 in. long; fruit oblong or obovoid, up to .5 in. long

12. *calophyllifolium*.

Leaves obovate, abruptly obtusely acuminate at apex, cuneate at base, coriaceous, prominently glandular, up to 2 in. long, .75 in. broad, the nerves somewhat distant; flowers in lax terminal and axillary cymes; calyx-tube funnel-shaped, .35 in. long.....13. *palghatense*.

Cymes mostly axillary, occasionally terminal:—

Peduncles 2–4 in. long, their branches also long, ascending; leaves chartaceous, ovate, obtuse, narrowed at base and decurrent on the .75 in. long petiole, 3–4 in. long, 2–2.5 in. broad; nerves few, distant, irregular, joining in loops only; flower buds small, scarcely .1 in. in diam.....14. *travancoricum*.

Peduncles nearly 1 in. long, their branches stout, divaricating at right angles; leaves elliptic, usually abruptly acuminate at apex, narrowed at base, up to 6 in. long, 2.5–3.5 in. broad, long-petioled, nerves many, parallel, joining in an intramarginal nerve; flower-buds rather large, about .25 in. in diam.

15. *Chavaran*.

Cymes lateral, usually from the scars of fallen leaves, sometimes also axillary:—

Leaves alternate, suborbicular or ovate, very coriaceous, large, reaching 8 in. long or longer, 6 in. broad; flowers in cymes with divaricating branches, the calyx-mouth .2 in. in diam. petals calyptrate; fruit nearly spherical, about .5 in. in diam.

16. *alternifolium*.

Leaves opposite:—

Petals free; leaves obovate to obcordate, thin, pale on both sides, nearly glaucous beneath, the nerves distant, meeting in loops only; flowers very small in very short branching cymes; fruit spherical, .25 in. in diam.....17. *malabaricum*.

Petals united, calyptrate:—

Nerves of leaf irregular, distant, anastomosing near the margin, but not producing a clearly marked intramarginal nerve:—

Branchlets terete, pale; leaves broadly obovate, often nearly orbicular, subcoriaceous, 3–8 in. long, 2–4 in. broad; inflorescence 2–2.5 in. long, the branches rather stout; fruit globose or ovoid, .25–.5 in. in diam.

18. *operculatum* var. *obovatum*.

Branchlets tetragonous, dark; leaves elliptic or elliptic-oblong, membranous, 4-6 in. long, 2-3 in. broad; inflorescence about 4 in. long, the branches slender, angled.

19. *Stocksi*.

Nerves of leaf joining in a distinct intramarginal nerve:—

Large tree; leaves over 1 in. broad, variable in shape but usually 3-6 in. long, usually acuminate, sometimes abruptly, the nerves close and parallel; flowers somewhat large, the mouth of the calyx-tube .2 in. in diam.; fruit oblong ellipsoid or globose.....20. *Jambolanum*.

Shrub or small tree; leaves narrow, oblong, 3-4 in. long, under 1 in. broad, the nerves close but slightly irregular; flowers small, the mouth of the calyx-tube about .1 in. in diam.; fruit obovoid, .5 in. long, crowned with the cup-like calyx-limb.....21. *Heyneanum*.

1. SYZYGIUM ARNOTTIANUM, Walp. *S. densiflorum*, Wall.; W. & A. 329. *Eugenia Arnottiana*, Wt.; F. B. I. ii. 483; Wt. Ic. t. 999.

W. Gháts, in Shola forests of the Nilgiris, Anamalais, Pulneys and Travancore Hills, at high levels, rarely lower than 5,000 ft.

A large tree with red young leaves and buds, cream-coloured flowers and dark purple fruit. Bark grey rough; wood greyish-brown, hard and close-grained; useful for building and fuel; one of the most important of the hill woods. Vern. *Tam.* Navál, Nagay; *Mal.* Ayri.

2. SYZYGIUM MYHENDRAE, Gamble n. comb. *Eugenia Myhendrae*, Bedd. MS.; Brand. Ind. Trees, 325.

W. Gháts, in the evergreen forests of Travancore and Tinnevelly, at 3,000-4,000 ft. (Beddome, Bourdillon).

A medium-sized handsome tree reaching 40 ft. in height, the flowers white, very small, the leaves small.

3. SYZYGIUM BENTHAMIANUM, Gamble n. comb. *Eugenia Benthamiana*, Wt. *E. Arnottiana* var. *Benthamiana*, Duthie in F. B. I. ii. 484.

W. Gháts, in the Nilgiri Hills, at Sispara, 6,000 ft. (Gardner).

Apparently a small tree or large shrub.

4. SYZYGIUM WIGHTIANUM, Wall.; W. & A. 330. *S. lanceolatum*, W. & A. 330. *Eugenia Wightiana*, Wt.; F. B. I. ii. 485; Wt. Ic. t. 529. *E. lanceolata*, Lam.; Wt. Ic. t. 530.



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W. Gháts, in the Anamalai, Travancore and Tinnevely Hills, up to 4,000 ft. in evergreen forests.

An enormous tree with slender branchlets, caudate leaves, white flowers and purple fruit. Bark smooth, white; wood dark reddish-brown with yellow patches, used for building in Travancore. Vern. *Tam.* Nir navál; *Mal.* Kari nyaral.

11. *SYZYGIUM CARYOPHYLLAEUM*, Gaertn.; W. & A. 329. *Eugenia caryophyllaea*, Wt.; Wt. Ic. t. 540; F. B. I. ii. 490.

W. Coast and W. Gháts from S. Canara southwards, up to 5,000 ft., especially near streams.

A small tree with white flowers and black globose fruit. Bark smooth, grey; wood brown, rather soft. Vern. *Mal.* Nyára.

12. *SYZYGIUM CALOPHYLLIFOLIUM*, Walp. *Eugenia calophyllifolia*, Wt.; Wt. Ic. t. 1,000; F. B. I. ii. 494.

W. Gháts, Shola forests of the Nilgiris above 6,000 ft., common and conspicuous.

A large evergreen tree with a rounded head, small leaves, white flowers and dark purple fruit. Bark thick, brown, rough; wood reddish-brown, hard and useful for building.

13. *SYZYGIUM PALGHATENSE*, Gamble in Kew Bull. 1918, 240.

W. Gháts, in the Palghat Hills of Malabar at 5,000 ft. (Beddome).

A large tree with conspicuously glandular leaves and long calyx-tube.

14. *SYZYGIUM TRAVANCORICUM*, Gamble in Kew Bull. 1918, 240.

W. Coast, in swampy places in the low country of Travancore, up to 200 ft. (Bourdillon).

A medium-sized or large tree with long-petioled leaves and small flowers in long-pedunculate corymbose axillary cymes.

15. *SYZYGIUM CHAVARAN*, Gamble n. comb. *Eugenia Chavaran*, Bourd. For. Trees Trav. 188.

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

A very large handsome tree with rather large white flowers, usually in axillary cymes, and large closely-nerved leaves. Wood useful, the trunks sometimes hollowed into boats. Vern. *Mal.* Chavaran.

16. SYZYGIUM ALTERNIFOLIUM, Walp. *Eugenia alternifolia*, Wt.; Wt. Ic. t. 537; F. B. I. ii. 497; Bedd. Fl. t. 198.  
Deccan, in the hills of Kurnool, Cuddapah and N. Arcot.  
A large tree with large alternate or subopposite leaves, yellowish-white scented flowers and globose fruit. The wood is dark red, hard and close-grained, and is in considerable demand for building purposes. Vern. *Tel.* Manchi moyadi, Mogi.
17. SYZYGIUM MALABARICUM, Gamble n. comb. *Eugenia malabarica*, Bedd. Fl. t. 199; F. B. I. ii. 497.  
W. Gháts, in the Wynaad forests of Malabar at 2,000–4,000 ft., generally in swampy places.  
A medium-sized tree with very small flowers in short lateral cymes and small globose fruit, the leaves pale when dry.
18. SYZYGIUM OPERCULATUM, Gamble n. comb. *Eugenia operculata*, Roxb.; F. B. I. ii. 498; Wt. Ic. t. 552. *E. cerasoides*, Roxb.; Wt. Ic. t. 615.  
Var. *obovatum*. *E. operculata* var. *obovata*, Duthie in F. B. I. ii. 498.  
N. Circars, forests of Gumsúr.  
A moderate-sized tree of rather dry grassy localities, usually in or near the Sál forests, the leaves turning red in the cold season, the flowers greenish, the fruit purple small and edible. Bark grey or light brown; wood reddish-grey. Vern. *Hind.* Piaman.
19. SYZYGIUM STOCKSII, Gamble n. comb. *Eugenia Stocksii*, Duthie in F. B. I. ii. 498.  
W. Gháts, Wynaad forests about 3,000 ft. (Beddome).  
A large tree with small flowers in axillary as well as lateral corymbose cymes.
20. SYZYGIUM JAMBOLANUM, DC.; W. & A. 329. *Eugenia Jambolana*, Lam.; F. B. I. ii. 499; Wt. Ic. t. 535; Bedd. Fl. t. 197. *E. caryophyllifolia*, Lam.; Wt. Ic. t. 553.  
All forest Districts, both in the plains and in the hills up to 6,000 ft., usually along river banks and in moister localities, but found even on coast sands on the one side and in W. Ghát Sholas on the other. Often cultivated in avenues and topes and for its fruit.  
A large evergreen tree with white flowers and purple fruit,



the latter in cultivation oblong and edible, good in tarts and puddings, in a wild state usually small and more or less globose. Bark smooth, light grey; wood hard, reddish-grey, useful for building and agricultural purposes. Vern. *Hind.* Jaman; *Ur.* Jamo; *Tel.* Neredu; *Tam.* Naval; *Kan.* Narala; *Mal.* Naga.

var. *axillare*, leaves thin, obovate, abruptly acuminate; flowers small, in axillary or lateral cymes; fruit globose, .2 in. in diam.

W. Gháts, lower hills of Travancore, in evergreen forests (Bourdillon).

21. SYZYGIUM HEYNEANUM, Wall. *Eugenia Heyneana*, Duthie in Fl. Br. Ind. ii. 500. *E. salicifolia*, Grab.; Wt. Ic. t. 539.

N. Circars and Deccan, in river-beds and along streams, westwards to Coorg, also in S. Travancore.

A large shrub or small tree with white flowers and narrow leaves.

### 5. *Eugenia*, Linn.

Trees or shrubs. *Leaves* opposite, entire, pellucid-dotted. *Flowers* moderate-sized, solitary or in fascicles or short cymes, axillary or terminal; bracteoles 2, below the calyx-tube, usually persistent. *Calyx*-tube nearly globose, not produced beyond the ovary, the limb of 4, rarely 5, persistent lobes; staminal disk, if present, broad. *Petals* 4, rarely 5, distinct. *Stamens* numerous, distinct. *Ovary* 2-celled, the cells often again divided by false partitions, ovules several in each cell; style slender; stigma simple. *Fruit* a nearly globose, 1- or 2-celled berry, crowned with the calyx-lobes. *Seeds* 1-2, large; cotyledons thick, partially combined; radicle very minute, scarcely distinguishable.

Young parts and inflorescence fulvous- or silvery-pubescent:—

Staminal disk broad:—

Leaves large, elliptic or obovate or suborbicular, very coriaceous, 3-5 in. long, 2-3.5 in. broad, floccose near the base when young like the innovations; flowers large, tawny-velvety, about 1 in. in diam., solitary or in short few-flowered terminal cymes; fruit about .5 in. in diam., densely tomentose.....1. *floccosa*.

Leaves usually under 3 in. long:—

Flowers on fairly long pedicels; leaves coriaceous:—

Pedicels solitary, .5-1 in. long, axillary or lateral among the leaves; leaves oblanceolate, obtuse, 1-2 in. long, .75 in. broad,



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A good-sized tree with white flowers, very velvety on the petals, large leaves and tomentose fruit.

2. *EUGENIA JOSSINIA*, Duthie in F. B. I. ii. 500. *Jossinia indica*, Wt.; Wt. Ic. t. 523.

W. Gháts, in the Sivagiri and Courtallum Hills of Tinnevelly.

A small tree or shrub.

3. *EUGENIA CALCADENSIS*, Bedd. Ic. t. 162; F. B. I. ii. 502.

W. Gháts, Nilgiris at Sispara, Silent Valley in Malabar at 3,000 ft., Calcad Hills of S. Tinnevelly at 2,000 ft. (Beddome).

A very pretty little tree with showy white flowers in pairs.

4. *EUGENIA DISCIFERA*, Gamble in Kew Bull. 1918, 239.

W. Gháts, hills of Travancore near Chimunji at 4,000 ft. (Bourdillon).

A small tree, the disk of the flowers broad and conspicuous.

5. *EUGENIA CODYENSIS*, Munro; F. B. I. ii. 501.

W. Gháts, from Coorg and S. Canara to Nilgiris and Travancore, in evergreen forests, at about 3,000 ft.

A shrubby little tree with greenish-white flowers.

6. *EUGENIA ROTTLERIANA*, W. & A. 331; F. B. I. ii. 502; Wt. Ic. t. 100.

W. Gháts, in the evergreen forests of Tinnevelly and Travancore at 4,000 ft.

A pretty little tree with small flowers.

7. *EUGENIA BRACTEATA*, Roxb.; F. B. I. ii. 502; W. & A. 331; Wt. Ill. t. 13. *E. Willdenowii*, Wt.; Wt. Ic. t. 545.

E. Coast, common on coast sandhills and in evergreen scrub forest from the Chilka Lake southwards; often cultivated in gardens.

A shrub, resembling myrtle, with pretty white flowers and red berries. Bark yellowish-grey, smooth; wood grey, hard, close-grained. Vern. *Ur*. Sagarabatna; *Tel*. Arivita; *Tam*. Kaya.

8. *EUGENIA ARGENTEA*, Bedd.; F. B. I. ii. 503.

W. Gháts, in the Wynaad forests of Malabar at 3,000 ft. (Beddome).

A shrub or small tree with silvery leaves and conspicuous filiform bracteoles under the calyx-tube.

9. *EUGENIA MOONIANA*, Wt.; Wt. Ic. t. 551; F. B. I. ii. 505.

W. Gháts, from S. Canara southwards, at 2,000–4,000 ft.

A small tree with white flowers and globose crimson fruit.

10. *EUGENIA SINGAMPATTIANA*, Bedd. Ic. t. 273; F. B. I. ii. 506.  
W. Gháts, in the Singampatti Hills of Tinnevely at 3,000 ft.,  
in moist forests.

A small dense tree with white flowers.

### 6. *Meteoromyrtus*, Gamble.

Small tree or shrub. *Leaves* opposite, membranous, pinnately-veined, villous when young. *Flowers* small, solitary, on axillary or supra-axillary pedicels, villous; bracteoles 2, linear, below the calyx-tube and longer than it. *Calyx*-tube short, not produced beyond the ovary, furnished with an annular disk at the mouth; lobes 4, lanceolate, villous, rather longer than the petals. *Petals* 4, suborbicular, pellucid-punctate. *Stamens* indefinite, inserted in a ring on the disk; anthers small, opening longitudinally. *Ovary* 2-celled, about 4-ovuled in each cell, the ovules pendulous from its apex; style elongate; stigma subcapitate. *Fruit* not yet known.

*METEOROMYRTUS WYNAADENSIS*, Gamble in Kew Bull. 1918, 241. *Eugenia wynaadensis*, Bedd. Ic. t. 161; F. B. I. ii. 506.

W. Gháts, about Devala in S.E. Wynaad, at 2,000–3,000 ft.

A small tree or large shrub with oblong, lanceolate, acuminate leaves, villous when young, afterwards glabrous, the rather distant nerves meeting in a looped intramarginal nerve; flowers on slender pedicels usually supra-axillary, with long linear bracteoles and lanceolate calyx-lobes, the petals pellucid-punctate and ciliate.

### 7. *Eucalyptus*, L'Hér.

Trees. *Leaves* usually opposite when young, when old different in shape and usually alternate, coriaceous, entire, pinnately-veined. *Flowers* on axillary peduncles, solitary or in umbels or heads of 3–many; bracts deciduous. *Calyx*-tube turbinate or campanulate, adnate at the base to the ovary, truncate at apex, sometimes with very small lobes. *Petals* 5, united in a calyptra which falls off by the pressure of the growing stamens. *Stamens* many, free, many-seriate; filaments filiform; anthers small. *Ovary* inferior, 3–4-celled; many ovules in each cell, subhorizontal; style slender;

stigma small. *Fruit* a hardened capsule, dehiscing loculicidally at the mouth. *Seeds* small, angular or linear-cuneate; testa membranous; cotyledons longer than the radicle.

#### EUCALYPTUS GLOBULUS, Labill.

An introduction from Australia, largely grown in forests on the Nilgiris and other hills of the W. Gháts and frequently found self-sown. The Blue Gum.

A lofty tree with very grey young leaves and narrow, green, linear-lanceolate, curved, vertically hanging old ones, white rather large flowers and rugose capsule, all parts very aromatic with a valuable essential oil which is largely extracted. Bark grey, the outer layers deciduous; wood grey with darker streak, smoderately hard, used in building but most especially for fuel.

Many other species of the genus are also found cultivated in gardens and plantations on the S. Indian hills.

### Family LXIV. LECYTHIDACEAE.

Trees. *Leaves* alternate, entire or shortly toothed, usually crowded at the ends of the branchlets; stipules 0. *Flowers* large, solitary or in axillary or terminal racemes. *Calyx*-tube enclosing the ovary; lobes usually 4-6, rarely 2-3, valvate or imbricate. *Petals* 4-6, rarely more or 0. *Stamens* many, in several series; filaments slender; anthers small, sometimes wanting. *Ovary* 2-6, rarely more-celled, many-ovuled, the ovules pendulous or horizontal; style long, slender; stigma capitate. *Fruit* a woody, fleshy or fibrous berry, with 1 or many seeds.

Fruit angular, fibrous, 1-seeded; stamens all perfect

#### 1. *Barringtonia*.

Fruit globose or ovoid, fleshy, many-seeded; stamens partly without anthers .....2. *Careya*.

#### 1. *Barringtonia*, Forst.

Trees. *Leaves* alternate, usually membranous, entire or crenate-serrate, penninerved. *Flowers* in elongate, terminal or lateral, racemes or interrupted spikes; bracts small, deciduous; bracteoles minute or 0. *Calyx*-tube scarcely produced above the ovary; limb of 2-4, rarely 5, lobes; lobes imbricate or valvate. *Petals* 4, rarely 5, imbricate, adnate at base to the staminal tube.



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celled, crowned by an annular disk; ovules many, in 2 rows in each cell, on vertical axile placentas; style long, filiform; stigma small. *Fruit* a large globose fibrous berry, crowned by the persistent calyx-limb. *Seeds* numerous, in fleshy pulp; albumen 0; embryo large with obsolete cotyledons.

CAREYA ARBOREA, Roxb. Cor. Pl. t. 218; F. B. I. ii. 511; W. & A. 334; Wt. Ill. tt. 99 and 100; Bedd. Fl. t. 205.

All Forest Districts, in deciduous forest, especially in N. Circars, up to 5,000 ft., conspicuous in grassy places.

A large deciduous tree with yellowish-white flowers, large obovate-serrate leaves and large globular fruit. Bark thick, dark grey, gives a good fibre and makes slow matches; wood red, hard, of good quality but little used. Vern. *Hind.*, *Ur.* Kumbi; *Tel.* Gadava, Dudippi; *Tam.* Ayma; *Mal.* Perzha:

#### Family LXV. MELASTOMACEAE.

Herbs or shrubs, sometimes climbing, rarely trees. *Leaves* opposite or rarely whorled, entire or nearly so, often ribbed from the base; stipules 0. *Flowers* regular, hermaphrodite, in spikes panicles or corymbs, rarely solitary or fascicled, usually bracteate and bracteolate. *Disk* sometimes present. *Calyx*-tube free or partly or entirely adherent to the ovary; limb 4-5-lobed, sometimes calyptrate. *Petals* as many as the calyx-lobes, inserted on the margin of the tube, imbricate. *Stamens* as many or often twice as many as the petals and inserted with them; filaments bent inwards in bud, often alternately shorter and longer; anthers 2-celled, basifixed, dehiscence usually by terminal pores, sometimes by slits; connective often appendaged near the base. *Ovary* 4-5-, rarely 3- or 6- or 1-celled; ovules usually numerous, on axile parietal or central placentas, sometimes few; style terminal, usually filiform. *Fruit* usually enclosed in the calyx-tube, capsular or baccate, dehiscent irregularly or by slits at the top of the cells. *Seeds* many (usually 1 in *Memecylon*); albumen 0; cotyledons small (in *Memecylon* large and convolute).

Leaves 3- or more-ribbed from the base; ovary 4-5-celled, ovules and seeds many:—

Petals 4 or 5:—

Seeds curved; flowers usually large and often showy:—

Stamens equal; fruit opening by pores at its apex

1. **Osbeckia.**

Stamens unequal; fruit bursting irregularly.....2. **Melastoma.**

Seeds straight, stamens equal:—

Flowers moderately large, fleshy and red, petals 4; climber

3. **Kendrickia.**

Flowers rather small, pink or white, somewhat fleshy; epiphytic shrubs .....

4. **Medinilla.**

Petals 3; seeds straight; stamens equal; inflorescence scorpioid;

herbs .....

5. **Sonerila.**

Leaves not ribbed but penninerved with faint intramarginal nerves; ovary 1-celled, few-ovuled; seed 1.....6. **Memecylon.**

### 1. **Osbeckia**, Linn.

Herbs, undershrubs or shrubs, usually erect, branches usually 4-angled. *Leaves* opposite or sometimes ternate, entire, 3-7- or sometimes 9-ribbed. *Flowers* terminal, solitary capitate or paniced, purple-pink or white, often conspicuous; bracts conspicuous, sometimes involucrate. *Calyx*-tube urceolate or subglobose, sometimes much produced beyond the ovary, usually covered with bulbous-based bristles which are solitary or in sessile or stalked clusters or on pectinate scales; lobes 4 or 5, subulate or lanceolate, variously bristly, alternating with as many appendages usually stellately bristly. *Petals* 4 or 5, usually broadly obovate, ciliate. *Stamens* 8 or 10, equal or subequal; anthers oblong, truncate attenuate or beaked. *Ovary* semi-inferior, 4-5-celled, bristly at apex; ovules numerous in each cell on placentas radiating from the axis; style long, simple. *Fruit* a capsule opening by pores at its apex. *Seeds* many, curved, minutely tuberculate.

Flowers pentamerous (also, sometimes, *O. cupularis*); anthers attenuate at tip:—

Calyx-tube with simple bristles only; leaves 3-5-ribbed, outer pair of ribs very slender:—

Leaves elliptic, .5-1 in. long, .5 in. broad, acute at apex, obtuse at base, pale greenish when dry, bristles on upper surface many small adnate, also few large adnate only at base; branchlets strigose; calyx-lobes ovate, obtuse, appendages very short with only about 3 bristles.....1. *minor*.

Leaves elliptic, 1-1.75 in. long, .5-1 in. broad, acute at apex, acute or obtuse at base, yellowish-green when dry, bristles on upper



surface distant, lineolate, thick, completely adnate except a minute mucro; branchlets glabrous; calyx-lobes ovate-lanceolate, acuminate, appendages triangular with few bristles, one long

2. *lineolata*.

Leaves oblong-lanceolate, 1-2.25 in. long, .5-.75 in. broad, acute at apex, obtuse at base, slightly yellowish when dry, bristles on upper surface slender, adnate except a short point; branchlets scabrous; calyx-lobes ovate oblong, rounded and stellately bristled at apex, ciliate on margins and with few bristles on back, appendages short with a small tuft.....3. *aspera*.

Calyx-tube with simple bristles below, tufts above; leaves 3-7-ribbed, outer pair slender:—

Calyx-lobes broad, obtuse or retuse, appendages cylindrical with a tuft of many bristles:—

Calyx-lobes many-bristly at apex and in a line on back; leaves elliptic, acute at apex, rounded at base, 1-1.5 in. long, .75 in. broad, bristles on upper surface slender, half adnate, half free; ribs 3 with a slender intramarginal pair.. .....4. *courtallensis*.

Calyx-lobes few-bristly at apex only; leaves lanceolate, acuminate at apex, narrowed at base, 2-4 in. long, 1-1.5 in. broad, bristles on upper surface sparse, slender, half adnate; ribs 5-7, the outer 2 pairs slender.....5. *Kleinii*.

Calyx-lobes short, acute, few-bristly at apex, appendages short, cylindrical with about 3 bristles; leaves lanceolate, acuminate, 1-2 in. long, bristles on upper surface few, slender, adnate below; ribs 5, the outer pair intramarginal.....6. *Lawsoni*.  
Calyx-tube with conspicuous tufts of bristles, rarely simple at the base only:—

Tufts of bristles sessile as are appendages; calyx-lobes ovate, obtuse, bristly at apex, ciliate on margins; branchlets fleshy, glabrous, bluish when dry; leaves oblong-lanceolate, 1-1.5 in. long, .3-.5 in. broad, 3-ribbed, lineolate on upper, nearly glabrous on lower surface.....7. *sublaevis*.

Tufts of bristles stalked as are appendages:—

Stalks of bristle-tufts and appendages very short, the bristles woolly, the tufts large, .5-1 in. broad; leaves ovate, densely tawny-bristly on both surfaces, reticulate; ribs 7-9

8. *reticulata*.

Stalks of bristle-tufts and appendages elongate:—

Shrubs with many branches; leaves 5-ribbed:—

Calyx-lobes obtuse or emarginate at apex, the bristles pale and bulbous-based:—



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Calyx-tube in fruit .15 in. long with 4 short lobes, each with a stellate cluster of bristles at tip, appendages similarly crowned on very short stalks; leaves elliptic, subacute, up to 2 in. long, 1 in. broad, drying greenish.....18. *truncata*.

Calyx-tube in fruit .25 in. long with 4 or 5 triangular lobes, each with a stellate cluster of bristles at tip, appendages long-stalked, stellately bristle-tipped; leaves elliptic or elliptic-ovate, acute, up to 1.5 in. long by .75 in. broad, drying yellowish...19. *cupularis*.

Calyx-tube in fruit .25 in. long with triangular ciliate lobes; leaves narrowly lanceolate, 2-3 in. long, about .5 in. broad, strigosely hairy above, shortly hispid beneath ..... 20. *gracilis*.

1. OSBECKIA MINOR, Triana. *O. aspera*, Wt. Ic. t. 377.

W. Coast, in Travancore (Wight, Horsley).

A small shrub with small whitish-hairy leaves and purple-red flowers.

2. OSBECKIA LINEOLATA, Gamble in Kew Bull. 1918, 241.

W. Gháts, Nilgiri and Pulney Hills, at high levels, up to 6,000 ft.

A small erect shrub with glaucous branches and leaves drying yellowish-green, the upper surface with large lineoles, flowers purple-red.

3. OSBECKIA ASPERA, Blume; F. B. I. ii. 519 *in part*; W. & A. 323 *in part*.

W. Gháts, Courtallum in Tinnevely Hills (Mitchel).

A small undershrub with purple flowers.

4. OSBECKIA COURTALLENSIS, Gamble in Kew Bull. 1918, 242.

W. Gháts, Courtallum in Tinnevely (Wight).

A small shrub with red-purple flowers.

5. OSBECKIA KLEINII, W. & A. 323 *in note*. *O. aspera*, Bl. var. *Kleinii*, C. B. Clarke in F. B. I. ii. 519.

W. Coast, in Cochin and Travancore.

An erect undershrub with purple-red flowers in terminal leafy panicles and rather large leaves, sparsely bristly.

6. OSBECKIA LAWSONI, Gamble in Kew Bull. 1918, 242.

W. Gháts, Murchison in Travancore, at 2,000 ft. (Lawson).

A small erect undershrub with purple flowers in short terminal panicles.

7. OSBECKIA SUBLAEVIS, Cogn. in DC. Monog. vii. 321.

W. Gháts from Mysore to Nilgiris, on rocks at about 7,000 ft.

A small fleshy shrub with smooth glabrous glaucous bluish branches and bright purple flowers in small terminal corymbose cymes.

8. OSBECKIA RETICULATA, Bedd.; Fl. Br. Ind. ii. 520.  
*O. alveolata*, Bedd. Ic. t. 168.  
W. Gháts, in the Anamalais and Pulneys, at 6,000–7,000 ft.  
A large, very handsome shrub reaching 10–15 ft. in height, the whole plant except the deep purple petals covered with ferruginous hairs.
- 9 OSBECKIA TRAVANCORICA, Bedd. ex Gamble in Kew Bull. ined.  
W. Gháts in the lower hills of Travancore (Beddome).  
An undershrub easily known by its stems being clothed with long retrorse bristles.
10. OSBECKIA WIGHTIANA, Benth.; F. B. I. ii. 419; W. & A. 323; Wt. Ic. t. 998.  
W. Gháts, in the Nilgiri, Anamalai and Pulney Hills, at 4,000–7,000 ft., often in rocky places.  
A much-branched shrub reaching 8 ft. or more in height, with handsome purple flowers and pale-brown silky foliage, the leaves whitish beneath, like the calyx-tube.
11. OSBECKIA LESCHENAULTIANA, DC.; F. B. I. ii. 520.  
*O. Gardneriana*, Wt. Ic. t. 997.  
W. Gháts, in the Nilgiri and Pulney Hills, at 6,000–8,000 ft., in damp places.  
A branching shrub 8–10 ft. high with handsome purple flowers in terminal capitate heads, the calyx and small leaves with rufous hairs.
12. OSBECKIA OCTANDRA, DC.; F. B. I. ii. 521. *O. virgata*, Don in W. & A. 323; Wt. Ic. t. 376.  
W. Gháts, from the Nilgiris to Travancore, at about 3,000 ft.  
A slender undershrub with small purple flowers and dark foliage, the leaves lanceolate.
13. OSBECKIA WYNAADENSIS, C. B. Clarke in F. B. I. ii. 521.  
W. Gháts, in Wynaad, at about 4,000 ft.  
A slender erect undershrub with purple flowers in sub-terminal corymbs, large long-petioled leaves and very characteristic comb-like scales on the calyx-tube.
14. OSBECKIA HISPIDISSIMA, Wt. Ic. t. 1612; F. B. I. ii. 516.  
N. Circars, Mahendragiri Hill in Ganjam, 4,500 ft.

(Gamble), Madgol Hills of Vizagapatam, at 5,000 ft. (A. W. Lushington). Deccan, in Mysore, at Wostara (Cleghorn). A very hispid erect undershrub with large crimson flowers.

15. *OSBECKIA* *ROSTRATA*, D. Don; F. B. I. ii. 517.

Var. *pulchella*, Triana. *O. recalva*, Bedd. M.S. in Herb. Kew and B.M.

Carnatic, in the Sirumalai Hills, at 3,500 ft., in swampy places (Beddome).

An erect glabrous shrub reaching 4–6 ft. high, with rosy-purple flowers.

16. *OSBECKIA* *CHINENSIS*, Linn.; F. B. I. ii. 515.

N. Circars, Madgol Hills of Vizagapatam, about 4,000 ft. (A. W. Lushington).

An erect slender undershrub, reaching about 2 ft. in height with pale mauve flowers in capitate leafy heads.

17. *OSBECKIA* *ZEYLANICA*, Willd.; F. B. I. ii. 516; W. & A. 322.

N. Circars, Deccan and Carnatic, especially near the coast.

An erect annual herb with small purple mauve flowers in leafy capitate heads.

18. *OSBECKIA* *TRUNCATA*, Don in W. & A. 322; F. B. I. ii. 514; Wt. Ic. t. 375.

W. Coast from S. Canara to Travancore.

An erect annual herb with small purple flowers.

19. *OSBECKIA* *CUPULARIS*, Don in W. & A. 323; F. B. I. ii. 514. *O. Leschenaultiana*, Wt. Ic. t. 996, not of DC.

W. Gháts, from Coorg to Nilgiris and Pulneys, at 3,000–7,000 ft., in grass.

A herbaceous plant from a perennial rootstock, the flowers white tinged with pink, calyx-lobes and petals as often 5 as 4.

20. *OSBECKIA* *GRACILIS*, Bedd. in Trans. Linn. Soc. xxv. 216; F. B. I. ii. 518.

W. Gháts, Sispara Ghát, in the W. Nilgiris, at 4,000 ft. (Beddome).

An erect slender plant with purple flowers in few-flowered terminal panicles and narrow leaves, the calyx-tube greyish-blue when dry.



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A very ornamental ivy-like climber, the lower stems adhering by rootlets, the branches free and pendent, the leaves various in shape.

#### 4. *Medinilla*, Gaud.

Erect or scandent, often epiphytic, branching shrubs. *Leaves* opposite or whorled, entire, often fleshy, ribbed from the base of the blade. *Flowers* pink or white, in terminal panicles or axillary or lateral cymes, 4-5- rarely 6-merous, sometimes solitary; bracts sometimes coloured, usually deciduous. *Calyx*-tube usually ovoid or cylindrical, the limb entire or obscurely toothed. *Petals* usually 4 or 5, ovate oblong or obovate, acute, somewhat fleshy. *Stamens* twice as many as the petals, equal; anthers opening by a terminal pore; connective with 2 tubercles in front at the base and a spur behind. *Ovary* inferior, 4-6-celled, with many ovules on axile placentas; style filiform. *Fruit* a berry, crowned by the limb of the calyx. *Seeds* numerous, ovoid or subfalcate, the raphe often thickened.

Leaves 3-5-ribbed, elliptic lanceolate, 3-3.5 in. long, 1.5 in. broad, usually acute at both ends, thinly fleshy; flowers axillary, fascicled, peduncles 1-3-flowered; stamens with very short anthers, the tubercles and spur very small .....1. *malabarica*.

Leaves 3-ribbed, the outer ribs obscure and close to the margin, orbicular, 1.5 in. in diam., very fleshy; flowers axillary on solitary peduncles; stamens with long, curved, acuminate anthers, the tubercles and spur prominent.....2. *Beddomei*.

1. *MEDINILLA MALABARICA*, Bedd. Ic. t. 157; F. B. I. ii. 548.

W. Gháts, in the Nilgiris and Anamalais, at 3,000-7,000 ft. (Beddome).

An epiphytic subscandent shrub, the flowers and their peduncles, the petioles and the bases of the leaves all of a brilliant crimson colour.

2. *MEDINILLA BEDDOMEI*, C. B. Clarke in F. B. I. ii. 548.

*M. radicans*, Bedd. Ic. t. 184, not of Blume. *Triplectrum radicans*, W. & A. 324.

W. Gháts, from Coorg to Wynaad and perhaps further south, at 2,000-3,500 ft.

An epiphytic fleshy shrub, rooting from the joints of the stems.

5. *Sonerila*, Roxb.

Herbs, sometimes shrubby below, sometimes stemless, often fleshy. *Leaves* opposite, the pairs equal or unequal, entire or serrulate, ribbed or nerved from near the base or penninerved. *Flowers* mostly purple reddish or white, in scorpioid cymes. *Calyx-tube* funnel-shaped campanulate or hemispheric; teeth 3, short. *Petals* 3. *Stamens* 3, rarely 6, equal, anthers oblong or lanceolate, connective without appendage. *Ovary* inferior, 3-celled, many-ovuled, the placentas axile; style simple, filiform; stigma small or capitellate. *Fruit* a capsule, enclosed in the persistent calyx-tube, dehiscing apically by 3 valves. *Seeds* very many, minute, smooth or tuberculate, the raphe forming a lateral appendage.

Stems erect, elongate:—

Leaves membranous:—

Small soft herb with very small flowers and small truncate anthers; stems glandular-pilose, often winged; leaves ovate, under 1 in. long, with a pair of slender nerves from above the base .....1. *tenera*.

Erect suffrutescent herbs with rather large flowers and acuminate or rostrate anthers:—

Leaves with one slender pair of nerves from the base, a stronger pair a short way up covered with scattered bristly hairs, oblong-lanceolate, subentire, 1-1.5 in. long; fruiting capsule smooth, ribbed.....2. *Clarkei*.

Leaves with 2-3 pairs of nerves from the base and a pair or more of nerves a short way up, all ascending almost to the apex and joining in loops:—

Leaves glabrous or nearly so, minutely serrate on the margins:—

Leaves under 2.5 in. long, acuminate at apex, rounded at base, the petiole up to 1.25 in. long; fruiting capsule glabrous .....3. *Brunonis*.

Leaves 3-4 in. long, acuminate at apex, cordate at base, the petiole about 2 in. long; fruiting capsule glandular, hairy .....4. *elegans*.

Leaves with ferruginous silky hairs on both surfaces, acute at apex, narrowed at base, the margins ciliate, 1-3 in. long, the petiole about 1 in.; fruiting capsule with few glandular hairs.....5. *travancorica*.



Leaves penninerved with 8-10 nerves on either side of midrib, ovate-lanceolate, long-acuminate, the base subcordate, unequal, 3-4 in. long, sharply serrate; fruiting capsule glabrous

6. *versicolor*.

Leaves, also stems, thick and fleshy :—

Calyx-tube and lobes glandular-pilose; leaves ovate, acute at apex, rounded or cordate at base, 7-9-ribbed from the top of the usually long petiole, up to 3 in. long by 1.5 in. broad, sharply bristly-serrate, sparsely glandular-pilose or glabrous...7. *speciosa*.

Calyx-tube glabrous, smooth, in fruit funnel-shaped from a thick pedicel; leaves lanceolate, acute at apex, narrowed and shortly auricled at base, conspicuously 3-ribbed from the top of the short petiole, up to 1.5 in. long, .6 in. broad, sharply serrate, glabrous

8. *grandiflora*.

Stems creeping; calyx-tube in fruit campanulate from a slender pedicel; leaves ovate, acute at apex, rounded at base, slenderly 3-5-ribbed from the top of the petiole, up to 1.75 in. long, 1 in. broad, sharply bristly-serrate, glabrous.....9. *pulneyensis*.

Stemless or with only short weak stems; capsule hemispheric, with a rim :—

Stems up to 6 in. long, quadrangular, sometimes hardly any; leaves penninerved, ovate-lanceolate, acute, rounded or cordate often unequally, at base, up to 4 in. long by 1.5 in. broad, sparsely bristly; peduncles up to 3 in. long with 4-8 flowers.....10. *Rheedii*.

Stemless :—

Leaves ovate or ovate-lanceolate, usually cordate at base; peduncles more than 4-flowered :—

Slightly crispate-hairy; leaves with 3-4 pairs of nerves from the base, 2-3 on each side further up, up to 5 in. long, 3 in. broad, acuminate, minutely serrate; petals narrow; capsule .1 in. long.....11. *Wallichii*.

Glabrous; leaves with 2 pairs of nerves from the base, 1 pair further up, up to 2 in. long, 1 in. broad, acute, crenate-serrate; petals broad; capsule .15 in. long .....12. *scapigera*.

Leaves orbicular, deeply cordate at base, 2-3 pairs of nerves from the base, others above, up to nearly 1 in. in diam., minutely serrate; peduncles less than 4-flowered; petals broad; capsule .1-.15 in. long.....13. *rotundifolia*.

1. *SONERILA TENERA*, Royle Ill. t. 45, fig. 2; F. B. I. ii. 530.

N. Circars, in Ganjam (Gamble); W. Gháts, in Wynaad at 4,000 ft. on rocks, occasional south to Tinnevelly.

A small weak herb with small pink flowers.



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A very pretty fleshy undershrub with purple flowers, sometimes paler, the small leaves prominently ribbed.

9. *SONERILA PULNEYENSIS*, Gamble in Kew Bull. 1919, 226.

W. Gháts, in the Pambar Ravine, Pulneys (Bourne).

A straggling fleshy plant rooting from the stems, the flowers not known.

10. *SONERILA RHEEDII*, W. & A. 321.

W. Gháts, Coorg to Malabar and Wynaad, at about 3,000 ft., on wet rocks.

A small short-stemmed or stemless plant with violet flowers.

11. *SONERILA WALLICHII*, Benn. ; F. B. I. ii. 538.

W. Gháts, from Wynaad to the Anamalais, at 3,000 ft. and upwards.

A stemless plant with bright pink or mauve flowers.

12. *SONERILA SCAPIGERA*, Dalz. ; F. B. I. ii. 538.

W. Gháts, Bababudan Hills of Malabar (Law).

A stemless glabrous plant with mauve flowers in many-flowered racemes.

13. *SONERILA ROTUNDIFOLIA*, Bedd. ; F. B. I. ii. 538 ; Bedd. Ic. t. 169.

W. Gháts, Malabar Hills, Nilgiris and Anamalais, on rocks at 4,000–6,000 ft.

A small stemless plant with rather large mauve flowers in few-flowered racemes, the peduncles bright red.

### 6. *Memecylon*, Linn.

Shrubs or trees, glabrous. *Leaves* opposite, coriaceous, sessile or shortly petioled, nerves inconspicuous, joining a usually inconspicuous intramarginal nerve. *Flowers* usually axillary (in axils of same year's leaves) or lateral (in axils of fallen leaves on old wood), fascicled or in simple or paniced cymes or umbellules; bracteoles 2 or more, at or near the base of the pedicels. *Calyx*-tube above the ovary campanulate or saucer-shaped, limb truncate or shortly 4-lobed, often coloured, enclosing a frequently rayed disk. *Petals* 4, blue or white, rarely reddish. *Stamens* 8, equal; filaments long; anthers short, opening by slits, the connective thickened at the back, ending in a spur or horn. *Ovary* 1-celled; ovules 6–12, on a central placenta; style filiform, simple. *Fruit* a globose or ellipsoid berry, crowned by the calyx-limb, normally

1-seeded. *Seed* large, testa crustaceous, cotyledons convolute, foliaceous.

Leaves petioled, acute at base, not cordate, rarely rounded:—

Flowers sessile or very shortly pedicellate; in fascicles on axillary or lateral tubercles:—

Leaves lanceolate, acuminate; flowers axillary:—

Leaves up to 10 in. long by 2·5 in. broad with prominent intramarginal nerves connected by about 10–16 prominent straight nerves with the midrib; flower-fascicles about ·5 in. broad, pedicels very short with lanceolate bracteoles; calyx-tube campanulate, disk rays prominent and raised.....1. *Heyneanum*.

Leaves up to 4 in. long by 1·25 in. broad, the 6–10 nerves and intramarginal nerve faint; flower-fascicles ·2 in. broad, the few flowers sessile, bracteoles ovate; calyx-tube campanulate, disk-rays very faint ..... 2. *Lawsoni*.

Leaves elliptic-ovate, up to 3·5 in. long, 1·5 in. broad, shortly and obtusely acute to acuminate at apex, narrowed at base, dull and yellowish when dry, intramarginal nerve and about 6 branching nerves often visible; peduncles very short, fascicled, axillary and lateral, flowers sessile in umbels, with ovate bracteoles and campanulate calyx-tube, disk rays not apparent .....3. *Talbotianum*.

Leaves elliptic or elliptic-obovate, under 2 in. long, 1 in. broad, nerves not visible, petiole very short; flowers axillary or lateral:—

Leaves green when dry; branchlets very slender, pale; tubercle small, flowers very shortly pedicellate with small bracteoles; calyx above the ovary saucer-shaped, disk rays obscure

4. *Lushingtonii*.

Leaves yellowish when dry; branchlets slender, nodose, rough, ultimate often quadrangular; tubercles small, flowers shortly pedicellate with lanceolate bracteoles; calyx above the ovary campanulate, disk rays obscure ..... 5. *flavescens*.

Flowers clearly pedicellate, in pedunculate cymes:—

Cymes branched, lateral, the ultimate branches umbellulate:—

Leaves linear-lanceolate up to 3 in. long by ·5 in. broad, obtuse at apex, intramarginal nerve close to the margin, the nerves ascending; calyx above the ovary saucer-shaped, the disk clearly but not thickly rayed ..... 6. *angustifolium*.

Leaves ovate or ovate-elliptic, under 2 in. long by ·75 in. broad, obtuse or emarginate at apex, dull above, yellowish when dry, nerves not visible; calyx campanulate, the disk rays conspicuous, raised ..... 7. *umbellatum*

Leaves ovate, acute or obtuse or emarginate at apex, acute or obtuse at base, shining above, up to 4 in. long by 1.5 in. broad, when dry the upper surface greenish, the lower brown, intramarginal nerve and about 8-10 pairs of nerves faintly visible; peduncles about .25 in. long; calyx campanulate, the disk rays slightly raised.....8. *edule*.

Leaves ovate, acute or acuminate at apex, acute or obtuse at base, sometimes shining above, up to 7 in. long by 2 in. broad, nerves and intramarginal nerves slightly visible when dry; peduncles about .5 in. long, pedicels filiform; calyx cup-shaped, the disk rays conspicuous.....9. *grande*.

Cymes branched, the ultimate branches not distinctly umbellate:—

Cymes axillary, 3-flowered, pedicels filiform with bracteoles above the base, peduncles .25-.5 in. long; leaves ovate-lanceolate, caudate-acuminate, up to 2 in. long, .7 in. broad; calyx cup-shaped, white, disk distinctly rayed.....10. *gracile*.

Cymes lateral, short, few-flowered:—

Leaves green when dry, ovate-lanceolate, caudate-acuminate, 2-3.5 in. long, .75-1.5 in. broad, the intramarginal nerve and about 8 pairs of nerves visible but faint; cymes scarcely .2 in. long.....11. *madgolense*.

Leaves yellow when dry, narrowly ovate-oblong, obtuse or emarginate, under 2 in. long, .75 in. broad, intramarginal nerve and about 6-8 pairs of nerves faintly visible; cymes .5 in. in diam.; calyx in fruit saucer-shaped, disk rays apparent; branchlets quadrangular.....12. *molestum*.

Leaves sessile or nearly so, cordate or sometimes rounded at base:—

Flowers fascicled, singly or in very short-peduncled cymes on lateral tubercles, or rarely axillary:—

Leaves shortly (.1 in.) -petioled, rounded or slightly cordate at base, ovate-oblong, obtuse at apex, up to 3.5 in. long by 1.5 in. broad, intramarginal nerves and about 10 nerves visible; pedicels .2 in. long; calyx campanulate above the ovary, the teeth acute, disk rays faint.....13. *sisparensis*.

Leaves sessile, cordate at base, ovate, obtusely acute, up to 2.5 in. long by 1.5 in. broad; pedicels .15 in. long; calyx campanulate above the ovary, the teeth acute, disk rays faint

14. *malabaricum*.

Leaves sessile or very shortly (scarcely .1 in.) -petioled, cordate, oblong-lanceolate, acuminate, up to 6 in. long by 1.5 in. broad;



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6. MEMECYLON ANGUSTIFOLIUM, Wt.; F. B. I. ii. 562; Wt. Ic. t. 276.  
W. Gháts, in forests near Courtallum in Tinnevelly (Wight), usually on river banks.  
A shrub reaching 6–8 ft. in height with purplish-blue flowers and black-purple berries.
7. MEMECYLON UMBELLATUM, Burm. f. *M. ramiflorum*, Lamk.; W. & A. 319. *M. tinctorium*, Koen.; W. & A. 319; Wt. Ill. t. 93. *M. edule* var. *ramiflora*, C. B. Clarke in F. B. I. ii. 563.  
E. Coast Districts from the Kistna southwards; Deccan, from Cuddapah and N. Arcot to Coimbatore, in forests on the slopes; W. Coast, in Travancore.  
A large shrub with yellowish foliage and small yellow berries, the flowers blue.
8. MEMECYLON EDULE, Roxb. Cor. Pl. t. 82; F. B. I. ii. 563 *in part only*.  
N. Circars, in Ganjam, up to 4,500 ft. on Mahendragiri; Deccan, hills of N. Arcot and Cuddapah, common in dry evergreen forests.  
A large shrub with blue flowers and black-purple, edible, fleshy berry .25 in. in diam., the leaves shining on the upper surface. Bark light brown, rough; wood light brown, very hard and close-grained, a good fuel. Vern. *Ur*. Nirása; *Tel*. Alli; *Tam*. Kaya.
9. MEMECYLON GRANDE, Retz; F. B. I. ii. 557; W. & A. 320. *M. edule* var. *ovata*, C. B. Clarke in F. B. I. ii. 564.  
W. Coast Districts from S. Canara to Travancore; W. Gháts, in the lower Pulney Hills.  
A large shrub with rather long-peduncled cymes, largish leaves and brownish-black berry .25 in. in diam.
10. MEMECYLON GRACILE, Bedd. Ic. t. 164; F. B. I. ii. 555.  
W. Gháts, evergreen forests of Travancore and Tinnevelly at 1,000–3,000 ft., a common undershrub.  
A pretty shrub with zig-zag branches, pale blue flowers and globose berry .25 in. in diam. The wood makes good walking-sticks.
11. MEMECYLON MADGOLENSE, Gamble in Kew Bull. 1919, 227.  
N. Circars, Madgol Hills of Vizagapatam at 3,000–4,500 ft. (A. W. Lushington).  
A shrub, the berries about .15 in. in diam.

12. MEMECYLON MOLESTUM, Cogn. *M. edule* var. *molesta*, C. B. Clarke in F. B. I. ii. 564.  
W. Gháts, in the Nilgiri and Anamalai Hills at about 6,000 ft.  
A tree reaching 30–40 ft. in height, with bright blue conspicuous flowers, the berries .2 in. in diam.
13. MEMECYLON SISPARENSE, Gamble in Kew Bull. 1919, 227.  
W. Gháts, on Sispara Ghát in W. Nilgiris, at 5,000 ft. (Gamble).  
A large shrub or small tree with flower clusters about 1 in. in diam., the petals blue, calyx red.
14. MEMECYLON MALABARICUM, Cogn. *M. amplexicaule* var. *malabarica*, C. B. Clarke in F. B. I. ii. 559 in part.  
W. Gháts, in moist sholas of the Nilgiri and Pulney Hills at 4,000–6,000 ft.  
A small tree with bright blue flowers in clusters about .5 in. in diam., the calyx red. Wood greyish-brown, very hard and close-grained, a good fuel.
15. MEMECYLON DECCANENSE, C. B. Clarke in F. B. I. ii. 560. *M. Heynerum*, W. & A. 319, not of Benth.  
W. Coast, in Malabar and Travancore at low levels.  
A shrub, apparently scarce, the flowers blue with red calyx, the berries black, .15 in. in diam., the flowers sometimes axillary.
16. MEMECYLON SUBCORDATUM, Cogn. *M. amplexicaule* var. *cordata*, Wight; F. B. I. ii. 559.  
S. India, precise locality not known.
17. MEMECYLON DEPRESSUM, Benth. *M. amplexicaule* var. *malabarica*, C. B. Clarke in F. B. I. ii. 559 in part.  
W. Coast and lower slopes of W. Gháts in Malabar and Travancore, up to 1,200 ft.  
A shrub, rather variable in leaves, the branchlets sometimes terete, sometimes tetragonous; berries black, .3 in. in diam.
18. MEMECYLON TERMINALE, Dalz.; F. B. I. ii. 558. *M. amabile*, Bedd. Ic. t. 163; F. B. I. ii. 555.  
W. Gháts, in the hills of S. Canara up to 2,000 ft. (Beddome).  
A slender, pretty shrub reaching about 10 ft. in height, with pale blue flowers.



### Family LXVI. LYTHRACEAE.

Trees, shrubs or herbs. *Leaves* usually decussate, rarely alternate or verticillate, entire; stipules 0 or minute, generally deciduous. *Flowers* hermaphrodite, regular or sometimes zygomorphic, solitary or in axillary dichasia, sometimes paniculate; bracts and bracteoles small, usually deciduous. *Calyx-tube* persistent, cup-shaped campanulate or tubular; lobes 3-6, valvate, often with accessory appendages alternating with them. *Petals* as many as the calyx-lobes, alternate with them, inserted on the mouth of the tube, sometimes 0, frequently clawed and wrinkled. *Stamens* as many as, or twice as many as, the calyx-lobes or very many, inserted on the calyx-tube. *Ovary* free, in the bottom of the calyx-tube, 1-6-celled; the ovules on axile placentas; style long; stigma capitate. *Fruit* a dehiscent or indehiscent capsule opening by valves or irregularly, usually many-seeded. *Seeds* various in shape, sometimes winged; cotyledons flat or convolute.

Low, usually aquatic herbs with very small flowers; calyx membranous:—

Placenta in the ovary not continuous with the style:—

Fruit dehiscent, opening in valves, the valves minutely horizontally striate ..... 1. **Rotala.**

Fruit indehiscent, opening irregularly, the walls not striate

2. **Ammannia.**

Placenta in the ovary continuous with the style, the fruit operculately or irregularly dehiscing.....3. **Nesaea.**

Trees or shrubs; calyx moderately thick:—

Flowers zygomorphic; calyx-tube tubular, curved; shrub with under surface of leaves black-dotted.....4. **Woodfordia.**

Flowers actinomorphic; calyx-tube not curved:—

Capsule circumsciss; flowers 6-merous, solitary in the leaf-axils; fleshy.....5. **Pemphis.**

Capsule 3-6-valved; flowers 6-merous; stamens many; seeds winged.....6. **Lagerstroemia.**

Capsule irregularly dehiscing; flowers 4-merous; stamens 8; seeds pyramidal.....7. **Lawsonia.**

#### 1. **Rotala**, Linn.

Annual or rarely perennial herbs of wet places, stems often tetragonous. *Leaves* verticillate, opposite and decussate or rarely



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1. *ROOTALA OCCULTIFLORA*, Koehne.

W. Coast, in Malabar (G. Thomson, quoted by Koehne).

A small water-herb with linear verticillate leaves and long bracteoles.

2. *ROOTALA VERTICILLARIS*, Linn.; W. & A. 303; Wt. Ic. t. t. 260 A. *Ammannia Rotala*, C. B. Clarke in F. B. I. ii. 567.

E. Coast, from Nellore (Bourne) southwards to Tranquebar (Rottler).

A small herb of ricefields with verticillate linear leaves.

3. *ROOTALA ILLECEBROIDES*, Koehne. *Ammannia pentandra* var. *illecebroides*, C. B. Clarke in F. B. I. ii. 569.

W. Gháts, in the Anamalai Hills, at 3,500 ft. (Fischer); no locality (Wight).

A very slender water-herb with erect slender stems, the leaves ovate-cordate, the calyx-lobes with conspicuous hair-like acumination.

4. *ROOTALA LEPTOPETALA*, Koehne. *Ammannia pentandra*, Roxb.; F. B. I. ii. 568 *in part*.

Plains Districts, chiefly on the East Coast, in moist places.

A herb 3 to 12 in. high with usually erect stems and rather few branches, hardly distinct from *R. densiflora*.

5. *ROOTALA DENSIFLORA*, Koehne. *R. Roxburghiana*, Wt. Ic. t. 260 B. *Ammannia pentandra*, Roxb.; F. B. I. ii. 568 *in part*.

Most plains Districts, in moist places.

A herb reaching 6-12 in. high with many divaricating floriferous branches.

6. *ROOTALA FIMBRIATA*, Wt. Ic. t. 217. *Ammannia pentandra* var. *fimbriata*, C. B. Clarke in F. B. I. ii. 569.

Deccan, in Mysore, in ricefields and on tank borders (Wight), Horsleykonda, in Cuddapah, at 4,000 ft. (Gamble, Fischer).

A rather large herb reaching nearly 2 ft. in height, the lower nodes rooting, the leaves linear cordate.

7. *ROOTALA INDICA*, Koehne. *Ammannia peploides*, Spr.; F. B. I. ii. 566. *Ameletia indica*, DC.; W. & A. 303; Wt. Ic. t. 257 A.

Most Districts in ricefields and other wet places, in the hills up to 2,000 ft.

An extensively rooting much-branched herb, the obovate

spathulate thickly marginate stem leaves much larger than the slender floral ones which make short leafy spikes.

8. *ROOTALA ROTUNDIFOLIA*, Koehne. *Ammannia rotundifolia*, Roxb.; F. B. I. ii. 566; W. & A. 306 *in part.*

All Districts, in ricefields and other wet places, up to 7,000 ft. in the hills.

An extensively creeping herb forming large patches, conspicuous for its terminal spikes of pretty rose-coloured flowers.

9. *ROOTALA MACRANDRA*, Koehne. *Ammannia rotundifolia*, W. & A. 306 *in part.* *Ameletia rotundifolia*, Wt. Ic. t. 258.

W. Gháts, in the hills of Malabar (Bourne), Anamalais (Wight).

A flaccid herb, creeping and rooting at base, much branched, scarcely distinct from *R. rotundifolia*.

## 2. *Ammannia*, Linn.

Annual (or perhaps biennial sometimes) glabrous herbs of wet places, stems more or less tetragonous. *Leaves* decussate, sessile, often cordate at base; stipules 0. *Flowers* small, 4- or rarely 5-merous, in axillary sessile or pedunculate dichasia; bracteoles pale, membranous. *Calyx*-tube campanulate, later globose; lobes 4, triangular; appendages 0 or very short. *Petals* alternate, when present, between the calyx-lobes, sometimes 0. *Stamens* 4 or 8, on the calyx-tube. *Ovary* sessile, incompletely 1-5-celled; style erect; stigma capitate. *Fruit* a capsule, breaking up irregularly or circumsciss, the walls very thin, membranous, not striate. *Seeds* very many, small, a raphe on the inner face.

Style filiform; leaves usually auriculate-cordate; petals present:—

- Capsule as long as or longer than the calyx-tube; flowers pedicellate; stamens 4, included; petals small or absent ..... 1. *multiflora*.  
 Capsule hidden in the calyx-tube; flowers subsessile; stamens 8, long exserted; petals 1 in. long.....2. *octandra*.  
 Style thick; leaves narrowed or somewhat cordate at base; petals 0; capsules lightly longer than the calyx-tube; stamens 4...3. *baccifera*.

1. *AMMANNIA MULTIFLORA*, Roxb.; F. B. I. ii. 570; W. & A. 305.

All plains Districts, in wet places.

A small erect herb with narrow leaves.

2. *AMMANNIA OCTANDRA*, Linn. f.; F. B. I. ii. 571; Roxb. Cor. Pl. t. 133; W. & A. 304.

East Coast, on tank borders.

A rather large erect herb with large rose-coloured petals.

3. *AMMANNIA BACCIFERA*, Linn.; F. B. I. ii. 569. *A. vesicatoria*, Roxb.; W. & A. 305.

All plains Districts, in wet places.

An erect herb reaching sometimes 2 ft. in height, the leaves narrowed at the base.

- Var. *aegyptiaca*, Koehne. *A. salicifolia*, C. B. Clarke in F. B. I. ii. 569. Leaves more or less cordate at base, the flowers and capsule larger.

Most Districts of the Circars and Deccan, and up to 5,000 ft. in the Nilgiri Hills.

### • 3. *Nesaea*, Comm.

Annual or perennial herbs or undershrubs, stems often tetragonous. *Leaves* decussate or verticillate, sessile or shortly petioled; stipules 0. *Flowers* small, solitary and axillary, or in axillary dichasia; bracteoles 2. *Calyx*-tube campanulate urceolate or globose, herbaceous, lobes 4-8, appendices usually short or 0. *Petals* as many as the calyx-lobes, inserted between them, sometimes absent. *Stamens* 4-many, inserted on the calyx-tube. *Ovary* sessile, glabrous, 2-5-celled; ovules many; style 0 or short; stigma capitate. *Fruit* a globose or ellipsoid capsule, at first opening with an operculum, later irregularly below; placenta central, running up to the style, the valves remaining as wings. *Seeds* minute, flattened or hollowed on one side.

Leaves attenuate at base; calyx-tube usually pubescent, appendages horn-like, prominent.....1. *lanceolata*.

Leaves cordate and subamplexicaul at base; calyx-tube glabrous, appendages short ..... 2. *brevipes*.

1. *NESAEA LANCEOLATA*, Koehne. *Ammannia lanceolata*, Heyne; F. B. I. ii. 570.

Circars, Deccan and Carnatic, in wet places, near the Coast.

2. *NESAEA BREVIPES*, Koehne. *Ammannia cordata*, W. & A. 304; F. B. I. ii. 570.

Circars and Deccan.



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silky pubescent small leaves under 1·5 in. long and pink flowers.

### 6. *Lagerstroemia*, Linn.

Trees or shrubs. *Leaves* opposite, distichous or the uppermost alternate, entire, petiolate, often glaucous beneath; stipules 2, deciduous. *Flowers* often large and showy, in axillary racemes often forming terminal usually trichotomous panicles; bracts 2, at the apex of the peduncles; bracteoles 2, on the pedicels. *Calyx-tube* campanulate, coriaceous, smooth or ribbed; lobes 6, valvate. *Petals* 6, sometimes more, inserted on the top of the calyx-tube, clawed, the blade wrinkled, the margins crispate. *Stamens* numerous, inserted near the base of the calyx-tube; filaments long, exserted. *Ovary* sessile, 3-6-celled; ovules many, ascending, on axile placentas; style long, curved; stigma capitate. *Fruit* an ellipsoid woody loculicidal capsule, 3-6-valved. *Seeds* numerous, flat, erect, falcately winged at the apex, testa hard; cotyledons orbicular, thin, convolute,

Ovary glabrous :—

Calyx-tube smooth without :—

Petals white, rather small, shortly clawed :—

Calyx-tube with a ring inside the lobes appressed to the capsule in fruit; leaves greyish and glabrous or shortly pubescent beneath, rounded at base .....1. *parviflora*.

Calyx-tube without a ring; leaves narrowed at base :—

Leaves glabrous or downy and bluish-white beneath up to 4 in. long; flowers scarcely ·25 in. broad; calyx lobes reflexed in fruit..... 2. *lanceolata*.

Leaves ferruginous-villous beneath, up to 6 in. long; flowers more than ·25 in. broad.....3. *Thomsonii*.

Petals variously coloured from white to crimson; leaves green beneath.....*indica*.

Calyx-tube ribbed without; petals large, mauve; leaves large, up to 8 in. long, green beneath.....4. *Flos-Reginae*.

Ovary densely villous; calyx-tube not ribbed, densely fulvous tomentose as is the under surface of the leaves.....5. *Rottleri*.

1. LAGERSTROEMIA PARVIFLORA, Roxb. Cor. Pl. t. 66; F. B. I. ii. 575; W. & A. 308; Wt. Ic. t. 69; Bedd. Fl. t. 31.

N. Circars and Deccán as far south as the N. Nilgiris, in deciduous forest.

A large deciduous tree with rather small white flowers and a woody capsule varying in size. Bark light brown, thin, exfoliating in long scales; wood hard, useful for building and agricultural purposes. Vern. *Hind.* Sida, Bakli; *Ur.* Sidha; *Tel.* Chinangi.

2. *LAGERSTROEMIA LANCEOLATA*, Wall.; F. B. I. ii. 576; W. & A. 309. *L. microcarpa*, Wt. Ic. t. 109; Bedd. Fl. t. 30.

Deccan, in the Sandúr Hills of Bellary, up to 4,000 ft. (A. W. Lushington); W. Gháts and W. Coast, common in deciduous and dry evergreen forests up to 3,000 ft.

A large deciduous tree with small white flowers and small capsules. Bark smooth, white, peeling off in papery flakes; wood reddish-brown, moderately hard, useful and valuable for building and other purposes. Vern. *Tel.* Ventaku; *Tam.* Vevala; *Mal.* Venthekku; *Kan.* Billi nandi.

3. *LAGERSTROEMIA THOMSONII*, Koehne in Engl. Pflzreich xvii. 257.

“Mysore and Carnatic” (G. Thomson), probably W. Gháts, apparently very rare.

4. *LAGERSTROEMIA FLOS-REGINAE*, Retz; F. B. I. ii. 577. *L. Reginae*, Roxb. Cor. Pl. t. 65; W. & A. 308; Wt. Ic. t. 413; Bedd. Fl. t. 29.

W. Gháts, from S. Canara through Malabar to Travancore, chiefly along river banks and up to 3,000 ft.; hills of the N. Circars (Roxburgh); much cultivated for ornament, sometimes for timber.

A large deciduous tree, very handsome from its large mauve flowers, the seed capsules remaining long. Bark smooth, usually grey; wood light red, hard, valuable for building, for ship work and furniture. Vern. *Hind.* Jarúl; *Tam.* Kadali, Pu maruthu; *Mal.* Mani maruthu.

5. *LAGERSTROEMIA ROTTLEI*, C. B. Clarke in F. B. I. ii. 576. Without locality (Rottler).

A well-marked but very little-known tree.

*Lagerstroemia indica*, Linn., is an ornamental large shrub or small tree, commonly cultivated in gardens, native of China.

## 7. Lawsonia, Linn.

A glabrous shrub, branches terete, branchlets sometimes tetragonous, ending in spines. Leaves opposite, entire, lanceolate;



stipules minute, deciduous. *Flowers* small, in terminal panicles; bracts small, deciduous. *Calyx*-tube short; lobes 4, spreading, ovate. *Petals* 4, obovate, wrinkled and crenate, inserted on the top of the calyx-tube. *Stamens* 8, inserted in pairs at the base of the calyx-tube and opposite the lobes; anthers oblong, the connective thick. *Ovary* subglobose, 2-4-celled; ovules many, on axile placentas; style long, thick; stigma capitate. *Fruit* a globose capsule, breaking up irregularly, ultimately 1-celled. *Seeds* numerous, pyramidal, closely packed; testa spongy; cotyledons orbicular, flat.

LAWSONIA INERMIS, Linn. *L. alba*, Lamk.; F. B. I. ii. 573; W. & A. 307; Wt. Ill. t. 87.

All plains Districts, cultivated as a hedge plant, perhaps wild on the Coromandel coast and in the Deccan. The Henna plant.

A deciduous shrub with white flowers and small leaves which give the "henna" dye. Bark greyish-brown, thin; wood grey, hard. Vern. *Hind.* Mehndi; *Ur.* Manghati; *Tel.* Gorinta; *Tam.* Marithondi; *Kan.* Gorantu.

### Family LXVII. SONNERATIACEÆ.

Trees or shrubs, glabrous. *Leaves* opposite, entire; stipules 0. *Flowers* regular, small or large, solitary or in panicles; bracts and bracteoles 0. *Calyx*-tube slightly united with the ovary; lobes 4-9, valvate. *Petals* as many as the calyx-lobes and alternate with them, sometimes 0. *Stamens* as many as the calyx-lobes and alternate with them or very many inserted within the rim of the calyx-tube; filaments bent inwards in bud. *Ovary* 2-20-celled, nearly superior; ovules numerous, in many rows; style long; stigma capitate or peltate. *Fruit* a dry or somewhat fleshy indehiscent or dehiscent capsule, many-seeded.

#### *Sonneratia*, Linn. f.

Glabrous sea-coast trees. *Leaves* opposite, petioled, coriaceous, entire. *Flowers* large, terminal, solitary or 2-3 together. *Calyx* thickly coriaceous; tube widely campanulate, lobes valvate. *Petals* 4-8 or 0. *Stamens* numerous, inserted on the circular rim of the calyx-tube, inflexed in bud. *Ovary* free or adnate at the base to the calyx-tube, many-celled; ovules many, ascending, on axile placentas; style long; stigma capitate. *Fruit* a subglobose,



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Fruit a many-seeded capsule; leaves alternate:—

Stamens twice as many as the calyx-lobes; ovary 4-celled:—

Calyx scarcely produced beyond the ovary; capsule septicidal

1. **Jussieua.**

Calyx usually much produced beyond the ovary; capsule loculicidal..... **Oenothera.**

Stamens as many as the calyx-lobes; ovary 3-6-celled

2. **Ludwigia.**

Fruit indehiscent, 1-4-celled, 1-4-seeded:—

Flowers 2-merous; ovary 1-2-celled, the ovules attached to the axis; small erect land herbs with small fruits having hooked hairs..... 3. **Circaea.**

Flowers 4-merous; ovary 2-celled, the ovules attached to the septum; floating water herbs with large fruits with 2-4 spines

4. **Trapa.**

### 1. **Jussieua, Linn.**

Herbs or undershrubs, usually of wet places. *Leaves* alternate, usually entire. *Flowers* yellow or white, axillary, solitary; pedicels with 2 bracteoles. *Calyx*-tube narrow, scarcely produced above the ovary; lobes 4-6, acute, persistent. *Petals* 4-6, on the margin of an epigynous disk. *Stamens* twice as many as the petals and inserted with them. *Ovary* inferior, 4-5-celled; ovules many, axile, in several vertical rows at the inner angle of each cell; style simple, short; stigma 4-5-lobed. *Fruit* a linear, terete or angled, 4-5-celled capsule, septicidally 4-5-valved, crowned by the disk and calyx-lobes. *Seeds* numerous, small, the crustaceous testa including an empty cell forming the raphe, the embryo in a membranous inner coat; cotyledons oblong, obtuse.

Water-plants with floating or creeping stems; petals 5, white; leaves obovate or oblanceolate, obtuse; seeds with a narrow raphe...1. *repens*

Erect plants of wet places; petals 4, yellow; leaves lanceolate, acute; seeds with a prominent raphe, appearing didymous in one variety.....2. *suffruticosa*.

1. **JUSSIEUA REPENS**, Linn.; F. B. I. ii. 587; W. & A. 336.

E. and W. Coast Districts, in or on the borders of ponds and tanks and watercourses.

A pretty water-plant, floating by means of white cellular floats at the nodes of the main stem.

2. **JUSSIEUA SUFFRUTICOSA**, Linn.; F. B. I. ii. 587. *J. villosa*, Lamk.; W. & A. 336.

W. Coast and W. Gháts, in wet places up to 3,000 ft.

An erect hairy undershrub, reaching 4-6 ft. high, with large flowers.

## 2. *Ludwigia*, Linn.

Herbs. *Leaves* alternate, petiolate, narrowly lanceolate, entire. *Flowers* yellow, usually axillary, solitary, sessile or nearly so; pedicels with 2 bracteoles. *Calyx*-tube scarcely produced above the ovary; lobes 3-5, acute, persistent or late deciduous. *Petals* 3-5, inserted below the margin of an epigynous disk. *Stamens* as many as the petals and inserted with them; filaments short. *Ovary* inferior, 4-5-celled; ovules many, axile, attached in 2 or more vertical rows to the inner angle of each cell; style simple; stigma capitate. *Fruit* a linear or oblong 4-5-celled capsule, opening by terminal pores or breaking up irregularly along the sides. *Seeds* very many, small, smooth, with a narrow raphe; cotyledons rounded.

Capsule inflated, smooth, the seeds in many rows in each cell, not distinguishable through the walls ..... 1. *parviflora*.

Capsule not inflated, slender, the seeds in one row in each cell, prominently distinguishable through the walls... ..... 2. *prostrata*.

1. *LUDWIGIA PARVIFLORA*, Roxb.; F. B. I. ii. 588; W. & A. 336; Wt. Ill. t. 101.

Almost all Districts, in rice-fields and other wet places.

An erect herb, up to 2 ft. high, the leaves lanceolate or linear-lanceolate up to 3 in. long, the flowers small, the capsule about .3 in. long.

2. *LUDWIGIA PROSTRATA*, Roxb.; F. B. I. ii. 558; Wt. Ic. t. 762.

W. Gháts, swamps in the Anamalais at 2,000 ft. (Beddome).

A herb at first prostrate, then erect, the leaves lanceolate with very slender petioles, together up to 3.5 in. long; the flowers very small, the capsule .5 in. long.

## 3. *Circaea*, Linn.

Herbs. *Leaves* opposite, petiolate, sinuate-dentate, membranous. *Flowers* very small, white, pedicelled, in terminal and axillary racemes; bracteoles minute. *Calyx*-tube ovoid, shortly produced

above the ovary; lobes 2. *Petals* 2, obcordate, inserted under the margin of the epigynous disk. *Stamens* 2, alternate with the petals; filaments filiform. *Ovary* inferior, 1-2-celled; ovules attached to the inner angle of the cells; style filiform; stigma capitate. *Fruit* small, pyriform, indehiscent, hispid with hooked hairs. *Seeds* 1 in each cell, ellipsoid; cotyledons flat.

CIRCAEA ALPINA, Linn.; F. B. I. ii. 589; Wt. Ill. t. 101.

W. Gháts, in the Nilgiri and Pulney Hills, at about 7,000 ft., in shady places.

A small, slender herb, reaching about 6-8 in. high, with membranous ovate leaves and 3-seeded fruit.

#### 4. *Trapa*, Linn.

Aquatic floating herbs. *Leaves* dimorphic, the submerged ones opposite, root-like, primatipartite, the floating ones rosulate, rhomboid, the petiole with a spongy swelling near its apex. *Flowers* axillary, solitary, peduncled. *Calyx*-tube short, adnate to the lower part of the ovary; lobes 4, 2 or all becoming spines on the fruit. *Petals* 4, sessile, white, inserted on the margin of the epigynous, cup-shaped disk. *Stamens* 4. *Ovary* 2-celled, semi-inferior with a conical apex; ovule solitary in each cell; pendulous; style subulate; stigma capitate. *Fruit* large, bony, 1-celled, with 4 angles, 2 or all of which spinose, indehiscent, with a short beak through which the radicle is protruded. *Seed* 1, inverted, cotyledons very unequal; radicle incurved.

TRAPA BISPINOSA, Roxb. Cor. Pl. t. 234; F. B. I. ii. 590; W. & A. 337.

Most plains Districts, floating in tanks, sometimes cultivated. The Water-Chestnut.

A plant with long stems bearing pectinate leaves (stipules, according to some authors) beneath the surface and curious rhomboid rosulate leaves with swollen petioles on the surface. The 2-spined fruit is eaten, either raw or cooked, and gives much starch. Vern. *Hind.* Singhara.

Var. *incisa*, Wall. Leaves smaller, more deeply incised at the margins, less villous; fruit smaller. W. Coast Districts (Wight).

*Oenothera rosea*, Ait., and *O. tetraptera*, Cav., also perhaps some other species, are found in gardens and apparently run



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orange or red) aril; testa coriaceous or crustaceous; albumen fleshy; cotyledons flat; radicle terete, superior.

Leaves glabrous:—

Leaves broadly elliptic, coriaceous when old:—

Leaves rounded at base, obtuse or very shortly pointed at apex; blade up to 6–7 in. long, 4 in. broad, crenate-serrate, prominently reticulate; capsule 7 in. long, yellow.....1. *graveolens*.

Leaves attenuate at base, acuminate at apex, the acumen twisted; blade up to 6 in. long, 3 in. broad, entire, shining above, not prominently reticulate; capsule 7 in. long.....2. *rubescens*.

Leaves narrowly elliptic, chartaceous when old:—

Leaves elliptic-oblong or -lanceolate, attenuate at base, acute or acuminate at apex, the acumen twisted; blade up to 5 in. long, 2 in. broad, entire or distantly serrate, reticulate beneath; capsule 5 in. long or less, orange.....3. *esculenta*.

Leaves elliptic-ob lanceolate, cuneate at base, acuminate at apex; blade up to 6 in. long by 2.5 in. broad, entire, pale, main nerves prominent; capsule up to 1 in. long, bright orange .... 4. *varians*.

Leaves obovate, coriaceous, cuneate at base, obtuse or shortly-pointed at apex; blade up to 4 in. long, 2.25 in. broad, often cucullate, entire, pale, but usually drying nearly black; capsule 7 in. long, orange-yellow.....5. *coriacea*.

Leaves hairy:—

Leaves thick, branchlets and inflorescence softly pale brown-tomentose; leaves subcoriaceous, oblong, unequally rounded at base, acuminate at apex; blade up to 6 in. long, 2.5 in. broad, crenate-serrate; capsule 5–8 in. long, yellow.....6. *tomentosa*.

Leaves and slender branchlets and inflorescence rufous-villous; leaves membranous, oblanceolate, long and sharply acuminate; blades up to 5 in. long, 2 in. broad, sharply serrate; capsule small, orange.....7. *wynadensis*.

1. *CASEARIA GRAVEOLENS*, Dalz.; F. B. I. ii. 592.

N. Circars, in Ganjam, chiefly on old cultivated lands.

A small deciduous tree conspicuous in forest by its rather large leaves turning red in winter before falling. Bark dark grey; wood light yellow, moderately hard, even-grained. Vern. *Hind.* Chilla; *Ur.* Giridi.

2. *CASEARIA RUBESCENS*, Dalz.; F. B. I. ii. 593.

W. Gháts, in the forests of Coorg (G. Thomson); hills of Travancore, 3,500 ft. (Bourdillon).

A large shrub, apparently evergreen, the glabrous branchlets

with large lenticels. The Travancore specimens have more lanceolate leaves.

3. *CASEARIA ESCULENTA*, Roxb.; F. B. I. ii. 592.

E. Coast, in the Circars and southwards; Striharikota and similar forests of the Carnatic; W. Coast, from S. Canara to Cochin.

A small tree with many fascicles of flowers from the leaf-axils, apparently evergreen. Roxburgh says the leaves are eaten. Vern. *Tel.* Kunda jungara.

4. *CASEARIA VARIANS*, Bedd. Fl. t. 208, *not of* Thw.

Evergreen forests of Travancore up to 3,000 ft.

A small glabrous apparently evergreen tree. Bark green, smooth; wood yellowish-white, even-grained. Vern. *Mal.* Vella kunnan.

5. *CASEARIA CORIACEA*, Thw.; F. B. I. ii. 592.

W. Gháts, Shola forests of the Nilgiris, Anamalais and Pulneys above 6,000 ft.

An evergreen tree with yellowish-white smooth bark.

6. *CASEARIA TOMENTOSA*, Roxb.; F. B. I. ii. 593; Brand. For. Fl. t. 31. *C. elliptica*, Willd.; Wt. Ic. t. 1849.

All plains forest Districts of the Circars, Deccan and Carnatic, very common in open, much-grazed lands; rare in W. Gháts, W. side.

A bushy shrub or small deciduous tree in open lands, a much larger tree in forest, the oblong leaves generally tomentose, sometimes nearly glabrous. Bark thick, pale; wood yellowish-white, close-grained. Vern. *Hind.* Chilla; *Ur.* Girari; *Tel.* Chilaka duddi.

7. *CASEARIA WYNADENSIS*, Bedd. Ic. t. 160; F. B. I. ii. 594.

W. Gháts, in the forests of Malabar, Travancore and Tinnevely at 2,000–3,000 ft.

A small villous tree with slender branchlets and trifid stigmas.

## 2. *Homalium*, Jacq.

Trees or shrubs. *Leaves* alternate, crenate or serrate, rarely entire, petiolate; stipules small or 0. *Flowers* small, in slender axillary and subterminal, simple or paniced, racemes; bract at the base of the pedicel often prominent, caducous. *Calyx*-tube turbinate, adnate to the base of the ovary; lobes 5–7, narrow



persistent. *Petals* 5-7, inserted in the throat of the calyx, persistent. *Stamens* opposite the petals, solitary or in fascicles, alternating with glandular staminodes. *Ovary* half-superior, 1-celled; ovules many, on parietal placentas near the top; styles 2-5, filiform; stigmas capitellate. *Fruit* a coriaceous capsule, 2-5-valved at the apex. *Seeds* small, oblong or angular; albumen fleshy; cotyledons foliaceous.

Stamens solitary opposite each petal:—

Racemes simple, elongate:—

Leaves obovate, obtuse or emarginate and very shortly apiculate at apex, tomentose beneath, repand-crenate, main nerves about 12 pairs, parallel and with parallel transverse nervules; sepals and petals very similar .....1. *tomentosum*.

Leaves elliptic, abruptly acuminate at apex, glabrous beneath, coarsely crenate, main nerves 6-8 pairs, arching and rather irregular, reticulate between; petals larger than the sepals

2. *zeylanicum*.

Racemes in panicles; leaves ovate or elliptic, acuminate at apex, puberulous beneath, crenate, main nerves about 8 pairs, rather irregular and reticulate between; petals longer and broader than the sepals ..... 3. *nepalense*.

Stamens in fascicles of 3-4 opposite each petal; racemes simple, up to 6 in. long; leaves ovate, bluntly acute or acuminate at apex, glabrous, crenate, main nerves about 7-8 pairs, irregular; petals much longer than the sepals.....4. *travancoricum*.

1. HOMALIUM TOMENTOSUM, Benth.; F. B. I. ii. 596.

N. Circars, in the forests of Ganjam (Gamble).

A large deciduous tree, the flowers in long racemes, the leaves in young trees and shoots sometimes up to 10 in. long and 5 in. broad. Bark thin, greyish-white; wood brown, hard and heavy.

2. HOMALIUM ZEYLANICUM, Benth.; F. B. I. ii. 596; Bedd. Fl. t. 210. *Blackwellia tetrandra*, Wt. Ic. t. 1851.

W. Gháts, in evergreen forests up to 3,000 ft., common on old coffee estates.

A large evergreen tree, the young leaves bright red, the flowers fragrant. Bark pale, rough; wood brownish-red, hard. Vern. *Mal.* Manthala mukki.

3. HOMALIUM NEPALENSE, Benth.; F. B. I. ii. 596. *Blackwellia nepalensis*, Wall. Pl. As. Rar. t. 179.



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Flowers hermaphrodite, usually large; corona of corolla conspicuous; fruit a large fleshy berry .. 1. **Passiflora.**

Flowers unisexual, small; corona small or none; fruit a capsule

2. **Adenia.**

### 1. **Passiflora**, Linn.

Twining herbaceous or shrubby plants, tendril-bearing. *Leaves* simple or palmately lobed, usually glandular beneath at the base or on the petiole; stipules slender or leafy. *Flowers* hermaphrodite, solitary or cymose; bracteoles 3. *Calyx*-tube fleshy; lobes 5. *Petals* 5, inserted on the throat of the calyx. *Corona* of 1 to several rows of numerous usually filiform segments with 1 or more membranous folds lower down and a shallow cup surrounding the gynandrophore. *Stamens* 5, from the gynandrophore; anthers oblong, dorsifixed. *Ovary* 1-celled, many-ovuled; styles usually 3. *Fruit* a fleshy indehiscent berry. *Seeds* many, arillate, often pitted; albumen fleshy; cotyledons foliaceous.

•PASSIFLORA LESCHENAULTII, DC.; F. B. I. ii. 599; W. & A. 352; Wt. Ic. t. 39.

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

A climbing shrub with curious semi-orbicular leaves, rounded at base, broadly truncate and 3-cuspidate above, white flowers and yellowish ovoid berry with pitted seeds.

*Passiflora edulis*, Sims, the Passion fruit from Brazil, is sometimes cultivated in the hills and may occasionally be found run wild. It has 3-lobed toothed leaves. *P. calcarata*, Mast., is a Madagascar species with 3-lobed leaves and large prominent stipules, run wild and now common on the Nilgiris. *P. foetida*, Linn., is a tropical American species commonly run wild near towns and along roadsides in many places in the plains and at once recognised by the moss-like pectinate involucre of the flowers. Several other species are also found in gardens.

### 2. **Adenia**, Forsk.

Twining herbs or undershrubs, tendril-bearing. *Leaves* entire, palmately lobed or pinnatifid, usually with large glands on the leaves and the top of the petiole; stipules 0 or inconspicuous. *Flowers* monoecious, usually small, in axillary cymes, the

peduncles often produced into tendrils. *Calyx*-tube campanulate or tubular; lobes 4-5. *Petals* 4-5, inserted on the throat or bottom of the calyx-tube. *Male flowers*: stamens 4-5, at the bottom of the calyx-tube, opposite as many scales or glands; filaments free or connate; anthers basifixed; ovary rudimentary or 0. *Female flowers*: staminodes 4-5, opposite as many scales or glands; ovary stalked or sessile; ovules numerous, attached to 3 parietal placentas; style 0 or 3-fid; stigmas 3. *Fruit* a loculicidal 3-valved capsule. *Seeds* numerous, arillate, flattened, usually pitted; funicle long; albumen fleshy; cotyledons foliaceous.

Flowers very small; petals attached to the throat of the calyx-tube, small, obovate; anthers short, filaments combined in a tube; corona a fringe of short hairs at the bases of the petals; leaves ovate, entire or hastate or palmately 3-lobed, glandular at the top of the petiole; capsule 1 in. long ..... 1. *Wightiana*.

Flowers rather large; petals attached to the base of the calyx-tube, linear-spathulate, long-fringed; anthers long, filaments forming a cup below; leaves palmately 3-5-lobed, rarely undivided, glandular at the sinuses and base; capsule 2 in. long ..... 2. *palmata*.

1. ADENIA WIGHTIANA, Engl. *Modecca Wightiana*, Wall.; F. B. I. ii. 601; W. & A. 353; Wt. Ic. t. 179.

Deccan and Carnatic, in dry hilly country from N. Arcot southwards, at low levels.

A tuberous-rooted slender climber with very small flowers, the petioles much twisted.

2. ADENIA PALMATA, Engl. *Modecca palmata*, Lamk.; F. B. I. ii. 603; W. & A. 353; Wt. Ic. t. 201.

Hills of the Carnatic, W. Gháts and W. Coast in moist hilly country at low levels.

A large tuberous-rooted woody climber, the stems thickened at the nodes, the leaves large and deeply palmate.

### Family LXXII. CARICACEAE.

CARICA PAPAYA, Linn., the Papaw tree, a soft-wooded, almost branchless tree, introduced from South America, is cultivated in gardens in the plains Districts for its valuable edible fruit, which is of the size of a small melon with a soft yellow pulp. Vern. *Hind.* Papáya, Popai.

Family **LXXIII. CUCURBITACEAE.**

Herbs or undershrubs, rarely shrubs, prostrate or climbing by means of tendrils spirally twisted. *Leaves* alternate, petioled, simple or lobed or palmately or pedately divided, often cordate at base; stipules usually 0. *Flowers* regular, monoecious or dioecious, yellow or white, solitary paniculate or racemose. *Calyx*-tube usually adnate to the ovary; limb rotate campanulate or tubular, lobes 5, rarely 3-6, imbricate. *Petals* as many as the calyx-lobes, free or gamopetalous, sometimes lobed or fimbriate, valvate or involute in bud. *Stamens* inserted at the mouth, near the middle or at the base of the calyx-tube, usually 3; anthers free or connate, usually 1 1-celled, the others 2-celled, the cells straight, flexuose or conduplicate, the connective sometimes produced; in ♀ flowers staminodes often present. *Ovary* inferior, usually of 3 connate carpels; ovules usually many, horizontal, rarely few and erect or pendulous; placentas usually 3, vertical, parietal or partly intruded, and so spuriously 3-celled; style 1 with 3 stigmas, rarely styles 2-4; in ♂ flowers pistillodes often present. *Fruit* usually a fleshy berry, indehiscent or dehiscing by valves or by a circumscissile lid. *Seeds* usually many, in pulp or fibre, often compressed; outer testa often corrugate and margined, inner membranous; albumen 0; cotyledons fleshy or foliaceous, radicle short.

Ovules horizontal:—

Anther-cells flexuose or conduplicate:—

Corolla rotate or campanulate, 5-partite to the base:—

Petals fimbriate on the margins.....1. **Trichosanthes.**

Petals entire:—

Calyx-tube of ♂ elongate; anthers cohering, included:—

Pistillodes 1-3, subulate; tendrils simple; fruit small, acute at both ends; slender climbers...2. **Gymnopetalum.**

Pistillodes glandular or 0; tendrils bifid; fruit very large, variously shaped; stout climber..... **Lagenaria.**

Calyx-tube of ♂ short; anthers free or slightly cohering, usually exsert:—

Stamens free, inserted on the mouth of the calyx; ♂ flowers usually with a large bract; tendrils simple...3. **Momordica.**

Stamens free, inserted on the tube of the calyx:—



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Leaves simple; tendrils simple or bifid; seeds compressed, with a broad membranous wing; scandent shrubs.....15. **Zanonia.**

### 1. *Trichosanthes*, Linn.

Herbaceous climbers. *Leaves* entire or palmately lobed rarely pinnate, denticulate; tendrils simple or 2-5-fid. *Flowers* dioecious, rarely monoecious, white; ♂ usually racemose, bracteolate; ♀ solitary. *Calyx*-tube long, cylindric, dilated above; lobes 5, entire serrate or laciniate. *Petals* 5, connate at the base, margins long-fimbriate. *Stamens* 3, inserted in the calyx-tube; filaments very short; anthers connate, 2 2-celled, the third 1-celled, the cells conduplicate; in ♀ flowers staminodes 0. *Ovary* inferior, ovoid or fusiform, 1-celled with 3 parietal placentas; ovules very many, usually horizontal; style slender; stigmas 3, entire or bifid; in ♀ flowers pistillodes 0. *Fruit* a glabrous ovoid or fusiform indehiscent berry, usually smooth. *Seeds* many, embedded in pulp, ellipsoid or angular.

Female flowers without or with very small bracts:—

Leaves entire, cordate; distantly denticulate, prominently reticulate:—

Male racemes few-flowered, straight; calyx-teeth short, lanceolate ..... 1. *nervifolia*.

Male racemes many-flowered, geniculate; calyx-teeth elongate, subulate.....2. *cuspidata*.

Leaves lobed:—

Male racemes without bracts; leaves deeply and usually acutely lobed, denticulate, the end teeth subulate; fruit ovoid-fusiform, short .....3. *cucumerina*.

Male racemes with very small bracts:—

Pedicels much shorter than the flowers; lobes of the leaves rounded; very faintly denticulate; fruit very long, narrow, twisted..... *anguina*.

Pedicels longer than the flowers:—

Leaves glabrous on both sides, 3-lobed, with distant subulate teeth; petals rather shortly fimbriate .....4. *Perrottetiana*.

Leaves densely villous beneath, 5-7-lobed, with shallow sinuses and subulate teeth; petals long-fimbriate, the inflorescence and petiole very villous..... 5. *villosula*.

Male racemes with large bracts, the bracts broad, laciniate:—

Calyx-lobes shortly dentate; leaves very variable, usually scabrous and often deeply lobed .....6. *palmata*.

Calyx lobes deeply divided, the divisions subulate; leaves soft, not deeply lobed and hardly scabrous ..... 7. *Lepiniana*.

Female flowers bracteate, either few with lanceolate bracts or many with laciniate bracts; leaves 3-5-lobed, very scabrous above, pubescent beneath, irregularly and deeply serrate.....8. *anamalayana*.

1. TRICHOSANTHES NERVIFOLIA, Linn.; F. B. I. ii. '609' *in part*; W. & A. 349.

W. Gháts, in Coorg, Nilgiris and Pulneys, at low levels.

A slender twining herb with reticulate leaves and ovoid acute fruit, green with white lines, afterwards red above, the seeds flattened with angular projections on the margins, the faces rugose.

2. TRICHOSANTHES CUSPIDATA, Lamk.; W. & A. 349. *T. nervifolia*, Linn.; F. B. I. ii. 609, *in part*.

W. Coast, in Travancore and Malabar.

A slender twiner with reticulate leaves and characteristically geniculate zig-zag racemes.

3. TRICHOSANTHES CUCUMERINA, Linn.; F. B. I. ii. 609; W. & A. 350. *T. lobata*, Roxb.; F. B. I. ii. 610.

Deccan and W. Coast, in plains country and in lower hills.

A slender annual climber with rather shortly laciniate small white flowers, deeply 5-lobed leaves and an ovoid fusiform fruit, green and striped when fresh, scarlet or orange when ripe, up to 3 in. long.

4. TRICHOSANTHES PERROTTETIANA, Cogn. Monog. 362.

Carnatic, at Pondicherry (Perrottet, *from description*).

A slender climber with 3-lobed leaves and deep basal sinus, the racemes slender, long-peduncled.

5. TRICHOSANTHES VILLOSULA, Cogn. Monog. 362.

W. Gháts, in the Nilgiri Hills at 5,000-6,000 ft.

A rather stout herbaceous climber with conspicuously villous stems, petioles and inflorescence and very long lacinae to the petals of the rather large white flowers; the fruit ovoid, acuminate, 2.5 in. long.

6. TRICHOSANTHES PALMATA, Roxb.; F. B. I. ii. 606; W. & A. 350; Wt. Ill. tt. 104, 105. *T. bracteata*, Voigt; Cogn. Monog. 375.

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

A large woody climber with palmate deeply-lobed but very variable leaves, scabrous-dotted above, conspicuous large



bracts and a large globose red orange-streaked fruit, not edible. Vern. *Tam.* Anacoruthay; *Tel.* Abuva.

Var. *tomentosa*, Heyne; F. B. I. ii. 607. Leaves much less lobed, scarcely scabrous, tomentose beneath; bracts and calyx-lobes more deeply laciniate.

W. Gháts, in the Mysore Hills, Pulneys and Nilgiris at about 3,000–6,000 ft.

7. *TRICHOSANTHES LEPINIANA*, Cogn. Monog. 377.

Carnatic, at Pondicherry (Lépine); W. Gháts, in the Nilgiris and Pulneys.

A large strong-growing climber with palmately 3–5-lobed leaves and deeply laciniate calyx-lobes.

8. *TRICHOSANTHES ANAMALAYANA*, Bedd.; Cogn. Monog. 378.

W. Gháts, in the Anamalai Hills at 4,000 ft. (Bedd. *from description*).

Apparently a large species but very little known.

*Trichosanthes Anguina*, Linn., is the Snake Gourd cultivated for its long twisted fruit, which may reach 3 ft. in length and 3 in. in diam. and is used as a vegetable. In leaves and flowers it greatly resembles *T. cucumerina*. Vern. *Hind.* Chachinda.

## 2. *Gymnopetalum*, Arn.

Twining slender pubescent or scabrous herbs; tendrils usually simple. Leaves cordate, 5-angular or 3–5-lobed. Flowers white or yellow, dioecious or monoecious, ♂ solitary or racemose, ♀ solitary. Calyx-tube elongate, tubular, contracted near the mouth; lobes 5, subulate. Corolla rotate, deeply 5-partite, the lobes oblong or obovate. Stamens 3, included, inserted on the middle of the calyx-tube; filaments short, free; anthers 3, connate, 1 1-celled, the others 2-celled, the cells linear, longitudinally conduplicate; in ♀ staminodes 3, minute or 0. Ovary ovoid or oblong; ovules numerous, on 3 placentas; style filiform; stigmas 3, linear; in ♂ pistillodes 1–3, subulate. Fruit an ovoid oblong berry acute at both ends. Seeds many or few, obovoid or oblong, compressed, marginate, nearly smooth.

*GYMNOPETALUM WIGHTII*, Arn.; F. B. I. ii. 611; Trim. Fl. Ceyl. t. 43. *G. tubiflorum*, Cogn. Monog. 388. *Bryonia tubiflora*, W. & A. 347.

W. Coast from S. Canara (Hohenacker) to Travancore; W. Gháts, in the Anamalai Hills at 3,000 ft. (Gamble).



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3 in., 5-7-lobed, the end lobes long and acute; fruit ovoid, rostrate, covered with triangular papillae... ..6. *denudata*.

1. *MOMORDICA CHARANTIA*, Linn.; F. B. I. ii. 616; W. & A. 348; Wt. Ic. t. 504.

All plains Districts, cultivated and commonly found run wild.

A slender twining annual herb with pale yellow flowers and an edible fruit of a bright orange colour, with crimson pulp, and covered with raised tubercles. Vern. *Hind.* Karéla; *Tam.* Pava kai.

2. *MOMORDICA DIOICA*, Roxb.; F. B. I. ii. 617; W. & A. 348; Wt. Ic. tt. 505, 506.

Plains Districts of the Carnatic and W. Coast, in the hills up to 4,000 ft.

A perennial tuberous-rooted climber with yellow flowers and an orange-coloured muricate fruit, up to about 2 in. long, sometimes eaten, as are the tubers. Vern. *Tel.* Puagakara.

3. *MOMORDICA SUBANGULATA*, Bl.; Cogn. Monog. 443.

W. Gháts, from S. Canara to Wynaad, up to 3,000 ft.

A pretty climber with large yellowish petals conspicuously veined.

4. *MOMORDICA COCHINCHINENSIS*, -Spr.; F. B. I. ii. 618. *M. mixta*, Roxb.; W. & A. 349.

Deccan and W. Gháts, in S. Canara and Mysore.

A handsome large climber with large petals, creamy-white tinged with yellow, and black claws; fruit bright red, ovoid, 4-5 in. long, covered with conical points, seeds very large.

5. *MOMORDICA TUBEROSA*, Cogn. *M. Cymbalaria*, Fenzl; F. B. I. ii. 618. *Luffa tuberosa*, Roxb.; W. & A. 1068.

Deccan and Carnatic, in Mysore, Bellary and Anantapur and down to Tinnevely, on black cotton soil.

A trailing plant with herbaceous shoots from a large tuberous rootstock, petals white, tinged pale yellow, fruit dark green and ribbed, about 1 in. long, said to be edible.

6. *MOMORDICA DENUDATA*, Thw.; F. B. I. ii. 618.

W. Coast, at Quilon in Travancore (Wight).

A slender climber with membranous leaves.

## 4. Luffa, Tourn.

Annual climbing herbs, large or small; tendrils 2-5-fid. Leaves 5-7-lobed, rarely subentire; petiole not glandular at the apex. Flowers monoecious, yellow or white; ♂ flowers in racemes, ♀ flowers solitary, both often from the same axil. Calyx-tube in ♂ turbinate or campanulate, in ♀ produced beyond the ovary; lobes 5, triangular or lanceolate. Petals 5, free, spreading, obovate or obcordate. Stamens 3, less often 4 or 5, inserted on the calyx-tube; filaments free or connate; anthers exserted, free, 1 1-celled, the others 2-celled, the cells sigmoid, often on a broad connective; in ♀ flowers staminodes 3 or more, thick. Ovary oblong, 1-celled; ovules many, horizontal, on 3 parietal placentas; style cylindrical; stigma 3-lobed; in ♂ flowers pistillode 0 or glandular. Fruit a large or small oblong or cylindrical, smooth or angled or spinous, fibrous berry, usually dehiscing by a circumsciss opening at the top with a stopple. Seeds many, oblong, compressed.

Stamens 5; fruit large, cylindrical, 5-12 in. long, smooth, 10-ribbed or somewhat 10 angled; seeds narrowly winged, smooth on sides; leaves orbicular-reniform, palmately 5-lobed, scabrous and punctate; petals obtuse ..... 1. *aegyptiaca*.

Stamens 3:—

Fruit oblong-clavate with 10 sharp angles; seeds not winged, slightly rugose on the sides; leaves orbicular-cordate, palmately 5-7-lobed, scabrous; petals emarginate ..... 2. *acutangula*.

Fruit small, spinous, the spines woolly; seeds thinly verrucose; leaves ovate-cordate, slightly 3-5-lobed, scabrous ..... 3. *umbellata*.

1. LUFFA AEGYPTIACA, Mill.; F. B. I. ii. 614. *L. pentandra*, Roxb.; W. & A. 343; Wt. Ic. t. 499.

All plains Districts, especially near the coast, cultivated and run wild, but doubtfully indigenous.

A large climbing plant with smooth fruit, edible when young, and when old the fibrous skeleton forms a flesh-brush "loofa." Vern. Hind. Ghia taroi.

2. LUFFA ACUTANGULA, Roxb.; F. B. I. ii. 713. *L. amara*, Roxb.; W. & A. 343.

Most plains Districts, especially near the E. Coast, not common.

A climber with angular fruit, and usually (var. *amara*,

C. B. Clarke) with scabrous and pubescent leaves, the fruit small.

3. LUFFA UMBELLATA, Roem. *L. Kleinii*, W. & A. 344; F. B. I. ii. 616.

W. Coast, in Travancore, scarce.

A slender branching climber.

### 5. Bryonopsis, Arn.

Annual scaberulous scandent herbs; tendrils 2-fid. *Leaves* deeply palmately 5-lobed. *Flowers* monoecious, ♂ and ♀ fascicled, often in the same axils. *Calyx*-tube broadly campanulate; lobes 5, subulate. *Corolla* campanulate, 5-partite; lobes ovate. *Stamens* 3, free, inserted on the tube of the calyx; filaments short; anthers cohering, 1 1-celled, 2 2-celled, the cells linear, flexuose round the broad connective not produced at the apex; staminodes in ♀ 3, small. *Ovary* globose or ovoid; ovules numerous, horizontal, on 3 placentas; style slender; stigmas 3, papillose, deeply 2-lobed; pistillodes in ♂ flowers 0. *Fruit* a spherical or ovoid-conical pulpy many-seeded berry. *Seeds* pyriform, surrounded by a thick grooved crenulate ring on either side of which project the swollen faces of the seed.

BRYONOPSIS LACINIOSA, Naud. *Bryonia laciniosa*, Linn.; F. B. I. ii. 622; W. & A. 345; Wt. Ic. t. 500.

Most Districts, in hedges and on bushes, up to 4,000 ft. in the hills.

A slender climbing annual from a thick permanent rootstock, stems angular; berries conspicuous, 5 to 1 in. in diam., brick-red when ripe with white vertical lines.

### 6. Cucumis, Linn.

Annual herbs or with a perennial root, climbing or trailing, hispid or scabrous; tendrils simple. *Leaves* entire or palmately 3-7-lobed or 5-angled, dentate or serrate. *Flowers* yellow, monoecious, short-peduncled, ♂ in clusters in the axils, ♀ solitary. *Calyx*-tube turbinate or campanulate; lobes 5. *Corolla* campanulate; lobes 5, oblong or ovate, acute. *Stamens* 3, free, 1 1-celled, 2 2-celled, the cells conduplicate, the connective produced above in a crest; in ♀ flowers staminodes 3, setiform or ligulate. *Ovary* in ♂ a broad gland-like pistillode, in ♀ ovoid or globose; ovules



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### 7. *Citrullus*, Neck.

Trailing herbs, hispid or scabrous; tendrils 2-3-fid. *Leaves* triangular-ovate, deeply 3-5-lobed, the midlobe elongate, all sinuately pinnatifid. *Flowers* monoecious, yellow, both ♂ and ♀ solitary, rather large. *Calyx*-tube broadly campanulate, lobes 5. *Corolla* usually rotate, the petals ovate or obovate, obtuse or emarginate. *Stamens* 3; filaments short, free; anthers free or slightly cohering, 1 1-celled, 2 2-celled, the cells linear flexuous, the connective not produced; in ♀ flowers staminodes 3, setiform or ligulate. *Ovary* ovoid, 1-celled; ovules many on 3 vertical placentas; style short; stigmas 3, thick, reniform; in ♂ flowers pistillode glandular. *Fruit* a globose or oblong fleshy, or dry, indehiscent berry. *Seeds* very many, elliptic-oblong, compressed, smooth.

Perennial; fruit globose, up to 3 in. in diam., very bitter; leaf-lobes narrow, thick.....1. *Colocynthis*.  
Annual; fruit oblong or ellipsoid, up to 10 in. in diam., edible; leaf-lobes broad, thin .....*vulgaris*.

CITRULLUS COLOCYNTHIS, Schrad.; F. B. I. ii. 620; Wt. Ic. t. 498. *Cucumis Colocynthis*, Linn.; W. & A. 342.

Deccan, on dry sandy or stony lands.

A trailing scabrid herb with much cut leaves and globular fruit variegated dark-green and white, the pulp of which affords an important purgative medicine. Vern. *Hind.* Indrawan; *Tel.* Patsa kaya.

*C. vulgaris*, Schrad., is the Water Melon, sometimes grown on the sandy beds of rivers for its refreshing fruit. It comes from Tropical Africa. Vern. *Hind.* Tarbuj.

### 8. *Coccinia*, W. & A.

Slender scandent or prostrate herbs; roots sometimes tuberous; tendrils simple. *Leaves* petiolate, deltoid or subrotund, angled or lobed, sometimes glandular beneath. *Flowers* rather large, white or yellow, dioecious, ♂ solitary or subcymose, ♀ solitary. *Calyx*-tube campanulate, short; lobes 5. *Corolla* campanulate, shortly 5-fid. *Stamens* 3; filaments connate in a column, rarely free; anthers connate, 1 1-celled, 2 2-celled, cells conduplicate; in ♀ flowers staminodes 3, oblong or subulate. *Ovary* ovoid,

oblong or linear; ovules very many, horizontal, from 3 placentas; style slender; stigmas 3; pistillode in ♂ flowers 0. *Fruit* an ovoid or oblong indehiscent berry. *Seeds* ovoid, compressed, margined, the testa smooth velvety or scorbiculate.

COCCINIA INDICA, W. & A. 347; Wt. Ill. t. 105. *Cephalandra indica*, Naud.; F. B. I. ii. 621.

Most plains Districts, especially in the Deccan and Carnatic, on hedges and bushes.

A pretty climber with large white flowers and oblong scarlet fruit with velvety seeds, the leaves variable, generally 5-angled with shallow sinuses, but sometimes even on the same plant (var. *palmata*, W. & A.) deeply 5-lobed. The fruit is sometimes eaten. Vern. *Hind.* Bhimb; *Tel.* Kaidonda; *Tam.* Kovay.

### 9. Melothria, Linn.

Slender scandent or prostrate herbs, annual or with a perennial root stock; tendrils simple, rarely bifid. *Leaves* usually membranous, entire or lobed. *Flowers* small, monoecious or dioecious, yellow or white; ♂ in racemes, corymbs or umbels, sometimes fascicled, rarely solitary; ♀ solitary fascicled or in umbels. *Calyx* campanulate; lobes 5. *Corolla* deeply 5-partite, the lobes entire. *Stamens* 3, inserted on the tube, rarely at the base, of the calyx; filaments free; anthers free or slightly cohering, 1 1-celled the others 2-celled, or all 2-celled, the cells straight or curved, the connective sometimes produced; in ♀ flowers staminodes 3 or 0. *Ovary* ovoid globose or fusiform, constricted below the flower; ovules usually many, on 3 placentas; style short, surrounded by an annular disk; stigmas 3, rarely 2; in ♂ flowers pistillodes globose or annular. *Fruit* a globose ovoid or fusiform berry, many- or few-seeded. *Seeds* ovoid or subglobose, usually compressed and margined, smooth or rugose.

Flowers usually monoecious, ♂ in racemes, ♀ solitary; anthers sessile; leaves deltoid, acute or acuminate, up to 2 in. long, 2-2.5 in. broad, membranous, punctate; fruit fusiform, rostrate; seeds smooth, truncate at base, not margined.....1. *zeylanica*.

Flowers monoecious or dioecious, ♂ usually umbellate, ♀ solitary or umbellate; filaments long, the connective not produced:—

. Seeds small, much compressed; leaves membranous, simple or 3-5-lobed:—



Flowers monoecious; leaves usually rufous-villous beneath, the teeth very short; berry globose, .25 in. in diam.; seeds smooth, faintly marginate ... .. 2. *perpusilla*.

Flowers dioecious; leaves nearly glabrous beneath, the teeth triangular; berry oblong, .6 in. long, .3 in. broad; seeds marginate ..... 3. *mucronata*.

Seeds large, globose, scarcely compressed; leaves subcoriaceous, variable in shape:—

Flowers dioecious; leaves cordate, ovate or 3-5-lobed or hastate, the lobes sometimes long, prominently nerved; fruit oblong, ribbed, up to 2.5 in. long; seeds smooth on the faces, the broad ring rugose ..... 4. *heterophylla*.

Flowers monoecious; leaves deeply cordate or sagittate, not lobed though often angulate, prominently nerved; fruit ovoid, beaked, up to 1 in. long; seeds smooth on the faces, nearly so on the flat ring ..... 5. *amplexicaulis*.

Flowers monoecious, ♂ fascicled, ♀ solitary; anthers sessile, the connective apiculate; fruit small, globose, sessile; seeds marginate, slightly flattened, .15 by .1 in.; leaves and stems more or less scabrous:—

Seeds smooth on the faces; leaves beneath densely softly villous-tomentose ..... 6. *leiosperma*.

Seeds rugose on the faces; leaves beneath shortly hirsute or scabrous ..... 7. *maderaspatana*.

1. *MELOTHRIA ZEYLANICA*, C. B. Clarke in F. B. I. ii. 626.

W. Gháts, in Wynaad and Pulney Hills, at about 3,000 ft.

A pretty, very slender climber, the flowers and fruit on long slender pedicels.

2. *MELOTHRIA PERPUSILLA*, Cogn. *Zehneria Hookeriana*, Arn.; F. B. I. ii. 624. *Bryonia Hookeriana*, W. & A. 345. *B. maysorensis*, Wt. Ic. t. 758.

Deccan, Horsleykonda at 4,000 ft. (Fischer); W. Gháts, in the Nilgiris and Pulneys, up to 6,000 ft.; Shevaroy Hills of Salem.

A slender climber with small globose berries, red when ripe, and greenish-yellow flowers. The var. *subtruncata*, Cogn., has the leaves nearly truncate at base.

3. *MELOTHRIA MUCRONATA*, Cogn. *Zehneria Bauermaniana*, C. B. Clarke; F. B. I. ii. 624. *Bryonia maysorensis*, W. & A. 345; Wt. Ic. t. 1609 (but not dioecious).



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in ♀ 0. *Ovary* ovoid; ovules few, horizontal, on 2–3 placentas; style columnar; stigmas 2, rarely 3; pistillode in ♂ flowers 0. *Fruit* a fleshy globose or subquadrate berry. *Seeds* usually 2 or 3, marginate, obovate, hollowed on one side, convex on the other, the testa smooth.

BLASTANIA GARCINI, Cogn. *Ctenolepis Garcini*, Hook. f.; F. B. I. ii. 629. *Bryonia Garcini*, Willd.; W. & A. 344.

N. Circars, Deccan and Carnatic, extending westwards to the Gháts.

A slender pretty annual climber with orange or red fruit.

### 11. *Kedrostis*, Medikus.

Prostrate or scandent herbs, with a perennial rootstock; tendrils simple. *Leaves* entire or lobed, dentate or partite. *Flowers* small, yellow or greenish, monoecious, rarely dioecious; ♂ racemose or corymbose; ♀ solitary or aggregated, shortly pedicelled. *Calyx*-tube campanulate; lobes 5, short. *Corolla* rotate, 5-partite. *Stamens* 3, rarely 5, inserted in the calyx-tube; filaments short; anthers short, 1 1-celled, the others 2-celled or all 1-celled if 5; cells straight or curved; connective produced above the cells, usually bifid; staminodes in ♀ 0 or 3, very small. *Ovary* ovoid, beaked, with 2–3 placentas; ovules few; style sometimes surrounded by a disk; stigmas 2 or 3; pistillode in ♂ 0 or glandular. *Fruit* an ovoid, usually rostrate berry. *Seeds* few, tumid, marginate, testa smooth.

KEDROSTIS ROSTRATA, Cogn. *Rhynchocarpa foetida*, C. B. Clarke; F. B. I. ii. 627. *Bryonia rostrata*, Rottl.; W. & A. 346.

Carnatic (Wight, Rottler).

A prostrate or scandent herb with orbicular or reniform leaves, small flowers and an ovoid, beaked, red fruit.

### 12. *Corallocarpus*, Welw.

Prostrate or climbing herbs; tendrils simple. *Leaves* roundish-cordate, lobed or palmate, rather thick. *Flowers* minute, monoecious, ♂ in small crowded racemes on long peduncles, ♀ solitary short-peduncled from the same axils. *Calyx*-tube campanulate; lobes 5, short. *Corolla* 5-partite; lobes ovate. *Stamens* 3, free, inserted on the calyx-tube; filaments very short; anthers all

2-celled or 1. 1-celled, the cells straight, lateral on the thin connective, which is often produced and sometimes bifid above; in ♀ staminodes 0 or minute. *Ovary* ovoid, beaked, 2-3-celled; ovules few, on 2-3 placentas; style straight, without disk; stigma 3-, rarely 2-4-lobed; in ♂ flowers pistillode minute. *Fruit* an ovoid usually beaked fleshy berry, circumsciss near the base. *Seeds* few obovoid or subglobose, often appressed-pilose, very little compressed.

Peduncles of ♀ flowers thickened, also of ♂, which reach 3 in. long; tendrils stout; leaves rather thick, deeply 3-5-lobed ..... 1. *epigaeus*.  
Peduncles of ♀ flowers very slender, also of ♂, which reach 1-5 in. long; tendrils capillary; leaves thin, 3-lobed ..... 2. *gracilipes*.

1. CORALLOCARPUS EPIGAEUS, Hook. f.; F. B. I. ii. 628.

*Bryonia epigaea*, Rottl.; W. & A. 346; Wt. Ic. t. 503.

Deccan and Carnatic and westward to the lower hills of the Gháts, in dry country.

A thick-stemmed climber from a large tuberous rootstock, the leaves rough and variable in their lobes, the fruit scarlet in the middle, the base and beak green.

2. CORALLOCARPUS GRACILIPES, Cogn. Monog. 650.

Carnatic, Near Pondicherry (Lépine).

A very slender climber.

13. *Cerasiocarpum*, Hook. f.

Climbing glabrous herbs; tendrils simple. *Leaves* oblong, cordate at base, entire or hastately 3-lobed. *Flowers* small, monoecious; ♂ in racemes; ♀ solitary, often from the same axils. *Calyx*-tube campanulate; lobes 5, minute. *Corolla* rotate, 5-partite, the lobes ovate. *Stamens* 3, free, inserted on the mouth of the calyx-tube; filaments very short, broad; anthers 1 1-celled, 2 2-celled; cells oblong, lateral on the connective, which is membranous and often produced; staminodes in ♀ 0. *Ovary* ovoid, 1-celled, with 2-3 placentas; ovules 4-6; style columnar; stigma 3-lobed; in ♂ pistillode 0. *Fruit* a depressed globose smooth fleshy indehiscent berry. *Seeds* 2-6 broadly ovoid, not compressed, marginate, surrounded by orange pulp.

CERASIOCARPUM BENNETTII, Cogn. *C. zeylanicum*, Hook. f.; F. B. I. ii. 629; Trim. Fl. Ceyl. t. 44.

W. Gháts, in S.-E. Wynaad, near Devala, at 3,000 ft. (Gamble).

A pretty climber with membranous leaves up to 5 in. long, 2.5 in. broad, dentate and acuminate, sometimes hastate at base, the fruit bright orange-red.

#### 14. *Gynostemma*, Blume.

Slender climbing herbs; tendrils simple. *Leaves* pedately 3-7-foliolate, leaflets ovate-lanceolate. *Flowers* minute, white or greenish, dioecious or rarely monoecious, in diffuse axillary panicles; pedicels articulate, bracteolate. *Calyx* rotate, 5-partite; lobes short. *Corolla* rotate, 5-partite; lobes lanceolate. *Stamens* 5, inserted at the bottom of the calyx; filaments connate in a column below; anthers 2-celled; staminodes in ♀ 0. *Ovary* spherical, 2-3-celled; ovules 2 in each cell, pendulous; styles 2-3, bifid at tip; pistillodes in ♀ 0. *Fruit* a globose, indehiscent, 1-3-seeded berry. *Seeds* ovoid or triangular, flattened, verrucose.

GYNOSTEMMA PEDATA, Blume; F. B. I. ii. 633; Trim. Fl. Ceyl. t. 45.

W. Gháts, Nilgiri Hills at 4,000-6,000 ft.; hills of Tinnevely (Beddome).

A slender climber with long flower- and fruit-panicles, the leaflets vine-like, crenate-serrate, the berry greenish.

#### 15. *Zanonia*, Linn.

Scandent shrubs; tendrils simple or bifid at the apex. *Leaves* petiolate, ovate or oblong, entire. *Flowers* small, dioecious, all racemose or the ♂ paniced. *Calyx* of 3, rarely 4, sepals, broadly oblong or orbicular, membranous, concave. *Corolla* rotate, 5-partite, coriaceous or fleshy; lobes narrowed at the apex. *Stamens* 5, free, inserted on a fleshy disk; filaments very short and thick; anthers transversely oblong, 1-celled; staminodes in ♀ short, alternate with the petals. *Ovary* elongate, at first 3-celled, later 1-celled by absorption of the septa; ovules 2-many in each cell, on parietal placentas, pendulous; styles 3, bifid at apex; pistillode in ♂ 0. *Fruit* cylindric clavate or hemispheric, terete or subtrigonus, truncate and broadly 3-valved at apex. *Seeds* large, pendulous, oblong, compressed, imbricate, surrounded by a broad membranous wing.



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*Capsule* ovoid, membranous, 4–8-ribbed, dehiscing at the apex. *Seeds* very many, minute, ellipsoid; testa very loose, reticulate, membranous.

TETRAMELES NUDIFLORA, R. Br.; F. B. I. ii. 657; Bedd. Fl. t. 212. *T. Grahamiana*, Wt Ic. t. 1956.

W. Coast and W. Gháts, in low level forests both evergreen and deciduous, up to 2,500 ft.

A very large deciduous tree reaching 150 ft. in height and a considerable diameter, the base supported by large buttresses. Bark greyish-white, smooth; wood coarse and soft, largely used on the W. Coast for dug-out canoes. Vern. *Tam.*, *Mal.* Chini.

### Family LXXV. BEGONIACEAE.

Succulent herbs, sometimes undershrubs; stem often reduced to a rhizome or tuber. *Leaves* alternate, rarely subverticillate, more or less inequilateral, entire toothed or lobed; stipules 2, free, often deciduous. *Flowers* usually showy, white rose or yellow, monoecious, on axillary peduncles bracteate at base, divided above in dichotomous cymes; bracts and bracteoles opposite. MALE: Perianth of 2 outer valvate *sepals* with or without an inner smaller pair; *stamens* numerous, the filaments free or connate in a bundle; anthers usually narrowly obovoid, 2-celled, dehiscing longitudinally. FEMALE: Perianth of 2–6 sepals, the 2 outer usually large; *ovary* inferior, 2–4-celled, usually 3-celled and -winged; *placentas* axile, simple or 2 in each cell; ovules numerous; styles 2–4, free or connate; stigmas branched or twisted. *Fruit* a capsule, usually winged, variously but usually loculicidally dehiscent. *Seeds* minute; testa reticulate; albumen scanty or 0.

#### *Begonia*, Linn.

#### CHARACTERS OF THE FAMILY.

Placentas 2 in each cell; small plants with tuberous roots:—

Capsule 3-celled; sepals of ♂ flowers 4, the outer larger:—

Ovary pubescent; leaves ovate, cordate, acuminate; capsule-wings 3, elongate, one especially so, ascending; stigmas spiral

1. *picta*.

Ovary glabrous; leaves orbicular, cordate; capsule-wings 3, narrow, horizontal, sub-equal; stigmas branched, curved

2. *cordifolia*.

Capsule 2-celled; sepals of ♂ flowers 4, the outer larger:—

Stem succulent, rather stout; leaves up to 6 in. long, ovate, unequally often not deeply cordate, nearly entire, acute; capsule-wings 1 broad descending, 2 narrow; stigmas twisted

3. *integrifolia*.

Stems very slender, scarcely 6 in. long; leaves small, membranous:—

Capsule-wings subequal, triangular, ascending; stigmas reniform, papillose; outer sepals of ♂ orbicular, broad; leaves unequally cordate, up to 2 in. in diam. .... 4. *crenata*.

Capsule-wings narrow, one much longer and broader than the other 2, horizontal; stigmas 3-5-lobed, capitate; sepals of ♂ flowers obovate, narrow; leaves equally cordate, about 1 in. in diam. .... 5. *canarana*.

Placentas undivided:—

Stemless scapigerous herbs:—

Leaves peltate, reniform-orbicular, broader than long, entire, ciliate; scape longer than the leaves; sepals of ♂ flowers 4, outer slightly larger than inner; capsule-wings equal and equally broad (.2 in.), prominently reticulate .... 6. *albo-coccinea*.

Leaves deeply cordate at base but not peltate:—

Leaves ovate, coarsely serrate, often lobed, acute, pilose, very membranous; scape slender, as long as the leaves; sepals of ♂ flowers 4, orbicular, inner narrow; capsule-wings subequal, broader above (about .15 in.) and truncate. .... 7. *subpeltata*.

Leaves orbicular, broader than long, distinctly dentate, white-tomentose beneath, thick; scape elongate, many-flowered; sepals of ♂ flowers 2 only; capsule-wings subequal, broadest at the middle (.2 in.) ..... 8. *floccifera*.

Stems elongate, leaf-bearing; leaves ovate, acute, serrate, sparsely pubescent, membranous; flowers large; sepals of ♂ flowers 4, outer much larger than the obovate inner, anthers long; capsule at first hispid, the wings subequal, ascending, broadest at top (.3-.4 in.)

9. *trichocarpa*.

Almost shrubby, the stems thick, jointed, leafy, the flowers on axillary peduncles; sepals in ♂ and ♀ 2 only, orbicular; leaves very unequally ovate-cordate, acuminate, serrate; capsule-wings subequal, rounded or slightly angled near the top where broadest, occasionally slightly acute at top ..... 10. *malabarica*.

1. BEGONIA PICTA, Sm.; F. B. I. ii. 638.

N. Circars, hills of Ganjam (Gamble).



A slender plant of shady banks, the flowers pale rose, the leaves variegated.

2. *BEGONIA CORDIFOLIA*, Thw.; F. B. I. ii. 641. *Diploclinium Arnottianum* and *cordifolium*, Wt. Ic. tt. 1815, 1816.  
W. Gháts, in forests from Malabar to Tinnevelly.  
A scapigerous herb with pink flowers and variegated leaves.
3. *BEGONIA INTEGRIFOLIA*, Dalz.; F. B. I. ii. 648.  
W. Gháts, in the hills from Canara and Mysore to Wynaad.  
A short-stemmed succulent herb with white flowers.
4. *BEGONIA CRENATA*, Dryand.; F. B. I. ii. 651. *B. minima*, Bedd. Ic. t. 110.  
W. Gháts, from Mysore to Wynaad, at low levels.  
A slender herb with small pale pink flowers.
5. *BEGONIA CANARANA*, Miq.; F. B. I. ii. 652.  
W. Coast and W. Gháts, from S. Canara (Hohenacker) to Malabar and Wynaad, up to 3,000 ft.  
A very slender herb with small flowers.
6. *BEGONIA ALBO-COCCINEA*, Hook.; F. B. I. ii. 654. *B. Grahamiana*, Wt. Ic. t. 1811.  
W. Gháts, in the hills of Tinnevelly about Courtallum.  
A scapigerous succulent herb with rose-coloured flowers, rather large peltate leaves, and large membranous stipules at the base.
7. *BEGONIA SUBPELTATA*, Wt. Ic. t. 1812; F. B. I. ii. 653.  
W. Gháts, probably in Malabar (Wight).  
A very slender herb with membranous leaves.
8. *BEGONIA FLOCCIFERA*, Bedd. Ic. t. 111; F. B. I. ii. 654.  
W. Gháts, hills of Travancore and Tinnevelly, at 3000 ft. (Beddome).  
A rather large herb with woolly leaves and tall many-flowered scapes.
9. *BEGONIA TRICHOCARPA*, Dalz.; F. B. I. ii. 653.  
W. Gháts, Bababudan Hills of Malabar (Law).  
A large fleshy herb with white flowers and large basal stipules.
10. *BEGONIA MALABARICA*, Lamk.; F. B. I. ii. 655. *B. dipetala*, Grah.; Wt. Ic. t. 1813. *Diploclinium Lindleyanum*, Wt. Ic. t. 1817.



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ANALYSIS, AFTER I. H. BURKILL IN RECORDS BOT. SURVEY  
INDIA, IV.

Stamens exserted; flowers rose-coloured; spines 0.. 1. *coccinellifera*.

Stamens not exserted:—

Spines falling except one long one on each cushion; flowers yellow, the sepals and petals tinged with red.....2. *monacantha*.

Several large spines remaining on each cushion:—

Spines all straight, slender, tawny or purplish-black; flowers at opening lemon-yellow, changing to rose-pink.....3. *elator*.

Spines some curved, the largest stout, light horn-coloured in life, darkening afterwards; flowers yellow.....4. *Dillenii*.

1. *OPUNTIA COCCINELLIFERA*, Mill.

Chingleput and Tinnevelly Districts in Carnatic.

A Mexican species which is only occasionally found in India and has apparently never spread itself widely; it was introduced at Masulipatam in 1788 with the object of acclimatizing the cochineal insect, for which it is suited.

2. *OPUNTIA MONACANTHA*, Haw.

N. Circars, common; Carnatic, about Madras; Deccan, in Coimbatore.

A species which has spread widely in some localities and is at once recognized by its single straight thorns. It was introduced very early, certainly before 1786, probably from Brazil.

3. *OPUNTIA ELATOR*, Mill.

N. Circars, along the coast down to the Kistna river, also near Madras; Deccan, about Bellary.

A common species, but frequently mistaken for the next, it is recognized by its rose-pink flowers and was apparently introduced about 1800.

4. *OPUNTIA DILLENII*, Haw.; F. B. I. ii. 657; W. & A. 363  
*excl. syn. Cactus indicus*, Roxb.; Wt. Ill. t. 114.

E. Coast from Ganjam to Madras, often quite close to the sea, inland also in various places; Deccan, in Bellary and Mysore, the most common species, easily recognized by its glaucous-green joints, yellow flowers, purple fruits and curved thorns. It comes probably from the Californian Peninsula and was introduced very early, and before 1786 it was established in Madras (Burkill). Many attempts have been made to eradicate it, but unsuccessfully in

general. Its spread is chiefly due to its use as a hedge plant. Vern. *Hind.* Nagphana.

**Family LXXVII. AIZOACEAE.**

Annual or perennial herbs. *Leaves* simple, often fleshy, opposite alternate or falsely whorled; stipules scarious or 0. *Flowers* regular, hermaphrodite or rarely polygamous, in cymes or fascicles, rarely solitary. *Calyx* of 4-5 sepals, free or rarely adnate to the ovary, usually persistent. *Petals* usually 0, when present small. *Stamens* perigynous or hypogynous, definite or indefinite, sometimes with staminodes; filaments free or connate in a cup; anthers oblong. *Ovary* free, 2-5-celled, syncarpous or rarely apocarpous; ovules many in each carpel, axile or solitary basal; styles as many as the carpels. *Fruit* usually capsular, dehiscing loculicidally or circumscissily, sometimes of indehiscent cocci. *Seeds* many or 1 in each carpel, usually reniform, compressed; testa membranous or crustaceous, often pitted or tuberculate; albumen mealy, surrounded by the curved or annular embryo.

Fruit syncarpous:—

Calyx-tube elongate; stamens inserted on the calyx-tube; capsule circumsciss; petals 0:—

Ovary and capsule 3-5-celled ..... 1. **Sesuvium.**

Ovary and capsule 1-2-celled ..... 2. **Trianthema.**

Calyx deeply 5-partite; stamens hypogynous; capsule 3-5-celled, loculicidal:—

Petals many, small; seeds arillate.....?.....3. **Orygia.**

Petals 0; seeds sometimes appendaged ..... 4. **Mollugo.**

Fruit apocarpous; carpels 3-5, 1-seeded; petals 0.....5. **Gisekia.**

**1. Sesuvium, Linn.**

Herbs or undershrubs, erect or prostrate, branched, succulent. *Leaves* opposite, entire, fleshy; stipules 0 or the petioles connected by a stipuliform membrane. *Flowers* axillary, sessile or peduncled, solitary or clustered; bracteoles 2 or 0. *Calyx-tube* turbinate; lobes 5, lanceolate, persistent, coloured within, apiculate below the tip, hyaline on the margins. *Petals* 0. *Stamens* 5 or many, inserted round the top of the calyx-tube; filaments usually connate at base. *Ovary* free, 3-5-celled; ovules numerous on axile placentas; styles 3-5. *Fruit* an ovate membranous 3-5-celled,

circumscissile capsule, the axis and placentas persistent. *Seeds* many, reniform; testa smooth; embryo annular.

SESUVIUM PORTULACASTRUM, Linn.; F. B. I. ii. 659.

E. and W. Coasts, on sea-shore sand.

A fleshy prostrate rooting stout-stemmed herb, the sepals purplish, the styles 3, the seeds black, shining, leaves linear-oblongate or spatulate.

Var. *repens*, Rottl. *S. repens*, Wt. in Hook. Comp. Bot. Mag. ii. 71; W. & A. 361. Leaves much smaller, obovate-spatulate, stems more slender.

## 2. *Trianthema*, Linn.

Diffuse prostrate branched herbs, glabrous or papillose. *Leaves* petioled, opposite, unequal, entire, subfleshy, the petioles of each pair connected at the base by stipuliform membranes. *Flowers* small, axillary, sessile or peduncled, solitary or in cymes or clusters; bracts membranous as are the 2 bracteoles. *Calyx*-tube short or long; lobes 5, coloured within, mucronate on the back near the tip. *Petals* 0. *Stamens* 5, 10 or 15, inserted near the top of the calyx-tube. *Ovary* free, sessile, usually truncate at apex, 1-2-celled; ovules 1 or more in each cell, from a basal placenta; styles 1 or 2, papillose. *Fruit* a capsule, circumsciss, the upper part carrying away 1-2 seeds, the lower 2-many-seeded. *Seeds* 1 or more, reniform, rough; embryo annular.

Style 1:—

Flowers solitary, sessile, sheathed by the base of the petiole; stamens 10 or 15; leaves obovate; capsule-top mitriform enclosing at least 1 seed, the lower part 3-5-seeded; seeds with concentric muriculate lines.....1. *Portulacastrum*.

Flowers fascicled, nearly sessile, not enclosed in the base of the petiole; stamens 5; leaves oblong or elliptic; capsule-top an annular depressed cushion enclosing 1 seed, the lower part also 1-seeded; seeds with concentric smooth lines .....2. *triquetra*.

Styles 2; flowers in clusters of dichasioid cymes; stamens 10 or 15; leaves elliptic or elliptic-oblong; capsule-top truncate with an annular rim enclosing 2 seeds, the lower part also 2-seeded; seeds with concentric muriculate lines .....3. *decandra*.

1. TRIANTHEMA PORTULACASTRUM, Linn. *T. monogyna*, Linn.; F. B. I. ii. 660. *T. obcordata*, Roxb.; W. & A. 355; Wt. Ic. t. 288.



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intermixed. *Ovary* free, globose or ovoid, 3-5-celled; ovules many in each cell, axile; styles 3-5, linear or small clavate. *Fruit* a membranous, oblong globose or subcylindric, capsule, dehiscence loculicidal. *Seeds* several in each cell, rarely 1, reniform, sometimes appendaged at the hilum; embryo annular.

Flowers in axillary fascicles; seeds appendaged and with a slender white thread curved round them:—

Leaves densely stellate-hairy, orbicular to obovate and spatulate; pedicels usually very short; sepals densely stellate hairy

1. *lotoides*.

Leaves glabrous or slightly crispate-pubescent, usually oblanceolate but sometimes almost orbicular; pedicels long, filiform; sepals glabrous.....2. *oppositifolia*.

Flowers in terminal cymes; seeds not or minutely appendaged, no curved thread:—

Leaves in whorls at the nodes:—

Cymes corymbosely branched; pedicels long, filiform:—

Leaves linear-lanceolate to obovate; stems quadrangular; seeds dark reddish-brown, shining, tuberculate...3. *pentaphylla*.

Leaves linear, very narrow; stems very slender, terete; seeds golden-brown, reticulate, not tuberculate.....4. *Cerviana*.

Cyme-branches lengthening into elongated racemes; pedicels short; leaves linear-lanceolate; stems angular; seeds golden-brown with flattened papillae, not tuberculate, the back furrowed

5. *disticha*.

Leaves all radical, spatulate; flower-peduncles many, erect, trichotomously branched; pedicels filiform; seeds reddish-black, covered with minute flattened tubercles..... 6. *nudicaulis*.

1. MOLLUGO LOTOIDES, O. Kze. *M. hirta*, Thunb.; F. B. I. ii. 662. *Glinus lotoides*, Loefl.; W. & A. 362. *G. dictamnoides*, Linn.; W. & A. 362.

Deccan and Carnatic, in dry sandy places, and on waste lands, common.

A prostrate herb covered with stellate hairs, the leaves usually orbicular, the pedicels sometimes up to .75 in. long, but more usually very short.

2. MOLLUGO OPPOSITIFOLIA, Linn. *M. Spergula*, Linn.; F. B. I. ii. 662; W. & A. 44.

Deccan and Carnatic, in dry places and on waste lands and fallow fields, common.

A slender prostrate herb, the leaves eaten and used medicinally. Vern. *Tam.* Toora.

3. MOLLUGO PENTAPHYLLA, Linn. *M. stricta*, Linn.; F. B. I. ii. 663; W. & A. 44.

All plains Districts and at low elevations in the hills, a common weed.

An erect slender glabrous herb, the leaves very variable in shape.

4. MOLLUGO CERVIANA, Ser.; F. B. I. ii. 663; W. & A. 44.

Deccan and Carnatic, in sandy places, especially near the coast.

A very slender small glabrous herb, many branched from the base.

5. MOLLUGO DISTICHA, Ser.; F. B. I. ii. 663; W. & A. 44; Wt. Ic. t. 3.

East Coast, in sandy places not far from the sea.

An erect rather stout long-leaved herb, more or less crispate-pubescent.

6. MOLLUGO NUDICAULIS, Lam.; F. B. I. ii. 664; W. & A. 43.

Deccan and Carnatic, in dry places.

An erect annual herb with rosulate leaves.

### 5. Gisekia, Linn.

Diffuse branched herbs. *Leaves* opposite or falsely whorled, fleshy, spathulate, abounding in raphides; stipules 0. *Flowers* small, hermaphrodite or polygamous, in axillary fascicles or short cymes. *Sepals* 5, ovate, herbaceous with membranous margins, many white raphides. *Petals* 0. *Stamens* 5-15, hypogynous; filaments dilated at the base; anthers oblong. *Carpels* usually 5, distinct, sessile on a small torus, 1-celled; ovule 1 in each cell, basal; styles simple. *Fruit* of 5 free, membranous, white-papillose, indehiscent, 1-seeded carpels. *Seeds* vertical, compressed, subreniform; embryo annular.

GISEKIA PHARNACEOIDES, Linn.; F. B. I. ii. 664; Roxb. Cor. Pl. t. 183; Wt. Ic. t. 1167.

Deccan and Carnatic, from the Godavari southwards, on waste lands.

A diffuse usually prostrate herb with fleshy glaucous leaves and black minutely pitted seeds. Vern. *Tel.* Ishi-rash kura.



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**Family LXXVIII. UMBELLIFERAE.**

Herbs, rarely shrubs or trees. *Leaves* usually alternate, simple or compound, the petiole generally sheathing at base; stipules 0 or rarely small and scarious. *Flowers* regular or irregular, hermaphrodite or polygamous, in compound, rarely simple, umbels, the outer flowers of the umbel sometimes radiant; umbels and umbellules each furnished with involucrel bracts or bracteoles, which may sometimes be absent from one or both. *Calyx*-tube adnate to the ovary, limb 5-toothed or 0. *Disk* epigynous, 2-lobed. *Petals* 5, epigynous, sometimes unequal, often bifid, with an inflexed apex and a median fold. *Stamens* 5, epigynous, alternating with the petals. *Ovary* inferior, 2-celled, crowned by the disk; ovule solitary in each cell, pendulous; styles 2, often dilated at the base into stylopods; stigmas capitate. *Fruit* of 2 indehiscent dorsally or laterally compressed mericarps separated by a commissure and attached to and often pendulous from a slender forked carpophore; the mericarps usually marked by 5 longitudinal primary ridges, often alternating with secondary ones, the pericarp traversed by oil-canals (vittae). *Seed* 1 in each mericarp, pendulous; albumen cartilaginous; embryo minute, near the apex, the radicle superior.

Umbels simple; leaves orbicular, undivided; fruit laterally compressed; vittae 0:—

Mericarps with 3 ridges, the commissural obscure; flowers white; pericarp of seed thin ..... 1. **Hydrocotyle.**

Mericarps with 7-9 ridges, the primary and secondary similar netveined between; flowers red; pericarp thick ..... 2. **Centella.**

Umbels in groups of about 3, sessile in the axils of a cymose panicle; leaves 3-5-partite; fruit covered with hooked prickles; vittae many, ..... 3. **Sanicula.**

Umbels compound:—

Fruit laterally compressed:—

Leaves entire; flowers yellow or lurid; mericarp with 5 primary ridges, the secondary inconspicuous ..... 4. **Bupleurum.**

Leaves usually pinnate or decomposed; flowers white:—

Involucrel bracts and bracteoles absent; umbels leaf-opposed ..... **Apium.**

Involucrel bracts and bracteoles usually present:—

Furrows between the ridges usually with 1 vitta... 5. **Carum.**

Furrows between the ridges 2-3-vittate..... 6. **Pimpinella**



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1. **HYDROCOTYLE JAVANICA**, Thunb.; F. B. I. ii. 667. *H. polycephala*, W. & A. 366; Wt. Ic. t. 1003.

W. Gháts, in the Nilgiris and Pulneys, in shady places at high levels.

2. **HYDROCOTYLE CONFERTA**, Wt. Ic. t. 1002; F. B. I. ii. 668.

W. Gháts, in the Nilgiris and Pulneys, at high levels in wet places.

3. **HYDROCOTYLE ROTUNDIFOLIA**, Roxb.; F. B. I. ii. 668; Wt. Ic. t. 564. *H. tenella*, D. Don; W. & A. 366.

E. Gháts, hills of Vizagapatam, at 5,000 ft.; W. Gháts, in the Nilgiris and Pulneys, in bogs and on bare wet soil, up to 7,000 ft.

## 2. *Centella*, Linn.

Prostrate herbs, rooting at the nodes. *Leaves* orbicular, crenate, palmately nerved, deeply cordate with an angular sinus, long-petioled; stipules scarious. *Flowers* reddish, small, sessile, in simple axillary few-flowered umbels; involucral bracts 2, small. *Calyx* truncate. *Petals* minute, ovate, acute, imbricate. *Fruit* laterally compressed, the mericarps with about 7-9 subsimilar ridges, the secondary ridges as prominent as the primary, reticulate between them, vittae 0; pericarp thickened.

**CENTELLA ASIATICA**, Urban. *Hydrocotyle asiatica*, Linn.; F. B. I. ii. 669; W. & A. 366; Wt. Ic. t. 565.

All plains Districts in wet places, the borders of ricefields, and on banks, up to 6,000 ft. in the hills.

A common trailing and rooting weed with leaves up to 2 in. in diam., orbicular-cordate with rather shallow sinus.

## 3. *Sanicula*, Linn.

Erect herbs. *Leaves* deeply 3-5-partite, the segments again lobed and mucronate-serrate, chiefly radical and long-petioled. *Flowers* very small, mostly unisexual, in groups of about 3 umbels, sessile in the forks and on the branches of a cymose panicle, the bracts sessile, leaf-like; umbellules usually small, few-flowered, with few bracteoles. *Calyx*-lobes herbaceous, lanceolate. *Petals* white, with long incurved points. *Disk* flattened, thickened round the filiform styles. *Fruit* ovoid, not compressed, the mericarps

thickly covered with hooked spiny prickles, without ridges, vittae many.

SANICULA EUROPAEA, Linn.; F. B. I. ii. 670. *S. elata*, Ham.; W. & A. 367; Wt. Ill. t. 117, fig. 2; Wt. Ic. tt. 334, 1004.

W. Gháts, in the Nilgiris and Pulneys above 6,000 ft., in Sholas and similar shady places.

A perennial herb of wide distribution but variable, the S. Indian form having the leaves acuminate lobed.

#### 4. Bupleurum, Linn.

Glabrous herbs or shrubs. *Leaves* entire. *Flowers* small, yellow or lurid, in compound umbels; involucral bracts and bracteoles usually present. *Calyx*-lobes 0. *Petals* 5, obovate, inflexed, the apex emarginate. *Disk* broad, flat. *Styles* short. *Fruit* laterally compressed, slightly constricted at the commissure; mericarps subpentagonal, primary ridges distinct, sometimes almost winged, secondary 0 or obscure; vittae 1-3 in the furrows between the primary ridges; carpophore 2-fid or 2-partite. *Seed* terete, sometimes slightly grooved on the inner face.

Erect, usually single-stemmed shrub up to 6 ft. high; lower leaves up to 6 in. long, cauline shorter, obtuse, all mucronate; bracts and bracteoles broad; mericarps 3-4 in. long with 5 corky ridges shortly winged; vittae 1 in each furrow between them ...1. *plantaginifolium*.

Erect perennial herbs up to 3 ft. high or even more; bracts and bracteoles narrow, 3-nerved; mericarps semi-ellipsoid, 5-ridged:—

Leaves linear-oblong, obtuse at apex and mucronate, usually 1-3 in. long, 3 in. broad; mericarps with 1-3 vittae in the furrows

2. *mucronatum*.

Leaves linear, acute at apex and mucronate, up to 4 in. long, 25 in. broad; mericarps with usually 3 vittae in the furrows...3. *virgatum*.

Erect slender perennial herb up to 1 ft. high; lower leaves crowded near the base, upper few, all linear mucronate; bracts and bracteoles lanceolate, hair-pointed; mericarps semi-ovoid, 1 in. long with distinct ridges; vittae 1 in each furrow, sometimes 3 at commissure

4. *distichophyllum*.

1. BUPLEURUM PLANTAGINIFOLIUM, Wt. Ic. t. 281; F. B. I. ii: 674.

W. Gháts, in the Shola Forests of the Nilgiris, above 6,000 ft.

A shrub, often with a single stem up to 6 ft. high, the stem marked by the round scars of fallen leaves. Basal leaves long and narrow with very oblique subparallel nerves; cauline leaves shorter and broader and very obtuse.

2. *BUPLEURUM MUCRONATUM*, W. & A. 370; F. B. I. ii. 676, *in part*.

W. Gháts, in the Nilgiris at about 7,000 ft., among bushes, scarce in Pulneys.

A bushy plant with knotted stems and many leaves, the cauline similar to the radical.

- Var. *ramosissimum*, C. B. Clarke in F. B. I. ii. 676. *B. ramosissimum*, W. & A. 370; Wt. Ic. t. 1007.

W. Gháts, in the Nilgiris and Pulneys, at 6,000–8,000 ft.; Shevaroy Hills of Salem.

A low bushy plant with more terete stems and shorter leaves, less obtuse at apex or sometimes acute.

3. *BUPLEURUM VIRGATUM*, W. & A. 370. *B. mucronatum* var. *virgatum*, C. B. Clarke in F. B. I. ii. 676.

W. Gháts, in the Pulney Hills, at about 7,000 ft., among grass on the downs.

A tall erect herb with terete stems and narrow, long and sharply mucronate-acuminate leaves; the umbels long-peduncled with many rays.

4. *BUPLEURUM DISTICHOPHYLLUM*, W. & A. 370; F. B. I. 677; Wt. Ic. t. 1006.

W. Ghats, in the Nilgiri Hills, above 7,500 ft., on the open downs.

A slender erect herb, the radial leaves tufted.

A small specimen from the Madgol Hills of Vizagapatam, 4,000 ft. (A. W. Lushington), seems to belong to *B. falcatum*, Linn.

### 5. *Carum*, Linn.

Annual or perennial herbs. *Leaves* pinnate or decomposed. *Flowers* white, polygamous, the sterile flowers often with irregular petals; umbels compound; involucral bracts few or 0; bracteoles numerous, entire. *Calyx*-teeth small or 0. *Petals* broad, obtuse retuse or emarginate. *Fruit* ovoid ellipsoid or oblong, laterally compressed and more or less constricted at the commissure;



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Fruit papillose—scabrous, ovoid:—

Fruit densely papillose, disk conical; styles long and slender; basal leaves orbicular-cordate, sometimes 3-partite, serrate, pubescent, passing in cauline ones to deeply pinnatifid, and finally to a sheath with pinnatifid blade; bracts and bracteoles many, small, linear.....4. *Candolleana*.

Fruit sparsely papillose, didymous, disk small; styles short; basal leaves, if present, ovate-cordate, acute, serrate, glabrous, lower cauline leaves trifoliolate, large, upper also trifoliolate; with slender acuminate serrate leaflets; bracts 0, bracteoles 0 or 1-3, small.....5. *monoica*.

1. PIMPINELLA HEYNEANA, Wall.; F. B. I. ii. 684. *Heliosciadium*? *Heyneanum*, DC.; W. & A. 368.

Circars and Deccan, in hill forests, scarce; W. Gháts, from the Coimbatore Hills to Tinnevelly.

An erect annual herb, the flower umbels with many long slender rays.

2. PIMPINELLA LESCHENAULTII, DC.; F. B. I. ii. 687; W. & A. 369; Wt. Ic. t. 1005.

W. Gháts, in the Nilgiris, above 6,000 ft.; on the open downs near sholas with long-petioled basal leaves (Fyson).

An erect almost scapigerous perennial with white flowers.

3. PIMPINELLA PULNEYENSIS, Gamble in Kew Bull. 1919, 228.

W. Gháts, at Bear Shola and in other moist woods in the Pulney Hills, about 6,000-7,000 ft. (Bourne).

A tall herb reaching 1-2 ft. high, with long-petioled basal and lower cauline reniform leaves with many palmate nerves, the upper cauline leaves tripartite and lobed; flowers white.

4. PIMPINELLA CANDOLLEANA, W. & A. 369; F. B. I. ii. 687; Wt. Ic. t. 341.

W. Gháts, in the Nilgiris and Pulneys, above 6,000 ft., in grass lands near Shola forests, more scarce to the hills of S. Tinnevelly.

An erect tawny pubescent tall perennial with orbicular cordate basal leaves and characteristic papillose fruits, the flowers white.

5. PIMPINELLA MONOICA, Dalz.; F. B. I. ii. 687.

N. Circars, in the hills from Ganjam to Godavari, at low

levels, up to 3,000 ft.; W. Gháts, Mudumalai in Wynaad at 2,000 ft., Anamalais; Shevaroy Hills of Salem.

A tall erect monoecious herb with white flowers and umbels with very slender rays.

### 7. Seseli, Linn.

Herbs. *Leaves* 2-3-pinnate or twice 3-partite. *Flowers* white, in compound umbels; involucral bracts 0 or few, rarely many, bracteoles many. *Calyx-teeth* minute, lanceolate or linear, or 0. *Petals* 5, with a long inflexed acumination. *Styles* short. *Fruit* oblong ovate or globose, broadest at the commissure, not compressed; mericarps semi-terete or compressed dorsally, the inner face flat or sometimes concave; ridges strong, obtuse or subacute, lateral hardly larger than the dorsal; vittae in each furrow solitary, large, others smaller often under the ridges; disk not prominent. *Seed* semi-terete, the inner face somewhat concave.

SESELI INDICUM, W. & A. 371; F. B. I. ii. 693. *Cnidium diffusum*, DC.; Wt. Ic. t. 569.

Plains Districts of the Carnatic (Heyne).

An annual herb, usually diffuse, with many branches, white or pinkish flowers and a globose fruit with prominent ridges and straight hairs stellate at the apex.

### 8. Schultzia, Spreng.

Glabrous perennial herbs. *Leaves* 1-2-pinnate, ultimate pinnae toothed, pinnatifid or multifid. *Flowers* in compound umbels; involucral bracts several, entire or divided, bracteoles numerous. *Calyx-teeth* prominent. *Petals* obovate, emarginate, white. *Fruit* ovate-oblong, the commissure broad; mericarps dorsally compressed, primary ridges slender, furrows between them with 2-4 vittae; carpophore bipartite.

SCHULTZIA ? BENTHAMII, C. B. Clarke in F. B. I. ii. 697.

W. Coast, in Canara (Hohenacker).

A tall herb with short pinnate leaves and rather large mericarps with 3 prominent ridges on the back followed by two secondary, in section crescent-shaped, the commissure with 4 vittae, vittae in the furrows between the ridges in pairs.



### 9. *Polyzygus*, Dalz.

A glabrous herb with tuberous root. *Leaves* ternately and pinnately decomposed, the segments pinnatifid. *Flowers* small, white, in compound umbels; involucre bracts very few or 0; bracteoles few, small, setaceous. *Calyx*-teeth small or the outer slightly larger. *Petals* obovate with an inflexed acumination. *Styles* slender. *Fruit* small, ovoid, terete, broad at the commissure; mericarps semiterete, the primary ridges obscure, furrows between them broad, 1-3-vittate; carpophore bipartite. *Seed* semiterete, flat on the inner face.

*POLYZYGUS TUBEROSUS*, Dalz.; F. B. I. ii. 698.

W. Gháts, Canara and Mysore (Law).

A weak herb with membranous leaves and tuberous root, very little known.

### 10. *Peucedanum*, Linn.

Perennial herbs. *Leaves* pinnately or ternately decomposed, the ultimate segments lanceolate or ovate, rarely linear, entire or toothed. *Flowers* white yellow or rarely pink, often polygamous, in compound umbels usually with many rays; bracts of various shapes; bracteoles many, few or 0. *Calyx* with entire or subentire limb; teeth small. *Petals* obovate or cuneate, inflexed at the tip, entire or emarginate. *Disk* undulate, the stylopods usually small. *Ovary* glabrous. *Fruit* much dorsally compressed, elliptic oblong or orbicular; mericarps slightly convex on the back, their margins more or less acutely winged; the dorsal ridges little elevated; vittae usually solitary in the dorsal furrows, 2-6 on the commissure. *Seed* flat, the inner face flat.

Leaflets oblong or oblanceolate, entire; mericarps elliptic, 3 in. long, 2 in. broad, with thick dark margins; dorsal furrows 1-vittate, lateral 2-vittate, commissure 2-vittate, vittae not conspicuous.

1. *Dhana*.

Leaflets linear-lanceolate, distantly serrate; mericarps orbicular, 2 in. in diam., the margins pale and rather thin; dorsal furrows 1-vittate, lateral 1-2-vittate, commissure 4-6-vittate, the vittae conspicuous but often short.....2. *anamallayense*.

1. *PEUCEDANUM DHANA*, Ham.; F. B. I. ii. 709, *var. Dalzellii*, C. B. Clarke.

E. Gháts, in Ganjam (Barber) and the Madgol Hills of Vizagapatam, at 3,000 ft. (A. W. Lushington).



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·4 in. long by ·2–·3 in. broad, the wings narrow, vittae on the back 4, on the commissure usually 2 .....4. *ceylanicum*.

Lower leaves bipinnate, sometimes nearly tripinnate:—

Fruit small, elliptic, ·25 by ·2 in., wing narrow, vittae 4 on the back, extending down three-fourths of the face, 2–4 and unequal on the commissure; bracteoles lanceolate, ·15 in. long; lower leaves 1–2-pinnate, the pinnules broad, pinnatifid, shortly crenate-serrate, mucronate, covered above with scattered scales, hispid on nerves beneath.....5. *Sprengelianum*.

Fruit large, at least ·3 in. long:—

Fruit obovate, ·45 by ·2 in., wing rather broad, vittae 4 on the back, extending down two-thirds of the face, 2 on commissure; bracteoles lanceolate, long acuminate, ·25 in. long; lower leaves much cut, bipinnate, the pinnules deeply lobed, sharply serrate, covered above and on nerves beneath with long soft hairs

6. *courtallense*.

Fruit elliptic, ·3–·4 by ·25–·3 in., wing narrow, vittae 4–6 on the back, extending nearly to the base, 2–4 on commissure; bracteoles lanceolate, ·25 in. long; lower leaves 1- to almost 3-pinnate, the pinnules broad, not deeply lobed, shortly serrate, both surfaces with short soft hairs .....7. *Candolleianum*.

Leaves pedately 5–7-foliolate, with lanceolate leaflets cuneate at base and sharply serrate above; petals unequal; mericarps apparently unequally winged.....8. *pedatum*.

1. HERACLEUM HOOKERIANUM, W. & A. 373; F. B. I. ii. 715.  
*Pastinaca Hookeriana*, Wt. Ic. t. 1010.

W. Gháts, open downs on the Nilgiris above 7,000 ft.

An erect herb with white flowers sometimes tinged with red, leaves villous and sticky, nearly all radical and flat on the ground, the stem 1 to 1·5 rarely to 2 ft. high.

2. HERACLEUM AQUILEGIFOLIUM, C. B. Clarke in F. B. I. ii. 715.

W. Gháts, in the Anamalai Forests (Wight).

An erect herb reaching 2–3 ft. in height.

3. HERACLEUM RIGENS, Wall.; F. B. I. ii. 715; W. & A. 373.

*Pastinaca rigens*, Wt. Ic. t. 1009.

W. Gháts, in the Nilgiri and Pulney Hills, on open downs above 6,000 ft.

A tall, erect, greyish-pubescent herb reaching 3 ft. in height, with yellow flowers, the leaves both radical and cauline, remarkable for the distant, more or less orbicular-cordate, slightly lobed leaflets.

Var. *multiradiatum*, Gamble.

W. Gháts, in the Pulney Hills, at lower levels.

A larger plant with larger and more cut leaflets and very large umbels, often with 30 or more rays 4-5 in. long, commissural vittae sometimes up to 10.

Var. *elongatum*, Gamble.

W. Gháts, in the Pulney Hills (Bourne).

A slenderer plant with thinner leaves, large umbels and an elongated fruit almost oblanceolate, .6 in. by .25 in., vittae on the commissure 2-4.

4. HERACLEUM CEYLANICUM, Gardn.; F. B. I. ii. 716; Fyson Hillt. Fl. 175.

W. Gháts, in the Pulney Hills, on the downs at high levels (Bourne).

A tall handsome species with much cut fern-like leaves, conspicuous white radiant flowers and very large umbels with sometimes over 40 rays, some nearly 6 in. long.

5. HERACLEUM SPRENGELIANUM, W. & A. 372; F. B. I. ii. 716. *Pastinaca Sprengeliana*, Wt. Ic. t. 1008.

W. Ghats, in the Nilgiri Hills, above 6,000 ft., in grassy places near the Sholas (Wight, Gardner), apparently scarce.

A large very leafy plant at once recognized by the small fruit.

6. HERACLEUM COURTALLENSE, Gamble n. comb. *H. rigens*, Wall. var. *Candolleana*, C. B. Clarke in F. B. I. ii. 715 *in part*. *Pastinaca ligusticifolia*, W. & A. 372; Wt. Ill. t. 116.

W. Gháts, at Courtallum in Tinnevelly (Wight).

A tall leafy plant, with much cut deeply serrate leaves and long fruit.

7. HERACLEUM CANDOLLEANUM, Gamble n. comb. *H. rigens*, Wall. var. *Candolleana*, C. B. Clarke in F. B. I. ii. 715 *in part*. *Pastinaca Candolleana*, W. & A. 372.

W. Gháts, from the Nilgiris to the Anamalai and Pulney Hills, above 6,000 ft. common.

A large leafy plant with broad leaves, shortly serrate.

8. HERACLEUM PEDATUM, Wt. Ic. t. 342; F. B. I. ii. 716.

W. Gháts, in the Pulney and Sivagiri Hills in the undergrowth of Shola forest.

A trailing and rooting herb of ground vegetation, with small white radiant flowers and pedate leaves.

*Apium graveolens*, Linn., Celery, and *Daucus Carota*, Linn., Carrot, are occasionally cultivated in gardens as vegetables.

*Foeniculum vulgare*, Gaertn., Fennel, *Anethum Sowa*, Roxb., Dill, and *Coriandrum sativum*, Linn., Coriander, are sometimes cultivated for their leaves and seeds and may occasionally be found run wild.

### Family LXXIX. ARALIACEAE.

Trees or shrubs, sometimes climbing, rarely herbs, glabrous or stellately pubescent, frequently prickly. *Leaves* alternate, rarely opposite, long-petioled, large, simple or compound; stipules adnate to the petiole, sometimes within its sheathing base, rarely 0. *Flowers* regular, hermaphrodite or polygamous, in umbels racemes or paniced heads, with bracts and bracteoles; pedicels continuous with the base of the calyx or there articulated. *Calyx*-tube adnate to the ovary; limb truncate or with small teeth. *Petals* usually 5, rarely more, valvate or slightly imbricate, separating or deciduously calyptrate. *Stamens* as many as and alternate with the petals, inserted round an epigynous disk. *Ovary* inferior, 1- to many-celled; ovules solitary in each cell, pendulous; styles as many as the cells, distinct or united. *Fruit* usually drupaceous or dry, cells as many as the ovary. *Seed* pendulous; testa thin; albumen uniform or ruminant; embryo minute, radicle superior.

Petals imbricate in bud :—

Styles 3-5, free; leaves compound, often prickly.....1. **Aralia.**

Styles 5, combined; leaves pinnate.....2. **Pentapanax.**

Petals valvate in bud :—

Ovary 2-celled; leaves compound..... **Nothopanax.**

Ovary 4-10-celled :—

Pedicels jointed; leaves pinnate.....3. **Polyscias.**

Pedicels continuous; leaves digitate.....4. **Schefflera.**

#### 1. **Aralia**, Linn.

Herbs, shrubs or small trees, often prickly. *Leaves* alternate or whorled, digitate pinnate or compound-pinnate; leaflets serrate or nearly entire; stipules small, not prominent. *Flowers* often



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*Stamens* 5–8, anthers oblong. *Ovary* 5–8-celled, the cells 1-ovuled; styles 5–8, distinct, erect. *Fruit* a 5-angled, subglobose berry with 5–8 pyrenes. *Seed* compressed, albumen uniform.

POLYSCIAS ACUMINATA, Seem.; F. B. I. ii. 727; Bedd. Fl. t. 213. *Hedera acuminata*, Wt. Ic. t. 1063.

W. Gháts, in W. Nilgiris, Anamalais and hills of Tinnevely at 4,500–5,000 ft.

A glabrous tree with long pinnate leaves with many oblong-lanceolate, long-acuminate leaflets, the flower umbels in racemes in a panicle.

#### 4. Schefflera, Forster.

Trees or climbing shrubs. *Leaves* alternate, digitate, rarely compound-digitate or 1-foliolate; leaflets usually coriaceous, entire or distally toothed; petioles long; stipules usually connate within the petiole. *Flowers* in panicles of umbels or compound racemes, usually terminal; bracts usually deciduous; bracteoles 0 or few, sometimes united in a tube; pedicels, if present, not jointed. *Calyx*-mouth truncate or toothed. *Petals* 5–6 or many, valvate. *Stamens* as many as the petals. *Ovary*-cells as many as the petals; styles small, separate or combined in a column. *Fruit* a subglobose, 5–6-angled dry drupe. *Seeds* compressed; albumen uniform.

Flowers pedicellate; bracteoles few or none:—

Styles connate in a cylindric column; trees:—

Flowers in umbels:—

Umbels large, nearly 1 in. in diam., many-flowered, in terminal racemes of rather large flowers; bracts, bracteoles and pedicels woolly; leaflets coriaceous with conspicuous nerves impressed above, raised beneath ..... 1. *rostrata*.

Umbels small, about .5 in. in diam., few- (about 12-) flowered, in lateral panicles of racemes and small flowers; bracts, bracteoles and pedicels glabrous; leaflets chartaceous with slender nerves scarcely impressed or raised.....2. *micrantha*.

Flowers in racemes, in panicles up to 1 ft. long from the wood of the previous year; bracts, bracteoles and pedicels rusty-pubescent; leaflets glaucous beneath, the nerves not conspicuous ..... 3. *racemosa*.

Styles short, not connate in a cylindric column; straggling shrubs:—

Leaflets prominently reticulated:—

Leaflets large, 4 in. long or more; fruit 5-angled:—

Leaflets obovate, rounded or emarginate at apex or very slightly obtusely pointed, the main nerves oblique, petiolules slender, 1-2 in. long; umbels in racemes in a terminal panicle often 1 ft. long ..... 4. *stellata*.

Leaflets ovate or elliptic, shortly and suddenly pointed at apex:—

Leaflets chartaceous, the main nerves scarcely more prominent than the secondary and the reticulations, not very oblique, about 60° with the midrib; panicles with a rather long rhachis ..... 5. *Roxburghii*.

Leaflets coriaceous, the main nerves much more prominent than the secondary and the reticulations, very oblique, about 30° with the midrib; panicles with a short rhachis

6. *venulosa*.

Leaflets under 2 in. long, coriaceous, obovate, obtuse or emarginate, petiolules .25-.5 in. long; umbels in subterminal stellate-villous racemes about 1 in. long ..... 7. *Bourdillonii*.

Leaflets not prominently reticulated, oblong, acute, coriaceous, up to 10 in. long, 4 in. broad, petiole 7-15 in. long, petiolules 5-10, 2 in. long or longer; umbels in large panicles up to 12 in. long ..... 8. *Wallichiana*.

Flowers sessile, bracteoles 4 to each flower; leaflets 6-8, oblong, acute or acuminate, up to 6 in. and even 1 ft. long, petiole about 6 in., petiolules stout, 1-2 in. long; flower-umbels in panicles of racemes with stout branches ..... 9. *capitata*.

1. SCHEFFLERA ROSTRATA, Harms. *Heptapleurum rostratum*, Bedd.; F. B. I. ii. 729. *Hedera rostrata*, Wt. Ic. tt. 1013, 1014.

Nilgiri Hills, in Kundahs Sholas, above 7,000 ft.

A large tree with 5-9 lanceolate, sometimes denticulate, leaflets, the petiolules about 1 in. long, the nerves conspicuous, meeting in loops near the margin.

2. SCHEFFLERA MICRANTHA, Gamble, n. comb. *H. rostratum* var. *micrantha*, C. B. Clarke in F. B. I. ii. 729.

Nilgiri Hills, along the W. scarp from Naduvatam to Sispara, about 6,000 ft.

A tree with about 6 lanceolate or oblong-lanceolate leaflets, the petiolules .5-1 in. long, the nerves not conspicuous nor meeting in loops.



3. SCHEFFLERA RACEMOSA, Harms. *Heptapleurum racemosum*, Bedd. Fl. t. 214; F. B. I. ii. 729. *Hedera racemosa*, Wt. Ic. t. 1015.

W. Gháts, in Shola Forests of the Nilgiris, Pulneys and southwards, at 3,000–7,000 ft.

A large tree, conspicuous for its large racemose inflorescence, the leaflets oblong-lanceolate, the petiolules 1–2 in. long. Wood soft, grey.

4. SCHEFFLERA STELLATA, Harms. *Heptapleurum stellatum*, Gaertn.; F. B. I. ii. 730. *Hedera obovata*, Wt. Ic. tt. 1011, 1012.

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

A large straggling or climbing shrub with small flowers, the petals usually falling as an operculum.

5. SCHEFFLERA ROXBURGHII, Gamble, n. comb. *Aralia digitata*, Roxb. *Heptapleurum venulosum*, Seem.; F. B. I. ii. 729 in part.

N. Circars, in Ganjam and Vizagapatam, in the E. Ghát forests.

A large straggling or climbing shrub with long racemes.

6. SCHEFFLERA VENULOSA, Harms. *Heptapleurum venulosum*, Seem.; F. B. I. ii. 729 in part. *Paratropia venulosa*, W. & A. 377; Wt. Ill. t. 118.

Deccan, in hilly country as at Horsleykonda, Chittoor; W. Gháts, on the east slopes; frequent on trees near villages.

A large straggling or climbing shrub, with coriaceous shining leaves, sometimes epiphytic. Bark grey, shining. Vern. *Hind*. Dain.

- Var. *obliquinervia*, Gamble. Leaves more coriaceous, the lower 1 or 2 pairs of nerves rib-like and curving very obliquely nearly to the top; flower racemes less congested.

W. Gháts, in Wynaad, Malabar and Anamalais up to 3,000 ft.

7. SCHEFFLERA BOURDILLONII, Gamble in Kew Bull. 1919, 228. Hills of Travancore, in evergreen forests at about 4,000 ft. (Bourdillon).

An epiphytic shrub about 12 ft. high, growing on large trees.

8. SCHEFFLERA WALLICHIANA, Harms. *Heptapleurum Wal-*



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Flowers in cymes; stamens as many as the petals; buds slender, about .5 in. long, nearly glabrous; leaves ovate, broad, entire or lobed with acuminate lobes, palmately 3-5-nerved at the base; berry ovoid, glabrous, .25 in. long.....2. *begonifolium*.

1. *ALANGIUM SALVIFOLIUM*, Wang. *A. Lamarckii*, Thw.; F. B. I. ii. 741; Bedd. Fl. t. 215. *A. decapetalum*, Lamk.; W. & A. 325.

Circars, Deccan and Carnatic, in dry regions, in the plains and low hills, common on roadsides.

A deciduous small tree, sometimes straggling, sometimes spinous, with pretty white-scented flowers. Bark grey, orange-yellow when young; wood olive-brown, hard and close-grained, scented, useful for ornamental work and a good fuel. Vern. *Hind.* Akola; *Ur.* Ankula; *Tel.* Ankolanu; *Tam.* Alangi; *Mal.* Arinjil; *Kan.* Ankola.

- Var. *hexapetalum*, Wang. *A. hexapetalum*, Lamk.; W. & A. 326. Leaves thinner, 3-5-nerved at base, cuspidate-acuminate at apex; berry larger; apparently evergreen and usually climbing.

W. Coast, in Malabar and Travancore.

2. *ALANGIUM BEGONIFOLIUM*, Baill. *Marlea begonifolia*, Roxb. Cor. Pl. t. 283; F. B. I. ii. 743.

E. Gháts, Madgol Hills of Vizagapatam above 3,000 ft. (A. W. Lushington).

A small tree with white flowers and broad lobed leaves. Bark grey; wood white and soft.

### Family LXXXI. CORNACEAE.

Trees or shrubs, rarely herbs. *Leaves* opposite or alternate, petiolate, entire or angular-lobed or serrate; stipules usually 0. *Flowers* small, hermaphrodite or unisexual, in dichotomously branched panicles cymes or heads, white or yellow or sometimes green or lurid. *Calyx*-tube adnate to the ovary; limb 4-5-lobed or subtruncate. *Petals* 4-5, rarely 0, alternate with the calyx-lobes, imbricate or valvate. *Stamens* as many as and alternate with the petals; filaments short; anthers introrse. *Disk* epigynous, usually fleshy. *Ovary* inferior, 1-4-celled; ovules solitary in the cells, pendulous; style simple or sometimes divided. *Fruit* a drupe or berry, 1-4-celled, with 1-4 bony or crustaceous pyrenes. *Seeds* oblong, terete, pendulous; testa membranous; albumen

copious enclosing the subfoliaceous cotyledons; embryo axile, radicle terete or flattened.

### Mastixia, Blume.

Trees, the branches terete. *Leaves* opposite or alternate, petioled, entire. *Flowers* small, hermaphrodite, in terminal many-flowered panicles; bracts small or elongate; bracteoles 2 at the base of the calyx-tube; pedicel articulate. *Calyx-tube* campanulate, limb 4-5-lobed. *Petals* 4-5, ovate, coriaceous, valvate, the apex inflexed. *Stamens* 4-5, alternate with the petals; filaments short; anthers oblong-cordate. *Disk* fleshy, 4-5-lobed. *Ovary* 1-celled; ovule 1, pendulous near the top of the cell; style short, cylindrical. *Fruit* an ovoid or ellipsoid drupe, crowned by the scar of the calyx-lobes; putamen woody, grooved down one side. *Seed* ellipsoid; testa membranous; albumen fleshy; cotyledons foliaceous; radicle elongate.

Bracts hardly any; bracteoles small, linear lanceolate; leaves elliptic, suddenly narrowed in a twisted acumen, glabrous, drying black or bluish, paler beneath; inflorescence stout, subglabrous or sparsely puberulous; flower buds .1 in. in diam.; drupe 1 in. by .75 in.....1. *arborea*.

Bracts leafy, up to .75 in. long; leaf-acumen not or slightly twisted; flower-buds about .05 in. in diam.:—

Bracteoles conspicuous, linear; leaves elliptic, glabrous, drying grey, almost glaucous beneath; inflorescence slender and spreading, tawny-villous; drupe not known .....2. *Meziana*.

Bracteoles small, lanceolate-acuminate; leaves elliptic-oblong, glabrous or puberulous when young, drying olive-green, pale beneath; inflorescence slender but close, densely white-villous; drupe oblong, 1.25 by .5 in.....3. *pentandra*.

1. MASTIXIA ARBOREA, C. B. Clarke; F. B. I. ii. 745; Bedd. Fl. t. 216. *Bursinopetalum arboreum*, Wt. Ic. t. 956.

W. Gháts, from S. Canara southwards, in evergreen forests from 3,000 ft. upwards.

A large tree with coriaceous leaves and a large greenish-purple drupe. Bark pale brown, lenticellate; wood greyish-yellow, soft.

2. MASTIXIA MEZIANA, Wangerin in Fedde Rep. iv. 336.

W. Coast, in Malabar and northwards (*teste* Wangerin).

A tree with conspicuously bracteate inflorescence.

## 3. MASTIXIA PENTANDRA, Bl.; F. B. I. ii. 746.

W. Coast and W. Gháts, in Canara and Malabar to Travancore, in evergreen forests and on river banks up to 1,000 ft. A very large tree (Bourdillon) with elliptic-oblong leaves up to 6 in. long, 2.5 in. broad. Wood greyish-white, soft.

## III. COROLLIFLORAE.

*Sepals* herbaceous, often connate in a usually persistent calyx, more or less adnate to the ovary or free. *Petals* usually as many as the sepals or sometimes fewer, usually 4-5, rarely 6 or more, very rarely biseriate, almost always combined in a corolla. *Stamens* 1-seriate, as many as the petals or fewer, sometimes biseriate and twice as many as the petals, sometimes but more rarely indefinite; filaments usually adnate to the corolla-tube, rarely free. *Carpels* usually connate, the styles free, sometimes free and then the styles united.

## Family LXXXII. CAPRIFOLIACEAE.

Small trees or shrubs, erect or climbing. *Leaves* opposite, rarely alternate, simple lobed or imparipinnate; stipules usually 0. *Flowers* hermaphrodite, regular or irregular, in cymes or panicles. *Calyx* adnate to the ovary; lobes 3-5, imbricate. *Petals* connate in a tubular, funnel-shaped or rotate corolla, 5-fid, with imbricate lobes. *Stamens* 5, rarely 4, inserted on the corolla-tube alternately with the lobes; filaments filiform or subulate; anthers 2-celled, introrse, dehiscing longitudinally. *Ovary* inferior, 2-8-, rarely 1-celled; style terminal; stigma capitate, or short with 2-5 lobes; ovules solitary, pendulous, or several on axile placentas. *Fruit* a drupe with 1-8 cartilaginous pyrenes or a many-seeded berry. *Seeds* 1 or many in each cell; albumen copious, fleshy; embryo usually minute with ovate cotyledons. Corolla-limb regular, flowers small; ovary cells 1-ovuled; stigma lobed.....1. **Viburnum**. Corolla-limb regular or irregular, flowers rather large; ovary cells many-ovuled; stigma capitate.....2. **Lonicera**.

1. **Viburnum**, Linn.

Trees or shrubs. *Leaves* opposite, petioled, simple or lobed, entire dentate or serrate; stipules inconspicuous or 0. *Flowers*



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brown, tessellated; wood light red, hard and close-grained.

Vern. *Tam.* Konakaran; *Badaga*, Yellé sundé.

2. *VIBURNUM CORIACEUM*, Bl.; F. B. I. iii. 6. *V. capitellatum*, W. & A. 388. *V. hebanthum*; Wt. Ic. t. 1023, *letterpress* 1022 (?).

Deccan, hills of N. Coimbatore; W. Gháts, about Coonoor in Nilgiris at 6,000 ft., sometimes higher, more common in Pulneys, on the margins of Sholas.

A small evergreen tree with whitish flowers.

3. *VIBURNUM HEBANTHUM*, W. & A. 388; F. B. I. iii. 6. *V. capitellatum*, Wt. Ic. t. 1022, *letterpress* 1023 (?).

W. Gháts, in Nilgiri Shola Forests at 6,000–8,000 ft., common about Ootacamund.

A small tree with bright green foliage and a strong, heavy, unpleasant smell, the flowers greenish-white. Bark brown, thin, lenticellate; wood light reddish-brown. Vern. *Badaga*, Kadambu.

4. *VIBURNUM ERUBESCENS*, Wall.; F. B. I. iii. 7. *V. Wightianum*, W. & A. 388; Wt. Ic. t. 1024.

W. Gháts, in the higher Sholas of Nilgiris at and above 7,000 ft., common, less so in the Pulney Hills.

A small tree with drooping thyrsi of white or pinkish flowers on red stalks, the fruit red. Bark thin, grey; wood soft, reddish.

## 2. *Lonicera*, Linn.

Erect or climbing shrubs. *Leaves* opposite, petioled sessile or sometimes connate, entire or sometimes sinuate; stipules 0. *Flowers* of various sizes, usually in peduncled pairs, axillary and solitary or in subterminal heads panicles or clusters; bracteoles 2. *Calyx*-tube ovoid or globose; limb short, 5-toothed. *Corolla* tubular campanulate or funnel-shaped, often irregular; limb 5-cleft. *Stamens* 5, inserted on the corolla-tube. *Ovary* 2–3-celled; ovules several in each cell in double rows on axile placentas; style slender; stigma capitate. *Fruit* a fleshy 2–3-celled berry; the berries in pairs or sometimes more or less united. *Seeds* few in each cell; testa crustaceous; albumen fleshy; embryo terete.

Climbing shrub; corolla-tube much elongate, 2-lipped; leaves ovate, acuminate, densely grey-tomentose beneath, up to 3 in. long; berries distinct.....1. *Leschenaultii*.

Erect shrub; corolla-tube shortly elongate and gibbous at base, 5-lobed; leaves lanceolate, nearly glabrous beneath, up to 2 in. long; berries combined, the pair enclosed in a membranous bract, the calyx-limb with a reflexed ring below the lobes.....2. *ligustrina*.

1. LONICERA LESCHENAULTII, Wall.; F. B. I. iii. 10; W. & A. 389; Wt. Ill. tt. 120 and 121 B.

Hills of the Deccan, Carnatic and W. Gháts above 5,000 ft.

A climbing shrub with light brown papery bark and creamy-white flowers.

2. LONICERA LIGUSTRINA, Wall.; F. B. I. iii. 12; W. & A. 389; Wt. Ic. t. 1025.

W. Gháts, in the Nilgiris and Pulneys above 6,000 ft.

An erect shrub with twisted stems, light brown papery bark, small leaves and creamy-white flowers, sometimes used as a hedge-plant.