

**FLORA  
OF INDIA  
SERIES 3**

**FLORA  
OF  
NALLAMALAI**

**Volume 1**

**J. L. ELLIS**

**BOTANICAL SURVEY OF INDIA**

**FLORA OF NALLAMALAI**

**FLORA OF INDIA (Series 3)**

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**VOLUME 1**

**J. L. Ellis**



**BOTANICAL SURVEY OF INDIA**

© Government of India, February 1957

Price : Rs. 72.00 or \$ 24.00 or £ 12.00

Published by the Director, Botanical Survey of India, P/8, Brabourne Road, Calcutta-700 001 and Printed by Imprints, 243/2B, Acharya Prafulla Chandra Road, Calcutta-700 006.

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## FOREWORD

The publication of District Floras by the Botanical Survey of India has been widely welcomed by scientists from India and abroad. The Department has in the meanwhile published eight District Floras of interesting and critical importance from the floristic and phytogeographical point of view.

The present work on the Flora of Nallamalais in Andhra Pradesh of peninsular India is an underexplored region which has a number of species new to science and species under vulnerable and threatened categories. This is also one of the centres of endemism.

There are also quite a good number of economic species like *Dendrocalamus strictus* becoming scarce due to excessive exploitation of the species. The region is vegetatively very rich, having dry lands and moist regions. There are 743 taxa of angiosperms under 109 families and 419 genera.

This rich composition of floristic components in the present work in 2 volumes from the Nallamalai forests bordering dry evergreen pockets, deciduous species, scrubs can be of great help to Botanists and Environmentalists in studying the species of this region. This inventory would highlight the need for the conservation of indigenous and endemic species.

The Flora of Nallamalais by Dr. J. L. Ellis on an area of a composite nature in the Eastern Ghats where there is no published literature is an added contribution to our Flora of India series III. I am sure this flora will be of a great help to students and botanists.

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February 27, 1987

M. P. Nayar  
*Director*

#### ACKNOWLEDGEMENTS

It is with a deep sense of gratitude that I place on record my indebtedness

to Dr. S. K. Mukerjee, M. Sc., Ph. D. (Edin.), F.L.S., F.B.S., ex-Keeper, Central National Herbarium, Botanical Survey of India, Howrah, for his guidance and kind encouragement throughout this work,

to the Director, Botanical Survey of India, Calcutta, for giving permission to work and for facilities extended,

to late Dr. K. Subramanyam, Ph.D., D.Sc., F.B.S., F.A.Sc., ex-Director, Botanical Survey of India and U.G.C. Professor of Botany, Bangalore University, Bangalore, for his unstinted help and constructive criticisms throughout the research work,

to Dr. S. N. Yoganarasimhan, Ph.D., Survey Officer, Central Council for Research in Ayurveda and Siddha, Bangalore, for his help in going through the typescript,

to Messrs. M. Chandrabose, M.Sc., and M. S. Swaminathan, B.Sc., Botanical Survey of India, Coimbatore, for their various acts of help on tours of Nallamalais, and

to the Officers of the Forest Department, Andhra Pradesh, for their ready help and guidance in conducting tours in many inaccessible areas of Nallamalais.



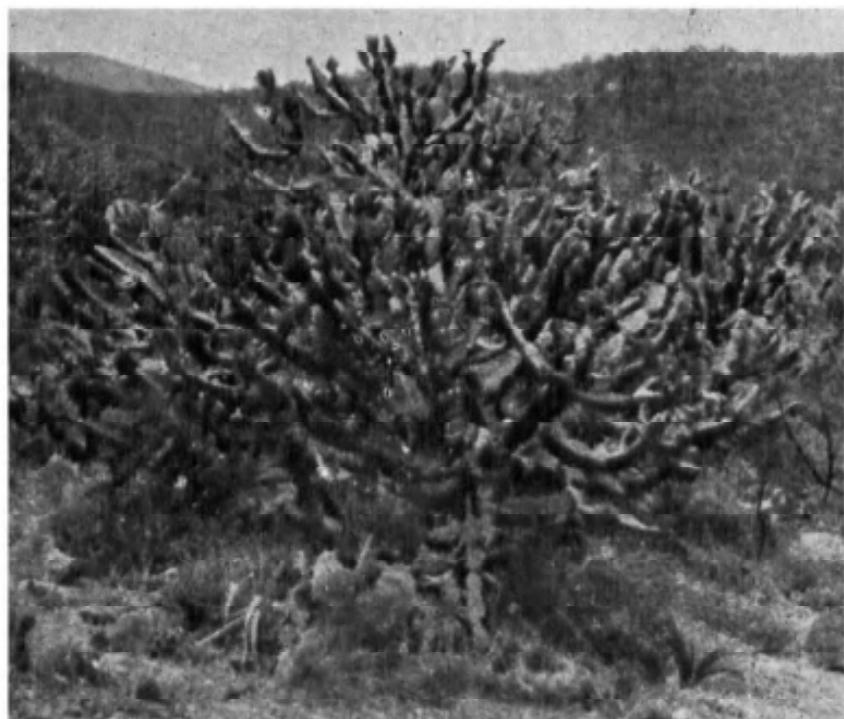
Southern Dry Mixed Deciduous forests showing dominantly *Cochlospermum religiosum* (Linn.) Alston, amidst others.



Southern Dry Mixed Deciduous forests showing a different view dominated by *Hymenodictyon orixense* (Roxb.) Mabberly, *Ixora arborea* Roxb. ex. Sm. etc.



*Acacia horrida* (Linn.) Willd.



Scrub vegetation showing dominantly *Euphorbia antiquorum* Linn.



*Andrographis nallamalayana* Ellis

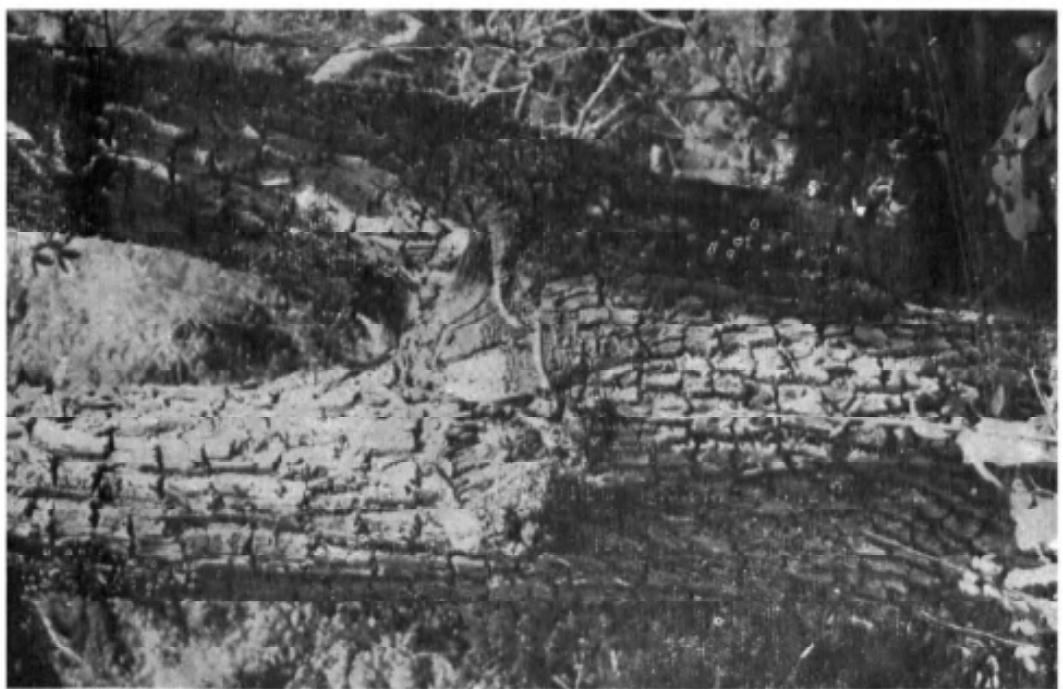


*Calamus rotang* Linn.

*Eruhinia volkii* Wt. & Arn.

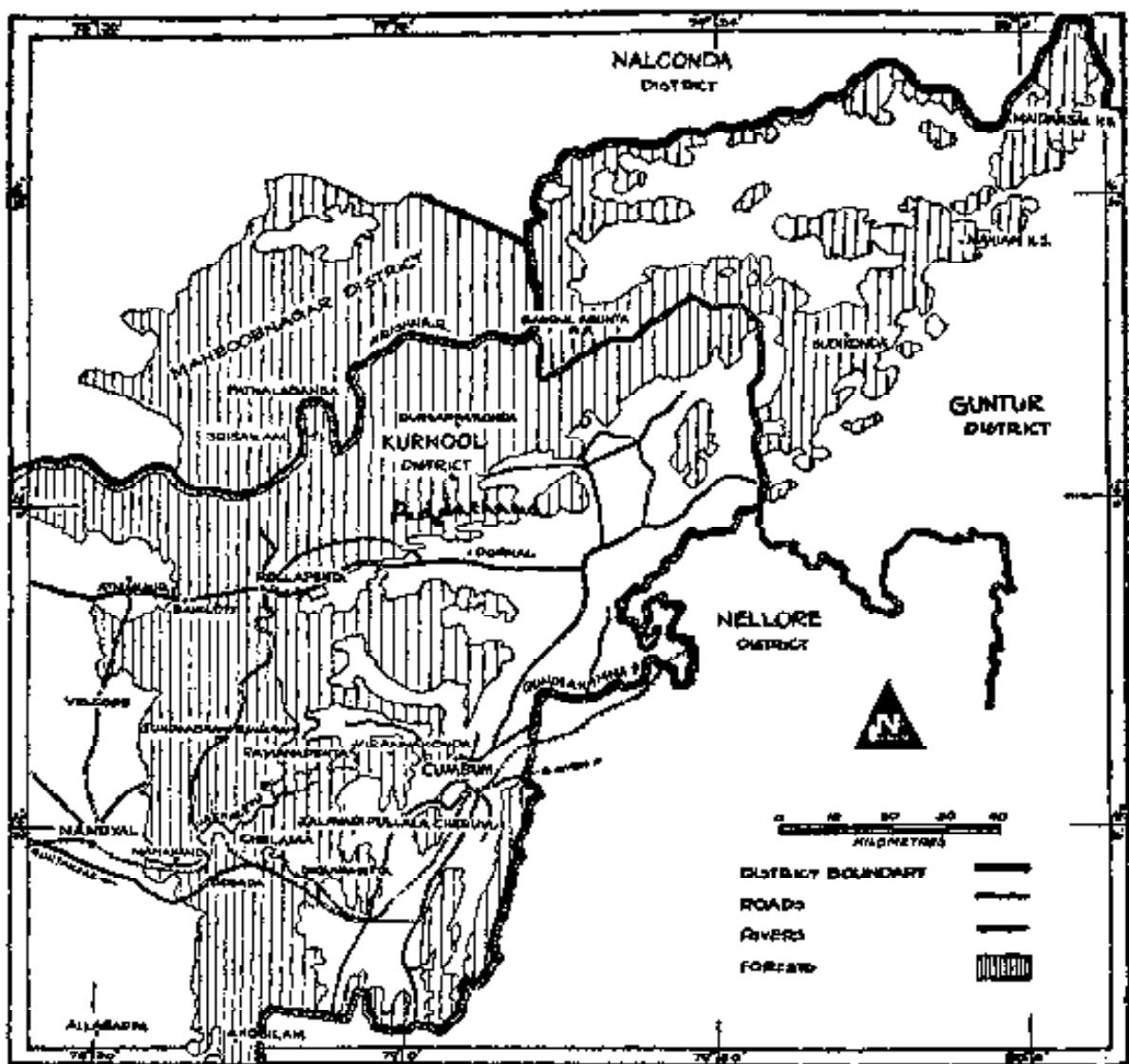


*Tern malia coriacea* (Roxb.) Wt. & Arn.





*Costus speciosus* (Koenig) Smith



Lined area constitute the Nallamalais region in Andhra Pradesh.

## INTRODUCTION

Intensive plant explorations of any region are prerequisites for a detailed botanical account of that region. The urgent needs that compel for detailed botanical accounts of several regions all over the world, in general, are mainly due to the alarming rate at which several of the plants are vanishing from many regions of the earth. Rapid industrialisation and its attendant pollution, and over-exploitation of raw plant materials are some of the causes for the disappearance of many plants. Subramanyam and Sreemadhavan (1969) have highlighted the urgency for remedying such happenings even by the title of their paper, 'Nature conservation—a losing battle' (*Indian Forester* 95 : 719-723). Therefore, it becomes imperative to make at least an inventory of all the plants of a region before some disturbing factor should have an effect on the plants, thus exterminating some of them altogether.

The over-exploitation of the forest produces for industrial uses, like paper-making, pulp-extraction for rayon-manufacture, etc. have become major disturbing factors to the vegetational stands of several regions in India. In a country like India the problems like rehabilitation of displaced people, acquisition of forest areas for cultivation of more food crops, and erection of dams for water and hydroelectric projects for more electrical power supply have further disturbed the vegetations in several parts of the country. Though regeneration and raising of plantations of selected plants have helped to some extent to retrieve the position, it is feared that there are many plants which are threatened with extinction in the near future, especially those whose potentialities have been studied. In Nallamalais, for example, *Dendrocalamus strictus* has been exploited for paper-making to such an extent that raising it in plantations has not kept pace with its exploitation. It may not be surprising when they may disappear altogether from the rich forests of Nallamalais.

That several regions in India are underexplored, if not unexplored, has been repeatedly stated (J. C. Sen Gupta in *Bull. Bot. Surv. India* 1 : 9-29. 1959 ; K. Subramanyam, *Ibid.* 70-73. 1959) ; the Nallamalais form one such in peninsular India. They are almost unexplored.

J. D. Hooker and T. Thomson (1855) in their *Flora Indica* say of the 'Dekhan' where the Nallamalais are situated as 'The Dekhan—the whole of the country between the Kistna and the Godavery,...'. J. D. Hooker (1904) later in his 'Sketch' states, 'The Deccan in a restricted sense, the country between the Godavari and Kistna river, a much less moun-

tainous region including Hyderabad...' (p. 35). Gamble (1915) in his general description of the flora treats the Nallamalais under 'the Dekkan Region', comprising the middle and lower Andhra Pradesh, extending up to North and South Arcot districts and also parts of Coimbatore and Salem districts of present Tamil Nadu (Madras State).

*Madras Presidency* : Gamble (1915) in his introductory chapter to his Flora speaks of the then Madras Presidency thus : 'The Madras Presidency presents, probably, a more varied flora than any other tract of equal area in India, possibly in the world.' He attributes this phenomenon to the combined effects of its geographical situation and its topography, viz. double coast lines, two main hill ranges of the Eastern and Western Ghats. '...within the direct influence of these expanses of water and numerous other lesser connected and isolated hill masses... ; elevations ranging from sea-level to almost 9,000 ft...', etc. The erstwhile Madras Presidency had within its boundaries the Andhra Pradesh in which the Nallamalais are situated. Since then the Andhra Pradesh has been segregated into a separate State.

*The Nallamalais* : The name, *Nallamala* in the local language, viz. Telugu, means black hills (*nalla*=black ; *mala*=hill). No one seems to be sure of the derivation of this name. One wild guess is that these hill ranges are infested with black-water fever. That this scourge is no longer prevalent does not seem to remove the stigma attached to these hill ranges long ago. The one dreaded disease that still persists in these hill ranges is the malaria ; swarms of mosquitoes attack any mammal that ventures into these forests, even during daytime.

The Nallamalais, however, have gained great reputation as areas of religious centres : *Shivaite's* temples at Srisailam in the north and Mahanandi in the south, and *Vishnuvaite's* temple at Ahobilam in the south are very famous pilgrim centres. The temple at Gundlabrahmeswaram in the 'heart' of Nallamalais is not very famous, perhaps due to its rather inaccessible approach ; it is right inside the forests about 40 kilometres away from any human habitation.

The tribals called *Chenchus* of these hill ranges live in groups called *gudemis* amidst the forests. They are nomadics, wandering from one forest to another. They are also laconic with 'other' people.

*Position of Nallamalais* : The Nallamalais form a series of parallel hill ranges oriented north-south towards the eastern portion of the peninsular India in the State of Andhra Pradesh. They are situated between 15°30'-16°30' N and 78°30'-80°10' E. Prior to its dissolution into several districts the composite district of Kurnool had two-thirds

of its area occupied by the hill ranges of Nallamalais. The Kurnool District formed one of the four districts which "...being known as the Ceded Districts, because they were transferred from the kingdom of Mysore to the Nizam after the war in 1800, and afterwards made over to the British Government in lieu of a money payment..." (J. D. Hooker & T. Thomson, *Flora India*, p. 135, 1855).

*Previous botanical history of the forests of Nallamalais and reasons for taking up the present floristic studies:* It is rather astonishing that when compared with the intensive botanical activities elsewhere on the Western and Eastern Ghats of peninsular India since the time of Tranquebar Mission in the seventeenth century and of R. Wight's travels in the 18th century the Nallamalais have escaped due botanical recognition ; except for some sporadic references to the 'Kurnool forests' or 'Nallamalais' in Hooker's *The Flora of British India*, Gamble's *Flora of the Presidency of Madras*, and Lushington's (1915) *Vernacular list of trees, shrubs and woody climbers of the Madras Presidency* the Nallamalais have totally been ignored.

Perusing through the herbaria at the Central National Herbarium, Indian Botanic Garden, Howrah (CAL), and the Madras Herbarium, Coimbatore, Tamil Nadu (MH), one comes across some stray collections of R. H. Beddome, C. A. Barber, C.E.C. Fischer, K. Rangachari, K. C. Jacob, J. S. Gamble, and personnel of the unit of Grass Survey of I.A.R.I. Apparently all these collectors had not made any intensive collections from these hill ranges ; the total number of these collections amount to about 150. There are no published data available on any of those collections. This gains all the more significance when we think of Nallamalais's close proximity to Hyderabad—a big city in Andhra Pradesh or what was once the princely State of Hyderabad.

The Railways have laid railway tracks connecting the two principal townships of Nandyal and Guntur across Nallamalais sometime in the later part of last century. The railway track passes through the mountainous pass called Nandikanama in the south of Nallamalais ; the huge bridge that is present near Diguvametta is a standing tribute to the engineers of those days. Naturally it is to be expected that the land survey people would have had a very active time then. Perhaps this might have been the reason for some botanical activities in the late part of last century and early part of this century : Beddome had made some plant collections between 1872-1876 ; Gamble had botanised during the period, 1884-1896, though surprisingly centred round about Dornal in the Eastern Nallamalais on plains and not in the interiors of Nallamalais. Of the subsequent collectors only Barber had made

collections of some significance numbering about 80, mostly from Diguvametta and some from Gundlabrahmeswaram. Rangachari and Jacob had made plant collections between 1915-1920. Fischer's collections in 1935 numbering about 50 were from Diguvametta, Gazulapalli and Chelama.

It was therefore thought that intensive plant explorations, coupled with systematic and taxonomic studies on the plants of the forests of these hill ranges of Nallamalais would be of great interest from the view of novelties and of plant distribution.

Starting the present project in 1963, seven botanical tours, covering almost all the seasons of a year, were undertaken.

The boundaries of reserve forests have been adhered to and no collection outside the limits of the reserve forests has been made.

In the ensuing enumeration broadly the Bentham and Hooker's system of classification of vascular plants is followed as given in Gamble's *Flora of the Presidency of Madras*. However, certain modifications as given in Hutchinson's (1973) *Families of the flowering plants* have been followed.

The artificial key to the families which is presented at the beginning of the enumeration is strictly for the plants of Nallamalais.

## PHYSIOGRAPHY

The Nallamalais form an unbroken, rugged and rather steep hill ranges. In between these hill ranges two principal mountainous passes, viz. Mantralakanama—connecting two big villages, Atmakaur and Dornal in the north, and Nandikanama—connecting two townships, Nandyal and Cumbum in the south, meander. Other passes of minor importance are the Veligonda and Hytokanama passes. All these passes run from east to west. The Gundlabrahmeswaram plateau is situated in the centre of Nallamalais. A series of folds from the main ridge runs in a westerly direction, descending into the plains of Atmakaur, Nandyal and Velgode. Another series of folds runs in a north-easterly direction into the extensive plateaus of Morrcheruvu and Guttalachenlu. The hills descend towards the north and widen into the plateau of Pecharuvu, Sivapuram, and Srisailam, and abruptly and precipitously of about 300 m into the Krishna Valley. The Gundlabrahmeswaram plateau is the highest, situated at about 800 m descending into the plains of Velgode and Nandyal and ascending precipitously towards east. The southern escarpments of the Gundlabrahmeswaram plateau and the steep range of

hills on the east forming the backbone of the Nallamalais encompass the Chelama valley (300-400 m). The Chelama valley unobtrusively mixes with the plains of Nandyal on the west and gives rise to folds of steep hills on the south in Sirvel range. South of Sirvel range three ranges are present parallel to one another in a north-south direction. Towards south-west the hills pan out in the plains of Ahobilam. The highest point in the Nallamalais is Virannakonda (939 m), situated on eastern portion of Nallamalais generally called Eastern Nallamalais.

#### GEOLOGY

The principal formations of Nallamalais are the *Kurnool* and the *Cuddapah* formations. The Kurnool formation is of Upper Precambrian and is mainly in the central basin of the Nallamalais, extending up to Krishna on the north and up to Yerramalais—another series of small hill ranges—on the west. This formation is made up of shales, limestones and quartzites. The Cuddapah formation is seen in the Cumbum division. Sandstones in mixtures of quartzites, shales and outcrops of barytes and manganese ores occur. The lower beds are formed by highly folded Eairenkonda quartzites, the succeeding Cumbum shales forming the cores of synclinal folds. The Srisailam quartzites in the north forms a rugged plateau (M. S. Krishna, *Geology of India and Burma*, 1956).

There are several barytes mines in Nallamalais, especially in the south. The Nallamalais are also reputed to have diamonds, and a few excavations—since long abandoned—in search of diamonds are present even today.

There are mainly three types of soil : red, mixed and black varieties. The red and mixed varieties occur along the bases of Nallamalais. Towards the interior of the forests the soil is red with calcareous shales. The humus content is almost negligible. The black soil occurs in plains where cultivation is practised.

#### RIVERS AND NATURAL SPRINGS

The general drainage of Nallamalais is in a northeasterly direction. Rivers of major importance are the Krishna and the Gundlakamma. (Map). The Krishna river forms the northern boundary of Nallamalais. It is joined by Bavanasi river near Nivartisangam, whence it flows through uninhabited tract of the Nallamalais, entrenching on its course about 300 m below the plateau of Sivapuram and Srisailam where near Srisailam

the famous temple of Mallikarjunaswami is situated. The Gundlakamma river takes its origin near Gundlabrahmeswaram and flows through Cumbum. All its tributaries, viz. the Rollavagu, Tigaleru, Kandleru and Duvvaleru arise in the Nallamalais. The Vekkalevu river originating near Chelama flows south through Nandyal and Sirvel ranges. The Paleru near Mahanandi and Bavanssi near Ahobilam, the Sagileru towards south of Nallamalais, the Kunderu in the centre joined by the Galeru or Kalai are small rivers. There are a number of seasonal streams.

An odd feature of the Nallamalais is that a running stream abruptly becomes dry over a long stretch of its course and again reappears a few kilometres below. This is perhaps due to the peculiar stratification of the rocks.

Of the Nallamalais' natural springs the principal one is that near Mahanandi, forming a perennial spring of lightly tepid water. The water gushes forth in great volume. Here the famous *Shivaite* temple dedicated to the reigning Deity, *Mahanandi* is situated. Devotees in hundreds take holy dip in this spring water everyday of the year. Other springs of similar type but of lesser volume and importance are at Onkaram, Chagalmarry, Sirvel, and others.

A hydroelectric project dam across the Krishna river near Srisailam is being constructed.

#### CLIMATE

Extremes of climate are encountered in the region where the Nallamalais are situated. These extremes, however, are not that perceptible right inside wooded areas as they are tempered by the plant cover; the vegetations at certain areas are very dense as in the mountainous passes at Ahobilam in the south, and Rollapenta in the north.

There is but one meteorological station at Kurnool—a big town about 70 kilometres away from Nandyal. There are no fixed observatories right inside the forests of Nallamalais all along their length and breadth. Some of the data given in the working-plans of the Forest Department are to be taken as not exact.

The following tables give the meteorological data as observed at Kurnool Town. I am greatly indebted to the Meteorological Department for furnishing the data.

On the whole, the areas covered fall under dry regions of peninsular India. The hot period is from March to May, the temperature reaching

TABLE 1 : Meteorological data for the period, 1931-60.

Months	Rainfall in mm	Temperature		Relative humidity %		Mean wind speed KPH
		Max.	Minimum	0830 hrs.	1730 hrs.	
January	0.2	31.3	17.0	70	32	6.1
February	3.0	34.3	19.3	57	24	6.9
March	9.7	37.5	22.5	48	21	7.7
April	21.6	39.3	26.0	49	24	8.7
May	44.4	40.0	27.2	54	27	13.4
June	90.5	35.0	25.0	69	46	21.1
July	129.6	32.5	23.8	75	57	21.3
August	121.6	32.1	23.5	75	56	18.4
September	147.1	31.9	23.3	76	57	12.6
October	79.2	32.4	22.4	74	53	6.0
November	21.8	31.0	19.2	72	44	5.1
December	3.0	30.4	16.6	72	37	4.9
Mean	673.7	34.0	22.1	66	40	11.0

TABLE 2 : Meteorological data for the period, 1973-77.

Months	Rainfall in mm.	Temperature		Relative humidity %		Mean wind speed KPH
		Max.	Minimum	0830 hrs.	1730 hrs.	
January	0.0	31.1	15.0	60	38	—
February	0.0	34.3	19.2	56	32	—
March	6.7	38.6	22.3	49	29	—
April	12.9	40.9	25.9	44	30	—
May	78.1	40.2	26.2	57	33	—
June	93.8	35.6	24.4	67	48	—
July	95.3	33.6	23.4	75	57	—
August	147.3	31.9	23.1	77	62	—
September	127.2	32.7	23.3	77	59	—
October	199.1	31.9	22.2	77	61	—
November	28.8	30.6	19.1	70	52	—
December	0.0	29.9	15.5	67	40	—
Mean	789.0	34.3	21.5	65	45	—

up to  $40.9^{\circ}\text{C}$ . The onset of the South-West Monsoon during the later part of June and its continuance up to the middle of August, accompanied later by the receding monsoon and increase in the wind speed, bring down temperature. Further fall in temperature during September and October is due to both the receding South-West Monsoon and the onset of North-East Monsoon. Cold weather is from about the end of November till about the middle of February when night temperature falls as low as  $15.5^{\circ}\text{C}$  generally in the plateaus. The weather is clear during the period from February to April when wind blows from south-west. It is interesting to note that the rain fall due to the activities of both the monsoons is heavier along the western side of Nallamalais than along the eastern side. The Gundlabrahmeswaram plateau receives about 127 cm of rainfall. The average rainfall for whole of Nallamalais is about 74 cm.

#### FAUNA

The Nallamalais are noted for the presence of tigers, panthers, bears, wolves, wild dogs, deer, different varieties of snakes, wild boars, black scorpions, etc. Fresh pug marks of tigers are commonly seen near Gundlabrahmeswaram soon after the rains during August-September. Accounts of hunts for man-eaters centering round Gazulapalli, Bogada and Chelama have been colourfully described by one Kenneth Anderson—a hunter of some repute in a book called "The killer from Hyderabad" in *The black Panther of Sivanipalli* 1977 (1959) pp. 139-194.

#### VEGETATION

In the present work accounts of vegetational types of different forests in the areas falling under the jurisdiction of the declared reserve forests are given. As stated earlier the explorations were strictly confined to the wooded portions of Nallamalais which occupy about 6480 sq. kms. The forests are not much disturbed because of the rugged terrain of the hill ranges, and the fear of contacting Malaria, in addition to tigers, panthers, and bears which are in great numbers. There are not many plants which have been planted, nor cultivated inside the reserve forests. A few exotics have made their entrance into these forests; *Parthenium hysterophorus* was recorded for the first time from the Eastern Ghats in 1963 ; Ellis also indicated (*Bull. bot. Surv. India* 10 : 152, 1968) the absence of *Lantana camara* Linn. var. *aculeata* in Nallamalais. Interestingly the plant has been collected in 1972 near the road at Rolla-

penta situated in the Mantralakanama pass, that too in a small patch. V. S. Raju and P. N. Rao (*Indian Journ. Forestry* 2 : 42. 1979) have recorded *Euphorbia agowensis* Hochst. ex Boiss. from Srisailam near the dam site ; it is reported to have been collected on 5-9-1977. Obviously the disturbances caused due to the construction of dam have helped this plant to make its entrance into these forests.

M. S. Mani (1978, pp. 197-203.) in his book, *Ecology and Biogeography in India* in the chapter dealing with the vegetation and phytogeography of the Eastern Ghats, speaks about the deciduous forests of Nallamala with their geographical connections with Western Ghats and Deccan Plateau of Karnataka and Maharashtra.

T. V. Subba Rao (1957-1960) in his unpublished thesis on the forests of Andhra Pradesh has recognised the following broad 'regional' types of vegetation in Kurnool West Forests which are the hill ranges of Nallamala : (1) Submontane Forests, occurring along strips of land of varying width along the foot of the hills, (2) The Forests along the slopes, (3) The Plateau Forests—in Gundlabrahmeswaram, Pecharuvu, Sivapuram, and Srisailam, (4) The Hill Forests—occurring along the back of the Nallamala and their spurs. He subdivides them into the following types : (i) Thorn Scrub, (ii) Inferior Deciduous types, (iii) Superior Deciduous types, (iv) *Hardwickia binata* type, (v) Bamboo type, (vi) Red Sanders type, (vii) Sandal type, and (viii) Semi-evergreen type—near perennial water courses.

H. G. Champion and S. K. Seth (1966) in their, *A revised Survey of Forest Types of India*, have formulated the following types of vegetation that are present in the Nallamala : (i) Southern Dry Mixed Deciduous Forests, (ii) South Indian Moist Deciduous Forests, (iii) Slightly Moist Teak Forests, (iv) Tropical Riparian Fringing Forests, (v) Tropical Dry Evergreen Forests, and (vi) Scrub—in which they differentiate *Euphorbia* type, *Acacia* type, etc. Some of the edaphic climaxes like *Boswellia* type, and *Calamus* type have also been indicated amidst these intermixed with Dry Deciduous plants.

However, it is rather difficult to circumscribe such different types of vegetation depending on one or a few species alone. There are many factors interacting on the types of vegetation for such generalisations ; most of the types can be encountered within a radius of a few kilometres, depending on the topography and availability of water. Furthermore, there are overlapping of forest types making it almost impossible for definite demarcations, particularly with so small an area as Nallamala occupying about 6740 sq. kilometres into distinct types. It is with this understanding that the vegetation is treated under the following broad

headings of the forest types as proposed by Champion and Seth whose is the latest and most authentic work.

(i) *Scrub* (ii) *Deciduous* (iii) *Dry Evergreen* and (iv) *Riparian*.

#### (i) *Scrub* :

This type of forest is usually confined to the bases of hills, bordering villages, and generally in the much disturbed and degraded dry deciduous forests. Since the western portion of the Nallamalais is greatly affected by the South-West Monsoon than the eastern portion, the eastern side of Nallamalais has preponderance of Scrub type of vegetation. Amidst this type there are Southern Tropical Thorn Forests with subdivisions comprising elements of Southern Thorn Forests with *Acacia catechu* var. *chundra*, *A. horrida* etc. *Acacia* type as at Peddachama, and Southern *Euphorbia* scrub forests with *Euphorbia antiquorum* type as at Dornal and Bairanidokku in the Eastern Nallamalais, some areas of Srisailam where the forests have been disturbed because of the construction of the hydroelectric project dam.

The following trees are common in this type of forests : *Atalantia monophylla*, *Balanites aegyptiaca*, *Dichrostachys cinerea*, *Diospyros chloroxylon*, *Maytenus emarginata*, *Moringa concanensis*, *Mundulea suberosa*, *Ochna obtusata* var. *gamblei*, *Cassine glauca* and others.

In the *Acacia* type of forests, the following trees are common : *Acacia catechu* var. *chundra*, *A. horrida*, *A. leucophlaea*, *A. nilotica* subsp. *indica*, *Aegle marmelos*, *Limonia elephantum*, *Capparis divaricata*, *Naringi alata*, *Murraya koenigii*, *Sapindus emarginatus*, *Syomida febrifuga*, *Sterculia urens*, *Tamarindus indica* and others.

It is interesting to note that *Murraya koenigii* is being commercially exploited for its leaves which are used in flavouring curries.

The *Euphorbia* type which is rather common at the foot hills of eastern Nallamalais commonly has the following trees : *Euphorbia antiquorum*, *Grewia tenax*, *G. tiliacifolia*, *Mundulea suberosa*.

The shrubs of these forests include : *Ehretia microphylla*, *Rhus mysorensis*, *Securinega virosa* and others.

Herbs of several taxa occupying several areas of different types of vegetation occur in this type of forests. They are, for example, *Andrographis nallamalayana*, *Euphorbia linearifolia* var. *nallamalayana*, *Enicostema hyssopifolia*, several species of *Tephrosia* and *Crotalaria* etc. Apparently these plants are not exclusive elements of scrub type of forests. *Tribulus terrestris* occurs in very much disturbed places, often along pathways.

Climbers, both herbaceous and shrubby, are common in degraded and disturbed areas as along the pathways and near villages. *Loeseneriella obtusifolia* is an extensive climber; *Cissampelos pareira* is common, as are *Dioscorea pentaphylla*, *D. tomentosa*; *Asparagus racemosus* is commonly seen amidst the branches of shrubs; *Gloriosa superba* forms a beautiful climber over the shrubs in many localities; *Pterolobium hexapetalum* makes a prickly thicket; *Cassytha filiformis* is a characteristic wiry parasite on many plants; *Tiliacora acuminata* often assumes a gigantic form, as are *Ventilago denticulata* and *V. madraspatana*; *Abrus precatorius* is seen on small shrubs; *Cissus quadrangularis* is confined to arid localities, mostly in plains.

The common grasses of these areas are: *Aristida depressa*, *A. setacea*, *Melanocenchrus monoica*, and others.

#### (ii) Deciduous :

The Deciduous forests are the most common occurring in the Nallamalais, except for the two mountainous passes, viz. Nandikanama in the south and Manralakanama in the north, and in some minor passes as at Upper Ahobilam and elsewhere, where water is plentiful and the forests are influenced by rainfall, the dry deciduous forest type is the dominant one.

Champion and Seth (1968) treat 3 types of forests under these, viz. Southern Dry Mixed Deciduous Forests, South Indian Moist Deciduous Forests, and Slightly Moist Teak Forests.

*Southern Dry Mixed Deciduous Forests* dominantly have the following trees: *Adina cordifolia*, *Anogeissus latifolia*, *Antidesma acidum*, *A. ghaesembilla*, *Canthium didymum*, *Cassine glauca*, *Cleistanthus collinus*, *Cochlospermum religiosum*, *Dalbergia lanceolaria*, *D. paniculata*, *Diospyros melanoxylon*, *Dolichandrone arcuata*, *Ehretia laevis*, *Firmiana colorata*, *Eriolaena lushingtonii*, *Gardenia turgida*, *Givotia moluccana*, *Hardwickia binata*, *Hymenodictyon excelsum*, *Ixora arborea*, *Lagerstroemia parviflora*, *Mallotus philippensis*, *Mitragyna parviflora*, *Nyctanthes arbortristis*, *Phyllanthus emblica*, *P. Indofischeri*, *Pterocarpus marsupium*, *Randia spinosa*, *R. uliginosa*, *Schrebera swietenoides*, *Semecarpus anacardium*, *Stereospermum chelonoides*, *S. personatum*, *Strychnos nuxvomica*, *S. potatorum*, *Syzygium alternifolium*, *Terminalia bellirica*, *T. chebula*, *T. coriacea*, *Wrightia tinctoria*, *W. tomentosa*, *Ziziphus mauritiana*, *Z. xylopyra*. Again, *Moringa concanensis* occurs near Pathalaganga, Srisailam. The tree imparts a festooned appearance during fruiting, with fruits hanging down in great number; the fruits are inedible because they are extremely bitter. Obviously no one collects the fruits.

Some of the common shrubs of dry deciduous forests are the following : *Canthium parviflorum*, *Cissus pallida*, *C. vitiginea*, *Colebrookea oppositifolia*, *Desmodium pulchellum*, *Erythroxylon monogynum*, *Grewia hirsuta*, *G. flavescentia*, *C. rothii*, *Helicteres isora*, *Indigofera mysorensis*, *I. tinctoria*, *Leea crispa*, *L. indica*, *L. macrophylla*, *Tarenna asiatica*, *Woodfordia fruticosa* and others.

It is most interesting to record that *Cissus vitiginea* assumes an arboreal habit in Bairani area of Diguvametta (Ellis, J. L. and M. S. Swaminathan, *Journ. Bombay Nat. Hist. Soc.* 72 : 230-236. 1975).

The following are the common herbs of dry deciduous forests : *Crotalaria calycina*, *C. medicaginea*, *C. mysorensis*, *Geodorum densiflorum*, *Globba bulbifera*, *Habenaria roxburghii*, *Ludwigia perennis*, *Oldenlandia* spp., *Plumbago zeylanicum*, *Tacca leontopetaloides*, *Tephrosia purpurea*, *T. tinctoria*, *Triumfetta rhomboidea*, *T. rhomboidea* var. *rhombifolia*, *Uraria picta* and others.

In drier localities of the dry deciduous forests the following plants are common : *Andrographis nallamalayana*, *Anisochilus carnosus*, *Barleria longiflora*, *Byttneria herbacea*, *Waltheria indica*, etc. all of which are generally confined to a gravelly-rocky substratum. *Cyanoglossum zeylanicum* occurs in denuded areas, whereas *Peristrophe bicalyculata* and *Leonotis nepetaefolia* are generally on the forest debris. *Euphorbia acaulis* occurs amidst rocky substratum, often under shade ; its fleshy, radical leaves are characteristic. *Rostellularia vahlii* var. *ruplicola* thrives on rocky substratum exposed to sun.

The herbaceous and shrubby climbers of the dry deciduous forests are some of the following : *Ampelocissus latifolia*, *A. tomentosa*, *Argyreia nervosa*, *A. setosa*, *Cayratia auriculata*, *C. pedata*, *Celastrus paniculatus*, *Coccinia hirsutus*, *Combretum ovalifolium*, *Cryptolepis buchananii*, *Derris scandens*, *Gymnema sylvestre*, *Hiptage benghalensis*, *Ipomoea eriocarpa*, *Jasminum auriculatum*, *J. malabaricum*, *Marsdenia tenacissima*, *Merremia aegyptia*, *Olax scandens*, *Opilia amentacea*, *Rivea hypocrateriformis*, *Ventilago madraspatana*, *Wattakaka volubilis*, *Ziziphus oenoplia*, *Z. rugosa* and others.

*South Indian Moist Deciduous Forests* : This type of forests is restricted to areas where rainfall is more and moisture is comparatively high. It is present at Gundabrahmeswaram—the 'heart' of Nallamalais, in Rollapenta of Maatraakanama pass, in south of Nallamalais between Upper and Lower Ahobilam, Bairani near Diguvametta, Iskagudum, Morricheruvu, and Guttachenu plateaus of Eastern Nallamalais. These areas are well sheltered and because of perennial streams water and moisture are available in good quantity. Even here the forests have been

disturbed because of forest fires which are common in the immediate vicinity of these forests which are generally confined to areas along rivers, streams, etc. Furthermore, the *Chenchus* have considerably disturbed the forests by their nomadic type of living amidst these forests.

The common trees of these forests include : *Careya arborea*, *Casearia graveolens*, *Cleistanthus patulus*, *Derris Indica*, *Dillenia pentagyna*, *Ficus hispida*, *Glochidion zeylanicum*, *Mangifera indica*, *Oroxylum indicum*, *Stereospermum personatum*, *Trema orientalis*, *Suregada lanceolatum*, and others.

Among these trees, *Cleistanthus patulus*, *Glochidion zeylanicum*, *Mangifera indica*, and *Suregada lanceolatum* generally occur along perennial water courses. That these are evergreen elements makes their presence in these forests very interesting. *Dillenia pentagyna* again is confined to wetter portions of Gundlabrahmeswaram, with its lofty height and characteristic, parallel-veined and serrate leaves.

Shrubs of moist deciduous forests are characteristically the following : *Costus speciosus*, *Clerodendrum serratum*, etc.

The common herbs of moist deciduous forests are the following : *Adiantum philippense*, *Athyrium hohenackerianum*, *Barleria strigosa*, *Desmodium gangeticum*, *Emilia sonchifolia*, *Gynura crepidioides*, *Limnophila rugosa*, *Liparis prazeri*, *Nephrolepis cordifolia*, *Oxalis corniculata*, *Pimpinella wallichiana*, *Pouzolzia auriculata*, *P. zeylanica*, *Selaginella inaequalifolia*, *Triumfetta pilosa*.

A gregarious patch of *Impatiens balsamina* has been seen inside the compound of a temple in Upper Ahobilam, obviously a cultivated plant long since abandoned ; it is now wild in the area.

The bamboo, *Dendrocalamus strictus* though not gregarious makes frequent clumps, attaining great heights. There was a general flowering of these plants during the period from 1965 to 1970. Since then many of these plants have died, and fresh sprouts have come out.

The fern, *Athyrium hohenackerianum* is seen under shade only along a perennial river near Ramanapenta of Gundlabrahmeswaram. The aquatic fern, *Ceratopteris thalictroides* imparts a pretty, lushy green sight along fast-flowing small streams in Lower Ahobilam and Srisailam.

*Rotala mexicana* subsp. *pusilla*—an ephemeral marshy plant soon after the rains in July—makes its appearance in puddles of water near Gundlabrahmeswaram.

The grasses in these moist deciduous forests are abundant soon after the rains in July-September. Most of the unmetalled roads and footpaths become almost impenetrable due to the abundance of these Forests. Some

of these grasses include : *Arimdinella punila*, *Bothriochloa glabra*, *B. pertusa*, *Capillipedium huegelii*, *Centotheca latifolia*, *Digitaria* spp., *Eragrostis* spp., *Pogonatherum paniceum*, *Sporobolus tenuissimus*, *S. wallichii*.

Three species of rice are present in these moist deciduous forests. They are : *Oryza granulata*, *O. malampuzhaensis*, and *O. sativa*. *Oryza granulata* forms a dense plant cover under the shade of trees near the moist deciduous forests of Gundlabrahmeswaram. *Oryza malampuzhaensis* is common along the river Gundlakamma in Gundlabrahmeewaram. This is a new record for the Eastern Ghats (Ellis in *Bull. Bot. Surv. India* 10 : 160, 1963) ; hitherto it was thought to be endemic to Palghat region of the Western Ghats. How this might have come here from its native habitat is not clear. Interestingly it has not been collected in any of the intermediate hill ranges, apparently due to lack of optimum conditions for the plant. *Oryza sativa* seems to have run wild as a sporadic plant near Gundlakamma river of the Gundlabrahmeswaram. This might have come here due to clearing operation of selected tree plants, including bamboos ; people who are employed here might have accidentally introduced this plant.

Climbers, both herbaceous and shrubby, make the moist deciduous forests very beautiful by their thick foliage and rugged climbing. *Bauhinia vahlii* which is considered very destructive to other plants from a forester's point of view imparts a picturesque beauty to the forest. The main stem often attains a circumference of about 175 cm ! *Entada pursaetha*, though not that elegant because of smallness of leaflets, makes a graceful liana all along the water courses in Gundlabrahmeewaram. *Pueraria tuberosa* is yet another liana of Gundlabrahmeswaram. The fern, *Lygodium flexuosum* is seen climbing over small hedges and trees. *Dioscorea hispida* is a graceful climber with thick foliage. *Naravelia seychanica* with its terminal leaflets modified into tendrils is seen near Gundlabrahmeswaram. Yet another liana of this type of forest is *Dalbergia volubilis*, though not that common. *Ichnocarpus frutescens* occurs generally along moist localities of Gundlabrahmeswaram, Krishnanandi, Upper Ahobilam, etc. *Calamus rotang*—a gregarious plant makes almost an impenetrable thicket near Krishnanandi. The area where this occurs is fed by the perennial spring water of Mahanandi. Surprisingly this plant has not been located elsewhere in Nallamalais.

In the following pages we present rather localised types of vegetation amidst the above three types of broad vegetational types, viz (a) *Boswellia*—type (b) *Terminalia cortacea*—type (c) *Phoenix humilis*—type and (d) *Calamus*—type.

(a) *Boswellia* type : This is an edaphic forest formed due to the

sub-stratum being rocky and soil shallow and poor. Its main tree species is *Bosivellia serrata*, associated with *Chloroxylon swietenia*. The vegetation is sparse, and the undergrowth is poor. *Andrographis nallamalayana* occurs in these forests, often with its leaves very much reduced and general appearance stunted. These forests are near Chelama.

- (b) *Terminalia coriacea* type : This is one of the major types in the dry deciduous forests of Nallamalais. One of these forests is named after this tree, viz. Maddipenta (*Maddi*=*Terminalia coriacea*; *penta*=forest), situated in the Eastern Nallamalais. Its characteristic bark showing evenly disposed cracked appearance makes it an attractive plant. The soil of these forests is rather poor, often rocky. *Anogeissus latifolia* forms another component of these forests.
- (c) *Phoenix humilis* type : This interesting type of forest occurs between Ramanapenta and Gundlabrahmeswaram. The plant, *Phoenix humilis* var. *pedunculata* is gregarious and forms a pure stand on rocky substratum.
- (d) *Calamus* type : This gregarious plant community consisting of *Calamus rotang* is restricted to Krishnanandi about 6 km away from Mahanandi. As stated earlier the water of Mahanandi feeds this area. The vegetation is dense, forming almost impenetrable thickets.

#### (iii) Dry Evergreen :

Interestingly several evergreen plants are seen intermixed with dry deciduous forests of Srisailam, Diguvametta, Ahobilam, Rollapenta, Mahanandi, etc. These are confined to perennial water courses. Some of these are *Canthium didymum*, *Drypetes sepiaria*, *Manilkara hexandra*, *Memecylon umbellatum*, *Santalum album*, *Suregada angustifolia* and others.

#### (iv) Tropical Riparian Fringing Forests :

These forests are interspersed amidst the forests of Nallamalais wherever streams and rivers flow. The plants constituting such forests include evergreen plants like *Cleistanthus patulus*, *Glochidion zeylanicum*, *Derris indica*, *Mangifera indica*, and others. *Barringtonia acutangula* is a common tree along the banks of the river Krishna near Pathalaganga. *Terminalia arjuna* is common throughout Nallamalais wherever small

rivers and streams flow. *Oroxylum indicum* with its long, doubly-pinnate leaves and broad sword-like fruits makes it an attractive plant. *Trema orientalis* is yet another plant along water courses, though confined generally to moist deciduous forests. Its leaves with silvery pubescence on their back give an impressive tinge to the dense foliage. *Celtis cinnamomea* with its trinerved leaves is a medium-sized tree near Pathalaganga, Srisailam. *Homonoia riparia* occurs along the beds of the rivers.

#### FERNS AND FERN-ALLIES

The ferns and fern-allies are poorly represented in the forests of Nallamalais. It is indeed surprising that these plants instead of being in great numbers, at least in moist deciduous forests of Nallamalais, are represented by 15 species only. Of great interest is the occurrence of *Athyrium hohenackerianum* in Gundlabrahmeswaram, for it generally prefers an evergreen type of forests where humidity and moisture are plentiful as on the Western Ghats. *Adiantum philippense* is again confined to moist deciduous forests, as are *Nephrolepis cordifolia*, *Christella dentata*, *Leptochilus decurrens*, and *Selaginella inaequalifolia*. *Adiantum caudatum*, *Chellianthes farinosa*, *C. tenuifolia* are ubiquitous, occurring generally in most of the areas. *Actinopteris radiata* is a plant of dry localities. *Ceratopteris thalictroides* forms a beautiful aquatic fern in fast-flowing streams, especially under shade. *Ophioglossum pedunculosum* has restricted occurrence in moist deciduous forests in slightly exposed regions, generally along footpaths near Gundlabrahmeswaram.

#### GENERAL.

*Tectona grandis* is the chief commercial tree of Nallamalais. It has been introduced in several localities. However, their growth is even and good only in moist deciduous forests.

*Cissus vitiginea* has been described by all the workers as a scandent shrub. This assumes an arboreal habit in shedding all its characteristic scandent nature in Nallamalais as at Bairani Falls near Diguvametta.

In general, the plants of Nallamalais show robust growth, with broader leaves, etc. This can perhaps be due to the fertility of soil and soil moisture.

Gamble (1915) in the general description of his flora has given a statistical analysis of the number of genera in each of the ten dominant families that are present in the composite Madras Presidency.

In the present study it is interesting that even though the Fabaceae have been treated in a restricted sense, it is the most dominant family with 69 taxa. In case the Caesalpiniaceae (14 taxa) and Mimosaceae (11 taxa) are also included in a broader family Leguminosae, then this out-numbers all other families, followed by the Poaceae with 67 taxa, and Euphorbiaceae with 44 taxa.

The following are the new taxa described from Nallamalai : *Andrographis nallamalayana* Ellis, *Crotalaria madurensis* Wt. var. *kurnoolica* Ellis & Swamin., *Euphorbia linearifolia* Roth var. *nallamalayana* Ellis, *Rostellularia vahlii* (Roth) Nees var. *rupicola* Ellis.

*Oldenlandia wightii* Hook. f. is treated as a synonym of *O. umbellata* Linn.

Of significant importance are the following plants which have been collected for the first time from the Eastern Ghats of peninsular India :

(i) *Oryza malampuzhaensis* Krishnaswamy & Chandrasekhar

The occurrence of this plant in the Eastern Ghats far removed from its original 'home', viz. Palghat, on the Western Ghats, is most interesting. As indicated earlier, this plant has not been collected in any of the intermediate hill ranges.

(ii) *Parthenium hysterophorus* Linn.

This obnoxious weed has made its appearance in a few places only, especially in places where much disturbances are present, like the construction of dam across river Krishna near Srisailam, and near Mahanandi. It is possible that this weed may not make much headway in Nallamalai as it prefers habitats near to human beings. However, unless otherwise checked it may assume an enormous economic hazard, at least near Srisailam.

(iii) *Liparis prazeri* King & Pantl.

The occurrence of this orchid on the Eastern Ghats is most interesting, for hitherto it had been collected only from the Western Ghats and Himalayas.

#### ENUMERATION

In the following enumeration, the name of the plant that has been accepted as 'correct' is followed by the basionym. Synonyms, if any, that have relevance to the plant enumerated are also given, especially those given in Hooker's *The Flora of the British India* and in Gamble's *Flora of the Presidency of Madras*. Important references, generally of the latest

revisions and monographs, are cited. We have also given references to Wight and Arnott's *Prodromus florae Peninsulae Indiae Orientalis*, De Candolle's *Prodromus Systematis Naturalis Regni Vegetabilis* and Wight's *Icones Plantarum Indiae Orientalis* and a few other works like Brandis's *Indian Trees*, etc. as far as possible.

Altogether 743 taxa have been treated in the following enumeration. This is followed by a list of ferns and fern-allies numbering 15. Number of families is 109, comprising 419 genera.

#### ABBREVIATIONS

For the sake of brevity the following works which are invariably referred to have been abbreviated thus :

(i) Gamble, J. S. and C. E. C. Fischer

FPM : *Flora of the Presidency of Madras*, London. 1915-1936.

(ii) Hooker, J. D. et al.

FBI : *The Flora of British India*, London. 1872-1897.

**ARTIFICIAL KEY TO THE FLOWERING PLANTS COLLECTED  
IN NALLAMALAIS**

- |  |         |
|--|---------|
| 1. Plants usually with, (i) 2 cotyledons in a single seed,<br>(ii) vascular bundles in rings, (iii) leaves reticulately<br>veined, petiolated or sessile       | Group A |
| 1. Plants usually with, (i) 1 cotyledon in a single seed,<br>(ii) vascular bundles scattered, (iii) leaves generally<br>parallel-veined, long-sheathed at base | Group B |

**GROUP A**

- |                                  |    |
|----------------------------------|----|
| I. Petals present, rarely absent | I  |
| II. Petals absent                | II |

I

- |                  |      |
|------------------|------|
| 1. Petals free   | (i)  |
| 1. Petals united | (ii) |

(i)

- |  |     |
|--|-----|
| 1. Calyx usually free from ovary ; stamens inserted on torus,<br>receptacle or disk :        |     |
| 2. Petals 1-2—or many-seriate ; ovary superior   | (a) |
| 2. Petals 1-seriate ; ovary superior or surrounded<br>by disk                                | (b) |
| 1. Calyx more or less adnate to ovary ; stamens inserted<br>on disk ; ovary usually inferior | (c) |

(a)

- |                   |              |
|-------------------|--------------|
| 1. Aquatic plants | NYMPHAEACEAE |
|-------------------|--------------|

- |                         |  |
|-------------------------|--|
| 1. Terrestrial plants : |  |
|-------------------------|--|

- |                       |  |
|-----------------------|--|
| 2. Ovary apocarpous : |  |
|-----------------------|--|

- |                   |               |
|-------------------|---------------|
| 3. Climbing herbs | RANUNCULACEAE |
|-------------------|---------------|

- |                                 |            |
|---------------------------------|------------|
| 3. Erect herbs, shrubs or trees | ANNONACEAE |
|---------------------------------|------------|

- |                       |  |
|-----------------------|--|
| 2. Ovary syncarpous : |  |
|-----------------------|--|

- |                                |    |
|--------------------------------|----|
| 4. Endocarps horse-shoe shaped | .. |
|--------------------------------|----|

- |                                      |                 |
|--------------------------------------|-----------------|
| 4. Endocarps not horse-shoe shaped : | MENISPERMACAEAE |
|--------------------------------------|-----------------|

- |            |  |
|------------|--|
| 5. Trees : |  |
|------------|--|

- |   |             |
|---|-------------|
| 6. Leaves pinnately compound ; fruits elongated | MORINGACEAE |
|---|-------------|

- |                                   |  |
|-----------------------------------|--|
| 6. Leaves simple ; fruits ovoid : |  |
|-----------------------------------|--|

- |                                    |    |
|------------------------------------|----|
| 7. Leaves strongly parallel-nerved | .. |
|------------------------------------|----|

- |  |              |
|--|--------------|
| 7. Leaves not strongly parallel-nerved | DILLENIACEAE |
|--|--------------|

7. Leaves not parallel-nerved :		
8. Leaves palmately lobed ; thorns absent		COCHLOSPERMACEAE
8. Leaves not palmately lobed ; thorns present		FLACOURTIACEAE
5. Herbs, shrubs, often climbing :		
9. Ovary usually on gynophore :		
10. Capsules with replum ..		CLEOMACEAE
10. Capsules without replum		CAPPARACEAE
9. Ovary not on gynophore :		
11. Seeds arillate ; flowers papilionaceous-like		POLYGALACEAE
11. Seeds exarillate ; flowers not papilionaceous-like :		
12. Flowers with scarious petals : fruits dehiscing apically by valves or teeth ..		CARYOPHYLLACEAE
12. Flowers with coloured non-scarious petals ; fruits not dehiscing apically by valves or teeth :		
13. Flowers irregular		VIOLACEAE
13. Flowers regular :		
14. Filaments connate :		
15. Epicalyx present ; stamens numerous		MALVACEAE
15. Epicalyx absent ; stamens about 15		STERCULIACEAE
14. Filaments free :		
16. Succulent herbs, often decumbent ; fruit-dehiscence circumscissile		PORTULACACEAE
16. Non-succulent herbs or shrubs, or trees ; fruit-dehiscence not circumscissile		TILIACEAE

( b )

1. Ovary inferior :		
2. Leaves with lateral nerves parallel, pellucid-dotted		MYRTACEAE
2. Leaves with lateral nerves not parallel, not pellucid-dotted :		
3. Stamens numerous		LECYTHIDACEAE
3. Stamens up to 20 :		
4. Inflorescences umbellate :		
5. Fruits of cromocarps ; leaves simple or compound, generally much dissected		APIACEAE

5. Fruits of drupes ; leaves digitate, not dissected	ARALIACEAE
4. Inflorescences not umbellate, but racemose, spicate, or cymose, sometimes solitary :	
6. Corona present ; climbing herbs	PASSIFLORACEAE
6. Corona absent ; erect or rarely climbing shrubs, or trees :	
7. Plants thorny ; leaves alternate	ATANGIACEAE
7. Plants not thorny ; leaves opposite or in whorls :	
8. Anthers opening by apical pores ; leaves generally 3-5-ribbed	MELASTOMATACEAE
8. Anthers not opening by apical pores ; leaves 1-nerved :	
9. Herbs :	
10. Carpels and styles united	ONAGRACEAE
10. Carpels united or not, styles free	AIZOACEAE
9. Trees, or erect or climbing shrubs	COMBRETACEAE
1. Ovary superior :	
11. Fruits of legumes :	
12. Flowers zygomorphic :	
13. Corolla papilionaceous	FABACEAE
13. Corolla not papilionaceous	CAPPARIDACEAE
12. Flowers actinomorphic	MIMOSACEAE
11. Fruits not of legumes	LYTHRACEAE

( e )

1. Fruits samaroid :	
2. Trees	SIMAROUBACEAE
2. Climbing shrubs :	
3. Flowers actinomorphic ; sepals eglandular	HIPPOCRATEACEAE
3. Flowers zygomorphic ; sepals with a gland at base	MALPIGHIACEAE
1. Fruits not samaroid :	
4. Leaves pellucid-dotted	RUTACEAE
4. Leaves not pellucid-dotted :	
5. Fruits spinescent ; prostrate herbs	ZYGOPHYLLACEAE
5. Fruits not spinescent ; erect, or rarely climbing herbs, or trees or shrubs :	
6. Leaves pinnate :	
7. Plants with balsaminous or resinous juice :	
8. Calyx minute ; plants balsaminous	BURSERACEAE

6. Calyx prominent ; plants with resinous juice	..	ANACARDIACEAE
7. Plants without balsaminous or resinous juice :		
9. Filaments connate		MELIACEAE
9. Filaments free :		
10. Fruits of berries :		
11. Plants tendrillar ; flowers hypogynous		VITACEAE
11. Plants non-tendrillar ; flowers perigynous		LEBACHAE
10. Fruits of capsules or drupes :		
12. Trees, or if herbs then climbers		SAPINDACEAE
12. Erect herbs		OXALIDACEAE
6. Leaves simple :		
13. Sepals coloured ; disks enlarged in fruits		OCHNACEAE
13. Sepals not coloured ; disks not enlarged in fruits :		
14. Flowers solitary		LINACEAE
14. Flowers in racemes :		
15. Racemes dichasial		CELASTRACEAE
15. Racemes paniculate, umbellate, or spicate :		
16. Racemes cone-like with prominent bracts		OPILIACEAE
16. Racemes not cone-like ; bracts inconspicuous :		
17. Calyx large ; ovary sunk in disk	..	RHAMNACEAE
17. Calyx small ; ovary not sunk in disk		OLACACEAE

## ( ii )

1. Plants tendrill-bearing	..	CUCURBITACEAE
1. Plants not tendrill-bearing :		
2. Ovary inferior :		
3. Interpetiolar stipules present	..	RUBIACEAE
3. Stipules absent :		
4. Flowers in capitulum		ASTERACEAE
4. Flowers not in capitulum	..	CAMPANULACEAE
2. Ovary superior :		
5. Calyx covered with stalked glands	..	PLUMBAGINACEAE

- |   |                |
|---|----------------|
| 5. Calyx not covered with stalked glands :                            |                |
| 6. Stigmatic surfaces flat, cohering with or touching pollen-sacs :   |                |
| 7. Stigmas rattle-shaped ; follicles cohering                         | APOCYNACEAE    |
| 7. Stigmas and pollen sacs form gynostegium ; follicles divaricatae : |                |
| 8. Pollen grains in pollinia ; filaments connate                      | ASCLEPIADACEAE |
| 8. Pollen grains granular ; filaments free ..                         | PERIPLOCACEAE  |
| 6. Stigmas simple, not cohering with pollen sacs or anthers :         |                |
| 9. Flowers actinomorphic :  |                |
| 10. Stamens 2 :   |                |
| 11. Trees   | NYCTANTHACEAE  |
| 11. Climbers  | OLEACEAE       |
| 10. Stamens 4 or more :   |                |
| 12. Flowers in scorpioid cymes  | BORAGINACEAE   |
| 12. Flowers not in scorpioid cymes :                                  |                |
| 13. Corolla lobes plicate ; stigmas biglandular                       | CONVOLVULACEAE |
| 13. Corolla lobes not plicate ; stigmas hispid or 2-lipped :          |                |
| 14. Plants laticiferous :   |                |
| 15. Stamens free from corolla   | EBENACEAE      |
| 15. Stamens epipetalous   | SAPOTACEAE     |
| 14. Plants not laticiferous :   |                |
| 16. Plants pubescent or glandular ; leaves alternate :                |                |
| 17. Pubescence stellate   | SOLANACEAE     |
| 17. Pubescence not stellate   | MYRSINACEAE    |
| 16. Plants glabrous : leaves opposite :                               |                |
| 18. Ovules numerous ; stipules 0 :                                    |                |
| 19. Terrestrial plants ; leaves opposite                              | GENTIANACEAE   |
| 19. Aquatic plants ; leaves alternate ..                              | MENYANTHACEAE  |
| 18. Ovule 1 to many ; leaves stipulate or exstipulate :               |                |

20. Erect herbs ; leaves 1-nerved	SPIGELEIACEAE
20. Trees or climbing shrubs ; leaves 3-nerved.	STRYCHNACEAE
9. Flowers zygomorphic :	
21. Ovules numerous :	
22. Stamens 2 ; insectivorous plants	LENTIBULARIACEAE
22. Stamens 4 or 5 ; non-insectivorous plants :	
23. Herbs or shrubs ; seeds minute, not winged	SCROPHULARIACEAE
23. Trees ; seeds large, flattened, winged	BIGNONIACEAE
21. Ovules few to many :	
24. Calyx annular, minute or 10-16- toothed	THUNBERGIACEAE
24. Calyx 5-6-partite or 2-lipped :	
25. Fruits of capsules, dehiscing elastically by ejaculators	ACANTHACEAE
25. Fruits of drupes or nutlets :	
26. Stigmas 2-lobed ; corolla ventricose :	
27. Flowers usually with glands at bases of pedicels ; anther cells parallel	PEDALIACEAE
27. Flowers without glands at bases of pedicels ; anther cells divaricate	MARTYNIACEAE
26. Stigmas entire or bifid ; corolla not ventricose :	
28. Flowers in verticillasters ; ovary deeply 4-lobed ; fruits of nutlets	LAMIACEAE
28. Flowers not in verti- cillasters ; ovary not lobed ; fruits of drupes	VERBENACEAE

## II

1. Flowers bisexual :
  2. Epiphytic plants :
  3. Leaves broad
  3. Leaves reduced to small scales
- LORANTHACEAE  
VISCACEAE

2. Terrestrial plants :		
4. Perianth lobes plicate		NYCTAGINACEAE
4. Perianth lobes not plicate :		
5. Ovary inferior :		
6. Trees ; fruits indehiscent		SANTALACEAE
6. Shrubs or herbs ; fruits dehiscent ..		ARISTOLOCHIACEAE
5. Ovary superior :		
7. Wiry, twining plants ; anthers dehiscing valvularly		LAURACEAE
7. Erect or prostrate herbs, not wiry ; anthers dehiscing laterally :		
8. Stipules present, ochreate ..		POLYGONACEAE
8. Stipules absent ..		AMARANTHACEAE
1. Flowers unisexual :		
9. Fruits with wing-like perianth lobes		GYROCARPACEAE
9. Fruits without wing-like perianth lobes :		
10. Climbers ..		PIPERACEAE
10. Trees, or erect herbs or shrubs :		
11. Leaves 3-nerved from base		ULMACEAE
11. Leaves 1-nerved :		
12. Fruits of syconia ..		MORACEAE
12. Fruits of capsules or achenes, not of syconia :		
13. Plants often with milky sap ; capsules generally 3-gonous ..		EUPHORBIACEAE
13. Plants not with milky sap ; fruits of achenes ..		URTICACEAE

## GROUP B

1. Aquatic plants :		
2. Ovary inferior ..		HYDROCHARITACEAE
2. Ovary superior :		
3. Fruits of achenes ; leaves linear, entire or minutely spinulose-serrulate		NAJADACEAE
3. Fruits of beaked follicles ; leaves oblong, entire ..		APONOGETONACEAE
1. Terrestrial plants :		
4. Flowers non-glumaceous :		
5. Inflorescences capitate		ERIOCAULACEAE
5. Inflorescences not capitate :		

6. Flowers with long-cylindric thread-like bracteoles	TACCACEAE
6. Flowers not with thread-like bracteoles :	
7. Flowers actinomorphic :	
8. Climbers :	
9. Leaves reduplicate, plicate in buds	ARBOCACEAE
9. Leaves not reduplicate, not plicate in buds	DIOSCOREACEAE
8. Erect or prostrate herbs or shrubs :	
10. Ovary inferior :	
11. Plants xerophytic; inflorescences umbellate	AGAVACEAE
11. Plants not xerophytic, inflores- cences not umbellate	HYPoxidaceae
10. Ovary superior :	
12. Flowers arranged on spadix enclosed in spathe	ARACEAE
12. Flowers not on spadix, nor enclosed in spathe :	
13. Flowers coloured ..	COMMELINACEAE
13. Flowers white :	
14. Erect herbs	LILIACEAE
14. Climbing shrubs with petioles tendriliform	SMILACACEAE
7. Flowers zygomorphic :	
15. Stamens generally 3; pollen in pollinia	ORCHIDACEAE
15. Stamens 1; pollinia absent	ZINGIBERACEAE
4. Flowers glumaceous :	
16. Stems 3-angled; stigmas entire; leaves tritrichous ..	CYPERACEAE
16. Stems terete, or 2-edged; stigmas feathery; leaves distichous ..	POACEAE

## RANUNCULACEAE

### NARAVELIA Adans. mut. DC., *nom. cons.*

*Naravelia zeylanica* (Linn.) DC. Syst. 1 : 167. 1818 ; Wt. & Arn. Prodr. 2. 1834 ; Hook. f. & Thoms. FBI 1 : 7. 1872 ; Dunn in Gamble, FPM 1 : 3. 1915. *Atragene zeylanica* Linn. Sp. Pl. 542. 1753.

Climbing shrubs ; stems woody, terete, grooved, glabrescent. Leaves opposite ; common petioles about 11 cm long, grooved, puberulous ; terminal leaflets modified into branched tendrils about 15 cm long ; lateral leaflets about 15×11 cm, ovate, elliptic-ovate, abruptly acuminate, rounded at base or slightly cordate, entire or irregularly dentate, 5-7-nerved from base ; nerves and nervules prominent below. Flowers pale green or maroon, 0.8 cm long, in axillary and terminal panicles about 8 cm long, bracteate ; pedicels 2 cm long ; sepals about 0.8×0.4 cm, ovate, tomentose without, glabrous within ; petals 0.6 cm long, linear-clavate or spatulate ; anthers longer than filaments, connectives expanded and exerted ; carpels many. Achenes twisted with persistent plumose styles.

*Fl. & Fr.* : October-February.

*World distribution* : India, Sri Lanka to Malaysia.

*Specimens examined* : Gazulapalli, 8-11-1906, C. A. Barber 8064 ; Gundlabrahmeswaram, 28-11-1969, Ellis 32657.

## DILLENIACEAE

### DILLENSIA Linn.

*Dillenia pentagyna* Roxb. Pl. Corom. I : 21, t. 20. 1795 ; Wt. & Arn. Prodr. 5 : 1834 ; Hook. f. & Thoms. in Hook. f. FBI. 1 : 38. 1872 ; Brandis, Indian Trees, 4 : 1906 ; Dunn in Gamble, FPM 1 : 8. 1915 ; Hoogland in Fl. Males. ser. I. 4(3) : 172. 1951.

Trees, about 20 m tall ; branchlets glabrescent. Leaves about 75×22 cm, obovate, obtuse, decurrent at base, crenate-serrate, dentate, each dentature apiculate, glabrous above, puberulous along reticulations below, sericeous in young ones ; lateral nerves about 50, parallel ; nervules parallel ; petioles faintly winged, vaginate at base. Flowers yellow, about 3 cm across, in panicles or clusters on leafless, stunted branchlets ; pedicels up to 4.5 cm long ; sepals 1×0.7 cm, oblong-ovate, accrescent

and fleshy in fruiting ; petals about  $2 \times 1$  cm, oblong ; stamens numerous, in 2 sets, inner longer : carpels 5, styles spreading. Fruits  $1.5 \times 1.5$  cm, globular, with fleshy sepals enclosing indehiscent carpels ; seeds ovoid.

*Fl. & Fr.* : March-July.

*World distribution* : India, Burma to Malaysia.

*Specimen examined* : Gundlabrahmeswaram, 31-3-1965, Ellis 23815.

### ANNONACEAE

1. Fruits of confluent, multicarpeled berries	ANNONA
1. Fruits of separate, single-carpeled berries	POLYALTHIA

#### ANNONA Linn.

**Annona squamosa** Linn. Sp. Pl. 537. 1753 ; DC. Prodr. 1 : 85. 1818 ; Hook. f. & Thoms. FBI 1 : 78. 1872 ; Brandis, Indian Trees, 22. 1906 ; Dunn in Gamble, FPM 1 : 20. 1915.

Shrubs or small trees about 3 m tall ; young branchlets terete, wrinkled, lenticellate, glabrescent. Leaves up to  $14 \times 5$  cm, elliptic-ovate, oblong, acute or obtuse at base, glabrous above, sparsely puberulous along nerves ; petioles about 1 cm long, grooved above. Flowers greenish, about 1 cm long, solitary or in clusters, extra-axillary ; sepals 0.2 cm long, ovate, pubescent without ; petals up to 2 cm long, linear-ovate, coriaceous, obscurely angular, pubescent ; stamens numerous ; ovaries several with connectives overtopping. Fruits about  $15 \times 15$  cm, ovoid, with confluent carpels ; seeds black, numerous, slightly flattened.

*Fl. & Fr.* March-October.

*World distribution* : Plants of tropical America naturalised in India.

*Specimen examined* : Srisailam, 13-7-1963, Ellis 16846.

#### POLYALTHIA Bl.

**Polyalthia cerasoides** (Roxb.) Bidd. Fl. Sylvat. t. 1. 1869 ; Hook. f. & Thoms. FBI 1 : 63. 1872 ; Gamble, FPM 1 : 12. 1915 ; Santappa & Wagh in Bull. bot. Surv. India 5 : 107. 1963. *Uvaria cerasoides* Roxb.

Pl. Corom. I : 30. 1795. *Guatteria verusoides* Dunal, Mem. Anon. 127. 1817.

Trees, about 10 m tall; branches terete, wrinkled, young branchlets pubescent. Leaves about  $16 \times 5.5$  cm, elliptic-acuminate, rounded at base, chartaceous, pilose below; petioles 1.5 cm long, pubescent; sepals 0.8 cm long, ovate, pilose without, glabrous within; petals 0.8 cm long, ovate, pilose along margin at top; stamens numerous, overtopped by expanded connectives; ovary with several carpels, stalked, pilose. Fruits  $0.8 \times 0.8$  cm, globose, 1-seeded.

*Fl. & Fr.* : April-August.

*World distribution* : India.

*Specimens examined* : Diguvametta, 4-11-1906, C. A. Barber 8038; Chelama, 4-7-1963, Ellis 16730; Srisailam, 15-7-1963, Ellis 16879; Mahanandi, 22-8-1965, Ellis 25470; Diguvametta, 7-8-1972, Ellis 42170.

### MENISPERMACEAE

1. Leaves peltate	...	CISSAMPELOS
1. Leaves not peltate :		
2. Flowers 0.1 cm long; leaves up to $5 \times 3$ cm, densely hirsute	...	COCCLUS
2. Flowers more than 0.3 cm long; leaves more than $7 \times 7$ cm, glabrous to glabrate :		
3. Stems coky; leaf-sinuses large; petioles expanded at base	..	TINOSPORA
3. Stems not coky; leaf-sinuses absent or not prominent; petioles not expanded at base		TIACORA

#### CISSAMPELOS Linn.

*Cissampelos pareira* Linn. Sp. Pl. 1031. 1753 var. *hirsuta* (Buch.-Ham. ex DC.) Forman in Kew Bull. 22 : 356. 1968. *C. hirsuta* Buch.-Ham. ex DC. Syst. 1 : 535. 1817. *C. pareira* Linn. Sp. Pl. 1031. 1753, p.p.; DC. Prodr. 1 : 100. 1820; Hook. f. & Thoms. FBI 1 : 103. 1872; Gamble, FPM 1 : 30. 1915; *C. convolvulacea* Willd. SP. Pl. 4 : 863. 1806; Wt. & Arn. Prodr. 1 : 14. 1834.

Twining herbs or shrubs; stems grooved, young branchlets tomentose. Leaves about  $8 \times 8$  cm, broadly ovate or orbicular, glaucous beneath;

petioles up to 10 cm long, grooved, glabrescent. Flowers pale green, unisexual; male flowers 0.1 cm long, in racemes about 7 cm long; calyx lobes 4, orbicular, attenuate at base, pilose; peduncles up to 2 cm long; bracts 0.5 cm long, ovate; anthers 4, forming a ring round staminal column; female flowers sessile, in pendulous, axillary cymes about 2 cm long; bracts about 1.5 cm long, several, ovate-orbicular, pubescent without; ovaries 4-9, densely pubescent, stigmas shortly 3-radiate. Drupes  $0.4 \times 0.4$  cm, ovoid, flattened, ridged along margin, ripening to orange; seeds curved.

*Fl. & Fr.:* Almost throughout the year.

*World distribution:* Tropics and Subtropics.

*Specimens examined:* Srisailam, 15-7-1963, Ellis 16888; Gundlbrahmeswaram, 24-10-1964, Ellis 22178; Mahanandi, 21-8-1965, Ellis 25414; Ahobilam, 22-11-1969, Ellis 32525; Lukki, Diguvametta, 9-8-1972, Ellis 42217.

#### COCCLUS DC. *nom. cons.*

*Cocculus hirsutus* (Linn.) Diels in Engler's Pflanzenr. 46 : 236. 1910; Dunn in Gamble, FPM 1 : 29. 1915. *Mensispermum hirsutum* Linn. Sp. Pl. 341. 1753. *Cocculus villosus* DC. Prodr. 1 : 98. 1818; Wt. & Arn. Prodr. 13. 1834; Hook. f. & Thoms. FBI 1 : 101. 1872.

Climbing shrubs or herbs; stems terete, grooved, villous. Leaves up to  $4.8 \times 2.8$  cm, generally those on main stem larger, ovate-oblong or orbicular, apiculate, rounded and cordate at base, 5-nerved from base, villous beneath, sparsely so above; petioles up to 1 cm long. Flowers greenish, 0.1 cm long, unisexual; male flowers in axillary, cymose panicles about 0.8 cm long, bracteate; sepals 6, in 2-series, outer smaller, all hairy; petals obovate, auricled at base; stamens covered by petals; female flowers in axillary clusters; petals clawed at base; ovary glabrous, styles united up to top. Drupes 0.4 cm across, flattened, ribbed on back.

*Fl. & Fr.:* October-February.

*World distribution:* Tropical Africa to India, and Burma.

*Specimens examined:* Chelaima, 8-12-1963, Ellis 17994; Chelaima, 18-3-1965, Ellis 23714.

#### TINOSPORA Miers

*Tinospora cordifolia* (Willd.) Miers in Ann. & Mag. nat. Hist. ser. 2,

7 : 38. 1851 ; Hook. f. & Thoms. FBI 1 : 97. 1872 ; Dunn in Gamble, FPM 1 : 26. 1915. *Menispernum cordifolium* Willd. Sp. Pl. 4 : 826. 1801. *Cocculus cordifolius* (Willd.) DC. Prodr. 1 : 518. 1818 ; Wt. & Arn. prodr. 12. 1834 ; Wt. Ic. 2(2) : 3, t. 485. 1843.

Shrubby climbers ; stems corky, grooved. Leaves about  $7 \times 7$  cm, ovate-acuminate, rounded and cordate at base, glabrous, about 5-nerved from base, reticulations prominent ; petioles up to 8 cm long, grooved, enclosed at base by stem extensions. Flowers pale green, about 0.3 cm long, in clusters, along axillary racemes about 10 cm long, bracteate ; pedicels up to 0.5 cm long ; sepals 0.1 cm long, outer 3 smaller ; petals 6, clawed at base ; male flowers—stamens antipetalous, filaments dilated ; female flowers—ovary about 5-carpellate, stigmas peltate. Drupes 0.6 cm long, ovoid, flattened, ribbed on back ; seeds ventrally grooved.

*Fl. & Fr.* : January-July.

*World distribution* : India, Sri Lanka and Burma, in dry localities.

*Specimens examined* : "Pyapali", July 1885, J. S. Gamble 16332 ; Chelama, 20-3-1965, Ellis 23740.

#### TILIACORA Colebr.

*Tiliacora acuminata* (Lamk.) Miers in Ann. & Mag. nat. Hist. ser. 2, 7 : 39. 1851 ; Dunn in Gamble, FPM 1 : 28. 1915. *Menispernum acuminatum* Lamk. Encycl. 4 : 101. 1797. *Cocculus acuminatus* (Lamk.) DC. Prodr. 1 : 99. 1818 ; Wt. & Arn. Prodr. 1 : 12. 1834. *Tiliacora racemosa* Colebr. in Trans. Linn. Soc. 8 : 67. 1822 ; Hook. f. & Thoms. FBI 1 : 99. 1872.

Climbing shrubs ; stems terete, striate, glabrous. Leaves about  $15 \times 10$  cm, ovate-acuminate, rounded or truncate, sometimes cordate at base, glaucous beneath, shining above ; nerves 5 from base, reticulations prominent beneath ; petioles up to 2 cm long. Flowers orange, 0.5 cm long, in axillary, pendulous panicles about 10 cm long, bracteate, bracteolate ; rachises villosus ; sepals ovate, outer 3 smaller, all ciliolulate along margin ; petals 0.5 cm long, oblong ; male flowers—stamens included, filaments dilated ; female flowers—ovaries 6-carpelled, styles curved, stigmas shortly bifid. Drupes about  $1.3 \times 0.6$  cm, obovoid, faintly rugose, obscurely ribbed on back ; seeds curved, fleshy.

*Fl. & Fr.* : July-December.

*World distribution* : India, Sri Lanka to Malaysia.

*Specimen examined* : Srisailam. 15-7-1963, Ellis 16883.

## NYMPHAEACEAE

## NYMPHAEA Linn.

- |  |                     |
|--|---------------------|
| 1. Leaves glabrous on both surfaces ; connectives<br>extended to form appendages | <i>N. nouchali</i>  |
| 1. Leaves velvety pubescent below ; connectives<br>not extended                  | <i>N. pubescens</i> |

*Nymphaea nouchali* Burm. f. Fl. Ind. 120. 1768 ; van Royen in Nova Guinea 10(8) : 110. 1962. *N. stellata* Willd. Sp. Pl. ed. 4. 2 : 1153. 1797 ; Dunn in Gamble, FPM 1 : 33. 1915. *N. cyanea* Roxb. (Hort. Beng. 41. 1814) Fl. Ind. 2 : 577. 1832 ; Wt. & Arn. Prodr. 17. 1834. *N. stellata* Willd. var. *cyanea* (Roxb.) Hook. f. & Thoms. Fl. Ind. 1 : 243. 1855 et FBI 1 : 114. 1872.

Aquatic herbs, rhizomatous. Leaves about  $20 \times 20$  cm, floating on water, orbicular, cordate at base, often peltate, expand to sinuate along margin, glabrous on both surfaces ; petioles variable with depth of water. Flowers bluish-purple to pale pink, about 7 cm across, solitary, on long, slightly emersed pedicels ; sepals about  $3 \times 0.6$  cm, oblong-lanceolate ; petals several, slightly smaller than sepals ; stamens numerous, anthers linear, connectives extended into appendages, filaments variously dilated ; ovary many-celled, stigmas radiating. Berries about 3 cm across ; seeds numerous, minute, arillate.

*Fl. & Fr.* : Throughout the year.

*World distribution* : Africa to India.

*Specimen examined* : Srisailam, 13-7-1963, Ellis 16857.

*Remarks* : This species has been collected only in ponds round about the temple at Srisailam.

*N. pubescens* Willd. Sp. Pl. ed. 2, 2 : 1154. 1797 ; DC. Prodr. 1 : 115. 1824 ; Wt. & Arn. Prodr. 17. 1834 ; Dunn in Gamble, FPM 1 : 34. 1915 ; van Royen in Nova Guinea 10(8) : 107. 1962. *N. lotus* Linn. var. *pubescens* (Willd.) Hook. f. & Thoms. Fl. Ind. 1 : 241. 1855 et FBI 1 : 114. 1872. *N. nouchali* auct. non Burm. f. ; Merrill in Philip. Journ. Sci. 19 : 350. 1921 ; Subramanyam, Aquat. Angiosp. 6. 1962.

Aquatic herbs, rhizomatous. Leaves about  $40 \times 40$  cm, orbicular, deeply cordate at base with large sinuses, peltate, sharply sinuate-dentate along margin, prominently nerved and velvety-pubescent beneath ; petioles variable, often pubescent. Flowers white, about 10 cm across, solitary, on pedicels ; sepals about  $5.5 \times 2$  cm, ovate-oblong, puberulous without ; petals up to  $7 \times 2$  cm, obovate-oblong ; stamens several, anthers linear,

connectives not extended, filaments dilated; ovaries many-celled, stigmas rayed. Berries about 2.5 cm across; seeds arillate.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : Africa, India to Malaysia.

*Specimen examined* : Chenchukunta, Diguvametta, 18-11-1969,  
Ellis 32514.

### CAPPARACEAE

1. Calyx tubular; stipular spines absent	MAERUA
1. Calyx not tubular, lobes separate till base; stipular spines present	CAPPARIS

#### MAERUA Forsk.

1. Trees; leaves trifoliolate; fruits ovoid ..	<i>M. apetala</i>
1. Climbing shrubs; leaves simple; fruits elongated	<i>M. oblongifolia</i>

*Maerua apetala* (Roth) Jacobs in Blumea 12 : 207. 1964. *Capparis apetala* Roth, Nov. Sp. Pl. 238. 1821. *Niebuhria linearis* DC. Prodr. 1 : 244. 1824; Wt. Ic. 9 : 174. 1840; Hook. f. & Thoms. FBI 1 : 171. 1872; Brandis, Indian Trees, 31. 1906. *N. apetala* (Roth) Dunn in Gamble, FPM 1 : 41. 1915.

Trees, about 4 m tall; young branches pale, glabrous. Leaves trifoliolate, common petioles 7 cm long; leaflets variable, up to 8×3 cm, elliptic, linear, obtuse or rounded at base, coriaceous; petiolules 0.5 cm long. Flowers pale green, 0.8 cm across, in terminal corymbs 6 cm long, bracteolate; pedicels 2 cm long; calyx tube 0.3 cm long, lobes 0.3 cm long, ovate, rufous along margins; petals absent; stamens many; gynophore about 1.8 cm long; ovary ovoid. Fruits about 1.8×1.5 cm, ovoid; seeds 0.8×0.6 cm, trabeculate.

*Fl. & Fr.* : March-July.

*World distribution* : India, in dry localities.

*Specimens examined* : Dornal, Feb. 1887, J. S. Gamble 18684; Way to Pathalaganga, Srisailam, 25-3-1965, Ellis 25751.

*M. oblongifolia* (Forsk.) A. Rich in Guill. & Perr. Fl. Scenegal. Tent. 1 : 32. t. 5. 1831. *Capparis oblongifolia* Forsk. Fl. Aeg. Aral. 99. 1775. *Maerua arenaria* (DC.) Hook. f. & Thoms. FBI 1 : 171. 1872; Dunn in Gamble, FPM 1 : 30. 1915. *Niebuhria arenaria* DC. Prodr. 1 : 244. 1824.

Climbing shrubs ; stems pale, terete, striate. Leaves about  $6 \times 4$  cm, ovate, oblong, apiculate, rounded at base, chartaceous ; petioles 0.5 cm long. Flowers greenish, about 1.5 cm across, in terminal corymbs about 8 cm long, bracteate ; rachises glabrous ; pedicels about 1.5 cm long ; sepals  $0.8 \times 0.4$  cm, ovate ; petals 0.6 cm long, oblong ; stamens many ; gynophore 3 cm long ; ovary elongated, stigmas obtuse. Fruits about 4 cm long, constricted between seeds : seeds echinate.

*Fl. & Fr.* : September-December.

*World distribution* : India, in dry localities.

*Specimen examined* : Chelama, 19-3-1965, Ellis 23721.

#### CAPPARIS Linn.

- |  |                       |
|--|-----------------------|
| 1. Flowers in umbels ; fruits 0.8 cm across  | <i>C. sepiaria</i>    |
| 1. Flowers solitary or in a few flowered clusters ; fruits more than 4 cm across . |                       |
| 2. Shrubs to small trees ; leaves various, generally linear ; fruits ribbed        | <i>C. divaricata</i>  |
| 2. Scandent shrubs ; leaves ovate-orbicular or elliptic-ovate ; fruits not ribbed  | <i>C. seychellica</i> |

*Capparis sepiaria* Linn. Syst. Nat. 10th ed. 2 : 1071. 1759 ; DC. Prodr. 1 : 247. 1824 ; Wt. & Arn. Prodr. 26. 1834 ; Hook. f. & Thoms. FBI 1 : 177. 1872 (var. *vulgaris* Hook. f. & Thoms) ; Dunn in Gamble, FPM 1 : 46. 1915 ; Jacobs in Blumea 12 : 489. 1965. *C. incanescens* DC. Prodr. 1 : 247. 1824 ; Wt. & Arn. Prodr. 26. 1834. *C. sepiaria* Linn. var. *incanescens* (DC.) Hook. f. & Thoms. l.c.

Shrubby climbers ; stems zig-zag, terete, puberulous. Leaves about  $4.5 \times 2.2$  cm, ovate, elliptic, generally emarginate, recurved along margins, softly pilose beneath, less so above, chartaceous ; stipules prickly. Flowers white, 0.5 cm across, in terminal umbels 4 cm across ; pedicels 2 cm long ; peduncles up to 2 cm long ; sepals  $0.3 \times 0.3$  cm, ovate-orbicular, concave ; petals about  $0.6 \times 0.3$  cm, oblong ; stamens many ; gynophore 1.2 cm long ; ovary ovoid. Fruits 0.8 cm across, globose ; seeds many.

*Fl. & Fr.* : March-August.

*World distribution* : Africa, India, Sri Lanka to Burma, Malaysia and Australia.

*Specimens examined* : Chelama, 4-7-1963, Ellis 16732 ; Mahanandi,

22-8-1965, Ellis 25453; Mahanandi, 23-8-1965, Ellis 25508; Pedda-chama, Eastern Nallamalais, 18-8-1972, Ellis 42297.

*Capparis divaricata* Lamk. Encycl. 1 : 606. 1785; DC. Prodr. 1 : 252. 1824; Wt. & Arn. Prodr. 77. 1834; Wt. Ic. 3 : 2, t. 889. 1840; Hook. f. & Thoms. FBI 1 : 174. 1872; Brandis, Indian Trees, 33. 1906. *C. stylosa* DC. Prodr. 1 : 246. 1824; Dunn in Gamble, FPM 1 : 45. 1915.

Shrubs to small trees; stems terete, tomentose, zig-zag in young branches. Leaves variable, about  $3.5 \times 3.0$  cm, linear, elliptic, ovate-obtuse, mucronulate, obtuse or acute at base, coriaceous. Flowers greenish, about 2.5 cm across, solitary or 2-3-clustered; pedicels about 2 cm long; sepals  $1.4 \times 0.7$  cm, oblong, concave, tomentose without; petals about  $4 \times 1$  cm, oblong, linear, acuminate; stamens many; gynophore about 2 cm long; ovary ovoid. Fruits about  $4 \times 4$  cm, globose, longitudinally ribbed and tuberculate; seeds many.

*Fl. & Fr.* : March-August.

*World distribution* : India and Sri Lanka, in dry localities.

*Specimens examined* : Kurnool, March 1883, Gamble 10904; Chelama, 21-3-1965, Ellis 23745; Upper Ahobilam, 29-8-1965, Ellis 25544; Mahanandi, 22-8-1972, Ellis 42325.

*C. zeylanica* Linn. Sp. Pl. ed. 2. 720. 1762; DC. Prodr. 1 : 247. 1824; Wt. & Arn. Prodr. 46. 1834; Dunn in Gamble, FPM 1 : 46. 1915; Jacobs in Blumea 12 : 505. 1965. *C. horrida* Linn. f. Suppl. 264. 1781; DC. Prodr. 1 : 246. 1824; Wt. & Arn. Prodr. 26. 1834; Wt. Ic. 1 : 9, t. 173. 1840; Hook. f. & Thoms. FBI 1 : 178. 1872.

Scandent shrubs; stems generally zig-zag, terete, striate glabrescent. Leaves about  $8 \times 5$  cm, ovate-orbicular, elliptic-ovate, abruptly apiculate, rounded at base; nerves and reticulations prominent; petioles 0.8 cm long; stipules prickly. Flowers white, about 3 cm across, solitary or 2-3, axillary and extra-axillary, pedicellate; sepals  $0.6 \times 0.5$  cm, unequal, elliptic-oblong, puberulous without; petals  $0.9 \times 0.5$  cm, oblong-orbicular; stamens many, turning pink; gynophore  $\pm 3$  cm long; ovary ellipsoid. Fruits about 5 cm across, globular, woody; seeds many.

*Fl. & Fr.* : January-June.

*World distribution* : India, Sri Lanka to Burma and Malaysia.

*Specimens examined* : Diguvametta, 5-11-1906, C. A. Barber 8045; Chelama, 18-3-1965, Ellis 23710.

*Remarks* : Jacobs (*op. cit.* p. 438 & 439) has discussed at length the

interpretations of several authors regarding this taxon and upholds the views of Roxburgh (1832) saying, 'Roxburgh (1832) interpreted *C. zeylanica* correctly' and of Wight and Arnott's (*op. cit.* p. 439, 1834), '... Their concept of *C. zeylanica* is also correct ... Their idea of *C. horrida* is also correct, only they did not combine it with *C. zeylanica*.'

### CLEOMACEAE

[Airy Shaw (Kew Bull. 18 : 256. 1965) has risen the section of Pax (*Pflanzenf. ed. 2.17b* : 146. 1936) to that of a family, stating that the family is intermediate between Capparaceae and Cruciferae—Stanleyeae, differing from the former in the glandular covering, and in the fruit being a 'cruciferous' siliqua with a replum; from the latter in the digitately 3-7-foliolate (rarely simple) leaves].

#### CLEOME Linn.

1. Leaves simple	<i>C. monophylla</i>
1. Leaves 3-7-foliolate :	
2. Stems and leaves asperous	<i>C. aspera</i>
2. Stems and leaves not asperous :	
3. Leaves glandular	<i>C. viscosa</i>
3. Leaves not glandular	<i>C. gynandra</i>

*Cleome monophylla* Linn. Sp. Pl. 672. 1753; DC. Prodr. 1 : 239. 1825; Wt. & Arn. Prodr. 21. 1834; Hook. f. & Thoms. FBI 1 : 168. 1872; Dunn in Gamble, FPM 1 : 41. 1915.

Erect herbs, about 50 cm high; stems grooved, glandular-puberulous. Leaves 4 x 1.8 cm, ovate, rounded at base, hirtellous above and on nerves beneath; petioles up to 3 cm long, hirtellous. Flowers white, 1 cm long, in axillary, elongated racemes about 12 cm long, bracteate; sepals 0.5 cm long, linear, glandular-pubescent; petals 1 cm long, spatulate, clawed at base, stamens as long as petals; ovary pubescent. Capsules up to 7 cm long, grooved, puberulous; seeds many, reniform, transversely grooved.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : Tropical Africa to India.

*Specimens examined* : Gundlabrahmeswaram, 20-7-1963, Ellis 16924; Gundlabrahmeswaram, 28-11-1969, Ellis 32651.

*C. aspera* Koenig ex DC. Prodr. 1 : 241. 1824; Wt. & Arn. Prodr.

22. 1834 ; Wt. Ic. 1 : 15, t. 287. 1840 ; Hook. f. & Thoms. FBI 1 : 169. 1872 ; Dunn in Gamble, FPM 1 : 41. 1915.

Herbs, about 10 cm high, often decumbent ; stems faintly angled, grooved, sparingly asperous ; roots rather woody. Leaves trifoliolate ; petioles about 0.7 cm long, asperous ; leaflets up to  $2 \times 0.4$  cm, obovate-spathulate, glandular, hirsutous, sessile. Flowers yellow, 0.3 cm long, solitary, axillary ; pedicels up to 1 cm long ; sepals 0.1 cm long, ovate ; petals 0.3 cm long, oblong ; stamens 4 ; ovary glabrous. Capsules about 3 cm long, linear, torulose, striate ; seeds reniform, transversely grooved, tubercled.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : India and Sri Lanka, in dry localities of dry deciduous forests.

*Specimens examined* : Srisailam, 12-7-1963, Ellis 16873 ; Srisailam, 21-10-1964, Ellis 22121.

*Cleome viscosa* Linn. Sp. Pl. 672. 1753 ; Hook. f. & Thoms. FBI 1 : 170. 1872 ; Dunn in Gamble, FPM 1 : 41. 1915 ; Iltis in Brittonia 12 : 281. 1960. *Polanisia icosandra* (Linn.) Wt. & Arn. Prodr. 22. 1834 ; Wt. Ic. 1 : 1, t. 2. 1840. *Cleome icosandra* Linn. Sp. Pl. 1 : 672. 1753. *Polanisia viscosa* (Linn.) DC. Prodr. 1 : 242. 1824.

Erect herbs, about 1 m high ; stems terete or slightly angled, striate viscous-puberulous. Leaves about 8 cm long, 3-5-foliate ; petioles 2 cm long ; leaflets  $3 \times 1.5$  cm, obovate-oblong, acute at base, sparingly glandular-hairy, sessile. Flowers yellow, 1 cm long, axillary, solitary or many in racemes 2 cm long ; pedicels 1.5 cm long ; sepals 0.5 cm long, acute, glandular-pubescent ; petals 1 cm long, obovate-oblong ; stamens many ; ovary glandular, stigmas capitate. Capsules about 6 cm long, cylindric, longitudinally irregularly grooved, sparingly puberulous ; seeds many, small, transversely grooved.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : Pantropic.

*Specimens examined* : Chelama, 9-7-1963, Ellis 16817 ; Jabakulavagu, Mahanandi, 22-8-1965, Ellis 25490 ; Bairani, Diguvametta, 7-8-1972, Ellis 42192.

*C. gynandra* Linn. Sp. Pl. 671. 1753 ; Iltis in Brittonia 12(4) : 284. 1960 ; Jacobs in Steenis, Fl. Males. ser. 1. 6 : 101. 1960. *Gynandropsis gynandra* (Linn.) Briq. in Ann. Cons. Jard. Geneve 17 : 382. 1914.

*G. pentaphylla* (Linn.) DC. Prodr. 1 : 238. 1824 ; Wt. & Arn. Prodr. 21. 1834 ; Hook. f. & Thoms. FBI 1 : 171. 1872 ; Dunn in Gamble, FPM 1 : 29. 1915. *Cleome pentaphylla* Linn. Sp. Pl. 983. 1762.

Erect herbs, about 1 m high ; stems terete, striate, glandular-pubescent. Leaves 3-7-foliolate ; petioles 5 cm long, faintly asperous ; leaflets  $2.5 \times 1.5$  cm, obovate-obtuse, cuneate at base, crenate-dentate. Flowers white, 1 cm across, in corymbs, elongating to racemes ; bracts shortly 3-foliolate ; pedicels 2 cm long, glandular-pubescent ; sepals 0.5 cm long, lanceolate ; petals 1 cm long, oblong, clawed at base ; stamens 6, filaments maroon ; gynophore 1.5 cm long ; ovary linear, glandular, stigmas capitate. Capsules 8 cm long, linear, terete, sparsely hirsutous ; seeds many, rugose.

*Fl. & Fr.* : June-December.

*World distribution* : Pantropical weed.

*Specimen examined* : Chelama, 8-7-1963, Ellis 16784.

## VIOLACEAE

### HYBANTHUS Jacq. nom. cons.

*Hybanthus enneaspermus* (Linn.) F. Muell. Phyt. Austra. Fragm. 10 : 81. 1876 ; Tennant in Kew Bull. 16 : 409-435. 1963. *Viola enneasperma* Linn. Sp. Pl. 937. 1753. *Ionidium enneaspermum* (Linn.) Vent. Jard. Maimou. 1 : t. 27. 1803 ; Ging. in DC. Prodr. 1 : 308. 1824. *L. suffruticosum* (Linn.) Roem. & Schult. Syst. Veg. 5 : 394. 1819 ; Ging. in DC. Prodr. 1 : 311. 1825 ; Wt. & Arn. Prodr. 32. 1834 ; Wt. Ic. 1 : 16, t. 308. 1840 ; Hook. f. & Thoms. FBI 1 : 185. 1872 ; Dunn in Gamble, FPM 1 : 49. 1915. *Viola suffruticosa* Linn. Sp. Pl. 937. 1753. *Hybanthus suffruticosus* (Linn.) Baillon in Bot. Medic. 2 : 841. 1884 ; Backer & Bakh. f. Fl. Java 1 : 194. 1963.

Herbs, up to 40 cm high ; rootstocks often woody ; stems faintly angled, grooved, puberulous. Leaves  $5 \times 1$  cm, elliptic-ovate, apiculate, attenuate at base, serrate, glabrescent, sessile. Flowers deep purple with yellow tubes, 1.1 cm long, axillary, solitary, bracteate ; pedicels 1.8 cm long, filiform ; sepals 0.4 cm long, ovate-acuminate, keeled on the back, faintly puberulous ; petals unequal, lowest 0.8 cm long, obovate, clawed at base, shortly spurred ; anthers gibbous on back ; ovary glabrous. Capsules 0.6 cm across, globose, softly pilose ; seeds ovoid, striate.

*Fl. & Fr.* : Throughout the year.

*World distribution* : Tropical Africa to India and Australia.

*Specimens examined* : Chelama, 5-7-1963, Ellis 16752 and Ellis 16758 ; Mahanandi, 21-8-1965, Ellis 25402 ; Diguvametta, 16-11-1969, Ellis 32421.

### COCHLOSPERMACEAE

#### COCHLOSPERMUM Kunth *nom. cons.*

*Cochlospermum religiosum* (Linn.) Alston, Handb. Fl. Ceylon 6 : 14. 1931 ; Steenis in Fl. Males. ser. I. 4(2) : 62. 1949. *Bombax religiosum* Linn. Sp. Pl. 552. 1753. *Cochlospermum gossypium* (Cav.) DC. Prodr. 1 : 527. 1824 ; Wt. & Arn. Prodr. 87. 1834 ; Hook. f. & Thoms. FBI 1 : 190. 1872. *Bombax gossypium* Cav. Diss. Bot. 5 : 297. 1785 (non Linn.).

Trees, about 20 m tall ; bark cracked. Leaves about  $21 \times 22$  cm, 5-7-lobed, cordate at base, lobes acuminate, margins wavy, pilose below, generally glabrous above, woolly-tomentose beneath in juvenile ones ; lateral nerves parallel, prominent beneath ; petioles up to 17 cm long ; stipules 0.8 cm long, linear. Flowers yellow, about 10 cm across, in racemes about 10 cm long ; pedicels up to 6 cm long, bracteate ; sepals about  $2.5 \times 1.5$  cm, oblong-orbicular, coriaceous, tomentose without ; petals  $5 \times 2.5$  cm, oblong-orbicular, obtuse at base ; stamens numerous, anthers falcate ; ovary glabrous. Capsules about 12 cm long, ovoid ; seeds curved, woolly.

*Fl. & Fr.* : February-May.

*World distribution* : India, Sri Lanka to Malaysia, in dry localities.

*Specimen examined* : Chelama, 19-3-1965, Ellis 23718.

### FLACOURTIACEAE

#### FLACOURTIA DC.

*Flacourzia indica* (Burm. f.) Merr. Interp. Herb. Amb. 377. 1917 ; Sleumer in Steenis, Fl. Males. ser. I. 5 : 77. 1954. *Gmelina indica* Burm. f. Fl. Ind. 132. 1768. *Flacourzia sepiaria* Roxb. Pl. Corom. 1 : 48. 1796 ; Hook. f. & Thoms. FBI 1 : 194. 1872 ; Gamble, FPM 1 : 54. 1915. *F. ramontchi* L'Herit. Stirp. 59. 1784 ; Wt. & Arn. Prodr. 29. 1834 ; Hook. f. & Thoms. FBI 1 : 193. 1872.

Trees about 5 m tall ; branches transformed into thorns, very often

prominently branched at base. Leaves about  $9 \times 6$  cm, often less, size depending on habitats, ovate, obovate, acute to rounded at base, crenate-serrate, chartaceous, glabrescent; nerves and reticulations prominent; petioles up to 1.5 cm long, puberulous. Flowers pale yellow, 0.5 cm across, in axillary racemes 4 cm long, bracteate; petals 0.2 cm long, ovate, ciliolulate; stamens numerous, filaments long, dilated, sparsely hairy at base; ovary glabrous, styles about 5. Drupes  $0.8 \times 0.6$  cm, ovoid; seeds 5.

*Fl. & Fr.* : February-September.

*World distribution* : Madagascar to India.

*Specimen examined* : Sunnipenta, Srisailam, 26-3-1965, Ellis 23777.

*Remarks* : Here Sleumer's (*op. cit.* p. 77) treatment of the taxon is followed even though *Flacourtia ramontchi* L'Herit. seems to have some constant features like the size of leaves, very large, branched thorns, etc. which are different from those of *F. sepiaria* Roxb. Sleumer (*op. cit.* p. 77), however, speaks of these apparently two different taxa thus: "... I cannot find any constant character neither in leaves nor flowers or fruits, which would allow to segregate two species in the *F. indica*-complex ..." He continues: "... It seems that *F. indica* (*F. sepiaria*) prefers rather dry, open plains, thickets or scrub-forest, whilst *F. ramontchi* seems to be more frequently attached to evergreen respectively rain-forest-vegetation, but also this may not hold,..."

## POLYGALACEAE

### POLYGALA Linn.

1. Racemes more than 10 cm long	...	<i>P. elongata</i>
1. Racemes less than 2 cm long :		
2. Capsules almost equally bilobed, pubescent ; plants pubescent	...	<i>P. erioptera</i> DC. var. <i>vahliana</i>
2. Capsules prominently unequally bilobed, hairy along margins ; plants slightly puberulous	...	<i>P. arvensis</i>

*Polygala elongata* Koenig in Willd. Sp. Pl. 3 : 879. 1800 ; DC. Prodr. 1 : 332. 1824 ; Wt. & Arn. Prodr. 1 : 38. 1834 ; Bennett in Hook. f. FBI 1 : 203. 1872, p.p. ; Dunn in Gamble, FPM 1 : 58. 1915 ; Mukerjee in Bull. bot. Soc. Bengal 12 : 36. 1958 ; Adema in Blumea 14 : 273. 1966.

Erect herbs, up to 40 cm high; sometimes basal branches decumbent; stems terete, crispately puberulous. Leaves up to  $7 \times 0.4$  cm linear, linear-elliptic, acute, obtuse, apiculate, acute at base, excurved along margins, glabrescent, sessile. Flowers yellow, about 0.6 cm long, in axillary and extra-axillary racemes up to 18 cm long, bracteate, bracteolate; outer sepals 3, 0.2 cm long, puberulous along margins, inner two 0.5 cm long, broadly ovate, apiculate; lower petals keeled, crested; stamens 8, filaments connate to half their lengths; ovary glabrous. Capsules  $0.5 \times 0.3$  cm, unequally bilobed, glabrous; seeds black, densely pubescent, caruncles shortly 3-radiate at base.

*Fl. & Fr.* : August-February.

*World distribution* : India and Sri Lanka.

*Specimens examined* : "Nallamalai Hills", 25-8-1921, C.E.C. Fischer 4677; Mallakondapenta, Nallamalai Hills, 13-8-1921, C.E.C. Fischer 4662; Iskugudum, Nallamalai, 16-8-1921, C.E.C. Fischer 4669; Sunnippeta, Srisailam, 21-10-1964, Ellis 22138; Mahanandi, 21-8-1965, Ellis 25403.

*Polygala eriopetra* DC. var. *vahliana* (DC.) Chodat in Mem. Soc. Phys. Hist. Nat. Geneve. 31 : 2, 281. 1893; Mukerjee in Bull. bot. Soc. Bengal 12 : 47. 1958. *P. vahliana* DC. Prodr. 1 : 326. 1824; Wt. & Arn. Prodr. 1 : 366. 1834. *P. eriopetra* sensu Bennett in Hook. f. FBI 1 : 203. 1872, p.p.; Dunn in Gamble, FPM 1 : 59. 1915, p.p.

Erect herbs, about 25 cm high; basal lateral branches decumbent; stems puberulous with crissate hairs; rootstock often woody. Leaves up to  $3.5 \times 0.8$  cm, linear, acute, obtuse or oblong with excurved margins, pubescent to glabrescent. Flowers pinkish, 0.5 cm long, in axillary or extra-axillary, a few-flowered racemes about 1 cm long, shortly pedicellate; outer 3 sepals small, pilose, inner two 0.5 cm long, scarious, pilose; petals smaller than inner sepals, lowest crested; filaments connate in 2 bundles; ovary pubescent. Capsules  $0.5 \times 0.3$  cm, slightly bilobed, pubescent; seeds black, densely hairy; caruncles slightly 3-radiate at base.

*Fl. & Fr.* : Throughout the year.

*World distribution* : India, in dry localities.

*Specimen examined* : Chelama, 10-12-1963, Ellis 18062.

*P. arvensis* Willd. Sp. Pl. 3(2) : 876. 1803; Wt. & Arn. Prodr. 36. 1834; Burtt in Notes Roy. bot. Gardn. 32 : 404. 1973. *P. chinensis* auct. non Linn.; Bennett in Hook. f. FBI 1 : 204. 1872; Chodat in Mem. Soc. Phys. Nat. Geneve. 31 : 385. 1893; Dunn in Gamble, FPM

1 : 58. 1915; Mukerjee in Bull. Bot. Soc. Bengal 12 : 38. 1958; Adema in Blumea 14 : 269. 1966.

Erect herbs, often diffuse, about 10 cm high; basal branches almost decumbent, faintly angled, crisplately puberulous to pubescent. Leaves up to  $3 \times 1.5$  cm, oblong-obovate, elliptic, often emarginate, acute at base, incurved along margins, softly pilose. Flowers yellow, in axillary and extra-axillary racemes about 2 cm long, bracteate, bracteolate; sepals unequal, inner 2 up to  $0.5 \times 0.25$  cm, outer 3 smaller, ciliolulate along margins; petals 3, inferior keeled and crested; stamens 8, filaments connate in 2 bundles. Capsules  $0.4 \times 0.4$  cm, broadly emarginate, flattened, ciliate along margins; seeds 2, black, densely pubescent; caruncles 3-radiate.

*Fl. & Fr.* : August-November.

*World distribution* : India, Sri Lanka to Malaysia.

*Specimens examined* : Chelama, 9-7-1963, Ellis 16813; Diguvametta, 17-11-1969, Ellis 32462.

*Remarks* : Burtt (*op. cit.* p. 403) discusses at length his study of the TYPE material in the Linnean Herbarium and advocates for abandoning *P. chinensis* Linn. as it is a source of confusion for *P. glomerata*; he takes up the next available epithet, *arvensis* of Willdenow for those occurring in India.

## CARYOPHYLLACEAE

### POLYCARPaea Lamk. *nom. cons.*

*Polykarpaea corymbosa* (Linn.) Lamk. Tab. Encycl. et Method. 2 : 129. 1800; DC. Prodr. 3 : 374. 1828; Wt. & Arn. Prodr. 358. 1834; Wt. Ic. 2 : 4, t. 712. 1843; Edgew. & Hook. f. FBI 1 : 245. 1874; Dunn in Gamble, FPM 1 : 65. 1915. *Achyranthes corymbosa* Linn. Sp. Pl. 205. 1753.

Erect herbs, up to 30 cm high; stems terete, pilose, rootstock woody. Leaves up to 1.7 cm long, in whorls at nodes, linear, glabrous or slightly pubescent, sessile; stipules ovate-caudate, scarious. Flowers reddish, 0.3 cm long, in corymbose cymes 1 cm long, pedicellate, scariously bracteate, bracteolate; peduncles about 10 cm long, dichotomously branched, pubescent; sepals 0.3 cm long, ovate-caudate, scarious; petals 0.1 cm long, oblong, pubescent; stamens 5, filaments connate at base with petals; ovary glabrous. Capsules dark brown, 0.1 cm long, ovoid; seeds a few, aggregated.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : Pantropic.

*Specimens examined* : Srisailam, 20-10-1964, Ellis 22085 ; Diguvalmetta, 19-11-1969, Ellis 32543.

## PONTULACACEAE

### PONTULACA Linn.

*Pontulaca suffruticosa* Wt. (Wall. Cat. 6842, 1832) ex Wt. & Arn. Prodri. 356, 1834 ; Dyer in Hook. f. FBI 1 : 247, 1874 ; Dunn in Gamble, FPM 1 : 66, 1915.

Herbs woody, about 30 cm high ; stems terete, scaly ; rootstock woody. Leaves 1 cm long, linear-elliptic, succulent, sessile ; stipules hairy. Flowers red, about 1.5 cm across, in terminal few-flowered clusters, subtended by a ring of leaves and hairs ; peduncles about 2.5 cm long ; sepals 2, connate, adnate at base to ovary ; petals about 6, episepalous ; stamens many ; ovary semi-inferior, glabrous. Capsules 0.6 cm long, ovoid-acute, circumscissile ; seeds several, flattened, reniform, granular.

*Fl. & Fr.* : May-December.

*World distribution* : India and Sri Lanka, in very dry localities.

*Specimen examined* : Srisailam, 13-7-1963, Ellis 16861.

## MALVACEAE

1. Capsules more than 2 cm long :

- 2. Corolla united with calyx at base ; calyx spathaceous, splitting on one side ; pedicels not jointed ... *ABELMOSCHUS*
- 2. Corolla and calyx separate ; calyx cupuliform with minute lobes, pedicels jointed ... *TUNGESTA*

1. Capsules less than 2 cm long :

- 3. Mericarps glochidiate ... *URENA*
- 3. Mericarps not glochidiate :
  - 4. Capsules truncate at top ... *ABUTILON*
  - 4. Capsules pointed at top or ovoid :
    - 5. Epicalyx present :

6. Epicalyx as long as or shorter than calyx lobes	...	HIBISCUS
6. Epicalyx twice as long as calyx lobes	...	PAVONIA
5. Epicalyx absent	...	SIDA

## ABELMOSCHUS Med.

- |   |     |                     |
|---|-----|---------------------|
| 1. Capsules up to $8 \times 4$ cm; flowers yellow with maroon centre; epicalyx segments 9 | ... | <i>A. moschatus</i> |
| 1. Capsules up to $3 \times 1.5$ cm; flowers white with red centre; epicalyx segments 5   | ... | <i>A. ficulneus</i> |

Wight and Arnott are the first Indian Botanists to follow Medicus (1787) in delimiting the broader circumscription of Linnaeus. Borssum's (*op. cit.*) treatise has once again reinforced the argument for treating *Abelmoschus* separate.

***Abelmoschus moschatus* Medicus**, Malv. 46, 1787; Wt. & Arn. Prodr. 53, 1834; Wt. Ic. 2 : 1, t. 399, 1843; Hu in Fl. China, Fam. 153 : 38, 1955; Robyns in Ann. Miss. bot. Gard. 52 : 515, 1965; Borssum in Blumea 14 : 90, 1966. *Hibiscus abelmoschus* Linn. Sp. Pl. 696, 1753; Masters in Hook. f. FBI 1 : 342, 1874; Dunn in Gamble, FPM 1 : 97, 1915.

Suffrutescent herbs, about 1.5 m high; stems woody, densely, retroseely hirsute. Leaves about  $10 \times 8$  cm, palmately 3-5-lobed, lobes oblong-ovate, cordate at base; crenate-serrate, densely, velvety pubescent to sparingly hairy; petioles up to 13 cm long; stipules up to 1 cm long. Flowers yellow with maroon centre; pedicels up to 5 cm long, stout; epicalyx segments 9, linear; calyx about 2 cm long, spathaceous, splitting along one side, deciduous; corolla 6 cm across, lobes connate at base and adnate to staminal tube; stamens many, filaments connate. Capsules about  $8 \times 4$  cm, ovoid, shortly acuminate, faintly angular, hispidly hairy; seeds many, reniform, striate, glabrous.

*Fl. & Fr.* : July-November.

*World distribution* : Pantropic, mostly cultivated.

*Specimen examined* : Gundlabrahmeswaram, 27-10-1964, Ellis 22228.

***A. ficulneus* (Linn.) Wt. & Arn. Prodr. 53, 1834; Wt. Ic. 1 : 8, t. 154, 1840; Borssum in Blumea 14 : 101, 1966. *Hibiscus ficulneus* Linn. Sp. Pl. 695, 1753; Masters in Hook. f. FBI 1 : 340, 1874; Dunn in Gamble, FPM 1 : 97, 1915.**

Suffrutescent herbs, about 80 cm high ; stems woody below, glabrous with occasional prickly hairs. Leaves about  $10 \times 10$  cm, shallowly or deeply 3-5-lobed, cordate to obtuse at base, lobes orbicular, ovate or oblong, crenate, dentate or serrate, distantly hirsutely to almost prickly hairy on both surfaces ; petioles about 7 cm long ; stipules small. Flowers white with red centre, about 5 cm across, in terminal leafless racemes about 12 cm long ; epicalyx segments 5, lanceolate ; calyx bottle-shaped when young, slightly lobed near the top ; stamens many, filaments connate. Capsules about  $3 \times 1.5$  cm ; oblong-ovoid, hairy without, hirsute on margins ; seeds many, black, reniform, striate, sparingly ciliate.

*Fl. & Fr.* : April to January.

*World distribution* : Pantropic.

*Specimen examined* : Velgode Range, 26-11-1969, Ellis 32616.

*Remarks* : Borssum (1966) has cited the authority of this species as Wt. & Arn. ex Wight, Cat. 14. 1833. It is inconceivable how the Catalogue which was published earlier in 1833 could have validated Wight and Arnott's epithet published in 1834. It can be Wight ex Wight & Arnott. It is possible that in Borssum's paper the typological error might have crept in.

#### THESPESIA Solander ex Coll. nom. cons.

*Thespesia lampas* (Cav.) Dalz. & Gibbs, Bombay Fl. 19. 1861 ; Masters in Hook. f. FBI 1 : 345. 1874 ; Hu in Fl. China, Fam. 153 : 69. 1955. *Hibiscus lampas* Cav. Diss. 3 : 154. 1787 ; DC. Prodr. 447. 1824 ; Wt. & Arn. Prodr. 48. 1834 ; Wt. Ic. 1 : 1, t.5. 1840 ; Dunn in Gamble, FPM 1 : 98. 1915. *Azanxa lampas* (Cav.) Alefeld in Bot. Zeit. 19 : 298. 1861.

Shrubs about 1.5 m tall ; stems woody. Leaves about  $20 \times 18$  cm, generally 3-lobed, or not, cordate at base ; terminal lobes acute, laterals rounded, pubescent-tomentose beneath, sparsely so above ; glandular on midrib at base adaxially ; petioles about 10 cm long, tomentose, exstipulate. Flowers yellow with maroon centre within, shortly pedicelled ; epicalyx segments 5, small, linear ; calyx about 1 cm long, tube cupular, accrescent, lobes minute, linear ; corolla about 6 cm across, brown stellate tomentose without ; stamens short ; stigmas club-shaped. Capsules  $2.5 \times 1.5$  cm, ovoid, faintly stellate-puberulous ; seeds many, black, sparsely pubescent.

*Fl. & Fr.* : August-February.

*World distribution* : Tropical East Africa to India, Sri Lanka and Malaysia.

*Specimens examined* : Gazulapalli, 8-11-1901, C. A. Barber 8061; Chelama, 8-12-1963, Ellis 18001; Chelama, 16-10-1964, Ellis 22040; Way to Mahanandi, 22-8-1965, Ellis 25497; Isagundum, Diguvametta, 19-11-1969, Ellis 32546.

*Remarks* : Borssum (*op. cit.*) and others speak of stipules as 'small, lanceolate to subulate'; surprisingly it has not been observed in our specimens, even in very young branches; only a glandular protuberance is present.

#### URENA Linn.

*Urena lobata* Linn. subsp. *sinuata* (Linn.) Borssum in Blumea 14 : 142. 1966. *U. sinuata* Linn. Sp. Pl. 692. 1753; Masters in Hook. f. FBI 1 : 329. 1875; Dunn in FPM 1 : 92. 1915. *U. lobata* Linn. var. *sinuata* (Linn.) Hochr. in Ann. Cons. Jard. Bot. Geneve 5 : 141. 1901; Robyns in Ann. Miss. bot. Gard. 52 : 524. 1965.

Herbs, up to 1 m high; stems hirsutely hairy when young becoming crispate in older branches; roots woody. Leaves 4 cm long, sinuately 3-5-lobed, or orbicular, 3-7-nerved from base, glandular on a nerve below; petioles up to 10 cm long. Flowers pale pink; pedicels up to 5 cm long; epicalyx segments 5, linear-elliptic or ovate-spathulate; calyx lobes ovate-elliptic, tube small; corolla up to 1.5 cm across, connate near base; ovary muricate, white-pubescent; stigmas maroon. Capsules 5-lobed, glochidiate, stellate-hairy; seeds striate, crisplately hairy.

*Fl. & Fr.* : August to February.

*World distribution* : Pantropic.

*Specimens examined* : Chelama, 7-12-1963, Ellis 17990; Chelama, 17-10-1964, Ellis 22062; Diguvametta, 16-11-1969, Ellis 32411.

*Remarks* : Andre Robyns (*op. cit.*) treats this plant, assigning it a varietal status because of its variability. However, Borssum is followed here as his work is done on a geographic delimitation, viz. South East Asia.

#### ABUTILON Mill.

*Abutilon indicum* (Linn.) Sweet, Hort. Brit. ed. 1 : 54. 1826; G. Don, Gen. Syst. 1 : 504. 1831; Masters in Hook. f. FBI 1 : 326. 1875; Hochr. in Ann. Cons. Jard. Bot. Geneve 6 : 19. 1902; Dunn in Gamble, FPM

1 : 91. 1915 ; Hu in Fl. China, Fam. 153 : 32. 1955 ; Borssum in Blumea 14 : 170. 1966. *Sida indica* Linn. in Turner, Cent. Pl. 2 : 26. 1756. *Abutilon indicum* var. *populifolium* (Lamk.) Wt. & Arn. Prod. 56. 1834.

Undershrubs, about 1 m high ; stems terete, brown-tomentose with occasional simple hairs. Leaves ovate, about 10 × 8 cm, acuminate, cordate at base, irregularly serrate, dentate, 9-nerved from base ; stipules linear, falcate ; petioles about 15 cm long. Flowers yellow, 1.5 cm across, solitary, axillary ; pedicels generally longer than petioles, jointed below the flower ; calyx 0.6 cm long, lobes ovate, mucronate, tube 0.4 cm long ; corolla hairy along margins at base ; stamens columnar around ovary, ovary densely pubescent. Capsules 1.5 cm across, falsely truncate at top with apices stretched out ; seeds black, reniform, minutely warty.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : Pantropic.

*Specimen examined* : Chelama, 7-12-1963, Ellis 17989.

*Remarks* : Borssum (*op. cit.*) has stated that Hochreutiner (1902) has given a wider concept of the species ; he quotes, however, with the word 'emend'. Hochreutiner appears to have amplified the description. Perhaps *descripto ampio* seems to be more appropriate.

Masters (*op. cit.*) and subsequently others have wrongly accredited G. Don as the author of the species ; as pointed by Hochreutiner (p. 19), Sweet had published the specific epithet earlier.

### HIBISCUS Linn.

1. Mericarps winged	...	<i>H. vitifolius</i>
1. Mericarps not winged :		
2. Stems and calyx red-purplish ; calyx coriaceous, succulent	...	<i>H. sahdariffa</i>
2. Stems and calyx greenish ; calyx thin, not succulent :		
3. Flowers white, generally pointing downwards ; seeds silky-cottony	...	<i>H. micranthus</i>
3. Flowers yellow with maroon centre, erect ; seeds glabrous or minutely stellate-tomentose :		
4. Shrubs ; petioles more than 15 cm long ; flowers solitary	...	<i>H. lunatifolius</i>
4. Herbs ; petioles less than 10 cm long ; flowers in a few-flowered raceme	...	<i>H. lobatus</i>

*Hibiscus vitifolius* Linn. Sp. Pl. 696. 1753 ; Masters in Hook. f. FBI 1 : 338. 1874 ; Dunn in Gamble, FPM 1 : 98. 1915 ; Rakshit & Kundu in Bull. bot. Surv. India 12 : 166. 1970. *Fioria vitifolia* (Linn.) Mattei in Bol. Ort. Bot. Palermo, n.s. 2 : 72. 1917 ; Kundu & Biswas in Bull. bot. Surv. India 16 : 125-138. 1974 (1977).

Suffrutescent herbs, about 2 m high ; stems tomentose with both simple and stellate hairs. Leaves about 10×10 cm, deeply 3-5-lobed, cordate at base ; lobes acute, acuminate or caudate-acuminate, dentate-serrate, serrulate, or crenate-serrate ; 7-9-nerved from base ; petioles up to 14 cm long. Flowers yellow with maroon centre, about 10 cm across, axillary, crowded at ends of branches ; pedicels up to 10 cm long, jointed about the middle ; epicalyx segments 8, 1.5 cm long, linear ; calyx 1.5 cm long, pubescent, lobes acute, strongly 3-5-nerved ; corolla 5 cm across ; stigmas maroon. Capsules about 1.5 cm long, prominently winged, depressed at top ; seeds about 15, faintly muriculate.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : Tropical Africa, India, Sri Lanka to Malaysia and Australia.

*Specimens examined* : Diguvametta, 28-10-1906, C.A. Barber 8004 ; Mahanandi, 23-8-1965, Ellis 25520 ; Diguvametta, 8-8-1972, Ellis 42204.

*Remarks* : Generally most of the authors, including Borssum (*op. cit.*) give the colour of central portion of flower as purple. It is maroon in plants from Nallamalais.

B. C. Kundu and Chhabil Biswas (*op. cit.*) support Mattei (*op. cit.*) in erecting a new genus, *Fioria*, though they observe (p. 137) "...It has also been observed that *Fioria vitifolia* is a very variable species and its splitting into two subspecies (Brenan and Extoll, 1958) or several varieties (Mattei, 1917) is not possible...". Mattei had segregated the genus mainly dependent on the nature of capsules. Hochreutiner (in *Candollea* 2 : 83-84. 1924) and Brenan and Exell (in *Bot. Soc. Broteriana* 32 : 69-74. 1958) do not accept this segregation.

*H. sabdariffa* Linn. Sp. Pl. 695. 1753 ; Masters in Hook. f. FBI 1 : 340. 1874 ; Dunn in Gamble, FPM 1 : 99. 1915 ; Hu in Fl. China, Fam. in 153 : 58. 1955 ; Robyns in Ann. Miss. bot. Gard. 52 : 506. 1965.

Herbs, about 1 m high ; stems reddish-purple, crisplately hairy in younger branches, woody at base. Leaves about 15×10 cm, generally deeply 3-lobed, lobes oblong-ovate, obtuse at base, serrate, conspicuously 3-nerved, glandular on the midrib at the base beneath ; petioles about 6 cm long ; stipules 1 cm long. Flowers red, about 8 cm across,

solitary, axillary, pedicellate; epicalyx segments 10, purplish-pink, linear-elliptic; calyx 5-lobed, lobes dark pinkish-purple, elliptic, accrescent; corolla 8 cm across. Capsules about  $2.5 \times 1.5$  cm, ovoid, hirsute; seeds many, reniform, hirtellous to glabrous.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : Cultivated throughout the tropics.

*Specimen examined* : Pathalaganga, Srisailam, 4-12-1969, Ellis 32689.

*Remarks* : The plants collected seem to have escaped from cultivation. The calyces are acidic and are eaten. The stems yield fibre.

*Hibiscus micranthus* Linn. f. Suppl. 308. 1781; Masters in Hook. f. FBI 1 : 335. 1874; Dunn in Gamble, FPM 1 : 97. 1915; Rakshit & Kundu in Bull. bot. Surv. Ind. 12 : 171. 1970.

Suffrutescent herbs, about 1 m high; stems terete, densely bristly when young. Leaves about  $10 \times 7$  cm, ovate to almost orbicular, often shallowly 3-lobed, rounded to acute at base, irregularly dentate, serrate or serrulate, 5-nerved from base; petioles short; stipules small, linear. Flowers white, about 1 cm across, solitary or in pairs, axillary; pedicels about 4 cm long, jointed above middle; epicalyx segments 6, linear, sparsely hirsute; calyx 0.8 cm long, lobes 5, acute; corolla 1 cm long, lobes 0.5 cm long, ovate, reflexed; stigmas capitate. Capsules 1 cm across, puberulous; seeds reniform, scirious near margins, centrally almost glabrous.

*Fl. & Fr.* : Throughout the year.

*World distribution* : Tropical Africa to India.

*Specimens examined* : Srisailam, 12-7-1963, Ellis 16829; Mahanandi, 23-8-1965, Ellis 25522; Bogada, 19-11-1969, Ellis 32526.

*H. lunariifolius* Willd. Sp. Pl. 3 : 811. 1800; Masters in Hook. f. FBI 1 : 338. 1874; Dunn in Gamble, FPM 1 : 97. 1915; Borssum in Blumea 14 : 80. 1966; Rakshit & Kundu in Bull. bot. Surv. Ind. 12 : 173. 1970.

Suffrutescent herbs, about 1 m high; stems terete, pubescent to sparsely hairy with simple and stellate, yellowish hairs. Leaves  $20 \times 20$  cm, 3-5-lobed, cordate at base, lobes acuminate, serrate, serrulate or crenate, sparsely hairy; nerves 7 from base; petioles up to 25 cm long, hairy; stipules linear. Flowers yellow with maroon centre, about 8 cm across, axillary, solitary; pedicels 1 cm long, thickened above, densely pubescent; epicalyx segments 5, about 2 cm long, linear, hirtellous;

calyx lobes about 2.5 cm long, ovate, acuminate, hairy, prominently 5-nerved; anthers convolute; stigmas pubescent. Capsules 2 cm long, oblong, apiculate, densely hirsute; seeds many, reniform.

*Fl. & Fr.* : November-January.

*World distribution* : Tropical Africa, India, Sri Lanka to Burma.

*Specimen examined* : Srisailam, 21-10-1964, Ellis 22149.

*Hibiscus lobatus* (J. A. Murray) O. Ktze. Rev. Gen. Pl. 3 : 19. 1898; Borssum in Blumea 14 : 77. 1966; Rukshit & Kundu in Bull. bot. Surv. Ind. 12 : 169. 1970. *Solandra lobata* J. A. Murray, Comm. Soc. Reg. Sc. Gattung, 6 : 20. 1785. *H. solandra* L' Herit. Stirp. Nov. 1 : 103. 1788; Masters in Hook. f. FBI 1 : 336. 1875; Dunn in Gamble, FPM 1 : 98. 1915.

Erect herbs, about 40 cm high, woody at base; stems terete, hairy, glandular. Leaves about 15 x 12 cm, 3-5-lobed or not, dentate, serrate, crenate, cordate at base, 5-7-nerved from base; petioles up to 12 cm long; stipules linear. Flowers white, about 1.5 cm long, in axillary, 5-6-flowered racemes about 12 cm long; pedicels about 8 cm long, jointed at middle; calyx 1 cm long, lobes linear-ovate, pubescent, accrescent, 3-nerved; corolla 1.5 cm long; stigmas pubescent. Capsules 1 cm across, crisplately hairy, hirsute along margins; seeds black, several, finely muciculate.

*Fl. & Fr.* : August-December.

*World distribution* : Tropical Africa to South East Asia.

*Specimens examined* : Gundlabrahmeswaram, 24-10-1964, Ellis 22162; Way to Upper Ahobilam, 29-8-1965, Ellis 25570; Diguvametta, 16-11-1969, Ellis 32427.

#### PAVONIA Cav. nom. cons.

*Pavonia odorata* Willd. Sp. Pl. 3 : 837. 1800; Masters in Hook. f. FBI 1 : 331. 1874; Dunn in Gamble, FPM 1 : 93. 1915.

Erect herbs, about 75 cm high, woody at base; stems pubescent, striate, fissured in older branches. Leaves 5 x 4 cm, 3-5-lobed, cordate at base; lobes ovate, dentate, sparsely hairy below, less so above, 8-nerved from base; petioles up to 8 cm long. Flowers pale pink to white, about 2 cm across, solitary; pedicels about 8 cm long, jointed at top; epicalyx segments 0.5 cm long, 10-14, linear, hirsute; calyx 0.5 cm long, lobes ovate, 3-nerved; corolla 1.5 cm long; ovary pubescent. Carpels

0.5 cm long, globose, pubescent, slightly winged; seeds striate, sparsely crisplately hairy.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : East Tropical Africa, India, Sri Lanka to Burma.

*Specimens examined* : Chelama, 9-7-1963, Ellis, 16795; Pathalanganga, Srisailam, 20-10-1964, Ellis 22094; Mahanandi, 23-8-1965, Ellis 25521.

*Remarks* : The differences between *Urena* Linn. and *Pavonia* Cav. seem to be overlapping and may not be adequate enough for separate generic status. In fact, Borssum (*op. cit.* p. 135) is of the opinion, "...*Urena* remains here separated from *Pavonia* only by the presence of glochidia on the fruit, as far as I know a unique character in the family. Admittedly, a single character is, though practical, in essence insufficient for generic distinction." He proceeds further: "...the statements above rather indicate that it should be merged with *Urena*; that would make necessary conservation of the generic name *Pavonia* also against *Urena*."

### SIDA Linn.

- |   |     |                       |
|---|-----|-----------------------|
| 1. Petioles up to 4 cm long; mericarps exceeding calyx  | ... | <i>S. cordifolia</i>  |
| 1. Petioles about 0.5 cm long; mericarps as long as or shorter than calyx :   |     |                       |
| 2. Pedicels twice as long as leaves; leaves cordate at base, hairy  | ... | <i>S. cordata</i>     |
| 2. Pedicels as long as or slightly longer than petioles; leaves acute at base, glabrous to pubescent :  |     |                       |
| 3. Leaves linear-elliptic, glabrous, much longer than broad   | ... | <i>S. acuta</i>       |
| 3. Leaves ovate-elliptic, mostly broad-rhomboid, pubescent to tomentose or sparingly hairy below, almost glabrous above, about twice as long as broad | ... | <i>S. rhombifolia</i> |

*Sida cordifolia* Linn. Sp. Pl. 684. 1753; Masters in Hook. f. FBI 1: 324. 1874; Dunn in Gamble, FPM 1: 89. 1915; Hu in Fl. China, Fam. 153: 15. 1955; Borssum in Blumea 14: 199. 1966.

Robust herbs, about 1 m high; stems terete, brown-fomentose, long-ciliate. Leaves about 10 x 7.5 cm, broadly ovate or orbicular, cordate at base, crenate-serrate, 7-nerved from base; petioles about 2.5 cm long; stipules linear. Flowers pale yellow, 1 cm across, axillary, solitary; pedicels about 2.5 cm long, jointed above the middle; calyx 0.8 cm

long, lobes ovate, pubescent without; petals hairy along margins near base; staminal tube hairy; ovary pubescent. Fruits 0.8 cm across, mericarps strongly reticulate, prominently 2-aristate; seeds black, depressed and hairy at base.

*Fl. & Fr.* : June-December.

*World distribution* : Pantropic.

*Specimens examined* : Pathalaganga, Srisailam, 20-10-1964, Ellis 22117; Diguvametta, 16-11-1969, Ellis 32428.

*Sida cordata* (Burm. f.) Borssum in Blumea 14 : 182. 1966. *Melochia cordata* Burm. f. Fl. Ind. 143. 1768. *S. veronicaefolia* Lamk. Encycl. 1 : 5. 1783; Dunn in Gamble, FPM 1 : 89. 1915; Hu in Fl. China, Fam. 153 : 23. 1955. *S. humilis* Lamk. var. *veronicaefolia* (Lamk.) Masters in Hook. f. FBI 1 : 322. 1874.

Herbs, up to 1 m high; stems weak, spreading, sparsely ciliate with simple hairs, also stellately hairy. Leaves up to 5×5 cm, upper smaller, ovate, crenate-dentate, ciliate to pubescent; petioles 2 cm long; stipules 0.3 cm long. Flowers yellow, 0.6 cm long, solitary or clustered or in subpanicles about 5 cm long; pedicels up to 3.0 cm long, jointed above middle; calyx 0.4 cm long, lobes ovate, glabrous; corolla 0.5 cm long; staminal tube hairy. Mericarps 0.4 cm long, muticous; seeds angled on one side, rounded on the other.

*Fl. & Fr.* : August-March.

*World distribution* : Tropical America to Africa, India, Sri Lanka and Malaysia.

*Specimens examined* : Diguvametta, 16-11-1969, Ellis 32420, Ellis 32429.

*S. acuta* Burm. f. Fl. Ind. 147. 1768; Dunn in Gamble, FPM 1 : 91. 1915; Hu in Fl. China, Fam. 153 : 18. 1955; Robyns in Ann. Miss. bot. Gard. 52 : 554. 1965. Borssum in Blumea 14 : 186. 1966. *S. carpiniifolia* sensu Masters in Hook. f. FBI 1 : 323. 1875, non Linn. f.

Erect herbs, about 50 cm high; stems terete, glabrous, longitudinally cracked. Leaves about 5×1.5 cm, elliptic-lanceolate, acuminate, acute to cordate at base, sometimes linear, dentate-serrate, serrulate, glabrous, sparsely puberulous on midrib below, 3-5-nerved from base; petioles up to 0.5 cm long; stipules 1 cm long, linear, falcate, 3-nerved. Flowers yellow, 0.5 cm long, axillary, solitary; pedicels 0.7 cm long, jointed at middle; calyx 0.7 cm long, lobes ovate, 3-nerved; corolla yellow, 0.5 cm

long ; ovary hairy. Mericarps 0.5 cm long, strongly reticulate, biaxistate at apex ; seeds angled, rounded outside, basally depressed.

*Fl. & Fr. :* June-December.

*World distribution :* Tropical Africa, India, Sri Lanka to Malaysia.

*Specimen examined :* Chelama, 9-7-1963, Ellis 16812.

*Remarks :* Borssum (*op. cit.* p. 186) agrees with Schumann in 'emending' the description of Burman f. (1768) and speaks of the description as "...insufficient to recognize his species" and continues to say that Burman's citation of plates of Plukenet, Rumphius and Rheede does not leave any doubt about its identity. Apparently Schumann seems to have amplified the description. However, Borssum prefers to cite it as 'emended'.

*Sida rhombifolia* Linn. Sp. Pl. 684. 1753 ; Masters in Hook. f. FBI 1 : 323. 1875 ; Dunn in Gamble, FPM 1 : 90. 1915 ; Hu in Fl. China, Fam. 153 : 20. 1955 ; Robyns in Ann. Miss. bot. Gard. 52 : 557. 1965 ; Borssum in Blumea 14 : 193. 1966. *S. rhomboidea* Roxb. ex Fleming, Asiat. Res. 6 : 178. 1810 ; Borssum, *op. cit.* 196. *S. rhombifolia* Linn. var. *rhomboidea* (Roxb. ex Fleming) Masters, *op. cit.* 324. *S. orientalis* Cav. Diss. 1 : 21, t. 12. 1785 ; Hu in Fl. China, Fam. 153 : 18. 1955.

Erect herbs, about 60 cm high ; stems terete, tomentose to sparingly stellate-hairy or glabrous. Leaves about 5×3 cm, ovate, acute or acuminate, rhomboid, obovoid or obtuse, serrate, serrulate, crenate-serrate or dentate ; petioles 1 cm long, pubescent ; stipules 0.8 cm long, linear. Flowers yellow, 0.75 cm across, axillary or terminal ; pedicels jointed above middle ; calyx 0.7 cm long, lobes 0.4 cm long, ovate, acuminate ; corolla 0.9 cm long ; staminal tube hirsute ; ovary pubescent. Mericarps 0.5 cm long, prominently awned, puberulous ; seeds black, hairy near depression at top.

*Fl. & Fr. :* Almost throughout the year.

*World distribution :* Pantropic.

*Specimen examined :* Chelama, 7-12-1963, Ellis 17965.

*Remarks :* Masters (*op. cit.*) has treated this plant, giving an amplified description. He has recognised many varieties, including var. *rhomboidea* Roxb. ex Fleming. Subsequently Cooke (1901) treats it in a restricted sense. Dunn (*op. cit.*) has treated *S. rhombifolia* and *S. rhomboidea* separately, treating *rhombifolia* in a restricted sense as before. Haines (*Bot. Bihar and Orissa, Rep. ed.* p. 62. 1961), on the other hand, has again brought it back under *S. rhombifolia*. Hu (*op. cit.* p. 20) treats

*Sida rhombifolia* Linn. and *S. rhomboidea* Roxb. ex Fleming separately. According to her (p. 18) the legitimate name for the latter is *S. orientalis* Cav. Borssum (*op. cit.*) has followed Haines in sinking var. *rhomboidea* under *rhombofolia*. It is apparent that the variations observed are ecological and not constant.

In citing the author for the taxon *rhomboidea*, Borssum has clearly shown that Hu (*op. cit.* p. 18) was correct in pointing the date of validation of Roxburgh's epithet as 1810 by Fleming which has been overlooked by subsequent authors who cite the date of origin of the specific epithet as 1814 in *Hortus Bengalensis* or as DeCandolle (1824) has indicated in *Journ. Bot.* 4 : 207. 1814.

### STERCULIACEAE

1. Herbs or undershrubs below 1.5 m tall :		
2. Erect undershrubs ; petals marcescent :		
3. Leaves especially the juvenile ones silky tomentose		WALTHERIA
3. Leaves glabrous	..	MALOCHIA
2. Decumbent herbs ; petals not marcescent	..	BYTNERIA
1. Shrubs above 2 m tall or trees :		
4. Shrubs ; fruits spirally twisted	..	HELICERES
4. Trees ; fruits not spirally twisted :		
5. Fruits ovoid, woody ; flowers pale green, white or yellow :		
6. Bark peeling off in flakes ; panicles glandular ; leaves absent during flowering		STERCULIA
6. Bark not peeling off in flakes ; panicles not glandular ; leaves present during flowering :		
7. Flowering buds constricted in middle ; leaves generally orbicular		EAIOLAENA
7. Flowering buds not constricted in middle ; leaves ovate or obovate	..	PTEROSPERMUM
5. Fruits flattened, papery ; flowers scarlet red	..	FIRMIANA

#### WALTHERIA Linn.

*Waltheria indica* Linn. Sp. Pl. 673. 1753 ; DC. Prodr. 1 : 493. 1824 ; Wt. & Arn. Prodr. 67. 1834 ; Masters in Hook. f. FBI 1 : 374. 1874 ; Dunn in Gamble, FPM 1 : 111. 1915.

Erect herbs, about 1 m high, suffrutescent ; stems terete, pubescent.

Leaves about  $6 \times 5$  cm, ovate, elliptic, sometimes orbicular, subcordate at base, serrate, tomentose on both surfaces; nerves parallel, prominently impressed above; petioles up to 2.5 cm long, pubescent; stipules subulate, hairy. Flowers yellow, small, in axillary and terminal, sessile or shortly peduncled heads about 1 cm across, bracteate, bractolate; calyx reddinged, lobes  $\pm 0.2$  cm long, ciliate, strongly 3-nerved, tube small; petals ovate, wrinkled on margins, clawed at base; stamens connate; styles and stigmas pubescent. Capsules 0.4 cm across, 1-seeded.

*Fl. & Fr.* : Throughout the year.

*World distribution* : Pantropic.

*Specimens examined* : Chelama, 9-7-1963, Ellis 16811; Diguvametta, 16-11-1969, Ellis 32422.

*Remarks* : Hutchinson (*Fam. Fl. Plants*, 1926) disagreeing with Engler and Prantl in assigning the genus *Waltheria* Linn. to the Bombacaceae has retained it in the Sterculiaceae. Venkata Rao (*Journ. Indian bot. Soc.* 29 : 163-176, 1950), working on the embryology of *Waltheria*, has concluded that the genus *Waltheria* is appropriately placed in the Sterculiaceae. Interestingly Hutchinson (1967) is rather doubtful about the distinction between the Sterculiaceae and Tiliaceae. He states (*Genera Pl.* p. 476, 1967), "...the somewhat slender differences used to separate them have largely broken down...a future monographer may combine them into one and probably recast the rather unsatisfactory tribes."

#### MELOCHIA Linn.

*Melochia corchorifolia* Linn. Sp. Pl. 675. 1753; Masters in Hook. f. FBI 1 : 374. 1874; Dunn in Gamble, FPM 1 : 110. 1915. *Riedleia corchorifolia* (Linn.) DC. Prodr. 1 : 491. 1824; Wt. & Arn. Prodr. 1 : 66. 1834.

Herbs or undershrubs; branches terete, sparsely stellately tomentose. Leaves  $5 \times 3$  cm, ovate, elliptic-lanceolate, faintly lobed, truncate to slightly cordate at base, serrate or serrulate, glabrous; nerves 5 from base; petioles 1 cm long; stipules ovate. Flowers pink, 0.5 cm long, in terminal, clustered, sessile racemes; bracts and bracteoles hispid along margins; sepals 0.3 cm long, linear-lanceolate, slightly falcate, hispid along margins; petals obovate or spatulate, clawed at base, persistent; stamens 5; filaments connate; ovary pilose. Capsules 0.5 cm across, ovoid-globose, sparingly hispid; seeds mottled black and brown.

*Fl. & Fr.* : October to January.

*World distribution* : Tropical Africa, India, Sri Lanka to Burma.

*Specimens examined* : Chelama, 10-12-1963, Ellis 18052 ; Chelama, 17-10-1964, Ellis 22078 ; Diguvametta, 18-11-1969, Ellis 32518.

**BYTTNERIA Loefling *nom. cons.***

*Byttneria herbacea* Roxb. Pl. Corom. 1 : 28, t. 29. 1795 ; Wt. & Arn. Prodr. 65. 1834 ; Wt. Ic. 2(2) : 6, t. 48B. 1843 ; Masters in Hook. f. FBI 1 : 376. 1874 ; Gamble, FPM 112. 1915.

Herbs, decumbent ; branches up to 1 m in length, faintly angled. Leaves  $4.5 \times 0.7$  cm, ovate-acuminate, rounded or truncate at base, serrate ; nerves 3 from base ; petioles 2 cm long ; stipules linear. Flowers reddish pink, 0.5 cm long, in 2-3-flowered cymes, bracteate, bractolate ; peduncles 0.5 cm long ; pedicels 0.5 cm long ; sepals ovate, long-acuminate, connate at base, prominently 3-nerved ; petals linear, shortly winged at base ; stamens 10, filaments connate at base, anthers conspicuously 2-lobed ; style and stigmas bluish-purple. Capsules 1 cm across, echinate.

*Fl. & Fr.* : July-January.

*World distribution* : India.

*Specimens examined* : Chelama, 5-7-1963, Ellis 16767 ; Chelama, 8-12-1963, Ellis 17998 ; Mahanandi, 22-8-1965, Ellis 25472 ; Balugram, Ahobilam, 23-11-1969, Ellis 32589 ; Rollapenta to Pecharavu, 16-8-1972, Ellis 42275.

**HELICTERES Linn.**

*Helicteres isora* Linn. Sp. Pl. 963. 1753 ; DC. Prodr. 1 : 475. 1824 ; Wt. & Arn. Prodr. 60. 1834 ; Wt. Ic. 1(9) : t. 180. 1840 ; Masters in Hook. f. FBI 1 : 365. 1874 ; Dunn in Gamble, FPM 1 : 107. 1915.

Large shrubs or small trees ; stems terete, bark fissured. Leaves up to  $18 \times 14$  cm, ovate, orbicular, abruptly acuminate, cordate at base, serrate or crenate-serrate, sparsely scabrous to tomentose, especially on the lower surface ; nerves 5 from base ; petioles about 1.5 cm long ; stipules small. Flowers reddish, turning purplish-grey, slightly falcate, about  $2.0 \times 1.0$  cm in 8-9-flowered cymes about 8 cm long ; calyx 1.5 cm long, tomentose without ; petals reflexed, clawed at base, glandular near base ; staminal column fused with gynophore ; styles bent near top, stigmas recurved. Capsules 5 cm long, elongated, spirally twisted ; seeds black, 6-angled — 4 on sides and 2 at top.

*Fl. & Fr.* : Throughout the year.

*World distribution* : Middle East, India, Sri Lanka to Australia.

*Specimens examined* : Diguvametta, 5-11-1906, Barber 8051 ; Chelama, 15-7-1963, Ellis 16876 ; Chelama, 7-12-1963, Ellis 17940 ; Ramanapenta, Gundlabrahmeswaram, 25-10-1964, Ellis 22197 ; Diguvametta, 18-11-1969, Ellis 32504 ; Rollapenta to Pecharavu, 16-8-1972, Ellis 42274.

*Remarks* : Generally the plants of this species collected in Nallamalais have different appearance from the normal ones : the leaves are large, thick and densely pubescent. This has made C. A. Barber to remark on his collection, Barber 8051, that the plants of Nallamalais look different. However, floral characters do not show any difference.

#### STERCULIA Linn.

*Sterculia urens* Roxb. Pl. Corom. 1 : 25, t. 24. 1795 ; Wt. & Arn. Prodr. 1 : 63. 1834 ; Masters in Hook. f. FBI 1 : 355. 1874 ; Dunn in Gamble, FPM 1 : 106. 1915.

Trees, about 8 m tall ; bark pale, smooth, peeling off in flakes. Leaves deciduous, 40×40 cm, palmately 3-5-lobed, cordate at base, entire, pubescent to tomentose beneath, 6-nerved from base ; petioles about 40 cm long, hairy. Flowers pale green within with bright red centre, yellowish to yellowish-red without, scented, in glandular, pubescent, terminal panicles about 15 cm long ; calyx 5×5 cm, 5-lobed at top, campanulate, glandular-pubescent within, tube 3 cm long ; petals 0 ; filaments connate to form staminal column, anthers 2-lobed ; carpels 5, stigmas peltate. Follicles 4-6, 4×2 cm, ovoid-oblong, woody, covered with rusty-brown stinging hairs ; seeds black, oblong.

*Fl. & Fr.* : November-April.

*World distribution* : India, Sri Lanka and Burma.

*Specimens examined* : Chelama, 19-3-1965, Ellis 23726 ; Sunnipenta-vagu, Srisailam, 5-12-1969, Ellis 32710.

#### ERIOLAENA DC.

*Eriolaena lusingtonii* Dunn in Kew Bull. 1915 : 88. 1915 et in Gamble, FPM 1 : 109. 1915.

Trees, about 5 m tall ; young branches pubescent. Leaves 5×5 cm, orbicular, acute, cordate at base, irregularly shortly dentate, stellately

hairy above, white-tomentose beneath ; petioles about 5 cm long. Flowers yellow, about 2 cm long, in axillary, 2-3-flowered racemes about 8 cm long ; flowering buds oblong, constricted at middle ; bracteoles 0.5 cm long, caducous ; calyx 5-partite, 2 cm long, pubescent within, tomentose without ; petals 5, obovate, clawed at base, tomentose ; filaments connate forming tube ; styles simple, stigmas 5-fid. Capsules about 4 cm long, ovoid, woody ; seeds several, winged on one side at top.

*Fl. & Fr.* : June-August.

*World distribution* : Endemic to Nallamalais, India.

*Specimens examined* : Chelama, 5-7-1963, Ellis 16715 ; Rollapenta, 16-8-1972, Ellis 42284.

*Remarks* : This plant has not been collected since Lushington collected at the end of the nineteenth century on which Dunn had worked and made his observations. In Madras Herbarium there is a sheet annotated as *Eriolaena hookeriana* Wt. & Arn. collected from 'Kurnool Hills' (Acc. No. MH 5154). However, the latter species is not collected in Nallamalais. Thanks are due to the Director, Kew Gardens, Surrey, England, for confirming the identity.

#### PTEROSPERMUM Schreb. *nom. cons.*

*Pterospermum xylocarpum* (Gaertn.) Sant. & Wagh in Bull. bot. Surv. Ind. 5 : 105, 1963 (1964). *Velaga xylocarpa* Gaertn. Fruct. 2 : 245, t. 133, 1791. *Pterospermum heymeanum* Wall. ex Wt. & Arn. Prodr. 69, 1834 ; Wt. Ic. 2(2) : 6, t. 489, 1843 ; Masters in Hook. f. FBI 1 : 369, 1874 ; Dunn in Gamble, FPM 1 : 108, 1915.

Small trees, about 8-10 m tall ; young branches rusty-tomentose. Leaves about 12×8 cm, coriaceous, ovate, obovate, acuminate, irregularly shortly lobed towards apex, unequally cordate at base, white-tomentose beneath with brown-stellate hairs on the nerves, glabrous above ; nerves prominent beneath ; petioles short. Flowers white, about 5 cm across, scented, in axillary, 2-3-flowered cymes about 12 cm long, shortly pedicellate ; involucral bracts foliolar, many-fid at apex ; calyx about 3 cm long, 5-fld, pubescent without ; petals stellate-hairy without, glabrous within ; anthers linear ; ovary densely pubescent ; style and stigma glabrous. Capsules 8×3 cm, oblong-ovoid, faintly angular ; seeds many, winged along one side.

*Fl. & Fr.* : September-April.

*World distribution* : India and Sri Lanka.

*Specimens examined* : Srisailam, 21-10-1964, Ellis 22146 ; Srisailam, 26-3-1965, Ellis 23781 ; way to Upper Ahobilam, 22-11-1969, Ellis 32559.

### FIRMIANA Marsigli

*Firmiana colorata* (Roxb.) R. Brown in Bennett & Brown, Pl. Jav. Rar. 235. 1844 ; Dunn in Gamble, FPM 1 : 107. 1915 ; Kostermans in Bull. Jard. Bot. Bruxelles 24 : 335-338. 1954 et *ibid.* 281-310. 1957, et in Reinwardtia 5 : 389. 1961. *Sterculia colorata* Roxb. Pl. Corom. 1 : 26. 1795 ; Wt. & Arn. Prodr. 63. 1834 ; Masters in Hook. f. FBI 1 : 359. 1874. *Erythropsis colorata* (Roxb.) Burkill in Gard. Bull. Straits Settl 5 : 231. 1931 ; Ridley in Kew Bull. 1934 : 215. 1934 ; Mooney, Suppl. Hajnes, Bot. Bihar & Orissa, 28. 1950.

Trees, about 10 m tall ; branches gnarled towards ends with raised pads of deciduous leaves. Leaves up to 17×17 cm, palmately lobed or not, cordate at base, entire or faintly serrulate, 7-nerved at base, lobes acuminate ; petioles up to 9 cm long ; stipules linear. Flowers orange red without, rose within, about 2.5 cm long, in terminal panicles about 8 cm long ; calyx 2 cm long, infundibuliform, slightly falcate, rusty-brown-stellate tomentose without, sparsely so within ; filaments connate forming staminal column ; styles recurved. Follicles 5, stipitate, about 3 cm long ; seeds 2, attached to margins of follicles.

*Fl. & Fr.* : March-June.

*World distribution* : India, Sri Lanka and Burma.

*Specimen examined* : Way to Ramanapenta, Gundabrahmeswaram, 31-3-1965, Ellis 23821.

*Remarks* : H. N. Ridley (*op. cit.*) has discussed the delimitations of the genera, *Erythropsis* Lindl. and *Firmiana* Marsigli, concluding that *Firmiana* is confined to China and Japan and the rest hitherto placed in that genus be treated under *Erythropsis*. Kostermans (*op. cit.* 1954) in a critical appraisal has shown that *Firmiana* Marsigli and *Erythropsis* Lindl. are congeneric. Santapanu (*Bull. bot. Surv. Ind.* 3 : 16. 1961) has traced the history behind the separation of *Firmiana* Marsigli, *Sterculia* Linn., and *Erythropsis* Lindl. and has followed Kostermans in treating the Indian plant under *Firmiana* Marsigli.

## TILIACEAE

1. Capsules elongated; last basal serratures of leaves elongated and prominent .....	CORCHORUS
1. Capsules not elongated; all serratures of leaves equal : 2. Capsules bristly; herbs or undershrubs .....	TRIUMFETTA
2. Capsules not bristly; herbs, shrubs, or trees .....	GREWIA

## CORCHORUS Linn.

1. Capsules more than 3 cm long, angled, glabrous : 2. Capsular beaks prominently spreading out; capsules winged .....	<i>C. aestuans</i>
2. Capsular beaks drawn out straight; capsules not winged .....	<i>C. olitorius</i>
1. Capsules less than 1.5 cm long, cylindric, pubescent .....	<i>C. fascicularis</i>

*Corchorus aestuans* Linn. Syst. Nat. ed. 10. 1079. 1759; *C. acutangulus* Lamk. Dict. 2: 104. 1786; DC. Prodr. 1: 505. 1824; Wt. & Arn. Prodr. 73. 1834; Wt. Je. 3(1): 1, t. 739. 1844; Masters in Hook. f. FBI 1: 398. 1875; Dunn in Gamble, FPM 1: 121. 1915.

Herbs, up to 1 m high; branches woody at base, terete, bark evenly fissured, hairy. Leaves about 5 × 1.5 cm, elliptic-acuminate, rounded or acute at base, crenate-serrate with basal serratures caudate-serrate, sparingly hairy; nerves 3 from base; petioles up to 4 cm long; stipules linear-caudate. Flowers yellow, 0.5 cm long, in leaf-opposed, 2-flowered cymes about 1.2 cm long, shortly pedicellate, bracteate; sepals obovate, slightly cucullate, apiculate; petals obovate, clawed at base, slightly puberulous along margins at base; urcellus cup-shaped; ovary elongated, hairy. Capsules about 3 cm long, elongated, 6-angled, winged, beaks spreading; seeds many, brown, angled.

*Fl. & Fr.* : August-December.

*World distribution* : Tropical belt from Africa, India, Sri Lanka to Australia.

*Specimens examined* : Chelama, 16-10-1964, Ellis 22038; Chelama, 7-12-1963, Ellis 17987.

*Remarks* : There has been some confusion about the conspecificity of *C. aestuans* and *C. olitorius*. From this study, however, it appears that both *C. aestuans* and *C. olitorius* are distinct.

*C. olitorius* Linn. Sp. Pl. 529. 1753; DC. Prodr. 1: 504. 1824; Wt. & Arn. Prodr. 73. 1834; Masters in Hook. f. FBI 1: 397. 1875; Dunn in Gamble, FPM 1: 122. 1915.

Suffrutescent herbs, about 80 cm high ; branches woody, terete, bark fissured evenly in older ones. Leaves  $13 \times 5$  cm, elliptic-acuminate, acute at base, serrulate, basal serratures recurved, caudate-acuminate, glabrous ; petioles hairy in grooves, 3.5 cm long ; stipules reddish, caudate-acuminate, falcate. Flowers yellow, 0.5 cm long, in leaf-opposed, 1-2-flowered cymes 1.5 cm long ; sepals 0.3 cm long, obovate, slightly cucullate, apiculate, hairy on margins below ; petals 0.3 cm long, obovate, spathulate, clawed at base ; urcellus wavy, cup-shaped ; ovary elongated, hirsute. Capsules 5 cm long, elongated, inconspicuously 10-angled ; seeds several, brown, angled.

*Fl. & Fr.* : August-January.

*World distribution* : India, cultivated in most of the tropics.

*Specimens examined* : Chelama, 16-10-1964, *Ellis* 22047 ; Diguavametta, 16-11-1969, *Ellis* 32392.

*Corchorus fascicularis* Lamk. *Dict.* 2 : 104. 1790 ; DC. *Prodr.* 1 : 505. 1824 ; Masters in *Hook. f. FBI* 1 : 398. 1875 ; Dunn in *Gamble, FPM.* 1 : 121. 1915.

Erect herbs, about 12 cm high, often woody at base ; branches terete, bark sparingly hairy and fissured evenly. Leaves up to  $4.2 \times 2.2$  cm, elliptic-ovate, crenate-serrate to dentate, glabrous, 3-nerved from base ; petioles 2 cm long ; stipules linear, caudate. Flowers yellow, 0.5 cm long, in leaf-opposed, 3-4-flowered, cymes 1.5 cm long ; sepals 0.3 cm long, linear-elliptic ; petals 0.3 cm long, linear-elliptic ; filaments dilated ; ovary hairy. Capsules 1.5 cm long, cylindric, drawn at apex, angled.

*Fl. & Fr.* : August-January.

*World distribution* : Tropical Africa, India, Sri Lanka to Burma and Australia.

*Specimens examined* : Chelama, 8-12-1963, *Ellis* 18007 ; Mahanandi, 10-12-1969, *Ellis* 32734.

#### TRIUMFETTA Linn.

1. Fruits including bristles 2 cm across ; leaves elliptic-acuminate ; flowering buds up to 1.5 cm long .. *T. pilosa*
2. Fruits including bristles 0.8 cm across ; leaves ovate-elliptic, acute, rhomboid to rotundly ovate, often shortly 3-lobed ; flowering buds 0.5 cm long ;
  3. Bristles glabrous .. *T. rhomboidea*  
var. *rhomboidea*
  3. Bristles hairy on upper edge *T. rhomboidea*  
var. *peninsularia*

*Triumfetta pilosa* Roth, Nov. Sp. Pl. 223. 1821; Wt. & Arn. Prodr. 74. 1834; Masters in Hook. f. FBI 1 : 394. 1875; Dunn in Gamble, FPM 1 : 120. 1915.

Erect or decumbent, suffrutescent herbs, extensively branched; branches hirsute. Leaves  $12 \times 5$  cm, elliptic-acuminate, rounded to cordate at base, irregularly crenate-serrate, hirsute below, less so above; nerves 7 from base; petioles up to 5 cm long, stipulate. Flowers yellow, 1 cm long, in axillary and terminal, fascicled cymes 5 cm long, bracteate, bracteolate; sepals 0.3 cm long, connate, apiculate, sparsely stellate-tomentose without; petals 0.5 cm long, obovate, clawed at base; styles filiform, stigmas 5-fid. Capsules 2 cm across, globose; bristles conspicuously recurved at tips, hairy; seeds dark brown, shining.

*Fl. & Fr.* : October-January.

*World distribution* : Tropical countries from Africa to India, Sri Lanka, Malacca etc.

*Specimen examined* : Ramanapenta, Gondlabrahmeswaram, 28-11-1969, Ellis 32641.

*Remarks* : Often *Triumfetta pilosa* and *T. tomentosa* Bojer have been confused, as observed from the sheets in CAL and MH. Apparently they seem to be conspecific with each other. Perhaps these two can be separated depending on, (i) the size of capsules which are smaller in *T. tomentosa*, (ii) the type of spines on capsules which are straight in *T. tomentosa* and curved in *T. pilosa*, (iii) the number of stamens are 5-7 in *T. tomentosa* and 10 in *T. pilosa* and (iv) *T. tomentosa* seems to be restricted to north-eastern India.

*T. rhuinboidea* Jacq. Enum. Pl. Carib. 22. 1760, var. *rhuinboidea* DC. Prodr. 1 : 507. 1824; Masters in Hook. f. FBI 1 : 395. 1874; Dunn in Gamble, FPM 1 : 120. 1915; Santapau in Bull. bot. Surv. Ind. 3 : 21. 1961 (1962). *Bartramia indica* Linn. Sp. Pl. 378. 1753, non *Triumfetta indica* Lamk. Encycl. 4 : 68. 1791. *Triumfetta bartramia* Linn. Syst. Nat. ed. 10, 2 : 1044. 1759; Lay in Ann. Miss. bot. Gardn. 37 : 317 & 382. 1950. *T. angulata* sensu Lamk. Dict. 3 : 41. 1789; Wt. & Arn. Prodr. 74. 1834; Wt. Ic. 2 (1) : 1, t. 320. 1843.

Erect herbs, about 20 cm high, sometimes suffrutescent; branches stellate-pubescent when young, becoming glabrous. Leaves  $8 \times 8$  cm, ovate-elliptic, rhomboid to orbicular-ovate, often 3-lobed; lobes acuminate, acute to rounded at base, irregularly serrate or crenate; petioles up to 6 cm long, sparingly stellate-pubescent; stipules ovate-acuminate. Flowers yellow, 0.5 cm long, in axillary and terminal, 4-6-flowered cymes

about 1.8 cm long, bracteate, bracteolate ; sepals 0.3 cm long, linear-spatulate, apiculate, pubescent without ; petals 0.5 cm long, obovate-oblong, cucullate, clawed at base ; ovary stipitate. Capsules 0.6 cm across, ovoid, hairy, echinate with hooked, glabrous bristles ; seeds dark brown, pointed at top.

*Fl. & Fr.* : June-March.

*World distribution* : Tropical countries from Africa, India, Sri Lanka to China and Australia.

*Specimens examined* : Chelama, 7-12-1963, Ellis 17986 ; Diguvametta, 16-11-1969, Ellis 32407.

*Triumfetta rhomboidea* Jacq. var. *pentandra* (A. Rich.) Ellis in Bull. bot. Surv. Ind. 24 : 209. 1982 (1983). *T. pentandra* A. Rich. in Guil. & Perr. Fl. Senegal. 1 : 93, t. 19. 1831. *T. neglecta* Wt. & Arn. Prodr. 75. 1834 ; Masters in Hook. f. FBI 1 : 396. 1874 ; Dunn in Gamble, FPM 1 : 120. 1915.

Except for the capsular bristles which are hairy on upper edges this variety resembles the *typica* in all other characters. Even this character is variable. In fact, Haines (*Bot. Bihar & Orissa*, 1921) speaks of this taxon, '.. It is perhaps scarcely more than a variety of the next species.' (i.e. *T. rhomboidea* Jacq.)

*Specimen examined* : Chelama, 17-10-1964, Ellis 22081.

#### GREWIA Linn.

1. Climbing shrubs :

  2. Drupes depressed at top ; flowering buds 2 cm long, 4-6-clustered .. *G. obtusa*
  2. Drupes not depressed at top ; flowering buds 1.5 cm long, 2-3 ; not clustered .. *G. rhamnifolia*

1. Trees or erect shrubs :

  3. Shrubs above 2 m high :
    4. Leaves  $\pm 5 \times 2.5$  cm :
      5. Leaves elliptic-ovate, 3-nerved from base ; drupes prominently bilobed .. *G. damine*
      5. Leaves broadly ovate or orbicular, 5-nerved from base ; drupes faintly lobed .. *G. orbiculata*
    4. Leaves  $\pm 10 \times 10$  cm :
      6. Drupes not lobed, villous ; leaves prominently wrinkled above .. *G. villosa*

- 6. Drupes bilobed, not villous; leaves not prominently wrinkled above :
  - 7. Flowering buds ovoid; leaves unequal at base *G. tiliaceifolia*
  - 7. Flowering buds elongate; leaves equal-sided at base *G. flavescens*
- 3. Shrubs below 2 m high :
  - 8. Drupes prominently 4-lobed; leaves broadly ovate or orbicular .. *G. tenax*
  - 8. Drupes faintly lobed; leaves elliptic-acuminate :
    - 9. Drupes  $1 \times 0.8$  cm; leaves densely pubescent below .. *G. hirsuta*
    - 9. Drupes  $0.4 \times 0.4$  cm; leaves finely tomentose below .. *G. rothii*

***Grewia obtusa*** Wall. (Cat. 1103, 1832) ex Wt. & Arn. Prodr. 76. 1834, *pro syn.*; Dunn in Gamble, FPM 1 : 117. 1915. *G. bracteata* Wt. & Arn. Prodr. 76. 1834; Masters in Hook. f. FBI 1 : 389. 1875, *p.p.*, non Heyne ex Roth.

Climbing shrubs; branches terete, younger rusty-tomentose. Leaves  $11 \times 3$  cm, elliptic-ovate, shortly acuminate, unequally rounded or acute at base, crenate-serrulate, stipulate; petioles 1 cm long. Flowers green, 2 cm long, in axillary, 3-flowered, 2-3-umbellate cymes 7 cm long, bracteate, bracteolate; flowering buds 2 cm long; sepals 1.5 cm long, elliptic, rusty brown tomentose without, glabrous within; petals  $0.4 \times 0.2$  cm, ovate with large glands covering half the lengths of petals; torus yellow-pubescent; stamens many; ovary and style hairy; stigmas flattened, overtopping stamens. Drupes 2.0 cm across, depressed at top, faintly 2-lobed; stones 4.

*Fl. & Fr.:* April-December.

*World distribution:* India and Sri Lanka.

*Specimens examined:* Srisailam, 12-7-1963, Ellis 16823; Dornal, February 1887, J. S. Gamble 18696; Dhone, March 1883, J. S. Gamble 10972.

***G. rhamnifolia*** Heyne ex Roth, Nov. Sp. Pl. 244. 1821; Dunn in Gamble, FPM 1 : 117. 1915; Narayanaswami & Seshagiri Rao in Journ. Indian bot. Soc. 29 : 179. 1950. *G. orientalis* Wt. & Arn. 76. 1834, non Linn.; Masters in Hook. f. FBI 1 : 384. 1875, *p.p.*

Climbing shrubs; branches terete, glabrous, or pubescent in young ones. Leaves about  $11 \times 6$  cm, ovate, acuminate or elliptic-acuminate,

rounded at base, crenate-serrulate, coriaceous, 3-nerved from base, glabrous; petioles 0.7 cm long. Flowers yellow, about 3 cm across, in 2-3-flowered, axillary cymes 8 cm long, bracteate, bracteolate; peduncles 2.5 cm long; pedicels 1.5 cm long, thickened higher up; sepals 2 cm long, elliptic, stellate-tomentose without, glabrous within; petals 0.8 cm long; stamens many; ovary yellow-hirsute, faintly lobed. Drupes globose, 2.0 × 1.7 cm, faintly 2-lobed, pubescent; stones rather angled.

*Fl. & Fr.* : April-December.

*World distribution* : India and Sri Lanka.

*Specimens examined* : Gazulapalli, 8-11-1906, C.A. Barber 8072; Rudravaram, Sirvel Range, 5-9-1917, K.C. Jacob 14993; way to Pathalaganga, Srisailam, 20-10-1964, Ellis 22103; Diguvametta, 18-11-1969, Ellis 32520.

**Grewia damine** Gaertn. *Fruct.* 2 : 113. 1791 ; Dunn in Gamble, PPM I : 118. 1915 ; Narayanaswami & Seshagiri Rao in Journ. Indian bot. Soc. 29 : 187. 1950. *G. salvifolia* Heyne ex Roth, Nov. Sp. Pl. 239. 1821 ; Wt. & Arn. Prodr. 77. 1834 ; Masters in Hook. f. FBI 1 : 386. 1875, p.p.

Trees, about 4 m tall; branches terete, dark, younger rusty-brown or white tomentose. Leaves 5 × 2 cm, elliptic-ovate, obtuse, oblong, apiculate, faintly unequally rounded at base, finely serrulate, sparingly stellate-puberulous above, white-tomentose beneath, 3-nerved from base; petioles 0.5 cm long. Flowers yellow, 0.8 cm across, in axillary, 2-flowered umbels 4 cm long; peduncles and pedicels 0.7 cm long, bracteate, bracteolate; sepals 0.5 cm long, linear-elliptic; petals 0.3 cm long, obovate, clawed at base. Drupes 1 cm across, prominently 2-lobed, generally one smaller, faintly stellate-puberulous.

*Fl. & Fr.* : July-December.

*World distribution* : India.

*Specimen examined* : Diguvametta, 18-11-1969, Ellis 32497.

*Remarks* : There exists some confusion between this and *G. salvifolia* Heyne ex Roth. Masters (*op. cit.*) and to some extent Roth treat *G. salvifolia* as distinct from *G. damine* Gaertn. However, in nature they intergrade with each other.

**G. orbicularis** Rottler in Nov. Act. Nat. Cur. Berol. 205. 1803 ; Roth, Nov. Sp. Pl. 246. 1821 ; Masters in Hook. f. FBI 1 : 386. 1875 ; Narayanaswami & Seshagiri Rao in Journ. Indian bot. Soc. 29 : 179. 1950. *G. rotundifolia* Juss. in Ann. Mus. Par. 4 : 92, t. 50. 1804 ; DC. Prodr.

1 : 511. 1824 ; Wt. & Arn. Prodr. 30. 1834 ; Wt. Ic. 1(3) : 1, t. 45. 1840 ; Dunn in Gamble, FPM 1 : 118. 1915.

Shrubs or small trees, about 4 m tall ; branches terete, stellately rusty-tomentose in young ones ; bark evenly fissured in older ones. Leaves  $4 \times 3$  cm, orbicular or broadly ovate, rounded and cordate at base, serrulate, stellate-tomentose on both surfaces, 5-nerved from base ; petioles 0.4 cm long. Flowers yellow, 0.5 cm long, in axillary, 3-flowered, 2-3-umbellate cymes 2 cm long, bracteate, bracteolate ; flowering buds orbicular ; sepals 0.5 cm long, elliptic-ovate, brown-pubescent without ; petals 0.4 cm long, ovoid ; glands about half as long as petals ; stamens many, filaments pubescent ; ovary hirsute ; stigmas laciniate. Drupes 0.8 cm across, 2-3-lobed, tomentose, 3-stoned.

*Fl. & Fr.* : March-August.

*World distribution* : India and Sri Lanka.

*Specimens examined* : Chelama, 19-3-1965, Ellis 23725 ; Dhone, March 1883, J. S. Gamble, 10972 ; Diguvametta, 13-11-1906, C. A. Barber 8103.

*Grewia villosa* Willd. in Ges. Nat. Fr. Neue Schr. 4 : 205. 1803 ; DC. Prodr. 1 : 512. 1824 ; Wt. & Arn. Prodr. 79. 1834 ; Masters in Hook. f. FBI 1 : 388. 1875 ; Dunn in Gamble, FPM 1 : 119. 1915.

Shrubs, up to 2 m high ; young branches brown-villous, bark evenly fissured in older branches. Leaves  $8 \times 8$  cm, orbicular-ovate, faintly lobed, cordate at base, serrulate, villous on both surfaces, upper surface bullate, 3-nerved from base ; cross nervules parallel ; petioles densely villous, 2.5 cm long ; stipules foliolar, ovate. Flowers yellow, 0.8 cm long, in axillary, leaf-opposed and extra-axillary 3-4-flowered cymes 7 cm long, bracteate, bracteolate ; sepals 3.6 cm long, ovate-lanceolate, villous and tomentose without, glabrous within ; petals 0.6 cm long, elliptic-ovate, emarginate, villous and pubescent from middle downwards without, glandular from about the middle down ; urcellus cup-shaped, hairy along margins ; stamens 10-15, filaments glabrous ; ovary densely pubescent ; stigmas lacerate in vertical lines. Drupes 1 cm across, ovoid, sparingly villous ; stones 4.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : Tropical Africa to India.

*Specimens examined* : Dhone, July 1886, J. S. Gamble 17722 ; Diguvametta, 18-11-1969, Ellis 32496.

*G. tiliaceifolia* Vahl, Symb. 1 : 35. 1790 ; Wt. & Arn. Prodr. 80. 1834 ; Masters in Hook. f. FBI 1 : 386. 1875 ; Dunn in Gamble, FPM 1 : 118.

1915 ; Narayanaswami & Seshagiri Rao in Journ. Indian bot. Soc. 29 : 179, 183-186. 1950.

Small trees, up to 10 m tall ; young branches dark brown, faintly pubescent. Leaves  $15 \times 13.5$  cm, ovate-orbicular or elliptic-ovate, acute or acuminate, cordate and unequal sided at base, crenate-serrate, 3-nerved from base ; petioles up to 1.8 cm long ; stipules auricled on one side, falcately acuminate. Flowers yellow, 1 cm across, in axillary groups of peduncled, 3-flowered, cymes 7 cm long, bracteate, bracteolate ; sepals 0.6 cm long, brown-tomentose without, glabrous within, elliptic-obovate or ovate with incurved tips ; petals 0.7 cm long, hairy and glandular at base within ; stamens many ; ovary pubescent. Drupes 1 cm across, bilobed, glabrous or sparingly pubescent.

*Fl. & Fr.* : March-December.

*World distribution* : Tropical East Africa, India, Sri Lanka to Burma.

*Specimens examined* : Way to Pathalaganga, Srisailam, 20-10-1964, Ellis 22106 ; Chelama, 20-3-1964, Ellis 23742 ; Mahanandi, 21-8-1965, Ellis 25432 ; Diguvarmetta, 7-8-1972, Ellis 42166.

*Remarks* : This taxon is a complex with a range of variability which has made Cooke (*Fl. Pres. Bombay*, 1902) to recognise a variety under it, and Haines (*Bot. Bihar & Orissa*, 1924) to recognise 4 forms under it. Narayanaswami & Seshagiri Rao (*op. cit.*) recognise the 'Tiliifolia group' comprising two sections : the first with *G. asiatica* auct. non Linn., *G. subinaequalis* DC. and *G. hainesiana* Hole, forming what they term 'ecoforms', and the second section with *G. elastica* Royle, *G. vestita* Wall., *G. eriocarpa* Juss., *G. celtifolia* Juss., and *G. sapida* Roxb. This taxon requires further study before any definite prognostication can be made on several of the taxa concerned.

*Grewia flavescens* Juss. Ann. Mus. 4:91. 1804 ; Dunn in Gamble, FPM 1 : 119. 1915 ; Narayanaswami & Seshagiri Rao in Journ. Indian bot. Soc. 29 : 187. 1950. *G. carpinifolia* Masters in Hook. f. FBI 1 : 387. 1875, non Juss. *G. pilosa* Lamk. *emend.* Wt. & Arn. Prodr. 78. 1834. *Vinticena flavescens* (Juss.) Burret in Notizbl. Bot. Gart. Berlin 9 : 729 & 750. 1926 ("Vincentia") & l.c. 12 : 715. 1936 ("Vinticena").

Small trees, 3-4 m tall ; branches dark, younger hirsute. Leaves  $9 \times 4.5$  cm, elliptic-ovate, obovate, abruptly acuminate, cordate at base, serrulate, stellate-pubescent on both surfaces, 3-nerved from base ; petioles 0.4 cm long ; stipules linear, falcate. Flowers yellow, 1 cm across, in axillary, extra-axillary, 2-3-flowered cymes 6 cm long, bracteate, bracteolate ; buds constricted in the middle ; sepals 0.5 cm long,

tomentose without, glabrous within ; petals 0.8 cm long, linear-elliptic, notched at top ; torus hirtellous at top ; ovary and style hirsute ; stigmas faintly 4-angled. Drupes  $1.5 \times 0.6$  cm bilobed, hirsute ; stones 4.

*Fl. & Fr.* : July-January.

*World distribution* : Tropical Africa to India.

*Specimens examined* : Diguvametta, 31-10-1906, C.A. Barber 8022 ; Diguvametta, 4-11-1906, C. A. Barber 8041 ; Srisailam, 13-7-1963, Ellis 16847 ; Srisailam, 21-10-1964, Ellis 22152 ; Diguvametta, 6-8-1972, Ellis 42145.

*Grewia tenax* (Porsk.) Fiori in Agri. Colon. 1911, suppl. vol. 23, 1912 ; Narayanaswami & Seshagiri Rao in Journ. Indian bot. Soc. 29 : 187, 1950. *G. popullifolia* Vahl, Symb. Bot. 1 : 33. 1790 ; DC. Prodr. 1 : 511. 1824 ; Wt. & Arn. Prodr. 80. 1834 ; Masters in Hook. f. FBI 1 : 385. 1885. *G. betulaefolia* Juss. in Ann. Mus. Par. 4 : 92. 1804 ; Dunn in Gamble, FPM 1 : 117. 1915.

Shrubs, 1.5 m high ; older branches dark, rather stunted, woody, younger terete, striated, sparingly stellate-puberulous. Leaves about  $6 \times 6$  cm, obovate, ovate or more or less orbicular, faintly angled, rounded or cordate at base, dentate to crenate-serrate, coriaceous, glabrous or faintly stellate-puberulous ; nerves 3 from base, both nerves and nervules prominent ; petioles 0.8 cm long ; stipules small. Flowers yellow, 1.5 cm across, solitary, leaf-opposed ; pedicels 2.0 cm long, jointed ; sepals 1.5 cm long, linear-acute, tomentose without ; petals 1 cm long, linear-spathulate, notched at top, glandular at base within ; torus glabrous, hairy at top ; stamens numerous ; ovary 4-lobed, stigmas flattened. Drupes  $1 \times 1.5$  cm, deeply bilobed ; stones 4.

*Fl. & Fr.* : May-September.

*World distribution* : Tropical Africa, Middle East, India in dry localities.

*Specimens examined* : Dhone, July 1886, J. S. Gamble 17681 ; Loddipalli, Kurnool, July 1886, J. S. Gamble 17684 ; Bairanidokku, 21-8-1972, Ellis 42232.

*G. hirsuta* Vahl, Symb. 1 : 34. 1790 ; Wt. & Arn. Prodr. 78. 1834 ; Wt. Ic. 1(4) : 1, t. 76. 1840 ; Masters in Hook. f. FBI 1 : 391. 1875 ; Dunn in Gamble, FPM 1 : 119. 1915 ; Narayanaswami & Seshagiri Rao in Journ. Indian bot. Soc. 29 : 186. 1950. *G. hirsuta* Vahl var. *helicterifolia* (Wall.) Haines in Bot. Bihar & Orissa, part 2 : 94. rep. ed. 1961.

Shrubs, 1 m tall; branches terete, younger brown-pubescent, older glabrous, fissured evenly. Leaves  $9 \times 3.5$  cm, elliptic-acuminate, rounded at base, sparingly pubescent above, pubescent below, serrate; nerves 3 from base, nerves and nervules impressed above; petioles 0.5 cm long; stipules 0.5 cm long, linear, falcate. Flowers white, 0.8 cm across, in axillary, 3-flowered, umbellate cymes about 4 cm long, bracteate, bracteolate; sepals 0.6 cm long, elliptic, pubescent without; petals 0.8 cm long, ovate-oblong, villous without, glandular to about half within; urcellus villous along margins; stamens many; ovary villous, styles glabrous, stigmas slightly lobed, lacerate. Drupes 1 cm across, lobed, sparsely hairy, 4-stoned.

*Fl. & Fr.* : June-March.

*World distribution* : India, Sri Lanka and Burma.

*Specimens examined* : Nallamalais, March 1883, Gamble 10954; Diguvametta, 28-10-1906, C. A. Barber 8010; Diguvametta, 11-11-1906, C. A. Barber 8088; Chelama, 9-7-1963, Ellis 16814; Mahanandi, 21-8-1965, Ellis 25406; Diguvametta, 18-11-1969, Ellis 32502; Diguvametta, 8-8-1972, Ellis 42209.

*Remarks* : The confusion in the circumscription of this species has led many authorities to accord different treatments. Dunn (*op. cit.*) treats *G. hirsuta* Vahl and *G. polygama* Roxb. separately, following Masters (*op. cit.*). Haines (*op. cit.*) recognises 2 forms and 1 variety under *G. hirsuta* Vahl, viz. a. *typica*, b. *polygama* (Roxb.) Haines and c. *helicterifolia* (Wall.) Haines. Further, he comments (*op. cit.*) : "... 3-nerved leaves are often on the same plant as slightly-lobed fruits and 4-nerved leaves with deeply lobed fruits. Both breadth with its correlated number of basal nerves and depth of lobing of the fruit are very variable characters." Narayanaswami & Seshagiri Rao (*op. cit.* p. 186) under the group 'Hirsuta' speak of *G. hirsuta* and *G. helicterifolia* as eco-forms of a single highly variable species; *G. polygama* Roxb. has been considered a distinct species.

In most of the Indian Floras, excepting Cooke (*Fl. Pres. Bombay*, 1901) and Haines (*Bot. Bihar & Orissa*, 1921) the flowers have been described as bisexual. The present observations indicate that the flowers are polygamous.

*Grewia rothii* DC. Prodr. 1 : 509. 1824; Wt. & Arn. Prodr. 78. 1834; Dunn in Gamble, FPM 1 : 118. 1915; Narayanaswami & Seshagiri Rao in Journ. Indian bot. Soc. 29 : 187. 1950. *G. bicolor* Roth, Nov. Sp. Pl. 240. 1821, non Juss. Ann. Mus. 4 : 90, t. 50. 1804. *G. excelsa* Masters in Hook. f. FBI 1 : 385. 1875, p.p. non Vahl.

Shrubs, 1.5 m high ; branches dark brown, young brown-tomentose, bark even-fissured in older. Leaves  $13 \times 5$  cm, elliptic-ovate, acute or acuminate, rounded or equally or unequally cordate at base, finely serrate, pale tomentose beneath ; nerves 3 from base ; petioles 0.5 cm long. Flowers greenish, 0.4 cm across : in long-peduncled, 3-flowered, axillary cymes 4 cm long, bracteate ; sepals 0.3 cm long, obovate, slightly cucullate, white-tomentose without, maroon, and white-pubescent within ; petals 0.4 cm long, linear-ovate, hairy, glandular at base within ; stamens many ; ovary pubescent, stigmas shortly 3-lobed. Drupes  $0.4 \times 0.4$  cm, faintly lobed, white-tomentose, edible.

*Fl. & Fr.* : June-December.

*World distribution* : India.

*Specimens examined* : Diguvametta, 28-10-1900, C. A. Barber 8011 ; Chelama, 8-11-1902, C. A. Barber 4772 ; Nallamalai Hills, 14-8-1921, C. E. C. Fischer 4667 ; Chelama, 4-7-1963, Ellis 16712 ; Chelama, 16-10-1964, Ellis 22035 ; Sunnipenta, Srisailam, 21-10-1964, Ellis 22122 ; Ahobilam, 23-11-1969, Ellis 32601 ; Rollapenta, 16-8-1972, Ellis 42264.

## LINACEAE

### ERYTHROXYLUM P. Br.

*Erythroxylum monogynum* Roxb. Pl. Corom. 1 : 61, t. 88. 1796 ; Hook. f. FBI 1 : 414. 1874 ; Schulz in Engler's Pflanzenr. iv. 134. Heft 29 : 129. 1907 ; Duan in Gamble, FPM 1 : 127. 1915. *Sethia indica* DC. Prodr. 1 : 576. 1824 : Wt. & Arn. Prodr. 106. 1834.

Shrubs or small trees, up to 5 m tall ; branches pale white or brown, striated, cystoliths present. Leaves  $6 \times 3$  cm, obovoid, sometimes emarginate, attenuate at base, margins deflexed, coriaceous ; petioles short ; stipules linear. Flowers pale green, 0.2 cm across, solitary, axillary ; sepals small, ovate ; petals 0.2 cm long, ovate, double-ligulate within ; stamens 10, filaments connate forming a tube ; ovary glabrous, styles 3-4, united below, stigmas capitate. Drupes reddish,  $1 \times 0.5$  cm, ovoid ; seed 1, testa thin.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : Peninsular India and Sri Lanka.

*Specimens examined* : Diguvametta, 2-11-1906, C. A. Barber 8034 ; Srisailam, 12-7-1963, Ellis 16822 ; Srisailam, 20-10-1964, Ellis 22087 ; Mahanandi, 21-8-1965, Ellis 25409 ; Diguvametta, 18-11-1969, Ellis 32486 ; Diguvametta, 6-8-1972, Ellis 42143.

## MALPIGHIACEAE

- |  |              |
|--|--------------|
| 1. Flowers 2 cm across ; prominent gland present on one of the calyx lobes ; samara wings spreading out .. | HIPTAGE      |
| 1. Flowers 0.5 cm across ; gland absent on the calyx lobe ; samara wings superposed ..                     | ASPIDOPTERIS |

## HIPTAGE Gaertn.

*Hiptage benghalensis* (Linn.) Kurz in Journ. Asiat. Soc. Bengal 14 : 36. 1879 ; Franz Niedenzu in Engler's Pflanzenr. iv. 141. Heft 91 (1) : 77. 1928. *Banisteria benghalensis* Linn. Sp. Pl. 427. 1753. *Hiptage madablotia* Gaertn. Fruct. 2 : 169. 1791 ; DC. Prodr. 1 : 583. 1824 ; Wt. & Arn. Prodr. 107. 1834 ; Hook. f. FBI 1 : 418. 1874 ; Gamble, FPM 1 : 128. 1915.

Climbing shrubs ; branches brown, terete, lenticellate. Leaves  $15 \times 8$  cm, opposite, elliptic-acuminate, acute at base, coriaceous, glabrous, prominently nerved, exstipulate ; petioles 1 cm long, channelled above. Flowers white, about 2 cm across, in large, axillary and terminal racemes 12 cm long, bracteate, bracteolate ; calyx lobes 0.5 cm long, oblong, obtuse, one with a large oblong gland without ; petals  $1.5 \times 1.5$  cm, almost orbicular, sinuate along margins, clawed at base, prominently declinate, laterals touching, the uppermost larger than others ; stamens 10, one stouter and longer (1.5 cm) than others (0.5 cm) ; ovary pubescent, carpels shortly 3-winged. Samara wings 2.5 cm long.

*Fl. & Fr.* : February-April.

*World distribution* : India, Sri Lanka to China and Malacca.

*Specimen examined* : Dornal, February 1887, J. S. Gamble, 18679.

*Remarks* : This species has not been collected in recent tours.

## ASPIDOPTERIS A. Juss.

- |  |                   |
|--|-------------------|
| 1. Leaves pubescent beneath ; samara wings more or less orbicular .. | <i>A. cordata</i> |
| 1. Leaves glabrous beneath ; samara wings elliptic-oblong ..         | <i>A. indica</i>  |

*Aspidopteris cordata* (Heyne ex Wall.) A. Juss. in Ann. Sci. Nat. ser. II. 13 : 267. 1840 ; Hook. f. FBI 1 : 421. 1874 ; Gamble, FPM 1 : 129. 1915 ; Hutchinson in Kew Bull. 1917 : 101. 1917. *Hiraea cordata* Heyne (Wall. Cat. 1060. 1829) ex Wall. Pl. Asiat. Rar. 1 : 13. 1830.

Herbaceous climbers; branches terete, glabrous. Leaves  $13 \times 13$  cm, simple, opposite, orbicular-ovate, abruptly acuminate, cordate at base, glabrous above, a few hairy above on midribs, hirsutely pubescent beneath; petioles 3.5 cm long, hirsute. Flowers pale green, 0.25 cm across, in terminal, pendulous panicles about 4 cm long; pedicels articulated above the middle, hirsute; bracts up to  $4.5 \times 1.2$  cm, leafy, ovate-acuminate; calyx 0.1 cm long, lobes 5, ovate, tube 0.1 cm long; petals 0.25 cm long, ovate, cucullate, coriaceous; stamens 10, filaments connate; ovary glabrous, styles 3, stigmas capitate. Samara wings about 2.5 cm long, sparingly setose when young, prominently reticulate-veined.

*Fl. & Fr.* : September-December.

*World distribution* : Peninsular India.

*Specimen examined* : Diguvametta, 28-10-1906, C. A. Barber 8013.

*Remarks* : This species is included here after the collection of C.A. Barber, as it is not collected from Nallamalais in the present study. It is possible that it is not present now in Nallamalais. However, this plant is rather common in Seshachellam Reserve Forests of Cuddapah District which is farther south. Gamble (*op. cit.*) has indicated Kurnool as one of the regions of occurrence, generally meaning 'Nallamalais'.

*Aspidopteris indica* (Roxb.) Hochreut, in Bull. Inst. Buit. 19 : 45. 1904; Hutchinson in Kew Bull. 1917 : 96. 1917. *Triopteris indica* Roxb. Pl. Corom. 2 : 32. 1798. *Aspidopteris roxburghiana* A. Juss in Ann. Sci. ser. II. 13 : 267. 1840; Hook. f. FBI 1 : 420. 1874, p. p.; Gamble, FPM 1 : 129. 1915.

Extensive climbers, branches terete, younger rusty tomentose. Leaves  $11 \times 7$  cm, elliptic-ovate, abruptly acuminate, cordate at base, glabrous, midrib rusty-tomentose beneath; petioles 1 cm long, rusty-tomentose. Flowers greenish, 0.3 cm long, in axillary and terminal panicles about 5 cm long, bracteate, bracteolate; pedicels hairy; sepals 0.1 cm long, elliptic-ovate, hairy along margins; petals 0.3 cm long, oblong, coriaceous; staminal filaments connate at base; ovary densely pubescent; styles 3, stigmas capitate. Samaras  $5 \times 1.5$  cm, elliptic-oblong, nerves on wings inconspicuous.

*Fl. & Fr.* : September-January.

*World distribution* : India, Burma.

*Specimens examined* : '...Nallamalai Hills of Kurnool, ...' J. S. Gamble s.n.

*Remarks* : It is intriguing that this plant has not been collected in the recent collections. It appears plausible that it no longer exists in the Nallamalais. However, it is common in the Seshachellam Reserve Forests of Cuddapah District which is farther south.

In his revision of the genus J. Hutchinson (*op. cit.*) has indicated that J. D. Hooker (*op. cit.*) had included *A. spidopteris indica*, *A. glabriuscula* and *A. oxyphylla* in one species, *A. roxburghiana* A. Juss., but all of them are separate. Gamble (*op. cit.*), however, does not comment on this point.

It is very surprising that none of the plants dealt with in the preceding pages belonging to this family has been collected from the Nallamalais ; it appears as though the members of the Malpighiaceae have, of late, disappeared from the area. It is indeed inexplicable how this could have happened, especially when they are quite common in the Seshachellam Reserve Forests of Cuddapah District which are farther south.

## ZYGOPHYLLACEAE

### TRIBULUS Linn.

*Tribulus terrestris* Linn. Sp. Pl. 387. 1753 ; DC. Prodr. 1 : 703. 1824 ; Edgew. & Hook. f. in FBI 1 : 423. 1874 ; Dunn in Gamble, FPM 1 : 130. 1915.

Prostrate herbs, generally occurring in disturbed clayey type of soils ; branches striate, pubescent with crisped and hirsute hairs ; root stocks woody. Leaves paripinnate ; leaflets  $0.5 \times 0.3$  cm, oblong-ovate, apiculate, unequally cordate at base, pilose, sessile ; stipules linear-elliptic, ovate-elliptic, slightly falcate, 3 at a node. Flowers yellow, 0.5 cm across, solitary, axillary ; sepals 0.3 cm long, densely pubescent without ; petals 0.5 cm long, spatulate, clawed at base ; anthers faintly puberulous ; ovary densely pubescent, stigmas clavate, hairy. Capsules  $1.5 \times 1.2$  cm, ovoid, spinous-horned, rugose, puberulous, sparingly pilose.

*Fl. & Fr.* : Throughout the year.

*World distribution* : Tropical Africa, India, Sri Lanka to Australia and America.

*Specimen examined* : Maddipenta, 11-8-1972, Ellis 42299.

*Fagonia cretica* Linn. Sp. Pl. 386. 1753 (= *F. arabica* Linn.) has been indicated here as occurring in the Kurnool District on the authority of following collectors : R. H. Beddome and J. S. Gamble. Beddome has

collected it from 'Kurnool', dt. 1870, without indicating any definite locality. J. S. Gamble has collected it from 'Kallwa', Kurnool Dt., dt. 1883 (Fl. No. 10895). In the recent tours of Nallamalais, however, it has not been collected, at least in the wooded portion. The plant generally occurs in very arid localities at low altitudes generally on sandy tracts. As the plant does not occur in the Nallamalais proper, it has not been treated in detail.

### OXALIDACEAE

1. Leaves pinnate	..	BIOPHYTUM
1. Leaves digitate	..	OKALIS

### BIOPHYTUM DC

1. Leaves thin, pale beneath ; lateral nerves parallel, rather inconspicuous ; seed grooves muricate ; sepals as long as mature capsules	<i>B. reinwardtii</i>
1. Leaves comparatively thicker, faintly glaucous beneath ; lateral nerves reticulate, not parallel, conspicuous ; seed grooves not muriculate ; sepals longer than mature capsules	<i>B. sensitivum</i>

*Biophytum reinwardtii* (Zucc.) Klotzsch in Peters Reise Mossamb. Bot. I : 85. 1862 ; Edgew. & Hook. f. in FBI 1 : 437. 1874 ; Gamble, FPM 1 : 133. 1915 ; van Steenis in Bull. bot. Gard. Buit. ser. 3, 184. 453. 1950. *Oxalis reinwardtii* Zucc. in Munch. Abhand. 1 : 274. 1848.

Herbs, about 10 cm high ; branches reddish, sparsely retroseely hairy. Leaves 8 cm long, crowded at top of stem ; leaflets ovate or obovate, rounded or truncate at base, about 10 pairs, increasing in size towards ends of branches, pale beneath ; lateral nerves faint, parallel. Flowers yellow with a red streak near the base of each lobe, in terminal umbels about 2 cm across ; peduncles hairy 5 cm long ; pedicels up to 1 cm long ; sepals 0.3 cm long, ovate-acuminate, strongly parallel veined, sparsely hairy without ; petals connate ; filaments dilated, sparsely hairy ; ovary faintly hairy at top, styles 5, stigmas 2-fid. Capsules 0.3 cm long, ovoid ; seeds grooved, muriculate.

Fl. & Fr. : July-January.

World distribution : India, Sri Lanka, China and Burma.

Specimens examined : Way to Upper Ahobilam, 29-8-1965, Ellis 25564 ; Diguvametta, 17-11-1969, Ellis 32445.

*Biophytum sensitivum* (Linn.) DC. Prodr. 690. 1824; Wt. & Arn. Prodr. 162. 1834; Edgew. & Hook. f. FBI 1 : 436. 1874, p.p.; Gamble, FPM 1 : 133. 1915; van Steenis in Bull. bot. Gard. Buit. ser. 3, 18<sup>4</sup> : 452. 1950. *Oxalis sensitiva* Linn. Sp. Pl. 434. 1753.

Erect herbs, about 8 cm high, sensitive to touch; stems reddish pink, appressedly retrose-hairy. Leaves about 6 cm long, several, crowded at top of stem; rachises sparsely hairy; leaflets in 12 pairs or less, about 1×0.5 cm, increasing in size towards ends of rachises, obtuse, obovate, truncate, equal or unequal at base; nerves irregular, prominent beneath, marginally jointed. Flowers deep yellow, 0.7 cm across, in terminal umbels 2 cm across, shortly pedicellate; peduncles up to 16 cm long; bracts and bracteoles ovate-acuminate, sparsely hairy on margins; midribs prominent below; sepals 0.5 cm long, ovate-acuminate, parallel-nerved; petals clawed at base. Capsules 0.5 cm long, ovoid; seeds many, spirally grooved.

*Fl. & Fr.*; June-December.

*World distribution*: Tropical belt of Africa, India, Sri Lanka and America.

*Specimens examined*: Chelama, 15-10-1964, Ellis 22016; Velgode Range, 26-11-1969, Ellis 32615.

*Remarks*: In the field and also in the herbarium, it is rather difficult to segregate *Biophytum sensitivum* and *B. reinwardtii*. Several characters like, (i) the structure of leaves—thick or thin, (ii) lateral nerves—prominent or not; parallel or reticulate, (iii) seeds—muriculated grooves or not, and (iv) sepals—longer than capsules or not, have been utilised by workers like, Edgeworth and Hooker f. (*op. cit.* 1875), Prain (*Bengal Plants*, 1903), Gamble (*op. cit.* 1915), Haines (*Bot. Bihar & Orissa*, 1921), van Steenis (*op. cit.* 1950), and others for distinguishing these species. However, after going through several herbarium specimens and also studying them in the field, it has become clear that all the characters must be considered, though the characters imperceptibly overlap with one another. Perhaps cytological studies may throw better light on the delimitations of these species.

#### OXALIS Linn.

*Oxalis corniculata* Linn. Sp. Pl. 435. 1753; DC. Prodr. 1 : 700. 1824; Edgew. & Hook. f. FBI 1 : 436. 1874; Gamble, FPM 1 : 132. 1915.

Small, procumbent, creeping, perennial herbs, running up to 40 cm long, radiating from robust rootstocks ; branches reddish, faintly angled, grooved, sparsely pubescent. Leaves alter, 3-foliolate ; stipules thin, adhering to petioles ; petioles 5 cm long, hispid ; leaflets 1.5 cm long, sessile, obocordate, cuneate at base, sparsely hispid. Flowers yellow, 0.5 cm across, in axillary umbels 2 cm across ; sepals 0.4 cm long, hispid without ; petals 0.4 cm long, obovate ; filaments dilated. Capsules 1.5 cm long, linear, cylindric, torulose, beaked ; seeds many, transversely muriculate-striate.

*Fl. & Fr.* : June-January.

*World distribution* : India, Sri Lanka and Burma.

*Specimens examined* : Gundlabrahmeswaram, 20-7-1963, Ellis 16927 ; Gundlabrahmeswaram, 29-11-1969, Ellis 32667.

An isolated dense population of *Impatiens balsamina* Linn. (Upper Ahobilam, 29-8-1965, Ellis 25576) has been seen inside the compound of a temple in Upper Ahobilam. Obviously this is a cultivated plant long since abandoned and has run wild only inside the temple. It has not been located anywhere else. As this happens to be a stray collection, not making a part of wild plants of Nallamalais, the species has not been treated separately.

## RUTACEAE

1. Fruits woody berries or capsules :
2. Woody berries :
  3. Leaves obovate, emarginate ; berries 1-loculed ..... **LIMONIA**
  3. Leaves elliptic-acuminate ; berries 8-15-loculed ..... **ARGLA**
2. Capsular fruits ..... **CHLOROVYLON**
1. Fruits fleshy berries or hesperidia :
  4. Fruits hesperidia :
    5. Leaves simple ..... **ATALANTIA**
    5. Leaves 3-foliate ..... **NARINGI**
  4. Fruits berries :
    6. Leaflets 11×5 cm ; flowers 0.3 cm across ..... **MICROMELUM**
    6. Leaflets 6×3 cm ; flowers 1.3 cm across ..... **MURRAYA**

## LIMONIA Linn.

*Limonia acidissima* Linn. Sp. Pl. ed. 2, 554, 1762; Alston in Trimen, Handb. Fl. Ceyl. 6 : 41, 1931; Airy Shaw in Kew Bull. 1939 : 293, 1939; B. C. Stone and D. H. Nicolson in Taxon 27 : 551-552, 1978. *Feronia limonia* (Linn.) Swingle in Journ. Wash. Acad. Sci. 4 : 328, 1914. *Schinus limonia* Linn. Sp. Pl. 1 : 389, 1753. *Limonia elephantum* (Correa) Panigrahi in Taxon 26 : 577, 1977. *Feronia elephantum* Correa in Trans. Linn. Soc. 5 : 225, 1800; Hook. f. FBI 1 : 516, 1874; Gamble, FPM 1 : 160, 1915.

Trees, about 10 m tall; young branches zig-zag, pinkish, brown-tomentose; thorns sharp, up to 3 cm long. Leaves 3-4 on raised pads, up to 8 cm long, 3-5-imparipinnate; leaflets about 2×1.5 cm, ovate or obovate, generally emarginate, cuneate at base, coriaceous; nerves prominent; petioles about 3 cm long, faintly winged. Flowers white with a pinkish tinge, 3 cm long, in axillary panicles 12 cm long; calyx campanulate, 5-6-lobed, lobes 0.1 cm long, triangular, hairy along margins; petals 5-6, 3 cm long, elliptic-oblong; stamens 10-12, filaments expanded below, hirsute at base within, anthers thick, as long as or longer than filaments. Berries 4×4 cm, woody, globose; seeds several, flattened, embedded in edible pulp.

Fl. & Fr.: March-August.

*World distribution:* Dry localities in India and Sri Lanka.

*Specimens examined:* 'Nallamalais', March 1883, J. S. Gamble 10937; Chelama, 18-3-1965, Ellis 23704; Mahanandi, 23-8-1965, Ellis 25512.

*Remarks:* Panigrahi (*op. cit.*) has argued for the rejection of the name *Limonia acidissima* Linn., as *nomen ambiguum*. He has traced history of the generic name, *Limonia* and concludes, "...Because the latter name is known to have been applied for over 170 years to a different species (including again its application in the still widely used *Flora of British India*), it seems to me to be preferable to reject the name as a *nomen ambiguum* and take up the next available epithet, ..." (p. 577) and "...the name *Limonia acidissima* L. was invariably mistakenly applied to the plant *L. crenulata* Roxb. for well over a hundred years, despite the fact that the latter does not occur in Ceylon" (p. 576). B. C. Stone and D. H. Nicolson (in *Taxon* 27 : 551-552, 1978) have argued for retaining the original name, *Limonia acidissima* Linn., and against its rejection as a *nomen ambiguum*. They argue that such a step is unnecessary.

AEGLE Correa ex Koenig, *nom. cons.*

*Aegle marmelos* (Linn.) Correa in Trans. Linn. Soc. 5 : 223. 1800 ; Wt. & Arn. Prodr. 96. 1834 ; Wt. Ic, 1 : t. 16. 1838 ; Hook. f. FBI 1 : 516. 1874 ; Gamble FPM 1 : 161. 1915. *Crataeva marmelos* Linn. Sp. Pl. 444. 1753.

Trees, about 5 m high ; branches faintly zig-zag ; thorns up to 3 cm long, sometimes faintly bilobed at apex. Leaves trifoliate, 2-3 together on elevated pads, about 15 cm long : leaflets 6×4 cm, elliptic-acuminate, faintly crenate-serrate, puberulous, terminal largest ; petioles up to 8 cm long. Flowers pale green, 0.6 cm across, in axillary panicles about 10 cm long ; calyx 0.3 cm long, 5-lobed, lobes cupular, wavy ; petals 1 cm long, ovate ; stamens many, filaments subulate ; disk intrastaminal ; ovary ovoid, 8-15-celled. Berries about 5.5×5.5 cm, globose, woody ; pulp orange, sweet to taste ; seeds several, flat, embedded in the pulp.

*Fl. & Fr.* : August-December.

*World distribution* : Dry localities of India and Sri Lanka.

*Specimens examined* : Chelama, 8-12-1963, Ellis 18025 ; Diguvametta, 6-8-1972, Ellis 42144.

CHLOROXYLON DC. *nom. cons.*

*Chloroxylon swietenia* DC. Prodr. 1 : 625. 1824 ; Wt. & Arn. Prodr. 123. 1834 ; Hiern in Hook. f. FBI 1 : 569. 1874 ; Dunn in Gamble, FPM 1 : 152. 1915.

Trees, about 10 m tall ; branches brown-tomentose when young, bark suberous. Leaves about 25 cm long, crowded at ends of branches ; leaflets about 3×1.5 cm, about 20 pairs, paripinnate, obtuse, unequally oblique at base with one side gibbous, coriaceous, oil-dotted, glaucous beneath. Flowers 0.7 cm across, white, in terminal, cymose panicles about 8 cm long, bracteate, bracteolate ; calyx 0.3 cm long, 5-lobed, tube small ; petals 0.7 cm long, ovate, clawed at base ; disk and ovary tomentose. Capsules 3×1 cm long, oblong, 3-loculed ; seeds several, angled at base, shortly winged above.

*Fl. & Fr.* : March-August.

*World distribution* : India and Sri Lanka.

*Specimen examined* : Chelama, 18-3-1965, Ellis 23705.

*Remarks* : This genus has been placed in the Rutaceae and also in the Meliaceae ; DeCandolle (1824), Hiern (1875), Cooke (1902), Prain (1903), Haines (1921), Hutchinson (1959) have treated it under the Meliaceae. Haines (*Bot. Bihar & Orissa*, 1925) speaks of this taxon thus : '...included in this family on account of its gland-dotted leaves, but its numerous ovules and its fruit are more those of *Meliaceae*, tribe *Cedreleae*, which connects the two families.' The 14th Supplement of *Index Kewensis* (1970) assigns it to the Rutaceae. Airy Shaw (1966) has it under the Flindersiaceae ; of the family he (p. 453) speaks thus, 'Somewhat intermediate between *Rutac.* and *Meliac.*'

ATALANTIA Correa, *nom. cons.*

*Atalantia monophylla* DC. Prodr. I : 535. 1824 ; Wt. & Arn. Prodr. 91. 1834 ; Hook. f. FBI I : 511. 1874 ; Gamble, FPM I : 159. 1915 ; Airy Shaw in Kew Bull. 1939 : 292. 1939. *Limonia monophylla* Linn. Mant. Pl. 237. 1768. *Atalantia spinosa* (Willd.) Tanaka in Journ. Bot. 68 : 232. 1930 ; Alston in Trimen, Handb. Fl. Ceyl. 6 : 38. 1931. *Trichilia spinosa* Willd. Sp. Pl. 2 : 554. 1799.

Trees, about 5 m tall ; branches thorny, terete, puberulous when young. Leaves  $9 \times 5$  cm, 1-foliate, ovate, acuminate, emarginate, acute at base, coriaceous, shortly petiolate : lateral nerves and nervules prominent. Flowers pale green, 0.5 cm long, in axillary racemes 10 cm long, bracteate, bracteolate ; calyx 0.3 cm long, irregularly split, sparsely hairy without along margin ; petals 0.5 cm oblong, obovate, cuneate at base ; stamens 8, filaments connate almost up to the top, alternatively 4 shorter ; ovary conical, stigmas capitate. Hesperidium globose, about  $1.5 \times 1.5$  cm ; seeds oblong.

*Fl. & Fr.* : March-July.

*World distribution* : India and Sri Lanka.

*Specimen examined* : Pathalaganga, Srisailam, 12-7-1963, Ellis 16830.

*Remarks* : Nomenclaturally this species had a tortuous course as can be seen by the works of Koorders (*Exkursionfl. Java* 2 : 427. 1912), Tanaka (*op. cit.*), Alston (*op. cit.*) ; Airy Shaw (*op. cit.*), however, has dealt at length regarding the identity of the plant and has concluded that '...Tanaka's interpretation of the Linnaean species as the South Chinese and Tonkin *Severinia buxifolia* (Poir.) Ten., on the basis of the undetermined specimens of the latter in the Linnaean Herbarium is indefensible. *Limonia monophylla* L. is clearly the Ceylon endemic known as *Atalantia ceylanica* (Wight) Oliv.' (p. 291).

DeCandolle (1824) did not cite *Limonia monophylla* Linn. under *Atalantia monophylla*, thereby providing a new name for Roxburgh's misidentified species and not a new combination based indirectly on *Limonia monophylla* Linn. Roxburgh's plant was described as *Trichilia spinosa* by Willdenow (1799) and *Sclerostylis spinosa* by Blume (1825). Koorders (1912) transferred Blume's species to *Atalantia* not aware of Willdenow's plant. Airy Shaw (*op. cit.*) concludes (p. 291), "...thus Tanaka's and Alston's transference of Willdenow's species to the same genus in 1930 and 1931 resulted in a later homonym ... The valid name under *Atalantia* for the species which has been called *A. spinosa* is therefore *A. monophylla* DC."

#### NARINGI Adanson

- |   |                     |
|---|---------------------|
| 1. Petioles prominently winged ; leaves 3-foliate | <i>N. alata</i>     |
| 1. Petioles faintly winged ; leaves imparipinnate | <i>N. crenulata</i> |

*Naringi alata* (Wall. ex Wt. & Arn.) Ellis in Bull. Bot. Surv. Ind. 22 : 193. 1930. *Limonia alata* Wall. ex Wt. & Arn. Prodri. 92. 1834 ; Hook. f. FBI 1 : 508. 1874 ; Gamble, FPM 1 : 157. 1915. *Pleiospermium alatum* (Wall. ex Wt. & Arn.) Swingle in Journ. Wash. Acad. Sci. 6 : 427. 1916. *Hesperethusa alata* (Wt. & Arn.) Alston in Trimen, Handb. Fl. Ceyl. vi. suppl. 38. 1931.

Small trees, about 6 m tall ; young branches faintly angled, puberulous ; thorns up to 2 cm long. Leaves trifoliate, about 8 cm long ; petioles 5 cm long ; leaflets 4 x 2.5 cm, obovate, cuneate at base, entire, sessile ; lateral nerves prominent. Flowers white, 0.4 cm long, in terminal racemes 6 cm long, bracteate, bracteolate ; sepals 0.2 cm long, ovate, puberulous ; petals 0.5 cm long, oblong, gland-dotted ; stamens 10, free, filaments dilated at base, anthers linear ; disk annular ; ovary oblong, style short, stigmas faintly lobed. Hespridiua 1.5 cm across ; seeds flattened.

*Fl. & Fr.* : February-September.

*World distribution* : India and Sri Lanka.

*Specimens examined* : Dornal, February 1887, J. S. Gamble 18686 ; Sunnipenta, Srisailam, 26-3-1965, Ellis 23770 ; Peddachama, Eastern Nallamalais, 18-8-1972, Ellis 42299.

*Remarks* : Dandy's (in *Taxon* 18 : 467. 1969) plea for conservation of *Hesperethusa* M. J. Roemer was rejected in favour of *Naringi* Adanson —a new name.

*Naringi crenulata* Nicolson, Fl. Hassan District, 387. 1976. *Limonia crenulata* Roxb. Pl. Corom. 1 : 60, t. 86. 1795; Trimen in Journ. Bot. 27 : 162. 1889; Gamble, FPM 1 : 157. 1915. *L. acidissima* auct. pl. non Linn.; Hook. f. FBI 1 : 507. 1874. *Hesperethusa crenulata* (Roxb.) Roem. Syn. Hesper. 31 : 38. 1846.

Small trees, 6 m tall; branches terete; thorns up to 1.5 cm long. Leaves 3-5-foliate, rachises broadly winged; petioles faintly winged; leaflets  $3 \times 2$  cm, elliptic-ovate, acute at base, crenate, conspicuously oil-dotted, glabrous, faintly hairy on midrib above. Flowers pale green, 0.6 cm long, in axillary, sometime extra-axillary, 6-8-flowered sub-umbellate racemes about 8 cm long; pedicels 0.9 cm long; calyx 0.3 cm long, 5-lobed; petals 0.6 cm long, oblong, prominently gland-dotted; filaments dilated at base. Fruits 0.8 cm across; seeds shining, flattened.

Fl. & Fr.: May-December.

*World distribution*: In drier localities of India, Sri Lanka and Burma.

*Specimens examined*: Diguvametta, 15-11-1906, Barber 8108; way to Vishounandi, Mahanandi, 21-8-1965, Ellis 25439.

*Remarks*: Trimen (*op. cit.*) referring to his previous work (*Journ. Linn. Soc.* 24 : 142. 1888) has shown that "...Linnaeus's name *Limonia acidissima* cannot be maintained for this, as Hermann's specimens, on which it was mainly based (*Fl. Zeyl.* n. 175) are *Feronia elephantum...*" (*Journ. Botany* 27 : 162. 1889)

#### MICROMELUM Bl. *nom. cons.*

*Micromelum pubescens* Bl. Bijdr. 1 : 137. 1825; Hook. f. FBI 1 : 501. 1874; Gamble, FPM 1 : 154. 1915. *Bergera integriflora* Buch.-Ham. ex Roxb. (*Hort. Beng.* 32. 1814, *nomen*) Fl. Ind. 2 : 376. 1824.

Trees, about 5 m tall; branches terete, greyish-brown, puberulous with raised, minute, glandular surface. Leaves up to 30 cm long, imparipinnate; leaflets  $11 \times 5$  cm, subopposite or alternate, elliptic-acuminate, unequal at base. Flowers pale green, 0.3 cm across, in terminal panicles about 15 cm long, bracteate, bracteolate; calyx 0.1 cm long, 5-lobed, cupular; petals  $0.4 \times 0.1$  cm, ovate-lanceolate, coriaceous, pubescent without, hairy at top within; stamens 10, alternately short and long, filaments dilated; ovary surrounded by disk, 5-celled, style thick, jointed, stigmas obtuse. Berries red, 0.7 cm long, ovoid; seeds 2, oblong.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : India, Sri Lanka, Burma and Malacca.

*Specimen examined* : 'Nallamalais', date not given, Collector not known, s.n.

*Remarks* : This plant has not been collected from Nallamalais during the recent tours. The main distribution of the plant in India is in Assam, and it is scarce in peninsular India. Gamble (*op. cit.*) has given the collections of Beddome, and Barber to record the plant's occurrence in Orissa in 'Hills of Ganjam' and in Andhra Pradesh in Vizagapatam. Apparently the plant does not cross beyond the middle of Andhra Pradesh.

MURRAYA Linn. *mut.* Murr. *nom. cons.*

*Murraya koenigii* (Linn.) Spreng. *Syst. Veg.* 2 : 315. 1825 ; Hook. f. *FBI* 1 : 503. 1874 ; Gamble, *FPM* 1 : 156. 1915. *Bergera koentgii* Linn. *Mant. pl. Alt.* 563. 1771 ; *Wt. & Arn. Prodr.* 94. 1834 ; *Wt. Ic.* 1(1) : t. 13. 1840.

Small trees, about 4 m tall ; branches terete, younger puberulous. Leaves 15 cm long, spirally arranged along the branches, imparipinnate ; leaflets about  $3 \times 1.5$  cm, subopposite, elliptic-ovate, broadly ovate, abruptly acuminate, unequally cuneate at base, crenately serrulate, black-pellucid-dotted, shortly petiolate. Flowers white, 0.7 cm long, in branched, corymbose cymes about 12 cm long ; peduncles long ; calyx 0.4 cm long, 5-lobed, lobes ovate, sparingly hairy without ; petals 0.4 cm long, linear-oblong ; stamens 10, extra-staminal, filaments slightly dilated at base ; ovary with style elongated, stigmas capitate. Berries 1 cm long, subglobose, glandular, black when ripe, edible ; seeds 2.

*Fl. & Fr.* : April-September.

*World distribution* : Warner parts of India and Sri Lanka, at lower-elevations, mostly cultivated.

*Specimen examined* : Peddachama, Eastern Nallamalais, 18-8-1972, Ells 42301.

*Remarks* : The leaflets of this plant are extensively used for flavouring foods in many Indian preparations.

## SIMAROUBACEAE

- |  |           |
|--|-----------|
| 1. Tall trees, about 25 m high ; leaves imparipinnate ; leaflets irregularly dentate ..... | AILANTHUS |
| 1. Small trees, about 4 m high ; leaves 2-foliolate ; leaflets entire .....                | BALANITES |

## AILANTHUS Desf. nom. cons.

*Ailanthus excelsa* Roxb., Pl. Corom. 24, t. 23, 1795; DC. Prodr. 2 : 89, 1826; Wt. & Arn. Prodr. 150, 1834; Bennett in Hook. f. FBI 1 : 518, 1875; Gamble, FPM 1 : 163, 1915; Basak in Fasc. Fl. Ind. 4 : 4, 1980.

Tall trees, about 25 m high ; branches pale, bark rough. Leaves about 80 cm long, imparipinnate ; leaflets about 24, alternate or subopposite, highly variable in shape, generally elliptic or rhomboid-acuminate, unequal at base, irregularly dentate, puberulous above, pubescent below ; lateral nervules parallel ; petiolules 2 cm long. Flowers yellow, 0.5 cm long, in panicles about 15 cm across, bracteolate ; calyx 0.2 cm long, tube 0.1 cm long ; petals 0.4 cm long, elliptic-ovate ; stamens 10, anthers 3-4-times larger than filaments ; disks lobed ; ovary deeply 5-lobed, styles 5, initially connate. Samaras  $6 \times 1$  cm, flat, pointed at both ends.

Fl. & Fr. : January-April.

*World distribution* : From tropical Africa, India, Sri Lanka to Burma and Australia, often cultivated.

*Specimen examined* : Chelama, 21-3-1965, Ellis 23749.

## BALANITES Del. nom. cons.

*Balanites aegyptiaca* (Linn.) Delile, Fl. Egypt. 221, t. 28, 1813; Wt. Ic. 1 : 274, 1840; Basak in Fasc. Fl. Ind. 4:20, 1980. *Ximenia aegyptiaca* Linn. Sp. Pl. 1194, 1753. *Balanites aegyptiaca* Delile var. *roxburghii* (Planch.) Duthie, Fl. Upper Gang. Pl. 1 : 136, rep. ed. 1960. *B. roxburghii* Planch. in Ann. Sci. Nat. ser. 4, 2 : 258, 1854; Bennett in Hook. f. FBI 1 : 522, 1875; Gamble, FPM 1 : 164, 1915.

Small trees, 4 m tall ; branches terete, striate, puberulous or glabrous ; thorns up to 2 cm long. Leaves 2-foliolate ; leaflets  $4 \times 2.5$  cm, elliptic-ovate or oblong, emarginate, acute at base, crisplately puberulous, coriaceous, finely nerved ; petioles 0.5 cm long. Flowers whitish, 7-8, in axillary or supra-axillary, pseudo-umbels about 5 cm long ; peduncles up to 1 cm long ; sepals  $0.4 \times 0.15$  cm, elliptic-ovate, pubescent, glabrous

along margins ; petals 0.3 cm long, linear-elliptic, rather falcate ; stamens 10, inserted in grooves of disk ; ovary pubescent, conical, styles and stigmas glabrous. Drupes about  $5 \times 3$  cm, rotund, fleshy ; stones 4, 5-angled, cotyledons oblong, thick.

*Fl. & Fr.* : September-July.

*World distribution* : Drier localities of Africa, India, Sri Lanka and Burma.

*Specimen examined* : Chelama, 5-7-1963, Ellis 16745.

*Remarks* : The systematic position of *Balanites* has been a matter of controversy. Bentham and Hooker (1862) and Cronquist (1968) treat it in the Simaroubaceae, while Engler and Prantl (1931) place it under the Zygophyllaceae. Hutchinson (1958) created a separate family, Balanitaceae. A. Parvati and L.L. Narayana (*Curr Sci.* 47 : 968-969, 1978) working from different disciplines have come to the conclusion that *Balanites* be retained in the Zygophyllaceae but under a subfamily Balanitoideae. They conclude, "...However, the similarities with Simaroubaceae do not rule out a probable common ancestral stock for both the taxa." Basak (*op. cit.*) treats *Balanites* Del. under Balanitaceae.

## OCHNACEAE

### OCHNA Linn.

*Ochna obtusata* DC. Ann. Mus. Paris 17 : 411. 1811, var. *gamblei* (King ex Brandis) Kanis in Blumea 16 : 34. 1968. *O. gamblei* King ex Brandis, Indian Trees, 128. 1906. *O. beddomei* Gamble, FPM 1 : 166. 1915 et in Kew Bull. 1916 : 34. 1916.

Trees, about 6 m tall ; branches pale. Leaves  $6 \times 4$  cm, elliptic-obovate, obtuse, emarginate, attenuate, often cordate at base, crenate-serrate, almost sessile ; nerves and reticulations prominent. Flowers yellow, about 2 cm across, in short panicles about 6 cm long, bracteate ; pedicels up to 5 cm long ; sepals red,  $1.8 \times 0.6$  cm, elliptic-ovate ; petals yellow, 1.8 cm long ; stamens many, anthers linear, dehiscing by apical pores, filaments short ; ovary on swollen torus, styles elongated, stigmas minute. Drupes  $1 \times 0.5$  cm, ovoid, placed on swollen torus ; seeds solitary.

*Fl. & Fr.* : March-June.

*World distribution* : India.

*Specimen examined :* Srisailam, 26-3-1965, Ellis 23786.

*Remarks :* Kanis (*op. cit.*), in his revision of the Ochnaceae, has dealt with *Ochna gamblei* King ex Brandis, *O. beddomei* Gamble and *O. pumila* Buch.-Ham. ex DC., and treating them under the variety, *gamblei*. From the present studies of the materials in CAL and MH, Kanis' treatment is followed in treating vars. *obtusata*, *gamblei* and *pumila* as different varieties because of constancy in differentiating characters like—shape, structure and lateral nerves of leaves. *O. beddomei* Gamble, however, seems to be just an ecological variant of *O. gamblei*, for there are many collections in both herbaria showing an array of variable characters.

### BURSERACEAE

- |   |            |
|---|------------|
| 1. Drupes trigonous, dehiscent ; leaves deciduous during flowering ; leaflets oblong .....                          | BOSWELLIA  |
| 1. Drupes ovoid, indehiscent ; leaves present during flowering ; leaflets abruptly acuminate or caudate-acuminate : |            |
| 2. Panicles exceeding leaves .....  | COMMIPHORA |
| 2. Panicles not exceeding leaves :  |            |
| 3. Flowers 0.7 cm across ; leaflets up to 9 pairs .....   | GARUGA     |
| 3. Flowers 0.2 cm across ; leaflets up to 4 pairs .....   | PROTIUM    |

#### BOSWELLIA Roxb. ex Colebr.

- |  |                      |
|--|----------------------|
| 1. Leaves dentate-serrate, elliptic-ovate ; petals pubescent without .....           | <i>B. serrata</i>    |
| 1. Leaves entire, ovate-oblong, suborbicular, obtuse, retuse ; petals glabrous ..... | <i>B. ovalifolia</i> |

*Boswellia serrata* Roxb. ex Colebr. in Asiatic. Res. 9 : 379, t. 5. 1807 ; Bennett in Hook. f. FBI 1 : 528. 1875 ; Gamble, FPM 1 : 168. 1915. *Bursera thurifera* Roxb. ex Fleming in Asiatic. Res. 11 : 158. 1811 ; Wt. & Arn. Prodri. 174. 1834.

Trees, about 8 m tall ; branches pale, bark peeling off into flakes. Leaves 30 cm long, alternate, imparipinnate, deciduous during flowering ; leaflets 6×3.5 cm, opposite, elliptic-ovate, dentate-serrate, coriaceous, sessile ; nerves prominent. Flowers pale pink, 0.5 cm across, in axillary

racemes about 8 cm long, shortly pedicellate : calyx 0.3 cm long, pubescent without, lobes triangular, tube 0.2 cm long ; petals 0.4 cm long, ovate, pubescent without ; stamens 10, 5 smaller and 5 bigger ; disk intrastaminal, crenate ; ovary sunk in disk, style and stigma faintly puberulous. Drupes  $2 \times 1.2$  cm, trigonous ; pyrenes bony, pointed at top, cordate at base ; seeds compressed.

*Fl. & Fr.* : February-May.

*World distribution* : India, in dry localities.

*Specimen examined* : Chelama, 19-3-1965, Ellis 23731.

**Boswellia ovalifoliolata** Balakrishnan & Henry in Journ. Bombay nat. Hist. Soc. 58 : 546-548. 1961.

Trees, up to 10 m tall ; bark ash-coloured, papery. Leaves crowded at ends of branches, about 20 cm long, imparipinnate ; leaflets  $4 \times 4$  cm, ovate-oblong, obtuse, retuse, rounded and unequal at base. Flowers greenish, 0.5 cm across, in axillary panicles about 4 cm long, pedicellate : calyx lobes 0.2 cm long, triangular, tube 0.1 cm long ; petals 0.5 cm long, obovate, oblong ; disk crenate ; stamens 10, alternately 5 long and 5 short, filaments broad at base, anthers oblong ; ovary sunk in disk, styles short, stigmas capitate. Drupes  $1.5 \times 0.8$  cm ; pyrenes 3, bony, winged ; seeds compressed.

*Fl. & Fr.* : February-April.

*World distribution* : India.

*Specimen examined* : "Nallamalays", Ac. No. MH 8776, no date, R.H. Beddome s.n.

*Remarks* : The specimen cited is one of the type materials examined by the authors of the new species. However, there is some doubt about the locality annotated on the sheet as 'Nallamalays', for the species has not been collected in Nallamalais during the recent tours of Nallamalais. It is possible that Beddome might have collected it slightly farther south of Nallamalais in Cuddapah and Chittoor Districts of Andhra Pradesh which form the Type locality of the new species—the major collecting centres of Beddome.

#### COMMIPHORA Jacq. *nom. cons.*

**Commiphora caudata** (Wt. & Arn.) Engler in DC. Monogr. Phan. 4 : 10. 1883 ; Gamble, FPM I : 171. 1915. *Prothium caudatum* Wt. & Arn. Prodr. 176. 1834 ; Bennett in Hook. f. FBI 1. : 530. 1875.

Trees, about 8 m tall ; bark papery. Leaves about 25 cm long, imparipinnate, deciduous ; leaflets  $6 \times 3.5$  cm, about 5 pairs, ovate-lanceolate, orbicular to abruptly long-acuminate, entire, glabrous ; petioles 10 cm long. Flowers red, scented, 0.6 cm across, in panicles about 18 cm long, bracteate, bracteolate ; calyx 0.3 cm long, cupular, lobes 6, ovate ; petals 6, 0.6 cm long, linear-oblong ; disk cupular, intrastaminal ; stamens 10, alternately long and short, filaments dilated at base ; ovary ovoid, style short, stigmas 3-4-lobed. Drupes 1.5 cm across, subglobose ; pyrenes 4, bony ; seeds membranous.

*Fl. & Fr.* : March-August.

*World distribution* : India and Sri Lanka.

*Specimens examined* : Way to Pathalaganga, Srisailam, 12-7-1963, Ellis 16824 ; way to Pathalaganga, Srisailam, 20-10-1964, Ellis 22100 ; way to Pathalaganga, Srisailam, 25-3-1964, Ellis 23752.

#### GARUGA Roxb.

**Garuga pinnata** Roxb. Pl. Corom. 3 : 5, t. 208. 1811 ; Wt. & Arn. 175. 1834 ; Wt. Ic. 4 : t. 1594, 1595. 1850 ; Bennett in Hook. f. FBI 1 : 528. 1875 ; Gamble FPM 1 : 169. 1915.

Trees, about 30 m high ; bark greyish, peeling in flakes, pubescent in young branchlets. Leaves about 30 cm long, crowded at ends of branches, alternate, imparipinnate ; leaflets  $10 \times 3.5$  cm, about 8 pairs, ovate, abruptly caudate-acuminate, unequal at base, crenate-serrate, shortly petioluled. Flowers pale yellow, 0.8 cm across, in crowded, many-branched panicles about 15 cm long, bracteate, bracteolate ; calyx 0.8 cm long, tomentose without, lobes ovate-acuminate, tube 0.5 cm long ; petals 0.8 cm long, inserted on calyx, linear-oblong, pubescent without, less so within ; stamens 10, inserted on calyx, 5 short and 5 long alternately, filaments pubescent, anthers sparingly puberulous ; style stout, stigmas 5-lobed. Drupes  $1.5 \times 1.5$  cm, globose ; pyrenes about 3, rugose.

*Fl. & Fr.* : March-September.

*World distribution* : Drier localities of India and Burma.

*Specimens examined* : Mantralakanama, February 1887, J. S. Gamble 18699 ; Rollapenta, 17-8-1972, Ellis 42248.

*Remarks* : This plant is rare in the Nallamalais, having been seen only in one of the two passes, viz. Mantralakanama—a moist deciduous tract.

## PROTIUM Burm. f. nom. cons.

**Protium serratum** (Coleb.) Engler in DC. Monogr. Phan. 4 : 88. 1883 ; Gamble, FPM 1 : 171. 1915. *Bursera serrata* Coleb. in Trans. Linn. Soc. 15 : 361, t. 4. 1827 ; Bennett in Hook. f. FBI 1 : 530. 1875. *Ieica indica* Wt. & Arn. 177. 1834.

Trees, up to 20 m high ; bark papery, young branches terete, striate, puberulous. Leaves about 14 cm long, alternate, imparipinnate ; leaflets  $13 \times 3.5$  cm, about 7, elliptic-ovate, abruptly acuminate, rounded at base, crenate-serrate, petiolulate ; nerves and nervules prominent ; rachises brown-tomentose. Flowers pale green, 0.2 cm long, in axillary panicles 5 cm long, bracteate ; calyx 0.1 cm long, 6-lobed, pubescent without ; petals 0.2 cm long, ovate-lanceolate, pubescent without ; disk crenately lobed ; stamens 10, extrastaminal, equal ; ovary ovoid, style short, stigmas 5-lobed. Drupes 1 cm across, ovoid ; pyrenes 5, arillate.

*Fl. & Fr. :* March-May.

*World distribution :* India.

*Specimen examined :* Gundlابrahmeswaram, 2-4-1965, Ellis 23849.

## MELIACEAE

- |   |    |             |
|---|----|-------------|
| 1. Fruits drupaceous ; leaflets ovate-acuminate or caudate :      |    |             |
| 2. Leaves pinnate ; leaflets unequal at base                      | .. | AZADIRACHTA |
| 2. Leaves bipinnate ; leaflets equal at base                      |    | MELIA       |
| 1. Fruits capsular ; leaflets elliptic-ovate, obtuse or orbicular | .. | SYMPUDA     |

## AZADIRACHTA A. Juss.

*Azadirachta indica* A. Juss. in Mem. Mus. Par. 19 : 221. 1830 ; Wt. & Arn. Prod. 118. 1834 ; Wt. Ic. I(1) : 1, t. 17. 1840 ; Gamble, FPM 1 : 177. 1915. *Melia azadirachta* Linn. Sp. Pl. 385. 1753 ; Hiern in Hook. f. FBI 1 : 544. 1875.

Trees, about 15 m tall ; young branches pinkish, terete. Leaves imparipinnate, about 25 cm long, crowded at ends of branches, imparipinnate, exstipulate ; leaflets  $3 \times 1.5$  cm, elliptic-ovate, unequal at base, serrate. Flowers white, 0.5 cm long, hermaphrodite, in axillary panicles about 12 cm long ; calyx 0.3 cm long, lobes broadly ovate, irregularly

crenate, ciliolulate along margins ; petals 0.5 cm long, obovate, pubescent within, puberulous without ; staminal tube obconic, laciniate at throat, toothed at apex ; ovary pubescent, style long, stigmas 3-lobed. Drupes  $1.2 \times 1$  cm, ovoid ; seeds ellipsoid.

*Fl. & Fr.* : March-July.

*World distribution* : Drier localities of peninsular India ; often planted.

*Specimens examined* : Patnala, Kurnool, March 1883, J. S. Gamble 10924 ; Srisailam, 13-7-1963, Ellis 16872 ; Chelama, 20-3-1965, Ellis 23738.

#### MELIA Linn.

*Melia composita* Willd. Sp. Pl. 2, 559, 1799 ; Wt. & Arn. Prodr. 117, 1834 ; Gamble, FPM 1 : 176, 1915. *M. dubia sensu* Hiern in Hook. f. FBI 1 : 545, 1875, non Cav.

Trees, about 25 m tall ; young branches pinkish, pinkish-tomentose. Leaves 40 cm long, bi-or tripinnate, alternate ; leaflets about 20,  $8 \times 4$  cm, in 10 pairs, ovate-acuminate, equal at base, petiolulate. Flowers white, 0.6 cm long, in axillary, branched panicles about 25 cm long, bracteate, bracteolate ; calyx 0.2 cm long, lobes ovate, stellately tomentose without ; petals 0.5 cm long, linear-spathulate, pubescent ; staminal tube cylindric, dilated and laciniate at mouth, glabrous or with a few hairs ; ovary glabrous, style cylindric, stigmas capitate. Drupes  $2 \times 1$  cm, ellipsoid ; endocarp woody ; seeds smooth.

*Fl. & Fr.* : March-August.

*World distribution* : Drier tracts from Africa, India, Sri Lanka to Australia.

*Specimen examined* : Rollapenta, 16-8-1972, Ellis 42282.

#### SOYMIDA A. Juss.

*Soymida febrifuga* (Roxb.) A. Juss. Mem. Mus. Par. 19 : 251, 1832 ; Wt. & Arn. Prodr. 122, 1834 ; Hiern in Hook. f. FBI 1 : 567, 1875 ; Gamble, FPM 1 : 185, 1915 ; Mabbcrly in Taxon 31 : 66, 1982. *Swietenia febrifuga* Roxb. Bot. Descr. Swietenia 1, 1793.

Trees, about 10 m tall ; branches terete, lenticellate. Leaves about 25 cm long, crowded towards ends of branches ; leaflets  $14 \times 7$  cm, about

6 pairs, elliptic-oblong, obtuse or orbicular, undulate, prominently unequal at base; lateral nerves parallel. Flowers whitish, 0.8 cm long, in axillary and terminal panicles about 7 cm long; calyx 0.4 cm long, broadly cupular, lobes 5; petals 0.8 cm long, obovate; staminal tube faintly urceolate; ovary glabrous, stigmas discoid, 5-lobed. Capsules 8×4 cm, ovoid, 5-valved; seeds numerous, winged.

*Fl. & Fr.* : February-June.

*World distribution* : India.

*Specimens examined* : Kurnool Dt., Ac. No. MH 9314, no date given, Beddome s.n.; Peddachama, Eastern Nallamalais, 18-8-1972, Ellis 42304.

*Toona ciliata* M. Roem. Syn. Hesper. 139, 1846 (= *Cedrela toona* Roxb. ex Rottl. in Ges. Nat. Fr. Neue Schr. 2 : 198, 1803) has been reported by J. S. Gamble (Fl. Pres. Madras 1 : 185, 1915) to be common in "...Hills of the Deccan in Kurnool,...". As he has not specifically indicated Nallamalais, and also as it has not been collected from these hill ranges in recent tours, it has not been taken up for a detailed study.

#### OLACACEAE

1. Small trees ; stamens 8-10	..	XIMENIA
1. Shrubby climbers ; stamens 3	..	OLAX

#### XIMENIA Linn.

*Ximenia americana* Linn. Sp. Pl. 1193, 1753; Wt. & Arn. Prodri. 89, 1834; Masters in Hook. f. FBI 1 : 574, 1875; Gamble, FPM 1 : 189, 1915; de Filippi in Boletim da Soc. Broteriana 93, 2<sup>a</sup> ser. 193-200, 1969.

Small trees, about 3 m tall; branches terete, thorny. Leaves about 4×4 cm, broadly elliptic-ovate, obovate, retuse, orbicular, broadly acute at base, entire, coriaceous; petioles short. Flowers pale green, 1 cm long, in short, subumbellate racemes 5 cm long; pedicels 0.5 cm long; calyx 0.3 cm long, lobes 5, ovate, faintly ciliate; petals 5, 0.9 cm long, oblong, pubescent within; stamens 10, anthers linear; ovary conical, style columnar. Drupes 3×3 cm, globose, orange when ripe, pulp edible; seed 1.

*Fl. & Fr.* : March-July.

*World distribution* : Tropical New World, Africa and India.

*Specimens examined* : Diguvametta, 29-10-1906, C. A. Barber 8015 ; Chelama, 6-7-1963, Ellis 16776 ; Chelama, 21-3-1965, Ellis 23746.

*Remarks* : De Filips (*op. cit.*) recognises 3 varieties, viz. var. *americana*, var. *microphylla* Welwitsch ex Oliver, and var. *argentinensis* de Filips, mainly on the glaucous nature of the leaves, and other characters like ciliate or eciliate nature of calyx lobes and the length of styles. From studies of the materials represented both in MH and CAL the characters seem to be more quantitative than qualitative. Even glaucous nature seems to be a variable character. Therefore, all the varieties are considered as really not distinctive.

Interesting accounts of the haustorial root-parasitism in *Ximenia americana* Linn are given by C. A. Barber (Parasitic trees in southern India,—*Proc. Cambridge Philos. Soc.* 14 : 246-256. 1907), and de Filips (*Rhodora* 71 : 439-443, 1969).

#### OLAX Linn.

*Olax psittacorum* (Willd.) Vahl, Enum. 34. 1804. *Olax scandens* Roxb. Pl. Corom. 2 : 2, t. 102. 1798 ; Wt. & Arn. Prod. 89. 1834 ; Masters in Hook. f. FBI 1 : 575. 1875 ; Gamble, FPM 1 : 190. 1915.

Climbing shrubs ; branches terete, thorny, puberulous. Leaves  $4 \times 2.5$  cm, elliptic-oblong, sometimes abruptly acuminate, puberulous beneath ; petioles short. Flowers white, 0.5 cm long, in axillary, racemes 3 cm long, minutely bracteate, shortly pedicellate ; calyx small, cupular, accrescent in fruits, lobes 5, minute, hairy along margins ; petals 3-5, connate, bifid or entire ; stamens 3, epipetalous ; staminodes 6, bifid ; ovary glabrous, stigmas 3-lobed. Drupes  $0.7 \times 0.7$  cm, globoso, slightly apiculate, enclosed to three-quarters by the accrescent calyx ; endocarp stony ; seed 1.

*Fl. & Fr.* : June-October.

*World distribution* : India, Sri Lanka and Burma.

*Specimens examined* : Mahanandi, 21-8-1965, Ellis 25426 ; Mahanandi, 21-8-1972, Ellis 42309.

*Remarks* : Harms (in Engler's *Pflanzenfam.* 16b : 27. 1935) has combined *Olax scandens* Roxb. and *O. wightiana* Wall. ex Wt. & Arn. The present studies indicate that these two are quite distinct : while *O. scandens* has thorns and peduncles and pedicels pubescent, *O. wightiana* Wt. & Arn. has no thorns and pedicels glabrous. Quantitative differences

are apparent in leaves being larger in *O. scandens* and smaller in *O. wightiana*, while flowering buds are longer in the latter.

### OPILIACEAE

#### *OPILIA* Roxb.

*Opilia amentacea* Roxb. Pl. Corom. 2 : 31, t. 158. 1802 ; Masters in Hook. f. FBI 1 : 583. 1875 ; Gamble, FPM 1 : 192. 1915.

Climbing shrubs ; branches brownish, terete, faintly striate. Leaves 9 × 3 cm, elliptic, acuminate, rounded or acute at base, entire, pinnerved ; petioles short. Flowers greenish, small, in axillary or extra-axillary racemes about 2 cm long, concealed by rhomboid, peltate, ciliate bracts ; pedicels 0.1 cm long ; calyx small, minutely 5-lobed ; petals 0.1 cm long, ovate, faintly cucullate at apex ; disk of 5 glands round the ovary ; stamens 5, antipetalous ; ovary with style and stigma simple. Drupes about 2.7 × 1.5 cm, oblong, glaucous ; seed 1, blackish.

*Fl. & Fr.* : March-July.

*World distribution* : In dry localities of India, Sri Lanka and Burma.

*Specimens examined* : Chelama, 4-7-1963, Ellis 16735 ; Chelama, 21-3-1965, Ellis 23744.

*Remarks* : C. A. Barber (in *Memoirs of the Department of Agriculture in India, Bot. Ser. vol. 2, part 5*) has indicated that this is a root parasite.

### CELASTRACEAE

1. Trees or shrubs :

2. Branches thorny ; petals not clawed MAYTENUS

2. Branches not thorny ; petals clawed CASSINE

1. Climbing shrubs CELASTRUS

#### *MAYTENUS* Molina *emend.* Bosc.

*Maytenus emarginata* (Willd.) Ding Hou in Steenis, Fl. Males. ser. 1. 6<sup>2</sup> : 241. 1962. *Celastrus emarginatus* Willd. Sp. Pl. 1, 2 : 1128. 1798. *Gymnosporia emarginata* Thw. Enum. Pl. Zey. 409. 1864 ; Lawson in Hook. f. FBI 1 : 621. 1875 ; Gamble, FPM 2 : 210. 1918. *Celastrus montana* (G. Don) Wt. & Arn. Prodr. 159. 1834 ; Wt. Ic. 2 : t. 382.

1840. *Catha montana* G. Don, Gen. Syst. 2 : 10. 1831. *Gymnosporia montana* (G. Don) Benth. Fl. Austral. 1 : 400. 1863 ; Lawson in Hook. f. loc cit. Gamble, FPM 2 : 209. 1918, p.p. *Maytenus senegalensis* (Lamk.) Exell in Boletim Soc. Broteriana, ser. 2, 26 : 223. 1952. *Celastrus senegalensis* Lamk. Encycl. Meth. 1 : 661. 1783.

Shrubs to small trees, about 3 m tall ; branches pink, terete, thorny ; thorns up to 5 cm long. Leaves up to  $11 \times 4$  cm, ovate, obovate, orbicular, emarginate, attenuate at base, crenato-serrulate, coriaceous ; nerves prominent. Flowers white or pale green often with a pink tinge, 0.4 cm long, in axillary, dichotomous cymes about 5 cm long, bracteate, bracteolate ; calyx lobes 0.1 cm long, ovate, irregularly margined ; petals 0.3 cm long, elliptic-ovate, obovate ; disk intrastaminal ; stamens 5, filaments slender ; ovary slightly sunk in disk, stigmas 3. Capsules  $1 \times 0.8$  cm, subglobose, 3-loculed ; seeds 2 in each locule, arillate.

*Fl. & Fr.* : November-June.

*World distribution* : Tropical India, Sri Lanka to Burma and New Guinea.

*Specimens examined* : Chelama, 9-12-1963, Ellis 18047 ; Diguvametta, 16-11-1969, Ellis 32381.

#### CASSINE Linn.

*Cassine glauca* (Rottb.) O. Ktze. Rev. Gen. Pl. 1 : 114. 1891 ; Ding Hou in Steenis, Fl. Males, ser. 1, 6<sup>2</sup> : 284-286. 1962. *Mangifera glauca* Rottb. in Nov. Harn. 2 : 534, t. 4. 1783. *Elaeodendron glaucum* Pers. Syn. 1 : 241. 1805 ; DC. Prodr. 2 : 10. 1825 ; Wt. & Arn. Prodr. 157. 1834 ; M. A. Lawson in Hook. f. FBI 1 : 623. 1875, p.p. ; Gamble, FPM 2 : 211. 1918.

Trees, about 10 m tall ; branches reddish, often pale white. Leaves up to  $14 \times 8$  cm, ovate, obovate, orbicular, abruptly acuminate, acute at base, distantly crenate-serrate, coriaceous. Flowers green, 0.5 cm across, in axillary, divergently branched, loose cymes about 6 cm long, bracteate, bracteolate ; calyx 0.2 cm long, 5-lobed ; petals  $0.5 \times 0.2$  cm, ovate, with membranous, incurved margins ; disk margin sinuate ; stamens 5, filaments recurved ; ovary conical. Drapes  $1.2 \times 0.6$  cm, gibbous on a side ; endocarp hard ; seeds exarillate.

*Fl. & Fr.* : Throughout the year.

*World distribution* : Tropics from Africa to India, Sri Lanka and Burma.

*Specimen examined* : Diguvametta, 7-8-1972, Ellis 42164.

*Remarks* : Ding Hou (*op. cit.*) has traced the history of this genus since the time of Linnaeus. The main difference between the two genera, viz. *Cassine* and *Elaeodendron* apparently is that in *Cassine* the drupe is supposedly juicy with a thin crust-like putamen, whereas in *Elaeodendron* it is rather dry with a hard ligneous putamen. He states (*op. cit.*, p. 285), "...Bentham & Hooker (*Gen. Pl.* 1, 1862, 363, 367) kept *Cassine* and *Elaeodendron* separate, but Baillon (*Hist. Pl.* 1, 1877, 33) recognised only the latter. In 1892 Loesener reduced *Elaeodendron* to *Cassine* and distinguished them as two different sections of *Cassine* subg. *Elaeodendron*, adding that sect. *Elaeodendron* has vessels with scalariform, rarely also simple perforations, and *Cassine* simple, round or elliptic perforations. Later, however, he reinstated *Cassine*, *Elaeodendron*, and *Mystroxylon* as distinct genera...". Taking into cognisance the additional anatomical evidence of Metcalfe & Chalk (1950), he concludes (p. 285) : "...The recognition of only one genus, *Cassine*, seems therefore to be final".

#### CELASTRUS Linn.

*Celastrus paniculatus* Willd. Sp. Pl. 1: 1125. 1797; DC. Prodr. 2: 6. 1825; Wt. & Arn. Prodr. 158. 1834; Wt. Ic. 1: t. 158. 1840; Lawson in Hook. f. FBI 1: 617. 1875; Gamble, FPM 2: 208. 1918; Ding Hou in Steenis, Fl. Males. ser. I. 6<sup>2</sup>: 235. 1962.

Climbing shrubs ; stems dark pink, angled or grooved, prominently lenticellate. Leaves 13×8 cm, ovate, obovate, orbicular, abruptly acuminate, attenuate at base, crenate-serrulate, prominently reticulately veined. Flowers pale yellow, 0.5 cm across, in terminal, paniculate cymes about 8 cm long, bracteate, bracteolate ; calyx 0.3 cm long, lobes 0.2 cm long, broadly ovate, faintly fimbriate ; petals 0.3 cm long, obovate, clawed at base ; disk 5-lobed ; stamens 5, anthers in male much longer than filaments ; ovary globose, stigmas 3-lobed. Capsules 1 cm across, globose, orange when ripe ; seeds 2, enclosed in arils.

*Fl. & Fr.* : April-December.

*World distribution* : Tropics from Africa, India, Sri Lanka to Philippine Islands, etc.

*Specimens examined* : Gundlabbrahmeswaram, 21-7-1963, Ellis 16951 ; Ramanapenta, Gundlabbrahmeswaram, 31-3-1965 ; Mahanandi, 21-8-1965, Ellis 25419 ; Rollapenta, 16-8-1972, Ellis 42275.

## FLORA OF NALLAMALAI

## HIPPOCRATEACEAE

## LOESENERIELLA A. C. Smith

**Loeseneriella obtusifolia** (Roxb.) A. C. Smith in Amer. Journ. Bot. 28 : 440. 1941. *Hippocratea obtusifolia* Roxb. (Hort. Beng. 5. 1814 ex) Fl. Ind. 1 : 170. 1820 ; DC. Prodr. 1 : 569. 1824 ; Wt. & Arn. Prodr. 104. 1834 ; Wt. Ic. 3(3) : 1. 936. 1845 ; Lawson in Hook. f. FBI 1 : 623. 1875 ; Gamble, FPM 2 : 213. 1918.

Climbing shrubs ; branches reddish-brown, becoming pale in older branches, glabrous. Leaves  $8 \times 5$  cm, elliptic-ovate, obovate, attenuate or rounded at base, distantly serrate ; lateral nerves and reticulations prominent. Flowers pale green, 0.5 cm across, in axillary and terminal, dichotomously branched cymes 4 cm long, bracteate, bracteolate ; calyx 0.2 cm long, lobes ovate ; petals 0.3 cm long, linear-obtuse ; stamens 3, filaments dilated at base adnate to ovary. Fruits samaroid, about  $3.5 \times 2$  cm, obovoid, flattened ; seeds flattened, winged below.

*Fl. & Fr.* : January-June.

*World distribution* : Dry localities of India and Burma.

*Specimen examined* : Dornal, February 1887, J. S. Gamble 18687.

*Remarks* : A. C. Smith (in *Brittonia* 3 : 341-555. 1940, and in *Amer. Journ. Bot.* 28 : 438. 1941) has discussed at length the circumscription of the genus *Hippocratea* Linn. and has advocated for splitting of the taxon and restricting *Hippocratea* to '... a monotypic American group.' Further, he recognises the genus *Pristimera* Miers (*Trans. Linn. Soc.* 28 : 360. 1872) as emended by him, and has erected another genus *Loeseneriella* Smith (*op. cit.* p. 438). Subsequently Ding Hou (in *Blumea* 12 : 33. 1963) has recognised *Reissantia* N. Hallie, thus changing the circumscription further. The present study on the following species described from south India, viz. *H. obtusifolia* Roxb. and *H. indica* Willd. suggests that to treat these two species under two separate genera does not justify ; there are too many characters common to these genera for warranting separate generic delimitation. However, pending a monographic treatment of the taxon occurring in India, A. C. Smith's treatment is followed.

It is intriguing that this species has not been collected during the present explorations of Nallamalais ; J. S. Gamble's collection from Dornal is present in CAT..

## RHAMNACEAE

1. Climbing shrubs, unarmed	VENTILAGO
1. Generally erect shrubs, armed with prickles	ZIZIPHUS

## VENTILAGO Gaertn.

1. Leaves about $15 \times 7$ cm; calyx tube adherent up to middle of ovary; disk pubescent ..	<i>V. denticulata</i>
1. Leaves about $8 \times 3$ cm; calyx tube adherent at base of ovary; disk glabrous except near its centre ..	<i>V. madraspatana</i>

*Ventilago denticulata* Willd. in Ges. Nat. Fr. Neue Schr. 3 : 417. 1801 ; DC. Prodr. 2 : 38. 1825 ; Oza in Journ. Bombay nat. Hist. Soc. 63 : 455. 1966. *V. calyculata* Tul. in Ann. Sci. nat. ser. iv, 8 : 124. 1857 ; Lawson in Hook. f. FBI 1 : 631. 1875 ; Gamble, FPM 2 : 218. 1918. *V. madraspatana* sensu Roxb. Fl. Ind. I : 629. 1820 ; Wt. & Arn. Prodr. 164. 1834 (non Gaertn.).

Climbing shrubs; branches faintly angled, striate, young branches fulvous-pubescent. Leaves  $15 \times 7$  cm, elliptic-ovate, unequally rounded at base, crenate; petioles 1 cm long. Flowers pale yellow, 0.3 cm across, in terminal, sometimes axillary, dense panicles 12 cm long; calyx 0.1 cm long, lobes ovate, cucullate at tips, pubescent without, tube 0.1 cm long; petals 0.1 cm long, ovate, obcordate, clawed at base; stamens 5, adnate to petals at base; disk pubescent; ovary sunk in disk, stigmas 2. Fruits of winged nuts about 4 cm across, enclosed at base by adherent calyx tube to more than half the nut, tawny-pubescent.

*Fl. & Fr.* : September-February.

*World distribution* : Tropics from India to Malaysia.

*Specimens examined* : Gazulapalli, 8-11-1906, C. A. Barber 8073 ; Chelama, 16-10-1964, Ellis 22052 ; Diguvametta, 19-11-1969, Ellis 32554.

*Remarks* : Oza (*op. cit.*) has shown that the specific epithet, *calyculata* is preoccupied and that the oldest available epithet is *denticulata* Willd.

*V. madraspatana* Gaertn. Fruct. 1 : 223, t. 49, f. 2. 1788 ; Wt. & Arn. Prodr. 164. 1834 ; Wt. Ic. 1 : 163. 1840 ; Lawson in Hook. f. FBI 1 : 631. 1875 ; Gamble, FPM 2 : 218. 1918 ; Oza in Indian For. 96 : 406. 1970.

Climbing shrubs; branches terete, striate, sparingly puberulous or glabrous. Leaves  $8 \times 3$  cm, elliptic-acuminate, ovate, acute at base,

distantly crenate-serrate, coriaceous, glabrous; lateral nerves and reticulations prominent. Flowers pale green, 0.3 cm across, in terminal and axillary, branched, panicles about 12 cm long, bracteate, bracteolate; calyx lobes 5, puberulous without; petals smaller than calyx lobes; stamens 5, adnate with petals at base; disk glabrous except near style; ovary sunk in disk, stigmas 2. Fruits of winged nuts about 3 cm across, enclosed at base by adherent calyx tube near base, wings glabrous.

*Fl. & Fr.* : January-May.

*World distribution* : Tropics from India, Sri Lanka to Burma.

*Specimen examined* : Srisailam, 26-3-1965, Ellis 23776.

*Remarks* : The spelling of specific epithet, *madraspatana*, as published by Gaertn. (*op. cit.*) has been reinstated by Oza (in *TAXON* 19 : 822, 1970) which had been changed to *maderaspatana* by Gamble.

There has been some confusion between *V. denticulata* Willd. and *V. madraspatana* Gaertn.; both the species have been mixed up as could be seen from the herbarium sheets kept in the bundles at CAL and MH. This has led V. Narayanaswami (dt. 11-2-1921) to annotate on the species covers stating that both venation and size of leaves are variable. He concludes, "...it is impossible to define the limits of the two species definitely..." for which D. Prain (dt. 18-2-1921) has added thus: 'There is another character—the extent to which the calyx tube is adnate to the nut—is of importance in differentiating the two species.' The present studies indicate that both the species are quite distinct, as could be observed in the sizes of leaves, the adnation of calyx to the fruit, and, to a lesser extent, the pubescence of inflorescences, and, in particular, whether the disk is pubescent only near the centre or throughout.

### ZIZIPHUS Mill.

1. Climbing shrubs :

2. Leaves up to 15 × 8 cm; inflorescence about 30 cm long; petals absent

*Z. rugosa*

2. Leaves up to 7 × 3 cm; inflorescence about 1 cm long; petals present

*Z. oenoplia*

1. Erect shrubs and trees :

3. Shrubs

..

*Z. nummularia*

3. Trees :

4. Styles 3; prickles occasional; drupes tomentose, wrinkled, woody

*Z. xylopyra*

4. Styles 2; prickles common; drupes glabrous, smooth, outer skin brittle

*Z. mauritiana*

*Ziziphus rugosa* Lamk. Encycl. 3 : 319. 1789 ; DC. Prodr. 2 : 20. 1825 ; Wt. & Arn. Prodr. 162. 1834 ; Wt. Ic. 2 : t. 339. 1840 ; Lawson in Hook. f. FBI 1 : 636. 1875 ; Gamble, FPM 2 : 221. 1918.

Lianas ; branches brown-pubescent, becoming glabrous, strongly prickly ; prickles recurved, broad-based. Leaves about  $15 \times 8$  cm, elliptic-ovate, unequally cordate at base, serrulate, coriaceous, brown-pubescent beneath, sparsely hairy to glabrous above, strongly 3-nerved ; petioles about 1 cm long. Flowers pale yellow, 0.5 cm across, in large, pubescent or tomentose cymose panicles about 12 cm long, bracteate, bracteolate ; calyx 0.3 cm long, ovate, densely brown-pubescent without, lobes cucullate at tips ; petals absent ; stamens 5 ; disk glabrous ; ovary pubescent, styles 2 from above the middle. Drupes  $1 \times 0.8$  cm, globose ; stones crustaceous.

Fl. & Fr. : March-May.

*World distribution* : India, Sri Lanka and Burma.

*Specimens examined* : Mantralakanama, Feb. 1887, Gamble 18900 ; Gundlabrahmeswaram, 31-3-1965, Ellis 23809.

*Z. oenoplia* (Linn.) Mill. Gard. Dict. ed. 8. 3. 1768 ; DC. Prodr. 2 : 21. 1825 ; Wt. & Arn. Prodr. 163. 1834 ; Lawson in Hook. f. FBI 1 : 634. 1875 ; Gamble, FPM 2 : 220. 1918. *Rhamnus oenoplia* Linn. Sp. Pl. 282. 1753.

Climbing shrubs ; branches brown-pubescent, prickles recurved. Leaves  $7 \times 8$  cm, ovate, ovate-lanceolate, oblique at base, densely sericeous below, sparsely so above ; nerves 3 from base ; petioles 0.8 cm long. Flowers pale green, 0.3 cm across, in axillary, peduncled cymes 2 cm long, bracteate, bracteolate ; calyx 0.1 cm long, hirsute without, lobes ovate, glabrous within, single nerve raised within near the tip ; petals 0.1 cm long, obovate ; ovary sunk in disk, styles 2. Drupes  $0.7 \times 0.7$  cm, globose ; stones bony.

Fl. & Fr. : July-April.

*World distribution* : Dry localities of India, Sri Lanka, Burma and Australia.

*Specimens examined* : Diguvametta, 30-10-1906, C. A. Barber 8017 ; Chelama, 9-7-1963, Ellis 16796 ; Chelama, 10-12-1963, Ellis 18054 ; Mahanandi, 21-8-1965, Ellis 25404 ; Diguvametta, 18-11-1969, Ellis 32485.

*Z. nummularia* (Burm. f.) Wt. & Arn. Prodr. 162. 1834 ; Lawson in Hook. f. FBI 1 : 633. 1875 ; Gamble, FPM 2 : 220. 1918. *Rhamnus*

*nummularia* Burm. f. Fl. Ind. 61. 1768. *Ziziphus rotundifolia* Lamk. Encycl. 3 : 319. 1789 ; Cooke, Fl. Pres. Bombay, 1 : 257. rep. ed. 1958.

Shrubs, about 1.5 m tall ; branches shortly zig-zag, tomentose. Leaves  $2.5 \times 2$  cm, orbicular, elliptic-oblong, serrulate, densely tomentose on both surfaces ; nerves 3 from base ; petioles 0.5 cm long ; stipular prickles of 2 types : one up to 1.5 cm long, straight, other 0.5 cm long, curved. Flowers 0.4 cm across, pale yellow, in axillary cymes about 2 cm long, bracteate, bracteolate, pedicellate ; calyx 0.15 cm long, lobes ovate, cucullate at tips, pubescent without ; petals 0.3 cm long, truncate at apex, cuneate at base ; stamens 5, antipetalous ; disk glabrous, pitted ; ovary sunk in disk, styles 2 from above the middle. Drupes  $1 \times 0.6$  cm, ovoid ; stones bony.

*Fl. & Fr.* : November-January.

*World distribution* : Middle East to India, in dry localities.

*Specimen examined* : Dornal, Feb. 1887, J. S. Gamble 18670.

*Remarks* : Intriguingly this has not been collected during recent tours of Nallamalais.

*Ziziphus xylopyra* (Retz.) Willd. Sp. Pl. 1 : 1104. 1797 ; DC. Prodr. 2 : 21. 1825 ; Wt. & Arn. Prodr. 163. 1834 ; Lawson in Hook. f. FBI 1 : 634. 1875 ; Gamble, FPM 2 : 220. 1918 ; Santapau in Journ. Bombay nat. Hist. Soc. 51 : 801-802. 1955. *Rhamnus xylopyrus* Retz. Obs. 2 : 11. 1781.

Small trees, about 4 m tall ; branches tawny-tomentose, prickly. Leaves about  $10 \times 6$  cm, ovate, obtuse, orbicular, abruptly acuminate, unequally cordate at base, minutely crenate-serrulate, white-tomentose beneath ; nerves 3 from base ; petioles 0.8 cm long ; stipular prickles not frequent, but when present one straight, other recurved. Flowers yellow, 0.5 cm across, in axillary and extra-axillary cymes about 4 cm long, bracteate, bracteolate ; calyx 0.3 cm long, villous without, lobes ovate ; petals 0.1 cm long, obovate-spathulate ; stamens near fringe of brownish, glabrous disk ; ovary sunk in disk, styles 3. Drupes  $2 \times 1.5$  cm, brown-tomentose, ovoid ; stones bony.

*Fl. & Fr.* : March-November.

*World distribution* : India and Sri Lanka.

*Specimens examined* : Diguvametta, 11-11-1906, C. A. Barber 8090 ; Chelama, 4-7-1963, Ellis 16703 ; Gundlabrahmeswaram, 27-10-1964, Ellis 22218 ; Chelama, 18-3-1965, Ellis 23713 ; Diguvametta, 18-11-1969, Ellis 32484 ; Diguvametta, 6-8-1972, Ellis 42162 ; Diguvametta 9-8-1972, Ellis 42215.

**Ziziphus mauritiana** Lamk. Encycl. 3 : 319, 1789 ; DC. Prodr. 2 : 21, 1825 ; Santapau in Journ. Bombay nat. Hist. Soc. 51 : 802, 1953. *Z. jujuba* Lamk. loc. cit. 318. (non Miller, 1768) ; Lawson in Hook. f. FBI 1 : 632, 1875 ; Gamble, FPM 2 : 219, 1918.

Trees, about 8 m tall ; young branches brown-pubescent, prickles small, curved. Leaves about 6×4.5 cm, oblong, obtuse, orbicular, unequally attenuate at base, serrulate, brown-tomentose beneath, glabrous above ; petioles 1 cm long. Flowers pale green, 0.5 cm across, in axillary, pedicellate clusters 5 cm long ; calyx 0.3 cm long, pubescent without, lobes ovate ; petals 0.2 cm long, spatulate, shortly clawed at base ; disk lobed, glabrous ; ovary sunk in disk, styles 2. Drupes about 2 cm across, globose ; stones bony.

*Fl. & Fr.* : September-December.

*World distribution* : Africa, India, China and Australia, in dry localities.

*Specimens examined* : Chelama, 10-12-1963, Ellis 18051 ; Chelama, 17-10-1964, Ellis 22067.

*Z. horrida* Roth has been reported by Gamble as occurring in 'Kurnool', and one of his collections, Gamble 17729 has been collected from 'Dhone'. As this species has not been collected in recent tours of Nallamalais, nor are there earlier collections from Nallamalais in MH or CAL, this has not been taken up for a detailed study.

## VITACEAE

1. Tendrils inflorescence-borne .....	AMPELOCISSUS
1. Tendrils leaf-opposed :	
2. Leaves simple .....	CISSUS
2. Leaves 3-5-foliate .....	CAYRATIA

### AMPELOCISSUS Planchon, nom. cons.

1. Branches and inflorescence woolly-tomentose .....	<i>A. tomentosa</i>
1. Branches and inflorescence glabrous .....	<i>A. latifolia</i>

*Ampelocissus tomentosa* (Heyne) Planchon in DC. Monogr. Phan. 5 : 375, 1883-87 ; Gamble, FPM 2 : 230, 1918. *Vitis tomentosa* Heyne in Roth's Nov. Sp. Pl. 157, 1821 ; DC. Prodr. 1 : 634, 1824 ; Wt. & Arn. Prodr. 130, 1834 ; Lawson in Hook. f. FBI 1 : 650, 1885.

Shrubby climbers ; branches striate, white to brownish-red woolly tomentose. Leaves about 22×22 cm, palmately 3-5-shallowly lobed,

rarely deeply lobed, cordate at base, slightly dentate, woolly-tomentose below, less so above; nerves 5 from base; petioles up to 13 cm long. Flowers brick red, 0.5 cm across, in leaf-opposed, condensed cymes about 2 cm long; pedunculate tendrils opposite fertile branches; rachises densely woolly; calyx 0.5 cm long, cupular, lobes 5, ovate, serrulate, densely woolly without; petals 5, 0.5 cm long, ovate-oblong, cucullate at apex; stamens 5, situated below disk; ovary sunk in disk. Berries 1×0.8 cm, ovoid, black when ripe; seeds ovate-oblong, rugose, furrowed along outer edge.

*Fl. & Fr.* : July-November.

*World distribution* : India.

*Specimens examined* : Ramanapenta, 26-8-1917, *K. C. Jacob* 14957; Gazulapalli, 3-9-1917, *K. C. Jacob* 11985; Chelama, 5-7-1963, *Ellis* 16740; Chelama, 9-12-1963, *Ellis* 18031; Chelama, 15-10-1964, *Ellis* 22021; Mahanandi, 21-8-1965, *Ellis* 25447; Ahobilam, 22-11-1969, *Ellis* 32564.

**Ampelocissus latifolia** (Lamk.) Planchon in Journ. Vigne Amer. 374, 1884 et in DC. Monogr. Phan. 5 : 370. 1883-87; Gamble, FPM 2 : 230, 1918. *Cissus latifolia* Lamk. Dict. Encycl. Bot. I : 30. 1783; Vahl, Symb. Bot. 3 : 18. 1794; DC. Prodr. 1 : 628. 1824. *Vitis latifolia* (Lamk.) Roxb. [Hort. Beng. 18. 1814 ex] Fl. Ind. 2 : 474. 1824; Wt. & Arn. Prodr. 130. 1834; Lawson in Hook. f. FBI 1 : 652. 1875.

Climbing shrubs; branches striate, glabrous, sparingly lenticellate. Leaves about 20×20 cm, shallowly 3-5-lobed, cordate at base with prominent sinuses, dentate-serrate or serrulate; nerves 5 from base; petioles up to 10 cm long. Flowers brick red, 0.5 cm across, in leaf-opposed cymes about 3 cm long, bracteate, bracteolate; rachises hirsutous, infertile branches tendrillar; calyx 0.4 cm long, shallowly 5-lobed, cupular, erose along margin; petals 0.5 cm long, oblong-ovate, cucullate at tips; stamens along grooves of disk; ovary sunk in disk; stigmas in bisexual flowers discoid. Berries 1×1 cm, globose; seeds ellipsoid, flattened, grooved on back.

*Fl. & Fr.* : June-September.

*World distribution* : India.

*Specimens examined* : Rudravaram, Sirvel, *K. C. Jacob* 14991; Chelama, 4-7-1963, *Ellis* 16736; Mahanandi, 21-8-1965, *Ellis* 25425.

*Remarks* : The specific epithet, *latifolia*, was validly published by Lamarck in Dict. Encycl. Bot. 1 : 30. 1783. Subsequent authors including

Planchon have accredited the specific epithet to Roxburgh ; but Roxburgh had just made a new combination under *Vitis* Linn. DeCandolle (*Prod.* 1 : 634. 1824) and Cooke (*Fl. Pres. Bombay* 1 : 270. rep. ed. 1958) have given Vahl as the author for the species ; Vahl's name, however, dates from 1794.

### CISSUS Linn.

- |   |                          |
|---|--------------------------|
| 1. Branches terete :                          |                          |
| 2. Leaves about $40 \times 40$ cm. glabrous   | <i>C. pallida</i>        |
| 2. Leaves about $18 \times 16$ cm. puberulous | <i>C. vitiginea</i>      |
| 1. Branches sharply 4-angled                  | <i>C. quadrangularis</i> |

*Cissus pallida* (Wt. & Arn.) Planchon in DC. Monogr. Phan. 5 : 477. 1883-87 ; Gamble, FPM 2 : 234. 1918. *Vitis pallida* Wt. & Arn. Prod. 125. 1834 ; Lawson in Hook. f. FBI 1 : 647. 1885.

Shrubs, about 1.5 m high ; stems reddish, terete, striate, woody ; tendrils leaf-opposed, simple. Leaves about  $46 \times 46$  cm. ovate-orbicular, shortly acuminate, cordate at base with wide sinus, distantly glandular-serrulate, glabrous ; nerves 5 from base ; petioles about 20 cm long. Flowers pale yellow, 0.3 cm across, in compound, umbellate cymes about 2 cm long, bracteate, bracteolate ; peduncles up to 4 cm long ; calyx 0.1 cm long, reddish, cupular, faintly 4-lobed, membranous along margin ; petals 0.2 cm long, ovate ; disk 4-lobed ; ovary sunk in disk, style long. Berries  $0.8 \times 0.5$  cm, ovoid ; seeds pyriform.

*Fl. & Fr.* : June-October.

*World distribution* : India.

*Specimens examined* : Chelama, 4-7-1963, Ellis 16713 ; Chelama, 15-10-1964, Ellis 22018 ; Mahanandi, 22-8-1965, Ellis 25473.

*Remarks* : Since its publication this species has been described as 'climbing shrubs'. During our collection tours, however, the climbing habit was not observed ; it was always seen as an erect shrub, reaching a height of 1.5 m.

*C. vitiginea* Linn. Sp. Pl. 117. 1753 ; Planchon in DC. Monogr. Phan. 5 : 472. 1883-87 ; Gamble, FPM 2 : 234. 1918. *Vitis linnaei* Wall. [Cat. 5987. 1828] ex Wt. & Arn. Prod. 126. 1834 ; Lawson in Hook. f. FBI 1 : 649. 1885. *Vitis vitiginea* (Linn.) Haines, Bot. Bihar & Orissa 2 : 201. 1921 (non O. Ktze.).

Shrubs or trees, 3-4 m tall, sometimes climbing ; young branches

serrate, pubescent, older fissured, suberous; tendrils stout, leaf-opposed. Leaves  $18 \times 16$  cm, ovate, orbicular-ovate, 3-5-lobed, cordate at base with sinus large, crenate-serrate, dentate, puberulous; stipules  $0.3 \times 0.2$  cm, broadly ovate, slightly auricled at base, deciduous. Flowers pale green, 0.4 cm across, in leaf-opposed, dichotomous cymes 3 cm long, bracteate, bracteolate; calyx 0.1 cm long, cupular, puberulous without; petals 0.1 cm long, ovate, cucullate at tips; stamens around yellow disk; style subulate. Drupes  $0.8 \times 0.5$  cm, ovoid, ripen blue.

*Fl. & Fr.* : June-November.

*World distribution* : India and Sri Lanka.

*Specimens examined* : Chelama, 5-7-1963, Ellis 16769; Srisailam, 20-10-1964, Ellis 22107; Mahanandi, 22-8-1965, Ellis 25477; Diguvametta, 6-8-1972, Ellis 42161; Diguvametta, 7-8-1972, Ellis 42193.

*Remarks* : Gamble (*op. cit.*) has pointed its arboreal habit. All the others have stated its habit as a 'climber'. This plant has been studied very carefully in the field. It has been observed that the plants have arboreal habit also. (J. L. Ellis & M. S. Swaminathan in *Journ. Bombay nat. Hist. Soc.* 72 : 230. 1975). They are trees with main trunk and dichotomous branches. The tendrils appear to be deciduous, for search for them in arboreal plants proved futile.

*Cissus quadrangularis* Linn. Mant. Pl. I : 39. 1767 et Syst. Nat. ed. 12. 124. 1767, ('*quadrangulus*'); DC. Prodr. I : 628. 1824; Planchon in DC. Monogr. Phan. 5 : 478. 1887; Gamble, FPM 2 : 233. 1918. *Vitis quadrangularis* (Linn.) Wall. ex Wt. & Arn. Prodr. 125. 1834; Wt. Ic. I : t. 51. 1840; Lawson in Hook. f. FBI 1 : 645. 1875.

Rambling succulent herbs, often spreading on ground in arid tracts; stems sparsely 4-angled, fleshy, often winged, jointed at nodes, tendrils leaf-opposed. Leaves  $5 \times 5$  cm, simple, ovate, reniform, cordate or truncate at base, crenate-serrate, succulent; petioles 1.5 cm long. Flowers reddish, 0.5 cm across, in umbellate cymes 2.5 cm long, pedicellate, bracteate, bracteolate; calyx 0.1 cm long, cupular, faintly lobed; petals 0.2 cm long, ovate, cucullate at apices; disk white, quadrangular; ovary ovoid, surrounded at base by disk, style simple. Berries  $0.5 \times 0.4$  cm, globose, apiculate; seed 1, ellipsoid, flattened.

*Fl. & Fr.* : June-September.

*World distribution* : Tropics from Africa, India, Sri Lanka to Malaysia.

*Specimen examined* : Bairanidokku, East Nallamalais, 12-8-1972, Ellis 42234.

## CAYRATIA A. Juss. nom. cons.

1. Stipules auriculate, falcate	<i>C. auriculata</i>
1. Stipules not auriculate, nor falcate :	
2. Leaves pedately 5-foliate	<i>C. pedata</i>
2. Leaves pedately 2-3-foliate	<i>C. trifolia</i>

**Cayratia auriculata** (Roxb.) Gamble, Fl. Pres. Madras 2 : 237. 1918.  
*Cissus auriculata* Roxb. Fl. Ind. 1 : 412. 1820 ; DC. Prodr. 1 : 632. 1824 ;  
 Planchon in DC. Monogr. Phan. 5 : 565. 1883-87. *Vitis auriculata* Wall.  
 [Cat. 6031. 1831] ex Wt. & Arn. Prodr. 129. 1834, p.p. ; Wt. Ic. 1(8) :  
 145. 1840 ; Lawson in Hook. f. FBI 658. 1875.

Climbing shrubs ; branches succulent, striate, sparsely crisped-pubescent ; tendrils leaf-opposed. Leaves about 25 cm long, digitately 5-foliate ; leaflets  $12 \times 7$  cm, elliptic-ovate, rounded and unequally cordate at base, dentate, crenate-serrate, crisped-pubescent to pubescent ; lateral nerves 8, parallel ; common petioles about 14 cm long ; stipules  $1.5 \times 0.5$  cm, foliaceous, auriculate, falcate, deciduous. Flowers pale green, 0.5 cm across, in dichotomously branched cymes 2.5 cm long ; calyx 0.2 cm long, cupular, truncate, puberulous without ; petals 0.4 cm long, oblong, cucullate at tips ; stamens 4 ; disk dark pink, 4-lobed ; ovary ovoid, surrounded at base by disk, style simple. Berries  $1.5 \times 1$  cm, globose ; seeds  $0.8 \times 0.5$  cm, triangular, outer edge curved, inner straight, rugose.

*Fl. & Fr.* : July-December.

*World distribution* : Dry tracts of India and Burma.

*Specimens examined* : Diguyametta, 17-11-1969, Ellis 32457 ; Diguyametta, 8-8-1972, Ellis 42194.

*Remarks* : Leaves are sourish to taste ; however, they irritate subsequently because of the presence of scleroids.

**C. pedata** (Lamk.) Gagnep. in Lecomte, Not. Syst. 1 : 346. 1918 ; Furtado in Taxon 13 : 240. 1964 ; Gamble, FPM 2 : 236. 1918. *Cissus pedata* Lamk. Dict. 1 : 31, t. 1628. 1783 ; DC. Prodr. 1 : 632. 1824 ; Planchon in DC. Monogr. Phan. 5 : 558. 1883-87. *Vitis pedata* Vahl ex Wt. & Arn. Prodr. 128. 1834 ; Lawson in Hook. f. FBI 1 : 661. 1875.

Climbing shrubs ; branches terete, striate, puberulous. Leaves about 23 cm long, pedately 7-foliate ; elliptic-ovate, obovate, unequally attenuate at base, distantly dentate, serrulate, puberulous ; petioles up to 9 cm long ; tendrils leaf-opposed. Flowers pale green, 0.4 cm across,

in axillary, branched cymes 2 cm long, bracteate, bracteolate, rachises hirtellous; calyx 0.15 cm long, lobes 4, hirtellous without; petals 0.2 cm long, cucullate and puberulous within, tomentose without; filaments dilated; disk cup-shaped; ovary ovoid, style subulate. Berries  $0.8 \times 1$  cm, subglobose, pale yellow when ripe; seeds hemispherical, deeply pitted towards centre.

*Fl. & Fr.* : June-December.

*World distribution* : India.

*Specimens examined* : Srisailam, 13-7-1963, Ellis 16853; Mahanandi, 21-8-1965, Ellis 25421; Ahobilam, 22-11-1969, Ellis 32563.

*Remarks* : Nomenclaturally this taxon is interesting, for, as pointed out by Furtado (*op. cit.*), the specific epithet, *pedata* originated in 1783 as *Cissus pedata* Lamk. and not in 1791 by Loureiro, as indicated in the 1961 Botanical Code. Notwithstanding, the actual type of the genus *Cayratia* Juss., is based on Loureiro's specimen.

*Cayratia trifolia* (Linn.) Domin in Biblioth. Bot. 89 : 37. 1927; Suesse in Engler's Planzenf. ed. 2, 20. d : 280. 1953. *Vitis trifolia* Linn. Sp. Pl. 203. 1753; Cooke, Fl. Pres. Bombay, 1 : 271. rep. ed. 1958; Haines, Bot. Bihar & Orissa, 1 : 213. rep. ed. 1961. *Cayratia carnosia* (Lamk.) Gagnep. in Lecomte, Not. Syst. 1 : 347. 1911; Gamble, FPM 2 : 237. 1918. *Cissus carnosia* Lamk. Dict. Encycl. 1 : 31. 1783; Planchon in DC. Monogr. Phan. 5 : 570. 1883-87. *Vitis carnosia* Wall. ex Wt. & Arn. Prodr. 127. 1834; Lawson in Hook. f. FBI 1 : 654. 1875.

Climbing shrubs, rather succulent; branches striate, glandular, crisped-hirtellous when young. Leaves about 18 cm long, pedately 2-3-foliolate; leaflets  $7 \times 3.5$  cm, ovate-orbicular or orbicular, unequally cordate or acute at base, crenate-dentate; tendrils leaf-opposed; stipules foliaceous, ovate, fimbriate along margins. Flowers pale green, 0.4 cm across, in dichotomously branched cymes 2.5 cm long, bracteate, bracteolate; rachises crisped-glandular puberulous; calyx 0.1 cm long, cupular, puberulous without; petals 4, ovate, cucullate at tips; disk glabrous; stamens 4; ovary ovoid. Berries  $0.5 \times 0.8$  cm, obovoid; seeds 4, triangular, rugose.

*Fl. & Fr.* : July-October.

*World distribution* : India, New Caledonia and Australia.

*Specimens examined* : Chelama, 6-7-1963, Ellis 16773; Chelama, 15-10-1964, Ellis 22022; Ahobilam, 29-8-1965, Ellis 25591.

## LEEACEAE

[Dumortier (1829) erected the family, Leeaceae from a deCandolle's tribe of Ampelideae. Bartling (1830) treated members of *Leea* Linn. as a monogeneric family, followed by workers like Planchon (1887), Gagnepain (1910, 1911, 1912), and Suessenguth (1953). No Indian botanist, nor Hutchinson (1959), has treated the members of *Leea* Linn. under Leeaceae. N. C. Nair (in *Journ. Indian bot. Soc.* 57 : 193-205, 1968 and *Bull. Nat. Sci. Acad.* 41 : 180-184, 1970) has adduced the following evidences from floral morphology and embryology to support the view that *Leea* Linn. deserves a family status : "...absence of climbers, stipules, disk, absence of raphides in seed coat, and in the presence of terminal inflorescence (extra-axillary in Vitaceae), obdiplostemonous condition, staminal tube, union of corolla and stamens at the base, inner whorl of staminodes,..." (p. 202) and concludes, "...separation of *Leea* from the Vitaceae to a family Leeaceae seems justified..." (p. 202). Ridsdale (in Steenis' *Fl. Males.* ser. I, 7 : p. 755, 1976) speaks of the family thus : "...Distinguished from the Vitaceae by the development of a complex staminodal tube, by the presence of one ovule in each locule of the ovary. Pollen is also distinct...supporting the segregation into a separate family...".]

*Leea* Linn. nom. cons.

- |   |                       |
|---|-----------------------|
| 1. Lobes of staminal tube rounded or truncate ;<br>leaflets acuminate   | <i>L. macrophylla</i> |
| 1. Lobes of staminal tube notched or bifid ;<br>leaflets crenate-serrate, dentate :                                     |                       |
| 2. Lateral nerves 15-20, close, prominent ;<br>leaflets asperous above  | <i>L. crispa</i>      |
| 2. Lateral nerves 10-11, rather distant, not<br>prominent above ; leaflets glabrous or<br>with only a few hirsute hairs | <i>L. indica</i>      |

*Leea macrophylla* Roxb. (Hort. Beng. 18. 1814) ex Hornem. Hort. Hafn. 1 : 231. 1813 ; Wt. Ic. 3 : t, 1154, 1843 ; Lawson in Hook. f. FBI 1 : 664. 1875 ; Gamble, FPM 1 : 239. 1918 ; Ridsdale in Blumea 22 : 85. 1974. *L. robusta* Roxb. [Hort. Beng. 18. 1814] ex Fl. Ind. 1 : 655. 1820 ; Wt. & Arn. 132. 1834 ; Lawson in Hook. f. FBI 1 : 667. 1875, p.p. ; Gamble, FPM 2 : 240. 1918. *L. integrifolia* Roxb. (Hort. Beng. 85. 1814) ex Fl. Ind. 2 : 472. 1824 ; Wt. & Arn. Prod. 132. 1834 ; Lawson in Hook. f. loc. cit. 667. *L. diffusa* Lawson in Hook. f. loc. cit. 667. *L. latifolia* Wall. [Cat. 6821. 1832] ex Kurz in Journ. Asiatic Soc. Bengal 44 : 178.

1875 ; Gamble, *loc. cit.* 240. *L. venkobanowii* Gamble in Kew Bull. 1917 : 26. 1917 et FPM 1 : 240. 1918.

Shrubs, about 1.5 m tall ; branches terete, striate, faintly puberulous. Leaves about 35 cm long, 3-5-foliate ; leaflets up to 25×15 cm, elliptic-ovate, acute or obtuse, unequally rounded at base, serrulate, sparingly strigose ; lateral nerves about 12 pairs, parallel ; petiolule of the end leaflet up to 4 cm long ; petioles spread at base into sheathing stipules. Flowers pale green, 0.4 cm across, in branched, corymbose cymes 10 cm long ; rachises rusty-puberulous ; calyx 0.1 cm long, lobes 5, puberulous without with membranous margins, tube 0.1 cm long ; petals 0.2 cm long, ovate-elliptic, cucullate at tips ; lobes of staminal tube rounded at apices ; disk 5-lobed ; ovary ovoid, seated on disk. Berries 0.9×0.5 cm, depressed, prominently 6-lobed ; seeds black with white-scurfy surfaces, wedge-shaped, rugose.

*Fl. & Fr.* : April-November.

*World distribution* : India and Burma.

*Specimen examined* : Ramanapenta, Gundlabrahmeswaram, 28-11-1969, Ellis 32652.

*Remarks* : Ridsdale's (*op. cit.*) treatment encompasses many species giving a broad circumscription of the species.

*Leea asiatica* (Linn.) Ridsdale in Manjilal Bot. & Hist. Hort. Malabaricus, 189. 1980. *Phytolocca asiatica* Linn. Sp. Pl. 474. 1753. *Glibertia nalugu* DC. Prodr. 4 : 256. 1830. *Leea crispa* van Rayen ex Linn. Syst. Nat. 627. 1767 ; DC. Prodr. 1 : 635. 1824 ; Lawson in Hook. f. FBI 1 : 665. 1875 ; Gamble, FPM 1 : 240. 1918 ; Ridsdale in Blumea 22 : 88. 1974. *L. herbacea* Buch.-Ham. in Trans. Linn. Soc. 14 : 228. 1823 ; Gamble, *loc. cit.* 240. *L. aspera* Edgew. in Trans. Linn. Soc. 20 : 36. 1846, *nom. illeg.* non Wall. ex G. Don ; Lawson, *loc. cit.* 665. 1875 ; Gamble, *loc. cit.* 240. *L. edgeworthii* Santapau in Rec. bot. Surv. Ind. 16 : 54. 1953. *L. pumila* Kurz in Journ. Asiatic. Soc. Bengal 41 : 302. 1872 ; Lawson, *loc. cit.* 666.

Shrubs, about 2 m tall ; branches shallowly 8-10-angled, grooved, glabrous. Leaves about 28 cm long, 3-5-foliate ; leaflets 21×10 cm, elliptic-ovate, caudate, or rhomboid, rounded or cordate at base, crenate-serrate ; lateral nerves about 12 pairs, transverse nervules prominent ; terminal leaflet petiolule up to 5.5 cm long. Flowers pale green, 0.5 cm across, in terminal and axillary, branched cymes 4 cm long, bracteate, bracteolate, pedicellate ; calyx 0.2 cm long, lobes obtuse, tube 0.1 cm

long ; petals 0.35 cm long, elliptic-ovate, cucullate at tips ; staminal lobes bifid. Berries 0.8×0.5 cm, depressed, 6-lobed ; seeds wedge-shaped.

*Fl. & Fr.* : August-November.

*World distribution* : India, in dry localities.

*Specimens examined* : Gundlabrahmeswaram, 20-7-1963, Ellis 16904 ; Upper Ahobilam, 29-8-1965, Ellis 25578 ; Gundlabrahmeswaram, 14-8-1972, Ellis 42263.

*Remarks* : Prior to Ridsdale's (*op. cit.*) work, the following conclusion had been arrived at : There is some confusion between *L. edgeworthii* Santapau, *L. herbacea* Buch.-Ham. and *L. crispa* Linn. ; they possess some characters which imperceptibly merge with one another, forming what may be termed a 'complex'. Gamble (*op. cit.*) states that *L. herbacea* is "...hardly distinct from *L. aspera*." Speaking of the same taxa, Haines (*Bot. Bihar & Orissa*, 1 : 216. rep. ed. 1961) states, "...*L. herbacea* is usually separated from *L. aspera* by the characters given in the key but I find these quite unworkable in the forest...depends on locality." The present studies indicate that in addition to *L. aspera* and *L. herbacea*, the other taxon which seems to be conspecific with both is *L. crispa* Linn. The crispations on the stems, petioles and inflorescence that mark *L. crispa* are also seen in *L. aspera* and *L. herbacea*, though to a lesser degree ; *L. crispa* is perhaps an extreme form. Even characters like one main nerve in each serrature of leaflets and asperous nature of the upper surface of leaflets seem to merge one with another. Further work is required before any definite prognostication can be made.

It is gratifying to note that conclusions arrived at about the three species are vindicated by a monographic work.

*Leea indica* (Burm. f.) Merr. in Phil. Journ. Sci. Bot. 14 : 245. 1919 ; Santapau in Rec. bot. Surv. Ind. 16 (1) : 47. rev. 3rd. ed. 1967 ; Ridsdale in Blumea 22 : 95. 1974 et in Steenis, Fl. Males. ser. I. 7(4) : 779. 1976. *Staphylea indica* Burm. f. Fl. Ind. 75. 1768. *Aquilia sambucina* Linn. Mant. pl. 2 : 211. 1771. *Leea sambucina* (Linn.) Willd. Sp. Pl. 1 : 177. 1797 ; DC. Prodr. 1 : 635. 1824 ; Lawson in Hook. f. FBI 1 : 666. 1875, p. p. ; Brandis, Indian Trees, 179. 1906 ; Gamble, FPM 2 : 240. 1918. *L. staphylea* Roxb. Fl. Ind. 1 : 658. 1832 ; Wt. & Arn. Prodr. 132. 1834 ; Wt. Ic. 1(4) : 78. 1838.

Shrubs, 1-2 m tall ; branches faintly angled, striate, lenticellate, glabrous. Leaves about 40 cm long, 2-3-pinnate ; leaflets 20×13 cm, elliptic, acuminate or cuneate, obtuse or rounded at base, serrate, crenate-serrate, dentate, chartaceous ; lateral nerves about 10 pairs ;

rachilla angular, faintly winged ; petioles and petiolules prominently channelled, expanded at base clasping rachises. Flowers white, 0.5 cm long, in branched, corymbose cymes 5 cm long, bracteate, bracteolate ; calyx 0.3 cm across, shallowly 5-lobed, brown-tomentose without ; petals 0.3 cm long, linear-ovate, cucullate at tips ; lobes of staminal tube notched at tips ; ovary surrounded by disk. Baccate 5×7 cm, depressed at top, faintly lobed ; seeds 5-6, wedge-shaped.

*Fl. & Fr.* : May-November.

*World distribution* : India, Sri Lanka China, Burma and Australia, in moist deciduous forests at low elevations.

*Specimen examined* : Rollapenta, 18-8-1972, Ellis 42310.

*Remarks* : Ridsdale (*op. cit.* 1974 & 1976) has given a very broad circumscription for this taxon including under it several taxa which hitherto had been treated as individual taxon. As he has done monographic studies on the taxon his delimitation of the specific circumscription is followed.

## SAPINDACEAE

1. Climbing herbs	CARDIOSPERMUM
1. Shrubs or trees :	
2. Petals absent :	
3. Shrubs ; leaves simple	DOBONABA
3. Trees ; leaves pinnate	SCHLECHTERA
2. Petals present :	
4. Leaves crenate-serrate	ALLOPHYLLUS
4. Leaves entire :	
5. Inflorescences terminal ; leaflets emarginate, generally more than 2 pairs	SAPINDUS
5. Inflorescences axillary ; leaflets not emarginate, only 2 pairs	LEPISANTHES

### CARDIOSPERMUM Linn.

*Cardiospermum halicacabum* Linn. Sp. Pl. 366. 1753 ; Wt. & Arn. Prodr. 1 : 109. 1834 ; Wt. Ic. 2 : t. 508. 1843 ; Hiern in Hook. f. FBI 1 : 670. 1885 ; Gamble, FPM 2 : 244. 1918 ; Radlk. in Engler, Pflanzenr. 98b : 379. 1932.

Climbing herbs ; stems prominently striate, faintly puberulous ; rootstocks woody. Leaves about 10 cm long, biennate ; petioles 5 cm long ; leaflets  $3.5 \times 1.5$  cm, ovate-lanceolate, acuminate, irregularly prominently crenate-serrate, acute or attenuate at base, sparsely hairy along nerves ; stipules small, ciliate. Flowers white, 0.3 cm across, in axillary, umbellate cymes about 2 cm long, bracteate, bracteolate ; peduncles about 9 cm long, slender ; floral pair of tendrils circinate, puberulous ; sepals 4, 0.15 cm long, ovate, outer 2 smaller ; petals 4, 0.3 cm long, spatulate, clawed at base, outer provided with scales at base within ; disk of 2 glands : stamens 8, filaments sparsely hairy ; ovary 3-celled, style short. Capsules  $1.5 \times 3$  cm, inflated, 3-winged, depressed at top, puberulous ; seeds 0.5 cm across, black.

*Fl. & Fr. :* Almost throughout the year.

*World distribution :* India, Sri Lanka and Burma, in dry localities.

*Specimens examined :* Chelama, 9-7-1963, Ellis 16754 ; Ahobilam, 31-8-1963, Ellis 25592.

#### DODONAEA Linn.

*Dodonaea viscosa* Jacq. Enom. Pl. Car. 19. 1760 ; Hiern in Hook. f. FBl. 1 : 697. 1875 ; Radlk. in Engler, Pflanzenr. 98b. 4. 165 : 1363. 1933 ; Gamble, FPM 2 : 253. 1918. *Dodonaea burmanniana* DC. Prodr. 1 : 616. 1824 ; Wt. & Arn. Prodr. 114. 1834.

Shrubs, about 1.5 m tall ; branches brown, faintly angled in young, bark fissured. Leaves  $12 \times 2.5$  cm, elliptic-obovate, attenuate at base, margins out-curved, shining, chartaceous, sticky ; lateral nerves about 25 pairs ; petioles almost oil. Flowers greenish, 0.4 cm across polygamous, in lateral or terminal, branched racemes about 4 cm long, pedicillate ; sepals 0.3 cm long, elliptic-oblong, ciliate along margins ; stamens about 10, anthers up to 0.2 cm long, few ciliate, filaments very short ; ovary in bisexual flowers tomentose, style long, glabrous, faintly lobed at top. Capsules  $1.5 \times 2$  cm, compressed, 2-4-valved, valves winged ; seeds black, globose, flattened.

*Fl. & Fr. :* August-January.

*World distribution :* Pantropic.

*Specimens examined :* Diguvametta, 18-11-1969, Ellis 32501 ; Bairanidokku, Eastern Nallamalais, 12-8-1972, Ellis 42236.

*Remarks :* A remarkable plant occupying localities from sea level to 2000 m, changing itself in habit from a shrub at low elevations to a medium-sized tree at higher altitudes in *Sholas* of peninsular India.

SCHLEICHERA Willd. *nom. cons.*

*Schleichera oleosa* (Lour.) Oken, Allg. Naturgesch. 3(2) : 1341. 1841 ; Merr. Int. Herb. Amb. 337. 1917 & in Journ. Arnold Arb. 31 : 284. 1950 ; Santapau in Rec. bot. Surv. Ind. 16(1) : 48. 3rd rep. ed. 1967. *Pistacia oleosa* Lour. Fl. Cochinch. 2 : 615. ed. 2. 1790. *Schleichera trijuga* Willd. Sp. Pl. 4(2) : 1096. 1805 ; Wt. & Arn. Prodr. 114. 1834 ; Hiern in Hook. f. FBI 1 : 681. 1885 ; Gamble, FPM 2 : 1918 ; Radlk. in Engler, Pflanzent. 98b. 874. 1932 (non Moritz).

Trees, about 15 m tall ; branches greyish, young faintly angled, striate, brown-tomentose. Leaves about 30 cm long, paripinnate ; petioles about 9 cm long ; leaflets  $15 \times 7$  cm, elliptic-ovate, obovate, oblong, unequally rounded or acute at base, coriaceous ; lateral nerves 13, reticulations prominent ; petiolules very short. Flowers pale yellow, 0.5 cm across, in axillary, many branched racemes 10 cm long, bracteate, bracteolate ; calyx 0.5 cm across, cupular, lobes 0.1 cm long, ovate, sparsely ciliate ; petals absent ; stamens 8, included, filaments ciliate ; ovary ovoid, style simple, stigmas 3-lobed ; disk hairy. Drupes about  $1.5 \times 1$  cm, ovoid, smooth or echinate ; seeds pulpy-arillate.

*Fl. & Fr.* : February-May.

*World distribution* : India and Sri Lanka.

*Specimen examined* : Chelama, 19-3-1965, Ellis 23728.

## ALLOPHYLLUS Linn.

*Allophylus cobbe* (Linn.) Racusch. Nomencl. Bot. ed. 3. 108. 1797 ; Hiern in Hook. f. FBI 1 : 673. 1875 ; Leenhouts in Blumea 15 : 322. 1967. *Rhus cobbe* Linn. Sp. Pl. 267. 1753. *Allophylus serratus* (Roxb.) Kurz in Journ. Asiat. Soc. 44(2) : 185. 1876 ; Radlk. in Engler, Pflanzenr. 98b : 562. 1932 ; Leenhouts in Blumea 15 : 351. 1967 ; S. K. Mukerjee in Indian For. 98 : 494. 1972. *Ornitrophe serrata* Roxb. Pl. Corom. 44, t. 61. 1796. *Allophylus cobbe* (Linn.) Raeusch. form. *serratus* (Roxb.) Hiern in Hook. f. op. cit. 674. 1875. *Schmidelia serrata* DC. 1 : 610. 1824 ; Wt. & Arn. Prodr. 110. 1834. *Allophylus rheedii* (Wt.) Radlk. in Engler & Prantl, Pflanzenf. 3(S) : 313. 1895 ; Gamble, FPM 2 : 246. 1918.

Small trees, about 4 m tall ; branches terete, prominently lenticellate. Leaves about 25 cm long, 3-foliolate ; leaflets about  $10 \times 6.5$  cm, ovate, elliptic-ovate, rhomboid, acute or rounded at base, crenate and dentate-serrate ; lateral nerves about 9 pairs, sparsely hirsute ; petioles up to 7 cm long. Flowers pale green or white, 0.2 cm across, clustered, in axillary spikes about 10 cm long, bracteate, bracteolate ; sepals 4, 0.2

cm long, orbicular, finely fimbriate along margins, cucullate; petals 4, 0.3 cm long, spatulate, clawed at base, hairy within; disk 4-lobed; stamens 8, filaments hairy; ovary 2-lobed. Berries 0.8 x 0.4 cm, subglobose; seeds arillate.

*Fl. & Fr.* : August-October.

*World distribution* : India, Sri Lanka, Burma and extending up to America.

*Specimen examined* : Pathalaganga, Srisailam, 20-10-1964, Ellis 22102.

*Remarks* : Leenhouts (*op. cit.*) has discussed at length the complexity of the plants coming under the genus *Allophylus* Linn. and concludes that out of 255 accepted species only one, viz. *Allophylus cobbe* (Linn.) Raeusch. is phenetically accepted; he would like to designate the locally recognisable forms as 'races'. He (*op. cit.* p. 313) concludes, "...I consider all names, enumerated in chapter 8, as synonyms." Mukerjee (*op. cit.*) working on Indian plants recognises 8 distinct species as present in India.

#### SAPINDUS Linn.

*Sapindus emarginatus* Vahl, Symb. Bot. 3 : 54. 1794; Wt. & Arn. Prodr. 111. 1834; Gamble, FPM 2 : 246. 1918; *S. trifoliatus* sensu Hiern in Hook. f. FBI 1 : 682. 1885, p. p. (non Linn.).

Trees, about 10 m tall; branches terete, striate, tomentose when young. Leaves about 60 cm long, paripinnate, exstipulate; leaflets 9 x 5 cm, about 4 pairs, elliptic-oblong, emarginate, rounded, cordate or attenuate at base, wavy along margins, coriaceous, glabrescent above, puberulous below; lateral nerves about 12 pairs; petiolules small. Flowers 0.5 cm across, brownish yellow, in terminal panicles about 15 cm long, bracteolate; sepals 0.4 cm long, oblong, cucullate, glabrous within, pubescent without; petals 0.3 cm long, spatulate, clawed at base, glabrous within, woolly without; stamens 8, filaments pilose; ovary densely hairy, 4-lobed, style simple, stigmas 4-lobed. Drupes 3 x 1.5 cm, ovoid, 3-lobed; seeds one in each locule, black.

*Fl. & Fr.* : August-December.

*World distribution* : India and Sri Lanka.

*Specimens examined* : Ahebilam, 22-11-1969, Ellis 32562; Pedda-chama, Eastern Nilgiris, 18-8-1972, Ellis 42307.

*Remarks* : The fruits are used as substitute for soap.

## LEPISANTHES Bl.

*Lepisanthes tetraphylla* (Vahl) Radlk. in Sitz. Math.-Phys. Acad. Muench. 8 : 276. 1878 et in Engler, Pflanzennr. 98 : 743, t. 15. 1932 ; Gamble, FPM 2 : 246. 1918 ; Haines, Bot. Bihar & Orissa, 1 : 220. rep. ed. 1961 ; Leenhouts in Blumea 17 : 63. 1969. *Sapindus tetraphyllus* Vahl, Symb. 3 : 54. 1794. *Lepisanthes deficiens* (Wt. & Arn.) Radlk. loc. cit. 276. 1878 ; Gamble, FPM loc. cit. *Sapindus deficiens* Wt. & Arn. Prodri. III. 1834. *Hemigyrosa canescens* (Wt. & Arn.) Bl. in Rumph. 3 : 166. 1847 ; Hiern in Hook. f. FBI 1 : 671. 1875. *Cupania canescens* Wt. & Arn. Prodri. 113. 1834.

Small trees, about 6 m tall ; branches prominently striate when young. Leaves about 18 cm long, exstipulate ; leaflets 4, 15×9 cm, elliptic, oblong, rounded or acute at base, coriaceous ; lateral nerves and reticulations prominent ; petiolules short, thick. Flowers white, 0.5 cm across, in axillary, velvety-pubescent panicles about 15 cm long, bracteate, bracteolate ; sepals 0.2 cm long, oblong-orbicular, outer two smaller, shaggy on both surfaces ; petals 0.5 cm long, unequal, ovate, fimbriate along margin, clawed at base ; disk lobed ; stamens 8, filaments vilous ; ovary ovoid, villous, style simple, stigmas oblique. Drupes 2×1.5 cm, trigonous, woody ; seeds oblong exarillate.

*Fl. & Fr.* : January-April.

*World distribution* : Peninsular India.

*Specimens examined* : Sunnipenta, Srisailam, 26-3-1965, Ellis 22769 ; Srisailam, 27-3-1965 ; Ellis 23790.

*Remarks* : Leenhouts (*op. cit.*, p.39) has given a broad circumscription of the taxon, treating it as 'The *Lepisanthes tetraphylla* complex' and includes several of the following species : *Lepisanthes deficiens*, *L. assamica* Radlk., *L. listeri* King ex Radlk., *L. cuneata* Hiern, *L. granulata* Radlk., and *L. lampanga* Radlk. He states, "...out of 38 species distinguished by Radlkofier, 33 have been included...".

It is interesting that *Lepisanthes tetraphylla* Radlk. indicates a dry evergreen type of forest ; its associate is *Memecylon umbellatum* Burm. f., again an indicator of evergreen type of forest.

## ANACARDIACEAE

1. Shrubs	..	Rhus
1. Trees :		
2. Leaves pinnate		LANNEA
2. Leaves simple :		
3. Inflorescence axillary	..	BUCHANANIA
3. Inflorescence terminal :		
4. Stamens 1 ; leaves acuminate ; fruits about $10 \times 7$ cm		MANGIFERA
4. Stamens 5 ; leaves oblong ; fruits about $1.7 \times 1.3$ cm	..	SEMECARPUS

## Rhus Linn.

*Rhus mysorensis* G. Don, Gen. Syst. 2 : 74. 1832 ; Heyne ex Wt. & Arn. Prodr. 172. 1834 ; Hook. f. FBI 2 : 9. 1876 ; Gamble, FPM 2 : 264. 1918.

Shrubs, about 1.5 m tall ; branches reddish, hirsutous, thorns about 2.5 cm long. Leaves 10 cm long, 3-foliate ; petioles 2.5 cm long ; leaflets up to  $5 \times 2.5$  cm, laterals  $2 \times 1.5$  cm, obovate, emarginate, crenate-dentate, sinuate-toothed, puberulous, attenuate at base. Flowers pale green, 0.1 cm across, in terminal and axillary panicles about 1.5 cm long, shortly pedicellate, polygamious ; sepals 0.05 cm long, linear-ovate, hirsutous without ; petals 0.1 cm long, oblong, rounded at base ; disk cupular, lobed ; stamens 5, filaments dilated at base ; ovary ovoid, styles 3, stigmas capitate. Drupes  $1 \times 0.5$  cm, flattened, 5-loculed ; seeds one in each locule.

Fl. & Fr. : December-March.

*World distribution* : Dry localities of India and Sri Lanka.

*Specimen examined* : Mahanandi, 10-12-1969, EHS 32732.

## LANNEA A. Rich. nom. cons.

*Lannea coromandelica* (Houtt.) Merr. in Journ. Arnold Arb. 19 : 353. 1939. *Dialium coromandelicum* Houtt. Nat. Hist. ser. 2. 2 : 39. 1774. *Odina wodder* Roxb. Fl. Ind. 2 : 293. 1832 ; Wt. & Arn. Prodr. 171. 1834 ; Wt. Ic. 1 : t. 60. 1840 ; Hook. f. FBI 2 : 29. 1876 ; Gamble, FPM 2 : 263. 1918.

Trees, 15 m tall, devoid of leaves when in flowers ; branches ash-coloured ; terete, young stellately brown-tomentose. Leaves about 15 cm

long, crowded at ends of branches; leaflets about  $8 \times 4$  cm, ovate, caudate, unequally rounded at base, cordate; lateral nerves about 10; petiolules 0.5 cm long. Flowers pale yellow, 0.2 cm across, subsessile, in crowded, branched racemes about 16 cm long, bracteate, polygamous; calyx small, lobes 4, oblong-orbicular, ciliate along margins, tube small; petals 0.2 cm long, oblong; stamens 8; disk lobed; ovary in female ovoid, styles 4, stigmas papillose. Drupes oblique,  $1.0 \times 0.6$  cm, compressed.

*Fl. & Fr.:* March-May.

*World distribution:* India, Sri Lanka and Burma, in dry localities.

*Specimens examined:* Chelama, 18-3-1965, Ellis 23703; Chelama, 19-3-1965, Ellis 23716.

#### BUCHANANIA Spreng.

*Buchanania axillaris* (Desr.) Ramamurthy in Saldanha & Nicholson, Fl. Hassan Dt. 374, 1976. *Mangifera axillaris* Desr. in Lamk. Encycl. 3 : 697, 1789. *Buchananta angustifolia* Roxb. Pl. Corom. t. 262, 1820 et Fl. Ind. 2 : 386, 1820; Wt. & Arn. Prodr. 169, 1834; Wt. Ic. 1 ; t, 101, 1840; Hook. f. FBI 2 : 23, 1876; Gamble, FPM 259, 1918.

Small trees, about 8 m tall; branches glabrous. Leaves  $10 \times 5$  cm, elliptic-ovate or oblong, acute at base, entire, wavy along margins, coriaceous; lateral nerves about 15 pairs; petioles up to 1.7 cm long. Flowers white, 0.4 cm across, bisexual, in axillary panicles about 2 cm long; calyx small, lobes 5, rather orbicular, faintly serrulate; petals 5, 0.2 cm long, ovate-oblong; disk crenately lobed; stamens 10, filaments thick, anthers recurved; ovary of 5 free carpels, seated on disk, pubescent, style short. Drupes  $1 \times 1$  cm, compressed-globose, bony; seed 1.

*Fl. & Fr.:* July-October.

*World distribution:* India and Sri Lanka.

*Specimens examined:* 'Nallamallays', no date given, Beddome s.n.; Ramanapenta, 28-11-1969, Ellis 32637; towards Krishnanandi, Mahanandi, Ellis 42312.

#### MANGIFERA Linn.

*Mangifera indica* Linn. Sp. Pl. 200, 1753; Wt. & Arn. Prodr. 170, 1834; Hook. f. FBI 2 : 13, 1876; Brandis, Indian Trees, 230, 1906; Gamble, FPM 2 : 259, 1918.

Trees, about 20 m tall ; branches glabrous, terete. Leaves  $18 \times 9$  cm, oblong-ovate, acute at base, wavy along margins, shining, coriaceous ; lateral nerves about 25 pairs, reticulations prominent ; petioles 2 cm long, thickened half way down. Flowers yellow, 0.5 cm across, in terminal, tomentose-panicles about 30 cm long, bracteate, bracteolate ; calyx lobes 0.1 cm long, linear-ovate, pubescent without ; petals 0.2 cm long, oblong, spatulate, sparsely hairy ; mid-nerve prominent, raised within at base ; disk 5-lobed ; stamen 1, inserted on disk ; ovary ovoid, style lateral, stigmas simple. Drupes  $10 \times 7$  cm, globose, obliquely gibbous on one side, pulp bitterly sour ; stone compressed, fibrous ; seeds oblong.

*Fl. & Fr. :* January-April.

*World distribution :* Tropics from Middle East, India, Sri Lanka and Burma.

*Specimen examined :* Along the stream Gundlakamma, Gundlbrahmeswaram, 1-4-1965, Ellis 23840.

#### SEMECARPUS Linn. f.

*Semecarpus anacardium* Linn. f. Suppl. 182. 1781 ; Wt. & Arn. Prodr. I : 168. 1834 ; Wt. Ic. 2 : t. 558. 1843 ; Hook. f. FBI 2 : 30. 1876 ; Brandis, Indian Trees, 231. 1906 ; Gamble, FPM 2 : 266. 1918.

Trees, about 10 m tall ; young branches terete, tomentose. Leaves up to  $40 \times 13$  cm, oblong, obovate, rounded or slightly cordate at base, glabrous above, puberulous beneath, coriaceous ; lateral nerves about 25 pairs, reticulations prominent ; petioles 2 cm long. Flowers pale yellow, 0.3 cm across, in terminal, branched, panicles 35 cm long ; calyx lobes ovate, small, pilose without ; petals 0.15 cm long, ovate ; stamens 5, filaments linear ; disk annular ; ovary pilose, styles 3, stigmas bilobed. Drupes  $1.7 \times 1.3$  cm, ovoid, glabrous, seated on fleshy receptacle ; seeds thick.

*Fl. & Fr. :* August-December.

*World distribution :* Tropical countries from India, Sri Lanka, Malaysia and North Australia.

*Specimens examined :* Gundlbrahmeswaram, 20-7-1963, Ellis 16930 ; Gundlbrahmeswaram, 21-7-1963, Ellis 16937 ; Ramanapenta, Gundlbrahmeswaram, 28-11-1969, Ellis 32630 ; Rollapenta, 16-8-1972, Ellis 42279.

## MORINGACEAE

## MORINGA Adans.

*Moringa concanensis* Nimmo [in Grah. Cat. 43, 1839] ex Dalz. & Gibson, Bombay Fl. 311, 1861; Brandis, For. Fl. 130, 1874; Hook. f. FBI 2 : 45, 1876; Gamble, FPM 2 : 270, 1918.

Trees, about 8 m tall; branches terete, bark often loose. Leaves about 40 cm long, bipinnate; petioles 10 cm long; leaflets elliptic-orbicular, retuse, rounded at base, puberulous above, about  $2.5 \times 2$  cm; lateral nerves about 8 pairs, prominent. Flowers pale yellow, 2.5 cm across, in branched, panicles about 30 cm long, bracteate; pedicels 1 cm long, articulated; sepals 5,  $1.3 \times 0.8$  cm, linear-lanceolate or oblong, reflexed; petals 1.5 cm long, spatulate, clawed at base; stamens 10, 5 fertile alternating with 5 sterile, filaments dilated, hairy at base; ovary linear, pubescent. Capsules 30 cm long, elongated, slightly 3-angled, irregularly undulate; seeds many, 3-angled and winged.

Fl. & Fr. : December-March.

World distribution : Peninsular India.

Specimen examined : Pathalaganga, Srisailam, 25-3-1965, Ellis 23756.

Remarks : Brandis (*op. cit.*) states that the unripe fruits of *Moringa concanensis* are eaten. However, our enquiries with the local people indicate that neither the fruits nor leaves are eaten, as they are extremely bitter. In fact, all the trees which we saw at Srisailam were full of ripened fruits hanging down imparting a pretty sight; it is obvious that nobody had plucked them.

Regarding the position of the family there have been diverse opinions : Bentham and Hooker f. (*Genera Plantarum* 1 : 430, 1862) place it after the Coriariaceae and before Connaraceae. Melchior (in Engler, *Syl. Pflanzenf.* 2 : 190, 1964) treats it under the Papaverales in the class Moringineae next to Resedineae. Datta and Mitra (in *Journ. Bombay nat. Hist. Soc.* 47 : 355-357, 1947) state that "...phylogenetically related with the family Violaceae." Hutchinson (*Genera of Flowering Plants* 2 : 318, 1967) places the family Moringaceae in between Capparaceae and Tovariaceae under the order Capparidales. Lately, Verdcourt (in *Kew Bull.* 40 : 1-23, 1985) is of the opinion (p. 2) : "The relationships of the Moringaceae to other families are scarcely satisfactorily settled...".

## FABACEAE (PAPILIONACEAE)

1. Generally trees, sometimes climbing shrubs :

  2. Legumes compressed, winged on one suture or both sutures :
    3. Legumes obovate, tapering at both ends ; inflorescences more than 20 cm long .. DERRIS
    3. Legumes orbicular ; inflorescences up to 6 cm long .. PTEROCARPUS
  2. Legumes compressed or not, not winged :
    4. Legumes compressed :
      5. Legumes silky-tomentose .. MUNDULEA
      5. Legumes glabrous .. DALBERGIA
      4. Legumes torulose .. ERYTHRINA
    1. Herbs or shrubs, erect or climbing :
      6. Climbing shrubs :
        7. Stinging hairs present on legumes ; stamens diadelphous .. MUCUNA
        7. Stinging hairs not present on legumes ; stamens monadelphous :
          8. Racemes pendulous ; upper lip of calyx projecting .. PURARIA
          8. Racemes not pendulous ; upper lip of calyx not projecting .. CANAVALIA
        6. Climbing or erect herbs :
          9. Calyx accrescent .. PARACALYX
          9. Calyx not accrescent :
            10. Inflorescences 35 cm long .. UBARIA
            10. Inflorescences less than 10 cm long :
              11. Seeds bright red .. ABRUS
              11. Seeds pale green, white or black :
                12. Leaflets 0.4 cm long ; marshy plants .. ABSCHYNOMENI
                12. Leaflets more than 1 cm long ; dry-land plants :
                  13. Legumes cylindric :
                    14. Hairs on leaves and stems basifixed :
                      15. Stipules midifixed .. VIGNA
                      15. Stipules basifixed .. CROTALARIA
                    14. Hairs on leaves and stems midifixed .. INDIGOPIRA
                  13. Legumes compressed :
                    16. Leaves orbicular ; legumes 1-seeded .. ELMOPIS

16. Leaves ovate ; legumes 1-to many-seeded :		
17. Legumes prominently diagonally ridged between seeds ..		ATYLOSTIA
17. Legumes not prominently ridged between seeds :		
18. Inflorescences glumaceous		ALYSICARPUS
18. Inflorescences not glumaceous :		
19. Inflorescences confined to ends of rachis with prominent bracts ; joints of legumes rugose ..		STYLOSANTHES
19. Inflorescences not confined to ends of rachis ; joints of legumes not rugose :		
20. Legumes glochidiate ; bracts prominent ..		ZORNIA
20. Legumes not glochidiate ; bracts not prominent :		
21. Leaves 1-3-foliolate :		
22. Legumes 2-seeded		RHYNCHOSIA
22. Legumes 4-to many-seeded :		
23. Leaves gland-dotted beneath		FLEMINGIA
23. Leaves not gland-dotted beneath :		
24. Pods—omentum of several, 1-seeded joints		DESMODIUM
24. Pods—flattened, 4-5-seeded		DOLICHOS
21. Leaves pinnate		TEPIROSIA

## DERRIS Lour. nom. cons.

1. Lianas	<i>D. scandens</i>
1. Trees	<i>D. indica</i>

**Derris scandens** (Roxb.) Benth. in Journ. Linn. Soc. 4. Suppl. 103. 1860 ; Baker in Hook. f. FBI 2 : 240. 1878 ; Gamble, FPM 2 : 387. 1918 ; Thothathri in Bull. bot. Surv. Ind. 3 : 177. 1961. *Dalbergia scandens* Roxb. Pl. Corom. 2 : 49, t. 192. 1805 ; DC. Prodr. 2 : 417. 1825 ; Wt. & Arn. Prodr. 1 : 264. 1834.

Lianas ; branches purplish, terete, pubescent and lenticellate when young. Leaves about 10 cm long, imparipinnate ; stipules small ; leaflets about  $6.5 \times 2.5$  cm, obovate, emarginate, rounded or acute at base, coriaceous ; petiolules 0.2 cm long, channelled above ; nerves and reticulations prominent. Flowers pale pink, 0.5 cm long, in axillary racemes 30 cm long, bracteate, bracteolate ; calyx brick red, 0.2 cm long, silky puberulous without, lobes shallow ; petals 0.8 cm long, wings sparsely pubescent along margins at base ; stamens monadelphous, anthers purplish ; ovary pubescent. Legumes about  $8 \times 1.5$  cm,

compressed, tapering at both ends, winged along upper suture, puberulous, 2-3-seeded.

*Fl. & Fr.* : June-December.

*World distribution* : India, Sri Lanka, China, Malaysia and North Australia.

*Specimens examined* : Chelama, 10-12-1963, Ellis 18053 ; Mahanandi, 21-8-1965, Ellis 25433 ; Mahanandi, 22-8-1965, Ellis 25452 ; Diguvametta, 18-11-1969, Ellis 32507 ; Mahanandi, 22-8-1972, Ellis 42327.

*Derris indica* (Lamk.) S.S.R. Bennet in Journ. Bombay nat. Hist. Soc. 68 : 302. 1971. *Galedupa indica* Lamk. Encycl. 2 : 594. 1788-89. *Cytisus pinnatus* Linn. Sp. Pl. 1 : 741. 1790 (non *Derris pinnata* Lour. 1790). *Pongamia pinnata* Vent. Jard. Malm. t. 28. 1803 ; Thothathri in Bull. bot. Surv. Ind. 3 : 418. 1962. *P. glabra* Vent. Jard. Malm. t. 28. 1803, p.p. ; DC. Prodr. 2 : 416. 1825 ; Wt. Ic. 1 : t. 59. 1840 ; Baker in Hook. f. FBI 2 : 240. 1876 ; Gamble, FPM 2 : 387. 1918.

Trees, about 15 m tall ; young branches purplish, lenticellate. Leaves about 20 cm long, 3-7-pinnate ; petioles pulvinate at base ; leaflets 10×5 cm, ovate-lanceolate, acuminate, acute or rounded at base, chartaceous to coriaceous ; petiolules 0.5 cm long, dark brown. Flowers pale pink, 1.2 cm long, in axillary racemes 22 cm long ; calyx 0.3 cm long, truncate or faintly lobed, puberulous without ; petals 1.2 cm long, sparingly sericeous without ; stamens monadelphous, filaments glabrous ; ovary densely pubescent. Legumes about 5×2.5 cm, obliquely oblong, beaked, shortly stalked at base, flattened ; seeds 1, flattened, thick, oily.

*Fl. & Fr.* : March-December.

*World distribution* : Tropics from India, Sri Lanka, Malaysia and North Australia.

*Specimens examined* : Gundlabrahmeswaram, 31-3-1965, Ellis 23826 ; Upper Ahobilam, 29-8-1965, Ellis 25577 ; Upper Ahobilam, 22-11-1969, Ellis 32579.

*Remarks* : From the totality of characters of this species arguments of Bennet are followed (*op. cit.*) for treating the plant under *Derris* Lour. : the differences between *Derris* Lour. and *Pongamia* Vent. are too small for treating them under two separate genera ; even the winged nature of the fruit on the dorsal suture which has been taken as the main difference between the two genera by several workers seems to be rather insignificant when one considers the indication of the presence of an incipient wing on the dorsal suture of the fruits. It is therefore treated under *Derris* Lour.

## PTEROCARPUS Linn.

*Pterocarpus marsupium* Roxb. Pl. Corom. 2 : 9, t. 116. 1798 ; DC. Prodr. 2 : 418. 1825 ; Wt. & Arn. Prodr. 266. 1834 ; Baker in Hook. f. FBI 2 : 239. 1876 ; Brandis, Indian Trees, 240. 1906 ; Prain in Journ. Asiatic Soc. Bengal 66 : 455. 1898 et in Indian For. 26 Suppl. 15. 1900 ; Gamble, FPM 2 : 385. 1918.

Trees, about 15 m tall ; branches dark brown when young, striate, bark thick, sap red. Leaves 10 cm long, 5-7-foliolate, exstipulate ; leaflets about 12 x 8 cm, elliptic-oblong, ovate, emarginate, almost bilobed, rounded at base, coriaceous ; nerves and reticulations prominent, laterals almost parallel ; petioles thick. Flowers yellow, 1 cm long, in terminal, much-branched panicles about 6 cm long, bracteate ; calyx 0.5 cm long, brown-tomentose, lobes ovate ; petals 1 cm long, ovate-spathulate, margins crisped ; stamens diadelphous, filaments glabrous ; ovary silky pubescent, style and stigmas glabrous. Legumes 5 x 4 cm, compressed, winged, orbicular, apex curved ; seeds reniform.

*Fl. & Fr.* : April-December.

*World distribution* : India and Sri Lanka, in moist deciduous forests.

*Specimens examined* : Without exact locality, 'Nallamalays', no date given, no collector's name ; Chelama, 15-7-1963, Ellis 16881 ; Chelama, 8-12-1963, Ellis 18027 ; Ahobilam, 28-8-1965, Ellis 25543 ; Ahobilam, 22-11-1969, Ellis 32569.

*Remarks* : *Pterocarpus marsupium* Roxb. which assumes huge proportions with prominent buttressed roots in some tracts is rather stunted in Nallamalais.

Gamble (*op. cit.*) mentions about the occurrence of *Pterocarpus santalinus* Linn. f. in '...S. Kurnool...', perhaps including the Ahobilam area of Nallamalais ; however, it has not been collected from the Nallamalais in our tours.

## MUNDULEA Benth.

*Mundulea sericea* (Willd.) A. Cheval in Compt. Rend. 180 : 1521. 1925. *Cytisus sericeus* Willd. Sp. Pl. 3 : 1121. 1802. *Tephrosia suberosa* DC. Prodr. 2 : 249. 1825 ; Wt. & Arn. Prodr. 210. 1834. *Mundulea suberosa* (DC.) Benth. in Miq. Pl. Jung. 2 : 48. 1852 ; Baker in Hook. f. FBI 2 : 110. 1876 ; Brandis, Indian Trees, 219. 1906 ; Gamble, FPM 2 : 314. 1918.

Trees, about 5 m tall ; young branches tomentose, bark thick,

suberous. Leaves 15 cm long, imparipinnate, stipulate; petioles about 10 cm long; leaflets  $2 \times 1.5$  cm, elliptic-acuminate, apiculate or emarginate, rounded at base, coriaceous, densely sericeous below; midribs glandular at tips. Flowers pinkish-violet, 2 cm long, in axillary racemes 6 cm long; calyx 0.4 cm long, densely pubescent without, lobes ovate; petals 2 cm long, standard sericeous without, rest glabrous; stamens monadelphous, filament tube glabrous, free ends thick; ovary densely pubescent, style and stigmas glabrous. Legumes 10  $\times$  1 cm, compressed, entire or indented between seeds, silky tomentose.

*Fl. & Fr.*; June-August.

*World distribution*: Africa, India and Sri Lanka, in dry localities.

*Specimens examined*: 'Kotakota', Kurnool Dt., March 1883, J. S. Gamble 10963; Srisailam, 12-7-1966, Ellis 16818; Bajranidokku, Eastern Nallamalais, 12-8-1972, Ellis 42240.

#### DALBERGIA Linn. f. nom. cons.

1. Lianas; branchlets often hooked	..	<i>D. volubilis</i>
1. Trees:		
2. Leaflets 7 $\times$ 7 cm; inflorescences glabrous	..	<i>D. latifolia</i>
2. Leaflets up to 5 $\times$ 3 cm; inflorescences rusty-pubescent:		
3. Lateral nerves on leaves parallel; leaflets acute at base		<i>D. lanceolaria</i>
3. Lateral nerves on leaves not parallel; leaflets rounded at base	..	<i>D. paniculata</i>

*Dalbergia volubilis* Roxb. Pl. Corom. 2: 48, t. 191. 1798; DC. Prodr. 2: 417. 1825; Wt. & Arn. Prodr. 265. 1834; Baker in Hook. f. FBI 2: 235. 1876; Prain in Ann. Roy. bot. Gard. Calcutta 10: 100, t. 85. 1904; Gamble, FPM 2: 384. 1918. *D. confertiflora* Benth. in Journ. Linn. Soc. 4: Suppl. 41. 1860, p. p.; Baker, op. cit. 2: 233. 1876, p. p.

Lianas; branches terete, striate, glabrous, often modified into thickened spiral hooks. Leaves 9-foliate, 12 cm long; leaflets up to 4.5  $\times$  2 cm, oblong-ovate; obovate, orbicular, apiculate, rounded or acute at base; lateral nerves about 15 pairs, reticulations rather prominent; petiolules 0.4 cm long; stipules ovate, deciduous. Flowers lilac, 0.5 cm long, in terminal panicles about 40 cm long; calyx 0.3 cm long, brown-tomentose without, lobes unequal; petals glabrous; stamens diadelphous, in 2 bundles; ovary glabrous. Legumes about 5  $\times$  2 cm, oblong, compressed, abruptly stipitate, glabrous.

*Fl. & Fr.* : January-April.

*World distribution* : India, Sri Lanka to Malaysia, in moist deciduous and evergreen forests.

*Specimens examined* : Dhone, Kurnool Dt., March 1883, J. S. Gamble 10966 ; Bairuti, February 1887, J.S. Gamble 18711 ; Nallamalais, March 1883, J. S. Gamble 10931 ; Gundlabrahmeswaram, 31-3-1965, Ellis 23813.

**Dalbergia latifolia** Roxb. Pl. Corom. 2 : 7, t. 113. 1798 ; DC. Prodr. 2 : 416. 1825 ; Wt. & Arn. Prodr. 264. 1834 ; Wt. Jr. 3 : t. 1156. 1844 ; Baker in Hook. f. FBI 2 : 231. 1876 ; Prain in Ann. Roy. bot. Gard. Calcutta 10 : 80, t. 62. 1904 ; Brandis, Indian Trees, 233. 1906 ; Gamble, FPM 2 : 383. 1918.

Trees, about 20 m tall ; branches terete, striate, glabrous. Leaves about 20 cm long, generally 5-foliolate (10 in some) ; leaflets up to 7×7 cm, alternate, ovate-orbicular, emarginate, suddenly acute at base, coriaceous ; lateral nerves about 7 pairs, reticulations prominent ; petioles 1 cm long, thick. Flowers white with a pale yellow tinge, 0.7 cm long, in axillary, branched, rather crowded panicles 7 cm long, bracteate ; calyx 0.4 cm long, glabrous without, sparsely hairy along margins, lobes oblong ; petals 0.4×0.2 cm, clawed at base ; stamens 5+5, filaments connate, glabrous ; ovary glabrous. Legumes about 3×0.8 cm, compressed ; seeds 3.

*Fl. & Fr.* : August-March.

*World distribution* : India.

*Specimens examined* : Mahanandi, 22-8-1965, Ellis 25464 ; Chelama, 9-12-1963, Ellis 18045.

**D. lanceolaria** Linn. f. Suppl. 316. 1781 ; DC. Prodr. 2 : 417. 1825 ; Baker in Hook. f. FBI 2 : 235. 1876 ; Prain in Ann. Roy. bot. Gard. Calcutta 10 : 93, t. 76. 1904 ; Brandis, Indian Trees, 236. 1906 ; Gamble, FPM 2 : 383. 1918. **D. frondosa** Roxb. [Hort. Beng. 53. 1814] Fl. Ind. 226. 1832 ; Wt. & Arn. Prodr. 266. 1834, p.p. ; Wt. Jr. 1 : t. 268. 1840.

Trees, about 15 m tall ; branches terete, striate, brown-tomentose when young. Leaves 18 cm long ; petioles 0.5 cm long ; leaflets up to 15, about 4×1.8 cm, ovate-oblong, retuse, acute at base, coriaceous ; lateral nerves parallel, reticulations prominent below ; petiolules 0.5 cm long. Flowers white with a bluish tinge, 1 cm long, in axillary panicles about 3 cm long, bracteate ; calyx 0.4 cm long, pubescent without, lobes uneven ; petals 0.5 cm long, glabrous ; stamens diadelphous, 5+5, filaments

glabrous ; ovary pubescent. Legumes  $8 \times 1.8$  cm, compressed, ovate, stipitate, rather prominently nerved, up to 3-seeded.

*Fl. & Fr.* : March-November.

*World distribution* : India and Sri Lanka.

*Specimens examined* : Dhone, March 1883, *J. S. Gamble* 10966 ; Mahanandi, 21-8-1965, *Ellis* 25441 ; Ahobilam 22-11-1969, *Ellis* 32570 ; Mahanandi, 22-8-1972, *Ellis* 42329.

**Dalbergia paniculata** Roxb. Pl. Corom. 2 : 8, t. 114. 1798 ; DC. Prodr. 2 : 417. 1825 ; Wt. & Arn. Prodr. 265. 1834 ; Baker in Hook. f. FBI 2 : 236. 1876 ; Prain in Ann. Roy. Bot. Gard. Calcutta 10 : 87, t. 68. 1904 ; Gamble, FPM 2 : 383. 1918.

Trees, about 15 m tall ; branches terete, striate, glabrous. Leaves up to 11 cm long ; leaflets about 15, about  $5 \times 3$  cm, ovate-oblong, orbicular, emarginate, rounded at base, coriaceous ; nerves not prominent, reticulations prominent ; petioles 0.4 cm long. Flowers white, 0.7 cm long, in axillary, branched, panicles 12 cm long ; peduncles and pedicels rusty-pubescent ; calyx rusty pubescent without, lobes ovate ; petals 0.7 cm long, standard narrow ; stamens diadelphous, 5+5, filaments glabrous ; ovary pubescent. Legumes  $7 \times 1.5$  cm, compressed, ovate, stipitate ; seeds 1.

*Fl. & Fr.* : May-August.

*World distribution* : Peninsular India.

*Specimens examined* : Chelama, 6-7-1963, *Ellis* 16775 ; Srisailam, 12-7-1963, *Ellis* 16820.

#### ERYTHRINA Linn.

**Erythrina stricta** Roxb. [Hort. Beng. 53. 1814] Fl. Ind. 3 : 251. 1832 ; Wt. & Arn. Prodr. 260. 1834 ; Baker in Hook. f. FBI 2 : 189. 1876 ; Brandis, Indian Trees, 227. 1906 ; Gamble, FPM 2 : 354. 1918.

Trees, about 10 m tall ; branches prickly, bark suberous. Leaves about 30 cm long, trifoliolate ; petioles 8 cm long ; leaflets about  $12 \times 12$  cm, ovate, abruptly acuminate, truncate at base ; stipels glandular. Flowers red, 4 cm long, in terminal racemes 10 cm long, bracteate ; calyx 1.5 cm long, spathaceous, splitting half-way down on one side ; petals 4 cm long, standard longest ; stamens 10, filaments free at top. Legumes about 15 cm long, torulose, stalked ; seeds 5.

*Fl. & Fr.* : February-April.

*World distribution* : India, often planted.

*Specimen examined* : Gundlabrahmeswaram, 2-4-1965, Ellis 23850.

MUCUNA Adans. *nom. cons.*

- |  |                    |
|--|--------------------|
| 1. Legumes S-shaped ; leaves 25 cm long                              | <i>M. pruriens</i> |
| 1. Legumes curved at tips, not S-shaped ; leaves about<br>15 cm long | <i>M. hirsuta</i>  |

***Mucuna pruriens* (Linn.) DC. Prodr. 2 : 405. 1825 ; Baker in Hook. f. FBI 2 : 187. 1876. *Dolichos pruriens* Linn. in Stickman, Diss. Herb. Amb. 23. 1754. *Sitzolobium pruriens* (Linn.) Medicus, Vorles. Churfalz. Phys. —Ocon. Ges. 2 : 399. 1787 ; Hara, Fl. East. Himalayas 164. 1966 ; Arcy in Ann. Miss. bot. Gardn. 62 : 769. 1980. *Mucuna prurita* Hook. Bot. Misc. 2 : 348. 1831 ; Wt. & Arn. Prodr. 255. 1834 ; Gamble, FPM 2 : 356. 1918.**

Climbing herbs ; branches terete, striate, puberulous. Leaves about 25 cm long, trifoliolate, stipulate ; petioles about 20 cm long ; leaflets about  $12 \times 8$  cm, ovate, unequally truncate at base, terminal rhomboid ; stipels minute. Flowers dark purple, 3.5 cm long, in axillary racemes 10 cm long, bracteate ; calyx 0.7 cm long, lobes linear-ovate, white-silky pubescent without ; petals glabrous, standard pale yellow, auricled at base ; stamens diadelphous, anthers dimorphic ; ovary sericeous. Legumes  $17 \times 1$  cm, prominently S-shaped, densely silky pubescent with irritant bristles : seeds orbicular.

*Fl. & Fr.* : October-February.

*World distribution* : Tropics from Africa, India, Sri Lanka, Burma and Malaysia.

*Specimens examined* : Chelama, 7-12-1963, Ellis 17958 ; Diguvametta, 19-11-1969, Ellis 32540.

***M. hirsuta*** Wt. & Arn. Prodr. 254. 1834 ; Baker in Hook. f. FBI 2 : 187. 1876 ; Gamble, FPM 2 : 355. 1918.

Climbing herbs ; branches terete, striate, angled, brown-pubescent. Leaves about 15 cm long, trifoliolate, stipulate ; petioles 4 cm long ; leaflets  $11 \times 6$  cm, ovate, apiculate, unequally truncate at base, densely sericeous beneath, sparsely so above ; lateral nerves about 9, reticulations prominent above. Flowers pale violet, 3.5 cm long, in axillary racemes 12 cm long, bracteate ; calyx 0.7 cm long, silky-pubescent without, lobes 0.3 cm long, ovate ; petals glabrous ; stamens diadelphous, anthers dimorphic ; ovary densely pubescent, stigmas glabrous. Legumes

$6 \times 1$  cm, flattened, outcurved at tips, densely silky brown-pubescent with irritant bristles; seeds 5, rounded.

*Fl. & Fr.* : October-February.

*World distribution* : Peninsular India, in dry localities.

*Specimens examined* : Diguvametta, 28-10-1906, C.A. Barber 8002; Chelama, 10-12-1963, Ellis 18066.

#### PUERARIA DC.

*Pueraria tuberosa* (Roxb.) DC. Prodr. 2 : 240. 1825; Wt. & Arn. Prodr. 205. 1834; Wt. Ic. 2 : t. 412. 1843; Baker in Hook. f. FBI 2 : 197. 1876; Gamble, FPM 2 : 360. 1918. *Hedysarum tuberosum* Roxb. in Willd. Sp. Pl. 3 : 1197. 1802.

Lianas; stems woody, dark brown when young, striate, puberulous, bark pale, wrinkled; roots tuberous. Leaves about 22 cm long, trifoliolate; petioles about 10 cm long; stipules  $0.8 \times 0.4$  cm, hastate at base; leaflets about  $12 \times 7$  cm, ovate, caudate-acuminate, unequally truncate at base, the central acute at base, silky pubescent when young; stipels small. Flowers white with pale pink tinge, 1 cm long, in axillary, many-branched, lax, pendulous racemes about 40 cm long, bracteate, bracteolate; calyx bluish pink, 0.5 cm long, upper lip projected, silky pubescent without, less so within; petals glabrous; stamens monadelphous, filaments glabrous, connate up to two-thirds their length; ovary pubescent. Lomentum  $7 \times 1$  cm, compressed, brown-hirsute without; seeds oblong.

*Fl. & Fr.* : March-May.

*World distribution* : India, in dry tracts.

*Specimens examined* : Bairuti, Feb. 1887, J.S. Gamble 18709; Gundlabrahmeswaram, 30-3-1965, Ellis 23805.

*Remarks* : This is a rare plant in Nallamalais.

#### CANAVALIA DC. *nom. cons.*

*Canavalia gladiata* (Jacq.) DC. Prodr. 2 : 404. 1825; Wt. & Arn. Prodr. 253. 1834; Chatterjee in Journ. Indian bot. Soc. 28 : 86. 1949. *Dolichos gladiatus* Jacq. Coll. Bot. 2 : 276. 1788. *Canavalia ensiformis* sensu Baker in Hook. f. FBI 2 : 195. 1876 et auct. pl. non DC.; Gamble, FPM 2 : 359. 1918.

Shrubby climbers; branches terete, glabrous. Leaves about 20 cm long, trifoliolate; stipules small; leaflets  $10 \times 6$  cm, ovate, abruptly

acuminate, rounded at base; nerves and reticulations rather prominent below. Flowers purplish, 4 cm long, in axillary racemes 30 cm long, bracteate; calyx 1.5 cm long, bilabiate, lobes ovate, hairy within; petals 2 cm long, standard reflexed; stamens monadelphous, glabrous; ovary pubescent. Legumes 12×3 cm, compressed, thickened along both sutures; seeds about 15, pinkish brown.

*Fl. & Fr.* : August-October.

*World distribution* : Pantropics, often cultivated.

*Specimens examined* : Srisailam, 15-7-1963, Ellis 16880; Chelama, 10-12-1965, Ellis 18065; Srisailam, 21-10-1964, Ellis 22127; Diguvametta, 19-11-1969, Ellis 32555.

*Remarks* : Chatterjee (*op. cit.* p. 86) has traced the history of this species and is of the opinion that the specific epithet, *ensiformis* which rightly belongs to an American plant has wrongly been used for the Indian plant. The old world plant should be known as *Canavalia gladiata* (Jacq.) DC.; true *ensiformis* has white seeds, whereas *C. gladiata* has red seeds.

#### PARACALYX Ali

*Paracalyx scariosus* (Ait.) Ali in Univ. Stud. Karachi 5: 95. 1968.  
*Cylista scariosa* Ait. Hort. Kew. 3: 512. 1789; Roxb. Pl. Corom. 1: 64, t. 92. 1795; DC. Prodr. 2: 410. 1825; Wt. & Arn. Prodr. 259. 1834; Wt. Ic. 4: t. 1597. 1850; Baker in Hook. f. FBI 2: 219. 1876; Gamble, FPM 2: 371. 1918.

Small, climbing herbs; branches terete, striate, pubescent. Leaves 10 cm long, trifoliolate, stipulate; leaflets 6×4.5 cm, ovate-lanceolate, rhomboid, sparsely pubescent, glandular below; stipels small. Flowers pale yellow, 3 cm long, in axillary racemes 12 cm long, bracteate; calyx 1 cm long, lobes scarious, lowest largest, membranous, reticulately veined; petals 2 cm long, standard puberulous without, with 2 small appendages near base within; stamens diadelphous; ovary pubescent, style filiform. Legumes 0.4 cm long, oblique, enclosed in the accrescent calyx; seeds 1.

*Fl. & Fr.* : October-March.

*World distribution* : India, in dry localities.

*Specimens examined* : Bairuti, February 1887, J.S. Gamble 18712; Gundlabrahmeswaram, 31-3-1965, Ellis 23831.

## URARIA Desv.

*Uraria picta* (Jacq.) Desv. in Journ. Bot. I : 123, t. 5. 1813 ; DC. Prodr. 2 : 324. 1925 ; Wt. & Arn. Prodr. 221. 1834 ; Baker in Hook. f. FBI 2 : 155. 1876 ; Gamble, FPM 2 : 336. 1918. *Hedysarum pictum* Jacq. Ic. Rar. 3 : 262, t. 567. 1783.

Robust herbs, about 70 cm high ; branches terete, striate, faintly puberulous. Leaves 12 cm long, 5-foliate, stipulate ; leaflets  $20 \times 3$  cm, variegated, linear, unequally rounded at base, coriaceous, margins excised, pale and sparsely puberulous beneath, stipellate ; lateral nerves and transverse nervules prominent beneath. Flowers violet, 1.5 cm long, in axillary, densely spicate racemes 35 cm long, bracteate : rachises and pedicels hirsutous with hooked hairs ; calyx 0.4 cm long, bilabiate, lobes ciliate-acuminate, puberulous, hirsute along margins ; petals 0.8 cm long, standard with 2 yellow spots ; stamens diadelphous ; ovary glabrous. Lomentum 1 cm long, 3-4, convolute within one another ; seeds white, shining.

*Fl. & Fr. :* August-October.

*World distribution :* Tropics from Africa, India, Sri Lanka, Malaysia and Philippine Islands.

*Specimens examined :* Gazulapalli, 4-9-1917, K. C. Jacob 14989 ; Nallamalai Hills, 13-8-1921, C. E. C. Fischer 4661 ; Chelama, 9-7-1963, Ellis 16785 ; Chelama, 15-10-1964, Ellis 22023 ; Mahanandi, 21-8-1965, Ellis 25413 ; Chinnamantra, 17-8-1972, Ellis 42296.

## AURUS Adan.

*Abrus precatorius* Linn. Syst. Nat. ed. 12 : 472. 1767 ; DC. Prodr. 2 : 381. 1825 ; Wt. & Arn. Prodr. 236. 1834 ; Baker in Hook. f. FBI 2 : 175. 1876 ; Gamble, FPM 2 : 349. 1918 ; Breteler in Blumea 10 : 617. 1960.

Twining herbs ; stems terete, sparsely pubescent when young. Leaves about 9 cm long, paripinnate ; stipules scarious ; petioles about 6 cm long ; leaflets up to  $1 \times 0.2$  cm, about 15 pairs, linear-oblong, apiculate, rounded or narrowed at base, sparsely hairy on both surfaces ; nerves and reticulations rather prominent ; petiolules small. Flowers pale pink, 7 cm long, in axillary racemes 10 cm long, often clustered at ends of peduncles, bracteate, bracteolate ; calyx 0.2 cm long, puberulous without, lobes shallow ; stamens 9, filaments connate up to the top, glabrous ; ovary hirsute, style and stigmas glabrous. Legumes  $4.5 \times 1.2$  cm, flattened, oblong, turgid, beaked at tips, hairy, about 5-seeded ; seeds scarlet with a black spot, shining.

*Fl. & Fr.* : August-January.

*World distribution* : Tropics from India, Sri Lanka to Malaysia.

*Specimens examined* : Mahanandi, 21-8-1965, Ellis 25434 ; Diguvametta, 18-11-1969, Ellis 32517 ; Mahanandi, 22-8-1972, Ellis 42324.

*Remarks* : Kannabiran (in *Curr. Sci.* 44 : 675-677. 1975) has discussed the systematic position of *Abrus precatorius* Linn. based on stomatal studies and has come to the conclusion that the presence of paramesogenous stomata in the leaves of *A. precatorius* Linn. shows its clear relationship with the *Phaseoleae*, supporting Venkateshwarlu and Seshuvetaram (in *Journ. Indian Bot. Soc.* 50 : 332. 1971), thus suggesting the removal of the genus *Abrus* from the *Vicieae*.

#### AESCHYNOMENE Linn.

*Aeschynomene indica* Linn. Sp. Pl. 713. 1753 ; DC. Prodr. 2 : 320. 1825 ; Wt. & Arn. Prodr. 219. 1834 ; Wt. Ic. 2 : t. 405. 1843 ; Baker in Hook. f. FBI 2 : 151. 1876 ; Gamble, FPM 2 : 331. 1918 ; Rudd in Reinwardtia 5 : 30. 1959 ; Subramanyam, Aquat. Angios. 14. 1962.

Robust herbs, about 1 m high, in marshy places ; stems about 4 cm in diameter, woody, terete, striate, sparingly hirsute ; roots fibrous. Leaves 10 cm long, imparipinnate, rachis glandular ; stipules 0.5 cm long, linear-ovate, serrate ; petioles 5 cm long ; leaflets 0.4 cm long, numerous, linear, apiculate, obtuse at both ends ; midrib raised below. Flowers pale yellow with maroon streaks on the standard, 0.7 cm long, in axillary racemes 2 cm long, bracteate, bracteolate ; pedicels glandular ; calyx 0.2 cm long, bilabiate, glabrous ; petals 0.5 cm long, standard orbicular ; stamens diadelphous, 5+5, filaments, glabrous ; ovary sparingly pilose, stipitate. Lomentum 4 cm long, flattened, 6-8-jointed, slightly falcate, smooth to prominently tuberculated ; seeds shining.

*Fl. & Fr.* : August-December.

*World distribution* : Pantropic.

*Specimens examined* : Ahobilam, 29-8-1965, Ellis 25583 ; Chenchukunta, Diguvametta, 18-11-1969, Ellis 32510.

*Remarks* : B. D. Sharma (in *Bull. Bot. Surv. Ind.* 10 : 369-373. 1968) has adduced significant palynological data to separate the two Indian species, *A. indica* Linn. and *A. aspera* Linn. : *A. aspera* has two circular ora in the central part of the colpus, whereas *A. indica* has only one os.

#### VIGNA Savi

- 1. Leaflets variously dissected
- 1. Leaflets entire

- V. aconitifolia*
- V. radiata*

*Vigna aconitifolia* (Jacq.) Marechal in Bull. Jard. Bot. Belge. 39 : 160. 1969 ; Verdcourt in Kew Bull. 23 : 464. 1969. *Phaseolus aconitifolius* Jacq. Obs. Bot. 3 : 2, t. 52. 1768 ; DC. Prodr. 2 : 394. 1825 ; Wt. & Arn. Prodr. 247. 1834 ; Baker in Hook. f. FBI 2 : 202. 1876 ; Gamble, FPM 2 : 363. 1918.

Trailing herbs ; branches running to about 1 m in length, terete, retro-sely sparsely pubescent. Leaves 8 cm long, trifoliolate ; stipules peltate, subulate ; leaflets  $3.5 \times 2$  cm, deeply 3-lobed, each in turn variously dissected, sparsely hairy, subsessile ; reticulations prominent ; petioles about 8 cm long. Flowers yellow, 0.5 cm long, confined to ends of rachises, in axillary racemes 6 cm long, bracteate, bracteolate ; peduncles about 8 cm long ; calyx 0.4 cm long, campanulate, lobes acuminate, shaggy without ; petals 0.4 cm long, glabrous ; stamens diadelphous, glabrous. Legumes 3 cm long, cylindric, glabrous ; seeds 4-5, smooth.

*Fl. & Fr.* : September-January.

*World distribution* : India and Sri Lanka, generally on sandy substratum ; often cultivated.

*Specimens examined* : Jaladurgam, Kurnool, July 1885, J. S. Gamble 16334 ; Chelama, 12-12-1963, Ellis 18069 ; Chelama, 17-10-1964, Ellis 22074.

*V. radiata* (Linn.) Wilczek in Fl. Congo Belge. 6 : 386. 1954 ; Verdcourt in Kew Bull. 24 : 558. 1970. *Phaseolus radiatus* Linn. Sp. Pl. 725. 1753 ; DC. Prodr. 2 : 395. 1825 ; Gamble, FPM 2 : 363. 1918. *P. mungo* Linn. var. *radiatum* (Linn.) Baker in Hook. f. FBI 2 : 203. 1876. *P. roxburghii* Wt. & Arn. Prodr. 246. 1834.

Twining herbs ; branches run to about 60 cm long, terete, retro-sely long-hairy. Leaves 13 cm long, trifoliolate ; stipules prominent ; petioles about 6 cm long ; leaflets  $6 \times 4$  cm, ovate, acuminate, obtuse at base, entire, membranous, sparsely puberulous ; reticulations prominent. Flowers yellow, 0.8 cm long, confined to ends of rachis about 15 cm long, bracteate, bracteolate ; calyx 0.4 cm long, lobes ovate, glabrous ; petals 0.8 cm long, glabrous ; stamens diadelphous, filaments glabrous ; ovary almost glabrous, style twisted, stigmas oblique. Legumes 6 cm long, slightly flattened, hirsute ; seeds about 12, smooth.

*Fl. & Fr.* : September-December.

*World distribution* : India, cultivated as a crop for seeds ; seen in Chelama on sandy substratum as an escape.

*Specimen examined* : Chelama, 7-12-1963, Ellis 17948.

## CROTALARIA Linn.

1. Leaves trifoliolate	..	<i>C. medicaginea</i>
1. Leaves simple :		
2. Stipules prominently lunate	..	<i>C. verrucosa</i>
2. Stipules linear :		
3. Racemes up to 40 cm long :		
4. Stipules 1.5 cm long ; stamens of 2 types — 5 long, sterile alternating with 5 small, fertile		<i>C. mysorensis</i>
4. Stipules inconspicuous, 0.3 cm long ; stamens of one type		<i>C. calycina</i>
3. Racemes about 8 cm long :		
5. Leaves usually $7.7 \times 3$ cm ; stamens dimorphic — 5 small, sterile alternating with 5 long, fertile		<i>C. madrensis</i> var. <i>kurnoolica</i>
5. Leaves about $2.5 \times 0.5$ cm ; stamens not dimorphic :		
6. Legumes 1-4-seeded, 1 cm long ; leaves linear to linear-ovate :		
7. Calyx lobes recurved		<i>C. pellita</i>
7. Calyx lobes not recurved		<i>C. pusilla</i>
6. Legumes 8-seeded, 2 cm long ; leaves ovate- oblong		<i>C. prostrata</i>

*Crotalaria medicaginea* Lamk. Dict. Encycl. Meth. 2 : 201. 1790 ; Wt. & Arn. Prodr. 192. 1834 ; Baker in Hook. f. FBI 2 : 81. 1876 ; Gamble, FPM 2 : 299. 1918. *C. foliosa* Willd. Enum. 747. 1809 ; DC. Prodr. 2 : 131. 1825.

Herbs, often prostrate, about 20 cm high or about 40 cm long ; branches terete, sparingly pubescent ; rootstock woody. Leaves 1.5 cm long, trifoliolate, stipulate ; petioles 0.8 cm long, articulate ; leaflets  $1 \times 0.5$  cm, oblanceolate, emarginate, acute at base, glabrous above, pubescent below. Flowers yellow with maroon streaks on the standard, 0.5 cm across, in terminal, 3-4-flowered racemes 2 cm long, bracteate ; calyx 0.3 cm long, sparsely pubescent without ; petals 0.5 cm long ; stamens 10, monadelphous, filaments connate ; ovary pubescent. Legumes  $0.3 \times 0.3$  cm, obliquely globose, puberulous ; seeds 2, glabrous.

Fl. & Fr. : September-April.

World distribution : India, Sri Lanka and Burma, in dry localities.

Specimens examined : Chelama, 8-12-1963, Ellis 18024 ; Chelama, 15-10-1964, Ellis 22012.

**Remarks :** Gamble (*op. cit.*) has followed Baker (*op. cit.*) in recognising 3 varieties under *C. medicaginea*, which had earlier been recognised as three distinct species by Wight and Arnott in their, *Prodromus* (p. 192). From our studies of all the taxa both in the field and in MH and CAL it becomes apparent that all the three forms are distinct at varietal level.

***Crotalaria verrucosa*** Linn. Sp. Pl. 715. 1753 ; DC. Prodr. 2 : 125. 1825 ; Wt. & Arn. Prodr. 187. 1834 ; Wt. Ic. 1 : t. 200. 1840 ; Baker in Hook. f. FBI 2 : 77. 1876 ; Gamble, FPM 2 : 297. 1918.

Erect herbs, about 60 cm high ; branches 4-angled, puberulous. Leaves  $8 \times 5$  cm, ovate-rhomboid, obtuse or acute at apex, acute at base, sparsely pubescent above, less so below ; petioles 0.3 cm long, pubescent ; stipules  $0.7 \times 1$  cm, foliar, lunar-shaped. Flowers pale purple with dark purple veins, 2 cm long, in terminal racemes 15 cm long, bracteate, bracteolate, pedicellate ; calyx 0.7 cm long, lobes ovate, tube 0.4 cm long ; petals glabrous, veins prominent, keel tomentose along margins from half-way down ; stamens monadelphous, filaments connate to half their length ; ovary brown-tomentose. Legumes  $4.5 \times 1$  cm, inflated, cylindric ; seeds about 15.

*Fl. & Fr. :* August-November.

*World distribution :* India, mostly on sandy soil.

*Specimens examined :* Diguyametta, 16-II-1969, Ellis 32405 ; Diguyametta, 8-8-1972, Ellis 42211.

**Remarks :** DeCandolle (*Prodr.* 2 : 125. 1825) recognises 2 forms under *Crotalaria verrucosa* Linn., viz. 1. *obtusa* and 2. *acuminata*. Wight and Arnott (*op. cit.*) express their doubt about the distinction between these two forms, for they have "...not seen specimens agreeing with the var. of Persoon and DeCandolle." Baker (*op. cit.*) does not recognise *acuminata*, for he gives this epithet as a synonym of *C. verrucosa* Linn. Further, he apparently does not seem to recognise the form *obtusa*, because he does not mention it.

***C. mysorensis*** Roth, Nov. Sp. Pl. 338. 1821 ; DC. Prodr. 2 : 126. 1825 ; Wt. & Arn. Prodr. 182. 1834 ; Baker in Hook. f. FBI 2 : 70. 1876 ; Gamble, FPM 2 : 295. 1918.

Erect, robust herbs, about 60 cm high ; branches pilose, terete woody. Leaves about  $7 \times 1.5$  cm, linear-elliptic, oblong, acute at base, densely brown-tomentose or pilose, sessile ; stipules linear. Flowers yellow with maroon streaks without on the standard, 2 cm long, in terminal racemes 40 cm long, bracteate, bracteolate ; calyx 1.5 cm long,

lobes ovate-acuminate, tube small; standard pilose without; stamens diadelphous, 5+5, sterile long alternating with fertile short; ovary glabrous, style puberulous. Legumes  $3 \times 1.5$  cm, obovoid, stipitate; seeds small, several, maroon, shining.

*Fl. & Fr.* : October-January.

*World distribution* : India.

*Specimens examined* : Chelama, 8-12-1963, Ellis 18023; Chelama, 16-10-1964, Ellis 22054.

**Crotalaria calycina** Schrank, Pl. Rar. Hort. Monac. t. 12. 1819; DC. Prodr. 2 : 129. 1825; Baker in Hook. f. FBI 2 : 72. 1876; Gamble, FPM 2 : 295. 1918. *C. anthylloides* sensu DC. Prodr. 2 : 129. 1825; Wt. & Arn. 181. 1834 (non Lamk.).

Robust herbs, 60 cm high; branches terete, striate, pilose. Leaves  $10 \times 2$  cm, linear-elliptic, obtuse, mucronulate, obtuse at base, pubescent beneath; stipules 0.3 cm long. Flowers yellow with standard red-tinged without, 3 cm long, in terminal racemes about 4 cm long, bracteate, bracteolate; calyx lobes 3 cm long, elliptic-acuminate, densely brown-pilose without, accrescent; petals 2 cm long, glabrous, keel densely tomentose along margin from middle; stamens monadelphous, filaments connate, style pubescent at top. Legumes 2.1 cm long, many-seeded.

*Fl. & Fr.* : October-December.

*World distribution* : Africa, India, Sri Lanka and Burma.

*Specimens examined* : Ramanapenta, Gundlabrahmeswaram, 28-11-1969, Ellis 32629.

*Remarks* : Gamble (*op. cit.*) recognises 4 'groups' under this species, viz. group 1—*anthylloides*, group 2—*roxburghiana*, group 3—*crinita* and group 4—without giving a name which he says (p. 296) is called "Rabbits' ears" on Pulneys. The present studies both in the field and in MH and CAL indicate that the 4 groups of Gamble cannot be delimited to specific compartments or forms; all of them tend to overlap one with another, making it almost impossible to differentiate them.

**C. madurensis** Wt. var. *kurnoolica* Ellis & Swaminathan in Journ. Bombay Nat. Hist. Soc. 66 : 227-228. 1969.

Erect herbs or undershrubs, about 1 m high; branches terete, softly pubescent. Leaves  $7.5 \times 3$  cm, elliptic-ovate, apiculate, obtuse at base, brown-sericeous on both surfaces, subsessile; lateral nerves about 14 pairs. Flowers yellow, 1 cm long, in axillary racemes 15 cm

long, bracteate, bracteolate, revolute along margins ; calyx 1 cm long, lobes ovate, cordate at base, prominently revolute along margins, densely pubescent without ; petals yellow, 1 cm long, standard hairy without, keels hairy without and along margins up to middle ; stamens diadelphous, 5 short, sterile, alternating with 5 long, fertile ; ovary densely pubescent, stipitate. Fruits not seen.

*Fl. & Fr.* : October-December.

*World distribution* : Peninsular India.

*Specimens examined* : Srisailam, 21-10-1964, Ellis 22144.

*Remarks* : The publication of this new variety was necessitated because of constant differences from the *typica*. Baker (in Hook. f. FBI 2 : 79, 1876) has treated *Crotalaria candicans* Wt. & Arn. under *C. madurensis* Wt. ex Wt. & Arn. Gamble (FPM 2 : 298, 1918), on the other hand, recognises both the species. P. M. Debbarman (in Journ. Indian Bot. Soc. 3 : 292-295, 1922) has critically reviewed the taxa, *C. madurensis* Wt. and *C. candicans* Wt. & Arn. and concludes (p. 295), "...The writer doubts very much if *C. candicans* is at all readily distinguishable from *C. madurensis* in the field..." and that "...*C. candicans* is only a form or at most only a variety... of *C. madurensis*...". Obviously the entire group is a complex ; it requires a monographic study.

*Crotalaria pellita* Bert. ex DC. Prodr. 2 : 128, 1825. *C. ramosissima* Roxb. [Hort. Beng. 54, 1814] Fl. Ind. 3 : 268, 1832 ; Wt. & Arn. Prodr. 183, 1834 ; Baker in Hook. f. FBI 2 : 80, 1876 ; Gamble, FPM 2 : 299, 1918.

Erect herbs, up to 30 cm high ; branches brown-pubescent ; rootstock woody. Leaves up to 2.8×0.5 cm, linear-ovate or obovate, cuneate at base, silky villous. Flowers yellow, 1.5 cm long, in terminal racemes 4 cm long, bracteate, bracteolate, both prominently recurved ; calyx 1 cm long, lobes 5, ovate, prominently recurved ; stamens 10, diadelphous, filaments connate ; petals 1.5 cm long, standard sparsely villous without, bearded at base within ; ovary villous. Legumes 1×0.6 cm, ovoid, villous ; seeds 1.

*Fl. & Fr.* : October-February.

*World distribution* : South India, in dry localities.

*Specimens examined* : Dhone, July 1886, J. S. Gamble 17226 ; Giddalur, 9-11-1906, C. A. Barber 8086 ; Diguvametta, 19-11-1969, Ellis 32552.

*Crotalaria pusilla* Heyne ex Roth, Nov. Sp. Pl. 335. 1821; DC. Prodr. 2 : 128. 1825; Wt. & Arn. Prodr. 189. 1834; Baker in Hook. f. FBI 2 : 70. 1876; Gamble, FPM 2 : 296. 1918.

Herbs diffusely branched from base, up to 13 cm high; branches terete, brown-pubescent. Leaves  $\pm 1.3 \times 0.3$  cm, linear-elliptic, obtuse at base, brown-pubescent, sessile. Flowers white with a pink tinge, 0.3 cm long in terminal, 8-10-flowered racemes 4 cm long, bracteate; calyx 0.3 cm long, lobes 0.2 cm long, linear, brown-pubescent; petals slightly longer than calyx, standard and keel a few fimbriate just above the claws; filaments connate halfway down; ovary villous, style puberulous near top. Legumes  $0.5 \times 0.3$  cm, ovoid-orbicular, brown-villous; seeds 4, alveolar.

*Fl. & Fr.* : October-December.

*World distribution* : Peninsular India, in drier localities.

*Specimens examined* : Sunnipenta, Srisailam, 21-10-1964, Ellis 22125; Diguvametta, 17-11-1969, Ellis 32432.

*C. prostrata* Rottl. ex Willd. Encum 747. 1809; DC. Prodr. 2 : 130. 1825; Wt. & Arn. Prodr. 189. 1834, excl. syn.; Baker in Hook. f. FBI 2 : 67. 1876; Gamble, FPM 2 : 292. 1918.

Erect or decumbent herbs, about 40 cm high; branches terete, brown-pubescent. Leaves  $2.5 \times 1.5$  cm, ovate-oblong, obtuse at base, densely hirsute, subsessile. Flowers yellow, 0.5 cm long, in axillary, 3-4-flowered racemes 8 cm long, bracteate, bracteolate; calyx 0.3 cm long, lobes linear-ovate, densely pubescent without, tube 0.2 cm long; petals fimbriate along margins above the claws, nerves rather prominent; stamens 10, filaments connate up to middle; ovary glabrous, style puberulous near stigma. Legumes  $2 \times 0.5$  cm, oblong, flattened, glabrous; seeds many.

*Fl. & Fr.* : October-December.

*World distribution* : India and Sri Lanka, in dry localities.

*Specimens examined* : Chelama, 7-12-1963, Ellis 17951; Diguvametta, 16-11-1969, Ellis 32406.

*Remarks* : All Indian works and *Index Kewensis* credit Roxburgh as the author of the species. However, it is Willdenow who had published it earlier in 1809, validating Rottler's epithet.

## INDIGOFERA Linn.

1. Leaves 1-foliate :		
2. Leaves ovate ; legumes 2-3-seeded	..	<i>I. cordifolia</i>
2. Leaves linear ; legumes 1-seeded		<i>I. linifolia</i>
1. Leaves 3-10-foliate :		
3. Legumes 2-seeded :		
4. Erect undershrubs	..	<i>I. mysorensis</i>
4. Prostrate herbs		<i>I. linnaei</i>
3. Legumes 4-12-seeded :		
5. Shrubs above 1.5 m high ; legumes up to 4.5 cm long		<i>I. cassiodera</i>
5. Undershrubs less than 1 m high ; legumes up to 3 cm long :		
6. Leaves trifoliate :		
7. Legumes cylindric, torulose		<i>I. barbata</i>
7. Legumes quadrangular, not torulose		<i>I. trita</i>
6. Leaves 5-9-foliate :		
8. Racemes spicate, hirsute		<i>I. astragalina</i>
8. Racemes not spicate, puberulous :		
9. Herbs ; legumes straight, spreading	..	<i>I. glabra</i>
9. Shrubs : legumes slightly curved, deflexed		<i>I. tinctoria</i>

**Indigofera cordifolia** Heyne ex Roth, Nov. Sp. Pl. 357. 1821; DC. Prodr. 2: 222. 1825; Wt. & Arn. Prodr. 199. 1834; Baker in Hook. f. FBI 2: 93. 1878; Gamble, FPM 2: 309. 1918; Ali in Bot. Notiser 3: 545. 1958 et in Fl. West Pak. 100: 69. 1977.

Diffuse herbs ; branches white-pubescent, terete. Leaves about  $1.2 \times 0.8$  cm, unifoliolate, sessile, ovate, mucronate, orbicular, cordate at base, sparsely pubescent ; midrib prominent below. Flowers red, 0.2 cm long, in axillary clusters, bracteate, bracteolate ; calyx 0.2 cm long, lobes linear, softly pubescent without ; petals slightly longer than calyx, spatulate, sparsely hairy without at top ; stamens diadelphous, filaments connate, glabrous ; ovary densely pubescent, style curved. Legumes 0.4 cm long, globose, beaks straight, halves with oil glands within ; seeds 2, prominently pitted.

*Fl. & Fr.* : July-October.

*World distribution* : Middle East, India, Sri Lanka, Malaysia and Australia.

*Specimens examined* : Diguvametta, 28-10-1906, C. A. Barber 8006 ; Chelama, 5-7-1963, Ellis 16765 ; Chelama, 10-12-1963, Ellis 18059 ; Diguvametta, 16-11-1969, Ellis 32388 ; Diguvametta, 8-8-1972, Ellis 42208.

*Remarks* : This plant occurs generally along the railway track and in disturbed areas.

*Indigofera linifolia* (Linn. f.) Retz. Obs. 4 : 29. 1786 et 6 : 33, t. 2. 1791 ; DC. Prodr. 2 : 222. 1825 ; Wt. & Arn. Prodr. 198. 1834 ; Wt. Ic. 1 : t. 313. 1840 ; Baker in Hook. f. FBI 2 : 92. 1876 ; Gamble, FPM 2 : 309. 1918 ; Ali in Bot. Notiser 3 : 546. 1958. *Hedysarum linifolium* Linn. f. Suppl. 331. 1781. *Indigofera linifolia* Retz. var. *campbellii* Wt. loc. cit. 313. 1840 ; Gamble, loc. cit. 309.

Erect herbs, often decumbent, about 20 cm high ; rootstocks woody ; branches 2-edged, faintly quadrangular, adpressedly pubescent. Leaves  $2.5 \times 0.4$  cm, linear, linear-elliptic, ovate or obovate, orbicular, mucronate, adpressedly pubescent, stipulate. Flowers bright red, 0.4 cm long, in axillary, 1-13-flowered racemes 1 cm long, bracteate ; calyx lobes 0.1 cm long, long-acuminate, tube 0.1 cm long, adpressedly pubescent ; stamens diadelphous, filaments connate up to top, glabrous ; ovary pubescent. Legumes  $0.2 \times 0.2$  cm, globose, 1-seeded ; seeds slightly triangular, muriculate.

*Fl. & Fr.* : August-January.

*World distribution* : Middle East, India, Sri Lanka, Malaysia and North Australia.

*Specimens examined* : Nallamalais, Kurnool Dt ; 10-8-1921, C. E. C. Fischer 4672 ; Chelama, 7-12-1963, Ellis 17957 ; Chelama, 15-10-1964, Ellis 22011.

*Remarks* : The variety, *campbellii* Wt. which had been doubtfully given by Baker in *Fl. Brit. Ind.* (*op. cit.* p. 93) has been treated by Gamble as a variety in his Flora (*op. cit.* p. 309) preceded earlier by Cooke (*Fl. Pres. Bombay*). From the present studies on the taxon both in the field and in CAL and MH both the names appear to be synonymous, for between the extremes there are intermediate forms showing variations from linear leaves on the one hand and ovate, orbicular and obovate leaves on the other.

*I. mysorensis* Rottl. ex DC. Prodr. 2 : 222. 1825 ; Wt. & Arn. Prodr. 202. 1834 ; Baker in Hook. f. FBI 2 : 102. 1876 ; Gamble, FPM 2 : 313. 1918.

Robust herbs to undershrubs, about 80 cm high ; branches dark brown, terete, striate, rather woody, younger pubescent. Leaves 3.5 cm long, 15-foliolate ; stipules filiform ; leaflets about  $1.5 \times 0.6$  cm, elliptic-oblong, apiculate, acute at base, glandular, subsessile. Flowers red, about

0.5 cm long, in panicled, bracteate racemes about 4 cm long; calyx 0.3 cm long, lobes acuminate; petals sparsely pilose; stamens 10, filaments glabrous; ovary densely pilose, style and stigma glabrous. Legumes  $1 \times 0.2$  cm, cylindric, glandular at apex, sparsely pilose, generally 2-seeded.

*Fl. & Fr.* : July-March.

*World distribution* : Peninsular India.

*Specimens examined* : Chelama, 13-7-1963, Ellis 16868; Srisailam, 5-12-1969, Ellis 32697.

*Remarks* : It is very interesting to note that in all the works dealing with this plant no mention has been made about the glandular tips of legumes, nor the glandular apicular leaf-tips. Furthermore, the calyx lobes are pilose on both surfaces.

*Indigofera ilmiae* Ali in Bot. Notiser 111 : 549, 1958 et. *Fl. West Pak.* 100 : 75, 1977. *I. enneaphylla* Linn. Mant. Pl. 272, 1771, *nom. illeg.*; DC. Prodr. 2 : 229, 1825; Wt. & Arn. Prodr. 199, 1834; Wt. Ic. 2 : 403, 1843; Baker in Hook. f. FBI 2 : 94, 1878; Gamble, FPM 2 : 309, 1918; Gillett in Kew Bull. Addl. ser. 1 : 35, 1958. *Hedysarum prostratum* Linn. Mant. Pl. 102, 1767. *H. prostratum* Burm. f. *Fl. Ind.* 168, 1768. *Indigofera prostrata* (Burm. f.) Domin in Bibl. bot. Sutt. 187, 1926 (*non* Willd.).

Prostrate herbs; branches spreading, terete, sparsely pubescent; rootstocks woody. Leaves about 5 cm long, 9-foliolate, adpressedly pubescent; stipules 0.3 cm long, falcate, scarious, caudate-acuminate; leaflets  $0.4 \times 0.2$  cm, obovate, emarginate, acute at base, subsessile. Flowers red, 0.4 cm long, in axillary, 4-5-flowered, dense racemes 2 cm long, bracteate; calyx 0.2 cm long, lobes long-acuminate, tube 0.1 cm long, pubescent without; petals 0.4 cm long, standard sparsely pubescent without; stamens 10, diadelphous, filaments glabrous; ovary pilose. Legumes  $0.4 \times 0.2$  cm, cylindric; seeds 2, black, truncate at ends, white-pubescent.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : Africa, India, Sri Lanka, Burma and North Australia, in dry localities.

*Specimen examined* : Chelama, 9-7-1963, Ellis 16808.

*Remarks* : Ali (*op. cit.* p. 550) has discussed at length the inadmissibility of taking the specific epithet, *enneaphylla* of Linnaeus, because of its illegitimacy by quoting *Hedysarum prostratum* referable to

*Mantissa Plantarum*, (p. 102) 1767 ; he should have taken the specific epithet, *prostratum*, according to the Botanical Code—articles 55 and 70. The name, however, is occupied and therefore a new name has been given.

*Indigofera cassioides* Rottl. ex DC. Prodr. 2 : 225. 1825. *I. pulchella* auct. non Roxb. ; Wt. & Arn. Prodr. 203. 1834 ; Wt. Ic. 2 : t. 367. 1843 ; Baker in Hook. f. FBI 2 : 101. 1876 ; Gamble, FPM 2 : 313. 1918 ; Ali in Bot. Notiser 111 : 569. 1958 et in Fl. West Pak. 100 : 83. 1977.

Shrubs, about 1.5 m high ; branches purplish, faintly angled, puberulous with midfixed hairs. Leaves 15 cm long, imparipinnate ; stipules minute ; leaflets about 9 pairs,  $2.5 \times 1.5$  cm, ovate-oblong, apiculate, orbicular, acute at base, puberulous, shortly petiolulate ; lateral nerves about 4. Flowers pink, 1.5 cm long, in axillary racemes 16 cm long, bracteate, shortly pedicellate ; calyx 0.2 cm long, pubescent without, lobes acute ; stamens 10, filaments united almost to top, glabrous ; ovary glabrous. Legumes  $4.2 \times 0.3$  cm, cylindric, sharply pointed ; seeds black, about 8.

*Fl. & Fr.* : Two periods : February-June and September-December.

*World distribution* : Pakistan, India, Sri Lanka, Burma to China and Indo-China, in dry localities.

*Specimens examined* : Chelama, 7-12-1963, Ellis 17945 ; Gundla-brahmeswaram, 31-3-1965, Ellis 23807 ; Bogada, 19-11-1969, Ellis 32535.

*I. barberi* Gamble in Kew Bull. 1919 : 222. 1919 et in FPM 2 : 310. 1918.

Undershrubs, about 1 m high ; branches angular in young, adpressedly pubescent. Leaves 3 cm long, 3-foliolate ; petioles 2 cm long ; leaflets  $1.5 \times 2$  cm, ovate-oblong, obovate, mucronate, puberulous, yellow-glandular below ; terminal petiolules 1 cm long ; stipules setaceous. Flowers 0.5 cm long, salmon red, aggregate, in axillary racemes 3 cm long ; calyx 0.1 cm long, lobes linear-acuminate, subulate, villous ; petals exerted ; ovary villous. Legumes  $1 \times 0.2$  cm, cylindric, deflexed, beaked, torulose, adpressedly white-villous, sutures thick ; seeds 4.

*Fl. & Fr.* : October-February.

*World distribution* : Peninsular India.

*Specimens examined* : Bairani falls, Diguvametta, 17-11-1969, Ellis 32470.

*Remarks* : Gamble (*op. cit.* p. 222) states, 'I have long hesitated about this species. I agree with Dr. Barber in considering it as coming

between *I. trifoliata* L. and *I. trita* L. f., and I think it best to describe it as new, for I cannot consider it even as a variety of either'

*Indigofera trita* Linn. f. Suppl. 335. 1781 ; DC. Prodr. 2 : 232. 1825 ; Wt. & Arn. Prodr. 204. 1834 ; Wt. Sc. 1 : t. 315. 1840 ; Baker in Hook. f. FBI 2 : 96. 1876 ; Gamble, FPM 2 : 310. 1918 ; Ali in Bot. Notiser 111 : 553. 1958 et in Fl. West Pak. 100 : 78. 1977 ; Gillett in Kew Bull. Addl. ser. 1 : 101. 1958.

Herbs to undershrubs, about 60 cm high ; branches reddish, terete to faintly angled, adpressedly hairy, woody. Leaves 6 cm long, trifoliolate ; leaflets up to  $4 \times 2$  cm, oblong, orbicular, emarginate, apiculate, acute at base, adpressedly hairy ; petiolules short. Flowers 0.3 cm long, red, in axillary racemes 3 cm long, those at base directed downwards, pedicellate ; calyx 0.3 cm long, lobes ovate-acuminate ; petals 0.3 cm long, standard and keel pubescent without ; stamens 10, diadelphous, filaments glabrous ; ovary densely pubescent, style glabrous. Legumes  $3 \times 0.2$  cm, quadrangular, beaked, adpressedly pubescent, halves spirally twisted after dehiscence ; seeds 10, black, quadrangular.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : India and Sri Lanka.

*Specimens examined* : Giddalur, 9-11-1896, C. A. Barber 8085 ; Chelama, 16-10-1964, Ellis 22060 ; Diguvametta, 16-11-1969, Ellis 32423 ; Mahanandi, 21-8-1972, Ellis 42314.

*Remarks* : Ali (*op. cit.* 1958) treats both *I. trita* Linn. f. and *I. subulata* Vahl ex Poir. as closely related if not conspecific with each other, and recognises statistically 4 "taxa" under *I. trita* Linn. f. having geographical distributions as follows :

- (i) Taxon A—confined to India, Pakistan, Sri Lanka, Burma, Java, Indonesia and Australia. var. *trita*.
- (ii) Taxon B—Tropical Africa to Pakistan and India. var. *maffeii* (Chiev.) Ali.
- (iii) Taxon C—confined to Africa. var. *subulata*.
- (iv) Taxon D—confined to peninsular India, Sri Lanka, tropical Africa and tropical America. subsp. *subulata* var. *scabra* (Roth) Ali.

Ali (*op. cit.* p. 557) concludes, "...As none of the characters taken into account is adequate for the delimitation of a separate species, it seems best to treat the whole complex as a single species. But, because of the geographical distribution of different taxa, two subspecies are recognised".

*Indigofera astragalina* DC. Prodr. 2 : 223. 1825 ; Gillett in Kew Bull. Addl. ser. 1 : 110. 1958 et in Kew Bull. 14 : 290. 1960 et 24 : 500. 1970 ; Ali in Fl. West Pak. 100 : 79. 1977. *I. hirsuta* auct. non Linn. ; DC. Prodr. 2 : 228. 1825 ; Wt. & Arn. Prodr. 204. 1834 ; Baker in Hook. f. FBI 2 : 98. 1878 ; Gamble, FPM 2 : 312. 1918 ; Ali in Bot. Notiser 111 : 559. 1958.

Herbs to small shrubs, up to 1 m high ; branches purplish, striate, sparingly pubescent. Leaves up to 13 cm long, imparipinnate ; stipules filiform ; leaflets  $4 \times 2.5$  cm, 11, ovate-oblong, apiculate, acute at base, puberulous, shortly petiolulate. Flowers 0.5 cm long, pink, in axillary, dense, racemes 15 cm long, shortly pedicellate, bracteate ; calyx 0.6 cm long, hirsutely brown-pubescent ; keel and wing petals marginally pubescent ; stamens 10, filaments connate to the top ; ovary densely pubescent, style and stigma glabrous. Legumes  $1.8 \times 0.4$  cm, cylindric, tetragonal, shortly pointed at apex ; seeds about 6, black, hexagonal, pitted.

*Fl. & Fr.* : August-December.

*World distribution* : Tropics from Africa, India, Sri Lanka, Philippines, North Australia and South America.

*Specimens examined* : Chelama, 16-10-1964, Ellis 22033 ; Upper Ahobilam, 28-8-1965, Ellis 25572 ; Diguvametta, 17-11-1969, Ellis 32440.

*I. glabra* Linn. Sp. Pl. 751. 1753 ; DC. Prodr. 2 : 229. 1825 ; Prain & Baker f. in Journ. Bot. 40 : 136. 1902 ; Gamble, FPM 2 : 311. 1918. *I. pentaphylla* Murray in Linn. Syst. Veg. ed. 13. 564. 1774 ; DC. Prodr. 2 : 230. 1825 ; Wt. Ic. 2 : 385. 1843 ; Wt. & Arn. Prodr. 200. 1834 ; Baker in Hook. f. FBI 2 : 95. 1876.

Herbs, about 80 cm high ; older branches brown, terete. Leaves 2.5 cm long, 5-7-foliolate ; stipules lanceolate ; leaflets  $1 \times 0.7$  cm, obovate-oblong, apiculate, adpressedly puberulous. Flowers red, 0.5 cm long, in 2-4-flowered, axillary racemes 2 cm long ; calyx 0.2 cm long, sparsely pilose without, lobes linear-lanceolate, gland-tipped ; petals 0.5 cm long ; stamens 10, filaments connate, glabrous ; ovary pilose, seated on a pad. Legumes 2 cm long, linear, pointed, glabrous, faintly torulose ; seeds 10, black, square.

*Fl. & Fr.* : September-November.

*World distribution* : Tropical Africa, India, Sri Lanka.

*Specimen examined* : Way to Pathalaganga, Srisailam, 20-10-1964, Ellis 22091.

*Remarks*: The specific epithet, *glabra* of Linnaeus has precedence over the specific epithet, *pentaphylla* of Murray. Further, it is interesting to note that by error the accreditation of the specific epithet, *pentaphylla* has been given to Linnaeus by most of the workers including DeCaudolle, Baker, and Cooke (*Fl. Pres. Bombay*, 1902). It is, in fact, Murray who, in the 13th edition of Linnaeus' *Systema Naturae* which was renamed as *Systema Vegetabilium*, described the plant as a distinct species.

*Indigofera tinctoria* Linn. Sp. Pl. 751. 1753 ; DC. Prodr. 2 : 224. 1825 ; Wt. & Arn. Prodr. 202. 1834 ; Wt. Ic. 2 : t. 365. 1843 ; Baker in Hook. f. FBI 2 : 99. 1876 ; Prain & Baker f. in Journ. Bot. 40 : 63. 1902 ; Duthie, Fl. Up. Gang. Pl. 1 : 235. rep. ed. 1960 ; Gamble, FPM 2 : 312. 1918 ; Ali in Bot. Notiser 111 : 569. 1958 et in Fl. West Pak. 100 : 82. 1977 ; Gillett in Kew Bull. Addl. ser. I : 106. 1958.

Shrubs, about 1.2 m high ; branches terete, faintly angular when young, adpressedly pubescent. Leaves 8 cm long, 9-foliate, stipulate ; leaflets 2.2×1.2 cm, ovate-oblong, apiculate, acute at base, adpressedly puberulous, shortly petiolulate. Flowers pink, 0.5 cm long, in axillary racemes 4 cm long, bracteate ; calyx 0.15 cm long, pubescent without, lobes acuminate ; petals 0.5 cm long, standard pubescent without ; stamens 10, filaments connate up to top, glabrous ; ovary pubescent. Legumes 3×0.2 cm, cylindric, slightly falcate, tapering towards tips, faintly torulose, puberulous, sutures rather thick ; seeds 9, dark brown, truncate at ends.

*Fl. & Fr.* : August-November.

*World distribution* : Generally cultivated in tropics from Africa, India, Sri Lanka to Malaysia.

*Specimen examined* : Pathalaganga, Srisailam, 20-10-1964, Ellis 2218.

*Remarks* : Prain and Baker (*op. cit.*) have described forms : the wild indigo, the semi-wild generally cultivated in peninsular India, and the north Indian cultivated form called *I. sumatrana* Gaertn. All the three forms apparently are difficult to distinguish, though apparent geographical isolations seem to be present. As the present collection is from a wild state ; it perhaps represents the peninsular form. However, Gillett (*loc. cit.*) treats *I. sumatrana* as synonymous with *I. tinctoria* Linn.

#### ELEIOTIS DC.

*Eleiotis sororia* (Linn.) DC. Mem. Legum. 7 : 350. 1825 ; Wt. & Arn. Prodr. 231. 1834 ; Baker in Hook. f. FBI 2 : 153. 1876 ; Gamble, FPM

2 : 833. 1918. *Hedysarum scororium* Linn. Mant. Pl. 270. 1767. *Eleotis monophylla* (Burm. f.) DC. Mem. Legum. 7 : 350. 1825 et Prod. 2 : 348. 1825. *Glycine monophylla* Burm. f. Fl. Ind. 161, t. 50. 1768.

Trailing herbs, running up to 1 m ; branches triangular, glabrous ; rootstocks woody. Leaves up to  $3 \times 2.5$  cm, unifoliate, reniform, crenate, cordate at base, glabrous above, sparingly pubescent below, petiolate, stipulate ; stipules striate. Flowers pale yellow, 0.2 cm long, in axillary racemes 9 cm long, bracteate ; bracts ovate, parallel-veined, ciliate along margins ; calyx 0.1 cm long, a few ciliolate ; petals 0.1 cm long ; ovary pubescent ; stamens diadelphous ; ovary glabrous, style bent, stigmas capitate. Legumes 0.8 cm long, obliquely bent, compressed, pointed ; seeds reniform, transversely oblong.

*Fl. & Fr.* : March-October.

*World distribution* : India and Sri Lanka, in sandy, marshy habitats.

*Specimens examined* : Chelama, 7-12-1963, Ellis 17953 ; Chelama, 15-10-1964, Ellis 22007.

#### ATYLOSLA Wt. & Arn.

- |   |                         |
|---|-------------------------|
| 1. Racemes 12 cm long ; leaflets $5 \times 5$ cm .....  | <i>A. volubilis</i>     |
| 1. Racemes 2 cm long ; leaflets $3 \times 0.5$ cm ..... | <i>A. scarabaeoides</i> |

*Atylosia volubilis* (Blanco) Gamble, Fl. Pres. Madras 2 : 369. 1918. *Cytisus volubilis* Blanco, Fl. Filip. ed. 1. 599. 1879. *Atylosia mollis* Benth. Pl. Jungh. 3 : 234. 1851-55 ; Baker in Hook. f. FBI 2 : 213. 1876, p. p. *A. crassa* Prain in Journ. Asiatic Soc. Beng. 45. 1898 ; Cooke, Fl. Pres. Bombay 1 : 408, rep. ed. 1958 (1902). *Cantharospermum volubile* (Blanco) Merr. in Philip. Journ. Sci. 5 : 127. 1910.

Climbing shrubs ; branches terete, striate, brown-puberulous. Leaves about 10 cm long, trifoliate ; stipules setaceous ; leaflets  $5 \times 5$  cm, ovate, coriaceous, densely brown-pubescent and glandular beneath ; stipels small ; lateral nerves and reticulations prominent. Flowers pale yellow, 2 cm long, in racemes 12 cm long ; bracts foliar ; calyx 0.9 cm long, campanulate, the lowest lobe longest, upper two connate, puberulous without ; petals exserted, glabrous ; stamens diadelphous ; ovary densely tomentose, style few ciliolate near tip. Legumes  $2.5 \times 0.8$  cm, linear-oblong, with oblique depressions between seeds ; seeds orbicular, strophiolate.

*Fl. & Fr.* : February-May.

*World distribution* : Peninsular India.

*Specimen examined* : Ramanapenta, Gundlabrahmeswaram, 31-3-1965,  
Ellis 23814.

*Atylosia scarabaeoides* (Linn.) Benth. Pl. Jangh. 3 : 243. 1851-55 ;  
Baker in Hook. f. FBI 2 : 215. 1876 ; Gamble, FPM 2 : 369. 1918. *Dolichos*  
*scarabaeoides* Linn. Sp. Pl. 726. 1753. *Rhynchosia scarabaeoides* (Linn.)  
DC. Prodr. 2 : 387. 1825. *Cantharospermum pauciflorum* Wt. & Arn.  
Prodr. 225. 1834. *C. scarabaeoides* (Linn.) Koorders in Kooders-Schum.  
Syst. Verz. I. fam. 128 : 68. 1911.

Slender twiners ; stems generally tawny-pubescent, striate. Leaves  
5 cm long, trifoliolate, stipulate ; leaflets  $4 \times 2.5$  cm, obovate-oblong,  
obtuse, laterals unequally truncate at base, margins excurrent, pubescent,  
yellow-glandular beneath ; nerves 3, reticulations prominent beneath.  
Flowers yellow with maroon venation, 1 cm long, in axillary, 2-6-flowered  
racemes 2 cm long, bracteate, calyx 0.6 cm long, teeth prominent, densely  
brown-pubescent without, less so within ; petals  $0.8 \times 0.4$  cm, glabrous,  
exserted ; stamens diadelphous, 5+5 ; ovary densely pubescent. Legumes  
 $2 \times 0.6$  cm, linear, pilose, obliquely depressed between seeds ; seeds 5, dark  
with prominent bivalvular caruncle at top.

*Fl. & Fr.* : July-March.

*World distribution* : Madagascar, India, China and Malay Peninsula.

*Specimens examined* : Chelama, 16-10-1964, Ellis 22032 ; Chelama,  
19-3-1965, Ellis 23717.

#### ALYSICARPUS Neck. ex Desv., nom. cons.

- 1. Erect herbs, about 1 m high ; lomentum  
prominently transverse-ridged :

  - 2. Bracts and bracteoles setaceous ; racemes 30 cm long .. *A. heyneanus*
  - 2. Bracts and bracteoles glabrous ; racemes  
about 6 cm long .. *A. pilifer*

- 1. Diffuse, decumbent herbs ; lomentum  
longitudinally ridged :
  - 3. Racemes terminal ; leaves generally trifoliolate .. *A. heterophylla*
  - 3. Racemes axillary ; leaves generally unifoliolate .. *A. vaginalis*

*Alysicarpus heyneanus* Wt. & Arn. Prodr. 234. 1834. *A. rugosus* DC.  
var. *heyneanus* (Wt. & Arn.) Baker in Hook. f. FBI 2 : 159. 1876 ;  
Gamble, FPM 2 : 339. 1918.

Robust herbs, about 1 m high ; branches terete, striate, pilose.  
Leaves about 12 cm long, 1-3-foliolate ; stipules scarious ; leaflets about

$5 \times 3$  cm, oblong, obovate, linear-oblong, emarginate, obtuse at base, glabrous above, pilose below; reticulations prominent; petioles 0.4 cm long. Flowers yellow and pink, 1 cm long, in axillary and terminal racemes 30 cm long, bracteate; calyx 1 cm long, glumaceous, glabrous, lobes 4; stamens diadelphous, style incurved, stigmas capitate. Lomentum 0.8 cm long, 4-jointed, monoliform, transversely ribbed; seeds orbicular.

*Fl. & Fr.* : September-January.

*World distribution* : India and Sri Lanka.

*Specimens examined* : Kurnool plains, Kurnool Dt., without date or collector, Acc. No. MH 14984 ; Ahobilam, 22-11-1969, Ellis 32583.

*Alysicarpus pilifer* (Prain) Ellis, *status et comb. nov.* *A. rugosus* DC. var. *pilifer* Prain in *Asiat. Soc. Bengal* 66. 2 : 384. 1897, p. p.; Gamble, *FPM* 2 : 339. 1918. *A. glumaceus* (Roth) DC. *Prodr.* 2 : 353. 1825; Schindler in *Fedde, Repert.* 21 : 12. 1925. *Hedysarum glumaceum* Roth, *Nov. Sp. Pl.* 355. 1821. *Alysicarpus rugosus* DC. var. *styracifolius* Baker in *Hook. f. FBI* 2 : 159. 1876.

Herbs, about 75 cm high; branches terete, striate, sparsely hirsute, puberulous. Leaves  $4 \times 0.6$  cm, ovate, orbicular, obtuse at base, very sparsely hirsute below; nerves rather prominent; stipules 1 cm long, parallel-veined. Flowers pink, 0.3 cm long, in racemes about 5 cm long; calyx 0.4 cm long, ovate, glumaceous, ciliate along margin, parallel-nerved; petals glabrous; stamens diadelphous, filaments glabrous; ovary glabrous, style incurved. Lomentum  $0.2 \times 0.1$  cm, monoliform; seeds orbicular.

*Fl. & Fr.* : January-March.

*World distribution* : India.

*Specimen examined* : Chelama, 10-12-1963, Ellis 18060.

*Remarks* : Schindler (*op. cit.* p. 12) has treated *Alysicarpus* complex in detail and has recognised some of the varieties of Roth, Baker, Wight and Arnott at specific level. From the present study of the several varieties, it becomes apparent that this complex requires a more detailed study before arriving at definite conclusions. From a totality of characters it is clear that Prain's assignment of *pilifer* to a varietal status is underestimating the differences; it requires a specific status.

*A. heterophyllus* (Baker) Jafri & Ali in *Biologia, Lahore* 12 : 13. 1966.  
*A. vaginalis* (Linn.) DC. var. *heterophyllus* Baker in *Hook. f. FBI* 2 : 158, 1876.

Herbs weak-stemmed, decumbent, spreading on ground, running up to 40 cm ; branches terete, striate, sparsely strigose. Leaves 2 cm long, trifoliate, stipulate ; leaflets  $3 \times 0.5$  cm, linear or elliptic-ovate, apiculate, rounded at base, sparingly hirsute below ; nerves and reticulations prominent. Flowers bluish pink, 0.5 cm long, in axillary racemes about 20 cm long, bracteate, bracteolate ; calyx 0.4 cm long, lobes long-acuminate, sparsely hirsute without ; petals glabrous ; stamens diadelphous ; ovary hairy. Lomentum 1.4 cm long, monoliform, angular, longitudinally rugose, puberulous ; seeds orbicular.

*Fl. & Fr. :* September-November.

*World distribution :* Peninsular India.

*Specimens examined :* Chelama, 15-10-1964, Ellis 22014 ; Chelama, 16-10-1964, Ellis 22075.

*Remarks :* The summation of distinct characters separating it from other taxa makes it justifiable to raise it to a specific status.

*Atyscarpus vaginalis* (Linn.) DC. Prodr. 2 : 353. 1825 ; Wt. & Arn. Prodr. 233. 1834 ; Baker in Hook. f. FBI 2 : 158. 1876 ; Gamble, FPM 2 : 339. 1918. *Hedysarum vaginalis* Linn. Sp. Pl. 746. 1753.

Perennial, decumbent herbs ; branches running to about 40 cm, terete, striate, pilose ; rootstock stout. Leaves unifoliate, up to  $3.5 \times 1.5$  cm, ovate, orbicular, rounded at base, glabrous above, sparsely puberulous below, shortly petiolate ; stipules ovate-lanceolate, parallel-nerved. Flowers pale pink, 0.4 cm long, in axillary racemes 8 cm long, bracteate, bracteolate ; calyx 0.4 cm long, lobes glabrous within, puberulous without ; petals glabrous ; stamens diadelphous, filaments glabrous ; ovary glabrous. Lomentum 1.5 cm long, cylindric, falcate, about 7-jointed, each tetragonal, reticulate ; seeds orbicular.

*Fl. & Fr. :* October-December.

*World distribution :* Tropics from Africa, Middle East, India and Sri Lanka, in dry localities.

*Specimens examined :* Chelama, 10-12-1963, Ellis 18061 ; Diguvametta, 17-11-1969, Ellis 32443.

#### STYLOSANTHES Sw.

*Stylosanthes fruticosa* (Retz.) Alston in Trimen, Handb. Fl. Ceyl. 6. Suppl. 77. 1931 ; Steenis in Reinw. 5 : 449. 1960 ; Verdcourt in Kew Bull. 24 : 59-60. 1970. *Arachis fruticosa* Retz. Obs. 5 : 26. 1789. S.

*mucronata* Willd. Sp. Pl. 3 : 1166. 1802 ; DC. Prodr. 11 : 318. 1825 ; Wt. & Arn. Prodr. 218. 1834 ; Baker in Hook. f. FBI 2 : 148. 1876 ; Gamble, FPM 2 : 326. 1918.

Undershrubs, about 70 cm high ; stems terete, striate, pilose when young ; roots woody. Leaves 1.5 cm long, trifoliate, shortly petiolate ; stipules large, vaginate to the petioles at base ; leaflets  $1 \times 0.4$  cm, elliptic-ovate, mucronate, base obtuse, coriaceous, sparingly pilose below, glandular ; nerves impressed above, raised below ; stipels absent. Flowers yellow with maroon markings near the throat, 0.9 cm long, in terminal, dense racemes 1.5 cm long, bracteate ; calyx 0.3 cm long, lobes linear, scarious ; petals 0.8 cm long, ovate, sparingly pubescent ; stamens diadelphous, anthers dimorphic ; ovary pubescent. Legumes 0.5 cm long, compressed, reticulate, pilose ; seeds 2, flattened.

Fl. & Fr. : August-March.

*World distribution* : Tropical Africa, India, Sri Lanka, Malaysia, in dry localities.

*Specimen examined* : Diguvametta, 18-11-1969, Ellis 32483.

*Remarks* : Verdecourt (*op. cit.*) has discussed at length the delimitation of *Stylosanthes fruticosa* (Retz.) Alston which has a distribution in tropics ; hesitantly he agrees that Indian and African materials are conspecific, for he is not at all certain that the two plant materials could not be separated at subspecific or varietal level, as the latter is often referred to as *Stylosanthes erecta* Beauv. With the limited materials available, especially from Africa, it is not possible not to pursue this aspect of the problem.

#### ZORNIA Gmel.

*Zornia gibbosa* Span. in Linnaea 15 : 192. 1841 ; Mohlenbroek in Webbia 16 (1) : 112. 1961 ; Wagh in Journ. Bombay nat. Hist. Soc. 61 : 213-214. 1964 ; Anjali Chakravorti & Jain in Curr. Sci. 42 : 744-745. 1973. *Z. diphylla* auct. pl. non (Linn.) Pers. 1803 ; Baker in Hook. f. FBI 2 : 147. 1876 ; Gamble, FPM 2 : 325. 1918.

Prostrate or diffuse herbs, about 25 cm long ; branches terete, glabrous. Leaves 3 cm long, 2-foliate ; petioles 1.5 cm long ; stipules foliar, peltate, glandular ; leaflets  $\pm 2.5 \times 1$  cm, variable, lanceolate to ovate, punctate with glands below ; stipels absent. Flowers pale yellow, 0.5 cm long, in axillary racemes 10 cm long ; bracts foliar, enclosing flowers, ovate, peltate, prominently nerved, punctate ; calyx 0.2 cm long, 2 upper connate, lowest ciliate ; petals glabrous ; stamens monadelphous,

filaments connate to middle ; style incurved. Lomentum 0.8 cm long, joints 3, spinous ; seeds reniform.

*Fl. & Fr.* : September-December.

*World distribution* : India, Australia, in dry localities.

*Specimens examined* : Chelama, 15-10-1964, Ellis 22004 ; Diguvametta, 17-11-1969, Ellis 32450.

*Remarks* : Subsequent to Mohlenbrock's contention that *Z. gibbosa* and *Z. diphyllea* had been confused and that what occurs in India was *Z. gibbosa*, S. K. Wagh (*op. cit.*) has definitely pointed out that in India both *diphyllea* and *gibbosa* occur. Recently, Chakravorti and Jain (*op. cit.*) have summarised stating that 4 species, viz. *Z. diphyllea*, *Z. gibbosa*, *Z. quilonensis* Ravi and *Z. walkeri* (Ara.) Mohlenbrock occur in India.

#### RHYNCHOSIA Lour. *nom. cons.*

1. Erect herbs	<i>R. cana</i>
1. Trailing herbs :	
2. Calyx lobes oblong, accrescent ..	<i>R. rufescens</i>
2. Calyx lobes acuminate, scarcely accrescent :	
3. Seeds estrophiolate :	
4. Flowers pale pink to red ; legumes glandular-hairy	<i>R. viscosa</i>
4. Flowers yellow ; legumes glabrous	<i>R. minima</i> var. <i>laxiflora</i>
3. Seeds strophiolate	<i>R. aurea</i>

*Rhynchosia cana* (Willd.) DC. Prodr. 11 : 386. 1825 ; Wt. & Arn. Prodr. 240. 1834 ; Baker in Hook. f. FBI 2 : 222. 1876 ; Gamble, FPM 2 : 374. 1918. *Glycine cana* Willd. Sp. Pl. 3 : 1063. 1802.

Undershrubs, about 1 m high ; branches terete, glandular-pubescent. Leaves 7 cm long, trifoliolate, stipulate ; leaflets 4×2.5 cm, ovate, obovate, oblong, acute at base, glandular-dotted, shortly petiolate. Flowers yellow with red streaks, 0.5 cm long, in 3-4-flowered, axillary racemes 3 cm long, bracteate ; calyx 0.3 cm, densely pubescent, lobes equal, ovate-acuminate ; petals puberulous without ; stamens diadelphous, filaments glabrous ; ovary pubescent, style incurved, stigmas capitate. Legumes 0.8 cm long, compressed, glabrescent ; seeds 2, reniform, strophiolate.

*Fl. & Fr.* : October-January.

*World distribution* : India and Sri Lanka, in dry localities.

*Specimens examined* : 'Kurnool Hills', no date, *Beddome* s.n.; Diguwanetta, 19-11-1969, *Ellis* 32557.

**Rhynchosia rufescens** (Willd.) DC. Prodr. 2 : 387. 1825; Wt. & Arn. Prodr. 239. 1834; Baker in Hook. f. FBI 2 : 220. 1876; Gamble, FPM 2 : 373. 1918. *Glycine rufescens* Willd. Ges. Nat. Fr. Berlin Neue Schr. 4 : 222. 1803.

Erect herbs, about 50 cm high, viscid to touch; branches weak, trailing, striato, puberulous. Leaves about 7 cm long, trifoliolate; stipules ovate; leaflets  $4.5 \times 3$  cm, ovate, acute, shortly stipellate; reticulations prominent below. Flowers 0.7 cm long, yellow, in axillary, 4-5-flowered racemes 6 cm long, rachises becoming tendrillar, bracteate; calyx 1 cm long, lobes unequal, oblong-obtuse, pubescent; petals 0.5 cm long, glabrous; stamens diadelphous, filaments glabrous; ovary glabrous, style incurved, stigmas capitate. Legumes  $1.3 \times 0.8$  cm, oblong, flattened, 1-2-seeded; seeds black, strophiolate.

*Fl. & Fr.* : November-March.

*World distribution* : India, Sri Lanka, Malaysia, in dry localities.

*Specimens examined* : 'Kurnool Hills', no date, ? *Beddome* s.n.; Chelama, 7-12-1963, *Ellis* 17947; Srisailam, 21-10-1964, *Ellis* 22146; Bogada, 19-11-1969, *Ellis* 32537.

**R. viscosa** (Roth) DC. Prodr. 2 : 387. 1825; Baker in Hook. f. FBI 2 : 225. 1876; Gamble, FPM 2 : 375. 1918. *Glycine viscosa* Roth, Nov. Sp. Pl. 349. 1821. *Dolichos glutinosus* Roxb. [Hort. Beng. 55. 1814] Fl. Ind. 3 : 312. 1832; Wt. & Arn. Prodr. 248. 1834.

Shrubby climbers; branches terete, striate, viscidly pubescent. Leaves 1.5 cm long, trifoliolate, stipulate; petioles 7 cm long; leaflets  $7 \times 5$  cm, ovate, laterals unequal-sided; reticulations prominent below; petiolules hairy. Flowers pale yellow with pinkish tinge, 1.5 cm long, in axillary racemes 25 cm long, bracteate; rachises glandular-hairy; calyx 0.5 cm long, lobes acuminate-oblong, unequal, glandular-pubescent without; petals 1.5 cm long, standard deep red and pubescent without; stamens diadelphous, filaments glabrous; ovary densely pubescent. Legumes  $4 \times 1$  cm, oblong, glandular-hairy; seeds 2, black, strophiolate.

*Fl. & Fr.* : October-June.

*World distribution* : Tropics from Africa, India and Sri Lanka, in dry localities.

*Specimens examined* : Chelama, 5-7-1963, Ellis 16755; Chelama, 18-3-1965, Ellis 23712.

***Rhynchosia minima* (Linn.) DC. Prodr. 2 : 385. 1825 var. *laxiflora* (Camb.) Baker in Hook. f. FBI 2 : 223. 1876; Gamble, FPM 2 : 375. 1918. *R. laxiflora* Camb. in Jacq. Voy. Bot. 44. 1844.**

Trailing herbs, up to 60 cm long; branches angular, puberulous. Leaves up to 10 cm long, trifoliolate, stipulate; petioles about 5 cm long; leaflets  $4.5 \times 4$  cm, ovate, glabrous, glandular below. Flowers yellow, 0.8 cm long, in axillary racemes 12 cm long, bracteate; calyx 0.4 cm long, puberulous and glandular without, lobes acuminate; petals glabrous; stamens diadelphous, filaments glabrous; ovary puberulous. Legumes  $1.5 \times 0.5$  cm, flattened, slightly oblique, puberulous; seeds 2, orbicular, strophioliate.

*Fl. & Fr.* : August-November.

*World distribution* : Peninsular India.

*Specimens examined* : Chelama, 15-10-1964, Ellis 22008; Ahobilam, 23-11-1969, Ellis 32599.

***R. aurea* (Willd.) DC. Prodr. 2 : 386. 1825; Baker in Hook. f. FBI 2 : 221. 1876, p. p.; Gamble, FPM 2 : 374. 1918. *Glycine aurea* Willd. in Nov. Act. Ber. 4 : 18. 1803. *Nomismia aurea* Wt. & Arn. Prodr. 2:7. 1834. *N. capitata* Wt. & Arn. I.c. 237; Wt. Ic. 1 : t. 295. 1840.**

Herbs, about 50 cm high; branches trailing, striate, finely pubescent. Leaves 10 cm long, trifoliolate, stipulate; leaflets  $5 \times 5$  cm, ovate, rhomboid, puberulous, shortly stipellate. Flowers deep yellow, 1.5 cm long, in axillary racemes 10 cm long; calyx 0.5 cm long, lobes linear, unequal, pubescent; petals 0.5 cm long, standard puberulous without; stamens diadelphous, filaments glabrous; ovary pubescent. Legumes 1.5 cm long, orbicular, flattened, puberulous; seeds 2, strophiolate, reniform.

*Fl. & Fr.* : September-January.

*World distribution* : India and Sri Lanka, in dry localities.

*Specimen examined* : Chelama, 17-10-1964, Ellis 22069.

Gamble (*Fl. Pres. Madras* 2 : 376. 1918) records *Rhynchosia bracteata* Benth. ex Baker in Mantralakanama pass in Kurnool. However, it was not possible to collect this plant from the Nallamalais in recent tours.

## FLEMINGIA Roxb. ex Ait. nom. cons.

- |  |                        |
|--|------------------------|
| 1. Flowers concealed by conspicuous bracts | <i>F. strobilifera</i> |
| 1. Flowers not concealed by bracts         | <i>F. macrophylla</i>  |

*Flemingia strobilifera* (Linn.) R. Br. in Ait. Hort. Kew. ed. 2. 4 : 350. 1812 ; DC. Prodr. 2 : 351. 1825 ; Wt. & Arn. Prodr. 243. 1834 ; Wt. Ic. 1 : t. 267. 1840 ; Gamble, FPM 2 : 377. 1918. *Hedysarum strobiliferum* Linn. Sp. Pl. 1053. 1753. *Moghania strobilifera* (Linn.) St. Hil. ex O. Kuntze. Rev. Gen. Pl. 199. 1891 ; Li in Amer. Journ. Bot. 31 : 227. 1944 ; Noteboom in Reinwardtia 5 : 433. 1960. *Flemingia bracteata* (Roxb.) Wt. Ic. 1 : t. 268. 1840 ; Kurz in Journ. Asiat. Soc. Beng. 45(2) : 260. 1876 ; Gamble, FPM 2 : 378. 1918 ; Meeuwen in Reinwardtia 5 : 433. 1960. *Hedysarum bracteatum* Roxb. Ind. 3 : 351. 1832. *Moghania bracteata* (Roxb.) Li in Amer. Journ. Bot. 31 : 227. 1944. *Flemingia strobilifera* var. *bracteata* (Roxb.) Baker in Hook. f. FBI 2 : 227. 1876.

Herbs, about 50 cm high ; branches striate, brown-pubescent. Leaves simple, 11 x 6.5 cm, ovate-elliptic, entire, glabrous except on nerves below, gland-dotted, stipulate ; lateral nerves 10, transverse nervules rather prominent. Flowers white, 0.6 cm long, in axillary and terminal racemes 18 cm long, bracteate ; bracts scarious ; calyx 0.4 cm long, lobes prominent, pubescent, tube short ; petals 0.6 cm long, prominently clawed at base, glabrous ; stamens diadelphous, glabrous ; ovary pubescent. Legumes 1 cm long, oblique ; seeds 2, orbicular, estrophiolate.

*Fl. & Fr.* : March-May.

*World distribution* : Pantropic.

*Specimen examined* : Gundlابrahmeswaram, 30-3-1965, Ellis 23802.

*Remarks* : Until the conservation of the generic name *Flemingia* Roxb. ex Ait. (in Taxon 21 : 432-437, 1972) as proposed by Velva E. Rudd (in Taxon 19 : 294-297, 1970) nomenclatural instability prevailed amongst *Maghaumia* Jaume St.-Hilaire, 'Moghania', *Flemingia* Roxb. ex Ait., and of Roxb. ex Rotl., *Lourea* Neck. and of Neck. ex Jaume St.-Hilaire, and *Christia* Moench. Briefly then to trace the history : *Lourea* ('Luores') Neck. ex Jaume St.-Hilaire is the earliest available substitute for the illegitimate *Flemingia* Roxb. ex Ait. *Lourea* Neck. ex Jaume St.-Hilaire became available when Necker's earlier work was invalidated by the International Congress in 1959. Realising that *Lourea* pertained to *Christia* Moench. (1802) another genus *Maughania* 'Moghania' Jaume St.-Hilaire (1813) was substituted. The proposal to conserve *Flemingia* Roxb. ex Ait.

against *Flemingia* Roxb. ex Rottl. and in preference to all other names was accepted by the committee for Nomenclature for Spermatophyta (*Taxon* 21 : 532-533. 1972), stating that "...because of the confusion between the two Lourcas, the two *Flemingias*, and *Maughamia-Moghamia*, this is one of the most involved and frustrating cases. By a large majority the Committee recommends conservation of *Flemingia*." (p. 533).

Coming to the taxonomic aspect of the taxon, *bracteata*, after a detailed study both in the field and in MH and CAL it appears desirable to agree with Meeuwen (*op. cit.*) to treat the two taxa, viz. *F. bracteata* (Roxb.) Wt. and *F. strobillifera* R. Br. as conspecific; the differentiating characters of both the taxa are not constant as they intergrade with each other.

***Flemingia macrophylla* (Willd.) Prain ex Merr. in Philip. Journ. Sci. 5 : 130. 1910. *Crotalaria macrophylla* Willd. Sp. Pl. 3 : 982. 1802. *Moghamia macrophylla* (Willd.) O. Ktze. Rev. Gen. Pl. 1 : 199. 1891; Li in Amer. Journ. Bot. 31 : 227. 1944; Noteboom in Reinwardtia 5 : 434. 1960. *Flemingia congesta* Ait. Hort. Kew. ed. 2. 4 : 349. 1812; DC. Prodr. 2 : 351. 1825; Wt. & Arn. Prodr. 241. 1834; Wt. Ic. 2 : t. 390. 1843; Baker in FBI 2 : 228. 1876; Gamble, FPM 2 : 378. 1918.**

Shrubs, about 1 m high; branches terete, striate, brown-pubescent. Leaves 12 cm long, trifoliolate; stipules small; petioles 6 cm long; leaflets 11×5 cm, ovate-elliptic, unequally rounded at base, glabrous above, sericeous beneath; nerves and reticulations raised below, 3-nerved from base. Flowers pinkish, 0.8 cm, in axillary racemes 5 cm long, bracteate; calyx 0.5 cm long, lobes acuminate, pubescent and glandular without; petals 0.6 cm long, glabrous; stamens diadelphous, filaments glabrous; ovary brown-pubescent. Legumes 1×0.7 cm, oblique; seeds 2, orbicular, estrophiolate.

*Fl. & Fr.* : March-May.

*World distribution* : Tropics from Africa, India, Sri Lanka, China, Malaysia and Australia.

*Specimens examined* : Nallamalais, Kurnool, 1883, H.A. Sim 16381; Gundlabrahmeswaram, 30-3-1965, Ellis 23802.

*Remarks* : Noteboom (*op. cit.*) has treated this taxon in a very broad sense, treating among others the following taxa as given by Gamble under it as synonyms, viz. *Flemingia grahamiana* Wt. & Arn., *F. semididata* Roxb., *F. stricta* Roxb., *F. walliepii* Wt. & Arn. Noteboom concludes, "...After having seen many plants from Malaysia and the Asiatic continent, I can say that range of variability covers all the

descriptions which belong to the synonyms.' As only a monographer can give an opinion on so great a complex group as this, Noteboom's interpretation of the taxon is followed because the materials at hand are too meagre for any definite pronouncement.

**DESMODIUM Desv. nom. cons.\***

1. Petioles prominently winged ; legumes shaggy-pubescent	<i>D. triquetrum</i>
1. Petioles not winged ; legumes puberulous :	
2. Leaves unifoliolate :	
3. Leaflets as broad as long or broader ; stems terete ..	<i>D. velutinum</i>
3. Leaflets twice as long as broad ; stems angular ..	<i>D. gangeticum</i>
2. Leaves trifoliolate :	
4. Bracts prominent, concealing the flowers ..	<i>D. pulchellum</i>
4. Bracts not prominent, not concealing the flowers :	
5. Lateral leaflets sensitive, much smaller than terminal ..	<i>D. motorium</i>
5. Lateral leaflets not sensitive, slightly smaller than terminal :	
6. Leaflets obovate-concate, about $0.8 \times 0.8$ cm ; prostrate herbs ..	<i>D. triflorum</i>
6. Leaflets elliptic-oblong, orbicular, up to $10 \times 4.5$ cm ; erect herbs ..	<i>D. heterocarpon</i>

**Desmodium triquetrum** (Linn.) DC. Prodr. 2 : 326. 1825 ; Wt. & Arn. Prodr. 224. 1834 ; Baker in Hook. f. FBI 2 : 163. 1876 ; Gamble, FPM 2 : 345. 1918 ; Meeuwen in Reinwardtia 6 : 262. 1962. *Hedysarum triquetrum* Linn. Sp. Pl. 746. 1753. *Pteroloma triquetrum* (Linn.) Desv. ex Benth. in Miq. Pl. Jungh. 220. 1852 ; Schindler in Fedde, Repert. 20 : 271. 1924. *Tadehagi triquetrum* (Linn.) Ohashi in Ginkgoana 1 : 290. 1973.

Shrubs, about 1 m high ; branches reddish, triquetrous, strigosely hairy along angles. Leaves  $20 \times 5$  cm, simple, ovate-lanceolate, linear-acuminate, entire, cordate at base, coriaceous, hirtellous on nerves below ; lateral nerves 16, parallel, reticulations prominent ; petioles about 4 cm

\* The genus *Desmodium* Desv. has been treated here in a broad sense comprising the following genera, viz. *Codariocalyx* Hassk., *Dendrolobium* Benth., *Phyllodium* Desv., and *Pteroloma* Desv. ex Benth., for it is observed that there are common characters shared by all, and the genus *Desmodium*, in a broad sense, serves well to have a circumscription having all the minor differences. Apparently *Desmodium* seems to be a natural genus.

long, prominently winged ; stipules  $2 \times 0.5$  cm, ovate-acuminate, prominently veined. Flowers pinkish orange, 0.7 cm long, in terminal, branched racemes 60 cm long, bracteate, bracteolate ; calyx 0.3 cm long, teeth prominent, puberulous, sparingly hirtellous ; petals 0.7 cm long ; stamens diadelphous ; ovary elongated. Legumes  $3 \times 0.6$  cm, woolly-pubescent, falcate, about 6-jointed ; seeds compressed, reniform, estrophiolate.

*Fl. & Fr.* : August-February.

*World distribution* : India, Sri Lanka and Burma, in dry localities.

*Specimen examined* : Gundlabrahmeswaram, 27-10-1964, Ellis 22224.

*Remarks* : Meeuwen (*op. cit.* p. 262) concurs with D. Prain (in *Journ. Asiat. Soc. Beng.* XLV : 232. 1897) in recognising as distinct 4 subspecies, viz. *triguetrum*, *alatum* (DC.) Prain, *pseudotriguetrum* (DC.) Prain, *auriculatum* (DC.) Prain, though later Prain himself (*Bengal Pl.* 1 : 305. rep. ed. 1963) has treated three among these as distinct species. Schlinder (*op. cit.*) has resurrected them as distinct species under *Pteroloma* Desv. Meeuwen (*op. cit.*), on the other hand, does not recognise *Pteroloma* Desv. as distinct from *Desmodium* Desv. Ohashi (*op. cit.*) treats it under a new genus, *Tadehagi* Ohashi.

*Desmodium velutinum* (Willd.) DC. Prodr. 2 : 328. 1825 ; Meeuwen in Reinwardtia 6 : 264. 1962 ; Ohashi in Hara, Fl. E. Himal. 155. 1966 et in Ginkgoana 1 : 192. 1973. *Hedysarum velutinum* Willd. Sp. Pl. 3(2) : 117. 1803. *Desmodium latifolium* DC. Prodr. 2 : 328. 1825 ; Wt. & Arn. Prodr. 225. 1834, incl. vars. *roxburghii*, *telfairii*, *plukenetii* ; Baker in Hook. f. FBI 2 : 163. 1876 ; Gamble, FPM 2 : 346. 1918.

Undershrubs, about 2 m high ; stems terete, puberulous, intermixed with recurved hairs. Leaves 1-foliolate, stipulate ; petioles 4 cm long ; leaflet  $10 \times 12$  cm, ovate-lanceolate, truncate or slightly cordate at base, undulate along margin, sparingly hirsute on both surfaces ; lateral nerves about 7 pairs, reticulations prominent. Flowers pink, 0.4 cm long, in axillary and terminal, branched racemes 30 cm long, bracteate ; calyx 0.2 cm long, lobes small, triangular, hirsute without ; petals glabrous ; stamens diadelphous, filaments connate up to top ; ovary hirsute, style glabrous. Lomentum 1.5 cm long, joints 3-4, sparsely pubescent with hooked hairs ; seeds reniform, flattened.

*Fl. & Fr.* : July-December.

*World distribution* : Tropics from Africa, India, Sri Lanka, Malaysia and Philippines.

*Specimens examined* : Chelama, 9-12-1963, Ellis 18032 ; Chelama, 16-10-1964, Ellis 22028.

*Remarks* : Meeuwen (*op. cit.*) treats even *D. virgatum* Zoll. ex King as synonymous to this, indicating that the taxon is polymorphic and that criteria of fair importance are the indumentum and shape of the leaflets, and that (*op. cit.* p. 265) a lot of intermediate forms are encountered which make the erection of varieties redundant.

**Desmodium gangeticum** (Linn.) DC. Prodr. 2 : 327. 1825 ; Wt. & Arn. Prodr. 225. 1834 ; Wt. Ic. 1 : t. 271. 1840 ; Baker in Hook. f. FBI 2 : 168. 1876, incl. var. *maculatum* (Linn.) Baker ; Gamble, FPM 2 : 345. 1918 ; Meeuwen in Reinwardtia 6 : 249. 1962 ; Ohashi in Hara, Fl. E. Himal. 149. 1966 et in Ginkgoana 1 : 184. 1973. *Hedysarum gangeticum* Linn. Sp. Pl. 746. 1753.

Herbs erect, often scandent, up to 1m high ; branches angled, grooved, sparsely pubescent, hirsutous especially on ridges of grooves. Leaves unifoliolate, up to 14×7 cm, ovate, rounded at base, entire, softly pubescent beneath, less so above, stipulate ; reticulations prominent ; petioles about 3 cm long. Flowers deep bluish pink, 0.5 cm long, in axillary and terminal panicles 20 cm long, bracteate, bracteolate ; calyx 0.3 cm long, sparsely strigose-pubescent without, lobes short ; petals pilose without ; stamens diadelphous, filaments connate up to top ; ovary elongated, pubescent. Legumes 2 cm long, falcate, joints pubescent with hooked hairs, reticulate ; seeds reniform, flattened, estrophiolate.

*Fl. & Fr.* : August-January.

*World distribution* : Tropics from Africa, India, Sri Lanka, Malaysia and Philippines.

*Specimens examined* : Chelama, 7-12-1963, Ellis 17955 ; Gundabrahmeswaram, 2-4-1965, Ellis 23844 ; Mahanandi, 21-8-1965, Ellis 25418 ; Diguvametta, 17-11-1969, Ellis 32449.

**D. pulchellum** (Linn.) Benth. Fl. Hongk. 83. 1861 ; Baker in Hook. f. FBI 2 : 162. 1876 ; Gamble, FPM 2 : 344. 1918 ; Meeuwen in Reinwardtia 6 : 256. 1962. *Hedysarum pulchellum* Linn. Sp. Pl. 747. 1753. *Dicerma pulchellum* (Linn.) DC. in Ann. Sci. Nat. Paris 4 : 236. Jan. 1825 et in Prodr. 2 : 339. Oct. 1825 ; Wt. & Arn. Prodr. 230. 1834 ; Wt. Ic. 2 : t. 418. 1843. *Phyllodium pulchellum* (Linn.) Desv. in Journ. de Bot. ser. 2. 1 : 124, t. 5. f. 24. 1813 ; Schindler in Fedde, Repert. 20 : 270. 1924 ; Ohashi in Hara Fl. E. Himal. 161. 1966 et in Ginkgoana 1 : 276. 1973.

Shrubs, about 2 m high ; stems 5-angled, striated, puberulous in young. Leaves trifoliolates ; petioles 8 cm long ; stipules 0.5 cm

long ; leaflets about  $12 \times 5$  cm, elliptic-ovate, apiculate, acute or rounded at base, wavy along margins, coriaceous ; lateral veins about 8 pairs, reticulations prominent. Flowers white, 0.3 cm across, 2 or 3 enclosed in a pair of prominent foliolar bracts, shortly pedicellate, in terminal, branched racemes about 25 cm long, bracteolate ; calyx 0.3 cm long, hairy without, teeth small ; petals 0.7 cm long, glabrous ; stamens monadelphous, filaments glabrous ; ovary pilose. Lomentum  $0.8 \times 0.3$  cm, joints about 3, reticulate ; seeds compressed, reniform.

*Fl. & Fr. :* August-January.

*World distribution :* India, Sri Lanka, Burma and North Australia.

*Specimens examined :* Chelama, 8-12-1963, Ellis 17995 ; Chelama, 16-10-1964, Ellis 22034 ; Diguvametta, 17-11-1969, Ellis 32437.

*Desmodium motorium* (Houtt.) Merr. in Journ. Arn. Arb. 19 : 345. 1938 ; Meenwen in Reinwardtia 6 : 254. 1962. *Hedysarum motorium* Houtt. Nat. Hist. II. 10 : 246. 1779. *Codariocalyx motorius* (Houtt.) Ohashi in Journ. Jap. Bot. 40 : 367. 1965. *Desmodium gyrans* (Linn. f.) DC. Prodr. 2 : 326. 1825 ; Baker in Hook. f. FBI 2 : 174. 1876 ; Gamble, FPM 2 : 348. 1918. *Hedysarum gyrans* Linn. f. Suppl. 332. 1781. *Codariocalyx gyrans* (Linn. f.) Hassk. in Flora 25 (2) : 49. 1842 ; Schindler in Fedde, Repert. 20 : 280. 1924.

Herbs, about 1 m high ; branches faintly angled, grooved. Leaves trifoliolate ; petioles 1.5 cm long ; stipules about  $1.5 \times 0.4$  cm ; terminal leaflets  $10 \times 3$  cm, elliptic-oblong, often emarginate, laterals  $1.5 \times 0.4$  cm, linear, puberulous below ; lateral nerves 15 pairs, reticulations prominent ; stipels small. Flowers pale orange, 0.5 cm long, in terminal, branched racemes 15 cm long, bracteate, pedicellate ; bracts prominently parallel-veined ; calyx 0.25 cm long, lobes puberulous without, ciliate along margins ; petals 0.5 cm long ; stamens diadelphous, filaments glabrous, connate up to top ; ovary pubescent, style and stigma glabrous. Legumes  $3.8 \times 0.5$  cm, joints about 9, not separating, puberulous ; seeds slightly flattened, reniform.

*Fl. & Fr. :* Almost throughout the year.

*World distribution :* Tropics from India, Sri Lanka, Burma, Malaysia and Philippines.

*Specimen examined :* Gundlabrahmeswaram, 27-10-1964, Ellis 22223.

*Remarks :* The jerky movements of lateral leaflets make this plant a remarkable one. Nomenclaturally too this plant is interesting. Schindler (*op. cit.*) re-established *Codariocalyx* Hassk. Recently Ohashi (*op. cit.*)

subscribes to the same view by recognising *Codariocalyx* Hassk. Nevertheless, the summation of several characters fits in well within the circumscription of *Desmodium* Desv., and therefore this taxon is treated under the same genus.

***Desmodium triflorum* (Linn.) DC.** Prodr. 2 : 334. 1825 ; Wt. & Arn. Prodr. 229. 1834, incl. var. *minus* ; Wt. Ic. 1 : t. 292. 1840 ; Baker in Hook. f. FBI 2 : 173. 1876 ; Gamble, FPM 2 : 347. 1918 ; Meeuwen in Reinwardtia 6 : 261. 1962 ; Ohashi in Hara, Fl. E. Himal. 154. 1966 et in Ginkgoana 1 : 246. 1973. *Hedysarum triflorum* Linn. Sp. Pl. 749. 1753.

Prostrate, spreading herbs ; branches faintly angled, sparsely hirsute, rooting at nodes. Leaves 1.2 cm long ; petioles 0.8 cm long, hirsute ; stipules many, parallel nerved. Flowers purplish pink, 0.3 cm long, in axillary fascicles 0.7 cm across, bracteate ; pedicels hairy ; calyx 0.15 cm long, lobes linear-ovate ; petals 0.3 cm long, glabrous ; stamens diadelphous, filaments connate up to top ; ovary pilose. Legumes 1.5 cm long, compressed, upper edge straight, joints about 4, puberulous with hooked hairs ; seeds compressed, reniform.

*Fl. & Fr.* : July-December.

*World distribution* : Tropics from India, Sri Lanka, Malaysia and Australia.

*Specimens examined* : Gundlabrahmeswaram, 24-10-1964. Ellis 22176 ; Diguvametta, 16-11-1969, Ellis 32417.

***D. heterocarpon* (Linn.) DC.** Prodr. 2 : 337. 1825 ; Meeuwen in Reinwardtia 6 : 95. 1961 et 6 : 251. 1962, p.p. ; Ohashi in Hara, Fl. E. Himal. 149. 1966 et in Ginkgoana 1 : 210. 1973. *Hedysarum heterocarpon* Linn. Sp. Pl. 747. 1753. *Desmodium polycarpum* (Poir.) DC. Prodr. 2 : 334. 1825 ; Wt. & Arn. Prodr. 227. 1834, excl. syn. ; Wt. Ic. 2 : t. 406. 1843 ; Baker in Hook. f. FBI 2 : 171. 1876 ; Gamble, FPM 2 : 346. 1918.

Herbs, about 40 cm high ; branches terete, striate, pubescent when young. Leaves about 17 cm long, trifoliolate ; petioles 7 cm long ; stipules ovate-caudate, many-parallel nerved ; leaflets 10×4.5 cm, elliptic-oblong, obovate, laterals smaller, often almost orbicular, glabrous above, softly pilose below ; lateral nerves 10, reticulations prominent. Flowers pinkish violet, 0.5 cm across, in terminal racemes about 18 cm long, pedicellate, bracteate ; calyx 0.2 cm long, lobes acuminate, scarious ; petals glabrous ; stamens diadelphous, filaments glabrous, connate up to top ; ovary sparsely puberulous. Legumes 2×0.4 cm, linear-oblong,

faintly falcate, hooked-hairs along sutures, sparsely so along surface, joints about 6, reticulate; seeds slightly flattened, reniform.

*Fl. & Fr.* : September-February.

*World distribution* : India, Sri Lanka, Burma, China, Japan and Malaysia.

*Specimen examined* : Srisailam, 21-10-1964, Ellis 22135.

*Remarks* : van Meeuwen (*op. cit.* p. 93 et p. 251) has studied *Desmodium heterocarpon*, *D. siliquosum*, *D. ovalifolium*, *D. polycarpum*, *D. trichocaulon*, and a few others, bringing them under two vars. viz. *heterocarpon* to include *D. trichocaulon*, *D. ovalifolium*, *D. buergertii*, and has described a new variety, *strigosum* to include *Desmodium siliquosum*, *D. polycarpum*. The present studies of the plant specimens in the field and in the herbarium indicate that *D. trichocaulon* DC. is quite distinct and Baker (*op. cit.*) is justified in treating it as a variety, later followed by Gamble. Therefore, the circumscription of Meeluwen has been taken in a restricted sense.

#### DOLICHOS Linn. *nom. cons.*

*Dolichos biflorus* Linn. Sp. Pl. 727. 1753 ; DC. Prodr. 2 : 398. 1825 ; Baker in Hook. f. FBI 2 : 210. 1876 ; Gamble, FPM 2 : 367. 1918. *D. uniflorus* Lamk. Encycl. 2 : 299. 1790 ; Wt. & Arn. Prodr. 248. 1834.

Twining herbs, about 50 cm long; branches terete, pubescent. Leaves 10 cm long, trifoliolate, stipulate; leaflets 4.5×2.5 cm, ovate, sparsely pilose; petiolules shaggy; stipels minute. Flowers pale yellow, 1.5 cm long, 3-4-together at axils of leaves, bracteate, bractolate, shortly pedicellate; calyx 0.7 cm long, shaggy, lobes caudate-acuminate; petals glabrous; stamens diadelphous; ovary puberulous, style filiform, stigmas pubescent. Legumes 5×0.3 cm, linear, slightly falcate, flattened, softly pilose; seeds about 5, black.

*Fl. & Fr.* : October-December.

*World distribution* : India, Sri Lanka and Burma, in dry localities.

*Specimen examined* : Bogada, 19-11-1969, Ellis 32538.

*Remarks* : This is the 'Horse Gram' for its seeds and leaves which are fed to horses and cattle. The present collection obviously is an escape from cultivation.

## TEPHROSIA Pers. nom. cons.

1. Inflorescences axillary	..	<i>T. tinctoria</i>
1. Inflorescences terminal :		
2. Legumes shaggy	..	<i>T. villosa</i>
2. Legumes puberulous :		
3. Leaves about 7-foliolate	..	<i>T. hamiltonii</i>
3. Leaves more than 9-foliolate :		
4. Racemes 4-5-flowered, about 1.5 cm long	..	<i>T. procumbens</i>
4. Racemes many-flowered, about 6 cm long	..	<i>T. purpurea</i>

**Tephrosia tinctoria** Pers. Syn. 2 : 329. 1807 ; DC. Prodr. 2 : 252. 1825 ; Wt. & Arn. Prodr. 211. 1834 ; Wt. Ic. 2 : t. 388. 1843 ; Baker in Hook. f. FBI 2 : 111. 1876 ; Gamble, FPM 2 : 319. 1918.

Herbs to undershrubs, about 1 m high ; branches faintly angled, striate, brown-pubescent. Leaves up to 8 cm long, 5-9-foliolate ; petioles about 7 cm long ; stipules small ; leaflets about 7 x 1.5 cm, ovate, obovate, apiculate, emarginate, obtuse at base, tomentose beneath ; lateral nerves parallel, reticulations prominent. Flowers orange, 1 cm long, in axillary racemes about 23 cm long, bracteate ; peduncles about 12 cm long ; calyx 0.4 cm long, teeth equal or subequal, pubescent without ; stamens dialeipous, filaments glabrous ; ovary densely pubescent. Legumes about 5.5 x 0.5 cm, flattened, pubescent, about 10-seeded ; seeds dark brown, flattened.

*Fl. & Fr.* : October-December.

*World distribution* : India, in dry localities.

*Specimen examined* : Gundlbrahmeswaram, 28-11-1969, Ellis 32661.

*Remarks* : Baker (*op. cit.* p. 112) recognises 3 varieties, viz. *pulcherrima*, *intermedia* and *coccinea*. Drummond in Gamble's (*op. cit.* p. 319), on the other hand, recognises var. *pulcherrima* as a distinct species, and part of var. *intermedia* as *T. canarensis* J. R. Drumm. ; var. *coccinea* does not occur in the areas covered by Gamble. The present study of the materials from the Nallamalais indicates that they fit in well within the circumscription of *T. tinctoria* Pers.

**T. villosa** (Linn.) Pers. Syn. 2 : 829. 1807 ; DC. Prodr. 2 : 251. 1825 ; Wt. & Arn. Prodr. 212. 1834 ; Baker in Hook. f. FBI 2 : 113. 1876. *Cracca villosa* Linn. Sp. Pl. 752. 1753. *Tephrosia hirta* Buch.-Ham. in Trans. Linn. Soc. 8 : 546. 1822 ; Drummond in Gamble, FPM 2 : 318. 1918.

Herbs, about 75 cm high ; branches faintly angled, villous-tomentose. Leaves 6 cm long, 9-13-foliolate, stipulate ; leaflets up to  $2 \times 0.5$  cm, obovate-oblong, acute at base, glabrous above, pubescent beneath ; lateral nerves rather prominent. Flowers pale purple, 1 cm long, in terminal racemes about 10 cm long, bracteate, bracteolate ; pedicels articulate ; calyx 0.7 cm long, lobes lanceolate, villous ; petals 1 cm long, villous without ; stamens diadelphous, filaments glabrous ; ovary villous. Legumes  $3.5 \times 0.5$  cm, linear, flattened, falcate, villous ; seeds about 8, ovoid.

*Fl. & Fr.* : September-December.

*World distribution* : Tropical Africa, India and Sri Lanka.

*Specimens examined* : Chelama, 16-10-1964, Ellis 22029 ; Bogada, 19-11-1969, Ellis 32539 ; Diguvametta, 6-8-1972, Ellis 42160.

*Tephrosia hamiltonii* J. R. Drummond in Gamble, FPM 2 : 320. 1918.  
*T. purpurea* Pers. Syn. 2 : 329. 1807, p.p. ; Baker in Hook. f. FBI 2 : 112. 1876, p.p. *Galega tinctoria* sensu Roxb. Fl. Ind. 3 : 386. 1832, non Linn.

Undershrubs, about 1 m high ; branches zig-zag, angled, pubescent. Leaves about 15 cm long, 5-7-foliolate, stipulate ; leaflets  $1.5 \times 0.7$  cm, ovate ; nerves and reticulations rather prominent. Flowers bright pink, 1 cm long, in extra-axillary racemes 6 cm long, bracteate, bracteolate ; calyx 0.5 cm long, pubescent without, teeth almost equal ; petals sericeous without ; stamens diadelphous, filaments glabrous ; ovary pubescent. Legumes 2.5 cm long, compressed, parchment-like, glabrous ; seeds 5, ovoid.

*Fl. & Fr.* : September-December.

*World distribution* : Peninsular India, in dry localities.

*Specimen examined* : Chelama, 15-10-1964, Ellis 22013.

*Remarks* : Drummond (*op. cit.*) has interpreted *Tephrosia hamiltonii* in such a way as to cover the restricted circumscription of *T. purpurea* of Persoon (*op. cit.*) and Baker (*op. cit.*). Definite prognostication can be made on this point only after a study of the TYPE materials of all the taxa concerned. For the present, Drummond's interpretation is followed.

*T. procumbens* Buch.-Ham. in Trans. Linn. Soc. 8 : 54. 1822 ; Gamble, FPM 2 : 320. 1918. *T. purpurea* Pers. var. *pumila* (Pers.) Baker in Hook. f. FBI 2 : 113. 1876. *T. pumila* Pers. Syn. 2 : 329. 1807 ; DC. Prodr. 2 : 254. 1834 ; Prain, Beng. Pl. 1 : 289. rep. ed. 1963. *T. diffusa* Wt. & Arn. Prodr. 213. 1834.

Diffuse herbs, about 30 cm tall ; branches decumbent, faintly angled, brown-pubescent. Leaves 4 cm long, imparipinnate, stipulate ; leaflets  $2 \times 0.6$  cm, oblong-obovate, retuse, attenuate at base, pubescent. Flowers purplish pink, 0.6 cm long ; in terminal, 4-5-flowered racemes 1.5 cm long, bracteate, bracteolate ; calyx 0.3 cm long, setose, teeth linear ; petals exserted, standard puberulous without ; stamens diadelphous, filaments glabrous ; ovary densely pubescent, style glabrous. Legumes 3.7 cm long, flattened, puberulous ; seeds about 10, ovoid, smooth.

*Fl. & Fr.* : September-December.

*World distribution* : Pantropic.

*Specimen examined* : Chelama, 10-12-1963, Ellis 18056.

*Tephrosia purpurea* (Linn.) Pers. Syn. 2 : 329. 1807 ; DC. Prodr. 2 : 251. 1825 ; Wt. & Arn. Prodr. 213. 1834 ; Baker in Hook. f. FBI 2 : 112. 1876 ; Gamble, FPM 2 : 320. 1918. *Cracea purpurea* Linn. Sp. Pl. 752. 1753.

Herbs, about 75 cm high ; branches spreading, terete, puberulous when young. Leaves 8 cm long, imparipinnate, about 12 foliolate, stipulate ; leaflets up to  $3.5 \times 0.8$  cm, obovate-oblong, emarginate, apiculate, glabrous above, puberulous below ; lateral nerves parallel, prominent. Flowers pink, 0.7 cm long, in terminal racemes 6 cm long, bracteate, bracteolate ; calyx 0.25 cm long, pubescent without, teeth acuminate ; petals 0.7 cm long, standard pilose without ; stamens diadelphous, filaments glabrous ; ovary pubescent. Legumes 4 cm long, flattened, falcate, puberulous ; seeds about 5, ovoid, glabrous.

*Fl. & Fr.* : March-December.

*World distribution* : Pantropic.

*Specimens examined* : Chelama, 7-12-1963, Ellis 17950 ; Pathalganga, Srisailam, 25-3-1965, Ellis 23766 ; Mahanandi, 23-8-1965, Ellis 25516.

### CAESALPINIACEAE

- |  |    |             |
|--|----|-------------|
| 1. Leaves of 2 leaflets :  |    |             |
| 2. Leaflets adnate to form one leaf, deeply cleft at apex ; petals present | .. | BAUHINIA    |
| 2. Leaflets free ; petals absent   | .. | HARDWICKIA  |
| 1. Leaves of several leaflets :  |    |             |
| 3. Branches prickly  | .. | PTEROLOBIUM |
| 3. Branches not prickly :  |    |             |
| 4. Stamens 3 ; petals 3 ; calyx lobes 4                                    | .. | TAMARINDUS  |
| 4. Stamens 5-10 ; petals 5 ; calyx lobes 5                                 | .. | CASSIA      |

## BAUHINIA Linn.

[Since De Wit's Work (in *Reinwardtia* 3 : 381-539. 1956) a new interest to treat several of the taxa included under *Bauhinia* Linn. under several genera seems to have gained momentum; A. Schmitz (in *Bull. Jard. Bot. Belg.* 43 : 309-423. 1973) in his palynological studies has effected new combinations under many genera for taxa previously retained in *Bauhinia* Linn. It is interesting to note, however, that Hutchinson (*Gen. Fl. Plants* 1 : 242. 1964) has preferred to treat all taxa under *Bauhinia*, for "...pending a comprehensive re-examination of the whole species,...".

From a study of 5 taxa falling under the purview of this study, the totality of characters that marks *Bauhinia* is too overwhelming and that the taxa apparently are a natural assemblage of plants having several distinct characters. They are, therefore, retained under the broader circumscription of the genus *Bauhinia* Linn.]

1. Lianas ; pods woody	..	<i>B. vahlii</i>
1. Trees or shrubs ; pods not woody :		
2. Stamens 5 long, 5 short :		
3. Calyx spathaceous		<i>B. variegata</i>
3. Calyx not spathaceous		<i>B. malabarica</i>
2. Stamens 10, all equal :		
4. Racemes 3-4-flowered ; legumes dehiscent	..	<i>B. tomentosa</i>
4. Racemes several-flowered ; legumes indehiscent	..	<i>B. racemosa</i>

*Bauhinia vahlii* Wt. & Arn. Prodr. 297. 1834; Baker in Hook. f. FBI 2 : 279. 1876; Gamble, FPM 3 : 408. 1919. *Phanera vahlii* (Wt. & Arn.) Benth. Pl. Jungh. 263. 1852. *Bauhinia racemosa* *sensu* Vahl, Symb. 3 : 56, t. 62. 1807; DC. Prodr. 2 : 515. 1825. (non Lamk.).

Lianas; stems woody, girth up to 60 cm in diameter; tendrils opposite, circinate. Leaves about 25×25 cm; petioles about 15 cm long; stipules small; leaflets 2, about 20×20 cm, adnate to two-thirds the length, cordate at base, glabrous or sparsely puberulous above, tomentose beneath; nerves 10 from base. Flowers white, 4 cm across, in terminal corymbs about 15 cm across, bracteate; pedicels 4.5 cm long, tomentose; calyx 1.2 cm long, slightly spathaceous, teeth 5, villous without, glabrous within; petals 2.5×1.5 cm, softly villous without; stamens 3, filaments glabrous; style and stigma villous. Legumes about 27×6 cm, flattened, oblong, rusty-tomentose, woody; seeds about 6, flattened.

*Fl. & Fr.* : March-July.

*World distribution* : India, in moist deciduous forests, specially along streams.

*Specimens examined* : Gundlabrahmeswaram, 21-7-1963, Ellis 16954 ; Gundlabrahmeswaram, 31-3-1965, Ellis 23811 ; Ahobilam, 29-8-1965, Ellis 25573.

**Bauhinia variegata** Linn. Sp. Pl. 375. 1753 ; DC. Prodr. 2 : 514. 1825 ; Wt. & Arn. Prodr. 296. 1834 ; Baker in Hook. f. FBI 2 : 284. 1878 ; Gamble, FPM 3 : 407. 1919 ; De Wit in Reinwardtia 3 : 411. 1956. **Perlebia variegata** (Linn.) Schmitz in Bull. Jard. Bot. Nat. Belg. 43 : 386. 1973. **Phanera variegata** (Linn.) Benth. Pl. Jungh. 262. 1852.

Trees, about 15 m tall ; branches terete, brown-tomentose when young. Leaves about 15 cm long ; petioles 5 cm long ; stipules small ; leaflets 11 x 13 cm, adnate to about two-thirds up, ovate-oblong or rounded, glabrescent ; nerves 11 from base, transverse nervules prominent. Flowers white, about 5 cm across, in racemes about 9 cm long, bracteate, buds fusiform ; calyx about 3 cm long, spathaceous, splitting along one side, tomentose without, teeth small ; petals about 5 x 3 cm, ovate ; stamens 10, 5 long fertile, alternating with 5 short sterile ; ovary sparsely pubescent. Legumes about 25 x 2 cm, flattened ; seeds about 15, slightly flattened.

*Fl. & Fr.* : August-December.

*World distribution* : India, China and Burma, in dry tracts.

*Specimen examined* : Gundlabrahmeswaram, 30-11-1969, Ellis 32677.

**B. malabarica** Roxb. [ Hort. Beng. 31. 1814 ex] Fl. Ind. 321. 1834 ; Wt. & Arn. Prodr. 294. 1834 ; Baker in Hook. f. FBI 2 : 277. 1876 ; Gamble, FPM 3 : 407. 1919. **Pileostigma malabarica** (Roxb.) Benth. Pl. Jungh. 2 : 261. 1852.

Trees, about 20 m tall ; stems rather rough, glaucous when young. Leaves about 16 cm long ; petioles 5 cm long ; stipules small ; leaflets 11 x 13 cm, adnate to three-fourths the length, oblong, cordate at base, glabrous and glaucous beneath ; nerves 9 from base, reticulations prominent. Flowers pale yellow, 2 cm across, in axillary racemes 4 cm long, bracteate, buds ovoid ; calyx 0.8 cm long, brown-tomentose without, lobes 5, short ; petals about 1.5 cm long, oblong ; stamens 10, alternately 5 long, fertile and 5 short, sterile ; ovary pubescent. Legumes 25 x 2 cm, flattened, rugulose, puberulous ; seeds 20, ovoid, flattened.

*Fl. & Fr.* : August-December.

*World distribution* : India, Sri Lanka and Burma, in dry localities.

*Specimen examined* : Rollapenta, 14-8-1972, Ellis 42243.

*Bauhinia tomentosa* Linn. Sp. Pl. 375. 1753 ; DC. Prodr. 2 : 514. 1825 ; Wt. & Arn. Prodr. 295. 1834 ; Baker in Hook. f. FBI 2 : 275. 1876 ; Gamble, FPM 3 : 406. 1919 ; De Wit in Reinwardtia 3 : 409. 1956. *Pouletia tomentosa* (Linn.) Schmitz in Bull. Jard. Bot. Nat. Belg. 43 : 393. 1973.

Shrubs or small trees, up to 5 m tall ; branches terete, rusty-pubescent when young. Leaves about 10 cm long ; petioles about 2.5 cm long ; stipules linear. Flowers yellowish, 4 cm across, in axillary and terminal, 2-3-flowered racemes 5 cm long, bracteate, bracteolate ; calyx 1.5 cm long, spathaceous, 5-toothed at apex, tomentose without ; petals 4 cm long ; stamens 10, filaments pubescent at base ; ovary tomentose. Legumes 13 × 2 cm, flattened, suture raised, dehiscent, glabrous ; seeds about 12, flattened.

*Fl. & Fr.* : July-December.

*World distribution* : Tropics from India, Sri Lanka, Malaysia.

*Specimens examined* : Srisailam, 13-7-1963, Ellis 16865 ; Upper Ahobilam, 29-8-1965, Ellis 25582 ; Srisailam, 6-12-1969, Ellis 32716.

*B. racemosa* Lamk. Encycl. Meth. 1 : 390. 1789 ; Wt. & Arn. Prodr. 295. 1834 ; Baker in Hook. f. FBI 2 : 276. 1878 ; Gamble, FPM 3 : 406. 1919. *Pileostigma racemosa* (Lamk.) Benth. Pl. Juncgh. 262. 1852. *Bauhinia parviflora* Vahl, Symb. 3 : 55. 1807 ; DC. Prodr. 2 : 514. 1825.

Trees, about 4 m tall ; branches glabrous, pale. Leaves about 10 cm long ; petioles 2 cm long ; stipules small ; leaflets about 7.5 × 5 cm, adnate to two-thirds their length, obtuse, rounded at base, puberulous when young ; nerves 9 from base, reticulations prominent. Flowers pale yellow, 1 cm long, in terminal racemes about 6 cm long, bracteate, buds and rachises densely tomentose ; calyx 0.8 cm long, spathaceous, toothed at apex, puberulous without ; petals 0.4 cm long, lanceolate ; stamens 10, filaments glabrous ; ovary pubescent. Legumes up to 20 × 2.5 cm, flattened, falcate, indehiscent ; seeds about 15, flattened, ovoid.

*Fl. & Fr.* : March-November.

*World distribution* : India, Sri Lanka, Malaysia, in drier localities.

*Specimens examined* : Chelama, 4-7-1963, Ellis 16716 ; Upper Ahobilam, 22-11-1969, Ellis 32568 ; Maddipenta, 11-8-1972, Ellis 42231.

### HARDWICKIA Roxb.

**Hardwickia binata** Roxb. Pl. Corom. 3 : 6, t. 209. 1819 ; DC. Prodr. 2 : 487. 1825 ; Wt. & Arn. Prodr. 284. 1834 ; Baker in Hook. f. FBI 2 : 270. 1876 ; Brandis, Indian Trees, 250. 1906 ; Gamble, FPM 3 : 412. 1919.

Trees, about 20 m tall ; end branches drooping, terete, lenticellate, glabrous. Leaves 7 cm long ; petioles 3 cm long ; leaflets 2, about  $4.5 \times 2.5$  cm, obtuse, obliquely ovate, trapezoid, coriaceous, glandular at base, bristly between leaflets, sessile ; nerves 6 from base, reticulations prominent. Flowers pale yellow, 0.4 cm long, in axillary and terminal, panicled racemes about 8 cm long, bracteolate, shortly pedicellate ; calyx 0.4 cm long, lobes 5, oblong, coriaceous ; disk small ; petals absent ; stamens 10, alternately longer and shorter, filaments glabrous ; ovary glabrous, style twisted to an angle, stigmas peltate. Legumes  $6 \times 1.6$  cm, flattened, winged, glabrous ; seed 1, generally placed at top, orbicular, flattened.

*Fl. & Fr.* : August-January.

*World distribution* : India, in moist deciduous to dry deciduous forests.

*Specimens examined* : Diguvametta, 2-11-1906, C. A. Barber 8031 ; Mahanandi, 23-8-1965, Ellis 25513.

### PTEROLOBIUM R. Br. ex Wt. & Arn. *nom. cons.*

**Pterolobium hexapetalum** (Roth) Sant. & Wagh in Bull. bot. Surv. Ind. 5 : 108. 1963 (1964). *Reichardia hexapetala* Roth, Nov. Sp. Pl. 210. 1821 ; DC. Prodr. 2 : 484. 1825. *Pterolobium indicum* A. Rich. Tent. Fl. Abyss. 1 : 247. 1847 ; Baker in Hook. f. FBI 2 : 259. 1878 ; Gamble, FPM 3 : 395. 1919. *P. laceras* Wall. [Cat. 5841. 1831] ex Wt. & Arn. Prodr. 283. 1834, (non R. Br. 1814) ; Wt. Ic. 1 : t. 196. 1840.

Straggling shrubs ; branches dark pink, prickly, glabrous. Leaves 12 cm long, bipinnate ; petioles 8 cm long ; stipules small ; leaflets  $1 \times 0.3$  cm, ovate-oblong, obovate, acute and unequal at base, glabrous. Flowers white with a red tinge, 0.8 cm across, in panicles about 20 cm long, bracteate ; pedicels 0.5 cm long ; calyx 0.5 cm long, lobes unequal, lowest large, coriaceous, glabrous ; petals 0.5 cm long, oblong ; stamens 10, free, filaments pubescent ; ovary glabrous. Legumes  $4.5 \times 1$  cm, winged along one side, glabrous ; seed 1, flattened.

*Fl. & Fr.* : July-October.

*World distribution* : India, Sri Lanka, Burma, Malay Peninsula, generally in disturbed areas.

*Specimens examined* : Diguvametta, 2-11-1906, C.A. Barber 8029 ; Chelama, 4-7-1963, Ellis 16731 ; Mahanandi, 22-8-1965, Ellis 25469 ; Diguvametta, 6-8-1973, Ellis 42158.

#### TAMARINDUS Linn.

*Tamarindus indica* Linn. Sp. Pl. 34. 1753 ; DC. Prodr. 2 : 488. 1825 ; Wt. & Arn. Prodr. 285. 1834 ; Baker in Hook. f. FBI 2 : 273. 1878 ; Gamble, FPM 3 : 409. 1919.

Trees, about 30 m tall ; branches glabrous, bark fissured. Leaves 15 cm long, bipinnate ; petioles 5 cm long ; stipules small ; leaflets many, 2×1 cm, oblong, obtuse, glabrous. Flowers yellow with pink striations, 1 cm across, in terminal, a few-flowered racemes 7 cm long, bracteate, bracteolate ; calyx 0.5 cm long, lobes unequal, oblong-lanceolate, tube campanulate ; disk lobed ; petals 3, 1×0.5 cm ; stamens 3, filaments connate up to middle ; ovary glabrous, stipitate, style thin, stigmas capitate. Legumes 8×2 cm, flattened, falcate, slightly torulose ; seeds about 6, quadrangular, brown, shining.

*Fl. & Fr.* : March-August.

*World distribution* : Tropics from Africa, India, Sri Lanka, Malaysia.

*Specimen examined* : Peddachama, Eastern Nallamalais, 18-8-1972, Ellis 42302.

#### CASSIA Linn.

1. Trees	..	<i>C. fistula</i>
1. Shrubs or herbs :		
2. Bracts foliolar	..	<i>C. auriculata</i>
2. Bracts not foliolar :		
3. Leaflets up to 5 pairs :		
4. Legumes up to 3 cm long, bristly hairy ; leaflets in 2 pairs	..	<i>C. absus</i>
4. Legumes more than 10 cm long, glabrous ; leaflets 3-5-paired :		
5. Leaflets sharply acuminate, in more than 3 pairs	..	<i>C. occidentalis</i>
5. Leaflets oblong, obovate or rounded, in 3 pairs	..	<i>C. tora</i>
3. Leaflets in several pairs	..	<i>C. pumila</i>

*Cassia fistula* Linn. Sp. Pl. 377. 1753; DC. Prodr. 2 : 490. 1825; Wt. & Arn. Prodr. 285. 1834; Baker in Hook. f. FBI. 2 : 261. 1878; Gamble, FPM 3 : 400. 1919. *C. rhombifolia* Roxb. Fl. Ind. 327. 1832; Wt. Ic. 1 : t. 269. 1840.

Trees, about 10 m tall; branches glabrous. Leaves about 25 cm long, pinnate; petioles 10 cm long; stipules ovate; leaflets about 9, up to  $18 \times 7.5$  cm, ovate, rounded at base, puberulous; nerves and reticulations prominent; petiolules about 1 cm long. Flowers yellow, 4 cm across, in racemes 40 cm long, bracteate; calyx 1 cm long, lobes 0.6 cm broad, ovate-oblong, puberulous without; petals  $2.5 \times 1.5$  cm, obovate, prominently nerved; stamens 10, 3 fertile, filaments glabrous; ovary glabrous, style bent, stigmas flat. Legumes  $50 \times 4$  cm, cylindric, indehiscent; seeds about 50, orbicular, flattened.

*Fl. & Fr.* : March-December.

*World distribution* : India, Sri Lanka, Burma and Malaysia, often planted.

*Specimens examined* : Srisailam, 15-7-1963, Ellis 16898; Chelama, 8-12-1963, Ellis 18000.

*C. auriculata* Linn. Sp. Pl. 379. 1753; DC. Prodr. 2 : 496. 1825; Wt. & Arn. Prodr. 290. 1834; Baker in Hook. f. FBI 2 : 263. 1878; Gamble, FPM 3 : 401. 1919.

Shrubs, up to 2.5 m high; branches terete, brown-puberulous. Leaves up to 11 cm long; petioles 8 cm long; stipules  $1 \times 1.8$  cm, foliolar, orbicular, cordate at base with one end produced into a tail, puberulous; leaflets up to  $2.5 \times 1.5$  cm, elliptic-obtuse, sparingly puberulous beneath, glabrous above, shortly petiolulate. Flowers yellow, 3 cm across, in axillary and terminal corymbs 8 cm long, bracteate; sepals  $1.5 \times 1$  cm, unequal, obtuse, coriaceous, pilose to glabrous without; petals  $2.5 \times 2$  cm, orbicular, prominently nerved; anthers suddenly curved at tips; ovary pubescent. Legumes about  $12 \times 2$  cm, linear, flattened, torulose, mucronate, stipitate, puberulous; seeds about 15, flattened.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : India, Sri Lanka and Malaysia, on poor soils.

*Specimens examined* : Chelama, 17-10-1964, Ellis 22076; Ahobilam, 31-8-1965, Ellis 25594.

*Cassia absus* Linn. Sp. Pl. 376. 1753; DC. Prodr. 2 : 500. 1825; Wt. & Arn. Prodr. 291. 1834; Baker in Hook. f. FBI 2 : 265. 1878; Gamble, FPM 3 : 401. 1919.

Herbs, about 25 cm high; branches viscidly hirsute, puberulous. Leaves 5 cm long; petioles 3 cm long; stipules small; leaflets in 2 pairs,  $2.5 \times 1.5$  cm, elliptic-obovate, mucronulate, unequal at base, sparsely puberulous; petiolules pubescent. Flowers yellow, 0.5 cm long, in 4-5-flowered racemes 3 cm long, bracteate; calyx 0.3 cm long, lobes almost up to base, pubescent without; petals  $0.5 \times 0.2$  cm, obovate, cuneate at base; stamens 5, filaments as long as anthers; ovary hirsute. Legumes  $3 \times 0.5$  cm, flat, dehiscent, bristly hairy; seeds about 5, ovoid.

*Fl. & Fr. :* July-December.

*World distribution :* Tropics from Middle East, India, Sri Lanka, Australia.

*Specimens examined :* Chelama, 9-12-1963, Ellis 18035; Chelama, 15-10-1964, Ellis 22006.

*C. occidentalis* Linn. Sp. Pl. 377. 1753; DC. Prodr. 2 : 497. 1825; Wt. & Arn. Prodr. 290. 1834; Baker in Hook. f. FBI 2 : 262. 1878; Gamble, FPM 3 : 401. 1919.

Herbs, about 1.5 m high; branches puberulous. Leaves 16 cm long, glandular above petioles; petioles 8 cm long; stipules ovate; leaflets more than 3 pairs, about  $6 \times 3$  cm, ovate, unequally rounded at base, glabrous above, puberulous below. Flowers yellow, 2 cm long, in a few-flowered racemes 8 cm long, bracteate; calyx 0.8 cm long, lobes oblong, glabrous; petals  $1.5 \times 1$  cm, unequal, ovate; stamens 7 fertile, glabrous; ovary glabrous. Legumes  $13 \times 0.6$  cm, compressed, tornose, glabrous; seeds about 20, flattened.

*Fl. & Fr. :* Almost throughout the year.

*World distribution :* Pantropic.

*Specimen examined :* Mahanandi, 23-8-1965, Ellis 25523.

*C. tora* Linn. Sp. Pl. 376. 1753; DC. Prodr. 2 : 493. 1825; Wt. & Arn. Prodr. 290. 1834, p.p.; Baker in Hook. f. FBI 2 : 263. 1878, p.p.; Gamble, FPM 3 : 401. 1919.

Herbs, about 20 cm high; crisped hairy in young branches. Leaves 7 cm long; petioles 6 cm long; stipules linear; leaflets in 3 pairs, 2.5

$\times 1.9$  cm, obovate, mucronulate, unequally cuneate at base, glaucous and pubescent beneath. Flowers yellow, 1 cm across, in a few-flowered, axillary racemes 2 cm long, bracteate; calyx 0.5 cm long, lobes ovate, crisped-hairy without; petals oblong-obtuse; stamens 7 fertile, filaments glabrous; ovary pubescent. Legumes  $15 \times 0.3$  cm, linear, quadrangular, puberulous, sutures prominent; seeds about 20, faintly tetragonal.

*Fl. & Fr. :* September-December.

*World distribution :* Pantropic, in poor soils.

*Specimens examined :* Chelama, 16-10-1964, Ellis 22030; Diguavamitta, 16-11-1969, Ellis 32415.

*Cassia pumila* Lamk. Encycl. Method. 1 : 651. 1784; DC. Prodr. 2 : 504. 1825; Wt. & Arn. Prodr. 292. 1834; Baker in Hook. f. FBI 2 : 266. 1878; Gamble, FPM 3 : 403. 1918.

Diffuse shrubs or prostrate herbs; branches puberulous, hairs curved. Leaves 3 cm long; petioles 1 cm long, glandular; stipules prominent; leaflets about 15 pairs,  $0.8 \times 0.1$  cm, ovate, oblong, rhomboid, mucronulate, unequal at base, puberulous without. Flowers yellow, 0.3 cm long, solitary, axillary; calyx 0.3 cm long, lobes ovate, unequal, sparsely pubescent without; petals 0.3 cm long, obovate, cuneate at base; stamens 5, fertile, filaments glabrous; ovary densely pubescent, stigmas flattened, concave. Legumes  $2 \times 0.4$  cm, sparsely puberulous; seeds about 6.

*Fl. & Fr. :* August-November.

*World distribution :* Tropics from India, Sri Lanka, Australia, in dry localities.

*Specimens examined :* Chelama, 17-10-1964, Ellis 22073; Upper Ahobilam, 29-8-1965, Ellis 25587.

## MIMOSACEAE

- |  |    |               |
|--|----|---------------|
| 1. Stamens definite, 4, 8 or 10 :        |    |               |
| 2. Branchlets modified into thorns       | .. | DICHOISTACHYS |
| 2. Branchlets not modified into thorns : |    |               |
| 3. Stamens united; trees                 | .. | PARKIA        |
| 3. Stamens free; scandent shrubs :       |    |               |
| 4. Branches prickly                      | .. | MIMOSA        |
| 4. Branches not prickly                  | .. | ENTADA        |
| 1. Stamens indefinite :                  |    |               |
| 5. Stamens monadelphous                  | .. | ALBIZIA       |
| 5. Stamens free                          | .. | ACACIA        |

## DICHROSTACHYS Wt. &amp; Arn.

*Dichrostachys cinerea* (Linn.) Wt. & Arn. Prodr. 271. 1834 ; Baker in Hook. f. FBI 2 : 288. 1878 ; Gamble, FPM 3 : 419. 1919. *Mimosa cinerea* Linn. Sp. Pl. 1505. 1753. *Desmanthus cinereus* (Linn.) Willd. Sp. Pl. 4 : 1048. 1806 ; DC. Prodr. 2 : 445. 1825.

Trees, about 8 m tall ; branches terete, striate, glabrous, branchlets modified into thorns. Leaves 5 cm long, bipinnate ; petioles 2 cm long ; stipules often modified into spines ; pinnae 10 pairs, rachis pubescent ; leaflets about 20 pairs,  $0.2 \times 0.05$  cm, linear-ovate, truncate at base, slightly falcate, sparingly hairy along margin and rachis ; stipitately glandular between petioles. Flowers yellow at top, pink lower down, 1 cm long, in dense, axillary and extra-axillary spikes 5 cm long, bracteate ; calyx 0.1 cm long, sparsely hairy without, lobes broadly ovate, cucullate, hyaline on margins ; stamens 10, filaments yellow at top of spike, pink lower down, anthers glandular at top ; ovary hairy. Legumes 5  $\times$  1 cm, falcate, twisted, flattened, glabrous ; seeds about 8, flattened.

*Fl. & Fr.* : July-December.

*World distribution* : Tropics from India, Sri Lanka, Burma, North Australia, in dry localities.

*Specimens examined* : 'Kurnool', no date, Beddome s.n. ; 'Kurnool', 1886, J.S. Gamble s.n. ; Srisailam, 12-7-1963, Ellis 16828 ; Ahobilam, 28-8-1965, Ellis 25534 ; Diguvametta, 18-11-1969, Ellis 32492.

*Remarks* : Based on re-examination of his earlier deduction (in *Kew Bull.* p. 188. 1956) that the specific epithet, *cinerea* was derived from Willdenow's work instead of Linnaeus's, J. P. M. Brenan (in *Kew Bull.* pp. 357-358. 1957) has discussed at length the history of the name bringing specific epithet, 'cinerea' and concludes that his earlier contention was erroneous and that Linnaeus's name, '...*Mimosa cinerea* is therefore the first legitimate name for the *Dichrostachys* complex' (p. 357).

## PARKIA R. Br.

*Parkia pedunculata* (Roxb.) Macbride in Contrib. Gray Herb. n.s. 59 : 19. 1919. *Mimosa pedunculata* Roxb. [Hort. Beng. 40. 1814 ex] Fl. Ind. 2 : 551. 1832. *Parkia biglandulosa* Wt. & Arn. Prodr. 279. 1834 ; Baker in Hook. f. FBI 2 : 289. 1878.

Trees, about 20 m tall ; branchlets striate, brown-pubescent when young. Leaves 50 cm long, bipinnate, rachises pubescent ; petioles about 18 cm long, biglandular at base ; pinnae about 25 pairs ; leaflets  $0.6 \times 0.05$  cm, linear-acute, truncate or rounded at base, puberulous along

margins above. Flowers white, in globular heads about 4 cm across, bracteate, seated on fleshy torus; calyx 0.5 cm long, lobed, sparsely hairy along connate edges; petals 1.5 cm long, ovate-spathulate; stamens 10, attached to petals at base, anthers gland-tipped; ovary with filiform style. Legumes  $35 \times 3$  cm, flat, thickened along sutures, pubescent when young; seeds about 16.

*Fl. & Fr.* : March-July.

*World distribution* : Native of Malay Peninsula, cultivated in many gardens in India.

*Specimen examined* : Srisailam, 27-3-1963, Ellis 23793.

*Remarks* : Apparently this tree is wild, obviously an escape. Srisailam being a pilgrim centre, this plant might have been introduced.

#### MIMOSA Linn.

*Mimosa polyacantha* Benth. in Trans. Linn. Soc. 30 : 422. 1875 ; Gamble, FPM 3 : 421. 1919.

Straggling shrubs, about 2 m high; branches prickly, terete, glabrous. Leaves 15 cm long, bipinnate; petioles 5 cm long; pinnae 8 pairs, 4 cm long; leaflets 16,  $1.2 \times 1.1$  cm, linear-ovate, oblong, obovate, rounded at base, faintly puberulous; nerves 3 from base, 2 prominent. Flowers pink, 0.6 cm long, in globose heads 1 cm across, bracteate; peduncles 4 cm long; calyx 0.05 cm long, glabrous, lobes ovate; petals 4,  $0.3 \times 0.1$  cm, connate to one-third the length, lobes ovate; stamens 4, filaments glabrous; ovary glabrous. Legumes  $8 \times 1.5$  cm, pointed at tips, flattened, glabrous, sutures prickly, of 5-6 joints, each 1-seeded; seeds orbicular, flattened.

*Fl. & Fr.* : August-December.

*World distribution* : Mexico and Peninsular India, in dry deciduous forests.

*Specimens examined* : Diguvametta, 11-8-1921, C. E. C. Fischer 4659; Chelama, 4-7-1963, Ellis 16723; Chelama, 17-10-1964, Ellis 22068.

#### ENTADA Adans. nom. cons.

*Entada purgaetha* DC. Prodr. 2 : 425. 1825; Wt. & Arn. Prodr. 267. 1834; Brenan in Kew Bull. 1955 : 164. 1955; Santapau in Journ. Bombay nat. Hist. Soc. 57 & 239. 1960. *Mimosa entada* Linn. Sp. Pl.

518. 1753. *Entada monostachya* DC. Prodr. 2 : 425. 1825. *E. scandens* *sensu* Baker in Hook. f. FBI 2 : 287. 1878, *p.p.* (non Benth. 1841); Gamble, FPM 3 : 417, 1919, *p.p.*

Lianas; branches about 50 cm in diameter, terete glabrous. Leaves 15 cm long, bipinnate, the main rachis generally ending in a bifid tendril; pinnae 4 pairs; leaflets about 4 pairs, up to 9×4 cm, ovate-acuminate, rounded at base, glabrous, puberulous along margins and midrib above; reticulations prominent; petiolules 0.3 cm long, pubescent. Flowers pale green, 0.4 cm long, in panicled spikes about 25 cm long, bracteolate; calyx 0.15 cm long, sparsely pubescent without, lobes 5, shallow; petals 0.3×0.1 cm, elliptic-ovate, faintly cucullate, glabrous; stamens 10, filaments glabrous, anthers glandular at tips; ovary glabrous. Legumes 70×10 cm, falcate, flattened, sutures thick, indented between seeds; seeds about 12, obtusely orbicular, shining.

*Fl. & Fr.* : March-July.

*World distribution* : India, Sri Lanka, Burma and Malay Peninsula.

*Specimens examined* : 'Kurnool', Feb. 1887, J. S. Gamble 18720; Gundlabrahmeswaram, 20-7-1963, Ellis 16955; Gundlabrahmeswaram, 30-3-1965, Ellis 23794.

*Remarks* : Brenan (*op. cit.* p. 162) agrees with I.M. Johnston (in *Sargentia* 8 : 135-138. 1949) and quotes him saying that *Mimosa scandens* of Linnaeus was an 'aggregate' species, restricted to the Amboina plant of Rumphius, and that *E. scandens* is a synonym of *E. phaseoloides* (Linn.) Merr. and that in Asia two entities occur, viz. *E. phaseoloides* (Linn.) Merr. and *E. pursaetha*, the latter having distribution in Africa, Asia, New Guinea and North Australia. Santapau (*op. cit.* p. 240) is of the opinion that what occurs in Western Ghats is "...not *Entada scandens* Benth, nor *E. phaseoloides* Merr., but it is *Entada pursaetha* DC."

#### ALBIZIA Durazz.

[ F. R. Fosberg (in *Reinwardtia* 7 : 77-90. 1965) has pointed that the original spelling of the genus was intentionally with only one 'z' as published by Durazzini in *Mag. Tosc.* 3, 4 : 11. 1772 and that it is not a typographical error to have used that spelling ].

- |  |                        |
|--|------------------------|
| 1. Leaflets in 3 pairs, about 4.5×3 cm, glabrous .....                       | <i>A. lebbeck</i>      |
| 1. Leaflets in 13 pairs, about 2.5×1 cm, pubescent or puberulous below ..... | <i>A. adoratissima</i> |

\* *Albizia lebbeck* (Linn.) Benth. in Hook. Lond. Journ. 3 : 87. 1844 ; Baker in Hook. f. FBI 2 : 298. 1878 ; Brandis, Indian Trees, 271. 1906 ; Gamble, FPM 3 : 432. 1919. *Mimosa lebbeck* Linn. Sp. Pl. 516. 1753. *Acacia lebbeck* Willd. Sp. Pl. 4 : 1066. 1805 ; DC. Prodr. 2 : 467. 1825 ; Wt. & Arn. Prodr. 275. 1834.

Trees, about 20 m tall ; young branchlets glabrescent, bark grey. Leaves 16 cm long, bipinnate ; petioles 8 cm long ; stipules ovate ; leaflets 5-6 pairs,  $5 \times 3$  cm, elliptic-oblong, orbicular, unequally truncate at base, glabrous ; nerves and reticulations prominent. Flowers white, 0.8 cm long, in globose heads 2.5 cm across ; calyx 0.25 cm long, puberulous, lobes ovate ; petals  $0.6 \times 0.3$  cm, ovate ; stamens many, filaments long, connate at base ; ovary glabrous. Legumes  $20 \times 3.5$  cm, compressed, thin, reticulately veined ; seeds 10-12, flattened.

*Fl. & Fr.* : March-October.

*World distribution* : Tropics from Africa, India, Sri Lanka, Burma and Australia.

*Specimens examined* : Chelama, 12-12-1963, Ellis 18067 ; Srisailam, 20-10-1964, Ellis 22101 ; Chelama, 18-3-1965, Ellis 23702 ; Upper Ahobilam, 22-11-1969, Ellis 32560 ; Kollapenta, 14-8-1972, Ellis 42261.

*A. odoratissima* (Linn. f.) Benth. in Hook. Journ. Bot. 88. 1844 ; Baker in Hook. f. FBI 2 : 299. 1878 ; Brandis, Indian Trees, 271. 1906 ; Gamble, FPM 3 : 432. 1919. *Mimosa odoratissima* Linn. f. Suppl. 437. 1781. *Acacia odoratissima* (Linn.) Willd. Sp. Pl. 4 : 1063. 1805 ; DC. Prodr. 2 : 466. 1825 ; Wt. & Arn. Prodr. 275. 1834.

Trees, about 20 m tall ; branches pubescent when young. Leaves 15 cm long, bipinnate ; petioles 5 cm long ; stipules small ; rachises puberulous, single-glanded at base ; pinnae in 4 pairs ; leaflets about 13 pairs,  $2.5 \times 1$  cm, linear-oblong, unequally truncate at base, glandular at base, puberulous below ; reticulations prominent. Flowers pale yellow, 0.5 cm long, about 12, in heads 1 cm across ; peduncles 2 cm long ; calyx 0.4 cm long, pubescent without, lobes acuminate ; stamens many, filaments glabrous ; ovary glabrous. Legumes  $14 \times 2.5$  cm, compressed, thin, glabrous, not prominently reticulated ; seeds about 11, flattened.

*Fl. & Fr.* : March-September.

*World distribution* : India, Sri Lanka, Burma and Malay Peninsula, in dry tracts.

*Specimens examined* : Diguvametta, 15-11-1906, C. A. Barber 8106 ; Chelama, 16-10-1964, Ellis 22051 ; Ahobilam, 22-11-1969, Ellis 32561.

*Remarks* : The variety, *mollis* Benth. ex Baker (*op. cit.*) has been recognised by all the workers on Indian plants. From the present study of the herbarium specimens of this species from both MH and CAL, however, it appears that the amount of pubescence depends on the climatic conditions, indicating ecological variations ; the variety, *mollis* Benth., therefore, appears to be a variation of the *typica*.

ACACIA Mill.

[Most of the Floras dealing with this plant give Willdenow as the author of the genus ; however, it was Miller who in 1754 published it in his *Gard. Dict. abridged edition No. 4*].

- 1. Flowers in globose heads :
- 2. Branches with curved prickles ; spines absent :
  - 3. Leaflets small,  $0.4 \times 0.1$  cm .. *A. pennata*
  - 3. Leaflets larger,  $1 \times 0.3$  cm .. *A. intia*
- 2. Branches not prickly ; spines present :
  - 4. Legumes prominently indented between seeds .. *A. nilotica* subsp. *indica*
  - 4. Legumes not indented between seeds .. *A. leucophloea*
- 1. Flowers in elongated spikes :
  - 5. Branches prickly ; stipular spines short, recurved ; legumes  $10 \times 0.5$  cm .. *A. catechu* var. *chundra*
  - 5. Branches not prickly ; stipular spines of 2 types, up to 6 cm long ; legumes  $3 \times 1.5$  cm .. *A. horrida*

*Acacia pennata* (Linn.) Willd. Sp. Pl. 4 : 1090. 1805 ; Wt. & Arn, Prodr. 277. 1834, p.p. ; Baker in Hook. f. FBI 2 : 297. 1878, p.p. ; Brandis, Indian Trees, 269. 1906 ; Gamble, FPM 3 : 429. 1919. *Mimosa pennata* Linn. Sp. Pl. 1507. 1753.

Scandent shrubs, up to 3 m high ; branches prickly, puberulous in young. Leaves about 18 cm long, bipinnate ; rachises puberulous, glandular near pulvini ; petioles 5 cm long ; stipules ovate ; pinnae about 12 pairs ; leaflets about 40 pairs,  $0.4 \times 0.1$  cm, linear-acute, truncate at base, puberulous beneath. Flowers white, 0.6 cm long, in globose heads 1.5 cm across, bracteate, bracteolate, the latter setaceous ; calyx 0.3 cm long, glabrous, lobes short ; stamens many ; ovary woolly, style and stigma glabrous. Legumes  $18 \times 2.5$  cm, flattened, glabrous, sutures prominent ; seeds about 13, flat.

*Fl. & Fr.* : August-December.

*World distribution* : Tropics from Africa, India, Sri Lanka, Burma and Malaysia, in dry localities.

*Specimens examined* : Nallamalai Hills, 13-8-1921, C.E.C. Fischer 4663 ; Chelama, 5-7-1963, Ellis 16744 ; Chelama, 8-12-1963, Ellis 17992 ; Ahobilam, 31-8-1965, Ellis 25596.

*Acacia intsia* (Linn.) Willd. Sp. Pl. 4 : 1091. 1805 ; DC. Prodr. 2 : 464. 1825 ; Wt. & Arn. Prodr. 278. 1834 ; Baker in Hook.f. FDI 2 : 297. 1878. *Mimosa intsia* Linn. Sp. Pl. 1508. 1753. *A. instioides* DC. Prodr. 2 : 464. 1825. *A. caesia* (Linn.) Wt. & Arn. Prodr. 278. 1834 ; Prain in Journ. Asiatic Soc. Beng. 66 : 510. 1898 et in Bengal Pl. 331. rep. ed. 1963 (1903) ; Gamble, FPM 3 : 428. 1919.

Shrubby climbers ; branches prickly, sparingly grooved, puberulous when young. Leaves about 15 cm long, bipinnate ; petioles 4 cm long ; stipules ovate ; pinnae about 6 pairs, 5 cm long, generally glandular between rachises ; leaflets about 15 pairs, 1×0.3 cm, oblong, obtuse to truncate at base, glabrous, sessile ; nerves and reticulations rather prominent beneath. Flowers pale yellow, 0.2 cm long, in heads 0.7 cm across, bracteate ; calyx 0.15 cm long, lobes ovate, sparingly pubescent without ; petals 0.2 cm long, lobes ovate ; stamens many ; ovary pubescent. Legumes 15×2 cm, compressed, thin, thickened along sutures, glabrous ; seeds about 11, flat.

*Fl. & Fr.* : September-February.

*World distribution* : India, Sri Lanka and Burma, in dry deciduous forests.

*Specimen examined* : Way to Vishnunandi, Mahanandi, 21-8-1965, Ellis 25416.

*Remarks* : There have been differences of opinion about the status of this taxon : DeCandolle (*op. cit.* p. 464) treats both *A. intsia* (Linn.) Willd. and *A. instioides* [= *A. caesia* (Linn.) Willd.] as distinct, followed later by Wight and Arnott (*op. cit.*), Prain (*op. cit.* 1898 and 1903), Duthie [*Fl. Up. Gang. Pl.* 1 : 293. rep. ed. 1960 (1903)], and Cooke [*Fl. Pres. Bombay* 1 : 479-480. rep. ed. 1958 (1903)]. Baker (1878) has reduced *A. caesia* to a variety under *A. intsia* Willd. Brandis (*Indian Trees*, p. 268. 1906) chooses *A. caesia* Willd., under which *A. intsia* is treated as a synonym ; this is followed by Gamble (*op. cit.*), and Haines [*Bot. Bihar and Orissa* 2 : 342. rep. ed. 1961 (1924)]. The present studies of the taxon both in the field as also in MH and CAL show that the two forms, if any, are ecological variants of one species, viz. *A. intsia* (Linn.) Willd.

*Acacia nilotica* (Linn.) Del. subsp. *indica* (Benth.) Brenan in Kew Bull. 1957 : 84, 1957. *Mimosa nilotica* Linn. Sp. Pl. 521, 1753. *Acacia arabica* auct. non Willd.; var. *indica* Benth. in Hook. Journ. Bot. 1 : 500, 1842; Baker in Hook. f. FBI 2 : 293, 1878; Gamble, FPM 1 : 425, 1919. *A. nilotica* var. *indica* (Benth.) A. F. Hill in Bot. Mus. Leafl. Harvard Univ. 8 : 99, 1940.

Trees, about 15 m tall; young branches sparsely puberulous, bark dark brown, fissured. Leaves 7 cm long, bipinnate; rachises puberulous; petioles 3 cm long; stipular spines about 4.5 cm long, white; pinnae about 7 pairs; leaflets about 20 pairs,  $0.3 \times 0.1$  cm, linear-obtuse, truncate at base, subglabrous. Flowers yellow, 0.3 cm long, in globose heads 1 cm across, bracteolate; bracts cupular, lobed; calyx 0.1 cm long, faintly puberulous without, lobes obtuse; petals 0.3 cm long, glabrous; stamens many, filaments glabrous. Legumes  $25 \times 1.5$  cm, flattened, torulose, indented along sutures between seeds, tomentose; seeds about 13, flattened.

*Fl. & Fr.* : August-April.

*World distribution* : Tropics from Africa, India and Sri Lanka.

*Specimen examined* : Peddachama, Eastern Nallamalais, 18-8-1972, Ellis 42308.

*A. leucophloea* (Roxb.) Willd. Sp. Pl. 4 : 1083, 1805; DC. Prodr. 2 : 462, 1825; Wt. & Arn. Prodr. 277, 1834; Baker in Hook. f. FBI 2 : 294, 1878; Brandis, Indian Trees, 265, 1903; Gamble, FPM 3 : 427, 1919. *Mimosa leucophloea* Roxb. Pl. Corom. t. 150, 1800.

Trees, about 10 m tall; branches pale, striate, puberulous when young. Leaves 6 cm long, bipinnate, rachises pubescent; petioles 4 cm long; pinnae about 10 pairs; stipular spines about 1.5 cm long; leaflets  $0.4 \times 0.1$  cm, linear-ovate, slightly falcate, sparsely puberulous. Flowers pale yellow, 0.1 cm long, in heads 0.4 cm across, in axillary and terminal panicles 30 cm long, bracteate, bracteolate; calyx 0.2 cm long, pubescent without, lobes ovate; petals  $0.1 \times 0.1$  cm, ovate, puberulous along margin; stamens many, filaments glabrous; ovary glabrous. Legumes  $10 \times 0.5$  cm, flattened, tomentose; seeds about 15, flattened.

*Fl. & Fr.* : August-December.

*World distribution* : India, Sri Lanka, Burma and Malay Peninsula.

*Specimen examined* : Peddachama, Eastern Nallamalais, 18-8-1972, Ellis 42303.

*Acacia catechu* Willd. var. *chundra* (Roxb.) Duthie, Fl. Upper Gang. Pl. 1 : 291. rep. ed. 1960 (1903, var. 'sundra'). *Mimosa chundra* Roxb. ex Rottl. in Ges. Nat. Fr. Ber. n.s. 4 : 207. 1803 ; Willd. Sp. Pl. 4 : 1079. 1806, in syn. *Acacia chundra* Willd. Sp. Pl. 4 : 1078. 1806. *Chundra acacie* Willd. l.c. 1806, *nomen. mimosa sundra* Roxb. Pl. Corom. 3 : 19, t. 225. 1819. *Acacia sundra* DC. Prodr. 2 : 458. 1825 ; Wt. & Arn. Prodr. 273. 1834 ; Baker in Hook. f. FBI 2 : 295. 1878 ; Gamble, FPM 3 : 428. 1919.

Trees, about 15 m tall ; young branches dark brown, striate, glabrous, often prickly. Leaves up to 15 cm long, bipinnate ; petioles 5 cm long ; pinnae 5 pairs, stipitately glandular below the lowest pair ; leaflets about 30 pairs, 0.4×0.1 cm, linear, sparingly hairy ; nerves rather prominent ; stipular spines short, hooked. Flowers pale yellow, 0.4 cm long, in axillary, cylindric spikes 8 cm long ; calyx 0.15 cm long, lobes ovate ; petals 0.2 cm long, ovate-spathulate ; stamens many. Legumes 7×1.5 cm, flattened, glabrous ; seeds 8, flattened.

*Fl & Fr.* : July-December.

*World distribution* : India, Sri Lanka and Burma, in dry localities.

*Specimens examined* : Gazulapalle, June 1905, without name and number ; Gazulapalle, 30-8-1936, C.E.C. Fischer 83134 ; Chelama, 4-7-1963, Ellis 16720 ; Chelama, 8-12-1963, Ellis 18002 ; Mahanandi, 21-8-1965, Ellis 25422 ; Peddachama, Eastern Nallamalais, 18-8-1972, Ellis 42305.

*Remarks* : D. Chatterjee (in *Sci. & Cult.* 14 : 290-291. 1949) in an article entitled, 'Acacia chundra or *Acacia sundra* ?' has clarified that the original spelling of the specific epithet by Willdenow was 'chundra', and the spelling 'sundra' was by Roxburgh in 1819, which is inadmissible.

There seems to be very little difference if not of conspecificity with *Acacia catechu* Willd. Wight and Arnott (*op. cit.* p. 273) say that '...this species extremely like *A. catechu*...' and '...principally differs by being perfectly glabrous'. Baker (*op. cit.*) is of the opinion that it is scarcely more than a variety of *A. catechu*. Brandis (*Indian Trees*, p. 268. 1903) recognises 3 forms, following Prain (in *Journ. Asiat. Soc. Beng.* 66 : 508. 1898), viz. (i) *catechu* proper—chiefly of Punjab, Bihar, Ganjam, Pegu and Upper Burma, (ii) *catechoides*—chiefly of Sikkim, Terai, Assam, Karnataka and Nilgiris and Upper Burma, (iii) *chundra* ('*sundra*')—chiefly Western Peninsula and Upper Burma. Nonetheless, Gamble (*op. cit.*) treats it as a separate species. Earlier, Duthie (*op. cit.*) had treated it as a variety of *Acacia catechu* Willd. Speaking of *Acacia catechu* Willd., he distinguishes 3 forms, viz. *A. catechu* Willd., *A. chundra*

(Roxb.) Willd., and *A. catechuoides* Benth. He states (*op. cit.* p. 291), 'In accordance with the views of Roxburgh, Baker and Prain they may each be considered as forms of *khair* occupying 3 distinct areas, *A. catechu* predominating in N. W. India, *A. catechuoides*, the Bengal, Assam and Burma form, and *A. chundra* ('*sundra*'), the characteristic form of W. and S. India'. However, he treats it at a varietal level.

The present study of the plants both in the field and in MH and CAL is in agreement with views of Duthie, viz. treating it as a variety of *A. catechu* Willd.

**Acacia horrida** (Linn.) Willd. Sp. Pl. 4 : 1982. 1806 ; Hillcoat & Breun in Kew Bull. 1958 : 39-40. 1958. *Mimosa horrida* Linn. Sp. Pl. 521. 1753. *Acacia latronum* (Linn. f.) Willd. Sp. Pl. 4 : 1077. 1806 ; DC. Prodr. 2 : 460. 1825 ; Wt. & Arn. Prodr. 273. 1834 ; Wt. Ic. 3 : t. 1157. 1844 ; Baker in Hook. f. FBI 2 : 296. 1878 ; Gamble, FPM 3 : 427. 1919. *Mimosa latronum* Linn. f. Suppl. 438. 1781.

Umbrella-shaped trees, about 15 m tall ; young branches dark brown, striate, glabrous. Leaves 3 cm long, bipinnate, rachis sparsely puberulous ; petioles 1 cm long ; stipular spines 2 cm long, some longer up to 6 cm long, white, smooth ; pinnae 3 pairs, 1 cm long ; leaflets 12 pairs, 0.2×0.1 cm, linear-ovate. Flowers pale yellow, in elongated spikes 4 cm long ; calyx 0.1 cm long, lobes short, ovate, glabrous ; petals 0.2 cm long, oblong ; stamens many, filaments glabrous ; ovary glabrous. Legumes 3×1.5 cm, flattened, recurved, glabrous, reticulately nerved ; seeds 2-4, rather flattened.

*Fl. & Fr.* : August-February.

*World distribution* : India, in very dry localities, generally on black-cotton soils.

*Specimens examined* : Tunnagpalli, Kurnool District, March 1883, J. S. Gamble 10906 ; Peddachama, Eastern Nallamalais, 18-8-1972, Ellis 42306.

*Remarks* : Dorothy Hillcoat and J. P. M. Brenan (*op. cit.*) have discussed at length the origin of this taxon which they have traced from Plukenet (*Phytographia*, t. 121, f. 4. 1692)—the material for Linnaeus's *Mimosa horrida*, collected from Madras ; *Mimosa latronum* Linn. f. then is a superfluous name for *M. horrida* Linn.

## COMBRETACEAE

1. Trees :		
2. Carpels free	..	ANOGEISSUS
2. Carpels united	..	TERMINALIA
1. Climbers :		
3. Calyx lobes persistent, accrescent ; leaves glandular beneath	..	CALYCOPTERIS
3. Calyx lobes caducous ; leaves not glandular beneath	..	COMBRETUM

## ANOGEISSUS Wall. ex Guill. &amp; Perr.

*Anogeissus latifolia* (Roxb. ex DC.) Wall. [Cat. 4015. 1828] ex Guill. & Perr. Fl. Seneg. Tent. 1 : 280. 1838. Scott in Kew Bull. 33 : 560. 1979. Brandis, For. Fl. 227. 1871 ; C. B. Cl. in Hook. f. FBI 1 : 450. 1878 ; Brandis, Indian Trees, 315. 1906 ; Gamble, FPM 4 : 466. 1919 ; *Conocarpus latifolia* Roxb. ex DC. Prodr. 3 : 17. 1825 ; Wt. & Arn. Prodr. 316. 1834 ; Wt. Ic. 2 : 994. 1843.

Trees, about 15 m tall ; branches pale, smooth. Leaves about  $11 \times 6$  cm, alternate, subopposite, broadly elliptic, obtuse, suborbicular, obtuse at base, glabrous ; nerves and reticulations prominent ; petioles 1 cm long. Flowers pale yellow, 0.2 cm long, in fascicled, clustered heads 1 cm across, bracteate, bracteolate ; pedicels 0.4 cm long ; calyx 0.2 cm long, lobes broadly ovate, reflexed ; petals absent ; stamens 10, filaments dilated, connectives produced ; ovary pubescent, styles glabrous. Achenes  $5 \times 4$  cm, broadly winged at base.

Fl. & Fr. : August-December.

World distribution : India and Sri Lanka, in dry deciduous forests.

Specimens examined : Diguvametta, 28-10-1906, C. A. Barber 8007 ; Diguvametta, 5-11-1906, C. A. Barber 8048 ; Chelama, 7-12-1963, Ellis 17980 ; Srisailam, 20-10-1964, Ellis 32096 ; Ahobilam, 28-7-1965, Ellis 25542 ; Diguvametta, 18-11-1969, Ellis 32493.

Remarks : C. B. Clarke (*op. cit.* p. 450) recognises 3 varieties under *A. latifolia* viz. *glabra*, *villosa* and *parvifolia*. However, these varieties have not been recognised by subsequent workers in the regional floras, showing thereby the ranges of variability. The present studies further strengthen the latter view ; the varieties of C. B. Clarke can not stand.

## TERMINALIA Linn. nom. cons.

1. Fruits winged :		
2. Bark prominently cracked ; fruits tomentose ..		<i>T. coriacea</i>
2. Bark peeling off in flakes ; fruits glabrous ..		<i>T. arjuna</i>
1. Fruits not winged :		
3. Fruits obovoid ; petioles up to 2 cm long ..		<i>T. chebula</i>
3. Fruits globose ; petioles up to 8 cm long ..		<i>T. bellirica</i>

*Terminalia coriacea* (Roxb.) Wt. & Arn. Prodr. 315. 1834; Gamble, FPM 3 : 465. 1919. *Pentaptera coriacea* Roxb., Fl. Ind. 438. 1832. *T. tomentosa* Wt. & Arn. var. *coriacea* (Wt. & Arn.) C. B. Cl. in Hook. f. FBI 2 : 447. 1878.

Trees, up to 30 m tall; bark characteristically cracked, suberous. Leaves up to 22 x 13 cm, elliptic-oblong, obtuse, often emarginate, unequally rounded or cordate at base, coriaceous, brown-tomentose beneath; midrib and lateral nerves prominent, 2-glandular on midrib above the petiole; petioles about 13 cm long. Flowers pale yellow, 0.4 cm across, in terminal panicles 12 cm long, bracteate, bracteolate; calyx 0.2 cm long, lobes ovate, tomentose; stamens 10, exserted; disk villous; ovary pubescent, style glabrous. Drupes 4 x 3.5 cm, winged, pubescent.

*Fl. & Fr.* : July-December.

*World distribution* : Peninsular India.

*Specimens examined* : 'Kurnool', August 1932, D.F.O. (?) s. n.; Chelama, 5-7-1963, Ellis 16763; Chelama, 9-12-1963, Ellis 18040; Mahanandi, 24-8-1965, Ellis 35525.

*Remarks* : How far Gamble (*op. cit.*) is justified in treating this taxon at a specific level which had been reduced to a varietal status under *T. tomentosa* (Roxb.) Wt. & Arn. by C. B. Clarke (*op. cit.*) requires a monographic study. Pending such a study, we are inclined to follow Gamble (*op. cit.*) in treating this taxon at a specific status.

*T. arjuna* (Roxb. ex DC.) Wt. & Arn. Prodr. 314. 1834; C. B. Cl. in Hook. f. FBI 2 : 447. 1878; Gamble, FPM 3 : 465. 1919. *Pentaptera arjuna* Roxb. [Hort. Beng. 34. 1814] ex DC. Prodr. 3 : 14. 1828. *Terminalia berryi* Wt. & Arn. Prodr. 314. 1834. *T. glabra* Wt. & Arn. l. c. 314. 1834.

Trees, about 30 m tall; bark pale, smooth, peeling off in flakes. Leaves 12 x 5 cm, subopposite, elliptic-ovate, obovate, oblong, orbicular or emarginate, unequally obtuse, rounded or cordate at base, coriaceous;

petioles 2 cm long. Flowers pale green, 0.4 cm across, bracteate, bracteolate; calyx 0.2 cm long, lobes broadly ovate, glabrous; stamens 10, filaments glabrous; disk densely brown-pubescent; ovary pubescent, style and stigma glabrous. Drupes  $5 \times 2.5$  cm, prominently 5-winged; nerves on wings curved at top.

*Fl. & Fr.* : April-October.

*World distribution* : India, along water courses in dry deciduous forests.

*Specimens examined* : 'Kurnool', 1881, *Beddome* s. n.; 'Yerramuddi', 1881, *Beddome* s. n.; Srisailam, 12-7-1963, *Ellis* 16837; Ahobilam, 24-11-1969, *Ellis* 32606; Bairani, Diguvametta, 7-8-1972, *Ellis* 42183.

*Remarks* : C. B. Clarke (*op. cit.*) has described a variety, viz. *angustifolia* from 'Southern peninsular India and Concan' under this species. However, this has not been mentioned in any of the subsequent floras. Furthermore, Clarke's description of its leaves as having '...narrow elongate-oblong, suddenly narrowed into the petiole' does not seem to stand.

*Terminalia bellirica* (Gaertn.) Roxb. Pl. Corom. 2 : 54. 1805; DC. Prodr. 3 : 12. 1828; Wt. & Arn. Prodr. 313. 1834; Wt. Ic. 1 : t. 172. 1840; C. B. Cl. in Hook. f. FBI 2 : 445. 1878, p. p.; Brandis, Indian Trees, 307. 1906; Gamble, FPM 3 : 463. 1919. *Myrobalanus bellirica* Gaertn. Fruct. 2 : 90. 1791. *Terminalia punctata* Roth, Nov. Sp. Pl. 381. 1821; DC. Prodr. 3 : 13. 1828.

Trees, about 30 m tall; branches rusty brown-tomentose when young. Leaves up to  $20 \times 13$  cm, elliptic-oblong, acute or rounded unequally at base, rather shining above, pale beneath, coriaceous; nerves and reticulations prominent; petioles 8 cm long. Flowers pale yellow,  $0.5 \times 0.4$  cm, in axillary spikes 12 cm long, bracteate; calyx 0.4 cm long, lobes ovate, rusty-pubescent without, vilous within; stamens 10, filaments short; ovary vilous; disk vilous. Drupes  $3.5 \times 2.5$  cm, globose, brown-tomentose.

*Fl. & Fr.* : March-October.

*World distribution* : India to Malay Peninsula, in dry localities.

*Specimens examined* : Srisailam, 13-7-1963, *Ellis* 16843; Srisailam, 26-3-1965, *Ellis* 23768; Mahanandi, 23-8-1965, *Ellis* 25503; Srisailam, 5-12-1969, *Ellis* 32707; Rollapenta, 16-8-1972, *Ellis* 42271.

*Remarks* : C. B. Clarke (*op. cit.*) has treated 2 varieties dependent

on geographical distribution, the var. *bellirica* being chiefly Indian and var. *laurinoides* Miq. confined to Sri Lanka and Malaysia.

*Terminalia chebula* Retz. Obs. 5 : 41. 1789 ; DC. Prodr. 3 : 12. 1828 ; Wt. & Arn. Prodr. 313. 1834 ; C. B. Cl. in Hook. f. FBI 2 : 446. 1878, p.p. ; Brandis, Indian Trees, 308. 1906 ; Gamble, FPM 3 : 464. 1919.

Trees, about 20 m tall ; branches terete, rusty brown-tomentose when young. Leaves up to  $17 \times 12$  cm, elliptic-ovate or oblong, or orbicular, unequally acute, oblong, rounded or cordate at base, coriaceous, glabrous ; nerves and reticulations prominent beneath ; petioles 2 cm long with 2 glandular protuberances near the top. Flowers pale green, 0.3 cm long, in terminal racemes about 14 cm long ; calyx 0.2 cm long, lobes ovate, villous within ; stamens 10, filaments glabrous ; disk villous ; styles glabrous. Drupes about  $3 \times 2$  cm, obovoid, obtusely 5-angled, glabrous.

*Fl. & Fr.* : March-July.

*World distribution* : India, Sri Lanka, Malay Peninsula.

*Specimens examined* : Srisailam, 16-7-1963, Ellis 16899 ; Srisailam, 21-10-1964, Ellis 22140.

*Remarks* : C. B. Clarke (*op. cit.*) recognises 6 varieties, Brandis (*op. cit.*) recognises 2 varieties, viz. *tomentella*—what he calls ‘the ordinary for widely spread form’ (p. 308) and the other *gangetica*—of Deccan Peninsula. Duthie [ (*Pl. Upp. Gang. Pl.* 1 : 309. rep. ed. 1960 (1903)] recognises var. *citrina* and var. *gangetica*. Cooke (*Fl. Pres. Bombay* 1 : 509. rep. ed. 1958) and Gamble (*op. cit.*) do not recognise any of the varieties of Clarke. It is desirable that a more detailed study is done for arriving at definite conclusions.

#### CALYCOPTERIS Lamk.

*Calycopterus floribunda* (Roxb.) Lamk. Encycl. Meth. Bot. Suppl. 2 : 41. 1811 ; C. B. Cl. in Hook. f. FBI 2 : 449. 1878 ; Gamble, FPM 3 : 467. 1919. *Getonia floribunda* Roxb. Pl. Corom. t. 87. 1798 ; DC. Prodr. 3 : 15. 1828 ; Wt. & Arn. Prodr. 315. 1834.

Scendent shrubs ; branches drooping, rusty brown-pubescent. Leaves up to  $11 \times 5$  cm, opposite, elliptic-ovate or acuminate, rounded or subcordate at base, softly pilose above, rusty tomentose beneath or glabrous, prominently gland-dotted beneath ; petioles 0.8 cm long. Flowers greenish white, 2 cm long, in terminal panicles 15 cm long, bracteate ; calyx tube elongate, lobes  $1.5 \times 1$  cm, elliptic-ovate, softly pilose,

glabellar-dotted beneath, prominently 3-nerved; petals absent; stamens 10, filaments glabrous; ovary villous. Fruits with enlarged calyx; seeds solitary.

*Fl. & Fr.* : February-May.

*World distribution* : India, Sri Lanka, Malay Peninsula.

*Specimen examined* : Srisailam, 26-3-1965, Ellis 23782.

#### COMBRETUM Loefling, *nom. cons.*

**Combretum ovalifolium** Roxb. [Hort. Beng. 28. 1814 ex] Fl. Ind. 2 : 256. 1832 ; Wt. & Arn. Prodr. 317. 1834 ; C. B. Cl. in Hook. f. FBI 2 : 458. 1878 ; Gamble, FPM 3 : 469. 1919.

Climbing shrubs; branches pale, terete, glabrous. Leaves about  $12 \times 7$  cm, ovate, ovate-elliptic, abruptly acuminate, rounded at base, coriaceous, glabrous; nerves and reticulations prominent; petioles 2 cm long. Flowers pale green, 0.4 cm long, in axillary, panicled racemes 6 cm long; rachises lepidote; calyx 0.15 cm long, lobes ovate, glabrous, densely hairy at base, prominently nerved; petals  $0.2 \times 0.1$  cm, spatulate; disk glabrous; stamens 8, filaments glabrous; ovary angled, style glabrous. Drupes samaroid, up to  $4 \times 3.5$  cm, glabrous.

*Fl. & Fr.* : February-April.

*World distribution* : India and Sri Lanka.

*Specimen examined* : Chelama, 20-3-1965, Ellis 23741.

#### MYRTACEAE

##### SYZYGIUM Gaertn. *nom. cons.*

**Syzygium alternifolium** (Wt.) Walpers, Rep. 2 : 179. 1906 ; Gamble, FPM 3 : 481. 1919. *Eugenta alternifolia* Wt. Ic. 2 : t. 537. 1842 ; Duthie in Hook. f. FBI 2 : 497. 1878 ; Brandis, Indian Trees, 322. 1906.

Trees, about 20 m tall; branchlets pale, glabrous. Leaves alternate, about  $13 \times 7$  cm, ovate-oblong to orbicular, emarginate, unequally rounded at base, glaucous beneath, thick; lateral nerves almost parallel, prominent, joining prominent marginal nerve; petioles 5 cm long. Flowers pale white, 1 cm long, in compound, trichotomous, lateral or axillary cymes 8 cm long; calyx 0.6 cm long, lobes 4, thick; petals  $0.5 \times 0.5$  cm, ovate-calyprate; stamens 1 cm long, numerous, filaments

glabrous ; ovary glabrous. Berries  $1.5 \times 0.8$  cm, globose, crowned at top with persistent calyx tube.

*Fl. & Fr.* : March-May.

*World distribution* : Peninsular India, endemic to the dry localities of Kurnool and Cuddapah forests.

*Specimens examined* : 'Nallamalai Hills', 1881, *Beddome* 70 ; Gundlabrahmeswaram, 2-4-1965, *Ellis* 23847.

### LECYTHIDACEAE

1. Fruits globose about $5 \times 5$ cm ; seeds many	..	CAREYA
1. Fruits obtusely quadrangular, about $3 \times 1$ cm ; seed one	..	BARRINGTONIA

#### CAREYA Roxb. *nom. cons.*

*Careya arborea* Roxb. Pl. Corom. 3 : 13. 1811 ; DC. Prodr. 3 : 295. 1828 ; Wt. & Arn. Prodr. 334. 1834 ; C. B. Cl. in Hook. f. FBI 2 : 511. 1878 ; Gamble, FPM 3 : 488. 1919.

Trees, about 8 m tall ; young branches gnarled with leaf-scars. Leaves about  $60 \times 16$  cm, oblong, rounded, attenuate at base, crenulate, coriaceous, glabrous ; nerves and reticulations prominent ; petioles small. Flowers greenish, about 4 cm across, in terminal spikes 10 cm long, bracteate ; calyx 2 cm long, lobes  $2 \times 1.5$  cm, oblong, coriaceous, ciliolate along margins ; petals  $2.5 \times 4$  cm oblong ; stamens numerous, filaments long, reddish, slightly connate at base ; ovary glabrous, stigmas finely lobed. Berries  $5 \times 5$  cm, globose ; seeds many, embedded in pulp.

*Fl. & Fr.* : February-May.

*World distribution* : India and Burma, in moist deciduous forests.

*Specimen examined* : Gundlabrahmeswaram, 30-3-1965, *Ellis* 23804.

#### BARRINGTONIA J. R. & G. Forst. *nom. cons.*

*Barringtonia acutangula* (Linn.) Gaertn. Fruct. 2 : 97. 1791 ; Wt. & Arn. Prodr. 333. 1834 ; C. B. Cl. in Hook. f. FBI 2 : 508. 1878 ; Brandis, Indian Trees, 330. 1906 ; Gamble, FPM 3 : 487. 1919 ; Payens in Blumea 15 : 1067. 1967. *Eugenia acutangula* Linn. Sp. Pl. 471. 1753.

Trees, about 12 m tall ; young branches pale, glabrous. Leaves about  $14 \times 7$  cm, oblong, narrowed at base, serrulate, coriaceous, puberulous on nerves beneath ; nerves and reticulations prominent ; petioles small. Flowers pale red, 1 cm long, in pendulous, spicate racemes

about 40 cm long, bracteate, bracteolate; calyx 0.2 cm long, glabrous, lobes imbricate, oblong, ciliolulate; petals  $0.5 \times 0.4$  cm, oblong-ovate, adnate at base to the staminal tube; stamens numerous, filaments bright red, exserted, connate at base; ovary glabrous. Berries  $3 \times 1$  cm, obtusely quadrangular, crowned with persistent calyx tube; seed 1.

*Fl. & Fr.:* March-December.

*World distribution:* India, Sri Lanka, Burma, Australia, along river banks.

*Specimens examined:* Pathalaganga, Srisailam, 12-7-1963, Ellis 16838; Pathalaganga, Srisailam, 20-10-1964, Ellis 22109.

*Remarks:* Both the genera, *Careya* Roxb., and *Barringtonia* Forst. are treated under the family, Lecythidaceae, in a broad sense, following Gamble (*op. cit.*), Haines (*Bot. Bihar and Orissa* 1924), Hutchinson (*Fam. Fl. Pl.* p. 304, 1959), and Payens (with regard to the latter genus, *op. cit.* 1967). Airy Shaw (in his edition of Willis's Dictionary, p. 196, 1973), and the entry in *Index Kewensis, Suppl.* 14 have assigned these genera to the family, Barringtoniaceae.

#### MELASTOMATACEAE

1. Trees; leaves glabrous	..	MEMECYLON
1. Herbs; leaves variously pubescent:		
2. Flowers trimerous		SONERIA
2. Flowers quadri- or pentamerous	..	OSBECKIA

#### MEMECYLON Linn.

*Memecylon umbellatum* Burm. f. Fl. Ind. 87. 1768; Cooke, Fl. Pres. Bombay 1 : 535, rep. ed. 1958 (1903); Gamble, FPM 3 : 504. 1919, p.p. *M. edule* Roxb. Pl. Corom. 1 : 59, t. 82. 1795; DC. Prodr. 3 : 6. 1828; C. B. Cl. in Hook. f. FBI 2 : 563. 1878, p.p.; Cogniaux in DC. Monogr. Phan. 7 : 1155. 1891; Brandis, Indian Trees, 1906, p.p.; Gamble, loc. cit., p.p. *M. tinctorium* Koen. ex Wt. & Arn. Prodr. 319. 1834.

Trees, up to 4 m tall; branches terete, glabrous, glaucous. Leaves about  $6 \times 4$  cm, elliptic, elliptic-ovate, obtuse, attenuate at base, coriaceous, glabrous; nerves obscure; petioles 1 cm long; dry yellowish. Flowers reddish-purple, 0.5 cm long, many, in umbellate cymes 3 cm across, pedicellate; calyx 0.3 cm long, campanulate, shortly 4-toothed, glabrous; stamens 8, filaments filiform, anthers opening by slits, connectives thickened at back, ending in spurs; ovary glabrous, style

filiform. Berries  $1 \times 1$  cm, globose, reddish-tinged, ripening black, with persistent calyx-tubes; seed 1.

*Fl. & Fr.* : July-August.

*World distribution* : India, in dry evergreen forests.

*Specimens examined* : Srisailam, 13-7-1963, Ellis 16866; Bairani, Diguvametta, 7-8-1972, Ellis 42184.

*Remarks* : From the original description and subsequent interpretations of this species by many workers on Indian plants, it is obvious that only a monographer on the Indian taxa will be in a better position to decide on their circumscriptions. However, the plant has been identified with the materials available at MH and CAL. Interestingly the plant is an indicator of evergreen type of forests.

#### SONERILA Roxb. *nom. cons.*

*Sonerila tenera* Royle, Ill. 215, t. 45, f. 2. 1834; C.B.CI. in Hook. f. FBI 2 : 530. 1878; Gamble, FPM 3 : 498. 1919.

Herbs, 4 cm high; branches almost prostrate, faintly winged, glandular-pilose in rows, succulent. Leaves opposite,  $3 \times 1.5$  cm, ovate, attenuate at base, sparsely hairy; nerves 3, almost from base; petioles small. Flowers pale pink, 0.7 cm long, in axillary and terminal, scorpioid cymes 6 cm long; calyx lobes 3,  $0.8 \times 0.5$  cm, ovate, tube sparsely puberulous; petals 3,  $0.5 \times 0.4$  cm, ovate; stamens 3, anthers yellow, short, truncate, with poral dehiscence; ovary glabrous, style filiform. Capsules about  $1 \times 0.3$  cm, trigonous, glabrous, opening by valves; seeds numerous, minute, ovoid, smooth, raphes with lateral appendages.

*Fl. & Fr.* : October-November.

*World distribution* : India.

*Specimen examined* : Gundlabbrahmeswaram, 27-10-1964, Ellis 22220.

#### OSBECKIA Linn.

- |   |                     |
|---|---------------------|
| 1. Anthers beaked; calyx lobes ovate-caudate,<br>hairy along margins      | <i>O. zeylanica</i> |
| 1. Anthers truncate; calyx lobes broadly<br>ovate, glabrous along margins | <i>O. muralis</i>   |

*Osbeckia zeylanica* Linn. f. Suppl. 2:5. 1768; Willd. Sp. Pl. 2 : 300. 1799; DC. Prodr. 3 : 141. 1828; Wt. & Arn. Prodr. 322. 1834; C.B.CI.

In Hook. f. FBI 2 : 516. 1878 ; Gamble, FPM 3 : 494. 1919 ; Hansen in Ginkgoana No. 4 : 43. 1977. *O. zeylanica* Linn. f. var. *nonrostrata* Haines, Bot. Bihar & Orissa, 369. 1922.

Herbs, up to 18 cm high ; branches quadrangular, striate, hirtellous along angles. Leaves  $2.5 \times 1$  cm, elliptic-ovate, sparsely hirtellous ; nerves 3 from base ; petioles 0.2 cm long ; stipules hirsutely hairy. Flowers pinkish-purple, 0.7 cm long, axillary, solitary, often clustered at ends of branches ; pedicels small ; calyx 0.3 cm long, stellately bristly, more so along ribs without, otherwise glabrous, lobes 4, ovate-acuminate, simple-bristly along margins ; petals 4,  $0.7 \times 0.5$  cm, obovate or subtruncate, clawed at base ; stamens 8, anthers abruptly beaked, filaments glabrous ; ovary bristly, simple-haired at top. Capsules  $0.8 \times 0.6$  cm, ovoid ; seeds minute, numerous, finely muriculate.

*Fl. & Fr.* : September-April.

*World distribution* : Peninsular India and Sri Lanka, in dry localities, along perennial streams.

*Specimen examined* : Srisajlam, 26-3-1965, Ellis 23774.

*Osbeckia muralis* Naud. in Ann. Sci. nat. Bot. ser. 3, 14 : 56. 1850 ; Hansen in Ginkgoana No. 4 : 41. 1977. *O. zeylanica* Steud. ex Naud. *loc. cit.* (pro syn.). *O. truncata* D. Don ex Wt. & Arn. Prodr. 322. 1834, *p.p. nom. confu.* ; C. B. Cl. in Hook. f. FBI 2 : 514. 1878 ; Gamble, FPM 3 : 484. 1919. *O. truncata* D. Don var. *kurzii*. C.B.Cl. *loc. cit.*

Erect herbs, up to 25 cm high ; branches quadrangular, hirtellous. Leaves up to  $3 \times 1.5$  cm, ovate-lanceolate, obtuse at base, hirsute on both surfaces ; nerves 3 from base ; petioles 0.2 cm long ; stipules ciliate. Flowers pink with bluish tinge, 0.4 cm long, axillary, solitary, often clustered at ends of branches ; calyx 0.4 cm long, sparingly bristly without, lobes ovate, glabrous, stipitately appendaged between lobes, crowned at top with bristles ; stamens 4, anthers truncate at tips ; ovary bristly. Capsules  $1 \times 0.6$  cm, ovoid, bristly at top ; seeds minute, numerous, muriculate.

*Fl. & Fr.* : August-December.

*World distribution* : India, in moist deciduous forests.

*Specimen examined* : Ramanapenta, Gundlabrahmeswaram, 28-11-1969, Ellis 32626.

*Remarks* : Hansen (*op. cit.* p. 103) speaks of choice of the specific epithet thus : "...that it is very likely that the description is based on

two elements. The random use of the name *O. truncata* for at least three species has made me reject the name as *nomen confusum*, accepting *O. muralis* Naud.....<sup>1</sup>.

### LYTHRACEAE

1. Trees	LAGERSTROEMIA
1. Shrubs or herbs :	
2. Dry-land shrubs	WOODFORDIA
2. Marshy herbs :	
3. Flowers solitary, axillary ; stamens 2 ..	ROTALA
3. Flowers 4 to several at nodes, axillary ; stamens 4	AMMANNIA

#### LAGERSTROEMIA Linn.

*Lagerstroemia parviflora* Roxb. Pl. Corom. 1 : 48, t. 66. 1796 ; DC. Prodr. 3 : 93. 1828 ; Wt. & Arn. Prodr. 308. 1834 ; Wt. Ic. 1 : t. 69. 1840 ; C.B.Cl. in Hook. f. FBI 3 : 575. 1879 ; Brandis, Indian Trees, 338. 1906 ; Gamble, FPM 3 : 512. 1919 ; Furtado & Sripako in Gard. Bull. Straits Settlem. 24 : 195. 1969.

Trees, about 20 m tall ; branches puberulous when young ; bark ash-coloured. Leaves up to 8 x 2.5 cm, elliptic-obtuse or acute, acute or rounded at base, coriaceous, glaucous beneath ; nerves and reticulations prominent. Flowers 0.6 cm long, white, in terminal and axillary panicles 8 cm long, bracteate ; calyx 0.5 cm long, accrescent during fruiting, lobes ovate ; petals 0.5 cm long, obovate, margins crisped, clawed at base ; stamens several, exserted with 6 larger and reddish ; ovary glabrous, style bent, stigma capitate. Capsules 1.5 x 1.25 cm, adnate to calyx, ellipsoid, woody, 6-valved ; seeds many, flattened, winged at tips.

*Fl. & Fr.* : May-November.

*World distribution* : India, in deciduous forests.

*Specimens examined* : 'Nallamalays', no date, *Beddome* s.n. ; Kurnool, 1886, *J. S. Gamble* s. n. ; Diguvametta, June 1905, *C.A. Barber* s. n. ; Chelama, 4-7-1963, *Ellis* 19738 ; Mahanandi, 21-8-1965, *Ellis* 25423 ; Ramanapenta, Gundlabrahmeswaram, 28-11-1969, *Ellis* 32637, Rollapenta, 16-8-1972, *Ellis* 42281.

#### WOODFORDIA Salisb.

*Woodfordia fruticosa* (Linn.) Kurz in Journ. Asiatic Soc. Bengal xi : 56. 1871 ; Gamble, FPM 3 : 511. 1919. *Lythrum fruticosum* Linn. Sp. Pl.

641, 1753. *Woodfordia floribunda* Salisb. Parad. Lond. t. 42. 1806; C.B.Cl. in Hook. f. FBI 2 : 572. 1879; Brandis, Indian Trees, 341. 1906. *Grislea tomentosa* Roxb. Pl. Corom. t. 31. 1796; DC. Prodr. 3 : 92. 1828; Wt. & Arn. Prodr. 308. 1834.

Shrubs, about 1 m high; branches terete; bark peeling off in threads. Leaves up to 12 × 3 cm, elliptic-lanceolate, acuminate, rounded or cordate at base, strigose above, tomentose and black-glandular beneath; lateral nerves join to form intramarginal vein. Flowers greenish-red, about 2 cm long, in axillary, panicled cymes 3 cm long, bracteate; calyx 1 cm long, striate, constricted above, lobes 6, ovate; petals small, linear; stamens 12, exserted, alternately larger; ovary sessile. Capsules 1 × 0.5 cm, ellipsoid; seeds numerous, minute, cuneate-obvoid.

*Fl. & Fr.* : February-May.

*World distribution* : Tropics from Africa, Pakistan, India, Sri Lanka, China.

*Specimen examined* : Ramanapenta, Gundlabrahmeswaram, 31-3-1965, Ellis 23824.

#### ROTALA Linn. *sensu amp.* Koehne

*Rotala mexicana* Cham. & Schlecht. in Linnaea 5 : 567. 1830, subsp. *pusilla* (Tul.) Koehne in Pflanzennr. 17. iv. 216 : 30. 1903. *R. pusilla* Tul. in Ann. Sci. Nat. 4. ser. iv : 128. 1856. *Ammannia pygmaea* Kurz in Seem Journ. Bot. 5 : 376. 1867; C.B.Cl. in Hook. f. FBI 2 : 568. 1879.

Marshy herbs, erect or prostrate, 2 to 4 cm long; branches tufted, quadrangular. Leaves 0.5 × 0.1 cm, opposite, occasionally verticillate, linear-oblong, stipulate; petioles 0.05 cm long. Flowers pale green, 0.1 cm long, axillary, solitary; calyx minute, 4-toothed, teeth ovate; petals absent; stamens 2, as long as calyx; ovary globose, glabrous, style columnar, stigmas capitate. Capsules globose, minute, glabrous; seeds numerous, minute, excavated on one side.

*Fl. & Fr.* : October-November.

*World distribution* : India.

*Specimen examined* : Gundlabrahmeswaram, 25-10-1964, Ellis 22196.

*Remarks* : This is a new record for peninsular India; hitherto it had been reported from Eastern Himalayas and Bengal.

C.D.K. Cook (*Boissiera* 39 : 33. 1979) treats *Rotala pusilla* Telasne

as a synonym of *R. mexicana* Cham. & Schlecht., treating the latter in a broad sense saying that it is highly variable.

**AMMANNIA** Linn.

**Ammannia baccifera** Linn. Sp. Pl. 120. 1753 ; C.B.CI. in Hook. f. FBI 2 : 569. 1879 ; Gamble, FPM 3 : 510. 1919 ; Blatter & Hallberg in Journ. Bombay nat. Hist. Soc. 26 : 215. 1918. *A. baccifera* Linn. var *aegyptiaca* Koehne in Pflanzensr. 17. iv. 216 : 53. 1903 ; Gamble, op. cit. 510. *A. vesicatoria* Roxb. Fl. Ind. 1 : 427. 1820 ; DC. Prodr. 3 : 78. 1828 ; Wt. & Arn. Prodr. 305. 1834. *A. salicifolia* Hiern in Oliv. Fl. Trop. Africa 11 : 478. 1871 ; C.B.CI. op. cit. 560.

Erect herbs, in marshy habitats, up to 30 cm high ; branches quadrangular. Leaves opposite, up to  $7 \times 1.5$  cm, linear-elliptic, narrowed or cordate at base, glabrous. Flowers green with reddish tinge, 0.1 cm long, in axillary clusters often forming whorls 0.8 cm across, bracteate ; calyx 0.15 cm long, glabrous, lobes 4, broadly ovate ; stamens 4, on calyx tube ; ovary glabrous, style simple, stigmas capitate. Capsules  $1.5 \times 1.5$  cm, globose ; seeds many, minute, scooped on one side.

*Fl. & Fr.* : March-December.

*World distribution* : Tropics from Africa, Afghanistan, India, Sri Lanka, Malaysia and Australia.

*Specimens examined* : Chelama, 7-12-1963, Ellis 17973 ; Mahanandi, 10-12-1969, Ellis 32737.

*Remarks* : Gamble (op. cit.) follows Koehne in treating *aegyptiaca* Koehne as a variety of *Ammannia baccifera* Linn. Blatter and Hallberg (op. cit. p. 125) have stated, "We have united *A. salicifolia* as understood by Hiern and Clarke (not Menti) with *A. baccifera* Linn., not even retaining them as subspecies as was done by Koehne...we have examined hundreds of specimens and found that this distinction does not hold good." Haines in his Flora [ (*Bot. Bihar & Orissa* 2 : 396. rep. ed. 1961 (1922, 1924)) hesitantly records *A. salicifolia* as distinct from *A. baccifera* Linn., though he gives a key distinguishing the two species depending on the leaf base. The present studies of the taxon both in the field and in MH and CAL support Blatter and Hallberg in assigning a broad circumscription to the taxon.

## ONAGRACEAE

## LUDWIGIA Linn.

1. Plants pubescent ; flowers 2 cm across	<i>L. octovalvis</i>
1. Plants glabrous ; flowers 0.6 cm across :	
2. Capsules about $2.5 \times 0.1$ cm ; seeds uniseriate ..	<i>L. prostrata</i>
2. Capsules about $1 \times 0.4$ cm ; seeds pleurisiate ..	<i>L. perennis</i>

*Ludwigia octovalvis* (Jacq.) Raven in Kew Bull. 15 : 476. 1962 et in Reinwardtia 6 : 356. 1963, incl. sep. *brevisepala* (Brenan) Raven & ssp. *sessiliflora* (Mich.) Raven in Kew Bull. 15 : 476. 1962 et in Reinwardtia 6 : 362. 1963 ; Raven in Steenis, Fl. Males. ser. 1. 8(2) : 101. 1977. *Jussiaea suffruticosa* Linn. Sp. Pl. 388. 1753 ; C.B.CI. in Hook. f. FBI 2 : 587. 1879, p.p. ; Fischer, FPM 10 : 1859. 1934.

Robust herbs, about 1 m high, in marshy places ; branches purplish-brown, quadridibbed, striate, pubescent. Leaves about  $10 \times 2.5$  cm, elliptic-ovate, spatulate, oblong or rounded, cuneate at base, sparingly villous ; petioles small. Flowers bright yellow, 2 cm across, solitary, axillary, bracteate ; calyx 0.8 cm long, lobes 4, oblong-ovate, pubescent without ; petals 4,  $1 \times 1$  cm, ovate or obovate ; stamens 8 ; ovary glabrous, style simple, stigma 4-lobed. Capsules  $5 \times 0.5$  cm, linear, sparsely pilose ; seeds numerous, minute, with prominent raphe.

*Fl. & Fr.* : Throughout the year.

*World distribution* : Pantropic.

*Specimen examined* : Srisailam, 12-7-1963, Ellis 16834.

*Remarks* : Raven [in Steenis, Fl. Males. ser. 1. 8(2) : 101. 1977] has taken a broader view of the circumscription of the taxon than what he had taken earlier, thus taking into cognisance the wide range of variability.

*Ludwigia prostrata* Roxb. [Hort. Beng. II. 1814 ex] Fl. Ind. 1 : 441. 1820 ; DC. Prodr. 3 : 59. 1828 ; Wt. Ic. 3 : 762. 1844 ; C.B.CI. in Hook. f. FBI 2 : 588. 1879 ; Gamble, FPM 3 : 517. 1919 ; Raven in Reinwardtia 6 : 374. 1963 et in Steenis, Fl. Males. ser. 1. 8(2) : 103. 1977.

Erect herbs, in marshy places, about 60 cm high ; branches quadrangular, grooved, glabrous. Leaves  $8 \times 2.5$  cm, elliptic-ovate, attenuate at base, glabrous, exstipulate. Flowers yellow, 0.3 cm across, solitary or 3-flowered axillary racemes about 2.5 cm long ; calyx 0.2 cm long, lobes ovate-acuminate, sparsely hirtellous without ; petals 0.2 cm long, spatulate ; stamens 4 ; disk glabrous ; ovary with simple style and

globose stigma. Capsules up to 2.5 cm long, linear, 4-angled; seeds uniseriate, discernible through walls, placed at an angle, raphe prominent.

*Fl. & Fr.* : Throughout the year.

*World distribution* : Tropics from India, Sri Lanka, Malaysia.

*Specimens examined* : Krishnanandi, 24-8-1965, Ellis 25531; Rollapenta, 14-8-1972, Ellis 42252.

*Ludwigia perennis* Linn. Sp. Pl. 119. 1753; Raven in Reinwardtia 6 : 367. 1963 et in Steenis, FL Males. ser. 1, 8 (2) : 102. 1977. *L. parviflora* Roxb. [Hort. Beng. 11. 1814 ex] Fl. Ind. 1 : 440. 1820; DC. Prodr. 3 : 59. 1828; Wt. & Arn. Prodr. 336. 1834; C.B.CI. in Hook. f. FBI 2 : 588. 1879; Gamble, FPM 3 : 517. 1919. *Jussiaea perennis* (Linn.) Brenan in Kew Bull. 1953 : 163. 1953.

Erect herbs, up to 1 m high; branches puberulous when young. Leaves up to 5×1 cm, elliptic-ovate, cuneate at base, glabrous; nerves rather prominent below; petioles up to 1.5 cm long, winged. Flowers yellow, 0.6 cm across, solitary, axillary, shortly pedicellate; calyx lobes 0.3 cm long, linear-ovate, glabrous, tube short; petals 4, 0.3 cm long, spatulate; stamens 4; disk glabrous; ovary glabrous, style simple, stigma globose. Capsules about 1×0.4 cm long, inflated, glabrous; seeds pleuriseriate, not discernible through walls, minute, raphes inconspicuous.

*Fl. & Fr.* : August-November.

*World distribution* : Tropics from Africa, India, Sri Lanka, Pacific Islands.

*Specimens examined* : Chelama, 17-10-1964, Ellis 22080; Ahobilam, 24-11-1969, Ellis 32609; Peddachama, Eastern Nallamalais, 18-8-1972, Ellis 42298.

## PASSIFLORACEAE

### PASSIFLORA Linn.

*Passiflora foetida* Linn. Sp. Pl. 959. 1753; Gamble, FPM 3 : 524. 1919.

Climbing herbs, densely glandular hairy; branches faintly angular; tendrils axillary. Leaves about 7×7 cm, variable, ovate, ovate-oblong, generally 3-lobed, lobes ovate at apices, central largest, base rounded;

petioles about 5 cm long ; stipules filiform with thickened apices. Flowers about 3 cm across, solitary or sometimes in twos ; pedicels up to 6 cm long ; involucral bracts bipinnatifid, with narrow segments having swollen apices ; calyx 0.7 cm long, lobes 5, ovate, tube fleshy ; petals white, about 2.5 cm long, oblong, coronal threads purple, about 1 cm long ; ovary glabrous, styles 3. Berries about 2 cm across, globose, fleshy ; seeds many, arillate.

*Fl. & Fr.* : March-October.

*World distribution* : Pantropical weed introduced from South America, often cultivated.

*Specimens examined* : Srisailam, 13-7-1963, Ellis 16854 ; Mahanandi, 23-8-1965, Ellis 25498 ; Mahanandi, 8-12-1969, Ellis 32719.

### CUCURBITACEAE

1. Fruits spinous-tuberulate		MOMORDICA
1. Fruits smooth :		
2. Petals fimbriate on margins		TRICHOSANTHES
2. Petals not fimbriate on margins :		
3. Fruits ribbed :		
4. Fruits about 30 cm long	..	LUCCA
4. Fruits about 4 cm long		SOLENA
3. Fruits not ribbed :		
5. Stipules foliolar, orbicular, ciliate along margins	..	Ctenolepis
5. Stipules not foliolar :		
6. Fruits about 5 cm long	..	Coccinea
6. Fruits less than 3 cm long :		
7. Tendrils branched	..	DIPLOCYCLOS
7. Tendrils simple :		
8. Male flowers in sub-umbellate racemes	..	MUKIA
8. Male flowers solitary		CUCURBITA

### MOMORDICA Linn.

1. Bracts prominent ; fruits echinate with soft spines		<i>M. dioica</i>
1. Bracts not prominent ; fruits densely tuberculate	..	<i>M. charantia</i>

*Momordica dioica* Roxb. in Willd. Sp. Pl. 4 : 605. 1805 ; DC. Prodr. 3 : 312. 1828 ; Wt. & Arn. Prodr. 348. 1834 ; Wt. Jc. 2 : t. 505, 506.

1843; C. B. Cl. in Hook. f. FBI 2 : 617, 1878; Cogniaux in DC. Monogr. Phan. 3 : 441, 1881; Gamble, FPM 3 : 532, 1919; Chakravarty in Rec. bot. Surv. Ind. 17(1) : 91, 1959.

Climbing herbs; branches grooved, glabrous; roots tuberous; tendrils simple. Leaves about  $9 \times 6$  cm, ovate, slightly or deeply 3-lobed, cordate at base, denticulate, sinus large, scabrous; petioles 2 cm long. Flowers yellow, male 1.5 cm long, solitary, in peduncles 6 cm long; bracts 1.5 cm across, hooded covering the flowers, orbicular-reniform, hairy; calyx 0.3 cm long, linear; petals about 2.5 cm long, oblong-acuminate, densely puberulous without; female as long as male, bracts small; ovary papillose. Fruits  $2.5 \times 2$  cm, ovoid, softly spinous; seeds many, flattened, smooth on face, corrugated along margins.

*Fl. & Fr. :* August-December.

*World distribution :* India, Sri Lanka and Burma, in dry localities.

*Specimens examined :* Mahanandi, 22-8-1965, Ellis 25454 (female), and Ellis 25465 (male).

**Memordica charantia** Linn. Sp. Pl. 1009, 1753; DC. Prodr. 3 : 311, 1828; Wt. & Arn. Prodr. 349, 1834; Wt. Je. 2 : t. 504, 1843; C. B. Cl. in Hook. f. FBI 2 : 616, 1878; Cogniaux in DC. Monogr. Phan. 3 : 436, 1881; Gamble, FPM 3 : 504, 1919; Chakravarty in Rec. bot. Surv. Ind. 17(1) : 83, 1959.

Climbing herbs; branches slender, grooved, sparingly puberulous; tendrils simple. Leaves about  $6 \times 6$  cm, pedately 9-lobed, denticulate, cordate at base, sinus large, scabrous; petioles 4 cm long, faintly hairy. Flowers yellow, male  $1 \times 1.5$  cm, solitary, on peduncles 6 cm long; bracts about  $1 \times 1$  cm, reniform-orbicular; calyx 0.8 cm long, lobes ovate, puberulous; petals 1 cm long, obovate, puberulous without; stamens 3; ovary in female muriculate. Fruits up to  $15 \times 5$  cm, profusely tuberculate; seeds  $1 \times 1$  cm, several, flattened, faces sculptured, margins corrugated.

*Fl. & Fr. :* August-December.

*World distribution :* Pantropic, widely cultivated for its edible, bitter fruits, often commonly found wild.

*Specimen examined :* Mahanandi, 23-8-1965, Ellis 25517.

#### TRICHOSANTHES Roxb.

- |                                   |                      |
|-----------------------------------|----------------------|
| 1. Bracts present, very prominent | <i>T. bracteata</i>  |
| 1. Bracts absent                  | ..                   |
|                                   | <i>T. cucumerina</i> |

**Trichosanthes bracteata** (Lamk.) Voigt, Hort. Sub. Calc. 58. 1845; Cogniaux in DC. Monogr. Phan. 3 : 375. 1881; Chakravarty in Rec. bot. Surv. Ind. 17(1) : 44. 1959. *Modecca bracteata* Lamk. Encycl. 4 : 210. 1797; DC. Prodr. 3 : 337. 1828. *Trichosanthes palmata* Roxb. Fl. Ind. 704. 1832; Wt. & Arn. Prodr. 350. 1834; C. B. Cl. in Hook. f. FBI 2 : 606. 1878; Gamble, FPM 3 : 529. 1919.

Climbing herbs; branches deeply grooved; tendrils branched. Leaves about  $12 \times 12$  cm, 5-lobed, cordate at base, dentate, scabrous, sparsely hirtellous; petioles about 6 cm long. Flowers—male white with green tinge, about  $5 \times 4$  cm, in a few-flowered racemes about 16 cm long; peduncles about 12 cm long; bracts about 3.5 cm long, foliolar, dissected, puberulous without; calyx tube 4 cm long, lobes 1 cm long, ovate, fringed and ciliate along margins; petals 1.5 cm long, spatulate, fringed or laciniate; stamens 3; female flowers solitary. Fruits about  $7 \times 4$  cm, ovoid, streaked with orange colour; seeds many, ellipsoid, embedded in pulp.

*Fl. & Fr.* : June-December.

*World distribution* : India, Sri Lanka, Burma and Indonesia.

*Specimens examined* : Gundlabrahmeswaram, 20-7-1963, Ellis 16910; Gundlabrahmeswaram, 21-7-1963, Ellis 16956.

**Trichosanthes cucumerina** Linn. Sp. Pl. 1008. 1753; DC. Prodr. 3 : 315. 1828; Wt. & Arn. Prodr. 350. 1834; C. B. Cl. in Hook. f. FBI 2 : 609. 1879; Cogniaux in DC. Monogr. Phan. 3 : 357. 1881; Gamble, FPM 3 : 529. 1919; Chakravarty in Rec. bot. Surv. Ind. 17(1) : 31. 1959.

Climbing herbs; branches grooved, sparsely puberulous; tendrils slender, branched. Leaves about  $12 \times 12$  cm, 5-7-palmately lobed, dentate, cordate at base, puberulous; petioles 3.5 cm long. Flowers white, male  $5 \times 5$  cm, a few in racemes about 20 cm long; peduncles about 14 cm long; bracts absent; calyx tube 1.5 cm long, puberulous, lobes acuminate; petals 0.5 cm long, oblong, fimbriate or laciniate; female flowers solitary, about  $2 \times 2$  cm; calyx tubes 1.5 cm long, ribbed, puberulous, lobes linear-acuminate; petals 1.5 cm long, laciniate at tips; pedicels 2 cm long; ovary oblong. Fruits  $5 \times 3$  cm, oblong; seeds many, flattened.

*Fl. & Fr.* : December-September.

*World distribution* : India, Sri Lanka, Burma, Malaysia and North Australia.

*Specimen examined* : Krishnanandi, 9-12-1969, Ellis 32726.

**LUFFA** Cav.

**Luffa acutangula** (Linn.) Roxb. [Hort. Beng. 70. 1814 ex] DC. Prodr. 3 : 302. 1828 ; Wt. & Arn. Prodr. 343. 1834 ; C. B. Cl. in Hook. f. FBI 2 : 615. 1879 ; Gamble, FPM 3 : 532. 1919 ; Chakravarty in Rec. bot. Surv. Ind. 17(1) : 79. 1959.

Climbing herbs ; branches angled, striate, sparsely hairy ; tendrils branched. Leaves up to  $12 \times 12$  cm, 3-5-lobed, orbicular, cordate at base, dentate, apiculate, sparsely pubescent. Flowers yellowish, male about 2.5 cm across, in many-flowered racemes about 15 cm long ; calyx 0.7 cm long, lobes lanceolate ; petals 0.7 cm long, obovate ; stamens 3 ; female solitary, peduncles about 7 cm long ; ovary elongate, ribbed. Fruits about  $30 \times 5$  cm, acutely 10-angled ; seeds several, oblong, flattened.

*Fl. & Fr.* : March-October.

*World distribution* : Pantropic ; cultivated for its fruit, sometimes running wild.

*Specimens examined* : Chelama, 12-12-1963, Ellis 18079 ; Diguvametta, 16-11-1969, Ellis 32402.

**SOLENA** Lour.

**Solena heterophylla** Lour. Fl. Cochin. 1 : 514. 1790. *Zehneria umbellata* Thw. Enum. 125. 1858 ; C. B. Cl. in Hook. f. FBI 2 : 625. 1878. *p.p. Bryonia umbellata* Klein ex Wt. & Arn. 345. 1834. *Melothria heterophylla* (Lour.) Cogniaux in DC. Monogr. Phan. 3 : 618. 1881 ; Gamble, FPM 3 : 539. 1919 ; Chakravarty in Rec. bot. Surv. Ind. 17(1) : 159. 1959.

Climbing herbs ; stems strongly grooved, glabrous ; roots tuberous ; tendrils simple. Leaves up to  $16 \times 10$  cm, very variable, 3-5-lobed, hastate, sometimes denticulate, cordate at base, often amplexicaul, sinus small or big, scabrous, hirtellous ; petioles 0.5 cm long, hirtellous. Flowers pale yellow, male 10-15, in short umbels 1.5 cm long, pedicellate ; calyx 0.3 cm long, faintly puberulous, teeth small ; petals small ; stamens 3, filaments faintly puberulous ; female flowers solitary ; ovary ribbed. Fruits  $4 \times 2$  cm, ovoid, ribbed ; seeds a few,  $0.4 \times 0.2$  cm, globose, banded along lateral sides.

*Fl. & Fr.* : May-October.

*World distribution* : Tropics from India, Sri Lanka, Burma and Indonesia.

*Specimens examined* : Ramanapenta, 26-8-1917, K. C. Jacob 14954 ; Gundlabrahmeswaram, 20-7-1963, Ellis 16934 ; Chelama, 15-10-1964, Ellis 22015 ; Gundlabrahmeswaram, 24-10-1964, Ellis 22188 ; Gundlabrahmeswaram, 1-4-1965, Ellis 23836 ; Mahanandi, 22-8-1965, Ellis 25457 ; Ramanapenta, 28-11-1969, Ellis 32640 ; Rollapenta, 16-8-1972, Ellis 42265.

#### CTENOLEPIS Hook. f.

*Ctenolepis garcini* (Linn.) Hook. f. Fl. Brit. Ind. 2 : 629. 1879. *Sicyas garcini* Linn. Mant. Pl. 297. 1767. *Blastaria garcini* (Linn.) Cogniaux in DC. Monogr. Phan. 3 : 629. 1881 et in Engler's Pflanzenr. ser. iv. 275. 1 : 134. 1916 ; Gamble, FPM 3 : 540. 1919 ; Chakravarty in Rec. bot. Surv. Ind. 17(1) : 175. 1959. *Bryonia garcini* (Linn.) Willd. Sp. Pl. 4 : 623. 1805 ; Wt. & Arn. Prodr. 344. 1834.

Climbing herbs ; branches grooved, glabrous ; tendrils simple. Leaves about 6 cm across, generally 5-lobed, sinuses prominent, lobes shallowly dentate, scabrid ; petioles 4 cm long ; stipules 0.8×0.8 cm, orbicular, dentate, ciliate. Flowers white, 0.2 cm long, male in a few-flowered racemes about 6 cm long ; pedicels slender ; calyx tube campanulate, lobes 5, ovate ; petals 0.2×0.1 cm, 5-partite, ovate ; stamens 3, free, anthers didynamous ; female flowers solitary, ovary ovoid, style columnar. Fruits 0.9×0.5 cm, subquadrate, oblique, 2-seeded : seeds obovate, hemispheric, compressed.

*Fl. & Fr.* : June-December.

*World distribution* : India, in dry localities.

*Specimen examined* : Diguvametta, 16-11-1969, Ellis 32425.

#### COCCEINIA Wt. & Arn.

*Coccelia grandis* (Linn.) Voigt, Hort. Suburb. Cal. 59. 1845 ; Bhandari in Ann. Arid. Zone 4 : 227, f. 1. 1965. *Bryonia grandis* Linn. Mant. Pl. 126. 1767. *Coccinia indica* Wt. & Arn. Prodr. 347. 1834, *nom. illeg.* (based on *Bryonia grandis* Linn.) ; Gamble, FPM 3 : 537. 1919. *Coccinia cordifolia sensu* Cogniaux in DC. Monogr. Phan. 3 : 529. 1881, *p.p.* (*non Bryonia cordifolia* Linn.) ; Chakravarty in Rec. bot. Surv. Ind. 17(1) : 117. 1959. *Cephalandra indica* (Wt. & Arn.) Naud. in Ann. Sci. Nat. ser. 5, 5 : 16. 1866 ; C. B. Cl. in Hook. f. FBI 2 : 621. 1879.

Climbing herbs ; branches grooved, glabrous ; tendrils simple. Leaves about 7×7 cm, simple, palmately 3-5-lobed, white punctate ; nerves 3-5 from base ; petioles about 2 cm long. Flowers white, about 2.8 cm across, male solitary or 3, female solitary ; pedicels 4 cm long ;

calyx 0.5 cm long, lobes 0.2 cm long; petals 0.5 cm long; stamens 3, anther cells convolute; female flowers 2 cm across, pedicels 1.5 cm long; ovary ribbed. Fruits 5×2.5 cm, oblong, indehiscent; seeds many, ellipsoid, compressed.

*Fl. & Fr.* : July-September.

*World distribution* : Tropics from Africa, India, Burma and Malaysia.

*Specimens examined* : Chelama, 6-7-1963, Ellis 16780; Gundlabrahmeswaram, 20-7-1963, Ellis 16921.

#### DIPLOCYCLOS (Endl.) von Post & O. Ktze.

*Diplocyclos palmatus* (Linn.) Jeffrey in Kew Bull. 15 : 352. 1961-62. *Bryonia palmata* Linn. Sp. Pl. 1012. 1753. *B. laciniosa* sensu Linn. Sp. Pl. 1013. 1753, p.p. quoad syn.; Wt. & Arn. Prodr. 345. 1834; Wt. Ic. 2 : t. 500. 1843; C. B. Cl. in Hook. f. FBI 2 : 622. 1878. *Bryonopsis laciniosa* sensu Naud. in Ann. Sci. Nat. ser. 4, 12 : 141. 1859, pro maiore parte; Gamble, FPM 3 : 534. 1919; Chakravarty in Rec. bot. Surv. Ind. 17(1) : 135. 1959.

Climbing herbs; branches slender, grooved, glabrous; tendrils once branched. Leaves up to 10×8 cm, deeply, pedately 5-7-lobed, cordate at base with large sinuses, distantly serrate, scabrid; petioles up to 6 cm long. Flowers pale yellow; male flowers 0.5×0.5 cm, axillary, 3-6-fasciculate, pedicellate; calyx 0.3 cm long, ovate; petals 0.3 cm long, ovate, puberulous; stamens 3; female flowers fascicled; ovary ovoid, style slender, stigmas 3, 2-lobed. Fruits 1.5 cm×1.5 cm, globose, smooth, striped white; seeds 0.5×0.3 cm, conical, strongly banded vertically.

*Fl. & Fr.* : August-December.

*World distribution* : Tropics from Africa, India, Sri Lanka, Burma and North Australia.

*Specimen examined* : Chelama, 16-10-1964, Ellis 22026.

*Remarks* : Jeffrey (*op. cit.* pp. 347 and 352) has discussed at length the identity of the Indian plant hitherto known as *Bryonia laciniosa* Linn. and points out that the American plant previously having the same specific epithet was under *Cayaponta* Manso, and that (p. 347), 'The Linnean epithet has long been erroneously applied to a widespread plant of the old world tropics in the combination *Bryonopsis laciniosa* (Linn.) Naud., for which species the correct name appears to be *Diplocyclos palmatus*...'

## MUKIA Arn.

*Mukia maderaspatana* (Linn.) Roem. Syn. Pep. 47. 1846. *Cucumis maderaspatanus* Linn. Sp. Pl. 1912. 1753. *Bryonia scabrella* Linn. f. Suppl. 424. 1768; DC. Prodr. 3 : 306. 1828; Wt. & Arn. Prodr. 345. 1834; Wt. Ic. 2 : t. 501. 1843. *Mukia scabrella* Arn. in Hook. Journ. Bot. 3 : 276. 1841; C. B. Cl. in Hook. f. FBI 2 : 623. 1878. *Melothria maderaspatana* (Linn.) Cogniaux in DC. Monogr. Phan. 3 : 623. 1881; Gamble, FPM 3 : 539. 1919; Chakravarty in Rec. bot. Surv. Ind. 17(1) : 141. 1959.

Climbing herbs; branches quadrangular, grooved, hispid, scabrous; tendrils simple. Leaves  $8 \times 8$  cm, simple, 3-5-lobed, irregularly dentate, cordate at base, sinus large, sparingly hirsute; petioles about 6 cm long. Flowers yellow, 1.5 cm across, male—fascicled, 2 cm long; calyx teeth small, ovate, recurved; petals 1.5 cm across; connectives produced; female—solitary, 1 cm across; pedicels 0.5 cm long. Berries about  $1.2 \times 1.2$  cm, globose; seeds many, ovoid, flattened, rugose on flattened faces.

*Fl. & Fr.* : July-December.

*World distribution* : India, China, Malaysia and Australia.

*Specimen examined* : Chelama, 9-12-1963, Ellis 18049.

## CUCUMIS Linn.

*Cucumis callosus* (Rottl.) Cogniaux in Engler's Das Pflanzent. 4. 275. 2 : 129. 1924; Chakravarty in Rec. bot. Surv. Ind. 17(1) : 100. 1959. *Bryonia callosa* Rottl. Neue Schrift. Ges. Nat. Fr. Ber. iv : 210. 1803. *Cucumis trigonus* Roxb. [Hort. Beng. 70. [814 ex] Fl. Ind. 3 : 722. 1832; Wt. & Arn. Prodr. 342. 1834; Wt. Ic. 2 : t. 497. 1843; C. B. Cl. in Hook. f. FBI 2 : 619. 1878, p.p.; Gamble, FPM 3 : 535. 1919.

Weak climbing herbs; branches grooved, hispid, almost prickly; tendrils simple. Leaves up to  $6.5 \times 7$  cm, shallowly or deeply lobed, crenately dentate, cordate at base, sinuses rather large, scabrous; petioles 5 cm long, hispid. Flowers yellow, 1.5 cm long, male—axillary, solitary, sometimes 2-3-clustered; calyx about 0.8 cm long, lobes linear, tube hispid; petals about 0.8 cm long, laciniate; female flowers—solitary, pedicels 0.3 cm long, ovary pubescent. Fruits  $2.5 \times 2.5$  cm, striped white, globose; seeds many, oblong, flattened, smooth.

*Fl. & Fr.* : May-October.

*World distribution* : Tropics from North Africa, Pakistan, India, Sri Lanka and North Australia.

*Specimen examined* : Chelama, 9-7-1963, Ellis 16803.

## AIZOACEAE

1. Flowers axillary, solitary ; seeds appendaged	GLINUS
1. Flowers in terminal and axillary panicled cymes ; seeds not or minutely appendaged ..	MOLLUGO

## GLINUS Linn.

1. Branches densely tomentose with stellate and simple hairs ..	<i>G. lotoides</i>
1. Branches hirtellous when young, becoming glabrous ..	<i>G. oppositifolia</i>

*Glinus lotoides* Linn. Sp. Pl. 463. 1753; DC. Prodr. 3 : 455. 1828; Wt. & Arn. Prodr. 362. 1834. *Mollugo lotoides* (Linn.) O. Ktze. Rev. Gen. Pl. 264. 1891; Gamble, FPM 3 : 552. 1919. *M. hirta* Thunb. Prodr. Pl. Cap. 24. 1794; C. B. Cl. in Hook. f. FBI 2 : 662. 1878.

Prostrate, spreading herbs ; branches tomentose with stellate and simple hairs ; rootstocks woody. Leaves about  $2 \times 2$  cm, opposite or falsely whorled, spatulate, orbicular, densely tomentose ; petioles up to 0.8 cm long. Flowers pale yellow, 0.8 cm long, solitary, sometimes 6-clustered at axils of leaves ; calyx segments  $0.8 \times 0.5$  cm, ovate, rounded at base, densely tomentose without, nerves 5 from base, tube minute or absent ; petals absent ; stamens 10, filaments dilated ; ovary globose, stigmas 5, persistent. Capsules  $0.5 \times 0.5$  cm, oblong ; seeds several, black, minute, faintly tuberculate, appendaged at hilum with an extension round the seed.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : India, in drying tanks and on waste lands.

*Specimens examined* : Srisailam, 8-7-1963, Ellis 16806 ; Pathalaganga, Srisailam, 18-8-1965, Ellis 25518.

*Glinus oppositifolius* (Linn.) A. DC. in Bull. Herb. Boiss. II. 1 : 559. 1901. *Mollugo oppositifolia* Linn. Sp. Pl. 89. 1753 ; Gamble, FPM 3 : 552. 1919. *M. spargula* Linn. Syst. ed. 10. 881. 1759 ; Wt. & Arn. Prodr. 44. 1834 ; C. B. Cl. in Hook. f. FBI 2 : 662. 1878.

Prostrate or decumbent herbs ; branches terete, faintly grooved, hirtellous when young ; rootstocks woody. Leaves up to  $1.5 \times 0.5$  cm, in whorls, obovate-spatulate, acute at base, glabrous ; petioles short. Flowers pale green, 0.4 cm long, solitary, axillary ; pedicels 1 cm long ;

calyx lobes 5, almost free,  $0.5 \times 0.2$  cm, unequal, scarious-margined; petals absent; stamens 3, 5 or 10; ovary glabrous, styles 3. Capsules  $0.5 \times 0.3$  cm, oblong-ovoid; seeds numerous, tuberculate, appendages connected thinly with hilum by filiform processes.

*Fl. & Fr.:* Almost throughout the year.

*World distribution:* Tropics from Africa, India, Sri Lanka and Australia.

*Specimens examined:* Chelama, 4-7-1963, Ellis 16799; Mahanandi, 23-8-1965, Ellis 25581.

*Mollugo pentaphylla* Linn. Sp. Pl. 89. 1753; Gamble, FPM 3 : 553. 1919. *M. stricta* Linn. Sp. Pl. ed. 2. 131. 1762; Wight & Arn. Prod. 44. 1834; C. B. Cl. in Hook. f. FBI 2 : 663. 1878.

Diffuse herbs, about 30 cm high; branches quadrangular, grooved, glabrous. Leaves up to  $3 \times 1.5$  cm, whorled, obovate-spathulate, apiculate, attenuate at base, glabrous, stipulate; petioles very short. Flowers pale green, 0.2 cm long, in terminal and axillary, paniculate cymes 20 cm long, bracteate, pedicellate; calyx lobes free,  $0.3 \times 0.1$  cm, ovate, glabrous; petals absent; stamens 3, filaments dilated; ovary globose, styles 3. Capsules  $0.3 \times 0.3$  cm, globose; seeds several, dark brown, minutely tuberculate, reniform.

*Fl. & Fr.:* Almost throughout the year.

*World distribution:* Tropics from India, Sri Lanka, China and Malay Peninsula.

*Specimens examined:* 'Pyapali', July 1885, J. S. Gamble 16413; Chelama, 9-7-1963, Ellis 16815; Srisailam, 20-10-1964, Ellis 22111; Jabakulavagu, Mahanandi, 22-8-1965, Ellis 25491.

*Remarks:* Sometimes the genus, *Mollugo* Linn. is treated under a separate family, Molluginaceae. Here it is treated under Aizoaceae, for many characters are shared by both *Glinus* Linn. and *Mollugo* Linn. which make them coherent and natural under a single family, Aizoaceae.

#### UMBELLIFERAE (APIACEAE)

- |  |    |            |
|--|----|------------|
| 1. Herbs, up to 5 cm high; umbels axillary | .. | CINTILLA   |
| 1. Herbs, up to 2 m high; umbels terminal  | .. | PIMPINELLA |

## CENTELLA Linn.

*Centella asiatica* (Linn.) Urban. in Mart. Fl. Bras. II : 287. 1879 ; Gamble, FPM 3 : 556. 1919. *Hydrocotyle asiatica* Linn. Sp. Pl. 234. 1753 ; Wt. & Arn. Prodr. 366. 1834 ; Wt. Ic. 2 : 565. 1843 ; C. B. Cl. in Hook. f. FBI 2 : 669. 1878.

Herbs, about 5 cm high ; stems creeping with long stolons, grooved, sparsely hairy. Leaves up to  $4.5 \times 4.5$  cm, in rosettes, reniform, crenate-dentate, sinus large ; nerves 5 from base ; petioles up to 20 cm long, striate, sheathing at base ; stipules scarious. Flowers 0.3 cm long, pink ; in axillary umbels 1 cm long, central sessile, laterals pedicellate, bracteate ; calyx 0.2 cm long, truncate ; petals  $0.5 \times 0.05$  cm, ovate ; ovary flattened. Cremocarps  $0.2 \times 0.3$  cm, flattened, 7-ribbed, prominently reticulate.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : Pantropic.

*Specimen examined* : Gundlabrahmeswaram, 30-3-1965, Ellis 23801.

## PIMPINELLA Linn.

*Pimpinella wallichiana* (Miq.) Gandhi in Saldanha & Nicholson, Fl. Hassan District, 417. 1976. *Holosciarum wallichianum* Miq. Bot. Zeit. 7 : 775. 1849. *Pimpinella monoica* Dalz. Kew Journ. Bot. 3 : 212. 1851 ; C. B. Cl. in Hook. f. FBI 2 : 687. 1878 ; Gamble, FPM 3 : 557. 1919.

Herbs, up to 2 m tall ; branches terete, striate, glabrous ; rootstocks woody. Leaves about 15 cm long, 3-foliolate ; petioles about 10 cm long ; leaflets up to  $9 \times 7$  cm, ovate-lanceolate, truncate, cordate at base, sometimes laterals pedately lobed, serrulate-dentate, sparsely hairy on both surfaces, upper laciniate ; nerves 9 from base ; petiolules 3.5 cm long. Flowers white, 0.2 cm across, in terminal, compound umbels 1 cm across, in dichotomously branched inflorescences ; petals  $0.1 \times 0.1$  cm, obcordate, inflexed at tips ; stamens 5 ; ovary topped by disk, styleodia 2. Cremocarps  $0.2 \times 0.15$  cm, finely muriculate.

*Fl. & Fr.* : August-November.

*World distribution* : India, in dry localities.

*Specimens examined* : Ramanapenta, Gundlabrahmeswaram, 25-10-1964, Ellis 22200 ; Ramanapenta, Gundlabrahmeswaram, 28-11-1969, Ellis 32634.

## ARALIACEAE

*SCHEFFLERA J. R. & G. Forst. nom. cons.*

*Schefflera stellata* (Gaertn.) Baillon, Hist. Pl. 7 : 161. 1874 ; Harms in Engler & Prantl, Pflanzeng. iii. 8 : 39. 1894 ; Gamble, FPM 3 : 570. 1919. *Heptapleurum stellatum* Gaertn. Fruct. 2 : 472, t. 178. 1791 ; C. R. Cl. in Hook. f. FBI 2 : 730. 1879. *Hedera obovata* Wt. Ic. 3 : tt. 1011, 1012. 1844.

Trees, sometimes straggling shrubs, about 4 m tall ; branches terete, bark pale, wrinkled, lenticellate. Leaves about 30 cm long, digitate ; common petioles about 14 cm long, sheathing at base, striate ; leaflets  $11 \times 8$  cm, ovate, elliptic-obtuse, abruptly acuminate, sometimes emarginate, rounded at base, coriaceous, glabrous ; nerves and reticulations prominent ; petioles 0.4 cm long. Flowers orange, about 0.5 cm across, in panicles of umbels 1.5 cm across, panicles up to 25 cm long ; bracts sheathing ; calyx 0.2 cm long, faintly 5-lobed, glabrous ; petals 5, ovate, cucullate ; stamens 5 ; ovary sunk, style obscure. Drupes  $0.4 \times 0.3$  cm. 5-angled ; seeds compressed.

*Fl. & Fr. :* March-August.

*World distribution :* India, in dry localities, generally along water courses.

*Specimen examined :* Srisailam, 15.7.1963, Ellis 16890.

## ALANGIACEAE

*ALANGIUM Lamk. nom. cons.*

*Alangium salviifolium* (Linn. f.) Wang, in Engl. Pflanzenr. 4. 220b : 9. 1910 ; Gamble, FPM 3 : 572. 1919 ; Bloembergen in Bull. Jard. bot. Buit. ser. 3. 16 : 139. 1939 ; Mukerjee in Bull. bot. Surv. Ind. 10 : 330. 1968. *Grewia salviifolia* Linn. f. Suppl. 409. 1781. *Alangium decapetalum* Lamk. Encycl. Meth. 1 : 174. 1783 ; DC. Prodr. 3 : 203. 1828 ; Wt. & Arn. Prodr. 1 : 325. 1834. *A. tomentosum* Lamk. I.c. DC. op. cit. 204. *A. lamarekii* Thw. Enum. Pl. Zeyl. 133. 1859 ; C. B. Cl. in Hook. f. FBI 2 : 741. 1879, excl. var. *glandulosum*.

Trees, about 10 m tall ; young branches pubescent, branchlets often thorny. Leaves up to  $12 \times 5$  cm, elliptic-ovate, acuminate, rounded at base, puberulous beneath ; nerves 5 from base, both nerves and reticulations prominent beneath. Flowers white, 2 cm long, in axillary fascicles 2.5 cm long ; pedicels articulate ; calyx 0.6 cm long, tube adnate to ovary, lobes small, about 10, pubescent ; petals  $2 \times 0.2$  cm, 10, linear, puberulous

without, recurved ; stamens many, filaments connate at base, pubescent at base ; ovary turbinate, style 2 cm long, stigmas 0.2 cm across, lobed and convolute. Drupes  $2 \times 1$  cm, ovoid, with persistent calyx-lobes and disk ; endocarps bony ; cotyledons flattened.

*Fl. & Fr.* : March-July.

*World distribution* : Tropics from East Africa, India, Sri Lanka, Burma, Malaysia and Philippines.

*Specimens examined* : Tumrapalli, March 1883, J. S. Gamble 10891 ; Chelama, 18-3-1965, Ellis 23708.

## RUBIACEAE

1. Herbs :		
2. Flowers pedicellate :		
3. Ovules numerous in each cell	..	OLDENLANDIA
3. Ovules solitary in each cell	..	KNOXIA
2. Flowers sessile	..	BORREIA
1. Shrubs or trees :		
4. Flowers in globose heads :		
5. Leaves cordate at base	..	ADINA
5. Leaves acute at base	..	MITRAGYNA
4. Flowers not in globose heads :		
6. Calyces coalesce in fruiting	..	MORINDA
6. Calyces do not coalesce :		
7. Inflorescences terminal :		
8. Flowers up to $2 \times 0.5$ cm ; stems not thorny :		
9. Inflorescences spicate ; pedicels recurved in fruiting ; fruits capsular	..	HYMENODICTYON
9. Inflorescences paniculate or corymbose ; pedicels in fruiting not recurved ; fruits drupaceous :		
10. Inflorescences corymbose :		
11. Leaves coriaceous, margins excavated ; ovules more than 2 in each locule	..	TARENNA
11. Leaves rather thin, margins not excavated ; ovules 1 in each locule	..	PAYETTA
10. Inflorescences long-paniculate :		
12. Flowers pedicellate	..	IXORA
12. Flowers sessile	..	WENDLANDIA
8. Flowers more than $3 \times 2.5$ cm ; stems often thorny	..	GARDENIA
7. Inflorescences axillary :		
13. Ovules 1 each locule		CANTHIMUM
13. Ovules more than 2 in each locule		RANDIA

## OLDENLANDIA Linn.

(It has been considered by several authorities that *Oldenlandia* Linn. is a heterogeneous genus that needs to be split up into several genera, viz. *Exallange* Bremek., *Gonotheca* Bl. ex DC., *Hedyotis* Linn., *Kohautia* Cham. & Schlecht., *Oldenlandia* prop., *Thecagonum* Babu, etc. But more evidences from other disciplines of research are required before this genus, at least from India, is split up, for apparently the external characters seem to bring all the smaller taxa dealt with here into a natural assemblage of a bigger taxon. Notes on many taxa have been given individually under the 'Remarks' column.)

- |   |                      |
|---|----------------------|
| 1. Leaves in whorls at nodes, elliptic-oblong, about $6 \times 3$ cm .....      | <i>O. ovatifolia</i> |
| 1. Leaves opposite, elliptic-ovate, up to $6 \times 1.5$ cm :                   |                      |
| 2. Inflorescences of umbellate cymes ; plants scabrellous .....                 | <i>O. umbellata</i>  |
| 2. Inflorescences of dichotomously branched cymes ;<br>plants not scabrellous : |                      |
| 3. Pedicels more than 1.5 cm long .....   | <i>O. affinis</i>    |
| 3. Pedicels less than 1 cm long :   |                      |
| 4. Flowers sessile, clustered .....   | <i>O. nitida</i>     |
| 4. Flowers pedicellate, in cymes .....  | <i>O. corymbosa</i>  |

**Oldenlandia ovatifolia** (Cav.) DC. Prodr. 4 : 427. 1830. *Hedyotis ovatifolia* Cav. Ic. 6 : 52. 1801. *Gonotheca ovatifolia* (Cav.) Santapau & Wagh in Bull. bot. Surv. Ind. 5 : 107. 1963 (1964). *Thecagonum ovatifolium* (Cav.) Babu in Bull. bot. Surv. Ind. 11 : 214. 1969 (1971). *Oldenlandia nudicaulis* Roth, Nov. Sp. Pl. 95. 1821; Hook. f. FBI 3 : 70. 1880; Gamble, FPM 4 : 424. 1921. *Hedyotis nudicaulis* (Roth) Wt. & Arn. Prodr. 416. 1834.

Erect herbs, about 12 cm high ; branches furfuraceous, angled, grooved. Leaves about  $6 \times 3$  cm, in whorls of 4, sometimes 2, ovate, elliptic-oblong, suddenly acute at base, subsessile, sparsely hairy, cystoliths prominent ; stipules ovate. Flowers white, 0.2 cm long, in dichotomously branched cymes, bracteate ; pedicels 1 cm long ; common peduncles 5 cm long ; calyx 0.1 cm long, accrescent, lobes broadly ovate ; corolla 0.1 cm, long, lobes ovate, hairy at throat ; ovary obscure. Capsules  $0.3 \times 0.3$  cm, hemispheric, loculicidally dehiscent ; seeds a few, pitted.

*Fl. & Fr.* : May-January.

*World distribution* : Tropics from India, Malaysia.

*Specimens examined*: Gundlabrahmeswaram, 26-10-1964, Ellis 22211; Diguvametta, 17-11-1969, Ellis 32475; Gundlabrahmeswaram, 1-12-1969, Ellis 32685.

*Remarks*: Santapau and Wagh (*op. cit.* p. 107) have followed DeCandolle (*op. cit.*) in raising the section or a subgenus of *Oldenlandia* Linn. to a distinct genus, *Gonotheca* Bl. ex DC., the main differences being in the nature of capsules and seeds; capsules are angled and seeds globose in *Gonotheca*, and capsules are terete and seeds angular in *Oldenlandia*. The present studies indicate that apparently these two characters are variable, and summation of other characters makes it desirable to place it under *Oldenlandia* Linn.

*Oldenlandia umbellata* Linn. Sp. Pl. 119. 1753; DC. Prodr. 4 : 425. 1830; Hook. f. FBI 3 : 66. 1880. *Hedyotis umbellata* (Linn.) Wt. & Arn. Prodr. 413 1834. *Oldenlandia wightii* Hook. f. FBI 3 : 66. 1880, *syn. nov.*; Gamble, FPM 4 : 601. 1921.

Erect or decumbent herbs, about 16 cm high; branches terete or faintly angled, sparsely scabrellous. Leaves 1.5×0.4 cm, linear-ovate, acute at base, marginally recurved and scabrellous, sessile; stipules 3-5, long-bristly. Flowers white, 0.4 cm long, in axillary, clustered, umbellate cymes 1 cm long, bracteate, shortly pedicellate, common peduncles up to 1.2 cm long; calyx 0.3 cm long, lobes 0.1 cm long, ovate, marginally scabrellous, tube 0.1 cm long; corolla 0.3 cm long, lobes 0.2 cm long, pubescent near the throat; stamens epipetalous. Capsules 0.2×0.2 cm, globose, loculicidal; seeds small, angled, reticulate.

*Fl. & Fr.* : Almost throughout the year.

*World distribution* : India, in rather dry localities.

*Specimens examined*: Chelama, 5-7-1963, Ellis 16749; Chelama, 8-12-1963, Ellis 18003; Mahanandi, 22-8-1965, Ellis 25466; Mahanandi, 23-8-1972, Ellis 42336.

*Remarks*: Studies of the plant both in the field and in the herbaria at MH and CAL point that *Oldenlandia wightii* Hook. f. cannot stand, for it is almost impossible to differentiate it from *O. umbellata* Linn. In fact, Gamble (*op. cit.* p. 601) has already indicated the same opinion thus: 'A stiff herb much resembling the last, perhaps not really distinct . . .', though in his key he had separated them (p. 596).

*O. affinis* (Koen. & Schult.) DC. Prodr. 4 : 428. 1830. *Hedyotis affinis* Koen. & Schult. Syst. 3 : 194. 1819. *Oldenlandia dichotoma*

(Koen. ex Roth) Hook. f. FBI 3 : 67. 1880 ; Gamble, FPM 4 : 601. 1921.  
*Hedyotis dichotoma* Koen. ex Roth, Nov. Sp. Pl. 23. 1821.

Erect, profusely branched herbs, about 25 cm long ; branches faintly angled. Leaves about  $3 \times 0.3$  cm, linear-elliptic, acute at base, subsessile ; stipules rather inconspicuous. Flowers pale purple,  $0.3 \times 0.1$  cm, in terminal and axillary panicles about 6 cm long, bracteate ; pedicels 1.5 cm long, capillary ; calyx 0.1 cm long, teeth minute, ovate, glabrous ; corolla 0.2 cm long, lobes ovate ; stamens included ; style simple. Capsules  $0.2 \times 0.2$  cm ; seeds many, minute, reticulate.

*Fl. & Fr.* : September-December.

*World distribution* : India, in dry localities.

*Specimens examined* : Chelama, 9-12-1963, Ellis 18033 ; Srisailam, 1-10-1964, Ellis 22119 ; Ahobilam, 28-8-1965, Ellis 25340 ; Diguvametta, 7-11-1969, Ellis 32458.

*Oldenlandia nitida* (Wt. & Arn.) Gamble, FPM 4 : 597. 1921. *Hedyotis nitida* Wt. & Arn. Prodr. 412. 1834 ; Hook. f. FBI 3 : 61. 1880.

Decumbent herbs, about 40 cm long ; branches quadrangular, ovoid, glabrous. Leaves  $6 \times 1.5$  cm, elliptic-ovate, acute at base, abrous, marginally recurved, coriaceous ; petioles short ; stipules membranous, bristly. Flowers white, 0.5 cm long, in a few-flowered clusters nodes ; calyx 0.2 cm long, lobes ovate, tube short ; corolla 0.4 cm long, brrous, lobes spathulate ; stamens included ; ovary glabrous, style triple. Capsules  $0.5 \times 0.3$  cm, ovoid ; seeds several, angled, reticulate.

*Fl. & Fr.* : September-November.

*World distribution* : India and Burma.

*Specimens examined* : Chelama, 21-7-1963, Ellis 16949 ; Gundabrahewaram, 26-10-1964 ; Ellis 22012 ; Ramanapenta, Gundabrahewaram, 28-11-1969, Ellis 32633 ; Chinamantrala, Eastern Nallamalais, 17-8-1972, Ellis 42286.

*Remarks* : This species has been placed under *Oldenlandia* Linn. byable, for there has been some confusion in the delimitation of the tra, *Oldenlandia* Linn. and *Hedyotis* Linn. Many characters are ed by both the genera. In fact, Haines [(Bot. Bihar and Orissa 2 : rep. ed. 1961 (1924)] speaks of this thus : 'Some authors now unite *Patis* and *Oldenlandia*. The more or less shrubby species are distin- bed by this habit, but some of the herbaceous species are only

separable by the more dilated stipules and the wider base of the sepals, which characters are only relative and not always evident...I prefer to keep them distinct.'

**Oldenlandia corymbosa** Linn. Sp. Pl. 119. 1753 ; Hook. f. FBI 3 : 64. 1880 ; Gamble, FPM 4 : 600. 1921. *Hedyotis burmanniana* Br. [in Wall. Cat. 868] ex Wt. & Arn. Prodr. 415. 1834, p.p.

Herbs, up to 30 cm tall, weak-stemmed ; stems terete or angled, glabrous. Leaves up to  $4 \times 0.5$  cm, linear-ovate, elliptic-ovate, acute at base, glabrous, margins recurved ; petioles small ; stipules membranous, almost truncate. Flowers white, 0.1 cm long, in dichotomously branched, axillary cymes 2 cm across, bracteate ; pedicels 1 cm long ; calyx small, lobes ovate ; corolla 0.1 cm long, lobes acute ; styles 2, filiform. Capsules  $0.2 \times 0.2$  cm, globose, glabrous ; seeds minute, numerous, angled, reticulate.

*Fl. & Fr.* : August-February.

*World distribution* : Pantropic, in dry localities.

*Specimen examined* : Chelama, 8-12-1963, Ellis 18015.

#### KNOXIA Linn.

**Knoxia sumatrensis** (Retz.) DC. Prodr. 4 : 569. 1830. *Spermacoce sumatrensis* Retz. Obs. 4 : 23. 1786. *Knoxia corymbosa* Willd. Sp. Pl. 1 : 582. 1798 ; Wt. & Arn. Prodr. 439. 1834 ; Hook. f. FBI 3 : 128. 1880 ; Gamble, FPM 4 : 622. 1921.

Herbs, up to 80 cm high ; stems obtusely quadrangular, puberulous. Leaves up to  $11 \times 3$  cm, linear-elliptic, acuminate, acute at base, puberulous on both surfaces ; petioles 0.5 cm long ; stipules ovate, bristly. Flowers white, 0.2 cm long, in branched, axillary or terminal, corymbose cymes 5 cm across ; calyx 0.1 cm long, sparsely hairy, lobes acute ; corolla 0.5 cm long, sparsely hairy without ; style filiform. Capsules  $0.2 \times 0.1$  cm, ellipsoid, angled ; seeds 2, angled.

*Fl. & Fr.* : April-January.

*World distribution* : Tropics from India, Sri Lanka, Burma, Malaysia, and Australia.

*Specimens examined* : Chelama, 21-7-1963, Ellis 16944 ; Diguvametta, 37-11-1969, Ellis 32460 ; Rollapenta, 16-8-1972, Ellis 42278.

*Remarks* : The differences between *K. corymbosa* and *K. mollis* Wt. & Arn. seem to be of little significance, for there are gradations between the two. However, further studies are required for definite pronouncement.

**BORRERIA** G. P. W. Mey. *nom. cons.*

- |   |                          |
|---|--------------------------|
| 1. Erect herbs ; both carpels dehiscing ventrally                     | <i>B. stricta</i>        |
| 1. Prostrate or decumbent herbs ; only one carpel dehiscing ventrally | .. <i>B. articulatis</i> |

**Borreria stricta** (Linn. f.) Schum. in Engler, Pflanzenf. 4(4) : 143. 1891 ; Gamble, FPM 4 : 654. 1921. *Spermacoce stricta* Linn. f. Suppl. 120. 1781 ; DC. Prodr. 4 : 555. 1828 ; Wt. & Arn. Prodr. 438. 1834 ; Hook. f. FBI 3 : 200. 1880.

Erect herbs, up to 40 cm high ; branches faintly quadrangular, grooved, glabrous or faintly scabrous along angles. Leaves up to  $5.5 \times 0.6$  cm, linear-ovate, obovate, attenuate and amplexicaul at base, scabrid on both surfaces ; stipules membranous, bristly. Flowers white, 0.15 cm long, in dense, axillary whorls 1 cm across, subtended by 2 pairs of leaves, bracteate ; calyx linear, tube pubescent without ; corolla 0.1 cm long, campanulate, lobes linear-ovate ; stamens epipetalous, filaments exserted ; style filiform, stigmas capitate. Capsules  $0.15 \times 0.1$  cm, pubescent ; seeds black, shining flattened, grooved on surfaces.

*Fl. & Fr.* : October-December.

*World distribution* : India, Sri Lanka, China and Malaysia, in rather dry localities.

*Specimens examined* : Chelama, 10-12-1963, Ellis 18055 ; Chelama, 15-10-1964, Ellis 22010 and Ellis 22020.

**B. articulatis** (Linn. f.) F. N. Will. in Bull. Herb. Boiss. ser. 2, 5 : 956. 1905. *Spermacoce articulatis* Linn. f. Suppl. 119. 1781. *Borreria hispida* (Linn.) Schum. in Engler, Pflanzenf. 4(4) : 144. 1891, (non Schum. 1888) ; Gamble, FPM 4 : 654. 1921. *Spermacoce hispida* Linn. Sp. Pl. 192. 1753 ; DC. Prodr. 4 : 555. 1828 ; Wt. & Arn. Prodr. 438. 1834 ; Hook. f. FBI 3 : 200. 1880.

Prostrate or procumbent herbs ; branches quadrangular, grooved, hirsutous along angles, subglabrous, internodes long or short ; rootstocks woody. Leaves about  $3.5 \times 2$  cm, ovate, obovate, or elliptic-ovate, rounded at base, scabrid-pubescent, subsessile ; stipules membranous, bristly along margins. Flowers violet, 1.5 cm long, about 8-9, in whorls,

enclosed by stipules; calyx hispid, lobes 0.1 cm long, acute, reflexed; corolla 1 cm long, faintly campanulate, lobes bristly without; styles filiform, stigmas 2. Capsules 0.3 x 0.2 cm, carpels dehiscing ventrally; seeds black, granulate, deeply grooved ventrally.

*Fl. & Fr.* : June-December.

*World distribution* : India, Sri Lanka, China, Malaysia and Philippines.

*Specimens examined* : Chelama, 15-10-1964, Ellis 22003 ; Mahanandi, 22-8-1965, Ellis 25481.

#### ADINA Salisb.

*Adina cordifolia* (Roxb.) Hook. f. ex Brandis, For. Fl. 263, t. 33. 1874 ; Brandis, Indian Trees 368. 1906 ; Hook. f. FBI 3 : 24. 1880 ; Gamble, FPM 4 : 584. 1921. *Nauclea cordifolia* Roxb. Pl. Corom. 1 : 40. 1796 ; Wt. & Arn. Prodr. 391. 1834.

Trees, about 20 m tall; branches pubescent when young, bark thick. Leaves about 14 x 12 cm, orbicular, abruptly acuminate, cordate at base, sinus small, glabrescent above, pubescent beneath; petioles up to 8 cm long, densely pubescent; stipules up to 3 x 1 cm, deciduous. Flowers yellowish green, several, in globose heads 2 cm across; peduncles up to 6 cm long; calyx 0.2 cm long, pubescent, lobes spathulate; corolla about 0.7 cm long, tube pubescent without, segments 0.1 cm long, obtuse; stamens 5, epipetalous near throat; style much exserted, stigmas club-shaped. Capsules 0.3 cm long, cuneate; seeds winged.

*Fl. & Fr.* : July-September.

*World distribution* : India, Sri Lanka, Burma and Indonesia.

*Specimens examined* : Srisailam, 12-7-1963, Ellis 16841 ; Chelama, 8-12-1963, Ellis 18026 ; Ahobilam, 28-8-1965, Ellis 25533 ; Bogada, 19-11-1969, Ellis 32536 ; Diguvametta, 6-8-1972, Ellis 42157.

#### MITRAGYNA Korth. *nom. cons.*

*Mitragyna parvifolia* (Roxb.) Korth. Obs. Nauci. Ind. 19. 1839 ; Gamble, FPM 4 : 585. 1921 ; Ridsdale in Blumea 24 : 63. 1978. *Nauclea parvifolia* Roxb. Pl. Corom. 1 : 40, t. 52. 1796 ; Wt. & Arn. Prodr. 396. 1834. *Stephegyne parvifolia* Korth. Verh. Nat. Ges. Bot. 161. 1840 ; Hook. f. FBI 3 : 25. 1880 ; Brandis, Indian Trees 369. 1906.

Trees, about 25 cm tall; bark smooth. Leaves up to 15 x 10 cm,

ovate, oblong or obovate-oblong, acute at base, glabrous; nervules and reticulations rather prominent; petioles 4 cm long; stipules about  $1.3 \times 0.6$  cm, oblong, deciduous. Flowers white, 0.7 cm long, in globose heads 2 cm across; calyx 0.15 cm long, almost truncate, pilose without at base, puberulous within; corolla lobes linear-ovate, recurved; anthers exserted; style exserted, stigmas mitriform. Capsules  $0.4 \times 0.2$  cm, obovoid, faintly angled; seeds flattened.

*Fl. & Fr.* : March-December.

*World distribution* : India, Sri Lanka and Burma, in moist deciduous forests.

*Specimens examined* : Chelama, 4-7-1963, Ellis 16704; Chelama, 8-12-1963, Ellis 18005; Diguvametta, 17-11-1969, Ellis 32474; Diguvametta, 6-8-1972, Ellis 42159.

#### MORINDA Linn.

*Morinda tinctoria* Roxb. [ Hort. Beng. 15. 1814 ex ] Fl. Ind. 1 : 543. 1820; DC. Prodr. 4 : 447. 1830; Wt. & Arn. Prodr. 419. 1834; Hook. f. FBI 3 : 156. 1880; Brandis, Indian Trees 392. 1906; Gamble, FPM 4 : 651. 1921.

Trees, about 8 m tall; bark fissured, suberous, faintly pubescent when young. Leaves about  $14 \times 6$  cm, elliptic-ovate, abruptly acuminate, acute at base, puberulous on both surfaces; petioles about 1.5 cm long; stipules ovate. Flowers white,  $1.5 \times 1$  cm, on a globose receptacle; peduncles about 3 cm long; calyx 0.3 cm long, truncate; corolla 1.5 cm long, glabrous or pubescent without, lobes linear-ovate; stamens not exserted. Fruits 2-3 cm across, of false berries due to coalescence of succulent calyces; pyrenes stony; seeds oblong.

*Fl. & Fr.* : March-August.

*World distribution* : India, Sri Lanka, Burma and Malaysia.

*Specimens examined* : Chelama, 4-7-1963, Ellis 16718; Diguvametta, 7-8-1972, Ellis 42171.

*Remarks* : *Morinda tinctoria* Roxb. is highly variable as seen from the treatment of the taxon by several of the Indian workers, including Wight and Arnott (*op. cit.*), Hooker f. (*op. cit.*), Gamble (*op. cit.*), and others: Hooker treats 4 varieties and 1 forma under it, reducing many of Wight and Arnott's species. Regarding *M. tomentosa* Wt. & Arn., most of the Indian botanists treat it at a varietal level. From the present studies

of the taxon both in the field and in MH and CAL, it appears that both glabrous and tomentose forms occur, depending on ecological conditions; apparently both need to be treated as one species. Evidences from other disciplines are necessary for arriving at a proper conclusion.

Gamble (*op. cit.* p. 651) records *Morinda angustifolia* Roxb. from 'Nallamalai Hills of Kurnool (Barber)'. However, this has not been collected in the present tours of Nallamalais, nor are there herbarium specimens at MH or CAL for including it here.

#### HYMENODICTYON Wall. *nom. cons.*

*Hymenodictyon orixense* (Roxb.) Mabberry in *Taxon* 31 : 66. 1982. *Cinchona orixensis* Roxb. Bot. Descr. Swietenia 21. 1793 et in Med. Facts. Obs. 6 : 152. 1795. *Hymenodictyon excelsum* (Roxb.) Wall. in Roxb. Fl. Ind. 2 : 149. 1824 ; DC. Prodri. 4 : 358. 1830 ; Wt. & Arn. Prodri. 392. 1834 ; Hook. f. FBI 3 : 35. 1882 ; Brandis, Indian Trees 371. 1906 ; Gamble, FPM 4 : 589. 1921. *Cinchona excelsa* Roxb. Pl. Corom. 2, t. 106. 1799. *Hymenodictyon obovatum* Wt. Ic. 1 : t. 80. 1840 (non Wall.).

Trees, about 25 m tall; young branches brown-puberulous. Leaves about 23×11 cm, ovate or obovate, abruptly acuminate, acute at base, puberulous on both surfaces; petioles 8 cm long; stipules ovate. Flowers pale green, 0.2 cm long, in terminal, dense, spiciform racemes about 12 cm long, bracteate; calyx 0.1 cm long, lobes ovate, pubescent; corolla 0.2 cm long, puberulous without; stamens 5, epipetalous; style exserted. Capsules 2×1 cm, pendulous, loculicidally dehiscing; seeds several, broadly winged.

*Fl. & Fr.* : August-February.

*World distribution* : India, Sri Lanka, Burma and Malaysia.

*Specimens examined* : Chelama, 9-12-1963, Ellis 18048 ; Diguvametta, 19-11-1969, Ellis 32553 ; Diguvametta, 8-8-1972, Ellis 42198.

#### TARENNA Gaertn.

*Tarenna asiatica* (Linn.) Alston in Trimen, Handb. Fl. Ceyl. 6. Suppl. 150. 1931. *Rondeletia asiatica* Linn. Sp. Pl. 172. 1753. *Tarenna zeylanica* Gaertn. Fruct. 1 : 139, t. 28. 1788 ; Cooke, Fl. Pres. Bombay 2 : 25. rep. ed. 1958 (1904). *Webera corymbosa* Willd. Sp. Pl. 1 : 1224. 1798 ; Hook. f. FBI 3 : 102. 1880. *Stylocoryne webera* A. Rich. Mem. Fam. Rubia. 168. 1829 ; Wt. & Arn. Prodri. 401. 1834 ; Wt. Ic. 1 : t. 309. 1840 et 2 : t. 584. 1843. *Chomelia asiatica* (Linn.) O. Ktze. Rev. Gen. Pl. 1 : 278. 1891 ; Gamble, FPM 4 : 613. 1921.

Shrubs, up to 2.5 m high ; young branches slightly angled, glabrous. Leaves  $14 \times 5$  cm, elliptic-ovate, acuminate, obtuse at base, coriaceous, shining above, glaucous beneath, margins excurved ; lateral nerves parallel ; petioles up to 2 cm long ; stipules ovate. Flowers white, 0.5 cm long, in branched, corymbose cymes 6 cm long, bracteate ; calyx 0.2 cm long, lobes obtuse, puberulous without ; corolla 0.5 cm long, oblong, sparsely hairy within near throat ; anthers linear ; stigmas club-shaped. Berries  $0.5 \times 0.5$  cm, orbicular ; seeds many, flattened.

*Fl. & Fr.* : February-September.

*World distribution* : India, Sri Lanka, Malaysia, in rather dry localities of deciduous forests.

*Specimens examined* : Srisailam, 13-7-1973, Ellis 16874 ; Srisailam, 20-10-1964, Ellis 22088 ; Mahanandi, 21-8-1965, Ellis 25445 ; Diguvametta, 6-8-1972, Ellis 42146.

*Remarks* : Gamble (*op. cit.* p. 613) recognises 2 varieties, viz. var. *rigida* (Wt.) Gamble and var. *montana* under this species, depending on the length of leaves and calyx lobes. These two varieties are from the evergreen forests of Western Ghats, whereas the *typica* is from dry forests of plain districts. However, these differentiations are not apparent from the materials at MH and CAL ; they appear to be one variable taxon.

#### PAVETTA Linn.

*Pavetta indica* Linn. Sp. Pl. 110. 1753 ; DC. Prodr. 4 : 490. 1830 ; Wt. & Arn. Prodr. 431. 1834 ; Wt. Ic. 1 : t. 148. 1840 ; Hook. f. FBI 3 : 150. 1880 ; Gamble, FPM 4 : 633. 1921.

var. *indica*. Shrubs, about 2 m high ; branches pale, purplish when young. Leaves about  $13 \times 5$  cm, elliptic-ovate, acute at base, glabrous ; petioles 1.5 cm long ; stipules ovate, membranous. Flowers white, green-tinted at tips, about 1.5 cm long, in corymbose cymes 8 cm across, bracteate, pedicellate ; calyx 0.1 cm long, lobes minute ; corolla 1.5 cm long, lobes 0.5 cm long, obovate, tubes narrow ; anthers linear ; styles exserted, stigmas club-shaped. Fruits  $0.5 \times 0.5$  cm, globose, 1-seeded, endocarps stony.

*Fl. & Fr.* : May-December.

*World distribution* : India, Sri Lanka, Malaysia and Australia.

*Specimens examined* : Chelama, 4-7-1963, Ellis 16729 ; Chelama, 16-10-1964, Ellis 22043 ; Mahanandi, 23-8-1965, Ellis 25514 ; Diguvametta, 16-11-1969, Ellis 32403.

*var. tomentosa* (Roxb. ex Smith) Hook. f. FBI 3 : 150. 1880 ; Gamble, FPM 4 : 633. 1921. *P. tomentosa* Roxb. ex Smith in Rees, Enclop. 26 : 2. 1819 ; DC. Prodr. 4 : 490. 1830 ; Wt. & Arn. Prodr. 431. 1834. *P. brunonis* Wt. Ic. 3 : t. 1065. 1844.

Plants tomentose. Leaves about  $25 \times 10$  cm.

*Remarks* : Except for the tomentose nature, though often obscure, as could be seen both in the field and in MH and CAL, this taxon is similar to var. *indica* in all other characters. Apparently the tomentose nature seems to be constant. Furthermore, the leaves are generally larger, up to  $25 \times 10$  cm.

*Fl. & Fr.* : May-December.

*World distribution* : India, Sri Lanka, Burma and Malay Peninsula.

*Specimens examined* : Gundlabbrahmeswaram, 24-10-1964 ; Ellis 22157 ; Srisailam, 5-12-1969, Ellis 32695 ; Rollapenta, 14-8-1972, Ellis 42258.

#### IXORA Linn.

*Ixora arborea* Roxb. ex Smith in Rees, Cycl. 19 : 5. 1811 ; Bremek. in Bull. Jard. Bot. Buitenz. ser. 3. 14 : 208. 1937. *I. parviflora* Vahl, Symb. 3 : 11, t. 52. 1794, (non Lamk.) ; DC. Prodr. 4 : 488. 1830 ; Wt. & Arn. Prodr. 429. 1834 ; Wt. Ic. 2 : t. 711. 1843 ; Hook. f. FBI 3 : 142. 1880 ; Brandis, Indian Trees 388. 1906 ; Gamble, FPM 4 : 631. 1921.

Trees, about 8 m tall ; young branches dark brown, glabrous. Leaves about  $23 \times 7$  cm, obovate-oblong, rounded or cordate at base, coriaceous ; petioles short ; stipules ovate. Flowers white,  $1 \times 0.3$  cm, in terminal, branched cymes 10 cm long, pedicellate, bracteate, bracteolate ; rachises puberulous ; calyx 0.1 cm long, lobes faintly triangular ; corolla lobes obtuse, recurved, tube 0.6 cm long ; anthers exserted ; styles filiform, hairy, stigmas bilobed. Drupes  $0.5 \times 0.5$  cm, globose, endocarp bony ; seeds flattened.

*Fl. & Fr.* : March-December.

*World distribution* : India, Sri Lanka, Burma, in dry localities.

*Specimens examined* : Chelama, 18-3-1965, Ellis 23707 ; Upper Ahobilam, 23-11-1969, Ellis 32565.

#### WENDLANDIA Bartl. ex DC. *nom. cons.*

*Wendlandia tinctoria* (Roxb.) DC. Prodr. 4 : 411. 1830 ; Hook. f. FBI 3 : 38. 1880 ; Gamble, FPM 4 : 588. 1921. *Rondeletia tinctoria* Roxb. [Hort. Beng. 15. 1814 ex] Fl. Ind. 1 : 522. 1820.

Trees, about 8 m tall; young branches brown-puberulous, striate. Leaves about  $15 \times 7$  cm, elliptic-ovate, obovate, abruptly acuminate, acute at base, puberulous beneath; lateral nerves about 10, parallel; petioles 16 cm long; stipules broadly ovate. Flowers white, 0.5 cm long, in terminal, branched, panicles about 26 cm long, bracteate; calyx 0.15 cm long, sparingly hairy without, lobes linear-ovate; corolla 0.4 cm long, hairy within, lobes recurved; stamens epipetalous, sessile; style glabrous, stigmas prominently 2-lobed. Capsules  $0.15 \times 0.15$  cm, globose, locularily dehiscent; seeds 1, reticulate.

*Fl. & Fr.* : January-May.

*World distribution* : India, Sri Lanka, Burma and Malaysia.

*Specimen examined* : Chelama, 24-1965, Ellis 23848.

**GARDENIA R. Ellis, nom. cons.**

- |   |                      |
|---|----------------------|
| 1. Branchlets thorny  | <i>G. turgida</i>    |
| 2. Branchlets not thorny :  |                      |
| 2. Lateral nerves close, more than 18 pairs; leaves elliptic-ovate or obovate, about $19 \times 9$ cm : |                      |
| 3. Leaves sessile; flowers sessile  | <i>G. gummifera</i>  |
| 3. Leaves petiolate; flowers pedicellate  | <i>G. resinifera</i> |
| 2. Lateral nerves not close, less than 18 pairs; leaves obovate-orbicular, about $23 \times 19$ cm      | <i>G. latifolia</i>  |

**Gardenia turgida** Roxb. [Hort. Beng. 15. 1814 ex] Fl. Ind. 1 : 711. 1820; DC. Prodr. 4 : 382. 1830; Hook. f. FBI 3 : 118. 1880; Brandis, Indian Trees 380. 1906; Gamble, FPM 3 : 619. 1921. *G. montana* Roxb. Fl. Ind. 1 : 709. 1820; DC. Prodr. 4 : 383. 1830; Wt. & Arn. Prodr. 396. 1834.

Trees, about 10 m tall; branchlets tomentose, a few modified into thorns. Leaves up to  $10 \times 5$  cm, obovate-oblong, abruptly attenuate at base, puberulous, sometimes densely tomentose beneath; petioles 0.5 cm long; stipules ovate, deciduous. Flowers 3 cm across, male—in 3-4-flowered fascicles; calyx 0.7 cm long, campanulate, teeth small; corolla about 1.8 cm long, lobes obovate, tube 2 cm long; female—solitary, stigmas club-shaped. Drupes  $5 \times 4$  cm, globose, endocarp woody; seeds several, 0.3 cm across, slightly flattened.

*Fl. & Fr.* : March-November.

*World distribution* : India and Burma, in dry localities.

*Specimen examined* : Mahanandi, 21-8-1965, Ellis 25435.

*Remarks*: J. D. Hooker (*op. cit.* p. 118) treats a variety, *montana* (Roxb.) Hook. f. at a varietal level under *G. turgida* Roxb.; this has been followed by Cooke (*Fl. Pres. Bombay* 2 : 20. rep. ed. 1958 (1904)), and Duthie (*Fl. Up. Gang. Pl.* 1 : 388. rep. ed. 1960 (1903)). Brandis (*op. cit.*) and Gamble (*op. cit.*), however, do not recognise this variety. Apparently the amount of pubescence and shape of leaves seem to be variable, depending on the climatic conditions, thereby supporting the latter two workers.

***Gardenia gummifera*** Linn. f. *Suppl.* 164. 1781; DC. *Prodr.* 4 : 381. 1830; Wt. & Arn. *Prodr.* 395. 1832; Wt. *Ic.* 2 : t. 395. 1843; Hook. f. *FBI* 3 : 116. 1879; Gamble, *FPM* 4 : 618. 1921.

Shrubs or small trees, about 6 m tall; branchlets glabrous, buds resinous. Leaves  $9 \times 5$  cm, obovate-oblong, acute at base, sessile, glabrous; lateral nerves about 18 pairs, parallel, hairy at the junction of lateral nerves and midrib; stipules ochrea-like. Flowers pale white, about 9 cm long, terminal, solitary, sessile; calyx 0.8 cm long, pubescent, teeth obtuse; corolla lobes  $2 \times 0.8$  cm, tube 5 cm long; stamens epipetalous; stigmas clavate. Drupes  $3 \times 2$  cm, oblong; endocarp bony; seeds several, compressed.

*Fl. & Fr.*: March-August.

*World distribution*: India, in dry deciduous forests.

*Specimens examined*: 'Kurnool', 1886, J. S. Gamble s. n.; Chelama, 20-3-1965, Ellis 23737; Mahanandi, 22-8-1965, Ellis 25474.

***G. resinifera*** Roth, *Nov. Sp. Pl.* 150. 1821. ***G. lucida*** Roxb. *Fl. Ind.* 1 : 707. 1820; DC. *Prodr.* 4 : 381. 1830; Wt. & Arn. *Prodr.* 395. 1834; Hook. f. *FBI* 3 : 115. 1880; Gamble, *FPM* 4 : 618. 1921.

Trees, about 6 m tall; bark smooth, glabrous. Leaves about  $18 \times 8$  cm, elliptic-ovate, obtuse, rounded, obtuse or acute at base, chartaceous; lateral nerves about 25, parallel, nervules parallel; petioles about 1 cm long; stipules connate at base, lobes ovate. Flowers pale yellow,  $5.5 \times 2$  cm, axillary, solitary; pedicels about 1.5 cm long; calyx 1 cm long, lobes puberulous without, linear, unequal; corolla lobes  $1 \times 0.5$  cm, tube 4 cm long; stamens 5, epipetalous; style fusiform. Drupes  $3.5 \times 2$  cm, ovoid, endocarp bony; seeds many, flattened.

*Fl. & Fr.*: March-November.

*World distribution*: India, Sri Lanka and Burma, in dry localities.

*Specimens examined*: 'Kurnool', no date, collector?; Gazulapalli, 8-11-1906, C. A. Barber 8069; Chelama, 4-7-1963, Ellis 16724 A; Chelama,

8-92-1963, *Ellis* 18011; Mahanandi, 21-8-1965, *Ellis* 25444; Upper Ahobilam, 22-11-1969, *Ellis* 32577; Diguvametta, 7-8-1972, *Ellis* 42186.

**Gardenia latifolia** Aiton in Hort. Kew. 1 : 294. 1789; Wt. & Arn. Prodr. 395. 1834; Wt. Ic. 3 : t. 795. 1844; Hook. f. FBI 3 : 116. 1881; Brandis, Indian Trees 379. 1906; Gamble, FPM 4 : 619. 1921.

Trees, about 10 m tall; branches smooth; bark peeling off in flakes. Leaves up to 23 x 10 cm, obovate-orbicular, attenuate or rounded at base; lateral nerves and reticulations prominent beneath; stipules ochrea-like. Flowers white, 6 cm long, solitary; calyx 1.5 cm long, lobes 5-9, deeply divided, densely pubescent; corolla lobes about 9, 2.5 x 1.5 cm, obovate-oblong, tubes 5 cm long, puberulous without; stamens 9, epipetalous; style thick, stigmas fusiform. Drupes 5 x 4.5 cm, ovoid or globose; seeds many, flattened.

*Fl. & Fr.* : March-December.

*World distribution* : India, in dry deciduous forests.

*Specimens examined* : Diguvametta, 5-11-1906, C.A. Barber 8054; Gazulapalli, 8-11-1906, C.A. Barber 8070; Chelama, 4-7-1963, *Ellis* 16724B; Chelama, 9-12-1963, *Ellis* 18041; Mahanandi, 23-8-1965, *Ellis* 25506; Ahobilam, 22-11-1969, *Ellis* 32571; Diguvametta, 8-8-1972, *Ellis* 42196.

#### CANTHIMUM Lamk.

- |   |                       |
|---|-----------------------|
| 1. Plants thorny; flowers tetramerous     | <i>C. parviflorum</i> |
| 1. Plants not thorny; flowers pentamerous | <i>C. didymum</i>     |

**Canthium parviflorum** Lamk. Encycl. Meth. 1 : 602. 1783; DC. Prodr. 4 : 474. 1830; Wt. & Arn. 426. 1834; Hook. f. FBI 3 : 136. 1880. **Plectonia parviflora** (Lamk.) Bedd. in For. Man. Bot. 134/5. 1874; Gamble, FPM 4 : 625. 1921.

Shrubs, about 2 m high; branches terete, juvenile ones purplish; thorns up to 3 cm long, opposite, supra-axillary, sometimes absent. Leaves about 3 x 2 cm, ovate, orbicular; petioles 0.5 cm long; stipules ovate. Flowers pale green, 0.2 cm long, in axillary, fascicled cymes 1.5 cm long, bracteate, tetramerous; calyx 0.1 cm long, lobes ovate; stamens 4, on throat of corolla, filaments almost absent; styles stout, stigmas globose. Drupes 1 x 1 cm, oblong, didymous, slightly flattened; pyrenes ridged; seeds oblong.

*Fl. & Fr.* : May-September.

*World distribution* : India and Sri Lanka, in arid localities.

*Specimens examined* : Gazulapalli, 11-1-1917, K.C. Jacob 15002 and 15003 ; Bairanidokku, Eastern Nallamalais, 12-8-1972, Ellis 42239.

**Canthium didymum** Gaertn. f. *Fruct.* 3 : 94, t. 196. 1791 ; DC. *Prodr.* 4 : 473. 1830 ; Wt. & Arn. 425. 1834 ; Hook. f. *FBI* 3 : 132. 1879 ; Brandis, *Indian Trees* 385. 1906. *Plectronia didyma* (Gaertn.) Kurz in *For. Fl.* 2 : 35. 1877 ; Gamble, *FPM* 4 : 624. 1921.

Trees, about 15 m tall ; young branches obscurely angled, glabrous, dark brown. Leaves up to  $18 \times 9$  cm, ovate-acuminate, acute or rounded at base, shining beneath, coriaceous ; petioles up to 1.5 cm long, grooved above. Flowers pale green, 0.5 cm long, in axillary, branched umbels 3 cm long, bracteate ; calyx 0.2 cm long, lobes ovate, puberulous along margins ; corolla tube 0.2 cm long, lobes 0.2 cm long, ovate, cucullate, hairy within ; anthers epipetalous ; style and stigma exserted. Drupes  $0.8 \times 0.6$  cm, obovate, didymous, slightly flattened ; seeds oblong.

*Fl. & Fr.* : October-March.

*World distribution* : India and Sri Lanka.

*Specimens examined* : Dornal, Feb. 1887, J.S. Gamble 18697 ; Srisailam, 26-3-1965, Ellis 23778 ; Upper Abobilam, 29-8-1965, Ellis 25579 ; Srisailam, 5-12-1969, Ellis 32694.

#### RANDIA Linn.

- |   |    |                       |
|---|----|-----------------------|
| 1. Fruits about $2 \times 1.7$ cm ; flowers           |    |                       |
| 1.5 cm across :                                       |    |                       |
| 2. Leaves about $9 \times 6$ cm ; plants thornless    | .. | <i>R. candolleana</i> |
| 2. Leaves about $5 \times 2.5$ cm ; plants thorned    |    | <i>R. spinosa</i>     |
| 1. Fruits about $5 \times 4$ cm ; flowers 4 cm across | .. | <i>R. uliginosa</i>   |

**Randia candolleana** Wt. & Arn. *Prodr.* 399. 1834 ; Hook. f. *FBI* 3 : 113. 1880 ; Brandis, *Indian Trees* 383. 1906 ; Gamble, *FPM* 4 : 616. 1921.

Trees, about 5 m tall ; branchlets with elevated leaf scars. Leaves  $9 \times 6$  cm, obovate-oblong, orbicular, abruptly acute at base, glabrous ; petioles 1 cm long ; stipules broadly ovate. Flowers white, 1 cm across, in axillary, branched cymes 1 cm long, confined to ends of branches, bracteate ; calyx 0.1 cm long, lobes linear-acute, glabrous ; corolla 0.5 cm long, softly puberulous within, pubescent without, tube glabrous ; stamens 5 ; disk annular ; styles slender, stigmas slightly bifid. Berries  $2 \times 1.7$  cm, globose ; seeds smooth.

*Fl. & Fr.* : May-December.

*World distribution* : Peninsular India.

*Specimens examined* : Srisailam, 15-7-1963, Ellis 16875 ; Srisailam, 21-10-1964, Ellis 22120 ; Srisailam, 26-3-1965, Ellis 23783 ; Srisailam, 5-12-1969, Ellis 32700.

*Remarks* : *Randia candolleana* Wt. & Arn. is interesting morphologically and taxonomically. The thorny nature is controversial : Wight and Arnott (*op. cit.*), Hooker f. (*op. cit.*), and Brandis (*op. cit.*) treat the species under the heading 'unarmed', whereas Gamble (*op. cit.* p. 615) speaks of axillary pair of spines. The present observations show that the plant collected is without thorns, as also the herbarium specimens at MH and CAL.

Wight and Arnott (*op. cit.* p. 399) have described two species, viz. *Randia candolleana* and *R. corymbosa*, mainly on the nature of pubescence of leaves, the former being glabrous. Hooker f. (*op. cit.* p. 113) treats *R. corymbosa* under *R. candolleana*. Beddome (*Ec. Pl. Ind. Or.* 57, t. 137, 1871) treats it at a specific level as *R. deccanensis*. Brandis (*op. cit.*) cites Beddome's superfluous name, *deccanensis* as synonymous to *R. candolleana*. Gamble (*op. cit.*) treats *R. corymbosa* as a variety under *R. candolleana*.

The present study of the plant both in the field and in the herbaria support Gamble, for the pubescent nature is quite distinct, though in other characters no dissimilarities are apparent.

*Randia spinosa* (Thunb.) Poir. in Lamk. Encycl. Suppl. 2 : 829. 1811. *Gardenia spinosa* Thunb. Diss. Gard. No. 7. 1780. *Randia dumetorum* (Retz.) Poir. loc. cit. 829 ; Hook. f. FBI 3 : 110. 1880 ; Brandis, Indian Trees 382. 1906 ; Gamble, FPM 4 : 615. 1921. *Gardentia dumetorum* Retz. Obs. 2 : 14. 1781. *Randia longispina* DC. Prodr. 386. 1830 : Wt. & Arn. Prodr. 398. 1834 ; Wt. Ic. 2 : t. 582. 1843 ; Gamble, op. cit. 616. *R. brandisii* Gamble, op. cit. 616. *Xeromphis spinosa* (Thunb.) Keay in Bull. Jard. Bot. Brux. 28 : 39. 1958 ; Maheshwari in Bull. bot. Surv. Ind. 3 : 91. 1961.

Shrubs or small trees up to 8 m tall ; thorns extra-axillary, about 3 cm long ; branchlets often stunted. Leaves up to 5×2.5 cm, obovate, oblong, attenuate at base, glabrous to pubescent ; petioles short ; stipules ovate. Flowers white, 1.5 cm long, mostly solitary at ends of branchlets ; calyx tube 0.4 cm long, pubescent without, lobes 0.3 cm long ; corolla lobes 0.4 cm long, tubes densely pubescent. Drupes about 2.5×2 cm, ovoid ; seeds several, smooth.

*Fl. & Fr.* : May-December.

*World distribution* : Tropics from Africa, India, Sri Lanka and Malaysia.

*Specimens examined* : Chelama, 4-7-1963, Ellis 16721 ; Mahanandi, 23-8-1965, Ellis 25504.

*Randia uliginosa* (Retz.) DC. Prodr. 4 : 386. 1830 ; Wt. & Arn. Prodr. 398. 1834 ; Wt. Ic. 2 : t. 397. 1843 ; Hook. f. FBI 3 : 110. 1880 ; Brandis, Indian Trees 381. 1906 ; Gamble, FPM 4 : 615. 1921. *Gardenia uliginosa* Retz. Obs. 2 : 14. 1781. *Xeromphis uliginosa* (Retz.) Maheshwari in Bull. bot. Surv. Ind. 3 : 92. 1961.

Trees, about 5 m tall ; young branches rather angled, a few ending in a pair of thorns 1 cm long. Leaves about 22×8 cm, elliptic-ovate, obovate, acute at base ; petioles 1 cm long ; stipules 0.4 cm long, broadly ovate. Flowers white, 4 cm across, solitary at ends of branches ; pedicels up to 1.5 cm long ; calyx 1 cm long, coriaceous, lobes broadly obtuse or orbicular, ciliate along margins ; corolla 2 cm long, coriaceous ; anthers linear ; stigmas club-shaped. Drupes 5×4 cm, ellipsoidal ; seeds several, flattened, smooth.

*Fl. & Fr.* : March-November.

*World distribution* : India, Sri Lanka and Burma, in dry deciduous forests.

*Specimens examined* : 'Kurnool', date not given, R.H. Beddome s. n. ; 'Kurnool', 1873, Beddome s. n. ; Chinnamantrala, Eastern Nallamalais, 17-8-1973, Ellis 42285.

*Remarks* : Maheshwari (*op. cit.*) following Keay (in *Bull. Jard. Bot. Brux.* 28 : 37-39. 1958) treats this species under *Xeromphis* Rafin. ; the latter is a West African genus, separable from *Randia* Linn. mainly on the nature of pollen grains, viz. single in *Xeromphis* and tetrads in *Randia*, and on the placental septum—present in *Xeromphis* and absent in *Randia*. However, here it is treated under *Randia* Linn., in a broad sense, for the summation of characters seems to unite all the taxa together making it a natural assemblage of plants. Until more evidences are forthcoming, it seems advisable to treat all these under *Randia* Linn. in a broad sense.