THE BOOK WAS DRENCHED

UNIVERSAL
LIBRARY

OU_162790

UNIVERSAL
LIBRARY

OUP—880—5-8-74—10,000

OSMANIA UNIVERSITY LIBRARY

Call No. 581.9541 Accession No. G.12625

Author K16F
Kanjilal, U.N & others

Title Flora of Assam 1934
Vol 1. pt. 1

This book should be returned on or before the date last marked below.

FLORA OF ASSAM

BY

U. N. KANJILAL, I. F. S.

Late Extra Deputy Conservator of Forests, Assam.

P. C. KANJILAL, I. F. S.

Deputy Conservator of Forests, U. P.

AND

A. DAS, I. F. S.

Botanical Officer, Assam.

VOL. I. (PART 1)

RANUNCULACEÆ TO ELÆOCARPACEÆ

Published under the authority of the Government of Assam.

PRICE RS. 8/-

Printed by M. C. Das, at the PRABASI PRESS, 120-2, Upper Circular Road, Calcutta

PREFACE

The first volume of the "Flora of Assam" is presented to the public. A considerable time has elapsed since the first conception of publishing a comprehensive account of the Flora of the province as a botanical unit and an apology is necessary for the delay, but for a large work of this nature it was inevitable. The death of Rai Bahadur U. N. Kanjilal, who originally undertook this work, caused the first interruption and then his son Mr. P. C. Kanjilal, I.F.S., B.Sc., of U. P. who agreed to continue the task from a sense of filial duty, had to return to his province before publication of this work could be taken up. The present writer, who succeeded Mr. P. C. Kanjilal, had to face great difficulties with the selected Press, which proved both highly unsatisfactory and dilatory, so much so that new publishers have had to be found. It is now hoped that the publication of succeeding volumes up to Coniferæ will not present any further difficulties.

Monocotyledons will, it is presumed, be an entirely separate publication.

Shillong,
15th April, 1934.

A. Das

INTRODUCTION

Assam Flora is by no means an untrodden ground. Wallich and Griffith explored parts of the province and Sir Joseph Hooker himself paid a visit to the Khasi Hills. Many enthusiastic collectors namely Klien of Cachar, De Silva of Sylhet, Peal of Sibsagar and Commissioner Jenkins of the Brahmaputra Valley contributed large numbers of specimens to the Sibpur herbarium. In recent times perhaps the most energetic worker in this field was Mr. C. B. Clarke, who traversed the whole province several times on foot and made a very extensive collection. Mr. Gustav Mann (the first Conservator of Forests in Assam) has left for his successors a fairly large collection of specimens besides generally contributing to the Sibpur herbarium. Mr. Burkill visited parts of the Khasi Hills and N.E. F. Tract.

Parties of the Botanical Survey of India have, from time to time, been sent out from Sibpur to collect specimen in selected localities.

What was wanting was that no one collected with any idea of presenting to the public a comprehensive 'Flora of Assam' as a botanical unit. This idea was first conceived by Chief Commissioner Sir Archdale Earle, an ardent lover of plants and a keen amateur botanist, and under his patronage the late Rai Bahadur U. N. Kanjilal began working on the compilation of a 'Flora of Assam'. Unfortunately his death before the publication of even the first volume retarded the progress of the work, but his monumental collection, elaborate field notes and drafts have been invaluable to his successors. In subsequent years the collections of Mrs. N. E. Parry in the Garo and Lushai Hills and that of Dr. N. L. Bor, D.Sc., I.F.S., in the Naga Hills and Aka Hills have been a great asset to the province. Mr. P. C. Kanjilal, I.F.S., B.Sc., whose services were obtained on loan from U. P. on the death of his father and who had to return to his province was concerned chiefly in the determination of species, in replenishing the herbarium

and inaugurating a proper herbarium for Assam out of the material available.

He completed the final draft upto Calyciflors and described a few families of Apetalæ before leaving Assam. Thanks are due to him for his absorbing interest in this work and labour of love, so much so that he ungrudgingly devoted his entire leave (nearly 10 months) making progress in his work. It fell to the lot of the writer to complete the work up to Coniferæ, to replenish the herbarium and see it through the Press.

Thanks to the combined labour of many workers, the Assam Flora is fairly well represented in the herbarium of the Royal Botanic Garden at Sibpur through which,—Kew and many other herbaria have received contributions. It may also be mentioned here that the Assam Herbarium has also contributed to the herbaria at Sibpur, Dehra Dun, Gauhati and other places.

The arrangement of the families have been based mainly on Betham and Hooker's Genera Plantarum which has been hitherto generally followed in this country. A few modifications have been made in conformity with modern conceptions where necessary and the termination of *aceæ* has been adopted for all families according to present conventions.

Some herbaceous plants have been included, which are beyond the real scope of this work and also a few, that are properly speaking not indigenous to the province. Their economic value and botanical importance warranted this step.

As far as practicable forest characters have been given for the identification of the important forest species *in situ*.

Many new species have in recent years been recorded from the province in different publications of which there are no specimens in Indian herbaria. As far as practicable these have been included.

A new Magnoliaceæ was discovered by the writer in Digboi Reserve in Lakhimpur District, but as he was then engaged in Divisional Forest work, the investigation of the species could not be taken up by him in time.

At the request of Mr. Dandy of the British Museum, complete specimens were forwarded to him who described the plant as *Pachylarnax pleiocarpa*, Dandy. (Journal of Botany, November, 1933.)

The following species, new to science, have recently been described and published (The Assam Forest Records Vol. I, 1934)—

Eurya japonica var. nitida forma Kanjilali. (Ternstrœmiaceæ.)
Sterculia khasiana. (Sterculiaceæ.)
Gymnocladus assamicus (Leguminosæ-Cæsalpinieæ.)
Lagerstrœmia minuticarpa. (Lythraceæ.)
Agapetes Kanjilali. (Vacciniaceæ.)
Maba cacharensis. (Ebenaceæ.)
Symplocos Pealii. (Styraceæ.)
Chirita mishmiensis. (Gesneraceæ.)
Strobilanthes furcatus. (Acanthaceæ.)

A new Myrtaceæ (Eugenia) and some Lauraceæs are under investigation and revision of the Assam Phœbes has also been undertaken by the writer and it is hoped that the results of these investigations will be included in the Flora.

The following annexures are given :—

(1) An Ecological Sketch of the Botany of the Province by the late Rai Bahadur Upendra Nath Kanjilai.
(2) A Note on the Geology of Assam by Mr. Evans, Geologist to the Burmah Oil Company Limited.
(3) A Note on Climatology.
(4) Bibliography.
(5) Synopsis of Families.
(6) Glossary of Botanic Terms.
(7) List of Abbreviations and Signs.

It now remains to acknowledge indebtedness to all those who have rendered assistance in the compilation of this voluminous work.

(*i*) Director of Royal Botanic Garden Sibpur ; Directors of Kew and the late Mr. J. S. Gamble contributed enormous help in determination of the species and scrutinising dubia sheets.
(*ii*) Most of the Forest Officers of the province have contributed by supplying good collections of specimens and furnishing vernacular names which enabled me to make it comprehensive.
(*iii*) Mr. Evans has contributed a most interesting Geological note of the province and the Director

Meteorological Department, Poona, has supplied details of records of humidity and temparature of the different stations in the province.

I am personally grateful to Messrs C. C. Calder, Superintendent, Royal Botanic Garden, Sibpur, K. Biswas, M.A., Curator, Sibpur Herbarium, and C. E. Parkinson, Forest Botanist, Forest Research Institute and College, for their ungrudging help in all possible directions, to Mr. C. Purkayastha for going through the proofs and also to the authorities in Assam for their encouragement without which it would not have been practicable for me to complete and publish this voluminous work.

Shillong,
1st May, 1934.

A. Das.

A BRIEF ECOLOGICAL SKECTH OF THE BOTANY OF ASSAM.

Rainfall and the configuration of the ground are the two chief factors which control the distribution of the plants and their grouping into the main types of forests association.

The province consists of two large valleys, the Brahmaputra and the Surma, separated by a range of comparatively low hills.

The Surma Valley is almost due north from the apex of the Bay of Bengal and is directly open to the N.-W. monsoon. The hills on the northern border of this valley are cliffy almost throughout and present an abrupt barrier to the rain clouds, with the result that extraordinarily heavy precipitation takes place over the cliffy region which subjects the valley to very heavy floods. The notoriously wet Cherrapunji is situated on the brow of one of the cliffs of this region.

The Brahmaputra Valley is much less open as it presents only its mouth at the western end rather tangentially to the monsoon current. It receives its rain partly from the half-spent clouds that soar above the Mikir Hills and drift northward and partly from those which enter the valley at Dhubri. In the angle formed by the Mikir and the Naga Hills there is a belt which is away from the main direction of the Brahmaputra current and over which the Surma Valley clouds pass without precipitating. This belt is the driest region in the whole province, the rainfall being as low as only about 40 inches. Another belt of low rainfall lies along the foot of the Himalayas extending from the Champamati river in Goalpara to the Panch Nadi in Darrang. The Brahmaputra clouds pass up away from this belt and it can get no benefit from the Surma clouds. Both currents impinge on the next range or Hills, the Himalayas, at a point opposite Tezpur and they combine to drift towards the apex of the valley giving very heavy rains to Sadiya, Dibrugarh and adjoining tracts.

The two dry belts mentioned above are characterised by having a pre-eminently deciduous type of forest, whereas the regions of heavy rainfall are clothed with evergreen forests.

The Sal-bearing areas of the Province are intermediate between the above two extremes where the rainfall is well below 100 inches. As might be conjectured some Sal tracts are so wet as to pertake of the character of evergreen forests. for example, those near Haltugaon in Goalpara and some parts of the Boko Range in Kamrup, but the main Sal areas belong to the deciduous type.

Swamp forests own their origin chiefly to configuration of the ground sometimes aided by the occurrence of an impervious substratum such as clayey or rocky beds.

Extensive grass lands occur in the deciduous tracts, also in the riparain areas of the Brahmaputra and its tributaries.

It will be seen from the above that the flora of Assam comprises the following types of forests.

1. Evergreen Forests
2. Deciduous Forests
3. Swamp Forests
4. Grass-lands

1. The Evergreen Forests

This type of forests occupies the major parts of the Frontier District, Lakhimpur, Sibsagar, Sylhet, Cachar, also in a more or less continuous narrow belt along the foot of the Himalayas from the extreme N.-E. corner of the Province as far west as the Panch Nadi in the Darrang District. It also occurs in the S.-E. portion of the Nowgong District along the A. B. Railway and in the greater parts of the Khasi Hills including the tracts covered by the Khasi Pine (Pinus Khasya), also in isolated pockets in the deciduous types of forests throughout the province.

The evergreen forests consist of a bewildering number of species, chiefly of the following Families:—Dilleniaceæ, Anonaceæ, Magnoliaceæ, Guttiferæ, Leguminosæ, Myrtaceæ, Styraceæ, Ebenaceæ, Myristicaceæ, Lauraceæ, Euphorbiaceæ, Fagaceæ, Palmæ and Graminæ and in the hills Coniferæ, Vacciniaceæ, Ericaceæ, and Ternstroemiaceæ, also a much larger number of Fagaceous species. The actual species of the above Families occur in different tracts in varying proportions so that a particular species may form gregarious forests in some localities and at the same time be totally absent in adjoining parts.

The forests generally present a three-storied appearance of which the top storey is very often constituted by one or two deciduous species of enormous size such as *Dipterocarpus*

pilosus, Artocarpus Chaplasha, Tetrameles nudiflora. These trees tower above the rest of the forest more or less in an isolated manner. They are generally fast-growers and also deciduous ; they can easily work their way through the crowns of the storeys now below them. The middle storey is formed either by a gregarious species, such as *Mesua ferrea,* or by a large number of mixed species of the families mentioned above. This storey determines the economic value of a forest. Where *Mesua ferrea* grows it is considered the principal species, but recently Bonsum which comprises two or three species of *Phoebe* has fairly established itself in the Calcutta market and is very much more in demand than *Mesua ferrea. Lagerstroemia Flos-Reginae* is another well known timber tree, but strictly speaking it is not confined to the evergreen type of forests. *Terminalia myriocarpa, Amoora Wallichii, Duabanga sonneratioides* are other well-known timber trees in this type of forests. The third or lowest storey consists of small trees and shrubs, generally of no great economic value.

This type is characterized by a very large number of climbers notably the climbing *Acacias* and *Bauhinias,* several species of *Vitis, Unona, Uvaria, Mezoneurum, Calamus, Tapiria hirsuta, Entada scandens, Dalhousiea bracteata, Gnetum Gnemon* and many others.

As indicated above the pine areas in the Khasi Hills fall under evergreen type of forests. The Khasia pine forms even-aged pure forests on moderately sloping hill-sides between 2500 and 6000 ft. A complete leaf canopy is formed at a very early stage and maintained till the high pole stage is well passed. This type of forest is remarkably free from climbers. Natural regeneration is easy to secure, but the Synteng Village Communities in the Jawai Sub-Division prefer to obtain new crops by sowing. All that is necessary after sowing is to close the plots against fire and grazing for a suitable period. Once the pine is established, the grass very soon disappears so that nothing is left to attract browsing animals. The pine is associated with several species of *Quercus* and *Castanopsis* with birch and in some places with yew, hornbeam and *Podocarpus neriifolia.*

Besides the pine areas we have in the Khasi Hills a very interesting type of forests commonly known as sacred forests. They generally occupy hill-tops and cool aspects as a rule above the pine zone. They belong to local chiefs or village communities and represent what may be called nature's

primeval forests. Until recently people did not dare to make fellings in these forests or obtain anything from them except fallen fruits and dead timber for fear of annoying the Sylvan gods believed to preside over them, with the result that we possess in them very rich store-houses of botanical treasures. It is indeed to these fascinating groves that the Khasi Hills owe the reputation they enjoy of being the richest botanical area not only in India, but perhaps in the world. Magnoliaceous, Fagaceous, and Lauraceous trees, generally of enormous sizes, are the predominating arboreous species besides such characteristic trees as *Dendropanax japonicum*, *Randia Wallichii*, *Croton laevigatus*, *Myrsine capitellata*, *Taxus baccata*, *Podocarpus neriifolia*, *Daphniphyllum himalayense*, *Eriobotrya bengalensis* and many others. But botanically speaking shrubs, undershrubs and herbs, if less showy are far, far more interesting. These however are so numerous that the writer is obliged to refrain from mentioning them in this very brief paper, and he frankly confesses that he is acquainted with only a very small proportion of them.

It is a great pity that the black foot of destruction is already visible in some parts ; the ultimate disappearance of these charming groves is therefore only a question of time.

2. The Deciduous Forests

This type comprises all the Sal tracts as well as the major part of scrub forests in the province. It therefore takes in nearly the whole of the Goalpara and Garo Hills Districts and the greater part of Kamrup, Nowgong and the North Cachar Hills, also the western half of Darrang and the drier tracts of the plains of the Surma Valley.

In the Sal areas the usual companions of Sal occur with local variations. *Lagerstraemia parviflora*, *Kydia calycina*, *Schima Wallichii* and *Careya arborea* being perhaps more constant than the rest. *Gmelina arborea*, *Cassia fistula*, *Albizzia lucida* and *odoratissima*, *Miliusa velutina*, *Stereospermum chelonoides* occur in some localities.

Where there is no Sal as in the North Cachar Hills, and in the drier parts of Cachar and Sylhet, the forest is very mixed and consists chiefly of *Bombax malabaricum*, *Adina cordifolia*, *Stephegyne diversifolia*, *Cassia nodosa*, several species of Ficus, besides most of the associates of Sal mentioned above.

The differentiation of storeys is not so clear in deciduous forests as in the evergreen type. A certain amount of grass

is almost everywhere present, but no canes occur except in evergreen or marshy pockets here and there.

3. Swamp Forests

This type includes undrained depressions generally known as *Bils*. Swamps and Bils abound in the plains of Sylhet and Cachar some of the latter being so large as to deserve to be called lakes. If much smaller in size they are not uncommon in the Brahmaputra Valley chiefly in the grass lands in the riparian tracts and the Sal areas in Kamrup and Goalpara. Some of the latter are up to 5 miles in length and about 3 miles in breadth. Depressions of the former kind are mostly abandoned river channels but those in the Sal areas appear to owe their origin to earthquakes.

The following trees and shrubs are characteristic on the border of the larger Bils, especially of those situated in hilly tracts :—*Crataeva lophosperma*, *Eugenia cuneata*, *Duabanga sonneratioides*, *Terminalia myriocarpa*, *Lagerstroemia Flos-Reginae*, *Hyptianthera stricta*, *Symplocos Pealii*, *Ardisia khasiana*, *Rhabdia lycioides*, *Litsaea zeylanica* and *angustifolia*, *Homonoia riparia*, *Antidesma Bunius*, *Trewia nudiflora*, *Ficus pyriformis*, *heterophylla*, *Cunia*, and *glomerata*, *Engelhardtia polystachya*, *Dracaena spicata*, *Clinogyne dichotoma*, etc., as well as the following grasses, *Hygrorhiza aristata*, *Vossia procera*, *Panicum proliferum*, *kashianum*, *interruptum*, *plicatum*, *Mnurus*, *Crus-galli* and *caesium*, *Phragmites communis* and *Karka*, *Arundo Donax*, *Arundinella arenacea*, *Thysanolaena Agrostis* etc. Some of the above grasses (Hygrorhiza, Vossia, etc.) float on the surface and cover considerable parts of the water along the borders.

The following aquatic families are also well represented *Nymphaeaceae*, *Araceae*, *Lemnaceae*, *Alismaceae*, *Naiadaceae*, *Eriocaulaceae* and *Cyperaceae*.

4. Grass-Lands

Pure grass lands are of two types in Assam, viz., the riparian tracts of both valleys and the belts of low rainfall mentioned above. Nearly the whole of the former is under water during the rains, and the permanent water-level is never so low as to be beyond the reach of the roots of the grass. Grasses of the following genera are characteristic of the riparian areas, *Saccharum*, *Anthisteria*, *Erianthus*, *Arundo*, *Phragmites*, etc. They cover extensive tracts along the

large rivers, especially where the banks are low. Most of them are remarkable for the enormous size their haulms attain, some being up to 20 ft. in height and nearly 2 inches in diameter at the base, so that they can easily hide large herds of buffaloes and even of elephants.

In the dry belts grasses generally smaller in size but of a more hardy nature predominate. In the Sub-Himalayan dry belt the permanent water-level is in places as low as 300 to 500 ft. below the surfaces so that the roots of the grasses have to draw sustenance entirely from the hygroscopic moisture of the surface soil.

The following grasses are characteristics of the dry tracts, *Imperata arundinacea*, *Aptuda varia*, *Andropogon Iwarancusa*, *Nardus contortus* and *squarrosus*, *Pollinia ciliata*, *Erianthus elephantinus*, *Panicum assamicum*, *Anthistiria gigantia* and *strigosa* ; *Setaria glauca*, *Rottboellia protensa*, *Isachne australis* *Saccharum Narenga*, *Neyraudia madagascariensis* *Paspalum scrobiculatum*, *Ischaemum ciliare* etc.

Shillong,
4th December, 1922. U. N. KANJILAL

The Himalayan *sub-alpine* forests on the Northern Frontier of the Province has, of late years, been explored by Dr. N. L. Bor, who has made many interesting records of plant life from the area.

A. DAS

A SUMMARY OF THE GEOLOGY OF ASSAM

BY

P. EVANS, B.A., F.G.S.,

Geologist, The Burmah Oil Co., Ltd.

Preface. ... xii

Introduction. ... xiii

Geological Formations
Sedimentary Rocks
Igneous and Metamorphic Rocks
Topographical Divisions

Topography, Strata and Structure. .. xv

The Surma Valley
The South-Eastern Hill Country
The Assam Valley
The Eastern Himalayas
The Central Assam Range.

Fossils. ... xxiii

History. .. xxiii

Bibliography. ... xxvi

PREFACE

Mr. H. M. Sale, Senior Geologist to the Burmah Oil Company in India, and Mr. P. Evans, the author of this note, have generously offered to regard this note, after modifications or amplification in the Geological Survey of India, as a joint production by an officer of this Department and Mr. Evans, so as to give expression to the fact that it is in part based on the pioneer work of the Geological Survey of India. This admirable summary of the geology of Assam has, however, been compiled entirely by Mr. Evans, and it is appropriate that he should be credited with the full authorship. Reference to the more important papers of his predecessors is provided by the appended Bibliography.

L. L. FERMOR,
Director,
GEOLOGICAL SURVEY OF INDIA

A SUMMARY OF THE GEOLOGY OF ASSAM

INTRODUCTION

Geological Formations

1. The geological formations of the province of Assam may be grouped as follows :—

Alluvium
Tertiary
Cretaceous
Gondwana
} Sedimentary

Igneous and Metamorphic.

These major divisions are separated by unconformities.

Sedimentary Rocks

2. A large part of the province is covered by *alluvial deposits* of a very varied character—pebbles, sand, clay, and very commonly a mixture of sand and clay, often with much decomposed vegetable material. The *Tertiary beds* include a similarly varied assemblage of rocks—hard sandstones, soft loose sands, hard conglomerates, soft loose pebble beds, coal seams, shales, clays ; clayey and shaly sandstones and sandy shales and sandy clays are very common. In several areas the more porous sands contain oil—usually present only in small quantities. The lowest Tertiary beds of some parts of Assam include thick limestones. A classification of the Assam Tertiaries has been worked out by the Burmah Oil Company's geologists starting from the basis laid down by F. R. Mallet, one of the pioneers of the Geological Survey of India. The major divisions are

Dihing Series
(Probable unconformity)
Tipam Series
Surma Series
(Unconformity)
Barail Series
Jaintia Series
Disang Series.

These are placed in order of age (the Dihing Series being the youngest) excepting that the Disang Series is thought to be partly equivalent to the Jaintia Series. The *Cretaceous beds* are mainly sandstones and conglomerates but include some shales and thin coal seams. The *Gondwana beds* include quartzites and shales also with thin coal seams.

Igneous and Metamorphic Rocks

3. Igneous rocks, other than those forming part of a metamorphic complex, are not very abundant, basalt being the most important rock. Serpentine is found in association with slightly metamorphosed shales and amongst the older metamorphic rocks are gneisses, schists and quartzites. Granite, peridotite and dolerite are found intruded into the metamorphic rocks.

Topographical Divisions

4. The topography and geology of Assam are so intimately related that it is convenient for descriptive purposes to adopt the usual topographical divisions of the province. Assam may conviniently be divided into five parts—

From north to south:—

(*i*) The Aka, Abor, Mishmi and neighbouring hills forming the eastern part of the Himalayas

(*ii*) The Brahmaputra Valley

(*iii*) The Central Assam Range—including the Garo Hills, Khasi and Jaintia Hills, North Cachar Hills, Mikir Hills

(*iv*) The Surma Valley

and forming the eastern and south-eastern portions of the province—

(*v*) The Naga Hills, Manipur, and the Lushai Hills

5. In general, the two valley areas are largely alluvial; the Central Assam Range is mainly gneiss with a fringe of Tertiaries on the south and east; the northern ranges include metamorphic rocks with a fringe of Tertiaries on the south; and the remaining area—the eastern, south-eastern, and the southern part of the province—is composed principally of Tertiary rocks.

6. The connection between geology and topography is so very close that the geologist visiting Assam soon recognizes that in the greater part of the province every major hill range and valley is a direct or indirect expression of some geological feature. The geology of the province has not yet been sufficiently elucidated to permit a full reconstruction of the geological history, but for the more accessible areas it is possible to indicate with certainty the general process by which the present topographical features have been developed.

7. In many parts of the country there is, too, a close connection between the geology and the type of jungle, but this is to some extent masked by the recent history of the area, as for example, the extent of recent Jhum operations, and by the variations in climatic conditions. The type of relationship found may be illustrated by the distribution of thorny canes which, in the hilly tracts, often occur in quantity in association with sandstones, not on the scarp faces but on any water-logged level stretched above the actual scarp.

8. The following notes describe the strata and structure and give some account of the topography of the five areas enumerated above, taken for convenience in the following order:—Surma Valley, South-Eastern Hills (Naga-Manipur-Lushai Hills), Assam Valley, Eastern Himalayas, Shillong Plateau (including the Mikir Hills, etc.). Following this is a summary of the geological history of the whole province.

9. The information utilized in this summary is derived, for the older rocks, from the observations of the Geological Survey of India and for the Tertiaries mainly from the work of the Burmah Oil Company's geological staff.

TOPOGRAPHY, STRATA, AND STRUCTURE

The Surma Valley

10. The main part of the Surma Valley consists largely of swampy flats broken by numerous low isolated hills (tilas) and low ranges. Northwards it ends abruptly against the foot of the Garo and Khasi and Jaintia Hills but the south-eastern boundary is of a different character—long spurs of high land project from the Lushai and Tripura Hills, and between them are broad valleys usually diversified with many low isolated hills and low ranges. The difference results from the difference in geological structure: the

northern boundary is determined by the existence of an east-west 'monoclinal' fold separating the Tertiaries of the Surma Valley from the older rocks of the Shillong Plateau, but along the southern boundary the strata have been buckled or folded into north-south wave-like 'corrugations' which give rise to the alternations of lines of hills and valleys; not every line of hills is a line of uplift ('anticline'), nor is each valley a line of depression ('syncline') for the folding has led to the development of long, nearly straight, north-south valleys by the wearing away of the less resistant beds, particularly clays and shales, leaving parallel ridges where the harder strata have more successfully withstood the denuding action of the rain and streams; in a few instances, where the beds exposed in the centre of an anticline are relatively soft, a valley may coincide with an axis of uplift. Thus, although the very clearly-marked suite of parallel north-south valleys and hills is due primarily to the trend of folding, it is in part an indirect result.

11. In the corrugations, the tops of the arches are usually narrower than the bottoms of the troughs and the inclined flanks separating crest from trough are very steep, the strata dipping at high angles. In many instances one of the flanks of the fold is much steeper than the other, and in these asymmetric anticlines it is common to find strike-faulting accompanied by vertical and inverted strata.

12. The strata of the Surma Valley belong entirely to the newer divisions; even the oldest series of the Tertiaries is not found in the valley itself, although it occurs in the low foot-hills of the Shillong Plateau. The oldest rocks found within the valley are the sandstones of the Barail Series, but these occupy a very small area. The lower beds of the Surma Series form fairly high and usually compact groups of hills; these are generally unsuited to tea-growing and are mostly covered with jungle; the Harargaj range between the Juri and Manu valleys forms a typical example. The beds include alternating groups of impure sandstones and impure shales. The upper beds of the Surma Series are mainly soft sandy shales with thin sandstones; they naturally give rise to long strips of low swampy ground broken by lines of tilas. Many of the lower more scattered hills of the Surma Valley are made up of sands and subordinate sandy and mottled clays belonging to the Tipam Series. The lower beds of the Tipams are usually much harder than the upper beds, and as they are also harder than the immediately underlying strata of the Surma

Series, the lowest part of the Tipams usually forms a prominent strike ridge. Most of the tea cultivation in 'tila' gardens in the Surma Valley is on the Tipam beds or the uppermost Surma beds. The highest division of the Tertiaries, the Dihing Series, which is made up largely of pebble beds, is found in a few low hills on the north and east of the valley.

13. An interesting feature is the occurrence of plateau gravels, deposited when the Barak and its tributaries were flowing at a level several hundred feet higher than to-day. There is an extensive plateau near Dewan (east of Silchar) and a higher more dissected plateau near Kumbhir (north-east of Silchar). On these there is a thick nearly horizontal capping of pebbles with some sands and sandy clay; most of the plateau is, or has been, under tea cultivation.

14. The flat ground is largely occupied by a rather clayey alluvium; most of this is utilized for rice but, especially in Sylhet, there are large areas too low-lying for any cultivation, and many of these contain large 'bils' or 'haors'—broad expanses of perennial water. In this alluvial ground the large streams have cut deep beds following very tortuous and unstable courses. Changes in these courses have led to the formation of many crescent-shaped lakes (frequently named Anua Bil) which in course of time become silted up, but remain easily recognizable by their characteristic shape. These old stream channels are commonly marked by a line of homesteads following very closely the former bank of the river.

The South-eastern Hill Country (Naga Hills to Lushai Hills).

15. The large area of hills forming the eastern and south-eastern borders of Assam and including the Naga Hills, Manipur, and the Lushai Hills is made up principally of Tertiary strata but it is possible that older formations occur in the areas furthest from the plains. Parts of this hill country have been examined in some detail but the geology of the more remote parts awaits investigation. Included in this area, both topographically and geologically, is the south-eastern part of the North Cachar Hills.

16. In the south—the Lushai Hills, western Manipur, and eastern Cachar—the structure is similar to and in continuation of that of the south-eastern part of the Surma Valley. Further north there is an interesting difference; the folding

in the Surma Valley was referred to as a series of north-south corrugations in which the arches are steep-sided, the strata in the steepest parts of the fold being vertical or even inverted, but in the Naga Hills simple anticlines are rare and the folding has reached a much more advanced stage in which the steep limbs of the folds have become entirely or almost entirely replaced by strike-faults so that the country is traversed by a series of large overthrust faults. The most important of these is the Haflong-Disang fault which begins in the hills bounding the Surma Valley to the north of Sylhet and runs through Haflong, towards Piphima (near Kohima) and thence roughly parallel to the edge of the hills as far as the headwaters of the Dihing.

17. On the south-east side of this large fault, in the extremely hilly country between Haflong and Imphal, is a broad synclinal area composed chiefly of sandstones—these form an impressive escarpment south-east of the 'Hill Section' of the Assam Bengal Railway from Ditokchara to Mahur, and from the name of this range these beds have been termed the Barail Series. Further north-east around Kohima and Mokukchung in the Naga Hills District are lower beds—the Disang Shales—which are of great thickness and cover an immense area. In the interior of the hills the shales pass into slates and are traversed by abundant quartz veins, and in the extreme east by serpentine intrusions. They are everywhere very sharply folded and faulted and no details of the structure of the shale area have as yet been deciphered although it is clear that here and there there must be large 'outliers' of the Barail Series.

18. The Naga Tribal Area and the Frontier Tracts near the Patkai Range have naturally not been examined in much detail. The Patkai Range near the pass over to the Hukong Valley is a scarp of the sandstones of the Barail Series—one of the many ridges bounded on the north-west by a strike valley due to Disang Shales and to one of the overthrust faults. It is probable that most of the Naga Tribal Area is occupied by Disang Shales and the lower beds of the Barails.

19. In the area north-west of the Disang fault, that is, in the ranges bordering the Dhansiri and Upper Assam plains, there are numerous strike-faults roughly parallel to the Disang Fault. The dip of the strata is towards the south-east and the beds, which include Dihing, Tipam, Surma and Barail strata, are repeated by the faults ; this has given rise to a series of nearly parallel ridges, not as well marked as

in the simpler structure of the Surma Valley, but very well seen from many points along the Manipur Road—Tinsukia section of the Assam Bengal Railway. The ridges are the escarpments of the harder beds—Tipam and Barail sandstones —and the intervening valleys mark the outcrop of softer beds and the position of the strike-faults.

20. In this area the Barail Series shows an interesting development; in the south-western part of the Naga Hills, interspersed amongst the sandstones in the middle part of the series, are considerable thicknesses of shale and carbonaceous shale. A few thin coal seams occur and when traced north-eastwards it is found that the seams thicken and become more numerous, until at Nazira they are of workable thickness. Further north-east they are still thicker and are worked on a large scale near Margherita and Ledo.

21. Above the Barail Series there is an important unconformity which represents an interval during which a large part of the Tertiary area of Assam was uplifted to form land and subjected to denudation. The emergence was greatest in the north-east, and here, not only is the upper part of the Barail Series missing, but the overlying Surma Series is very poorly represented, and in places the sandstones of the Tipam Series rest on the Barails.

22. With the exception of the Manipur plain, there is very little flat ground within the area of hills; the valleys are narrow and steep-sided and there are but few level stretches of alluvium in the valley bottoms. There are a few accumulations of high level 'gravels' or boulder beds in several parts of the Naga Hills, as for example near Ghaspani on the Kohima cart-road, and parts of the Disang Shale outcrop below the Barail scarp are almost completely covered by a thick mantle of sandstone boulders. These boulders form a useful source of road metal and ballast and are extensively worked at Ditokchara in the Hill Section

The Assam Valley

23. The Assam Valley may be divided into two parts; in Lower Assam the plains are broken by isolated groups of hills but in Upper Assam almost unbroken plains stretch from the Himalayas on the north-west to the Naga Hills on the south-east.

24. The numerous low hills of Dhubri, Goalpara, Gauhati, and Tezpur are actually outlying portions of the Shillong metamorphic complex and are composed for the most part of gneiss. The surrounding plains have been

formed by the alluvial material brought down by the Brahmaputra and its tributaries. The Assam Valley is narrowest near the Mikir Hills, where the river first encounters the gneiss, and above this point the valley is entirely devoid of tilas. The extensive plains of Sibsagar and Lakhimpur are the alluvial deposits of the Brahmaputra and its tributaries; there are distinct traces of deposits of different ages, the most recent alluvium within the present flood plain, and various patches of older deposits at a slightly greater elevation. The geology of the alluvial area has not been worked out in any detail; on the whole, the alluvium is more sandy than in the Surma Valley. Towards the head and sides of the valley the surface is slightly undulating, and there occur, as for example near Dum Duma, examples of broad gently sloping alluvial 'cones' with irregular almost dry channels marking the site of old courses of tributary streams.

25. River terraces flank some of the streams; good examples are to be found along the Dihing at Margherita and much further upstream.

26. At the head of the Assam Valley there are low spurs (such as the Tipam Hills of Jaipur and Digboi) which are structurally a part of the Naga Hills.

27. The foot-hills bounding the valley on the north-west and south-east are composed of Tertiary deposits (as mentioned in the adjacent sections of this note) and deeply buried beneath the alluvium there must be a floor of similar Tertiary beds. The thickness of the alluvium is unknown but it probably amounts to some thousands of feet in the centre of the valley.

The Eastern Himalayas

28. North of the Brahmaputra Valley the hills curve round from an east-west direction in the Balipara Frontier Tract to a north-east trend which continues to the Dibang north of Sadiya. Thence there is a big sweep round the head of the valley to the Mishmi or Miju Hills.

29. The structure of these hills has not been worked out, although some of the main outlines are known. A belt of Tertiary beds occurs in the first ranges of the Aka, Dapla, and Abor Hills, but is absent further east; beyond the Tertiary belt there occur beds of Gondwana age, corresponding approximately to the coal-bearing beds of the Bengal coal-fields and indeed containing thin but crushed coal seams. In the Dihang Valley these are associated

with volcanic rocks—basalts and tuffs. Beyond the Gondwana beds are schists, slates, limestones, and dolomites of very great age.

30. The structure is undoubtedly complex for the beds dip north-westwards so that the Tertiaries appear to underlie the much older rocks. From evidence in Himalayan areas that have been examined in more detail it appears that the belts of different beds are separated by very large overthrust faults, similar to, but greater than, those which have been proved by detailed investigations in the Naga Hills. The successive sheets of rock have been thrust forward and upward from a north-westerly direction during the building up of the Himalaya.

The Central Assam Range

31. In the west, the Central Assam Range consists of a large broken plateau, usually termed the Shillong plateau; eastwards this merges into the more irregular hills of North Cachar and thence joins the Naga Hills. Geologically the two portions are quite distinct, the western part being an area which has undergone very little Tertiary folding and the eastern part belonging to the area of very intricate faulted and folded structure already described. Near Haflong the junction of the plateau country and the hill country is very sharply marked, coinciding with the Haflong-Disang overthrust fault, but in the northern part of the Assam Bengal Railway Hill Section the transition is more gradual.

32. The plateau reaches a height of over 6000 feet near Shillong; it has a general northerly slope but is much dissected by deeply cut valleys and is traversed by step-like scarps. The valleys are often notably straight and steep-sided and there are many large waterfalls in the rivers. The southern edge of the plateau overlooks the Surma Valley and is remarkably abrupt.

33. A large part of the area is occupied by metamorphic rocks of great age—schists, quartzites, and gneisses, with granites, peridotites and dolerites intruded into them. The details of the greater part of the metamorphic area have not yet been investigated. The gneiss is composed mainly of quartz and felspar (orthoclase predominating) with subsidiary magnetite and very little hornblende and mica. Less ancient are the schists, slates, quartzites and conglomerates which have been grouped together as the Shillong Series. These rocks (especially the schists) have been invaded by basic dykes

and, apparently subsequently, there were the intrusions of granite.

34. The metamorphic rocks of the Shillong plateau extend northwards across the Brahmaputra Valley, forming low isolated hills at intervals west of Tezpur and higher hills near Gauhati and Goalpara. (The gneiss is very clearly seen near Gauhati in railway cuttings and in the river bank). Similar gneiss forms the greater part of the Mikir Hills.

35. Of much later age is the Sylhet Trap, an andesitic or basaltic lava found along the extreme southern margin of the plateau. This lava is associated with volcanic 'ash' and intrusive dykes.

36. Overlying the trap and the gneiss are Cretaceous beds—sandstones with conglomerates. These rest on a very irregular surface, filling up old valleys eroded in the metamorphic rocks in pre-Cretaceous times. The Cretaceous beds occur in the southern foot-hills and as isolated outliers scattered over a large part of the southern portion of the plateau ; they form a belt extending across the plateau from near Jaintiapur north-eastwards towards the Mikir Hills. They occur near Lumding but are unknown further north-east. Coal seams occur locally and in places these are of workable thickness.

37. The Cretaceous beds are overlain by the lowest Tertiaries. These contain thick limestones (Sylhet Limestone) which provide an important source of lime ; these beds are of considerable interest as their solubility in rain water has given rise to caves and underground rivers—phenomena that are characteristic of limestone areas. The outcrop is marked by numerous swallow-holes and at the base of the limestone cliffs there are often to be found copious springs of water. Associated with and above the limestones are sandstones and shales with a few thin coal seams. These beds lie almost horizontally (but with a very slight south-easterly inclination) over a large area in the eastern part of the plateau and extend north-eastwards into the Mikir Hills.

38. In the north-western part of the North Cachar Hills, sandstones of the Barail Series predominate and the beds are no longer nearly horizontal but have an undulating dip and are traversed by zones of disturbance ; further east the disturbances increase and higher members of the Tertiaries appear in the synclinal areas : in this way the plateau zone passes into the parallel ranges of the Naga Hills.

FOSSILS

39. The strata of Assam are notable for the paucity of fossil remains. The Cretaceous beds contain a small fauna which has affinities with the Cretaceous fossils of Madras The lowest beds of the Tertiaries contain a large number of fossils but the remaining, and by far the greater, portion of the Tertiary strata is almost barren, thus contrasting strongly with the very fossiliferous Tertiary beds of Burma.

40. The Sylhet Limestone is in places very largely made up of the hard shells of Nummulites but other fossils are much less abundant ; the beds immediately overlying the Sylhet Limestone have also yielded a number of fossils in a few localities. In the upper Tertiaries, fossiliferous beds occur in the Garo Hills and at Kanchanpur in Cachar ; these belong to the Surma Series. A few fossiliferous localities in the Tipam Series have been reported from the Naga Hills but the fauna is very poor.

41. This paucity of fossil beds makes it very difficult to correlate the strata of different portions of Assam and also prevents any very exact correlation between the Assam Tertiaries and those of the rest of India. The fossils of the Jaintia Series show that this belongs to the Eocene and is approximately of Kirthar (Lutetian) age. The Kanchanpur and Garo Hills fossil beds contain species characteristic of the lower parts of the Miocene.

HISTORY

42. It is not possible to reconstruct with any certainty the conditions under which the older rocks were formed, but it is clear that during a large part of Tertiary times almost the whole of the south-eastern part of Assam was under water : either open sea, coastal lagoon, or river estuary. (A possible exception is the east of Manipur, about which little is known). It is likely that during much of this period there existed land to the north-west—*i.e.*, part of the Shillong Plateau.

43. It seems probable that during the earlier Tertiary times there was a shore line running roughly from south-west to north-east, through the Garo, Khasi, Jaintia, and Mikir Hills. To the south-east lay a broad sea which was continuously receiving sediments from the denudation of the neighbouring land. At some time in the Oligocene period part of the sea became almost silted up and coal-

forming conditions prevailed over a large area in north-eastern Assam. At the end of Oligocene times important earth-movements took place and large areas of the sea covering most of Assam were converted for a time into land and were subject to weathering and denudation. Subsidence set in and during the Miocene period the shore line ran again through the Garo, Khasi and Jaintia, and Mikir Hills. The water lying to the south-east was very shallow and received vast quantities of sediment from the neighbouring shores, but the water-covered area was not completely silted up, as subsidence, on the whole, kept pace with deposition. Whether the water ever completely covered the Assam plateau is not known, but it is clear that at times there must have been very little of the province that was not submerged. The Tertiary sediments in places attained a thickness of over 40,000 feet.

44. Towards the end of the Miocene period very extensive earth-movements began ; there was a great change in the material brought down by the streams, widespread pebble deposits show the proximity of large rivers draining from the newly forming land. As these changes continued the land began to assume something of its present shape, but with far higher elevations than now exist. During this period the strata were in the south folded into the broad corrugations so typical of the Surma Valley, and in the Naga Hills (where they were subjected to stronger forces) the strata became broken up along immense faults, areas scores of miles in length and several miles wide being pushed forward many miles over their north-western neighbours and having in turn similar large fault masses pushed over them from the south-east. Somewhat similar but even more intense movements occurred in the Eastern Himalayas, the forces being in this case from the north and north-west. In this way great hills were piled up, leaving a broad depression between—the original of the Brahmaputra Valley. As these mountain-building movements proceeded, denudation removed tens of thousands of feet of rock from the hills, so in the course of time lowering them to their present level, the material removed being carried out to sea or deposited in the lower reaches of the streams.

45. That the mountain-building movements are still in evidence is shown by the frequent earthquakes. During the 1897 earthquake many changes of level took place and subsequent measurements indicated that the Shillong

Plateau as a whole had moved appreciably towards the plains on the south. In some of the streams in the Patkai range there are a number of partly silted up lakes and marshes which show that there, too, there has been quite recent movement along a line crossing the course of these streams. Similar comparatively recent earth-movements have produced smaller but important changes of level in the plains resulting in obstructions to drainage, and consequent water-logging of large areas.

46. The activity of present-day denudation of the hilly areas is indicated by the vast quantity of sediment carried down the rivers during the monsoon and by the abundance of landslips showing as prominent scars in the jungle-covered hills.

47. Although the larger valleys and hills owe their origin to the earth-movements that have folded and broken the Tertiary strata of the province, their present form is entirely due to weathering and to erosion by streams. It is often popularly supposed that the deep gorges traversing the hills (for example, the immense ravine seen from the Cherrapunji road, or the narrow valley of the Jatinga above Damchara) are rifts produced in the earth's crust by destructive earthquakes. This is not so ; the gorges, as well as the less impressive valleys, are due to the erosion by the streams which are now, or were at some previous time, flowing through them. During the monsoon, the streams with their loads of sediment erode their beds and banks and, according to local conditions, either deepen or broaden their valleys. The harder more resistant strata tend to remain as ridges whilst the weaker beds rapidly get worn down into low ground, possibly getting completely covered by the debris resulting from the weathering of the harder beds.

BIBLIOGRAPHY

48. The following are the more important papers on Assam published by the Geological Survey of India in Records, Memoirs and Palæontologia Indica :—

1856	Capt. E. T. Dalton and Lt.-Col. S. F. Hannay.	Gold yielding deposits of Upper Assam. Mem. G. S. I. Vol. 1, pt. 1, pp. 90-96.
1858	T. Oldham.	Geological Structure of a portion of Khasi Hills. Mem. G. S. I. Vol. 1, pt. 2, pp. 99-207.
1865	H. B. Medlicott.	Coal of Assam etc. Mem. G. S. I. Vol. IV, pt. 3.
1868	„	Coal in Garo Hills. Rec. G. S. I. Vol. 1, pt. 1, pp. 11-16.
1869	„	Geological Sketch of Shillong Plateau. Rec. G. S. I. Vol. II, pt. 1, pp. 10-11.
1869	„	Shillong Plateau. Mem. G. S. I. Vol. VII, pt. 1.
1874	„	Coal in Garo Hills. Rec. G.S.I. Vol. VII, pt. 2, pp. 58-62.
1874	T. W. H. Hughes.	Petroleum in Assam. Rec. G.S.I. Vol. VII, pt. 2, pp. 55-58.
1875	F. R. Mallet.	Coal recently found near Moflong, Khasi Hills. Rec. G. S. I. Vol. VIII, pt. 3, p. 86.
1876	„	Coalfields of Naga Hills. Mem. G. S. I. Vol. XII, pt. 2.
1879	„	Corundum from Khasi Hills. Rec. G. S. I. Vol. XII, pt. 3, p. 172.
1882	„	Iridosmine from Noa-Dihing river, Upper Assam. Rec. G.S.I. Vol. XV, pt. 1, pp. 53-55.
1882	T. D. La Touche.	Daranggiri Coalfield, Garo Hills, Assam. Rec. G. S. I. Vol. XV, pt. 3, pp. 175-178.

1883	R. D. Oldham.	Geology of part of Manipur and Naga Hills. Mem. G. S. I. Vol. XIX, pt. 4.
1883	T. D. La Touche.	Cretaceous coal-measures at Borsora in Khasi Hills. near Laour in Sylhet. Rec. G. S. I. Vol. XVI, pt. 3, pp. 164-166.
1883	„	Traverse through the Eastern Khasi, Jaintia and North Cachar Hills. Rec. G. S. I. Vol. XVI, pt. 4, pp. 198-203.
1884	„	Langrin coalfield, South-West Khasi Hills. Rec. G. S. I. Vol. XVII, pt. 3, pp. 143-146.
1887	„	Geology of Garo Hills. Rec. G.S.I. Vol. XX, pt. 1, pp. 40-43.
1890	„	Lakudong Coalfields, Jaintia Hills. Rec. G. S. I. Vol. XXIII, pt. 1, pp. 14-16.
1890	„	Coalfields of Lairungao and etc. in Khasi Hills. Rec. G. S. I. Vol. XXIII, pt. 3, pp. 120-124.
1904	P. N. Bose.	Um-Rileng coal-beds, Assam. Rec. G. S. I. Vol. XXXI, pt. 1, pp. 35-37.
1904	J. M. Maclaren.	Geology of Upper Assam. Rec. G. S. I. Vol. XXXI, pt. 4, pp. 179-204.
1904	„	Auriferous Occurrences of Assam. Rec. G. S. I. Vol. XXXI, pt. 4, pp. 205-232.
1910	H. H. Hayden.	Coalfields in North-Eastern Assam. Rec. G. S. I. Vol. XL, pt. 4, pp. 283-319.
1912	E. H. Pascoe.	Coal in Namchik Valley, Upper Assam. Rec. G. S. I. Vol. XLI, pt. 3, pp. 214-216.
1912	A. C. Seward.	Dicotyledonous Leaves from Coal Measures of Assam. Rec. G. S. I. Vol. XLII, pt. 2, pp. 93-101.
1912	E. H. Pascoe.	Traverse Across the Naga Hills Assam. Rec. G. S. I. Vol. XLII, pt. 4, pp. 254-264.

1914	E. H. Pascoe.	Petroleum Occurrences of Assam and Bengal. Mem. G. S. I. Vol. XL, pt. 2.
1919	E. S. Pinfold.	Two New Fossil Localities in Garo Hills. Rec. G. S. I. Vol. L pt. 2, pp. 126-129.
1921	E. Vredenburg.	Marine Fossils collected by Mr. Pinfold in the Garo Hills. Rec. G. S. I. Vol. LI, pt. 3, pp. 303-337
1923	R. W. Palmer.	Geology of part of Khasi and Jaintia Hills, Assam. Rec. G.S.I. Vol. LV, pt. 2, pp. 143-168.
1923	E. Spengler.	Contributions to the Palæontology of Assam. Pal. Ind. N. S. Vol. VIII, Memoir No. 1.
1929	J. A. Dunn.	The Aluminous Refractory Minerals in Northern India. Mem. G.S.I. Vol. LII.

49. Of papers published elsewhere, the most important are :—

1932	P. Evans.	Tertiary Succession in Assam Trans. Min. Geol. Inst. Ind. Vol. XXVII, pt 3, pp. 155-253.
1933	G. W. Lepper.	Geology of the Oil-bearing Regions of the Chindwin-Irrawaddy Valley of Burma, and of Assam-Arakan. Proc. World Petroleum Congress. Vol. 1, pp. 15-25.

Digboi
1st. August 1934.

P. EVANS.

CLIMATE

In Assam the annual revolution of the seasons is not marked by the strongest contrast of temparature and of rainfall.

The climate of Assam in virtue of its constant high humidity has an alternation of summer and winter of which neither is extreme in its temperature.

The rise of temperature which in most parts of India follows rapidly on the vernal equinox, is, in Assam checked by frequent showers and thunderstorms, giving it a heavy rainfall during the spring or hot weather months.

The perpetual humidity, frequent and heavy rainfall and moderate temperature changes of a warm summer and cool winter especially distinguish the Valley of Assam.

The annual rainfall figures shown in the following table against each rainfall recording district in the province of Assam have been compiled from the record of five years from 1927-1931, supplied by the Agricultural Department, Assam.

District.	Normal rainfall.
Goalpara	109.05
Kamrup	81.12
Darrang	87.38
Nowgong	68.39
Sibsagar	88.19
Lakhimpur	113.17
Sylhet	135.45
Cachar	121.15
Garo Hills	107.05
Khasi & Jaintia Hills	229.23
North Cachar Hills	109.17
Sadiya Frontier Tract	143.82
Balipara Frontier Tract	96.54
Naga Hills	86.90
Manipur	59.91
Lushai Hills	108.02

The following average mean maximum and mean minimum temperatures have been calculated from the statements of the five years from 1927-1931.

Station.	M. Maximum.	M. Minimum.
Dibrugarh	81.39	65.77
Sibsagar	78.32	66.28
Tezpur	83.99	66.56
Gauhati	83.81	66.36
Dhubri	80.50	66.86
Silchar	85.57	67.44
Srimangal	86.92	66.00
Shillong	69.85	53.22
Cherrapunji	68.77	57.88

Average relative humidity calculated from figures from 1927 to 1931

Station.	Average relative humidity.
Dibrugarh	89
Sibsagar	90
Tezpur	85
Gauhati	86
Dhubri	83
Silchar	86
Srimangal	85
Shillong	73
Cherrapunji	76

BIBLIOGRAPHY

Annals of Royal Botanic Garden Vols. I-IV, IX and X, 1888-1905.
Alphonso & Casimir De Candolle—Monographie Phanerogamerum, 1878-93.
Basu, Major B. D. and Kirtikar, Lt. Col. K. R.—Medicinal Plants of India.
Bentham, G. and Hooker, J. D.—Genera Plantarum 1877-83.
Blatter, E.—Beautiful Flowers of Kashmir, 1928-29.
Bourdillon, T. F.—The Forest Trees of Travancore, 1908.
Brandis, D. and Stewart, J. L.—Forest Flora of North West and Central India, 1874.
Brandis, Sir D.—Indian Trees, 1908.
Collett, Sir H.—Flora Simlensis, 1902.
Cooke, T.—Flora of the Bombay Presidency, 1903.
Dallimore, W. and Jackson, A. B.—Handbook of Conifers, 1923.
Duthie, J. F.—Flora of the Upper Gangetic Plain, 1903-20
Duthie, J. F. and Fuller, J. B.—Field and Garden Crops of the N. W. Provinces and Oudh, 1882-93.
Engler, A.—Das Pflanzenreich—1900.
Engler A. et Prantl K.—Die naturlichen Pflanzenfamilien Vol. VIII-XVIII, 1889-1908.
Gagnepain, F.—Flore Generale L'Indo-Chine, Parts I-VII, 1907—
Gamble, J. S.—Flora of Madras. Parts I—VII, 1915-25.
Haines, H. H.—Botany of Bihar and Orissa, 1921-25.
Haines, H. H.—Forest Flora of Chota Nagpur, 1910.
Henderson, I. F. and W. D.—Dictionary of Scientific Terms, 1920.
Heinig, R. L.—Glossary of Botanic Terms, 1899.
Hooker, Sir J. D.—Flora of British India, 1875-97.
Hutchinson, J.—Families of Flowering Plants 1926, Vol. I.
Jackson, B. D.—Glossary of Botanic Terms, 1916.
Kanjilal, P. C.—Forest Flora for Pilibhit, Oudh, Gorakhpur and Bundelkhand 1933.
Kanjilal, Rai Bahadur U. N.—Forest Flora of the Siwalik and Jaunsar Forest Divisions of the United Provinces of Agra and Oudh—(revised edition) 1911.

King, Sir G.—Materials for the Flora of the Malayan Peninsula, 1889-1909.
Kurz, S.—Forest Flora of British Burma, 1877.
Osmaston, A. E.—Forest Flora of Kumaon, 1927.
Parker, R. N.—Forest Flora for Punjab with Hazara and Delhi (second edition) 1924.
Pearson, R. and Brown, P.—Commercial Timbers of India, 1932.
Prain, D.—Bengal Plants, 1903.
Ridley, H. N.—Flora of Malayan Peninsula, 1923-25.
Roxburgh, W.—Flora Indica (1874 reprint).
Talbot, W. A.—Forest Flora of the Bombay Presidency and Sindh, 1909-1911.
Troupe, R. S.—Silviculture of Indian Trees, 1921.
Watt, G.—Dictionary of Economic Products of India, 1885-96.
Wight, R.—Icones Plantarum Indio' Orientalis, 1840-53.
Willis, J. C.—Dictionary of Flowering Plants and Ferns (revised edition) 1914.

SYNOPSIS OF THE FAMILIES.

The distinguishing characters of the families have been selected with special reference to the plants described. In the body of the work under each family an account of the family as a whole will be found. The plants here mentioned all belong to the Phanerogams or flowering plants. They are divided as follows :—

Cotyledons, two or more	...	**A. Dicotyledons.**
Ovules in closed ovary, fertilized through stigma	...	a. Angiosperms.
Calyx and corolla both present.		
Corolla of distinct petals	...	i. Polypetalæ.
Calyx of distinct sepals ; petals hypogynous.		
Torus small or elongate, not expanded	...	1. Thalamifloræ.
Torus thickened or expanded into a fleshy disk	...	2. Discifloræ.
Calyx of combined sepals ; disk thin ; petals inserted on the calyx.	...	3. Calycifloræ.
Corolla of combined petals	...	ii. Gamopetalæ.
Calyx or corolla or both wanting	...	iii. Apetalæ.
Ovules naked, fertilized by direct contact with pollen	...	b. Gymnosperms.
Cotyledon one	...	**B. Monocotyledons.**

A. DICOTYLEDONS

a. Angiosperms

i. Polypetalæ

1. THALAMIFLORÆ.

1. **Ranunculaceæ**. Sepals deciduous, often petaloid. Stamens numerous, anthers adnate, longitudinally dehiscent. Carpels numerous, free, 1-celled.

2. **Dilleniaceæ**. L. alternate, simple, penninerved, petioles sheathing. Fl. large, white or yellow. Sepals 5, imbricate, persistent, petals 5, caducous. Carpels one or many, more or less cohering, styles free.

3. **Magnoliaceæ**. Trees, shrubs or climbers. Leaves alternate, simple. Sepals and petals alike in whors of three, imbricate, deciduous. Stamens numerous. Carpelsl numerous, free or slightly cohering. Fruit a cone or spike.

4. **Anonaceæ**. Trees or shrubs, often scrambling. Leaves alternate, entire, exstipulate. Sepals 3. Petals 6. Stamens numerous, free. Carpels numerous, free or (Anona) confluent. Fruit succulent.

5. **Menispermaceæ**. Climbing shrubs or small trees. Leaves alternate, entire or lobed, usually palminerved, often peltate. Flowers small, unisexual, trimerous. Stamens as many as and opposite the petals or anthers sessile on a column. Ovaries 1 or 3, free. Fruit a drupe.

6. **Berberidaceæ**. L. alternate, glabrous. Sepals and petals alike, usually trimerous, caducous. Stamens opposite to petals, anthers adnate, as a rule opening by valves. Carpels distinct, often one only. Endosperm fleshy.

7. **Nymphæaceæ**. Aquatic-herbs. Leaves usually peltate. Sepals 4-5. Petals and stamens usually numerous. Carpels many in pits of the torus or confluent with it. Ovary 1 or more ovuled. Fruit a spongy berry or of nuts sunk in pits of the torus.

8. **Papaveraceæ**. Annual or perennial herbs. Leaves radical or alternate, stipules 0. Flowers often large, nodding in bud, regular; perianth and stamens very caducous. Sepals 2, hypogynous. Petals 4, 2-seriate, large, crumpled. Stamens very many. Carpels dehiscing by pores or valves.

9. **Fumariaceæ**. Annual or perennial herbs. Leaves usually divided, segments not jointed. Flowers small, racemed, irregular. Sepals 2, small, deciduous. Petals 4. Fruit a 2-valved, many-seeded capsule.

10. **Cruciferæ.** Herbs, rarely undershrubs. Leaves cauline and radical, exstipulate. Flowers racemed. Sepals 4, free, imbricate. Petals 4, free, hypogynous. Stamens 6. Fruit either a 2-celled 2-valved pod, the valves deciduous and leaving the seeds on the persistent placentas (*replum*), or indehiscent, or transversely jointed.

11. **Capparidaceæ.** Trees or shrubs. L. as a rule alternate, stipules often present and spinescent. Fl. usually bi-sexual, often zygomorphic. Sepals usually 4, petals 4. Stamens 4-5 or numerous, filaments filiform. Carpels connate into a 1-celled ovary with 2-4 parietal placentas, often on an enlongated gynophore. Fruit baccate or capsular.

12. **Violaceæ.** L. as a rule alternate, stipules small or leafy. Fl. regular or zygomorphic, sepals 5, imbricate, persistent, petals 5. Stamens 5, filaments short or 0, connective broad and often produced above, anthers connivent or connate round the ovary. Carpels connate into an one-celled ovary with usually 3 parietal placentas. Seeds small, embryo straight in a fleshy endosperm.

13. **Bixaceæ.** L. alternate, simple, mostly dentate, stipules small or 0. Fl. regular, 4-or 5-merous, stamens usually numerous. Ovary 1-celled, seeds few, arillate or with pulpy testa.

14. **Flacourtiaceæ.** Trees or shrubs, usually thorny. Leaves toothed or crenate. Flowers small, usually diœcious. Stamens numerous. Fruit a drupe with several 1-seeded pyrenes.

15. **Pittosporaceæ.** L. alternate, simple, entire, stipules 0. Fl. regular, pentamerous and pentandrous; sepals free, as well as petals imbricate, anthers versatile. Embryo small, in copious endosperm.

16. **Polygalaceæ.** L. alternate, simple, quite entire, stipules 0. Fl. bisexual, zygomorphic, sepals 5, the 2 inner larger, petaloid, petals 5 or 3. Stamens as a rule 8, filaments usually connate in a cleft sheath, anthers mostly opening by terminal pores.

17. **Tamaricaceæ.** L. alternate, small, generally scale-like. Fl. regular, in spikes, racemes or panicles, sepals and petals usually free, pentamerous, sometimes tetramerous. Stamens as many as petals or twice their number. Capsule 3-5-valved, seeds tufted or winged.

18. **Hypericaceæ.** L. opposite, often gland-dotted, stipules 0. Fl. regular, bisexual, sepals 5, imbricate, petals 5, contorted in bud. Stamens numerous, filaments usually connate into 3 or 5 bundles, anthers versatile. Endosperm 0.

19. **Guttiferæ.** Juice resinous, yellow or greenish. L. opposite, simple, entire, usually coriaceous, stipules 0. Fl. regular, unisexual or polygamous, sepals 2-6, mostly in decussate pairs, petals as a rule 2-6, imbricate or contorted. Fr. usually indehiscent, seeds large, endosperm 0.

20. **Ternstrœmiaceæ.** L. alternate, simple, generally coriaceous, stipules 0. Fl. regular, as a rule bisexual, sepals and petals usually pentamerous and imbricate. Stamens generally numerous, ovary 3-5-celled.

21. **Dipterocarpaceæ.** Resinous trees. L. alternate, usually coriaceous, simple, penninerved; stipules large, enclosing the bud. Fl. bisexual, regular, calyx-segments 5, some or all as a rule much enlarged in fr. Petals 5, contorted; stamens 5,10, or more, anthers adnate to filaments. Fruit indehiscent, 1-seeded.

22. **Ancistrocladaceæ.** Glabrous, woody climbers, not resinous. L. entire, stipules minute, caducous. Fl. bisexual, regular, pentamerous, calyx adnate to the 1-celled ovary, segments much enlarged in fr.

23. **Malvaceæ.** Wood soft and light. L. alternate, mostly stipulate, generally palminerved, hairs usually stellate. Fl. as a rule bisexual, regular, supported by 3 or more bracteoles. Sepals 5, valvate, more or less connate, petals 5, base adnate to staminal-column, contorted in bud. Stamens numerous; filaments variously connate; anthers 1-celled.

24. **Sterculiaceæ.** L. alternate, mostly stipulate, hairs often stellate. Sepals 5, valvate, more or less connate, petals 5 or none. Stamens commonly monadelphous, anthers 2-celled. Fr. a dehiscent capsule or a whorl of distinct carpels.

25. **Tiliaceæ.** L. alternate, simple, stipules deciduous. Fl. regular, almost always bisexual. Sepals 5, usually connate, valvate in bud. Stamens numerous, anthers 2-celled. Ovary 2-10-celled.

26. **Elæocarpaceæ.** Trees. Leaves simple. Flowers usually hermaphrodite, rarely polygamous, in axillary racemes. Sepals 5, distinct. Petals 5, often 5-lobed torus. Stamens usually indefinite, never less than 10. Ovary sessile, 2-5-celled. Seeds pendulous.

2. Discifloræ.

27. **Linaceæ.** Shrubs. Leaves alternate, glabrous, stipules minute. Flowers yellow, regular, bisexual. Sepals and petals 5 each, free. Stamens 5, connate at the base with small interposed staminodes. Disk inconspicuous of 2-3

glands adnate to the staminal-tube. Ovary 3-5-celled, cells spuriously 2-locellate. Fruit a capsule.

28. **Malpighiaceæ.** L. usually opposite, simple, entire, stipules small or 0. Fl. often zygomorphic, calyx 5-lobed, petals 5, often fimbriate. Stamens 10, sometimes unequal. Fr. usually of one or more winged samaras.

29. **Oxalidaceæ.** Generally herbs or undershrubs, rarely trees. Leaves alternate, compound. Flowers regular. Fruit a loculicidal capsule or a 5-lobed berry.

30. **Rutaceæ.** L. aromatic, dotted with translucent glands, stipules 0. Fl. regular, sepals and petals 4 or 5, stamens 4-5 or 8-10, filaments inserted on the outside of the disk.

31. **Simarubaceæ.** Bark bitter. L. alternate, stipules deciduous or 0. Fl. regular, small, often unisexual, sepals 3-5, usually connate, petals 3-5. Stamens as many as petals or double their number, inserted outside the disk.

32. **Ochnaceæ.** L. alternate, simple, glabrous, stipulate. Fl. regular, bisexual. Sepals 4 or 5, free, imbricate, persisting, petals 5 or more, deciduous, stamens 10 or many, anthers basifixed. Fr. of 3-10 one or few-seeded drupes.

33. **Burseraceæ.** Resinous. L. alternate, imparipinnate, sometimes 1-foliolate. Fl. small, regular, calyx 3-5-lobed, petals 3-5. Stamens as many as petals or twice their number, inserted on the disk or outside at its base. Ovary 2-5 celled, ovules 2 in each cell.

34. **Meliaceæ.** L. alternate, generally pinnate, stipules 0. Fl. regular, in cymose panicles, calyx small, 4-5-cleft, petals 4-5, stamens twice the number of petals, filaments generally united into a tube, disk between stamens and ovary often tubular.

35. **Chailletiaceæ.** L. alrernate, entire, simple, stipules deciduous. Fl. 1-sexual or polygamous, petals 5, notched or bifid ; stamens 5, disk of 5 glands, alternating with stamens. Ovary pubescent, 2-3-celled, ovules 2, collateral in each cell. Endosperm 0 ; cotylendons thick.

36. **Olacaceæ.** L. alternate, stipules 0. Fl. small, as a rule bisexual, calyx small or wanting, stamens opposite of petals or many. Ovary at base often 2-5-celled, ovules from a free axile placenta. Drupe 1-seeded.

37. **Icacinaceæ.** L. generally alternate, stipules 0. Fl. small, 1-sexual or polygamous, calyx small or wanting, stamens alternating with petals. Ovary 1-celled. Drupe 1-seeded.

38. **Aquifoliaceæ.** L. alternate, simple, usually coriaceous and evergreen, stipules minute. Fl. regular, usually 1-sexual, calyx 4-5-lobed, petals 4-5, connate at base. Stamens 4-5, alternating with petals, disk 0. Fr. a drupe, supported by the persistent calyx, stones 1-seeded, 2 or more.

39. **Celastraceæ.** L. simple, as a rule opposite, stipules minute or none. Fl. regular, small, bisexual or polygamous, calyx small, 4 or 5-lobed, persistent. Disk large, surrounding the base of the 3-5-celled ovary or partially enclosing it, stamens 3-5, rarely 10, inserted on the disk.

40. **Hippocrateaceæ.** Small trees or scandent shrubs. Leaves opposite, petioled ; stipules small, caducous. Flowers small, white or greenish. Fruit of 3-flattened carpels connate at the base, usually dehiscent. Seeds compressed.

41. **Rhamnaceæ.** Branchlets or stipules often spinescent. L. simple. Fl. small, regular, calyx 4-5-cleft, lobes triangular, valvate in bud, disk lining or filling the calyx-tube. petals inserted at the mouth of calyx-tube. Stamens opposite to petals, often enclosed by them.

42. **Ampelidaceæ.** Climbers. L. alternate, often compound. Fl. regular, calyx small, entire or 4-5-dentate ; petals 4-5, valvate in bud. Stamens opposite of petals, inserted outside or between the lobes of the disk. Fr. a berry.

43. **Staphyleaceæ.** L. opposite, stipulate, compound, leaflets stipellate. Fl. regular, bisexual, pentamerous, stamens 5, inserted outside the disk. Ovary 3-celled.

44. **Aceraceæ.** L. opposite, stipules 0. Fl. regular, polygamous, calyx 5-12-parted, deciduous. Stamens generally 8, inserted outside or upon (rarely inside) the disk. Fruiting carpels winged.

45. **Sapindaceæ.** L. alternate (opposite in Æsculus), stipules 0. Fl. sometimes zygomorphic, mostly polygamous. Stamens inserted between disk and ovary, filaments usually hairy, disk frequently unilateral. Ovary 3-celled, often 3-lobed.

46. **Sabiaceæ.** L. alternate, stipules 0. Fl. small, calyx 4-5-partite, stamens 4-5, opposite to petals, anther-cells distinct, usually adnate to a large connective.

47. **Anacardiaceæ.** L. in most genera alternate, stipules 0. Fl. regular, calyx 3-5-cleft (spathaceous in Gluta), petals 3-5, rarely 0. Stamens alternating with petals, inserted under, rarely on the disk. Ovary in 2 genera inferior, drupe 2-5-seeded.

48. **Moringaceæ**. Wood soft. L. deciduous, alternate, bi-or tri-pinnate, pinnæ and leaflets opposite, glands at base of petioles and pinnæ. Fl. large, bisexual, pentamerous, petals unequal. Fertile stamens 5, opposite to petals alternating with sterile stamens. Fr. a long 1-celled 3-valved pod.

3. Calyciflorae.

49. **Connaraceæ**. L. alternate, imparipinnate or 1-foliolate, leaflets entire, coriaceous, stipules 0. Fl. usually bisexual and regular, pentamerous, petals linear-oblong, stamens 10, the epipetalous stamens generally shorter and often sterile. Carpels 5, free, mostly hairy, ovules 2, collateral. Fruiting carpel one, 2-valved.

50. **Leguminosæ**. L. stipulate, as a rule alternate and compound. Fl. bisexual, petals 5, in the majority of genera zygomorphic, stamens 10 or many. Carpel one, free, ovules usully numerous, attached to the inner suture. Fr. a 1-celled pod, endosperm generally 0.

51. **Rosaceæ**. L. stipulate, usually alternate. Fl. pentamerous, as a rule regular and bisexual, stamens usually numerous. Carpels mostly distinct, often adnate to and enclosed in the calyx-tube albumen 0 or scanty.

52. **Saxifragaceæ**. L. simple. Fl. regular, 4- or 5-merous, calyx free or adnate to ovary, stamens free, as many as petals, twice the number or numerous. Carpels 2 or numerous, usually connate, ovules numerous. Seeds small, embryo minute, in copious albumen.

53. **Droseraceæ**. Perennial herbs. Leaves rosulate or alternate, usually circinate in vernation. Calyx free from the ovary. Petals 4-8. Stamens as many as the petals. Capsule loculicidally 2-5 valved. Seeds numerous.

54. **Hamamelidaceæ**. L. alternate, stipules usually deciduous. Fl. in compact heads or spikes, usually bracteate, calyx-tube more or less adnate to ovary. Ovary 2-celled, styles 2, usually persistent. Testa shining.

55. **Rhizophoraceæ**. L. opposite, usually coriaceous and entire, scars of petioles mostly prominent, stipules interpetiolar, deciduous. Fl. regular, generally bisexual, calyx more or less adnate to ovary, limb 4-14-lobed, lobes as a rule persistent, petals as many as sepals, stamens usually twice the number of petals. Fr. coriaceous, usually 1-seeded.

56. **Combretaceæ**. L. simple, entire, stipules 0. Fl. usually bisexual and regular, calyx-tube adnate to ovary

and produced beyond it, segments 4-5, valvate, petals often wanting. Stamens as many as calyx-segments or twice their number, perigynous. Fr. generally angled or winged.

57. **Myrtaceæ.** L. simple, generally quite entire, either opposite with translucent glands or alternate without glands. Stipules 0. Fl. regular, generally bisexual. Ovary enclosed in and generally adnate to calyx-tube. Stamens many, inserted with the petals in the mouth of calyx-tube.

58. **Lecythidaceæ.** Usually trees. Leaves alternate not gland dotted, entire or toothed. Flowers regular, 2-sexual. Calyx-tube adnate to the ovary; lobes usually 1-6, valvate or imbricate. Petals usually 4-6. Stamens numerous, in many series, few sometimes sterile. Ovary inferior, 2-6, rarely more celled. Fruit indehiscent, usually a woody, fleshy or fibrous berry.

59. **Melastomaceæ.** Herbs or shurbs. Leaves opposite, simple, exstipulate. Flowers regular, showy, 4-5-merous. Calyx-tube partially adnate to the ovary. Petals free. Stamens twice as many as the petals; anthers longer than the filaments, curved, opening by apical pores. Ovary usually 4-celled. Fruit a capsule. Seeds many, minute.

60. **Lythraceæ.** L. generally opposite, simple, entire, calyx cup-shaped, persistent, segments valvate, often with intermediate teeth, petals when present imbricate and crumpled in bud. Ovary as a rule superior.

61. **Onagraceæ.** Herbs or undershrubs, sometimes aquatic. Flowers usually regular, 2 sexual. Calyx adnate or 1/2-adnate to the ovary (Trapa); lobes 2-5, usually 4, valvate. Petals alternating with sepals, rarely 0. Stamens as many or twice as many as the sepals. Ovary usually 2-4-celled. Fruit capsular and many seeded or indehiscent and 1-seeded (Trapa).

62. **Passiflorace.æ** L. alternate, usually lobed. Fl. regular, unisexual in Papaya, bisexual in Passiflora.

63. **Cucurbitaceæ.** Large climbing herbs. Leaves petioled, cordate, ovate, 5-angular or lobed. Flowers monœcious, all solitary, yellow, very large. Fruit fleshy, indehiscent, often large. Seeds ovoid or oblong.

64. **Begoniaceæ.** Flowers not symmetrical; stamens numerous, free or conjoined, anthers ovoid; placentas projecting from inner angle into carpellary chamber; styles free or only united at base; herbs or shrubs with more or less succulent leaves and stems.

65. **Datiscaceæ.** L. deciduous, petiolate, broadly ovate. Fl. dicœcious, male flowers-calyx deeply 4-lobed, petals 0, stamens 4. Capsule crowned by the persistent calyx-segments, the valves terminating in the persistent styles.

66. **Cactaceæ.** Stems and branches succulent, prickly. Fl. regular, bisexual, solitary, calyx-tube adnate to ovary, petals numerous, imbricate, stamens many. Fr. fleshy, seeds numerous.

67. **Umbelliferæ.** Herbs; fruit dry separating spontaneously into two dry indehiscent carpels with usually glandular vittæ containing an essential oil.

68. **Araliaceæ.** L. alternate, simple or compound. Fl. regular, usually pentamerous and umbellate. Calyx adnate to ovary, usually entire, petals caducous. Stamens inserted outside the epigynous disk, anthers didymous.

69. **Cornaceæ.** L. entire, stipules 0. Fl. regular, clayx-tube adnate to ovary, limb persistent, segments small, petals 4 or 5, inserted with stamens round an epigynous disk. Fr. drupaceous.

ii. Gamopetalæ.

70. **Caprifoliaceæ.** L. opposite, stipules usually 0. Fl. bisexual, calyx-tube adnate to ovary, limb 3-5-toothed, corolla often zygomorphic, lobes 5. Stamens inserted on the corolla-tube.

71. **Rubiaceæ.** L. opposite, sometimes whorled, stipules as a rule interpetiolar. Fl. as a rule bisexual and regular, calyx-tube adnate to ovary, corolla inserted round the epigynous disk, stamens inserted on the corolla-tube, alternating with its lobes. Ovary as a rule 2-celled.

72. **Valerianaceæ.** Herbs or shrubs. Leaves opposite, exstipulate. Flowers sessile, cymose, sometimes polygamous or dicœcious, bracteate. Stamens 1-4, on the corolla-tube. Fruit indehiscent, dry, 1-seeded. Seed pendulous.

73. **Dipsaceæ.** Herbs or rarely shrubs. Leaves opposite or whorled, exstipulate, sometimes connate at the base, entire, toothed. Flowers scattered in cymes, whorled in spikes. Stamens 4 or 2. Seed pendulous, albumen copious.

74. **Compositeæ.** L. as a rule alternate, stipules 0. Inflorescence a dense head of many small fl., sessile on a broad receptacle and enclosed in an involucre of whorled or imbricate bracts. Calyx usually a pappus of hairs on the top of the ovary, stamens on the corolla-tube, anthers usually connate, connective produced upwards.

75. **Campanulaceæ.** Herbs or undershrubs, sometimes twining. Leaves alternate or opposite, entire, toothed or rarely lobed; stipules 0. Inflorescence axillary or terminal. Stamens 4-6, alternating with the corolla-lobes. Fruit capsular. Seeds very many.

76. **Vacciniaceæ.** Shrub or small trees. Leaves alternate or falsely whorled, entire or serrate; stipules 0. Flowers racemose or axillary and solitary. Stamens 10. Fruit a berry, rarely dry, 5-or falsely 10-celled. Seeds many, albuminous.

77. **Ericaceæ.** L. alternate, simple, stipules 0. Fl. bisexual, 4-or 5-merous, stamens as a rule twice the number of corolla-lobes, anther-cells opening at the top by pores or short slits. Ovary inferior or superior, 4-5-or many-celled, ovules numerous on an axile placenta.

78. **Plumbaginaceæ.** Herbs or undershrubs. Flowers in terminal scapes or peduncles, capitate, racemed or panicled. Petals 5. Stamens 5, opposite the petals, filaments rarely united into a linear tube. Stamens 5, opposite the petals. Capsule membranous.

79. **Primulaceæ.** Perennial, rarely annual herbs. Leaves all radical, or if cauline opposite, alternate or whorled, exstipulate. Flowers hermaphrodite, regular. Stamens on the corolla-tube, opposite its lobes. Capsule dehiscing transversely or by valves. Seeds minute, usually angular.

80. **Myrsinaceæ.** L. alternate, simple, gland-dotted, stipules 0. Calyx persistent, often enlarged in fr. Corolla-tube short or none, stamens opposite the corolla-segments. Ovary 1-celled, ovules on a free central placenta.

81. **Sapotaceæ.** L. entire, usually alternate and coriaceous. Fl. bisexual, calyx persistent, segments 4-8, almost distinct, corolla-tube short, lobes 4-24. Fr. a 1-8-seeded berry, seeds oily, with a crustaceous shining testa.

82. **Ebenaceæ.** L. entire, as a rule alternate, stipules 0. Fl. regular, usually diœcious, calyx gamosepalous, persistent and generally enlarged in ft.; segments 3-6, corolla-segments 3-6, stamens usually twice the number of corolla-lobes, filaments variously connate at base, often in pairs, anthers basifixed. Rind of fr. coriaceous, seeds embedded in soft or viscid pulp.

83. **Styraceæ.** L. alternate, stip. 0. Fl. bisexual, regular, 4-5-merous, calyx superior or inferior, limb persistent, petals free or connate, stamens 10 or numerous. Ovary 2-5-celled, ovules 1 or few on the inner angle.

84. **Oleaceæ.** L. as a rule opposite, stip. 0. Fl. regular, as a rule bisexual, in trichotomous panicles, calyx small, often truncate. Stamens 2, filaments usually short, ovary free, 2-celled, ovules 1 or 2 in each cell.

85. **Apocynaceæ.** L. entire, as a rule opposite or whorled, stipules 0 or small, sometimes intrapetiolar. Fl. regular, bisexual, usually pentamerous. Calyx free, corolla-lobes spreading, mostly contorted in bud, stamens 5, inserted in the corolla-tube. Carpels 2, usually distinct. Seeds often with a tuft of hairs. Endosperm scanty.

86. **Asclepiadaceæ.** L. entire, as a rule opposite, stipules 0. Fl. regular, bisexual, pentamerous. Calyx inferior, sepals imbricate in bud. Stamens 5, inserted on the base of the corolla, anthers cohering or connate, enclosing the stigma, pollen-grains as a rule united into waxy masses. Corona corolline or staminal. Carpels 2, distinct. Seeds usually winged and surmounted by a dense brush of hairs. Embryo large, in copious endosperm.

87. **Loganiaceæ.** L. opposite, simple, generally connected by interpetiolar stipules or by a raised line. Fl. regular. usually bisexual, ovary free, 2-celled. Embryo straight, in copious endosperm.

88. **Gentianaceæ.** Herbs, rarely minutely hairy. Leaves opposite, rarely alternate, entire, or alternate and 3-foliolate in Menyanthes. Fl. cymose, capitate or umbelled, rarely solitary, regular. Stamens on the corolla-tube, as many as its lobes ; filaments linear. Capsule membranous, rarely fleshy and berried. Seeds numerous, small.

89. **Polemoniaceæ.** Herbs, shrubs, or trees. Leaves exstipulate. Flowers showy, regular, hermaphrodite, 5-merous. Calyx inferior. Stamens 5, on the corolla-tube, alternate with its lobes. Capsule septicidal, 3-valved. Seeds many, albuminous ; embryo straight.

90. **Hydrophyllaceæ.** Herbs, rarely shrubs, usually hairy, sometimes glandular hairy. Leaves simple or compound, exstipulate, usually alternate, rarely opposite. Flowers bisexual, regular, usually 5-merous. Fruit usually a loculicidal capsule. Seeds minute, embryo small.

91. **Boraginaceæ.** L. as a rule alternate and simple, stipules 0. Fl. bisexual, as a rule regular and pentamerous, in unilateral spikes or racemes, calyx free, persistent, lobes valvate in bud. Ovary superior, cells 2, each with 2 ovules, or 4, each with one ovule. Fr. a drupe or consisting of 4 nutlets.

92. **Convolvulaceæ.** L. alternate, stipules 0. Fl. large, bisexual, regular, pentamerous, sepals distinct, persistent Fr. a berry or capsule, seeds 2-4.

93. **Solanaceæ.** L. as a rule alternate, stipules 0. Fl. regular, pentamerous, calyx usually gamosepalous, ovary free. Fr. a berry or capsule, seeds numerous.

94. **Scrophulariaceæ.** L. usually opposite, stip. 0. Fl. usually bisexual, corolla bilabiate, stamens 4, didynamous. Fr. a capsule, seeds numerous.

95. **Lentibulariaceæ.** Herbs, aquatic or in wet places. Leaves radical, rosulate, or capillary multifid or obsolete. Flowers hermaphrodite, purple, yellow, or white. Stamens 2, attached to the base of the corolla. Capsule globose, 2-4 valved. Seeds numerous, small.

96. **Gesneraceæ.** Herbs or undershrubs. Leaves opposite, alternate or solitary, undivided, entire or toothed; stipules 0. Flowers hermaphrodite, rarely regular. Fruit capsular or berried, dehiscent or indehiscent. Seeds very many.

97. **Bignoniaceæ.** L. usually opposite, compound, leaflets opposite, stip. 0. Fl. bisexual, generally zygomorphic, calyx gamosepalous, truncate, split or toothed. Ovary free, supported by an annular disk. Fr. often elongated, generally dehiscent, the two valves separating from the dissepiment, to which numerous seeds are attached.

98. **Pedalineaceæ.** Herbs or undershrubs. Leaves opposite, or the upper alternate, entire, toothed or divided. Flowers irregular, axillary, solitary or rarely clustered. Stamens 4, didynamous; rarely 2. Capsule 2 or 3-4-celled. Seeds wingless, exalbuminous.

99. **Acanthaceæ.** L. opposite, stip. 0. Fl. bisexual, mostly irregular. Ovary free, 2-celled, style filiform, bifid, one branch often obsolete. Capsule loculicidal, seeds seated on hard curved acute supports.

100. **Verbenaceæ.** L. usually opposite or whorled, stip. 0. Fl. bisexual or by abortion polygamous, usually zygomorphic. Calyx as a rule gamosepalous and persistent, lobes imbricate, stamens usually 4, ovary 2-or 4-celled, 1 ovule in each cell.

101. **Labiatæ.** Mostly aromatic, branches usually 4-sided, L. opposite or whorled, stip. 0. Fl. zygomorphic, calyx persistent, corolla usually 2-lipped, lobes imbricate in bud. Stamens didynamous, the 2 upper sometimes imperfect or wanting. Ovary free, usually 4-lobed, supported by the annular disk. Fr. of 4 one-seeded nutlets.

102. **Plantaginaceæ.** Scapigerous herbs. Leaves usually radical. Flowers small, greenish, spicate, often dimorphic. Stamens 4, inserted on the corolla-tube; filaments capillary. Capsule 1-4-celled. Seed usually peltate, testa thin.

iii. Apetalæ.

103. **Nyctaginaceæ.** L. as a rule entire and opposite, stip. 0. Fl. usually bisexual, often involucrate, perianth small, petaloid. Ovary free, 1-celled, ovule 1. Fr. indehiscent, enclosed in the persistent perianth-tube.

104. **Amarantaceæ.** Stip. 0. Fl. usually bisexual, perianth of 5 persistent sepals, imbricate in bud. Stamens opposite the sepals, ovary free, 1-celled. Seed one, embryo horseshoe-shaped or annular, surrounding a mealy endosperm.

105. **Chenopodiaceæ.** L. alternate, rarely opposite, simple, stip. 0. Fl. small, perianth of 3-5 sepals, stamens opposite the sepals. Fr. generally enclosed in the perianth, seed one, embryo curved, annular or spiral.

106. **Phytolaccaceæ.** Glabrous trees, shrubs or herbs. Leaves alternate, quite entire, stipules small or 0. Flowers racemed, bracteate and 2-bracteolate. Stamens 4, alternate with the petals. Carpels 1 or more, superior, free or connate. Seeds erect, often arillate.

107. **Polygonaceæ.** L. alternate, simple, stipules scarious or membranous, usually sheathing. Fl. small, usually bisexual, perianth of 4-6 persistent segments, imbricate in bud, stamens opposite the segments. Ovary free, 1-celled, compressed or trigonous. Fr. a small hard nut, seed one.

108. **Podostemonaceæ.** Aquatics, growing on stones in tropical streams, annual or perennial. Flowers 1-sexual, rarely diœcious, usually enclosed in a spathe. Stamens definite or not, free or connate. Capsule 1-3-celled. Seeds minute; embryo straight.

109. **Nepenthaceæ.** Climbing or prostrate evergreen undershrubs. Leaves alternate, exstipulate, midrib stout. Stamens 4-16, united in a column crowned by the usually connate anthers with extrorse dehiscence. Capsule coriaceous. Seeds very numerous.

110. **Cytinaceæ.** Leafless brown reddish or yellowish parasites, or with leaves reduced to scales. Flowers solitary. Stamens 8 or more. Ovary 1-celled. Fruit fleshy, 1-celled. Seeds innumerable, very minute.

111. **Aristolochiaceæ.** L. alternate, stip. 0. Fl. bisexual, perianth campanulate or tubular, 3-lobed or 2-lipped, ovary inferior, placentas parietal, ovules numerous.

112. **Piperaceæ.** L. alternate, entire, basal nerves 3 or more, stipules membranous, enclosing the buds. Fl. usually diœcious or polygamous, in catkinlike spikes, perianth 0, stamens 1-4, hypogynous. Berry 1-celled, seed globose.

113. **Chloranthaceæ.** Herbs, shrubs or trees, usually aromatic. Leaves opposite, usually toothed, petioles often connate and forming a sheath. Flowers in terminal or pseudo-axillary spikes, heads or panicles, 1-sexual. Stamens 1 or 3 connate. Ovary 1-celled. Seed pendulous, testa membranous.

114. **Myristicaceæ.** Aromatic. L. entire, penninerved, stip. 0. Fl. 1-sexual, perianth as a rule 3-lobed, valvate in bud, anthers 6-30, usually sessile, ovary free, ovule 1, erect. Seed arillate, endosperm oily, ruminate.

115. **Lauraceæ.** Aromatic. L. as a rule entire and evergreen, stip. 0. Perianth regular, deeply 6-cleft, segments biseriate, tube often enlarged in fr., stamens perigynous, normally 12 in 4 circles, those of the innermost circle often wanting, those of the two outermost circles opposite to perianth-segments, anther-cells 2 or 4, opening by valves. Ovary free, 1-celled. Fr. a berry or drupe, seed one, cotyledons thick, oily.

116. **Hernandiaceæ.** L. alternate, stip. 0. Perianth of 4-10 segments, stamens 3-5, anther-cells 2, opening by valves.

117. **Proteaceæ.** L. hard, mostly alternate, stip. 0. Fl. bisexual, perianth of 4 segments, in bud valvately cohering into a cylindrical tube, tips free, recurved. Stamens 4, filaments inserted on perianth-segments. Ovary free, 1-celled. Seeds few.

118. **Thymelæaceæ.** L. simple, quite entire. Fl. usually bisexual, perianth tubular or campanulate, lobes 4 or 5, imbricate in bud. Stamens inserted on the perianth, usually twice the number of lobes. Ovary free, usually 1-celled.

119. **Elæagnaceæ.** Often spinescent, with silvery or brown stellate scales or hairs. L. alternate, quite entire, stip. 0. Fr. indehiscent, entirely enclosed within the lower fleshy part of perianth, seed 1, radicle inferior.

120. **Loranthaceæ.** Parasitic on stems and branches. L. entire, usually opposite, sometimes wanting. Fl. regular, perianath simple or double, stamens equal to and opposite

the petals or perianth-lobes. Ovary inferior, 1-celled, ovule 1, adnate all round to the ovary walls. Fr. usually viscid.

121. **Santalaceæ**. Mostly root-parasites. L. entire, stip. 0. Perianth usually adnate to ovary, 5-8-lobed, stamens opposite to lobes, ovary 1-celled, ovules several. Drupe or nut 1-seeded.

122. **Balanophoraceæ**. Flowers monœcious or diœcious, small or minute, crowded on spadix-like peduncled heads or cones. Stamens 1-2 in the naked flowers; in the flowers with a perianth as many as its lobes and opposite them or more, filaments 0. Fruit minute, crustaceous or coriaceous, 1-seeded. Seed usually adherent to the pericarp.

123. **Euphorbiaceæ**. L. in most genera alternate, undivided and stipulate. Fl. as a rule unisexual. Perianth calycine, several genera with petals. Ovary superior, as a rule of 3 carpels, more or less united, styles 3, ovules 1 or 2 in each cell, pendulous from the inner angle.

124. **Ulmaceæ**. L. distichous, undivided, stipulate. Perianth 4-9-lobed or of 4-5 sepals, stamens opposite to perianth-segments, rarely twice their number. Ovary of 2 carpels, usually 1-celled, ovule 1, pendulous.

125. **Moraceæ**. L. usually alternate, stipules large, often amplexicaul. Fl. unisexual, crowded on receptacles, which are globose, cylindric or hollow. Female flowers-perianth of 4 sepals or segments, often fleshy in fr. Ovary 1-celled, ovule 1, usually pendulous.

126. **Urticaceæ**. L. alternate, stipulate, as a rule dentate, basal n. 3. Fl. unisexual, sessile, usually in compact heads or clusters, stamens 4 or 5, opposite to perianth-segments, filaments inflexed in bud. Ovule erect, orthotropous.

127. **Juglandaceæ**. L. alternate, pinnate, stip. 0. Fl. monœcious; male flowers in lateral pendulous catkins. Female flowers in few-or many-fld. spikes, perianth adnate to the 1-celled ovary, ovule 1, erect. Cotyledons oily, endosperm 0.

128. **Myricaceæ** Aromatic. L. alternate, coriaceous, stipules 0. Fl. unisexual, in catkins, stamens 3-6 in the axils of broad bracts. Fr. fleshy, endocarp bony, seed 1, endosperm 0.

129. **Fagaceæ**. L. alternate, simple, penninerved, stip. deciduous. Fl. monœcious, male flowers in drooping catkins or in erect spikes, anther-cells not distinct. Female flowers in spikes, each fl. or group of fl. enclosed in an involucre of numerous bracts, coalescing in fr., perianth adnate to ovary. Ovary 2-6-celled, 2 pendulous ovules in each cell.

130. **Betulaceæ.** L. alternate, undivided, as a rule serrate, stipules deciduous. Fl. early in spring, male fl. in drooping catkins, anther-cells as a rule distinct, female fl. in spikes, ovary 2-celled, 1 pendulous ovule in each cell, styles 2, long, filiform, perianth 0 or adnate to ovary.

131. **Salicaceæ.** L. deciduous, alternate, simple, stipulate. Fl. diœcious, in catkins similar in both sexes, 1 fl. in the axil of each bract, a disk at the base of stamens and ovary, perianth 0. Ovary 1-celled, ovules many on 2-4 parietal placentas. Seeds many, minute, enclosed by long silky, deciduous hairs.

b. Gymnosperms.

132. **Gnetaceæ.** Stem and branches jointed at the nodes. L. opposite or reduced to a short sometimes 3-4-dentate sheath. Fl. unisexual, ♀ one erect ovule, integument single, prolonged into a tube. Ovule enclosed in a perianth, which usually becomes fleshy in fr.

133. **Taxaceæ.** L. mostly narrow, linear or lanceolate. Fl. mostly diœcious. Carpels usually few or even 1 terminal, with 1-2 ovules each.

134. **Pinaceæ.** L. usually needl-like or scaly. Fl. mostly monœcious. Male flowers in deciduous catkin consisting of numerous sporophylls which are usually scale-like. Female flowers in cones consisting of scale-like open carpels which are flat or peltate.

135. **Cycadaceæ.** Trunk cylindric, sometimes branched, with terminal tufts of rigid, pinnate leaves, pith and bark large. Fl. diœcious, at the apex of trunk among the leaves, male fl. in erect cones with numerous thick scales, bearing on the under-surface many globose anther-cells. Female fl. carpophylls densely woolly in crowded whorls around the top of trunk, each with 1-5 pairs of ovules on its edge.

GLOSSARY

OF

BOTANIC TERMS.

A

Abortion, imperfect development or non-development of an organ; **abortive,** obsolete; imperfectly developed.

Accrescent, increasing in size with age; usually said of parts of the calyx or corolla that persist and enlarge after flowering.

Achene, a small dry indehiscent 1-celled 1-seeded fruit or a 1-seeded indehiscent carpel of an apocarpous fruit.

Acicular, needle-shaped; long and slender.

Acorn, fruit of the oak. *i.e.*, a nut enclosed within a cup formed of an involucre of thickened bracts.

Actinomorphic, divisible into similar halves by two or more planes; said of flowers.

Aculeate, abounding with prickles.

Acumen, a sharp tapering point more or less prolonged.
Acuminate, terminating in an acumen.

Acute, evenly tapering and ending in a narrow angle, but without a prolongation.

Adnate, said of dissimilar organs when congenitally united.

Adpressed, lying close throughout the entire length against the surface.

Adventitous, occuring in an unusual position; usually applied to buds and roots.

Æstivation, the mode in which the parts of a flower are folded in the bud, also their relative position.

Albumen, the nutritive substance found within the seed coats of some seeds outside the embryo.

Amplexicaul, said of a sessile leaf or the base of a petiole when clasping the stem.

Anastomosing, reticulately united.

Anatropous, said of an inverted ovule, *i.e.*, one with the micropyle close to the hilum, and the chalaza at the opposite end, the axis of the ovule itself remaining straight.

Androphore, the tube or column on which some stamens are supported.

Andrœcium, the male organs of a flower collectively.

Androgynous, said of an inflorescence bearing both male and female flowers.

Angiosperm, a subphylum (which includes the two classes Monocotyledons and Dicotyledons) in which the ovules are enclosed in the ovary and are fertilized through the stigma.
Annulate, marked transversely by rings.
Anterior, said of that part of a flower which faces outwards from the axis of inflorescence; inferior.
Anther, the part of a stamen that bears the pollen.
Antipetalous, inserted opposite the petals.
Apetalous, without petals.
Apiculate, with a short pointed tip.
Arborescent, tree-like, growing to the size of a tree.
Apocarpous, with the carpels free and distinct.
Arcuate, shaped like a bow, *i.e.,* moderately curved.
Areola, a small space with clearly defined outline *e.g.,* the spaces bewteen the reticulating veinlets of a leaf.
Aril, arillus, an accessory seed-covering or an appendage growing from or about the hilum of a seed. **Arillate,** having an aril. **Arillode,** a false aril growing from the micropylar end.
Aristate, bearing an awn, or bristle *e.g.,* glumes of some grasses.
Articulate, jointed in such a manner as to separate at maturity.
Ascidium, a pitcher-like cavity formed by a modification of the leaf stalk or blade.
Ascending, directed obliquely upward.
Attenuate, narrow and gradually tapering.
Auricle, an appendage like the lobe of an ear. **Auriculate, auricled;** having an auricle.
Awn, a bristle-like appendage, especially of the glumes of grasses.
Axil, the upper angle formed by a leaf or a similar organ and the supporting stem or axis. **Axillary,** relating to the axil.
Axile, relating to the axis; generally said of a kind of placentation in which the ovules are borne on the axis at the inner angles of the cells of a syncarpous ovary.
Axis, the central line or support round or on which parts of an organ are arranged.

B

Baccate, berry-like, pulpy.
Basifixed, fixed by the base, especially said of an anther attached at its lower end to the top of the filament; innate. **Basal, basilar** attached to the base.
Bast, fibrous inner bark.
Beak, a sharp tip like the bill of a bird.
Berry, a simple fruit succulent throughout, without a stone, and generally with more than one seed.
Bifarious, in two opposite vertical rows.
Bifid, divided into two segments with a narrow sinus.
Bifurcate, two-forked, having two prongs or branches.
Bilabiate, having two lips, a term usually applied to gamosepalous calyces and gamopetalous corollas.

Bipinnate, twice pinnate.
Biseriate, in two series or rows, generally one above or within the other.
Bisexual, having both stamens and pistil in the same flower; hermaphrodite.
Biternate, twice ternate.
Blade, the expanded portion of a leaf or a clawed petal.
Bole, the main axis or trunk of a tree.
Brachiate, widely spreading, a term applied to branches.
Bract, a rudimentary or modified leaf subtending a flower or an inflorescence. **Bracteate,** having bracts.
Bracteole, a secondary bract or one of the ultimate grade subtending each flower of an inflorescence. **Bracteolate,** having bracteoles.
Bulb, a short, usually underground stem, consisting of a short axis, bearing a bud or buds enclosed in fleshy scales or coats. **Bulbiform,** formed like a bulb. **Bulbous,** of the nature of bulbs. **Bulbil,** small axillary bulbs.
Buttressed, said of stems with vertical ridges or projections.

C

Caducous, falling off very early.
Cæspitose, tufted or growing in tufts, *e.g.*, many species of bamboos.
Callus, the new tissue which forms over the wounds of plants.
Calyx, the outer whorl of floral leaves, immediately below or outside the corolla. **Calycine,** relating to the calyx.
Calyptra, a cap or hood. **Calyptrate,** hooded.
Cambiumlayer, a zone of tender thin-walled cells separating the wood from the bark in Dicotyledons and Gymnosperms, by the division and growth of which new wood and bark are formed.
Campanulate, bell-shaped—deeper than cupshaped.
Canescent, with very short grey hairs or pubescence giving the epidermis a greyish white hue.
Capillary, slender, hairy or thread-like.
Capitate, having a globose head.
Capitulum, a globose head or cluster or sessile or shortly pedicellate flowers.
Capsule, a dry syncarpous fruit, which opens at maturity to discharge the seed.
Carpel, one of the component parts of a syncarpous or apocarpous pistil. **Carpellary,** relating to a carpel.
Carpophore, the part of the axis of a flower situated between or above the Carpels, and to which the Carpels are attached.
Caruncle, a wart-like appendage, produced at the base of a seed.
Cartilaginous, firm and tough, like parchment.
Caryopsis, a grain; the seed-like fruit of Gramineæ with thin pericarp, which is usually adnate to the contained seed.
Catkin, a scaly spike or raceme of unisexual flowers, pendulous or drooping, and generally deciduous.

Caudate, furnished with a tail, or with a slender tail-like terminal appendage.
Cauline, pertaining to the stem.
Cell, the living vegetable unit; the structural unit in the formation of a plant. Also one of the cavities of an ovary or of an anther.
Chalaza, that part of the ovule where the base of the nucellus is confluent with the coats of the ovule.
Chartaceous, having the texture of writing paper, thin and flexible.
Cilia, marginal hairs forming a fringe like eye-lashes.
Ciliate, having cilia; dim. **ciliolate.**
Circinate, coiled inwards from the tip.
Cirrhose, cirrose, bearing tendrils.
Circumsciss, dividing or opening circularly or transversely.
Cladode, a branch more or less flattened which assumes the form and functions of a leaf.
Clavate, club-shaped, slender below and gradually thickened upwards.
Claw, the narrowed base of certain petals.
Cocci, pl. of coccus, the seed-like dehiscent or indehiscent segments of the dry fruit which separate at maturity.
Cogener, one of the same genus.
Coherent, similar parts united together but separable without rupture.
Collateral, side by side.
Coma, a tuft of soft hairs or cotton borne on a seed. **Comose,** having a coma.
Commissure, the union line between two parts.
Concolor, Concolorus, of the same colour throughout.
Confluent, blending together.
Conduplicate, folded once upon itself lengthwise.
Cone, the multiple fruit of Conifers forms mostly of imbricated scales by which the seeds are subtended.
Connate, said of similar organs or parts of the same organ when congenitally united.
Connective, the portion of a stamen that connects the two lobes or cells of an anther.
Connivent, conniving, said of sepals, petals or anthers having the apex arching over or converging in the centre of the flower.
Contorted, convolute, twisted in one direction upon itself; said of leaves or petals in a bud with one margin within and the other outside the whorl.
Convergent, said of lateral nerves of leaves curved from base to apex.
Cordate, heart-shaped; when applied to the base of a leaf or other organ—with two broad rounded lobes on either side of the axis.
Coriaceous, leathery, tough and thick.
Corm, a solid fleshy underground stem more or less jointed and naked or with thin scales, such as is characteristic of certain families, *e.g.,* Aroideæ.
Corolla, the inner whorl of floral leaves.

Corona, a whorl of process from the corolla, or from stamens in some families like Asclepiadaceæ.
Cortical, relating to the cortex or bark.
Corymb, an inflorescence of the indefinite or centripetal kind in which the lower branches or pedicels, are longer than the upper, and thus although starting from different points, all attain almost the same level.
Costate, furnished with one or more primary ribs or veins.
Cotyledons, the seed lobes or first leaves of an embryo.
Crateriform, shaped like a shallow cup.
Crenate, with rounded teeth.
Crustaceous, hard and brittle; said of a covering which splits and breaks off easily.
Cruciform, in the form of a cross; generally said of flowers with four petals arranged crosswise.
Culm, the hollow and jointed stem of grasses, especially of bamboos.
Cuneate, wedge-shaped, acute angled at the base.
Cupula, cupule, a cup-like involucre of thickened bracts supporting the nut of the oak.
Cupular, cup-shaped.
Cusp, a long and tapering rigid point. **Cuspidate,** furnished with a cusp.
Cuticle, the outermost layer of the epidermis.
Cyathiform, wine-cup shaped.
Cyme, an inflorescence of the definite or centrifugal type in which the main axis and all the lateral axis are each terminated by a flower so that flowering proceeds from the centre outwards.
Cypsela, a dry inferior achene invested with the adnate calyx; the fruit of Compositæ.
Cystolith, a crystalline concretion usually of calcium carbonate in the cells of some plants.

D

Decandrous, with ten stamens.
Deciduous, said of trees or shrubs which are leafless for a part of the year; also of leaf or parts of a flower which fall off normally.
Declinate, bent to one side.
Decompound, compound or divided more than once.
Decumbent, inclined downwards but with the tip ascending.
Decurrent, produced down, as a sessile leaf when the blade is prolonged below the insertion along the stem forming a winged appendage.
Decurved, bent or directed outwards.
Decussate, in pairs alternately crossing at right angles.
Deflexed, bent downward.
Dehiscence, the mode of opening of a capsule or of an anther.
Deltoid, triangular in outline or in section.
Dentate, with margins cut into triangular salient teeth directed outward. **Denticulate,** minutely toothed.

Dextrorse, turning or twining from left to right, *i.e.*, in the anti-clockwise direction.
Di, Dis (prefix), two, twice, double.
Diadelphous, said of stamens united by their filaments into two sets of bundles.
Dichasium, a falsely dichotomous cyme of which the main axis ends in a flower and branches below the latter into two lateral axes of almost equal strength.
Diclinous, having the stamens in one flower and the pistil in the other.
Didymous, slightly 2 lobed or occuring in pairs.
Didynamous, said of a flower with two long and two short stamens, and also of stamens when they are such.
Diffuse, widely spreading;—stems, procumbent and also very much loosely branched.
Digitate, finger-like; said of a compound leaf with the leaflets all borne on the apex of the common petiole.
Dimorphic, dimorphous, having two forms, generally said of hermaphrodite flowers having one form with long styles and short stamens, and another with short styles and long stamens.
Dicœcious, unisexual with the male and female flowers on separate individuals.
Disk, Disc, an enlargement of the receptacle of a flower in the form of a cup or of a cushion, ring or glands. **Discoid, disciform,** disk-like; circular and flat. **Disc-florets,** those borne on the central portion of a capitulum.
Dissepiment, a partition in an ovary or pericarp in the direction of its length.
Distal, furthest from the base.
Distichous, arranged in two opposite vertical rows.
Divaricate, spreading widely apart.
Dorsal, relating to, or inserted on, the back.
Dorsifixed, said of an anther attached to the top of the filament by a part not the whole of the back.
Drupe, a stone fruit, *i.e.*, one with a fleshy or pulpy pericarp and a bony or crustaceous endocarp. **Drupaceous,** like a drupe. **Drupelet,** drupel. a dimunitive drupe.

E

E, Ex (prefix), without or out of.
Ebracteate, without bracts. **Ebracteolate,** without bracteoles.
Echinate, set all round with sharp bristles like a hedge hog.
Effuse, very widely spreading.
Elliptic, elliptical, oblong with rounded ends. **Ellipsoid,** a solid with an elliptical outline.
Emarginate, with a notch at the apex.
Embryo, the rudimentary plantlet formed in a seed.
Endocarp, the inner layer of the pericarp.

Endosperm, the albumen of a seed.
Ensiform, in the shape of a sword.
Epi (prefix) upon.
Epicalyx, a whorl of bracts below the calyx proper and somewhat resembling it in shape and colour.
Epicarp, the outer layer of a pericarp.
Epidermis, the outermost layer of tissue or skin of a plant.
Epigynous, inserted on the top of the ovary.
Epipetalous, said of stamens which are borne on, or adnate to the petals or corolla.
Epiphyllous, growing on leaves or perianths.
Epiphyte, a plant growing on, but not nourished by another plant. **Epiphytic,** having the habit of an epiphyte.
Equitant, said of two ranked leaves, or leaves in bud, when folded lengthwise, the outer ones at their base folding over the inner.
Erose, with an irregularly toothed margin.
Exalbuminous, without albumen.
Excavate, hollowed into broad deep pits.
Exocarp, the external layer of the pericarp when an endocarp is present.
Exserted, projecting outwards as anthers beyond the corolla.
Exstipulate, without stipules.
Extra-axillary, growing outside the axil, *i.e.*, above, below or one side of it.
Extrorse, applied to anthers that dehisce outwards, *i.e.*, away from the axis of the flower.

F

Falcate, curved like the blade of a sickle or scythe.
Family, a group of co-related genera.
Farina, starch or anything resembling it or analogous to it.
Farinaceous, consisting of or resembling starch.
Fascicled, fasciculate, in dense clusters.
Fastigate, said of branches which are nearly parallel and point upwards.
Ferruginous, coloured like iron rust.
Fibro-vascular, said of a tissue consisting of woody fibres and ducts or vessels.
Filament, the stock of an anther.
Filiform, thread-like.
Fimbriate, having a fringe or border of fine thread-like processes.
Fistular, hollow tubular.
Flabellate, fan-shaped.
Flaccid, soft, flabby, wanting in stiffness.
Floccose, wooly with locks of dense soft hairs that are easily detached.
Foliaceous, of the form or texture of a leaf.
Follicle, a dry fruit resulting from a single carpel opening by only

one usually the inner suture. **Follicular,** pertaining to or resembling a follicle.

Foramen, the minute aperture in the coats of an ovule corresponding to the micropyle of a seed.

Free, distinct, not adnate to any other organ. **Free central,** said of the placenta of an one-celled ovary when it forms a central ovule bearing column arising from the base.

Fugacious, falling off or fading very early.

Fulvous, tawny.

Funicle, the stalk of an ovule or seed.

Furcate, forked.

Fuscous, brown or greyish brown.

Fusiform, spindle-shaped; solid and tapering at both ends.

G

Gamopetalous, having combined petals.

Gamophyllous, said of a flower having a perianth of united leaves or segments; also applied to such a perianth.

Gamosepalous, having combined sepals.

Geminate, growing in pairs.

Geniculate, bent abruptly.

Genus, pl. genera, a group of closely related species indicated by the first name of a plant.

Gibbous, having a pouch-like swelling or protuberance on one side.

Glabrous, without hairs of any kind. **Glabrate,** somewhat glabrous. **Glabrescent,** becoming glabrous.

Glands, small wart-like bodies or round excrescences of any kind found on stems, petioles, etc., or inside flowers. Small raised superficial dots, or minute vescicles imbedded in the substance of leaves, etc., usually filled with oil. **Glandular,** having glands or relating to glands.

Glaucous, of a bluish-grey colour, often covered with a fine bloom.

Globose, nearly spherical.

Glochidia, barbed bristles.

Glomerate, compactly clustered.

Glumes, the chaffy bract-like scales of the inflorescence of grasses and their allies. **Glumaceous,** resembling or relating to glumes.

Glutinous, sticky.

Gonophore, a stipe or stalk supporting both stamens and ovary in a flower.

Gymnosperm, with naked seeds, *i.e.*, not enclosed in a seed-vessel: a group comprising the Fir, Gnetum and Cycas families, the naked seeds of which are fertilised by direct contact with the pollen; see angiosperm.

Gynobase, a short and broad elongation of the torus on which the pistil rests. **Gynobasic,** resting on a gynobase.

Gynophore, the stipe or stalk supporting an ovary.

H

Hastate, spear-head shaped, usually said of leaves with a pointed apex, and basal lobes directed outwards.
Haustorium, pl. haustoria, a sucker at the end of a parasitic root; a root-like sucker.
Head, a form of inflorescence consisting of a more or less dense cluster of sessile flowers which are centripetal in evolution.
Helicoid, coiled in a spiral.
Hermaphrodite, bisexual; having both stamens and pistil in the same flower.
Heter, hetero, (prefix) different.
Heterogamous, said of fllower heads when male, female, bisexual and neuter florets, or any two or three of these, are borne on the same head.
Hilum, the place of attachment of an ovlue or seed to the placenta or funicle.
Hirsute, thickly covered with long and rather coarse hairs.
Hispid, beset with rigid or bristly hairs.
Homogamous, said of a flower head with the florets all of the same sex.
Hyaline. transparent or translucent and colourless.
Hypanthium, an enlargement of the torus of the flower under the calyx or perianth.
Hypocrateriform, salver-shaped; said of a corolla with a slendet tube abruptly expanded into a flat horizontal limb.
Hypogynous, inserted below the ovary.

I

Imbricate, overlapping.
Imparipinnate, unequally pinnate; pinnate with a terminal leaflet or pinna.
Impressed, marked with small depressions. **nerves,** those slightly below the surface of the leaf.
Incised, cut sharply and irregularly.
Included, not protruding beyond the surrounding organs, usually said of stamens or styles that are not produced beyond the corolla.
Incomplete, said of a flower wanting calyx or corolla or both.
Incumbent, leaning upon.
Indehiscent, said of fruits the pericarp of which does not open to discharge the seeds.
Indumentum, a general term for any kind of hairy covering or coating.
Induplicate, with the margins folded inwards.
Induplicate-valvate, said of members of a whorl when they touch one another with margins of each folded inward.
Indurated, hardened.
Inferior, inserted below the ovary and free from it, if said of the

calyx; adnate to, or situated below the calyx, if said of the ovary; also anterior, when said of the relative position of the parts of a flower in an inflorescence.

Inflorescence, the mode in which flowers are arranged on the stem. Also used as a collective term for the whole flowering portion of the stem of a plant with its branches, bracts, bracteoles and flowers.

Infundibuliform, funnel-shaped.

Innate, said of an anther borne on the apex of the filament and with usually marginal dehiscence.

Innovation, a newly formed shoot.

Integuments, the coats of an ovule or seed.

Inter, (prefix) between.

Interpetiolar, said of stipules of opposite leaves when they are inserted between the petioles, *i.e.*, across the stem.

Intra, (prefix) within.

Intrapetiolar, is applied to stipules of single leaves when they are connate by their margins so as to form apparently one stipule.

Introrse, applied to anthers that dehisce or are turned towards the axis of the flower.

Intruded, projecting inward.

Involucre, a circle of bracts subtending a flower cluster.

Involute, rolled inward.

Irregular, wanting in symmetry of form, said of flowers with the petals or perianth segments unequal in size and shape.

Isomerous, having an equal number of members.

K

Keel, the central dorsal ridge, like the prow of a boat, formed by the two anterior and innermost petals of a Papilionaceous corolla.

Kernel, the contents of the putamen of a drupe.

L

Labiate, two-lipped.

Lacerate, irregularly cleft as if torn.

Laciniate, irregularly cut or fringed into narrow lobes or segments with narrow sinuses.

Lacunose, marked with minute pits or depressions.

Lamina, the blade of a leaf; the expanded portion of a clawed petal.

Lanate, wooly.

Lanceolate, shaped like a lance-head, *i.e.*, 2-4 times as long as broad, narrowed at both ends towards the apex, and broadest below the middle.

Latex, milky sap.

Lax, diffuse, said of an inflorescence when the flowers or fruits are not closely arranged on it.

Legume, a fruit of a single carpel usually opening by both sutures when ripe. See Pod.

Lenticel, a corky dot or protuberance on the bark. **Lentincellate,** having lenticels.
Lenticular, lentil shaped, *i.e.,* like a double convex lens.
Lepidote, scurfy with minute scales.
Ligule, anything shaped like a strap, such as the limb of the ray-corolla in some Compositæ; a thin and scarious projection from the summit of the sheath of the leaf of grasses; an outgrowth from the inner face of the base of some petals.
Ligulate, strap-shaped, usually applied to the ray-flowers of Compositæ.
Limb, the expanded part of a gamosepalous calyx or a gamopetalous corolla as distinguished from the tube; the blade of a clawed petal.
Linear, narrower than lanceolate, at least five times as long as broad.
Lineolate, marked with fine lines.
Lip, one of the two divisions of a bilabiate calyx or corolla.
Littoral, growing on or along the seashore.
Lobulate, divided into small lobes.
Loculicidal, applied to a kind of dehiscence of a capsular fruit in which splitting takes place through the cells.
Loculus, the cell of an ovary; the sac or cell of an anther.
Lodicule, one of the small scales which represent the perianth in the flower of a grass, occuring usually in pairs.
Lomentum, a form of legume which breaks up at maturity into one-seeded indehiscent segments.
Lyrate, pinnately lobed with a large terminal lobe and one or more pairs of small basal lobes, so as to resemble a lyre.

M

Macro, large or long (prefix).
Mamillate, having nipple-like prominences.
Marcescent, withering without falling off like the petals of some flowers.
Marginate, having a border, with a distinctive texture.
Median, relating to the middle, in a plane radial to the axis of a plant.
Medullary rays, verticular plates of cellular tissue which radiate from the centre of a dicotyledonous plant towards the cambium.
Membranous, thin, pliable like a membrane.
Meristem, tissue of cells capable of reproducing themselves by division.
Mesocarp, the middle layer of the pericarp.
Micro, small (prefix).
Micropyle, the minute orifice in the coats of a seed represented by a scar; the opening through the coats of an ovule at the apex of the nucellus
Mon, mono, single, alone (prefix).

Monadelphous, said of stamens united by their filaments into one bundle forming a tube or column or sheath.
Moniliform, cylindrical and constricted at regular intervals so as to a resemble a necklace of beads.
Monœcious, unisexual with the male and female flowers on the same plant.
Monopodial, pertaining to or of the nature of a monopodium, *i.e.*, a simple axis prolonged by means of a terminal bud.
Mucro, a short straight stiff and sharp point.
Mucronate, abruptly terminating in a mucro.
Multi, many (prefix).
Multifarious, in many vertical rows.
Multifid, cleft into many lobes or segments.
Multiseriate, in many series or rows.
Muricate, rough with sharp straight points.
Muticous, blunt.

N

Needles, the acicular leaves of conifers.
Nerves, the principal lateral ribs of a leaf. **Nervose,** with strongly developed nerves.
Nodose, with swollen joints; knotty, chiefly said of roots.
Nucellus, the central part of an ovule containing the embryo sac.
Nucleus, the solid portion of a winged seed or fruit; a clearly defined and comparatively dense portion of the cytoplasm which controls all activities of the cell.
Nut, a hard indehiscent 1-seeded fruit resulting from a syncarpous ovary.

O

Ob, reversed or inverted (prefix).
Obconic, inversely conical, *i.e.*, with the attachment at the pointed end.
Obcordate, inversely cordate, *i.e.*, broadly two-lobed with a notch at the apex.
Obdiplostemonous, having twice as many stamens as petals in two series, the outer being opposite the petals.
Oblanceolate, inversely lanceolate, *i.e.*, long, narrow and tapering at both ends, but broadest above the middle. **Oblanceoloid,** said of a solid having an oblanceolate outline.
Oblique, one-half larger than the other, unequal-sided—nerves, those making acute angles with the midrib.
Oblong, much longer than broad with the sides nearly parallel.
Obovate, inversely ovate, *i.e.*, egg-shaped in outline with the broad end towards the apex.
Obovoid, said of a solid which is inversely egg-shaped in outline.
Obsolete, rudimentary, imperfectly developed.
Obtuse, blunt or rounded at the apex.

Ochrea, Ocrea, a membranous tubular stipule or a pair of membranous stipules forming a sheath round the stem.
Oid, (suffix) resembling.
Operculum, a lid; a top which separates by a transverse line of separation.
Orbicular, orbiculate, flat with the outline circular or nearly so.
Order, a group of closely-related Families of plants.
Osseous, of bony texture.
Ovary, that portion of the pistil which includes one or more cavities or cells containing one or more ovules.
Ovate, egg-shaped in outline with the broad end towards the base.
Ovoid, said of a solid with an ovate or oval longitudinal section.
Ovule, the embryonic seed in the ovary.

P

Palea, or pale, a chaffy scale; the inner glume of the flower of a grass; the chaffy scales on the receptacles of many Compositæ. **Paleaceous,** chaff-like.
Palmate, with the midribs of the lobes or leaflets all radiating from the apex of the petiole, the segments like the spread fingers of the hand.
Palmatifid, palmate with the sinuses reaching half way down.
Palmatilobed, palmately lobed.
Palmatisect, deeply cut in a palmate manner.
Palmatipartite, with the segments palmately cut almost to the base.
Palminerved, with nerves radiating like the ribs of a palmate leaf.
Pandurate, Panduriform, fiddle-shaped.
Panicle, a compound inflorescence in which the main axis is racemose and the secondary and tertiary ramifications are racemose or not.
Papilionaceous, butterfly-like; applied to the kind of corolla characteristic of Papilionaceæ (the Pea Tribe) of Leguminosæ. See *Keel, Wings & Standard.*
Papillose, bearing minute nipple-shaped projections.
Pappus, thistle-down, the hairy tufts on achenes and other fruits.
Paraboloidal, said of a solid having a parabolic, *i.e.*, ovate-oblong outline.
Parasite, a plant that grows on or in another plant, and draws nourishment from it.
Parietal, said of placentas attached to the wall of a more than 1-carpelled ovary.
Paripinnate, Syn. **abruptly pinnate,** evenly pinnate; pinnate without the terminal leaflet or pinna.
Patent, widely spreading.
Pedate, Palmately divided with the lateral segments 2-cleft.
Pedicel, the ultimate stock supporting a single flower in an inflorescence. **Pedicellate,** having a pedicel.

Peduncle, the stalk supporting a solitary flower or fruit or a cluster of flowers or fruits. **Pedunculate,** having a peduncle.
Pellucid, transparent or translucent.
Peltate, shield-shaped; said of a flat body (*e.g.*, a leaf) attached to the stalk by the lower surface and not by the margin or base.
Penicillate, bordered or tipped with brush-like hairs.
Penninerved, pinnately nerved; with nerves spreading laterally from various points on the midrib.
Penta, five (prefix).
Pentadelphous, said of stamens arranged in 5 bundles
Pentamerous, having the members in each whorl of the flower in fives.
Penultimate, next to the ultimate.
Perianth, a floral envelope; a term especially used when the calyx and corolla are similar in form and texture, or are represented by a single whorl.
Perfoliate, said of a sessile leaf the basal lobes of which pass round the stem and are connate on the other side of it.
Pericarp, the portion of the fruit formed of the ovary and whatever adheres to it, exclusive of, and outside, the seeds.
Perigynous, inserted around but away from the ovary; said of the sepals, petals and stamens of a flower when these are inserted on a tube formed by the torus (the calyx-tube) above the level of the base of the ovary.
Persistent, remaining attached; generally said of a calyx or a corolla which remains attached until the fruit is mature.
Perisperm, the outer endosperm of some seeds derived from the nucellus, *e.g.*, Piperaceæ.
Perulate, wrapped in scales as many winter buds
Petal, one of the divisions of the corolla.
Petiole, the stalk of a leaf. **Petiolate,** having a petiole. **Petiolule,** the stalk of a leaflet. **Petiolulate,** having a petiolule.
Phloem, the soft tissue of the inner bark.
Phylloclade, Phyllocladium, a modified branch that resembles a leaf in form and function C|p. **Cladote.**
Phyllodium, a petiole having the form and function of leaves.
Pilose, thinly sprinkled with long soft simple hairs.
Pinna, pl. pinnæ, the primary division of a bipinnate or tripinnate leaf. **Pinnule,** the secondary division of a tripinnate leaf.
Pinnate, a compound leaf is so called when the leaflets are arranged on either side of a common axis.
Pinnatifid, deeply pinnately lobed to about half way down.
Pinnatisect, pinnately cut nearly to the common axis.
Pisiform, pea-shaped.
Pistil, the female organ of a flower consisting normally of ovary style and stigma. **Pistillode,** a rudimentary or barren pistil.
Placenta, that portion of the interior of an ovary on which the ovules are borne. **Placentation,** position of the placenta.
Plaited, plicate, folded in longitudinal plaits.

Plumose, feathered; branches on either side like the plume or webs on the shaft of a feather.

Pod, the same as legume, but has a wider application, being used to denote any dry dehiscent many-seeded fruit, especially when it is much longer than broad.

Pollen, minute powder-like grains contained in the anther cells, the fertilizing agent of a plant.

Poly, many (prefix).

Polyadelphous, having the stamens united by the filaments into many sets or bundles.

Polygamous, with hermaphrodite and unisexual flowers on one or different plants.

Polyphyllous, said of a perianth having distinct leaves or segments.

Pome, a succulent fruit with seeds in many cartilaginous dry cells. *e.g.*, the apple and the pear.

Pore, a minute passage or orifice.

Posterior, said of that part of a flower which is nearest to the axis of inflorescence; superior.

Prickle, a sharply pointed stiff outgrowth of the epidermis.

Procumbent,
Prostrate, } lying flat or close to the ground.

Proximal, nearest the base or starting point.

Pruinose, covered with a whitish waxy bloom or powder.

Pseud, Pseudo, false (prefix).

Pseudocarp, a false fruit; one which has some portion other than the ovary so developed as to resemble a fruit.

Pubescent, covered with short soft straight simple hairs.

Puberulous, puberulent, minutely pubescent.

Pulvinate, cushion-shaped.

Pulvinus, the swollen base of petioles or petiolules.

Punctate, dotted with small punctures or glands. **Punctulate,** minutely punctate.

Pungent, terminating in or tapering gradually to, a hard sharp point.

Pustular, with small blister-like elevations.

Putamen, the shell of a nut; the hard endocarp of a drupe.

Pyrene, one of the small stones of a drupaceous fruit having more than one stone.

Pyriform, pear-shaped; obovoid with a tapering base.

Q

Quadrangular, four-cornered.

Quadrate, square.

Quinquefoliolate, with five leaflets.

R

Raceme, an inflorescence of the indefinite kind in which the flowers are borne on pedicels of more or less the same length along a

single undivided axis or rachis, the oldest flowers being lowermost.

Rachis, the principal axis of a pinnate leaf or of an inflorescence. **Rachillum, pl. rachilla,** the secondary rachis of a compound spike; the rachis of a spikelet of grass.

Radical, relating to or springing from the root.

Radicle, the axis of an embryo below the cotyledons.

Raphe, the cord or ridge formed by the funicle along the side of some ovules.

Raphides, needle-shaped crystals found in the cells of some plants.

Ray, one of the radiating branches of an umbel. **Ray-florets,** the flowers borne on the rim or circumference of the heads in Compositæ usually differing in structure from those of the disk.

Receptacle, the torus of a flower; hence also what is commonly known as the fruit of figs.

Reflexed, bent abruptly backward or downward.

Regular, symmetrical, generally said of flowers with the petals or perianth-segments alike in size and shape.

Reniform, kidney-shaped; *i.e.*, broader than long, broadly cordate at the base, and with the auricles rounded.

Repand, having a wavy margin.

Replum, a septum joining the sutures of two carpels from which the carpels or valves finally separate, *e.g.*, Cruciferæ.

Resupinate, turned or twisted so that parts are eventually turned to the opposite direction from their normal position, generally spoken of flowers.

Reticulate, having the veins connected together like the meshes of a net.

Retinaculum, a persistent hook-like, upcurved and subsequently hardened process from the placenta in most Acanthaceæ on which the ovules and seeds are borne.

Retrorse, directed backwards or downwards.

Retuse, with as small shallow notch in a rounded or truncate apex.

Revolute, having the margins or apex rolled backward upon the under-surface.

Rhizome, an underground or prostrate stem of root-like appearance which sends off roots at the nodes and bears, like a true stem, buds, leaves or scales.

Rhomboid, rhomboidal, with four sides more or less equal, and the lateral angles obtuse.

Rostrate, beaked, narrowed into a slender tip or process.

Rotate, wheel-shaped; said of a regular gamo-petalous corolla with a short tube and a flat spreading limb.

Rotundate, circular or nearly so in outline.

Rufous, reddish brown.

Rugose, full of wrinkles. **Rugulose,** minutely wrinkled.

Ruminate, marked by transverse lines of divisions, said of albumen of some seeds, *e.g.*, Anonaceæ.

Runcinate, toothed or incised with the teeth or segments pointed backwards.

Runner, a very slender prostrate branch arising from the base of a stem, rooting at the nodes or tip and sending up shoots which form new plants.

S

Saccate, bulged into a small bag or cavity.

Sacciform, in the form of a bag.

Sagittate, shaped like an arrow-head; tapering towards the apex, two lobed at the base with the lobes pointed and directed downwards.

Salver-shaped, with a long tube and horizontally spreading limb, C|p. **hypocrateriform.**

Samara, an indehiscent dry fruit with a wing developed from the pericarp.

Saprophyte, a plant that is nourished by dead organic matter.

Sarmentose, producing long straggling woody branches.

Scabrous, very rough to the touch owing to short stiff hairs. **Scabrid, Scaberulous,** somewhat scabrous.

Scalariform, joined by transverse bars or with transverse markings like the rungs of a ladder.

Scandent, climbing.

Scape, a leafless and generally unbranched flower-stem arising from the ground.

Scarious, scariose, thin, dry, membranous, somewhat stiff and not green.

Schizocarp, a general name for a dry fruit which on maturity splits into one-seeded portions.

Sclerotic, hardened or stony in texture.

Scorpioid, said of a form of unilateral inflorescence which is coiled inward from the apex to the base in the bud like the tail of a scorpion.

Scurf, loosely adherent epidermal scales.

Secund, said of parts of organs all of which are turned in the same direction.

Sect, (suffix) deeply cut nearly to the axis.

Sepal, one of the parts of leaves of the calyx, especially when not combined; **Sepaloid,** green and resembling a sepal in structure.

Septicidal, a form of dehiscence of a ripe carpel when it opens through the dissepiments or lines of junction of the carpels.

Septifragal, a form of dehiscence of a ripe carpel when the valves break away from the dissepiments and leave the latter attached to the axis.

Spetum, pl. septa, see Dissepiment. **Septate,** divided by one or more partitions.

Seriate, in rows transverse or lengthwise.

Sericeous, covered with silky straight hairs.

Serrate, toothed like a saw with the teeth directed forward. **Serrulate,** minutely serrate.

Sessile, without a stalk.

Seta, a bristle. **Setaceous,** bristle-like. **Setose,** bristly. **Setulose,** bearing minute bristles.

Sheath, a close fitting tubular or enrolled case, *e.g.*, the lower portion of the leaf of grasses.

Simple, undivided; consisting of one blade when said of a leaf; resulting from a single pistil when said of a fruit; unbranched when said of a stem, tendril, or style.

Sinistrorse, turning or twining from right to left *i.e.*, clock-wise.

Sinus, the space between the divisions or lobes of a leaf. **Sinuate,** with an irregular deeply wavy margin.

Spadix, a spike with a thickened or fleshy axis bearing l-sexual flowers generally sheathed in a spathe.

Sparse, arranged at some distance from each other.

Spathe, a large sheath-like bract enclosing an inflorescence or part of it. **Spathaceous,** spathe-like.

Spatulate, Spathulate, shaped like a spatula, *i.e.*, oblong with a broad and rounded apex and gradually narrowed base.

Species, a group of individuals alike in all essential particulars; the subdivisions of a genus.

Spike, a racemose inflorescence bearing sessile flowers, on an undivided axis. **Spicate,** in the form of or resembling a spike, or disposed in spikes. **Spikelet,** a secondary spike; an ultimate branchlet of the inflorescence of grasses and **Cyperaceæ** generally consisting of one or more flowers subtended by glumes.

Spine, a strongly pointed woody process consisting of a modified branch but sometimes of a modified leaf. **Spinescent,** terminating in or resembling a spine-like sharp point; also becoming spinous. **Spinose, spinous,** furnished with or of the nature of spines.

Sporadic, occuring scattered here and there.

Spore, a minute unicellular body which detaches itself at maturity and is instrumental in the process of sexual reproduction in Cryptogams.

Squamose, beset with scales.

Stamen, the male organ of a flower, consisting of a filament and an anther. **Staminode,** an abortive or antherless stamen.

Standard, the posterior or odd petal of Papilionaceous corolla.

Stellate, star-shaped; with radiating rays like points of a star.

Stigma, that part of the pistil which is specially adapted for the reception of the pollen for the fertilization of the ovules. **Stigmatic,** relating to the stigma. **Stigmatose,** resembling or of the nature of the stigma.

Stipe, any stalk-like support; the stalk of an ovary above the floral whorls. Syn. gynophore. **Stipitate,** having a stipe.

Stipule, an appendage of a leaf, usually one on either side of the

petiole. **Stipulate,** having stipules. **Stipel,** a secondary stipule, the appendage of a leaflet. **Stipellate,** having stipels.

Stolon, a prostrate or reclined branch rooting at intervals or only at the tip and giving off shoots which become independent plants.

Stone, the hard endocarp of a drupe. Syn. Putamen.

Striate, marked with thin longitudinal lines or minute furrows.

Strigose, covered with sharp pointed straight stiff hairs of unequal length lying close along the surface and all in the same direction.

Strophiole, a crest-like appendage about the hilum or the base of a seed, C|p Caruncle.

Style, a stalk-like outgrowth from the summit of the ovary supporting the stigma.

Stylopodium, a fleshy disk at the base of some styles as in many Dipterocarpaceæ.

Subulate, shaped like a cobbler's awl; narrow, tapering and somewhat stiff.

Succulent, with abundant cellular tissue full of juice.

Suffruticose, said of plants when low woody and branching from near the base.

Sulcate, grooved or furrowed with the depressions more or less parallel.

Superior, inserted on the ovary or adnate to it, if said of the calyx; above the calyx and free from it, if said of the ovary; also posterior in position.

Superposed, placed one above the other.

Suture, a seam indicating the line of union of two parts; a line of opening.

Symmetrical, said of a flower having the same number of members in each whorl.

Syncarpous, composed of two or more combined carpels.

Syncarpium, a fruit formed by the union of several carpels which have become compacted and fleshy.

Syngenesious, said of stamens united by their anthers, as in Compositæ.

T

Tap-root, primary root resulting from the direct prolongation of the radicle.

Tendril, a slender process usually belonging to the axis and serving as a support in climbing.

Tepal, a division of a perianth; a word applicable to either a sepal or a petal. "An anagram of petal," Jackson.

Terete, cylindrical, rounded in cross section.

Ternate, arranged in threes in a cluster of whorl.

Tesselated, divided up into small squares.

Testa, the outermost coat of a seed.

Tetra, (prefix) four.

Tetradynamous, with four long and two short stamens.

Tetramerous, said of a flower having the parts or members in each whorl in fours.
Tetrandrous, with four stamens.
Thalamus, that part of the axis of a flower which supports the floral whorls and the pistil. Syn. Torus.
Thyrsus, a contracted panicle, ovate or lanceolate in outline, usually with cymose branches. **Thyrsiform,** of the shape of a thyrsus. **Thyrsoid,** somewhat like a thyrsus.
Tigellum, Tigellus (plu.), the central embryonic axis consisting of radicle and plumule.
Tiller, a sucker from the base of a stem.
Tissue, an aggregation of cells differentiated from surrounding aggregations.
Tomentose, covered with short, soft, rather dense and more or less tangled hairs.
Tortuous, bent irregularly in different directions.
Torulose, cylindrical with contractions at regular intervals.
Torus, same as thalamus.
Tri, (prefix) three.
Tribe, a division of a family, comprising a number of closely-related genera.
Trichotomous, with the divisions always in threes and of more or less the same length.
Tricuspidate, with three cusps or sharp points.
Trimerous, said of a flower having the parts or members in each whorl in threes.
Triplinerved, with a strong secondary nerve on either side of the midrib proceeding from near the base.
Triquetrous, sharply 3-cornered.
Tristichous, in three vertical rows.
Truncate, ending abruptly, as if with the end cut off.
Tuber, a thickened underground stem bearing buds or 'eyes.' **Tuberous,** swollen like a tuber.
Tumid, swollen.
Turbinate, top-shaped; like an inverted cone.
Turgid, swollen and more or less firm.

U

Umbel, a form of racemose inflorescence in which several branches or pedicels radiate from the top of a common peduncle and are of nearly the same length.
Umbonate, bearing a boss, or conical or rounded protuberance.
Undulate, with a wavy margin.
Uni, (prefix) one.
Unicellular, formed of, or consisting of, only one cell.
Unilateral, arranged on one side of the axis.
Unisexual, of one sex; having the stamens and the pistil in separate flowers.
Urceolate, urn-shaped.

Urticle, a 1-celled 1-seeded fruit with a thin and more or less loose pericarp.

V

Valvate, with the margins of the members of a whorl only meeting without overlapping. Also dehiscing by valves.
Varicose, irregularly swollen at intervals.
Variety, a group of individuals differing from others of the same species in certain striking particulars which, however, are not of a nature to justify specific rank; sub-divisions of a species.
Venation, the mode in which the veins are disposed in a leaf.
Ventral, relating to, attached to the, or opening by the inner angle, or anterior face of a carpel.
Venulose, closely and finely veined.
Ventricle, a lateral swelling or bulging out. **Ventricose,** having a ventricle; unequal swollen.
Verrucose, covered with wart-like excrescences.
Versatile, swinging to and fro; said of an anther attached by the back to the attenuated top of the filament on which it swings.
Verticellate, arranged in whorls.
Villous, Villose, more or less thickly covered with long soft simple hairs.
Virgate, with slender erect rod-like stems or branches.
Vitta, pl. Vittæ, one of the oil receptacles in an umbellifer fruit.
Viviparous, said of plants, the seeds of which germinate before falling; also sometimes of such seeds.

W

Whorl, a collective name for all similar members that are arranged in a circle, round an axis.
Wing, any thin membranous appendage. **Wings,** the side petals of a papilionaceous corolla.

X

Xerophyte, said of plants that grow naturally in dry hot places.
Xylem, woody tissue.

Z

Zygomorphic, capable of being bisected into similar halves by the median plane only; said usually of irregular flowers.

LIST OF ABBREVIATIONS AND SIGNS USED IN THE FLORA.

Ass.	Assamese.
Beng.	Bengali.
Cach.	Cachari.
Darr.	Darrang.
Duff.	Duffla.
fem.	female.
flrd.	flowered.
fls. or flrs.	flowers.
1-2, 6-8	January to February. June to August.
fr.	fruit.
ft.	foot or feet.
herm.	hermaphrodite.
Hind.	Hindi.
in.	inch or inches.
Kach.	Kachari.
Kam.	Kamrup.
Kh.	Khasi.
loc.	locular.
Lush.	Lushai.
Manip.	Manipur.
Mik.	Mikir.
m. s.	moderate or middle-sized.
Nep.	Nepali.
Sans.	Sanskrit.
Sibs.	Sibsagar.
sp.	species.
stip.	stipule.
Sylh.	Sylhet.
syn.	synonym.
Synt.	Synteng.
Tipp.	Tippera.
var.	variety.
♂	male.
♀	female.
∞	indefinite, numerous.
!	Added after a locality, but without the name of collector or herbarium signifies that the author has himself seen the plant in the locality named.
!	The same sign following the name of a person in italics signifies that the author has either not seen it or is uncertain of the identification.
=	Equal to or Synonym.
?, (?).....	Doubtful.
+	The plus sign when used for parts of a flower, *e.g.*, petals 3+3, indicates separate whorls. In the example two whorls of 3 petals in each whorl.

FLORA OF ASSAM

THALAMIFLORÆ.

FAM. 1. RANUNCULACEÆ.

Herbs or climbing shrubs. *Leaves* alternate, rarely opposite, usually ex-stipulate, simple or compound; petiole sheathing. *Flowers* usually regular, generally ebracteate. *Sepals* 4-5 or more, usually caducous, often coloured. *Petals* hypogynous, generally imbricate, 3-5 or more, often reduced or deformed, sometimes absent. *Stamens* hypogynous, usually numerous, often in many rows; anthers adnate and usually dehiscing laterally. *Ovary* apocarpous, rarely syncarpous; carpels many or few, free, 1-celled with one or more anatropous, erect or pendulous ovules. *Fruit* either of many achenes or of follicles, rarely a berry; seeds small with copious albumen and minute embryo.

I. Flowers regular. Carpels 1-ovuled :—
  Erect or climbing shrubs :—
    Leaves opposite. Sepals petaloid, valvate.
      Ovules pendulous :
        Leaves various, not terminating in a tendril. Petals 0. **1. Clematis.**
        Leaves consisting of two opposite leaflets and a terminal tendril. Petals many, linear. ... ... **2. Naravelia.**
  Herbs :—
    Petals 0. Sepals 4-5, petaloid. Ovule pendulous.:—
      Flowers in umbelliform cymes, involucrate. ... **3. Anemone.**
      Flowers panicled, not involucrate. ... ... **4. Thalictrum.**
    Petals and sepals both present. Flowers panicled.
      Ovule erect. ... ... **5. Ranunculus.**
II. Flowers irregular, racemed. Carpels many-ovuled. **6. Delphinium.**

1. CLEMATIS, Linn.

Shrubs, mostly woody, climbing by means of their petioles. *Leaves* opposite, exstipulate, usually compound; leaflets often lobed and irregularly toothed. *Flowers* in axillary fascicles or panicles, rarely solitary or terminal. *Sepals* usually 4, valvate, petaloid. *Petals* 0. *Stamens* and *carpels* indefinite. *Fruit* a head of achenes usually with elongated feathery styles.

1. Flowers not panicled :—
  Flowers axillary, solitary, bluish: pedicels long bracteate. Achenes without feathery tails. Leaves ternately compound. ... 1. *C. Cadmia.*
  Flowers axillary, 1-3 in each axil, brownish: pedicels short, ebracteate. Achenes with feathery tails. Leaves 2-pinnate. ... ... 2. *C. acutangula.*
  Flowers axillary fascicled white: pedicels long, ebracteate. Achenes with feathery tails. Leaves 3-foliolate. ... ... 3. *C. montana.*

II. Flowers in axillary panicles. Achenes with feathery tails :—

A. Sepals spreading from the base :—
Leaves usually simple. Flowers large ; sepals brown outside, purple or white inside. ... *4. C. smilacifolia.*
Leaves 3-foliolate, long petioled. Flowers very small. ... ... *5. C. apiculata.*
Leaves once pinnate. Flowers small ; sepals 3-nerved. ... ... *6. C. puberula.*
Leaves 2-pinnate or 2-ternate. Flowers small ; sepals greenish-white. ... ... *7. C. gouriana.*

B. Sepals erect with recurved tips :—
Leaves 3-foliolate, rarely simple, shining. Flowers fairly large. ... ... *8. C. acuminata.*
Leaves pinnately 3-5-foliolate. Flowers large ;— sepals brown-tomentose outside, pubescent inside ; not ribbed ; anthers very long, twisted after flowering. *9. C. grewiæfolia.*
Leaves pinnately 5-7-foliolate. Flowers large, brownish ; sepals linear-oblong, ribbed, tomentose throughout : anthers not twisted after flowering. ... ... *10. C. Buchananiana.*
Leaves decompoundly pinnate. Flowers large, pale yellow ; sepals many nerved. ... *11. C. nutans.*

1. Clematis Cadmia, Ham. Vern. *Bon-jalukia,* Ass. (Lakh.) *Bon-marich,* Ass. (Goal.).

A slender sub-herbaceous climber. *Leaves* 3-9 in. long, ternately decompound ; ultimate leaflets, ·7-2 by ·25-1 in. narrow-lanceolate to ovate or rhomboid, entire or minutely crenulate acuminate, more or less ciliate along the margins otherwise glabrous, 3-5-nerved from the acute, cuneate or rounded, rarely sub-cordate base ; other nerves 1-3 on either half, much arched, anastomosing, very indistinct. *Flowers* axillary, solitary ; peduncles 3-4 in. long, with a pair of opposite, leaflike, sessile or short-petioled bracts about the middle. *Sepals* 5-6, bluish-white, ·8-1 by ·2-·5 in. longitudinally veined, softly tomentose behind. *Filaments* numerous, short flat, glabrous ; anthers ·1-·15 in. long, dehiscing laterally. *Achenes* many, ovate, with a long straight beak and no feathery tail.

BRAHMAPUTRA VALLEY generally with reeds along edges of open swamps, also in SYLHET. *G. Mann* !
Fls. 1-4. Fr. 2-6.

2. Clematis acutangula, Hk. f. & Th.

A slender woody climber ; stem deeply furrowed, sparingly puberulous, shining. *Leaves* 2-pinnate ·5-·9 in. long ; common potiole 2-5 in. long ; pinnæ generally 3-foliolate ; petiolules of pinnæ 1·5-3 in. long. *Leaflets* ·5-2 by ·15-·8 in. ; ovate or ovate-lanceolate, acute, or acuminate, deeply serrate or lobed, coarsely hairy on both surfaces. *Flowers* brownish-yellow, about ·7 in. diam. ; pedicels 1-3 from each axil, 1-1·5 in. long, not bracteate. *Sepals* 4 or 5, about ·4 in. long, oblong, acute, puberulous outside. *Filaments* pilose ; anthers introrse. *Achenes* ovate, strongly margined, pubescent ; feathery style about 1 in. long, brownish.

KHASI HILLS, 4-5,000 ft., not very common.
Fls. 9-10. Fr. 10-1

3. Clematis montana, Ham. Vern. *Jarmai-thobawa,* Synt. A large, but not very heavy, woody climber ; young parts pubescent. *Leaves* 3-foliolate, fascicled at the nodes ; common petiole 1·5-2·5 in. long. *Leaflets* 1-4 by ·5 to 2 in., ovate, distantly cuspidate-serrate, acute, membranous, scattered hairy or glabrescent, 3-5-nerved from the base ; tertiary nerves few, distant, indistinct ; lateral petiolules ·1-·3 in. long. *Flowers* white, axillary, solitary, 2-3 in. diam.. faintly scented ; peduncles 2·5-4 in. long, terete, pubescent. *Sepals* 4, 1-1·5 by ·5-·8 in., acute or acuminate, longitudinally veined, softly tomentose along the margins. *Filaments* short ; anthers shorter than the filaments, introrse. *Achenes* glabrous or hairy ; style ·6-1·2 in. long, rather stout ; densely hairy.

KHASI HILLS. 4-5,000 ft., *e. g.,* Shillong, Nong-kasem, Sutynga, etc. NAGA HILLS. *C. B. Clarke* !
Fls. 4-5. Fr. 5-6.

4. Clematis smilacifolia, Wall. Vern. *Mei-long-kydup,* Khasi.

A large woody climber ; branches sulcate glabrous, green or purplish. *Leaves* usually simple ; blade 3-9 by 1-6 in. ovate-cordate, acuminate, gradually smaller and narrower and with a cuneate base towards the ends of the branches, entire or distantly serrate, coriaceous, glabrous, 5-9-nerved from the base, tertiary nerves faint, more or less transverse ; petioles 3-6 in. long, terete, often much coiled and functioning as tendrils. *Panicles* axillary, 6-12 in. long ; pedicels 1·5-2 in. long, with linear bracteoles at the base. *Flowers* 1-1·5 in. across, sweet-scented. *Sepals* 4-5, ·7-1 in. long, oblong, greenish-brown tomentose outside, glabrous and purplish or whitish inside. *Filaments* linear, membranous, glabrous gradually shorter towards the centre of the flower ; connectives produced. *Achenes* ·3-·4 by ·1 in., flat, acute at both ends, with thickened margins which coalesce and prolong to form a slender feathery tail 1·5-2·5 in. long and of a cream colour.

LOWER ASSAM, *e.g.,* Bijni Reserve, GOALPARA, also KHASI HILLS up to 4,000 ft., *e.g.,* Nonghulen.
FIS. 9-10. Fr. 11-1.

5. Clematis apiculata, Hk. f. & Th.

A slender woody climber ; branches, sulcate, patently grey, hairy. *Leaves* 3-foliolate, sometimes simple and 3-lobed ; common petiole 2-3 in. long, slender, patently hairy. *Leaflets* ·8-3 by ·6-2 in., ovate-cordate, acuminate, crenate-serrate, membranous, sparsely pubescent on both surfaces, ciliate ; lateral petiolules ·2-·7 in. long. *Flowers* small in many-flowered axillary panicles. *Sepals* ·15-·25 in. long, oblong, tomentose outside. *Filaments* short, linear. *Achenes* oval, hairy.

KHASI HILLS near Beadon Falls ! also Nongkhlaw. *Griffith* ! and Cherra, *Hk. f. & Th.* ! Apparently not very common.
Flg. & Frg. time not known.

6. Clematis puberula, Hk. f. & Th.

A slender climber ; stem deeply grooved, downy. *Leaves* pinnate. *Leaflets* 1-1·5 in. long, ovate-lanceolate, remotely toothed

sparsely hairy. *Flowers* rather small in few-flowered axillary panicles ; pedicels slender. *Sepals* about ·5 in. long, linear-oblong, 3-nerved, silky outside. *Filaments* narrow ; anthers short. *Achenes* silky.

KHASI HILLS. 2,-4,000 ft. Rather rare.

Flg. & Frg. time not known.

7. Clematis gouriana, Roxb. Vern. *Jyrmi-bytengdoh*, Khasi.

A large spreading climber ; branches purple, sulcate, pubescent when young. *Leaves* 2-pinnate or 2-ternate. *Leaflets* 1-3·5 by ·3-1·3 in., ovate, oblong or lanceolate, acuminate, entire or distantly toothed, rounded or cordate at the base, chartaceous or membranous, wholly glabrous or sometimes pubescent beneath. *Flowers* greenish-white, small, in dense axillary panicles ; ramifications of panicle bracteate at the base. *Sepals* ·2-·3 in. long, oblong, revolute ; margins tomentose ; *filaments* narrow. *Achenes* about ·05 in. long, narrow-oblong or lanceolate, densely grey-hairy ; feathery tails 1·5-2 in. long, very slender.

Common in LOWER ASSAM, especially GOALPARA, also up to 4,000 ft. in the KHASI HILLS.

Fls. 10-11. Fr. 11-1.

8. Clematis acuminata, DC. Vern. *Tilli-tymen-khla* Synt.

A large woody climber ; branches slender, terete, smooth, glabrous. *Leaves* 3-foliolate, very rarely simple ; common petiole 1-1·5 in. long, slender, terete. *Leaflets* 1·5-3·5 by ·5-1·3 in. ovate, or oblong-lanceolate, caudate-acuminate, usually quite entire, membranous or subcoriaceous, glabrous ; lateral nerves slender, irregular, very indistinct. *Flowers* 1-1·5 in. across, in decompound axillary panicles. *Sepals* oblong-lanceolate, more or less pubescent outside, suberect. *Filaments* clothed with long spreading hairs. *Achenes* silky.

Evergreen forests in UPPER ASSAM, *e.g.*, near Tippum in LAKHIMPUR and possibly in many other similar localities.

Flg. and Frg. time not known.

Var. *sikkimensis*, distinguished by larger leaflets and more numerous flowers, occurs at Nongpoh in the KHASI HILLS, also in the MISHMI HILLS.

9. Clematis grewiæfolia, DC. Vern. *Mei-iong* (black climber), *Mei-si-ing*, Khasi.

A large woody climber ; branches closely sulcate and more or less densely dun-pubescent. *Leaves* 3-5 foliolate ; common petiole 3-4 in. long, stout, often curled, as well as the rest of the rachis, densely brown-tomentose. *Leaflets* 2-3·5 by 1·-5-2·5 in. broadly ovate-cordate, dentate, serrate, often lobed, membranous or softly subcoriaceous, coarsely scattered-hairy or sub-glabrous above, more densely hairy especially along the nerves beneath, 5-nerved from the base ; lateral petiolules ·5-1 in. long, with a tendency to curl. *Panicles* 4-8 in. long, on peduncles 1·5-4 in. long ; buds globose or ovoid ; pedicels 1-2 in. long, often twisting, supported by bracts resembling variously lobed miniature leaflets. *Sepals* ·8-1·2

in., ovate or oblong, greenish-brown and densely tomentose outside, pubescent or puberulous inside. *Filaments* ·7-1 in. long, tapering from a narrow linear base, densely covered with ascending hairs; anthers ·25-·3 in. long, very narrow, twisted after flowering. *Achenes* scarcely ·1 in. long, flat, ovate, velvety; feathery tail about 1 in. long, densely white-silky.

North Cachar and Khasi Hills, ·3,-5,500 ft. *e. g.*, Maibong, Kynshi, Mairong, Mawsynrang, etc.

Fls. 11-12. Fr. 12-1.

10. Clematis Buchananiana, DC. Vern. *Mei-byteng-doh*, *Mei-lih* (white climber), Khasi; *Jermai-sniuh*, *Tilli-kynsaw-blai*, Synt.

A woody climber; branches sulcate, pubescent while young. *Leaves* pinnately 5-7-foliolate; common petiole 2-3·5 in. long, often twisted. *Leaflets* 2-4 by 1·5-2·7 in. broadly ovate or suborbicular, generally cordate, coarsely dentate-serrate, often irregularly lobed, subcoriaceous or membranous, glabrescent above, pubescent beneath chiefly along the nerves, 3-5-nerved from the base; lateral petiolules ·6-1·2 in. long, often curled. *Flowers* about 2 in. across, usually sweet-scented, in large axillary panicles. *Sepals* linear-oblong fleshy, longitudinally many-ribbed, softly silky-tomentose. *Filaments* hairy. *Achenes* ovate-lanceolate, densely hairy; hairy tail elongating in fruit to about 2 in.

North Cachar Hills at about 4,000 ft. Khasi and Jaintia Hills, 4,000-5,500 ft. Very common in the Mantedu valley in the Jawai Sub-Division.

Var. *vitifolia* distinguished by pubescent stems and membranous pubescent leaves, is fairly common in the above tracts.

Fls. & Fr. 12-1.

11. Clematis nutans, Royle.

Stem slender, woody, angled, sulcate, with leaves very pungent to the taste. *Leaves* twice or thrice, pinnate. *Leaflets* 1-3 in. long, ovate or lanceolate, usually deeply 3-5-lobed, rarely entire, silky-pubescent; veins slender. *Flowers* 1-2 in. across, cream-coloured in much-branched panicles. *Sepals* ·5-·7 in. long, oblong, closely nerved, silky outside, erect at the base, recurved at the tip. *Filaments* tapering, silkly along the lower half; anthers short, *Achenes* large, ovate, covered with silky hairs; hairy tail 1-1·5 in long in fruit, very slender.

Occurs chiefly in the Jawai Sub-Division, Khasi and Jaintia Hills, in the neighbourhood of Nartiang.

The leaves when smelt after bruising produce violent sneezing.

Fls. 11-12.

Clematis tortuosa, Wall. Cat. 4675. ex. C. E. C. Fischer, Kew Bulletin 1929 P. 4. Incl. C. Buchananianae. DC. var tortuasa, Wall. Cat. 4675 and var vitifoiia, Wall. Cat. 4676.

Branchies pilose with long spreading fulvous hairs. *Leaf* rachis and petiole, pilose or pubescent with brown hairs. *Leaflets* 2-5 by ·7-4·5 in. ovate-lanceolate to suborbicular, acuminate base 5-7-nerved, margins irregularly coarse dentate, or crenate-dentate, teeth apiculate, membranous or subcoriaceous, thinly pilose on both surfaces or only on the nerves; petiolules ·5-4 in. long, often twining. *Panicles* axillary, densely to thinly fulvous pilose; pedicels ·7-1.5 in. long. *Sepals* 4, erect, oblong, apex recurved, ·5-·8 in. long, densely clothed with light brown hairs outside. *Carpels* pilose, styles long, slender densely silky.

Very closely allied to C. Buchananiana of which it has been regarded as a variety in F. B. I.

SYLHET Wall. Cat. 4675 ! KHASI HILLS Wall Cat. 4676 ! Hooker and Thomson, NAGA HILLS—Kingdon Ward, LUSHAI HILLS Mrs. Parry.

2. NARAVELIA, DC.

Naravelia zeylanica, DC. Vern. *Gorap-choi*, Ass. ; *Chhagal-lati*, Beng. ; *Bamnam-riube*, Miri ; *Khoro-soi-rikang*, *Nongnongbiki-ringkang*, Mik. ; *Jyrmai-lasam*, Khasi ; *Sangongri*, *Shamgangri*, *Behalisham*, Garo.

A woody climber generally spreading on bushes in scrub jungles ; branches sulcate, adpressed pubescent. *Leaves* pinnately 5-foliolate on seedlings, but on mature plants the upper three leaflets become reduced to tendrils ; common petiole 1·5-3 in. long. *Leaflets* usually only two, often in unequal pairs, 2-6 by 1·7-4·5 in., ovate-rotundate, acuminate, rounded or cordate and often abruptly cuneate at the base, entire or distantly toothed soubcoriaceous, glabrous and somewhat shining above, more or less pubescent along the nerves and nervules beneath, 5-7 nerved from the base, nervules reticulate, very close ; petiolules ·3-1·5 in. long, usually more or less twisted, densely pubescent. *Panicles* terminal and axillary, 4-18 in. long. *Flowers* greenish, ·5-·7 in. across ; pedicles ·5-·8 in. long, slender, pubescent. *Sepals* 4-5, ·2-·35 in. long, densely buff-tomentose outside, caducous. *Petals* usually 12, about ·5 in. long, greenish, club-shaped. *Stamens* numerous. *Fruit* a head of tailed achenes. *Achenes* ·2-·25 in. long, pointed at both ends, shortly stipitate, more or less twisted, brown when mature ; tail 2-3 in. long, very slender, finely hairy.

Throughout the BRAHMAPUTRA VALLEY and both slopes of the GARO and KHASI HILLS up to 2,500 ft.

The stems are used as tooth-sticks to cure toothaches and can be twisted into rough but strong ropes.

Fls. 10-11. Fr. 12-3.

3. ANEMONE, Linn.

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

Stems branched. Ultimate segments of involucre linear-oblong. Achenes large, oblong. Beak hooked, naked. ... ... *1. A. rivularis.*

Stems elongate usually not branched. Ultimate segments of involucre oblong, or cuneate. Achenes compressed, broadly oval. Beak straight, naked. ... ... *2. A. elongata*

1. Anemone rivularis, Ham. Vern. *Bat-soh-plia,* Khasi.

Stem branched, 1-3 ft. high; rootstock woody, sheathed in fibres. *Leaves* radical, 2-6 in. diam., silky pubescent beneath, palmately 3-partite, inducing sneezing if smelt after bruising ; segments primarily 2-or 3-lobed and serrate ; nerves straight, prominent beneath sparingly anastomosing ; petiole 4-6 in. long. *Flowers* about 1 in. across in compound cymes, 2-bracteolate ; sepals white within, generally bluish and silky outside. *Involucre leaves* large, 3-partite ; ultimate segments linear or linear oblong, inciso-serrate. *Achenes* oblong glabrous ; style hooked.

Common in shady or dampish place in the KHASI HILLS between 4,000 and 4,500 ft.
Fls. 4-7.

2. Anemone elongata, Don.

Stem slender, unbranched or sparingly branched 2-3 ft. high, pubescent. *Radical Leaves* 2-4 in. diam., orbicular in outline cordate, 3-partite, sparingly hairy ; segments 2-3-lobed ; lobes, dentate. *Flowers* white, smaller than of the above, in fascicles of 2-3 in few-flowered elongate compound cymes. *Involucre leaves* oblong or cuneate, irregularly toothed.

Fairly common in the KHASI HILLS. 5,000 ft.

4. THALICTRUM, Linn.

Erect perennial herbs ; stem hollow. *Leaves* ternately or pinnately once to thrice or more times compound, rarely simple ; petioles sheathing, often auricled or stipuled, *Flowers* generally panicled, rarely racemed, never involucrate, often polygamous. *Sepals* 4-5, petaloid, imbricate in bud. *Petals* 0 *Stamens* numerous. *Carpels* few or many ; ovule 1, pendulous. *Fruit* a head of small achenes ; style persistent or deciduous.

Filaments filiform. Achenes small :—	
Leaves 1-2-ternate : leaflets ·5-2 in. diam.	... 1. *T. punduanum.*
Leaves pinnately decompound : leaflets usually not exceeding ·5 in. in diam.	... 2. *T. foliolosum.*
Filaments club shaped. Achenes large :—	
Leaves ternately decompound : leaflets not exceeding ·5 in. in diam.	... 3. *T. javanicum.*

1. Thalictrum punduanum, Wall.

Stem erect about 2ft. high. *Leaves* ternate or 2-ternate ; leaflets 1-2 in. in diam., more or less orbicular, cordate or truncate at the base, 5-lobed, crenate, glaucous, or tomentose beneath ; sheath auricled. *Panicle* much branched. *Flowers* white ; filaments filiform. *Achenes* numerous, small, ribbed, sessile or stalked.

Two varieties occur almost side by side, in the KHASI HILLS.
Var. 1. *glaucum.* Leaflets membranous, glabrous, glaucous beneath. Achenes sessile, glabrous.
Var. 2. *glandulosum.* Leaflets coriaceous, viscid-pubescent beneath. Achenes stalked or subsessile, glandular hairy.

2. Thalictrum foliolosum, Bl. *Vern. Popum,* Khasi.

By far the tallest plant in the genus reaching up to 8 ft. in height ; stem glabrous. *Leaves* pinnately decompound up to the

fourth degree ; leaflets ·15-·25 in., but sometimes up to ·8 in. in diam., sub-orbicular, membranous, glabrous, glaucous beneath. sheath auricled. *Panicle* axillary and terminal, profusely divided bracts and bracteoles minute. *Flowers* ·1-·15 in. long, polygamous, on filiform pedicles, dull bluish or greenish-white ; filaments filiform. *Achenes* few, ·12 in. long, sharply 8-ribbed.

KHASI HILLS. 3-6.000ft., e. g., Borpani, Happy Valley, Nongbri, etc.

The root is good for fever and eye diseases and is used in the form decoction, extract or powder. In the last named form it is known as *Surma. mamira* in Kashmir.

Fls. Rainy season.

3. Thalictrum javanicum, Bl.

Stem erect, 2-3ft. high, glabrous. *Leaves* several times ternately decompound ; leaflets ·2-·8in. diam., ovate or orbicular, membranous, glabrous, somewhat glaucous beneath, 3-7-toothed ; base, rounded or cordate. *Panicle* laxly branched ; stipules adnate, imbricate. *Flowers* about ·2 in. long, white, on filiform pedicels ·4-·6 in. long ; filaments club-shaped. *Achenes* up to 15, about ·25 in. long, strongly ribbed ; beak short.

KHASI HILLS, 5-6000 ft.

May be used as a substitute for *T. foliolosum*

Fls. 7-9.

5. RANUNCULUS, Linn.

Annual or perennial herbs generally gregarious in habit. *Leaves* simple, lobed or dissected ; petiole sheathing ; stipules membranous or 0. *Flowers* panicled, or single. *Sepals* 3-5, imbricate in bud, caducous. *Petals* usually 5, often with a nectary near the base. *Stamens* many, *Carpels* numerous ; styles very short ; ovule 1, ascending. *Fruit* generally a head of beaked or apiculate achenes.

An aquatic herb. Flowers small not panicled.

Receptacle of achenes hairy. ... *1. R. scleratus.*

Terrestrial herbs :—

A much-branched diffuse herb. Flowers solitary, Receptacle small, elongated, not hairy. ... *2. R. diffusus.*

A sparingly branched tall herb. Flowers laxly panicled. Receptacle small, pilose. ... *3. R. pensylvanicus.*

1. Ranunculus scleratus, Linn.

An annual herb, 1-2 ft. high, generally growing along the edge of water, stem fleshy, hollow, usually glabrous, *Radical leaves* 3-partite, segments cuneate ; cauline sessile. *Flowers* ·5-·6 in. diam. *Sepals* as long as the petals reflexed. *Receptacle* ·5 in. long, hairy. *Achenes* about ·1 in. long, with a continuous intermarginal ridge all round.

Goalpara, *W. R. Fisher*

This plant has an acrid juice and is used for medicinal purposes.

2. Ranunculus diffusus, DC.

A perennial diffuse or prostrate herb with spreading hairs and fibrous roots, often shooting from the nodes. *Leaves* 3-partite, softly hairy ; segments cuneate. *Flowers* ·5-1 in. diam., solitary on terminal or leaf-opposed peduncles 1-2 in. long. *Sepals* hirsute, smaller than the petals. *Petals* white or yellow. *Receptacle* small. *Achenes* compressed, cuneately sub-orbicular, margined.

KHASI HILLS, *G. Mann* ! 5,-6,000 ft.

3. Ranunculus pensylvanicus, Linn.

An erect or prostrate plant 2-3 ft. long. *Radical leaves* 3-foliolate, long-petioled, leaflets 3-partite deeply cut into linear segments ; cauline with petioles of decreasing lengths, the uppermost being sessile. *Flowers* about 1 in. long. *Sepals* reflexed, hirsute. *Receptacle* pilose. *Achenes* compressed, with an intramargined ridge.

A weed of rice-fields in the KHASI HILLS and the plains of ASSAM.

6. DELPHINIUM, Linn.

Delphinium altissimum, Wall. Vern. *Rad-sohplih-rit,* Khasi.

Stem 2-4 ft. much branched. *Leaves* few, palmately lobed, 5-7 fid ; segments broadly cuneate, 3-lobed, coarsely toothed, few-nerved, sparsely hairy above, ciliate along the nerves beneath, cauline 3-lobed, or entire; petiole up to 1 ft. in length. *Flowers* 1-1·5 in. long including the spur, in lax racemes, irregular, purple or lurid-blue, very foetid ; pedicels ·5-2 in. long ; bracts and bracteoles linear, *Sepals* 5, golden-hairy, strongly ciliate, dorsally spurred behind ; spur ·6-·8 in. long, subulate, incurved. *Petals* 4, the two dorsal with long slender spurs within the spur of the dorsal sepal ; anterior petals 2-lobed, hairy. *Stamens* many ; filaments about 3 in. long, glabrous. *Fruit* of 3 pubescent follicles.

KHASI HILLS, 5,500-6,000 ft., c. g., Mawphlang, Sohiong, etc.

Coptis Teeta, Wall.

A stemless herbaceous plant of this Family which grows in the temperate regions of the Mishmi Hills and yields the drug *Mishmi-tita* much used in Bengal and elsewhere. The roots are gathered towards the end of the rainy season and are carried in tiny little wicker baskets to Sadiya where dealers from other provinces go to buy them.

Many other medicinal plants, such as *Aconitum, Pulsatilla, Cimicifuga,* etc., belong to this Family, but they do not occur in Assam.

FAM. 2. DILLENIACEÆ.

Trees or climbing shrubs. *Leaves* simple, alternate, ex-stipulate, close and parallel-veined, generally rough and hard. *Sepals* 5, broadly overlapping, persistent. *Petals* usually 5, rarely 2-4, deciduous. *Stamens* numerous. *Carpels* 1 or 5-20, in the latter case generally cohering in the axis; ovules 100 or few or many, attached to the ventral suture. *Fruit* follicular or baccate. *Seeds* arillate, albuminous; embryo minute.

Climber. Fr. dry, of 1 carpel and 1 seed. **1. Delima.**
Trees. Fr. fleshy, of 5-20 many-seeded carpels. **2. Dillenia.**

1. DELIMA, Linn.

Delima sarmentosa, Linn. Vern. *Ou-lota, Oua-lota, Pamlewa* Ass.; *Bau-tarak*, Daff.; *Samphot-rikang*, Mik. *Aithlang shrui*, Kuki; *Hruisen*, Tipp.; *Tiegdi-douka*, Cach.

A harsh evergreen climber. Stem cinnamon coloured, exfoliating in square or rectangular pieces. L. 3-6 by 2-2·5 in. elliptic or oblong, more or less cuneate at base, scabrid on both surfaces, unchanged in colour when shed; pet. ·6-·8 in. long, pilose, channelled; lateral nerves 14-16 pairs, almost straight and parallel, depressed above, raised beneath. *Flowers* white, in terminal panicles. *Sepals* reflexed. *Petals* obovate, cilliate. *Ovary* of one carpel only. *Follicle* 1-seeded. *Seed* arillate.

Common in evergreen forests throughout the province.

The stem quickly cut into pieces gives copious and wholesome potable water. The leaves can be used as a substitute for sand-paper in polishing wood, horn or ivory.

Fls. 5-7. Fr. 7-9.

2. DILLENIA, Linn.

Trees with large leaves crowded at the ends of branches. *Flowers* large, white or yellow, more or less scented. *Sepals* 5, persistent, much thickended in fruit. *Petals* 5. *Anthers* opening by terminal slits or pores. *Fruit* of 5-20 carpels cohering in the axis, enclosed in the thickened sepals. *Seed* generally immersed in pulp.

I. Each pedicel bracteate about the middle. Leaves flat :—
Fls. white, solitary, 6-8 in. diam. Fr. 3-5 in. diam. ... *1. D. Indica.*
Fls. yellow, fascicled, not exceeding 2-5 in. in diam.
Fr. less than 1 in. in diam. ... *2. D. scabrella.*

II. Individual pedicels ebracteate (fascicles of them bracteate only at the base). Leaves V-shaped in transverse section. ... *3. D. pentagyna.*

1. Dillenia indica, Linn. Vern. *Ou-tenga, Panchkol*, Ass., *Chalta, Chalita*, Beng.; *Sompa, Sampa*, Miri; *Chumpa*, Abor; *Pumplang*, Mik.; *Thegdi bapahng, Thaida*, Cach.; *Bau-changne*, Daff., *Aithlong*, Lushai; *Aitrang* Kuki; *Aitang, Jongphang,*

Tipp.; *Hegri*, Manip.; *Thagit*, Mech. *Dieng-soh-karbam*, Kh. *Dong-phang-thai*, Naga.

An evergreen tree up to 60 ft. in height and 6 ft. in girth, often fluted or buttressed at the base, with a large oval crown. *Bark* cinnamon coloured or reddish-grey, peeling off in more or less papery and fragile flakes reddish inside with fine and close veins of deeper red. *Leaves* 6-12 by 3-5 in. petioled, oblanceolate or narrow-elliptic, more or less V-shaped in transverse section, glabrous above, pubescent beneath, sharply serrate; lateral nerves. 30-40, very prominent beneath making a narrow angle with the midrib. *Flowers* 6-8 in. across. *Petals* white, very tender. *Fruit* 3-5 in. in diam., always green, with 16-20 carpels tightly enclosed inside the much-thickened sepals. *Seeds* compressed.

Very common and often gregarious in damp places and round swamps in all Disiricts.

Wood reddish-brown, elastic. The timber is considered very good for ridge, poles and is durable under water. The fruit (fleshy calyx) is eaten raw or cooked and also used medicinally.

Fls. 6-8. Fr. 2-4.

2. Dillenia scabrella, Roxb. Vern. *Banji-ou*, Ass. *Mandiphang* or *Munde-phang*, Kach.; *Chirimso*, Mik. *Mangie-thing*, Kuki; *Agatchi-badura*, Garo.

A deciduous tree up to 50 ft. in height and 5 ft. in girth with a fluted trunk and more or less horizontal branches. *Bark* brown and rather rough outside, light-pink inside with rather coarse brownish radial veins, turning darker brown after exposure. *Leaves* 8-15 by 4-7 in., flat, oblanceolate to elliptic, cuspidate-serrate, rather membranous for the genus, hispid above, harshly pubescent beneath; lateral nerves 25-40, often almost horizontal, slightly arcuate; base acute; petiole winged, dilated at the base to clasp the stem. *Flowers* 1·5-2·2 in. across, appearing shortly before the leaves; pedicels 2-2·5 in. long, 3-bracteate about 1 in. above the base. *Sepals* concave, translucent, cohering at the base, nearly glabrous, palegreen. *Petals* ·8-1·2 by 4-·6 in. golden-yellow. *Fruit* globose, about ·8 in. across, pale-green, with 5-7 carpels.

Foot of the MIKIR HILLS, Doigurung Reserve in SIBSAGAR; Dhansiri Reserve also Sildharampur in NOWGONG.

Wood light reddish-brown, rather light, moderately hard, not much used. The fruit is eaten.

Fls. 3-5. Fr. 5-7.

Dillenia pentagyna, Roxb. Vern. Generally the same as of the preceding species. *Akshi*, *Okshi*, *Oua*, Ass.; *Tantri*, *Tatera*, Nep.; *Chirimpi*, Mik. *Boncholta*, Cach.; *Dieng-sah-bar*, Kh.

A deciduous tree about 50 ft. in height; branches generally ascending; branchlets marked with V-shaped leaf scars. *Bark* greyish-white outside, green underneath the corky layer, light red inside, finely purple-veined. *Leaves* 12-40 by 4-12 in, oblanceolate, very narrow at the base which is often stem-clasping, serrate, coriaceous and hard, glabrous above, glabrescent beneath; lateral nerves up to about 40, almost straight, making an angle of about

50 degrees with the midrib, tertiary nerves very fine, sub-parallel; petiole short or 0. *Flowers* about 1·5 in. across, in fascicles of 3-8 from short bracteate protuberances, appearing before the leaves; pedicels ·8-1·5 in. long, without any bract. *Sepals* broadly ovate, concave, pale-green, glabrate, slightly ciliate. *Petals* about 1 in. long, obovate, light greenish-yellow. *Fr.* ·6-·8 in. in diam., of 5 carpels (whence the specific name).

A characteristic tree of deciduous forests, therefore rather scarce in UPPER ASSAM, which area it just touches by occurring along the foot of the MIKIR HILLS, *e.g.*, Lumding, Barpathar, Kukrakata, etc.

Wood reddish-grey, moderately hard and fairly durable, but is liable to warp and crack, hence not much used. The fruit is eaten. In Western India the leaves are used as a substitute for thatching grass. They might be so used in parts of Assam also where thatching grass is scarce.
Fls. 3-5. Fr. 5-7.

FAM. 3. MAGNOLIACEÆ.

Trees, shrubs or climbers, more or less aromatic. *Leaves* simple, alternate, usually entire, generally with stipules which leave a transverse scar on the branchlets. *Flowers* solitary, generally showy. *Sepals* and *petals* similar, deciduous, arranged in whorls of 3. *Stamens* many. *Carpels* many, arranged often spirally on an axis which generally elongates as the fruit ripens.

1. Trees with large but caducous stipules. Carpels spirally arranged on an axis :
   - A. Flowers terminal (axillary in *Talauma phellocarpa*) with little or no interval bet. stamens and carpels :—
     - Carpels persistent on the axis :—
       - Carpels separate, each with 2 ovules. ... **1. Magnolia**
       - Carpels co-hering, each with 6 or more ovules. **2. Manglietia.**
     - Carpels separating from the axis, with 2 ovules in each :— ... ... **3. Talauma.**
     - Carpels concresant with 2 ovules in each cell ... **4. Pachylarnax**
   - B. Flowers axillary with a distinct interval between stamens and carpels : ovules 2-6 in. each carpel. **5. Michelia.**

II. Shrubs without stipules.
   - Carpels in only one whorl, each with 2uo ovule **6. Illicium.**

III. Climbers without stipules. Carpels with 2 or more ovules:—
   - Carpels in fruit distant forming a long spike ... **7. Schizandra.**
   - Carpels in fruit closely packed forming a globose head. ... ... **8. Kadsura.**

1. MAGNOLIA, Linn.

Generally trees. *Leaves* entire; buds enclosed in large convolute stipules which are connate in pairs. *Flowers* terminate usually large. *Sepals* 3, as a rule not brightly coloured. *Petals* 6-12, in series of 3. *Stamens* numerous, filaments flat, with little or no interval between them and the carpels. *Carpels* many, persistent 2-ovuled, the stigmas running down along their ventral

suture. *Fruit* with an elongated axis. *Seeds* pendulous with a long cottony cord, only.

Leaves large, generally 9-16 in. long, very closely reticulate, hairy at least when young :—

Leaves very coriaceous glabrous when mature, pet. long with a narrow V-shaped scar; sepals and petals broad. . . . . 1. *M. pterocarpa.*

Leaves moderately coriaceous, felted-tomentose beneath ; pet. short, channelled ; sepals and petals narrow. . . . . 2. *M. Griffithii.*

Leaves medium-sized. 6-9 in. long, chartaceous, generally glabrous :—

Leaves elliptic, glabrous and green beneath, petiole at least 1 in. long. . . . 3. *M. sphenocarpa.*

Leaves oblong, glabrous when mature, petiole scarcely ·3 in. long. . . . . 4. *M. Pealiana.*

Leaves small, 4-6 in. long, thinly chartaceous, quite glabrous, very closely reticulate, pet. short. . . . 5. *M. Gustavi.*

1. Magnolia pterocarpa. Roxb Vern. *Thouthua*, Ass. (N. Lakh.) *Barampthuri-sopa*, Ass. ; *Doloi-champa*, Cach ; *Utham-ban*, Manip. ; *Phapitemhaija*, Kuki ; *Lairouthou-buphang*, Cach. ; *Chapite-jamja*, Tipp. and Kuki ; *Thang-Ksem*, *Dieng-long-krop*, *Dieng-soh-bar-synrang*, *Dieng-soh-dkhar*, Khasi.

A middle-sized ever-green tree generally with a large crown, branchlets green, annulate. *Bark* grey, rough with warts, inside fibrous, light brown with distant white streakes, soon turning dirty-brown, ·5-·7 in. thick. *Leaves* 9-16 by 5-7 in., eliptic or obovate, very coriaceous, felted rustytomentose beneath while young, glabrous and shining above, young light-green, old pale-yellow ; lateral nerves 20-25 on either side, raised underneath, tertiaries raised on both surfaces (rather depressed above when green), closely reticulated in crocodile pattern ; base cuneate; petiole 1·2-2 in. long, flattened above with a narrow V-shaped scar ; stipules 4-5 in. long, caducous, adnate by their edges to the petiole, greenish-white, grey-canescent, with a tuft of hairs at the apex. *Flowers* 5-6 in. across ; buds ovoid, 2-2·5 by 1·5 in., enveloped in a concave coriaceous puberulous caducous bract, *Sepals* 3, 3 by 2 in. very concave, green outside, greenish-white inside. *Petals* 6, dull-white very fleshy but with a sharp margin, aromatic, gradually smaller but scarrely narrower inwards obovate, emarginate. *Stamens* very numerous with no interval between them and the carpels, together forming a continuous conical mass 1·5 by 1 in. ; anthers long with purple tips. *Stigmas* feathery. *Fruit-spike* 6-10 by 2-2·5 in. *Mature carpels* with a recurved terminal wing 1-1·7 in. long ; axis much thickened and somewhat spongy. *Seeds* orange.

North Lakhimpur and Charduar. Somewhat rare in Upper Assam but possibly generally mistaken for *Talauma Hodgsoni* which it closely resembles in foliage.

The wood is white, rather soft and even-grained and suitable for tea-boxes. It is considered excellent as fire wood in N. Lakhimpur. The stipules, while

tender, are chewed to blacken the gums and teeth in the same way as those of *Talauma Hodgsonni.*

Fls. 4-5. Fr. 10-12. L. renewal 10-12.

2. Magnolia Griffithii, Hk. f. & Th. Vern. *Gauri-sopa, Gahori-sopa* or *Bar-gahori-sopa* Ass. (Lakh. and Darr.); *Pansopa, Kola-sopa.* Ass. (Sibs.); *Lakap*, Naga.

A middle-sized tree with a more or less oval crown; branchlets thickly rusty-pilose. *Bark* grey, fairly plain but with shallow horizontal wrinkles and fine vertical fissures, dark-brown and fibrous inside, turning darker brown after exposure about ·5 in. thick. *Leaves* 6-12 by 4-6 in., eliptic thinly coriaceous, glabrous and somewhat shining and very finely recticulate above, densely felted tomentose and often variagated beneath; lateral nerves 20-28 on either side, straight or very slightly arcuate, base gradually or suddenly cuneate, petiole ·3-·5 in. long, hairy channelled. *Flowers* about 6 in. across pale-white faintly scented; buds enclosed in silky scales 2 by ·8 in., oblong silky on silky peduncles 1·2-1·8 in. long. *Sepals* 3. *Petals* 6, 2·5-·3 by ·8-·3 in.; fleshy, brittle creamy-white or pale-yellow. *Stamens* about 90, crowded a littte below the carpels which are adpressed in fl. and form a cylindrical column. *Carpels* about 110, styles slender and slightly recurved. *Fruit-spike* 5-10 by 1-1·2 in.; carpels speckled when mature, compressed, 1-2-seeded, scarcely woody; axis scarcely thickened. *Seeds* reddish-brown.

Fairly common in the evergreen forests of LAKHIMPUR, SIBSAGAR and DARRANG DISTRICTS.

The wood is greyish-brown, rather soft and light, not used for timber.

Fls. 4-5. Fr. 11-1.

3. Magnolia sphenocarpa, Roxb. Vern. *Pansopa*, Ass. (Sibs.) *Parokbithi-arong*, Mikir.

An evergreen tree up to 70 ft. in height and 5 ft. in girth. Bark grey, fairly smooth, with very fine vertical fissures and shallow horizontal wrinkles, inside brown and mottled, soon turning dirty green, aromatic. *Leaves* 8-12 by 4-6 in., aromatic, elliptic, membraneous, quite glabrous, shining above; lateral nerves 10-12 on either side with often a few intermediate ones, tertiaries finely and closely recticulate; base rather suddenly cuneate; petiole 1-1·2 in. long channelled swollen at the base, with no V-shaped scar; stipules about 2 in. long, hairy at the tip.

The above description refers to my No. 3887 which was identified at Sibpur as this species. Sir George King, however, has made *M. sphenocarpa* Roxb., synonymous with *M. pterocarpa* Roxb., but if the Sibpur identiffcation of my specimen is correct, the two trees must be kept distinct. My specimen agrees exactly with Mr. Haines' No. 505 from Lower Tondu, W. Duars. Unfortunately I have seen no flower or fruit.

Barpathar, SIBSAGAR.

4. Magnolia Pealiana, King. Vern. *Gahori-sopa*, Ass. (Lakh.) Apparently a middle-sized tree; young shoots hairy. *Bark*

dark-grey with longitudinal wrinkles. *Leaves* 6-10 by 2-3 in., oblong or oblanceolate, suddenly acuminate, chartaceous, glabrous and shining above, pubescent on the midrib and nerves beneath ; lateral nerves about 18 on either side often with shorter intermediate ones, reticulations much closer and finer than in the preceding species ; base cuneate or rounded ; petiole ·2-·3 in. long, channelled, stipules 1·25 in. long, strap-shaped with a subulate tip, pale-yellow, silky. *Flowers* solitary, leaf-opposed, 3-4 in. across, on a yellow-silky pedicel 1·5-2 in. long ; buds oblanceolate in outline ; involucre covered with yellow silky hairs. *Sepals* 3, oblong, coriaceous with undulate margins near the apex. *Petals* 6, oblong or oblanceolate, coriaceous, smaller than the sepals. *Stamens* ·5 in. long ; filaments about one-tenth the length of the sharply pointed anthers ; gynaecium cylindrical with a short stalk above the stamens. *Fruit* 3-5 in. long ; carpels ·6 by ·45 in., 2-seeded, slightly speckled outside.

Makum Forest, LAKHIMPUR. Mann.
The wood is white throughout, soft and even-grained, light but fairly strong.

5. Magnolia Gustavi, King. Vern. *Khorokia-sopa,* Ass. (Lakh.)

An evergreen tree 70 to 80 ft. in height and 5 to 6 ft. in girth, closely resembling *Talauma phellocarpa* in habit and foliage. *Leaves* 5-8 by 1·2-2 in., elliptic-lanceolate, acute, chartaceous, quite glabrous ; main lateral nerves 14-16 on either side, reticulations very fine and close ; base acute ; petiole ·3-·5 in. long. *Flowers* 3-4 in. across, terminal and axillary, solitary, on peduncles 1·5-2 in. long ; buds 1·5 in. long, oblong-ovoid ; bracts ovoid, smooth, coriaceous. *Sepals* 3, oblanceoalte, membranous. *Petals* 6, of the size and shape of sepals, coriaceous. *Stamens* about ·6 in. long, not very numerous, with no interval between them and the carpels. *Carpels* sessile, suborbicular, smooth, dorsally compressed when young, ·6-·7 in. long when mature, not beaked. *Young fruit* club-shaped.

Makum Forest. LAKHIMPUR.

2. MANGLIETIA, Bl.

Some characters as of *Magnolia* excepting that the *leaves* are generally more laxly veined, the *gynophore* is always sessile, the carpels are more congested and cohering, and with 6 or more ovules in each carpel. Scar of stipules is always present on the petiole and is of the shape of a narrow U.

Large trees. Leaves at least thrice as long as broad, generally finely acuminate, pale beneath ; petiole stout :—	
Fruit-spike ovoid-oblong. Leaves lanceolate.	1. *M. Caveana.*
Fruit-spike globosely ovoid. Leaves oblanceolate.	2. *M. Hookeri*
Middle-sized tree. L. not more than twice as long as broad, obtuse or suddenly obtusely acuminate, glaucous beneath petiole slender.	3. *M. insignis.*

1. Manglietia insignis, Bl. Vern. *Pan-sopa Phul-sopa,* Ass. (Lakh. and Sibs.). *Dieng-rhi-basaw,* also *Dieng-rhi-balih,* Khasi ; according as the flowers are pink or white.

An evergreen tree 80-90 ft. high and 5-7 ft. in girth. *Bark* plain, greyish white to reddish brown outside with faint vertical fissures and fine horizontal wrinkles, green underneath the thin layer of cork, fibrous, inside dirty-brown, faintly mottled, soon turning darker brown. *Leaves* 6-9 by 2-3 in., elliptic-lanceolate, generally thickly coriaceous, quite glabrous; main lateral nerves about 18 on either side alternating with shorter ones; main reticulation lax, raised on both surfaces in dry but impressed above in green leaves; base acute or cuneate; petiole 1·2-1·6 in. long, more or less stout. *Flowers* 4-6 in. across scented. *Sepals* 3, 3 by 2 in., pink. *Petals* 9, white, gradually narrower towards the centre, very fleshy. *Anthers* sessile or nearly so. *Carpels* slightly beaked, warty, each with about 6 ovules. *Fruit* narrowly ovoid or almost cylindrical, 3-5 in. long. *Seed* red, facetted, suspended by a very slender cord.

Fairly common in evergreen forest along the foot of the Naga Hills in LAKHIMPUR to Geleki and in the Diroi Reserve in SIBSAGAR. Also near Gagaldhubi, in N. LAKHIMPUR, and Pabhoi in DARRANG; *KHASI HILLS* below 2,500 ft.

The wood is yellowish-white, even-grained and smooth and takes a very fine satiny polish. It is very good for indoor work.

Fls. 5-6. Fr. 910.

Var. 1. LATIFOLIA. Leaves shorter but rather broader than in the type, acute.

Occurs in the same localities and has the same vernacular names.

2. Manglietia Hookeri, Cubitt and Smith, Rec. Bot. Surv. Ind. IV. 273. Vern. *Pansopa, Phulsopa,* Ass. (Lakh. and Sibs.)

Apparently a large tree; young parts rufous-silky. *Bark* grey outside, fairly smooth, light brown and fibrous but soft inside, ·7-·9 in. thick. *Leaves* 6-8 by 2-2·5, elliptic or oblanceolate, finely acuminate, membranous or very thinly coriaceous, minutely ferruginous-pubescent beneath when young, glabrous when mature; main lateral nerves 10-14 on either side, very slender, with a few more slender intermediate ones; reticluations inconspicuous in green, but distinct and slightly raised on both surfaces in dry leaves; base acute; petiole rather slender 1-1·5 in. long; stipules 2-3 in. long lanceolate, brown-silky outside. *Flowers* 5-6 in. across, scented. *Sepals* 2·5-3 by ·8 in., oblanceolate, green tinged with pink. *Petals* white, soon turning pale-yellow. *Carpels* with 3-4 ovules. *Fruit* 2-3 by 1·5-2 in., ovoid; carpels without beak.

Evergreen forests of LAKHIMPUR and SIBSAGAR from Makum to Sapakathi. Fls. and new lvs. 2-3 Fr. 6-7.

The heart wood is greenish-brown, fine and even-grained, fit for furniture and indoor work. It is said to be very durable.

3. Manglietia Caveana. Hk. f. and Th. Vern. *Pansopa, Phulsopa,* Ass. (Lakh. and Sibs.); *Larsei-Kynthei,* Khasi.

Generally a middle sized tree with ashy-grey fairly smooth bark green underneath the corky layer, inside dirty-brown and faintly mottled, ·3 in. thick. *Leaves* crowded at ends of branchlets, 4-9 by 2·2-3·5 in, broadly or oblong-elliptic, finely acute or bluntly acuminate, chartaceous, shining above, more or less glaucous beneath, main lateral nerves 10-15 on either side, almost regularly alternating with shorter intermediate ones slightly arcuate; midrib depressed above, prominent beneath reticulations close, distinct in dry, but somewhat indistinct in green leaves; base rounded or obtuse; petiole 1·3-1·5 in. long; stipules very sparingly rusty-silky pubescent. *Flowers* 4-6 in. across, scented. *Sepals* 3, dull-red with green veins, 2-3 in. long. *Petals* 9, gradually narrower, white, fleshy. *Anthers* sessile. *Carpels* congested, each with about 6 ovules, not or very slightly beaked when mature. *Fruit* narrowly ovoid; seeds faceted, red.

Jaipur and similar localities in LAKHIMPUR: Sapekathi and Abhaipur Reserve in SIBSAGAR; also KHASI HILLS upto 2000ft.

Wood appears to be soft, not used as timber.

Fls. 2-3. Fr. 6-7.

3. TALAUMA, Juss.

Generally trees. *Leaves* entire; buds enclosed in large convolute stipules. *Flowers* terminal. *Sepals* 3. *Petals* in whorls of 3. *Anthers* linear, introrse. *Gynophore* sessile. *Carpels* indefinite, each with 2-4 ovules, woody or corky when mature, finally separating from the axis; seeds suspended by an elastic cord.

Carpels not confluent, woody. Leaves glabrous. Sepals and petals broad and fleshy:— A small tree. Sepals and outer whorl of petals never fully expanded. ...	1. *T. Hodgsoni.*
A tall tree. Sepals and outer whorl of petals reflexed when flower is fully open. ...	2. *T. Rabaniana.*
Carpels confluent externally, spongy. Leaves adpressedly grey-pilose beneath. Sepals and petals narrow, not fleshy. ...	3. *T. phellocarpa.*

1. Talauma Hodgsoni, Hk. f. & Th. Vern. *Boromthuri, Boronthuri*, Ass.; *Dat-bhola*, Ass. (Charduar); *Dieng-soh-pydem*, Khasi; *Tetere-asing*, Miri.; *Burbang-asing*, Abor; *Boron-thari-arong*, Mik.; *Laigerau*, Kach.; *Laigungron*, Mech.

A small tree with a few spreading branches. *Bark* greenish, grey, warty, otherwise smooth, with distant horizontal wrinkles, often with large white patches; inside brownish-yellow, fibrous, ·2-·3 in. thick. *Leaves* 8-20 by 4-8 in., oblanceolate, rounded or suddenly apiculate, thinly coriaceous, quite glabrous, red and erect when young; secondary nerves 15-25 on either side, almost straight, tertiaries more or less transverse to the secondaries, quarternaries reticulate; base very acute; petiole 1-2·5 in. long, terete, with a faint scar of fallen stipules, much swollen at the base. *Flowers* large, terminal. *Sepals* greenish-purple. *Petals* greenish-white at base, bright-red above. *Filaments* short. *Fruit* ovoid, 4-6 by 2·5-3·5 in. *Carpels* beaked, woody, dehiscent by the ventral suture, separating from the axis leaving the red seeds

attached to it at the upper end of the empty pits by an elastic cord.

Fairly common in the evergreen forests of all the DISTRICTS of UPPER ASSAM.

The wood is grey, soft, light and even-grained.

It is used for handles of knives, etc,. in Darjeeling, but only as firewood in ASSAM. The stipules are chewed by young girls to blacken their teeth and gums.

Fls. and new leaves 4-5. Fr. 8-9.

2. Talauma Rabaniana, Hk. f. & Th. Vern. *Sopa*, Ass.; *Laimakhan-phang*, Kach.; *Kobaraiching*, Naga.

A tall tree with a conical crown attaining 70ft. in height and 6ft. in girth, closely resembling *T. Hodgsoni* in general appearance, young parts fugaciously tawny-tomentose. *Bark* ·5-·7in. thick, dark-grey and rough outside, fibrous and uniformly pale-brown inside. *Leaves* 8-14 by 2-4 in., elliptic or oblanceolate, shortly acuminate, gradually narrowed to the base, coriaceous, dark-green and shining above light-green underneath; midrib stout; lateral nerves 12-24 on either half, nearly straight; reticulations fine and close. *Flowers* solitary, terminal, 2·3 in. long; peduncles about 1 in. long and ·4-·5 in. thick, annulate; bracts densely adpressed tomentose. *Sepals* 3, sub-orbicular, rough outside, caducous. *Petals* 9 in three whorls, broadly elliptic or obovate, concave, the outer whorl reflexed after the fall of the sepals. *Filaments* very short; anthers ·6-·7 in. long. *Fruit* about 3-6 in. long and 1·5-1·8 in diam.; carpels not so numerous as in the last species, woody, dehiscent by the ventral suture; axis woody; pits somewhat shallow, rhomboidal.

GARO, KHASI and NORTH CACHAR HILLS upto 4,000 ft., also near Patgaon in GOALPARA.

The timber is greyish white and moderately hard, weighing about 30 lb. per c. ft. It is suitable for furniture and planking.

Fls. 4-6. (?).

3. Talauma phellocarpa, King. Vern. *Khorika-sopa*, *Tita-sopa*, Ass. (Lakh. & Sibs.); *Dieng-lari*, *Dieng-rewi*, Synt.; *Karo-phang*, *Dauthu-kundu-phang*, Kach.; *Champa*, Cach.; *Bol-mring*, Garo; *Langlu-chikong-arong*, Mik.

A large evergreen tree up to 100 ft, in height and 8 ft. in girth, with grey pubescent branchlets which are gracefully pendulous in mature trees; crown narrow and conical till full height is attained, oval afterwards. *Bark* ashy-grey, somewhat rough, exfoliating in rectangular flakes; inside fibrous, yellowish tan-brown, mottled with coarse strands of amber-brown, soon turning darker tan-brown, ·4-·5 in. thick, aromatic, bitter. *Leaves* 3-8 by 1·2-2 in., elliptic lanceolate or oblong-lanceolate, acute or acuminate, thinly coriaceous, glabrous and shining above, densely grey-pi ose beneath when young, glabrescent when mature, pale-yellow before falling; main lateral nerves about 14 on either half, slender, straight or more or less arcuate, reticulations very close

and fine, base acute ; petiole ·4-·7 in. long, pubescent; stipules ·4-·6 in. long, brown-silky outside ; scar inconspicuous. *Flowers* axillary, solitary, erect, pale-white, about 1 in. across ; buds ovoid-elliptic, ·5-·7 in. long, enclosed in silky scales ; peduncles ·4-·5 in. long, jointed about the middle. *Sepals* and *petals* 12, narrow-lanceolate to strap-shaped, pale-white. *Fruit-spike* continuous, 3-4 by 1·2-1·4 in., speckled with large grey corky lenticels, aromatic, somewhat bumpy indicating the position of the carpels which ultimately fall off leaving empty oval cavities and falcate stalks attached to the persistent axis.

Fairly common in the LAKHIMPUR and SIBSAGAR DISTRICTS from Makum to the Diroi Reserve ; also found in the MIKIR HILLS and in the Dhansiri Reserve, NOWGONG ; KHASI HILLS upto 4000ft ; CACHAR and GARO HILLS.

The tree has a large heartwood of a greenish-brown colour turning darker brown when dry. It takes a good polish and is used for planking, doors and windows and furniture. Annual rings marked by a very fine ring of softer tissue.

Fls. 5-7. Fr. 7-9. Occasionally flowers and fruits out of season.

4. PACHYLARNAX, Dandy.

Pachylarnax pleiocarpa, Dandy. Sp. nov. Vern. *Phulsopa, Kothal-pathia sopa*, Ass.

A large evergreen tree, young shoots dark green, tubercled. *Bark* rough with longitudinal furrows. *Blaze* brownish yellow marked with dark dots. *Leaves* alternate, somewhat crowded towards the ends of branchlets 6-9 by 2-3 in., elliptic oblong to oblanceolate oblong, entire, obtuse or rounded, rarely subacuminate, sometimes slightly emarginate, thickly coriaceous, shining, green above, pale beneath, glabrous ; lateral nerves 10-18 on either half, conspicuous, midrib prominent beneath ; nerves laxly reticulate, base cuneately attenuate, occasionally unequal ; petiole 1-1·2 in. long, thick, flattened above (not channelled) ; stipules deciduous, elliptic oblong. *Flowers* fragrant, generally solitary, rarely in pairs, about 4 in. across ; flower buds lanceoloid or narrowly ovoid oblong, covered by 1-3 deciduous bracts ; peduncles thick, ·8-1·2 in. long. *Perianth* 4-5-merous ; tepals 13-15, fleshy, whitish yellow or cream coloured, 4-5 outer ones oblanceolate or narrow elliptic oblong, 9-10 inner ones spathulate, smaller towards interior. *Stamens* numerous (53-57), ·5-·8 in. long ; filaments short ; anther cells produced into a short acute appendix, gynœcium ellipsoid ; carpels concrescent, 5-8 ; ovules 4-8 in each carpel. *Fruit* capsular, woody, ellipsoid, 3-4 by 3 in., dorsally dehiscent, (upper most separating from the conical central axis), each valve being composed of united halves of 2 adjacent carpels. *Seeds* about 3 in. across, with an orange coloured fleshy coat.

LAKHIMPUR (Digboi, Upper Dehing and Jaipur Reserves).
Wood moderately hard, takes a fine polish and is very valuable for cabinet work.
Fls. 10-12. Ft. 8-9 (persists long on the tree).
. *E. Dandy in the Journal of Botany, November, 1933.)*

5. MICHELIA. Linn.

Evergeeen trees. *Leaves* enveloped by stipules in bud with prominent reticulate veins, generally bitter and aromatic. *Flowers* axillary (terminal in *M. Cathcartii*), solitary, with sepals and petals similar and in whorls of 3. *Filaments* flat, with a distinct interval above them and below the carpels, anthers introrse. *Carpels* terete or compressed, usually white-speckled, contiguous in flower but generally distant in fruit owing to elongation of the axis, dehiscing dorsally, each with 2-4 ovules, but mostly 1-seeded in fruit. *Styles* short.

I. Carpels numerous :—

A. Flowers mostly terminal. Leaves 3-5 by 1·5-2 in., chartaceous, glabrous except the midrib, lateral nerves 10-15 on either half. Fruit-spike 3-5 in. long ; ripe carpels compressed, congested. . . 1. *M. Catficartii.*

B. Flowers axillary :—

1. Young parts hairy :—

a. Leaves more or less pubescent beneath. Young parts densely ferruginous-tomentose :—

Leaves 5-8 by 2-3·5 in., thinly coriaceous ; lateral nerves 8-10 on either half. Fruit-spike 5-8 in. long ; ripe carpels terete, rather distant. . . . . 2. *M. excelsa.*

Leaves densely grey-tomentose beneath, 6-10 by 2-3·5 in., sub-coriaceous ; lateral nerves up to 18 on each half. Fruit-spike 2-5 in. long ; ripe carpels compressed, stalked. Flowers pale-white, not scented. . . . . 3. *M. lanuginosa.*

Leaves usually puberulous beneath, 8-10 by 2·5-4 in., thinly coriaceous; lateral nerves about 15 on either half. Fruit-spike 4-8 in. long ; ripe carpels terete, sub-sessile, rather distant. Flowers pale-yellow, strongly scented. . . . . 4 *M. Champaca.*

b. Adult leaves glabrous :— Leaves 2·5-6 by 1·5-3 in., chartaceous ; lateral nerves 10-15 on either half, slender. Fruit-spike 2-4 in. long ; ripe carpels much compressed, orbicular, sessile. Flowers pale-yellow, delightfully scented. . . . . 5. *M. Kisopa.*

Leaves 3-6 by 1·5-2 in., hinly coriaceous ; lateral

nerves 8-12 on either half. Fruit-spike 2-4 in. long; ripe carpels compressed, obovoid ... 6. *M. punduana.*

2. All parts glabrous:—
Leaves 3·5-5 by 1·5-2·5 in., thinly coriaceous. Fruit-spike 5-7 in. long; ripe carpels terete obovoid sessile, somewhat distant. ... 7. *M. oblonga.*

Leaves 5-7 by 3·5-4·5 in., coriaceous, strongly reticulate. Fruit-spike 5-7 in. long; ripe carpels terete, oblong, slightly apiculate. ... 8. *M. Mannii.*

II. Carpels few:—
Leaves 4-6 by 1·5-2·2 in., oblong-lanceolate, coriaceous, glabrous, glaucous beneath; lateral nerves 9-11 on either half. Fruit-spike 2-4 in long; ripe carpels slightly compressed, shortly beaked. ... 9. *M. manipurensis.*

Leaves 3-7·5 by 1·5-4 in., lanceolate, thinly coriaceous, shining above, closely but notvery strongly reticulate; lateral nerves 10-12 on either half Fruit-spike 1·7-2 in. long; ripe carpels usually only one, as long as the fruit, obovoid, not terete. ... 10. *M. montana.*

1. Michelia Cathcartii, Hk. f. & Th. Vern. *Dieng-rai*, Kh.

A large evergreen tree; young branches silky-hairy; bark dark-grey. *Leaves* 3-5 by 1·5-2 in., lanceolate or oblong-lanceolate acuminate, more or less rounded at the base, quite entire, chartaceous, shining on both surfaces; midrib densely silky-hairy above, brown-pilose beneath; lateral nerves 10-15 on either half, very slender, tertiaries finely reticulate; petiole ·2-·3 in. long, slender, densely yellow-hairy; stipules ·6-·8 in. long, densely silky. *Flowers* white, mostly terminal, 3-4 in. diam.; buds oblong, rounded at both ends; peduncle 1 in. long. *Sepals* and *petals* 9 in 3 whorls, each 1·5-2 in. long. *Stamens* about 1 in. long, overtopping the carpophore; filaments one-fourth the length of the anthers. *Carpels* sessile, beaked and densely imbricate while young. *Fruit-spike* 3-5 in. long; ripe carpels ·3-·4 in. diam., sub-orbicular, compressed, closely lenticellate; seeds 2-3.

KHASI HILLS, *e.g.*, Nong-ryng-koh. Also NAGA HILLS.
Wood compact and moderately hard, fit for planking and tea-boxes, weighing about 40 lbs. per c. ft. Annual rings distinct.
Fls. 3-5. Fr. Rainy season.

2. Michelia excelsa, Bl. Vern. *Dieng-rai*. Khasi.

A lofty deciduous tree. *Bark* ·7 in. deep. dark-grey, corky outside with irregular lines of fat lenticels and with very fine horizontal wrinkles, inside uniformly dun-yellow but for a few deep-brown specks; fibres very fine. Young parts densely ferruginous-tomentose. *Leaves* 5-8 by 2-3·5 in., ovate-elliptic or oblong-lanceolate, acuminate, cuneate or slightly rounded at

the base, thinly coriaceous, glabrous and shining above, glaucous often minutely silky-puberulous underneath; lateral nerves 8-10 on either half, arched, tertiaries very closely reticulate; petiole ·5-1 in. long; stipules 1·5-2 in. long oblong-acuminate, silky outside. *Flowers* white, axillary, sometimes spuriously terminal, 3-4 in. diam., faintly scented. *Sepals* and *petals* 12, of the outermost whorls 3 by 1·3 in., gradually narrower towards the centre. *Stamens* about 50, shorter than the gynœcium; filaments ·1 in. long. *Carpels* about 40, tipped with persistent recurved styles. *Fruit-spike* 5-8 in. long; ripe carpels ·4-·6 in. long, obliquely ovoid, shortly beaked; ovules 2-4 in each carpel, fascicled on a tubercle on the placenta, only 1-2 developing into seed in each ripe carpel, seeds red, faceted, oily.

KHASI HILLS, *e.g.*, Lum-sutar near Dampep and similar other localities —not common.

Sapwood small, white, soft: heartwood yellow when freshly-cut, afterwards turning brown. Medullary rays very numerous, mostly very fine, showing a satiny silver-grain on a radial surface. Weight about 35 lbs. per c. ft. The timber is remarkably durable and is very suitable for furniture and planking.

Fls. 4-5. Fr. Rainy season.

3. Michelia lanuginosa, Wall. Vern. *Dieng-lali*, Khasi; *Gogoi-champ*, Nep.

A fast-growing deciduous tree up to 90 ft. in height and 7 ft. in girth with a broad crown. *Bark* about 1 in. thick, rather plain, grey corky outside, dun-brown inside, the whole soon turning on exposure to deeper brown, very fibrous. Young parts including stipules and bracts covered with pale grey-tomentum. *Leaves* 6-10 by 2-3·5 in., oblong-lanceolate, acute at both ends or sometimes more or less rounded at the base, thinly coriaceous, glabrous and somewhat shining above, mattedly grey-tomentose beneath, turning yellow before falling; lateral nerves 14 to 17 on either half, slender, reticulations very close but distinct only on the upper surface; petiole ·5-·7 in. long, rather short, grey-tomentose; stipules oblong. *Flowers* pale-white, 2·5-3 in. diam., axillary, solitary on short stout hairy pedicels; bracts very densely grey-silky. *Sepals* and *petals* 1-1·5 by ·2-·3 in., oblanceolate. *Stamens* 60-70, much shorter than the gynœcium; filaments glabrous. *Carpels* about 45, very woolly; styles glabrous. *Fruit-spikes* 2-5 in. long; ripe carpels about ·5 in. diam., shortly stalked, slightly compressed, densely lenticellate; seeds 1-3, faceted, deep-orange.

KHASI HILLS, 5,-6,000 ft., *e.g.*, Kynshi. Not very common.

Wood greyish-white, soft, weighing 30-35 lbs. per c. ft. Medullary rays fine and numerous. Might be used for planking.

Fls. 8-9. Fr. 9-11.

4. Michelia Champaca, Linn. Vern, *Champa*, Beng. & Hind.; *La-champa*, Synt.; *Tita-sopa*, Ass.; *Champari-phang*. Kach., *Serjo-asing*, Miri; *Bol-nabat*, Garo; *Ching-kappa*, Naga.; *Shap*, Khasi

Usually a middle-sized evergreen tree up to about 70ft. in height. *Bark* ashy-grey or brownish, rather rough outside, inside light dun-brown with thick strands of amber brown tissue, soon turning reddish brown, ·5-·7 in. thick. *Leaves* 4-9 by 2-3·5 in., lanceolate, sometimes ovate, finely acuminate, thinly coriaceous, glabrous and more or less shining above, glabrescent underneath with usually some pubescence at least along the nerves ; lateral nerves about 16 on either side of the midrib with often a few intermediate ones, slender but conspicuous, tertiaries finely reticulate in square or rectangular pattern ; base very gradually cuneate ; petiole ·7-1·2 in. long, slightly channelled, usually pubescent ; leaf-buds lanceolate, ferruginous-pubescent outside ; old leaves yellow. *Flowers* axillary, rarely terminal, solitary, 1·2-1·8 in. long, pale-yellow to deep dun-yellow, very fragrant ; buds ovoid ; bract spathoid, broadly ovate, about 1 in. long, as broad as, or broader than long, often silky outside. *Sepals* and *petals* 15-21, oblong or oblanceolate, gradually narrower towards the centre. *Fruit-spike* 3-6 in. long ; ripe carpels ·6-·8 in. long, ovoid or ellipsoid, generally sessile, white-speckled, woody when dry.

Occurs sporadically in all DISTRICTS generally along the foot of the HILLS, but not at all common. Much cultivated for its flower.

Heartwood light olive-brown, very durable, seasons and polishes well, useful for cabinet work and building.

Fls. 4-6. Fr. 4-6, of the following year.

5. Michelia Kisopa DC. Vern. *Chobsi*, Nep.

A tall deciduous tree with plain grey bark and thin lenticelled branchlets. *Leaves* 9·5-6·5 by 1·5-3 in., ovate, elliptic, oblong-or elliptic-lanceolate, acute or shortly acuminate, abruptly cuneate, rarely rounded at the base, thinly coriaceous, glabrous on both surfaces, shining above, dull underneath, turning yellow before falling ; lateral nerves 10-15 on either half, only slightly arched towards the outer extremities ; reticulations very close and fine ; petiole ·8-1·5 in. long, rusty-puberulous when young ; stipules ·6 in. long, oblong, grey or rusty-pubescent outside. *Flowers* pale-yellow, axillary, shortly-stalked, 1-1·5 in diam., delightfully scented ; buds ·5 in. long ; bracts 2, fleshy, grey-pubescent outside. *Sepals* and *petals* 12-15, obovate or oblanceolate, glabrous. *Stamens* shorter than the gynœcium. *Carpels* silky-hairy ; styles recurved. *Fruit-spikes* 2-4 in. long ; ripe carpels sessile, ·3-·4 in. diam., compressed, closely lenticelled ; seeds 3-4.

Cultivated at Shillong.
Wood yellowish, suitable for use as door-frames and planking.

Fls. 7-9. Fr. 11-1,

6. Michelia punduana, Hk. f. & Th. Vern. *Dieng-rtiang-khlaw*, Synt. ; *Dieng-soh-niar*, *Dieng-rai*, Khasi.

A middle-sized tree ; young parts densely red-silky. *Bark* grey, ·5-·7 in. thick, thinly corky and with horizontal wrinkles outside, inside aromatic, granular yet fibrous, hard, brown,

mottled with coarse streakes of darker brown, soon turning uniformly deep-brown after exposure. *Leaves* 3-6 by 1·5-2 in. oblong, elliptic, obovate or oblanceolate, abruptly acuminate, base acute or cuneate; coriaceous, glabrous on both surfaces, shining above, pale or sub-glaucous beneath; lateral nerves 8-12 on either half, obscure, reticulations open, visible on both surfaces; petiole ·5-·75 in. long, rather stout; stipules about as long as the petiole, narrowly oblong. *Flowers* axillary, solitary, rarely in pairs, 1·3-1·5 in. across, on short, thick, rufous stalks; buds ·5-·7 in. long, ovoid, sharply pointed densely rufous-velvety. *Sepals* and *petals* 9-12, white, of the outer whorls obovate-cuneate, of the inner narrowly oblanceolate, pointed, not much scented. *Stamens* about 80, slightly shorter than the gynœcium. *Carpels* about 50, beaked. *Fruit-spike* 2-4 in. long; ripe carpels ·3-·4 in. diam., obovate or sub-globular, compressed, lenticellate, not beaked; seed solitary, aromatic with a scarlet arillus and black testa.

Appears to be confined to the KHASI HILLS, 4-5,000 ft., *e. g.*, Cherapunji Jawai, Jarain, *etc.*

Wood of a dull grey colour, compact, even grained, little liable to warp or split, weighing about 37 lbs. per c. ft., capable of being used for planking and furniture. Medullary rays close and uniform.

Fls. 10-11.

7. Michelia oblonga, Wall. Vern, *Phul-sopa*, *Bor-sopa Kothal-sopa*, Ass.; *Dieng-ta-roi*, Khasi; *Chambi-sersang*, *Bera-chhamphe*, Garo; *Serio asing*, Miri & Abor.

A lofty tree up to 150 ft. in height, generally buttressed at the base. *Bark* grey, rough and warty outside, more or less plain and with horizontal wrinkles on young trees, green below the corky layer, inside light-brown with close and reticulating streaks of darker brown, turning dirty brown on exposure (when the streaks become invisible), ·7-1·5 in. thick, aromatic. *Leaves* 3·5-7 by 1·5-2·7 in., oblanceolate, sometimes ovate, suddenly shortly acuminate, thinly coriaceous, shining above, pale and often glaucous beneath, turning yellow before falling; lateral nerves 10-12 on either half, sometimes with shorter intermediate ones; tertiaries laxly reticulate, the recticulations being conspicuous on both surfaces on dry leaves; base acute; petiole ·6-1 in. long, rather slender, channelled, slightly swollen at the base; stipules narrow-oblong, as long as the petiole. *Flowers* white, scarcely scented, axillary, solitary, on short annulate peduncles; buds ·8-1 in. long, elongate-ovoid. *Sepals* and *petals* 12 in all, white, fading to pale-yellow, 1-1·5 in. long, oblanceolate or spathulate. *Stamens* about 50; filaments ·1 in., anthers ·6-·8 in long, turning brown after opening. *Carpels* about 40, glabrous, generally 4-ovuled. *Fruit-spike* 6-7 in. long; ripe carpels lax, sessile, obovoid, terete, speckled, upto ·8 in. in length.

Fairly common in evergreen forests excepting NOWGONG, KAMRUP and GOALPARA: also in the GARO and KHASI HILLS.

Timber greyish-white with greenish grey, very fine-grained with close uniform medullary rays: weight about 40 lbs. per c. ft. Much prized for Planking and cabinet work, as it does not warp or split.

Fls. 2-3. Fr. 8-10.

8. Michelia Mannii, King. Vern. *Kothalua-sopa*, Ass. (Lakh.)

A middle-sized evergreen tree, wholly glabrous; branches lenticelled. *Leaves* 4-7 by 2-4 in., oblanceolate to obovate with a subacute apex, firmly coriaceous, glabrous, shinning above somewhat dull underneath; lateral nerves rarely more than 10 on either half, tertiaries conspicuously but broadly reticulate; base acute; petiole ·8-1·2 in. long finely channelled, swollen at the base; stipules narrowly oblong, smooth. *Flowers* white, axillary, solitary, 2·5-3 in., across, on short peduncles; buds 1·2 in. long, oblong, smooth. *Sepals* 3, ·6-8 by ·1-1·5 in., linear. *Petals* 6, oblanceolate, in two series those of the inner series slightly smaller. *Stamens* as long as, or overtopping the gynœcium. *Carpels* sessile, smooth; style short. *Ripe-fruit* 5-7 in. long, with a fleshly rachis; ripe carpels up to an inch in length, oblong or obovoid, sparsely lenticellate, 2-seeded.

Makum Forest Range, LAKSHIMPUR DISTRICT, not very common.
Nothing is known about the quality of the timber, but it is likely to be as useful as most of its other co-geners.

Fls. 11-12. Fr. 4-5.

9. Michelia manipurensis, Watt. Mss. ex. Brandis Ind. Trees Vern. *Dieng-rai* Khasi; *Sopa*, Ass.

An imperfectly known middle-sized evergreen tree, young parts rufous-silky. *Bark* grey-corky outside with vertical lines of larger lenticels, soft inside white mottled with brown specks, turning uniformly brown on exposure ·3-·4 in. thick, not bitter. *Leaves* 3-7 by 1·5-2·3 in. oblong or oblong lanceolate, acuminate, cuneate at the base, coriaceous, glabrous, not particularly shining above, dull or sub-glaucous beneath, lateral nerves 10-12 on either half, conspicuous underneath, reticulations fairly close, equally distinct on both surfaces; petiole ·75-1·2 in. long, margined. *Flowers* axillary, solitary, shortly stalked; buds about 1 in. long, lanceolate in outline, apiculate, slightly falcate, densely silky-rufous outside. *Fruiting-spike* 2·5-4 in. long; ripe carpels few generally at the extremity of the spike, with many barren carpels below, and sometimes with a few between them, ·3b-·4 in. diam., sub-globose compressed, beaked, lenticellate.

SIBSAGAR—Baruasali; LAKHIMPUR; KHASI HILLS upto 6000 ft. *e, g*
Lum Suar.
Timber not seen,

Fls. oct. Fr. remains fully a year on the tree.

10. Michelia montana, Bl. Vern. *Pan sopa*, Ass. (Sibs.)

A fairly large evergreen tree. *Bark* grey outside, smooth but with close horizontal wrinkles, inside dark-brown, fibrous and much mottled, aromatic. *Leaves* 3·5-7·5 by 1·3-3 in., ovate elliptic or obovate, somewhat suddenly acute, coriaceous, glabrous

and shining on both surfaces; main lateral nerves 9-11 on either half, slender, often with a few intermediate ones between, tertiaries closely reticulate and distinct on both surfaces (at least on dry leaves); base cuneate; petiole ·7-1 in. long, slender, finely channelled, slightly swollen at the base. *Flowers* white, axillary, solitary or sometimes 2 from a short peduncle; pedicels slender, ·8-1 in. long; buds cylindrical. *Sepals* and *petals* about 8, ·8-1 in. long, oblanceolate or linear. *Stamens* overtopping the velvety gynœcium of 2-4 carpels. *Ripe carpels* 1-3, 2-2·5 by 1·2-1·5 in., obovoid, sessile or shortly stalked, woody, speckled with large white lenticels; seeds 3-4, ·5 by ·3 in., reddish-brown, faceted, suspended by an elastic cord.

Makum Range, LAKHIMPUR: CACHAR-Owden! Cultivated at Jorhat. Apparently not very common. Mann's Longai specimens are probably not this species.

The timber is probably as good in quality as of most other species of the genus, although not much known owing to the scarcity of the tree.

Fls. 7-9. Fr. 8-9 of the following year.

1. Michelia excelsa, Bl. and M. manipurensis, Watt, have been reduced to M. doltsopa, Buch-Ham. by Dandy (Journal of Botany Vol. LXV (1927) P. 277-279).

It is possible that an allied species which is not covered by this, exists, in N. E. Frontier District and Manipur which further field observations may bring to light.

2. Michelia Kingii, Dandy.

Dandy maintains *(Journal of Botany. Novr. 1928)* that the Indian plant included under this name is a new species, and describes it under the above name. He has drawn up the following key for separating it from M. montana proper :—

Tepals sub-similar in texture, all rather fleshy; penultimate bract inserted well below the middle of the peduncle; valves of mature fruiting carpels not very convex outside. . . .	M. Kingii
Tepals very dissimilar in texture, those of the outer whorl membranous, those of the inner two whorls fleshy; penultimate bract inserted usually about half way up the peduncle; valves of mature fruiting carpels convex outside.	M. montana.

Michelia Wardii, Dandy. A large tree. *Leaves* about 6·2 by 1·5 in. oblanceolate, narrowly oblong to elliptic oblong acuminate or sometimes acute, glabrous above, undersurface glaucescent and glabrous to thinly adpressed pubescent on the nerves, base decurrent into the petiole which is up to about ·5 in. long; stipules adpressed grey tomentose or pubescent outside. *Spathoid bracts*, grey, sericeo-tomentose, peduncles thick, ·2-·25 in. long. *Perianth* cream coloured, 1·75-2·5 in. long, segments 9-12, pubescent outside. *Carpels* numerous adpressed pubescent at least when young.

Allied to M. excelsa, Wall, and M. manipurensis, Watt., from which it differs by grey indumentum of the stipules, spathoid bracts and peduncles grey, and the narrower leaves, and the absence of tawny or rufous hairs which are conspicuous in the earlier species.

Chibaon-Delei valley.

6. ILLICIUM, Linn.

Illicium Griffithii, Hk. f. and Th.

A large aromatic evergreen shrub 10-15 ft. high, without stipules; branches somewhat angular, glabrous, shining. *Leaves* 2-4 by ·8-1·7 in. ovate, elliptic or lanceolate, shortly acuminate, acute at the base, coriaceous, glabrous, pellucid-dotted, shining above, dull-brown beneath, margins slightly recurved; lateral nerves 6-7 on either half, very obscure; petiole ·4-·6 in. long, channelled. *Flowers* axillary or terminal, solitary, about 1 in. in diam.; pedicels ·5-1 in. long, recurved. *Sepals* 4-6, orbicular, acute. *Petals* 12-20, orbicular, not pointed, fleshy. *Stamens* 20-24, erect; filaments very short; anthers broad, blunt. *Carpels* about 20, in a single whorl, 1-ovuled with recurved styles. *Fruit* of spreading compressed beaked follicles; ripe carpels 8-12; seeds about ·2 in. diam., sub-rotund, slightly compressed, glossy-brown.

KHASI HILLS, 4,500-5,500 ft., chiefly in gorges and deep ravines at Cherapunji and its neighbourhood

The fruit is aromatic and has carminative properties.

Fls. Rainy season. Fr. Oct.

7. SCHIZANDRA, Michaux.

Sinistrorsely climbing glabrous shrubs. *Leaves* exstipulate. *Flowers* axillary, 1-sexual and dioecious, white, yellow or red. *Sepals* and *petals* 9-12, imbricate, generally in 3 series. *Stamens* 5-15 or more, spirally arranged; filaments monadelphous and short, or connate into a fleshy tube; anthers free, or sessile and half-buried in the head of connate filaments, cells small, remote. *Carpels* many, densely imbricated; stigma sessile; ovules 2, pendulous. *Fruit* an elongated spike of 1-seeded, rarely 2-seeded carpels; seeds albuminous.

Filaments free above; anthers free:—
Pedicles slender, 1-2·5 in. long. ... 1. *S elongata.*

Filaments in one globose mass; anthers sessile:—
Pedicels stout, ·2-·7 in. long:—
Branchlets verrucose, rather thick. ... 2. *S. Propinqua.*
Branchlets plain, thin. ... ... 3. *S. axillaris.*

1. Schizandra elongata, Hk. f. and Th. Vern. *Soh-mijarian*, Khasi.

A deciduous woody climber; branchlets thin, lenticelled, scaly at the base. *Leaves* 1·5-3·5 by ·7-1·5 in., ovate or oblong-lanceolate, membranous, rather soft, glabrous above, minutely verrucose and sub-glaucous underneath, margins cartilaginous, with or without minute, distant, cartilaginous teeth; base acute or rounded, somewhat unequal; main lateral nerves 4-6 on either half, oblique, arched, reticulations open, faint; petiole ·6-·8 in. long, slender, channelled above. *Flowers* yellowish; ·5-·7 in. diam.; pedicels 1-2·5 in. long, slender. *Sepals* 3, orbicular, green outside, yellow within. *Petals* 6, ovate-orbicular, larger than the sepals. *Stamen*

spirally arranged ; filaments monadelphous below, free and tubular above ; anthers with a thick connective. *Carpels* 20-24, imbricated on a conical receptacle. *Fruit-spike* 2-3 in. long, rachis slender at the base, swollen at intervals above ; ripe carpels sessile, globose, not beaked.

KHASI HILLS, 5,-6,000 ft., *e. g.*, Shillong Peak, Elephant Falls. *etc.*

Fls. 5-6. Fr. 8-9.

2. Schizandra propinqua, Hk. f. and Th.

A woody climber ; stem dark-brown ; branchlets succulent, brown, verrucose and lenticellate. *Leaves* 3-6 by 1·2-2 in., ovate-lanceolate, acuminate, somewhat fleshy and soft, glabrous, dark-green and shining above, pale and minutely gland-dotted underneath, margins with minute distant gland-teeth ; base cuneate or more or less rounded, slightly unequal ; lateral nerves 8-12 on either half, arched, not prominent, reticulations open, obscure ; petiole ·4-·6 in. long, rather stout. *Flowers* ·5-·9 in. diam., yellowish, axillary, solitary, slightly scented ; pedicles ·4-·7 in. long, stout, minutely bracteolate. *Sepals* and *petals* ovate or obovate, concave in bud *Filaments* connate into a globose brick-red fleshy mass, about ·3 in. diam., anthers 12-15 or more, embedded in the mass of filaments. *Fruit-spike* 4-6 in. long, with a fleshy cylindrical rachis ; ripe carpels globose, shortly stalked, baccate, 2-seeded.

KHASI HILLS, *e, g.*, Laitkor Forest, 5,200 ft. Rather scarce.

Fls. 8-9. Fr. 10-11,

3. Schizandra axillaris, Hk. f. & Th.

A slender woody climber ; old stems with thick corky reticulations, branches lenticellate, branchlets plain, angular. *Leaves* 2·5-4 by ·8-1·3 in.. narrowly oblong-lanceolate, long-acuminate, minutely gland-toothed at irregular intervals along the margins, tapering at the base, thinly coriaceous and somewhat succulent., glabrous, deep green above, pale beneath ; lateral nerves 6-8 on either half, slender, reticulations very open, faint ; petiole ·4-·6 in. long, narrowly margined. *Flowers* dull-scarlet, axillary, solitary, about ·5 in. diam., sessile, or on short bracteolated pedicels. *Sepals* orbicular, rather fleshy, concave. *Petals* ovate. *Stamens* as in *S. Propinqua* but generally with fewer anthers. *Fruit-spike* 1-2 in. long ; ripe carpels sub-sessile globose, 1-2-seeded.

KHASHI HILLS, 4,-5,000 ft. ; ravines near Shillong, not at all common.
Fls. 7-9. Fr. 10-11.

Schizandra sphenanthera, Rchd & Wils. A large glabrous rambling shrub. *Leaves* 2·7-5·7 by 1-2 in., ovate or ovate-elliptic, acuminate distantly denticulate, base broadly cuneate, often unequal, membranous main lateral nerves 6-8 on either half ; petioles ·5-1 in. long. *Flowers* deep cherry red, about ·7 in. across, pedicels slender axillary 1-1·7 in long, outermost perianth segments much smaller than the inner ones. *Fruit* in short compact purple hanging spikes—*Kingdon Ward.*

Mishmi Hills--Delei Valley, Kingdon Ward. A Chinese plant.

8 KADSURA, Kæmp.

Kadsura Roxburghiana, Arn. Vern. *Mi-ja-ngew*, Khasi; *Kang-mari*, Manip.

A woody evergeen climbing shrub; branches generally with elongated lenticels. *Bark* on old stems grey-corky and deeply reticulately furrowed; pith large. *Leaves* 3-6 by 1·3-2·4 in. elliptic to ovate-lanceolate, acute or shortly acuminate, distantly, dentate-serrate on young plants, entire on mature ones, soft and rather fleshy when fresh, but membranous when dry, quite glabrous; main lateral nerves 10-12 on either half, often with shorter intermediate ones between, tertiaries obscure on fresh leaves but fairly distinct on the under surface of dry leaves, reticulations with large meshes; base subacute; petiole ·6-·8 in. long, slender, sharply margined; stipules 0. *Flowers* 1-sexual, whitish, axillary, solitary, about ·5 in. across, on peduncles ·3-·5 in. long, with as many as a dozen ciliate bracteoles, the uppermost passing into the sepals, elongating as the fruit matures to about 1 in. *Sepals* and *petals* 12, the largest ·25 in. long, orbicular. *Stamens* about 12; outer filaments free, inner connate. *Carpels* many, imbricated; stigma sessile; ovules 2. *Ripe fruit* 1-1·5 in. diam., globose; ripe carpels ·3 in. long, oblong and faceted, red, juicy, more or less coalescing, shortly mucronate: seeds orbicular, compressed. The fruits sometimes run into galls which assume the shape and size of small plantains.

Jaipur Reserve in LAKHIMPUR; Diroi Reserve and Garampani, SIBSAGAR, Charduar Reserve (Belsiri), DARRANG; also KHASI HILLS. Not rare, neither abundant.

Fls. 9-10. Fr. 10-11.

Magnolia globosa, HK. f. & T. A small tree, branchlets deciduously silky pubscent with reddish brown hairs. *Leaves* 5-8 by 2·7-5 in. ovate or elliptic acute or obtuse, and mucronate, base rounded or subcordate, thin or subcoriaceous, glabrous above, except the puberulous midrib, glaucous and pubescent beneath on the nerves, main lateral nerves 8-10 on either side; petiole 1-1·75 in. rufous tomentose like the stipules which are about 1·5 in. long. *Flowers* white solitary, 4-5 in. across each covered by a spathoid caducous rufous tomentose bract; pedicels stout, leaf opposed up to 2·5 in. long. *Sepals* and *petals* 3 ovate, the latter smaller. *Ripe fruit* 1·5-2·7 in. long; oblong or ovoid cylindric: carpels with short recurved deciduous beaks.

Mishmi—Delei valley, 9000 ft. Kingdon Ward.

FAM. 4. ANONACEÆ.

Trees or shrubs, erect or climbing, sometimes aromatic. *Bark* usually with layers of anastomosing fibres inside, of branchlets marked by close reticulated longitudinal ridges. *Leaves* alternate, bifarious, simple, entire, extipulate. *Flowers* 3-numerous, usually 2-sexual. *Sepals* 3, usually valvate. *Petals* 6, in two series, or the inner obsolete. *Stamens* usually numerous, seated with the ovaries in the centre on a more or less conical or convex

torus ; anthers 2-celled, sessile or subsessile, extrorse, connective enlarged or dilated. *Carpels* 1-celled, generally numerous and hairy. *Fruit* of numerous dry or succulent carpels on stalks which elongate as the fruit ripens, rarely united into a fleshy berry-like fruit. *Seeds* large with a hard shining testa and ruminated albumen.

I. TREES OR ERECT SHRUBS :—

A. Outer petals more or less flat, valvate :—

1. Petals uniform, flat :—
   Ripe carpels baccate, with one basal seed. — 1. Polyalthia.
   Ripe carpels indehiscent with many ventral seeds and constrictions between them. — 2. Unona (partly)
2. Petals subequal :—
   a. Ripe carpels 6 or more usually with one sub-basal seed :—
      Inner petals concave at the base, not clawed nor arching. — 3. Popawia.
   b. Ripe carpels many :—
      i. Inner petals clawed and arching :—
         Ripe carpels 1-seeded. — 4. Goniothalamus
         Ripe carpels with 2 or more seeds in two series. — 5. Mitrephora.
      ii. Inner petals saccate at the base (in the species here described), not clawed. — 6. Alphonsea
   c. Ripe carpels usually solitary, berries, many seeded. Petals saccate at the base. — 7. Cyathocalyx.
3. Petals very dissimilar, valvate, outer small sepaloid, inner much larger, flat. Ripe carpels generally 1-2 seeded. — 8. Miliusa.

B. Outer petals, thin, imbricate, subequal. Ripe cerpels 3 or more, 1-seeded in fruit. — 9. Sageræa.

C. Outer petals triquetrous, valvate. Ripe carpels many, confluent into a many-seeded berry-like fruit. — 10. Anona.

II. CLIMBING OR STRAGGLING SHRUBS :—

A. Petals imbricate in bud. Ripe carpels with 2 rows of seeds. — 11. Uvaria.

B. Petals valvate in bud :—
1. Ripe carpels constricted between the single row of ventral seeds. — 12. Unona (partly)
2. Ripe carpels not constricted :—
   a. Petals nearly equal, concave and conniving at base. Flowers on hooked peduncles. — 13. Artabotrys.
   b. Outer petals larger than the inner.
      Outer petals thin and flat (in the species described here). Carpels 1-seeded. — 14. Oxymitra.
      All petals thick and concave. Carpels with 2 or more seeds. — 15. Melodorum.

1. POLYALTHIA, Bl.

Trees or shrubs, erect in all Assam species. *Flowers* axillary or leaf-opposed, bracteate, solitary or in few-flowered fascicles from axillary tubercles. *Sepals* 3, valvate or sub-imbricate *Petals* 6 in two series, ovate or linear, flat or the inner slightly vaulted. *Torus* convex. *Stamens* cuneate; anther-cells remote. *Carpels* indefinite; ovules 1-2, basal or sub-basal. *Ripe carpels* berry-like, 1-seeded.

I. Flowers 1·5 in. or more in diameter :—
  A. Flowers fascicled or umbelled. Petals linear, yellowish green :—
    Leaves narrow-lanceolate and taper-pointed with wavy edges. ... ... 1. *P. longifolia.*
    Leaves ovate-oblong with even edges. ... 2. *P. simiarum.*
  B. Flowers solitary or in pairs, Petals broadly lanceolate, white or pale-yellow. ... 3. *P. Jenkinsii.*
II. Flowers under 1 in. in diameter :—
  Sepals scarcely shorter than the petals.
    Petals greenish-white. ... ... 4. *P. cerasoides.*
  Sepals much shorter than the petals.
    Petals red, ... 5. *P. suberosa.*

1. Polyalthia longifolia, Benth. and Hk. f. vern. *Unbot*, Ass.; *Debdaru*, Beng.

A handsome evergreen tree with a concial crown and dark greyish-brown bark. *Leaves* 3-5·9 by ·8-1·5 in., narrowly lanceolate, taper-pointed, rather membranous, quite glabrous, shining above, subpellucid-punctate, with wavy edges, somewhat aromatic; main lateral nerves up to about 30 on either half, faint, very oblique, base cuneate; petiole ·2-·5 in. long. *Flowers* yellowish-green, 1-1·2 in. long, in fascicles or very short umbels from axils of fallen leaves; pedicels slender, 1-2 in. long, with 1 or 2 minute bracts about the middle. *Sepals* about ·2 in. long, ovate-triangular, densely-pubescent. *Petals* about 1 by ·2 in., tapering from a slightly expanded base, puberulous. *Ripe carpels* numerous, black, ·7-·9 by ·5-·6 in., on glabrous stalks ·3-·5 in. long; seed smooth, shining.

Cultivated as an ornamental tree in almost all the towns of ASSAM.
Wood whitish fairly even-grained but not strong. Suitable for packing-cases, barrels, *etc.*

Fls. 3-5. Fr. 7-9.

2. Polyalthia simiarum, Benth. & Hk. f. Vern. *Bor-koliori*, Ass. (Makum); *Boga-khamtou*, Ass. (Darr.); *Deing lar-sei, Deng-ja-roi*, Khasi; *Silem-phang, Senem-phang*, Kach.; *Mengchuri-arong, Phangput-arong*, Mik.; *Jethou*, Kuki; *Jathou*, Tipp.; *Mikr-asing*, Miri; *Khandou*, Mech: *Bolang-banchibok, Jiri, Borsthi*, Garo.

A large tree up to 100ft. in height and 8 ft. in girth, practically evergreen, with a simple stem, thin horizontal branched and very thin branchlets. *Bark* light or dark-grey and smooth nearly outside except for horizontal wrinkles and very fine vertical fissures, blaze light-brown or white with often a shade of purple,

in thin lace-like concentric layers, about 1 in. thick. *Leaves* bifarious, 5-10 by 2-4·5 in., oblong, obovate, elliptic or lanceolate, rather abruptly acuminate, thinly coriaceous, glabrous and shining above, sometimes more or less pubescent along the midrib and nerves beneath, pinkish-brown and drooping when young; lateral nerves 12-18 on either half, arcuate, conspicuous beneath, tertiaries transverse to the secondary nerves, parallel, very slender; base rounded, rarely suddenly cuneate; petiole about ·2 in. long. *Flowers* yellowish green, 1-1·5 in. long, in fascicles from axils of fallen leaves or from tubercles on the branches; pedicels as long as the flowers, slender, minutely pubescent with a bract about the middle. *Sepals* ·1-·15 in. long, bluntly ovate, recurved, pubescent outside. *Petals* 1-1·25 in. long. strap-shaped or linear-lanceolate, spreading, puberulous outside. equal or the inner somewhat longer. *Ripe carpels* about 40, 1·25-1·5 in. long, obovoid, glabrous. turning orange-red to blue-black in ripening, gradually narrowed to a stalk 1-2 in. long. *Seed* ovoid, grooved and transversely ribbed.

Fairly common throughout UPPER ASSAM but very common in the MIKIR HILLS and forests along the foot of the HIMALAYAS in DARRANG, *e.g.* Pabhoi, Nanduar, Balipara, *etc.*

Fresh-cut wood is white outside but yellowish towards the centre. Annual rings indistinct; medullary rays close and equidistant; pores of various sizes and of irregular shape. Weight about 35 lbs. per c. ft. The wood seems to be suitable for tea-boxes and such other purposes. The fibres of the bark are made into ropes.

Fls. 6-11. Fr. 5-8.

3. Polyalthia Jenkinsii, Benth. and Hk. f. Vern. *Koliori, Titahachi (sachi), Kola-khamtou,* Ass.; *Dieng-ther,* Khasi; *Thengpiopsu,* Mik.; *Khem-judi, Thaisin-jola,* Kach.; *Jong-mochal, Jathu,* Kuki; *Bol-jakru-chhen,* Garo.; *Kalikath,* Nep.

A middle-sized evergreen tree with a simple stem often fluted at the base and thin but long horizontal branches; young shoots generally rusty pubescent. *Bark* black or very dark-brown and fairly smooth outside, yellowish or brown inside, ·2-·3 in. thick. *Leaves* 4-7 by 1·2-3 in., oblong-lanceolate, elliptic or ovate, acute or acuminate, membranous or chartaceous, dark-green, glabrous except the midrib above which is puberulous, shinning above; lateral nerves 7 on either side, slender, arching, forming an intramarginal nerve away from the edge, tertiaries finely reticulating; base generally acute or subacute; petiole ·2-·3 in. long, puberulous. *Flowers* axillary, generally solitary, spreading, 2-3 in. diam., scented, white to pale-yellow; pedicels ·6-·8 in. long, expanding towards the apex, bracteate at the base. *Sepals* very small, suborbicular, puberulous. *Petals* sub-coriaceous, oblanceolate, narrowed at the base, faintly longitudinally nerved. *Ripe carpels* 30-50, ·4-·5 by ·25-·3 in., oblong, apiculate, verruculose, on slender stalks as long as the carpels. *Seeds* smooth.

Found in all the Districts specially of UPPER ASSAM. Fairly common in some parts of the SIBSAGAR DISTRICT including the MIKIR HILLS; also in the GARO, KHASI and N. CACHAR HILLS and the SURMA VALLEY.

The wood is used for house-posts and ridge poles. The Kacharis consider poles of this tree indispensable for carrying their dead bodies.

Fls. 8-10. Fr. 12-6.

4. Polyalthia cerasoides, Benth. & Hk. f.

A shrub about 10 ft. high with black or pale-grey lenticellate bark; young parts rusty-tomentose. *Leaves* 3-7 by 1-1·5 in., oblong-lanceolate, generally long-acuminate, membranous, glabrous above except the midrib which is puberulous, glabrescent beneath; main lateral nerves 8-10 on either side besides a few intermediate ones, very slender and arched, forming loops away from the edge, indistinct above; base more or less rounded; petiole ·1 in. long, stout. *Flowers* axillary, greenish-white, ·3-·5 in. diam. *Sepals* membranous, ovate-lanceolate, hairy outside, glabrous inside, as long as or slightly shorter than the petals. *Petals* ·2-·3 in. long, coriaceous, puberulous, incurved. *Ripe carpels* about ·4 in. long, ellipsoid or ovoid, on stalks ·5-·7 in. long.

Nizamghat, N. E. FRONTIER DISTRICT.
Fls. 10-12.

5. Polyalthia suberosa, Benth. & Hk. f. Vern. *Makhamsra-phang,* Kach.; *Habida-cha* (wild tea), Mik.

A large handsome shrub branched almost down to the base; branchlets rusty-pubescent; older ones lenticellate; stem dark-brown with reticulately furrowed cork. *Bark* reddish inside, about ·1 in. thick. *Leaves* 2-5 by ·8-1·6 in., oblong, obtuse, or subacute usually thin glabrous and shining above, sparsely pubescent or glabrescent beneath. *Flowers* ·3-·4 in. across, on slender extra-axillary peduncles ·5-1 in. long, which are puberulous and with minute bracts at the base. *Sepals* much smaller than the petals, spreading, pubscent. *Petals* reddish-brown, ovate, silky outside, the outer shorter than the inner. *Ripe carpels* subglobose, ·2 in. diam., on stalks ·2-·3 in. long; seed globose, smooth.

NOWGONG; KHASI HILLS.
Deserves to be planted in gardens on account of its ornamental appearance.
Fls. 4-5. Fr. 10-12.

2. UNONA, Linn.

Trees or shrubs, the latter erect or climbing. *Leaves* generally thin. *Flowers* axillary, leaf-opposed or terminal, often solitary. *Sepals* 3, valvate. *Petals* 6, valvate, in two series (the inner wanting in *U. longiflora*), long or elongated. *Stamens* cuneate; anthers extrorse. *Carpels* numerous; styles recurved, grooved. *Ripe carpels* generally elongate and constricted between the seeds. *Seeds* 1-8.

A tree. Leaves upto 5 in. in length; petals strap-shaped, thin. ... ... 1. *U. præcox.*
Shrubs erect, sarmentose or climbing:—
Flowers red usually on very long axillary peduncles:—
Petals 3 (sometimes 2), 3-6 in. long, very narrow, fleshy with no constriction between claw and limb. Leaves up to a foot in length. ... 2. *U. longiflora.*

Flowers yellow or yellowish-green on long or short extra-axillary peduncles :—
Petals 6 in 2 series, more or less oroad and narrowed above the claw :—
Generally sarmentose. Flowering peduncles 2-7 in. long. Leaves up to 9 in. in length. ... 3. *U. Desmos*
Erect shrub, often climbing. Flowering peduncles 1-2 in. long. Leaves up to 7 in. in length. ... 4. *U. discolor*
Climbing shrub. Flowering peduncles up to 1·5 in. in length. Leaves up to 5 in. in length. ... 5. *U. dumosa.*

1. Unona præcox, Hk. f. & Th. Vern. *Porteng-phang,* Kach.

A deciduous tree up to 90 ft. in height and 1 ft. in girth with a narrow conical crown ; young shoots puberulous. *Bark* grey fairly smooth except for warts, shallow vertical fissures and faint horizontal wrinkles ; inside light-brown, very fibrous and in thin lace-like plates. *Leaves* 2-5 by 1-1·8 in., elliptic ovate or lanceolate, finely acuminate, membranous, glabrescent, minutely punctate underneath ; main lateral nerves 10-12 on either half, very slender, arcuate, tertiaries exceedingly fine and closely reticulate ; base cuneate ; petiole ·2-·3 in. long, slender, channelled. *Flowers* light-green, 2·5-3·5 in. long, from bases of current year's shoots, pendulous, sweet-scented ; peduncles 1 in. long, slender, ebracteate. *Sepals* ·4-·7 in. long, linear-oblong, membranous, reflexed. *Petals*—outer 2·5 by ·25, inner 3·2 by 3 in., linear, membranous, glabrous, pale-green. *Stamens* truncate. *Carpels* glabrous ; styles oblong, pilose.

Banks of the Burisoti in the N. E. FRONTIER DISTRICT also Dhansiri Reserve in NOWGONG DIVISION, and other parts of the MIKIR HILLS,—not very common.

Wood light-grey ; medullary rays fairly broad, not very close ; annual rings marked by larger and more numerous pores.

Fls. 4-5.

2. Unona longiflora, Roxb. Vern. *Jor-lewa.* Ass. ; *Dieng-phallam,* Khasi ; *Dieng-sa-la-tyrkai,* Synt. ; *Theseming,* Mikir ; *Meruang-omak,* Garo.

Usually an erect glabrous shrub with a simple stem 10-12 ft. high and slender spreading branches ; branchlets minutely verrucose when dry ; leaf-buds silky. *Leaves* 5-12 by 1·7-4 in., narrowly oblong or oblong-lanceolate, acute or acuminate, chartaceous, green and more or less shining above, glaucous beneath ; lateral nerves 12-16 on either half, tertiaries sub-parallel and more or less transverse to the secondary nerves, the spaces between them closely reticulate with very slender quarternary nerves ; base rounded or subcuneate ; petiole ·3-·5 in. long somewhat swollen, finely channelled, verrucose. *Flowers* red, horn-shaped in outline, pendulous ; penduncles axillary, 1-4 in. long, elongating in fruit, bracteate and jointed near the base, expanded at the upper extremity. *Sepals* 3, very broadly triangular, acute, pubescent outside. *Petals* 2 or 3, 3-6 in. long, very gradually tapering from a broad base, red, fleshy, puberulous outside, inner wanting. *Connectives* of *stamens* produced but truncate. *Carpels* few in

flowers with long peduncles, but up to about 60 in short-peduncled-flowers. *Ripe carpels* 7-60 (varying inversely with the length of the peduncle), moniliform, on stalks ·6-1 in. long which are channelled above; joints 1-4, ·5-·7 by ·2-·3 in. elongate-ellipsoid, verrucose.

In ravines of the MIKIR HILLS near Barpathar also Daiang Reserve, SIBSAGAR DIVISION; Kulsi reserve KAMRUP: CACHAR: and KHASI HILLS upto 3500 ft

Fls. 4-5 Fr. 10-12

3. Unona Desmos, Dunal.

A straggling or climbing shrub; branchlets rufous-pubescent. *Leaves* 4-9 by 1·5-3·5 in., oblong-lanceolate, acute or acuminate thinly coriaceous, glabrous above, puberulous beneath; lateral nerves 12-14 on either half; base rounded; petiole ·3-·4 in. long. *Flowers* solitary, about 2 in. long, yellow, odorous, pendulous; peduncles extra-axillary, 2-7 in. long, slender, 2-bracteate. *Sepals* ·3-·4 in. long, ovate, acuminate, pubescent. *Petals* coriaceous, obovate to ovate-lanceolate, golden-pubescent, longitudinally 3-6 nerved, outer up to 2 by 1 in., inner shorter and narrower. *Ripe carpels* numerous, ·5-·7 in. long on stalks of the same length, glabrous, constricted between the 1-6 joints, glossy-green when young.

In evergreen forests between Makum and Lumding.

4. Unona discolor, Vahl.

A spreading ever-green erect shrub, 6-8 ft. high, often also climbing, with rough grey bark; young branches slender, more or less pubescent. *Leaves* 2-farious, 3-7 by 1-2 in., oblong, oblong-lanceolate or oblanceolate, acuminate, rounded at the base membranous, glabrous above, pale and more or less pubescent beneath, (in var. *pubescens* densely so); lateral nerves 8-12 on either half, very oblique, slender, free at the outer extremity. *Flowers* leaf-opposed or extra-axillary, solitary, about 2 in. long on peduncles 1-1·5 in. long, with a small linear bracteole below the middle, slender in flower, thickening in fruit. *Sepals* ·4-·6 in. long, ovate-acuminate, spreading. *Petals* about 2 in. long, narrow-lanceolate coriaceous, glabrous or adpressedly silky. *Anthers* with a spreading top. *Ripe carpels* numerous, ·75-1·5 in. long, 2-5-seeded, constricted between the ovoid joints, on stalks ·2-·25 in. long.

UPPER ASSAM, SYLHET and the KHASI HILLS; fairly common in evergreen forests.

Fls. 4-6. Fr 9-12.

5. Unona dumosa, Roxb.

A large woody climber; young shoots softly rufous-tomentose. *Leaves* 2-5 by 1·3-2·5 in., ovate-oblong, obovate or lanceolate, subacute, membranous, glabrescent above, softly rufous-tomentose beneath; lateral nerves 8-12 on either half, straight or slight-

ly arched; base rounded or subcordate; petiole ·25-·4 in. long, rusty-tomentose. *Flowers* 2-3 in. long, solitary, yellowish-green, pendulous; peduncles leaf-opposed or terminal, 1-·15 in. long, slender, tomentose, with a bract below the middle resembling a sepal. *Sepals* ·4 in. long, ovate, tomentose, longitudinally nerved. *Petals* elliptic or spathulate, 3-7-nerved, velvety-pubescent; outer 2-3 by ·7-1·5 in., inner somewhat smaller. *Ripe carpels* about 20, glabrous, 1-4-seeded, on stalks ·5-·7 in. long, much constricted between the ovoid or ellipsoidal seeds.

Daiang to Kalioni in the SIBSAGAR DISTRICT, possibly also in LAKHIMPUR between Jaipur and Margherita.

3. POPOWIA, Endl.

Evergreen erect shrubs or small trees. *Flowers* small, extra-axillary or leaf-opposed, often polygamous, never fully open. *Sepals* 3, ovate, valvate. *Petals* 6, in two series, valvate (inner imbricate in *P. Kurzii*), outer spreading, inner thick, concave, acute. *Anther-cells* dorsal, remote. *Carpels* generally few, ovoid; ovules 1-2, ventral or basal, erect. *Ripe carpels* berry-like.

Leaves wholly glabrous, silvery underneath; tertiary nerves transverse to the secondary. Inner petals valvate.	1. *P. Hookeri.*
Leaves sparsely adpressed-pubescent on both surfaces, granulate above; petiole tomentose; midrib strigose; tertiary nerves transverse to the midrib. Inner petals imbricate	2. *P. Kurzii.*

1. Popowia Hookeri, King. Syn. *Polyalthia argentea*, Hk. f. & Th. Fl. Br. Ind. I. 67.

A wholly glabrous shrub; branches dark-brown or black. *Leaves* 4-7 by 1·2-2·5 in., oblong or oblanceolate, abruptly acuminate, thinly chartaceous, glabrous, dull-silvery beneath; lateral nerves 8-10 on either side, slender, arcuate, tertiaries transverse to the secondary nerves, more or less parallel; base acute; petiole ·12-·16 in. long, terete. *Flowers* very small, polygamous, solitary or in fascicles of 2-3 from extra-axillary tubercles. *Ripe carpels* ·7-·8 by ·3 in., oblong, rugose, faintly transversely ribbed when dry, minutely apiculate, on stalks ·2-·35 in. long.

Banks of the Dikhou, SIBSAGAR DISTRICT, towards the foot of the NAGA HILLS; also Balipara in DARRANG. Very possibly in similar localities elsewhere.

2. Popowia Kurzii, King.

A shrub 6-8 ft. high; young shoots tawny-pubescent. *Leaves* 4-9 by 1·5-3 in., obovate, oblanceolate or elliptic, thinly coriaceous, sparsely adpressed-pubescent on both surfaces, minutely granulate above, pale beneath; lateral nerves 8-12 on either side of the strigose midrib, arcuate, tertiaries faint, transverse to the midrib; petiole ·2-·25 in. long, stout, tomentose. *Flowers* extra-axilary, solitary or in pairs, sub-globose, subsessile. *Sepals* smaller than the petals and like them tomentose outside. *Petals* concave, outer valvate, slightly larger than the inner which are imbricate.

Fruit ·8 in. by ·3 in., rugose; seed with two longitudinal channels, otherwise smooth.

Only found hitherto at Garampani, DISTRICT SIBSAGAR.

Fls. 5-8. Fr. 10-12.

4. GONIOTHALAMUS, Bl.

Small trees or shrubs. *Leaves* generally large, oblong, coriaceous; lateral nerves short, anastomosing to form intramarginal loops. *Flowers* axillary, solitary or fascicled; peduncles with scaly distichous bracts at the base. *Sepals* 3, valvate. *Petals* 6, valvate, in two series; outer thick, flat; inner smaller, shortly clawed, cohering to form a volt over the stamens and carpels. *Stamens* many; anther-cells distant; connective prominent and produced beyond the anthers into variously shaped processes. *Carpels* many; ovules 1 or 2, in the latter case superposed, sub-basal. *Ripe-carpels* 1-seeded.

Leaves glabrous. Ripe carpels sub-sessile. ...	1. *G. sesquipedalis.*
Leaves brown-tomentose along nerves beneath. Ripe carpels long-stalked. ...	2. *G. Simonsii.*

1. Goniothalamus sesquipedalis, Hk. f. & Th. Vern. *Soh-um-synrang, Skum-synsar,* Khasi; *Leikham,* Manipur; *Kham,* Lushai.

A sparingly branched undershrub 4-8 ft. high. *Leaves* 10-15 by 2-3·5 in., oblong, bluntly acuminate, narrowed at the base, coriaceous, glabrous, dark-green above, pale and minutely punctate beneath, margins revolute, midrib stout; lateral nerves 15-18 on either half, anastomosing to form large intramarginal loops; petiole about ·5 in. long, stout, channelled. *Flowers* greenish-yellow, axillary or supra-axillary, solitary; buds triquetrous. *Sepals* ·2-·3 in. long, glabrous, green, shining inside. *Outer petals* 1 in. long, glabrous, or slightly pubescent outside, inner ·7-·8 in. long, pubescent. *Carpels* usually 5, sometimes more, with golden hairs; styles slightly recurved. *Ripe carpels* solitary or 2-4, ·7 by ·3 in., slightly tapering, shortly stalked, supported by the persistent calyx, red to cherry-coloured while ripening; seed large.

KHASI HILLS up to 4,000 ft. Also on the Bhuban Hill in CACHAR, 2,-3000 ft., *e. g.,* Mainadhar, Bhubandhar, *etc.*

The dry leaves are burnt as an incense in temples in Manipur.

Fls. 5-6. Fr. 11-12

2. Goniothalamus Simonsii, Hk. f. & Th.

A large shrub or small tree; young parts brown-pubescent, *Leaves* 10-15 by 3-5 in., narrowly elliptic or obovate-oblong, caudate-acuminate, rounded or sub-acute at the base, thinly coriaceous, glabrous and glossy above, brown-tomentose chiefly along the midrib and nerves beneath, minutely punctate; lateral nerves 13-20 on either half, almost straight, anastomosing at their extremities to form a continuous wavy intramarginal nerve; reticulations strong but rather open; petiole ·4-·6 in. long, channelled, tomentose. *Flowers* axillary, solitary, 1-1·5 in. long,

peduncles ·2-·3 in. long, supported by a pair of bracts. *Sepals* ·5 in. long, ovate or triangular, persistent. *Outer petals* 1·5-2 in. long, cream-coloured, oblong-lanceolate, pubescent; inner ·5 in. long, forming a triquetrous cone, pubescent; style cylindrical. *Ripe carpels* ·5 in. long, oblong, mucronate; torus elongated.

KHASI HILLS, 2,-3,000 ft., chiefly along shady streams, *e. g.*, Umran, Nongpoh, *etc.*

Fls. 5-6. Fr. 8-9.

5. MITREPHORA, Bl.

Mitrephora tomentosa, Hk. f. & Th. Vern. *Kolti, Koliori*, Ass.; *Jeithuh-ang-thing*, Kuki. *Thinggpi-ilso-arong, Golthi-arong*, Mik.; *Sinam-jola*, Kach.

Usually a small evergreen tree, but individual trees have been seen up to 70 ft. in height and 5 ft. in girth. *Bark* smoothish excepting for very shallow and distant vertical fissures, dark-brown or very nearly black outside, generally with large white blotches; blaze very light dun-brown with distant broad strands of white and softer granular tissues, otherwise finely fibrous and in thin concentric layers. *Leaves* 3-7 by 1-3 in., varying in shape from ovate to narrow-lanceolate even on the same twig, acute or acuminate, subcoriaceous, dark-green, glabrous and shining above (except the pubescent midrib); undersurface velvety rusty-tomentose on young trees, glabrescent and pubescent along the nerves on older individuals; lateral nerves 10-15 on either half, slender, very oblique but only slightly arched, tertiaries invisible; base rounded; petiole ·2-·3 in. long, stout, tomentose. *Flowers* 2-3 in. across, in short leaf-opposed cymes, each supported by a large broad bract. *Sepals* 3, ·2-·3 in. long and as broad, acute, densely rusty-tomentose. *Outer petals* 1-1·5 by ·7 in., yellow with faint purple veins outside, *inner* ·5-·7 by ·5 in. clawed, closely purple-veined and velvety outside, white-hairy and ribbed inside, cohering by margins to form a vault over the anthers and stigmas. *Ripe carpels* 1 in. long, sub-globose, densely rusty-tomentose; seeds 2, plano-convex.

GARO HILLS, NOWGONG, N. CACHAR HILLS, KAMRUP, etc.

Wood even-grained, compact, dun-white, in regular thin concentric bands; medullary rays very fine, regular, about 125 to the inch; weight about 50 lbs. per c. ft. It is liable to split, but is used for posts and such other purposes in NOWGONG.

Fls. 3-5. Fr. 8-10.

6. ALPHONSEA, Hk. f. & Th.

Tall evergreen trees with tough fibrous bark. *Leaves* coriaceous, glabrous and shining above. *Flowers* generally in leaf-opposed fascicles; buds conical; pedicels bracteolate. *Sepals* 3, small, valvate. *Petals* 6, in 2 series, valvate, much larger than the sepals, of the inner whorl usually slightly smaller. *Stamens* indefinite; anther-cells dorsal; connective apiculate. *Carpels*

1-12 ; ovules 4-10 in 2 series. *Ripe carpels* 4-6, sessile or stalked, ovoid or oblong-ovoid.

Leaves 6-10 in. long, narrow-oblong. Sepals free. Carpels long-stalked. 1. *A. ventricosa.*
Leaves 3-6 in. long, ovate-oblong. Sepals connate. Carpels very shortly stalked. 2. *A. lutea.*

1. Alphonsea ventricosa, Hk. f. & Th. Vern. *Noga-kola,* Ass., *Norlok-arong, Jhingpi-arung-otwang,* Mik. (near Barpathar) ; *Thaisen-phang, Rulang-buphang,* Kach. ; *Thei-wok-ek, Jong-mot,* Kuki ; *Pakna-kala.* Cach.

A tall tree with a short conical crown, attaining 100 ft. in height and 7 ft. in girth ; branches at first softly tomentose but become speedily glabrous and blackish. *Leaves* 6-10 by 1·5-2·8 in., oblong to oblong-elliptic, shortly acuminate ; cuneate or rounded at the base, coriaceous, glabrous except for a little pubescence on the midrib beneath when young, shining above, turning yellow before falling ; lateral nerves slender, irregular , 12-18 on either half, reticulations fine and open ; petiole ·1-·25 in. long, stout, pubescent. *Flowers* greenish-white, ·3-·4 in. long, in short leaf-opposed extra-axillary racemes ; pedicels ·4-·5 in. long, rusty-tomentose, with a bracteole at the base and another about the middle. *Sepals* very small, broadly ovate or deltoid, acute, tomentose outside. *Petals* ·4-·5 in. long, sub-equal, oblong, acute, sub-cordate and more or less saccate at the base, pubescent on both surfaces. *Stamens* broad, pointed. *Carpels* oblong, tapering to the apex, densely pubescent ; ovules many. *Ripe-carpels* 1·5-2·5 by 1·2-1·8 in. diam., ovoid, minutely pubescent, yellowish when ripe, up to 4-5 from a single flower ; stalk ·4-·5 in. long. *Seeds* compressed, in two rows, immersed in an aromatic yellowish pulp ; testa horny, brown.

Along the foot of the NAGA HILLS in LAKHIMPUR and SIBSAGAR ; CACHAR including the NORTH CACHAR HILLS ; Singla Reserve in SYLHET ; NOWGONG ; Khaling-duar in DARRANG ; GOALPARA—Guma res. ; and KHASI HILLS—Raitkhwan ; probably all over the province.

Wood greenish brown, even-grained. Medullary rays of varying thickness, rather broader than in most other Anonaceous trees, tangential bars very close ; pores large, often sub-divided. It is very elastic and is used for posts, poles, *etc.* Weight about 40 lbs. per c. ft. The aromatic pulp of the ripe fruit is eaten.

Fls. 3-4. Fr. 7-9.

2. Alphonsea lutea, Hk. f. & Th. Vern, *Jong-mot-kung.* Tipp. The Vernacular names of *A. ventricosa* are also loosely applied to this species.

Apperantly a somewhat smaller tree than the foregoing species ; young parts minutely rufous-tomentrse. *Leaves* 2·5-6 by 1·2-2·3 in., ovate-oblong to elliptic, obtusely acuminate, sub-cuneate or rounded at the base, coriaceous, glabrous and shining above, sparsely strigose beneath ; lateral nerves 8-10 on either half, faint and irregular. *Racemes* very short, leaf-opposed, sub-sessile, each with 2 or 3 flowers and many small bracts. *Flowers* ·6-·7 in. diam. ; pedicels tomentose, with only one bracteole rather

above the middle. *Sepals* connate into a 3-cornered shallow cup, tomentose outside, glabrous inside. *Stamens* short, broad, flat in three rows. *Carpels* oblong, compressed, strigose ; style very short glabrous. *Ripe carpels* 2-4, open solitary, 1·3-1·5 by ·8-1·2 in., broadly ovoid, pointed, puberulous ; stalk ·2-·4 in. long, very stout. *Seeds* 3-6, in two rows, oval-oblong, pointed.

Occurs along the south-eastern boundary of the PROVINCE chiefly in CACHAR and SYLHET, and is very liable to be mistaken for young individuals of the other species.

Economic uses and flowering and fruiting time are Probably the same as of *A. ventricosa.*

7. CYATHOCALYX, Champion.

Cyathocalyx martabanicus, Hk. f. & Th. Vern. *Bolong,* Garo ; *Hrieroth,* Lushai.

A tall and graceful evergreen tree with a narrow crown attaining about 140 ft. in height and 6 ft. in girth. *Bark* ·3-·5 in. thick, grey and fairly plain but with a few horizontal wrinkles outside, dun-brown and faintly mottled inside, innermost layers in fibrous plates. *Leaves* sub-bifarious, 4-9 by 1·2-3 in. elliptic or elliptic-oblong, bluntly acuminate, cuneate or sometimes rounded at the base, coriaceous, glabrous, dark-green and shining above, somewhat pale beneath, turning yellow before falling ; lateral nerves 8-12 on either half, very oblique, arching, slightly impressed above ; reticulations very fine but distinct ; petiole ·3-·5 in. long, margined. *Flowers* extra-axillary, sometimes opposite the axils, usually solitary, ·8-1·5 in. long, densely buff-pubescent throughout, pedicels ·3-·5 in. long. *Calyx* as long as the pedicel, deeply divided ; lobes oblong-lanceolate, reflexed. *Petals* in two whorls of three each, ·7-1·2 in. long, oblong-lanceolate, spreading, somewhat fleshy, of the inner whorl slightly smaller. *Stamens* numerous truncate ; anthers extrorse. *Mature carpel* solitary, 2·5-3 by 2-2·5 in., oblong, transversely depressed between the seeds, greenish-white, turning to cherry-colour when fully ripe. *Seeds* 6-10, transversely set in two rows, 1-1·2 by ·7-·9 in., oblong, flat, with a blunt ridge right round, brown shining ; albumen mottled.

LUSHAI, NORTH CACHAR and the GARO HILLS, up to 3,000 ft Rather rare.

The timber, though soft appears to be very elastic. The sweetish-aromatic pulp of the ripe fruit is eaten.

Fls. 4-5. Fr. 10-11.

8. MILIUSA, Lesch.

Trees or shrubs. *Flowers* usually 2-sexual, rarely polygamous, green or red, axillary or extra-axillary, solitary fascicled or cymose. *Sepals* 3, small, valvate. *Petals* 6 in 2 series, valvate outer small like the sepals, inner larger but thinner, at first cohering by their margins, ultimately free. *Stamens* definite or indefinite ; anthers extrorse ; connective slightly apiculate. *Carpels*

indefinite ; style usually very short. *Ripe carpels* globose, 1-2- or many-seeded.

Leaves velvety-tomentose on both surfaces, apiculate :—
Flowers 2-sexual, Ripe carpels puberulous, 2-seeded. ... 1. *M. velutina.*
Leaves glabrous and shinning above, acuminate.
Ripe carpels, 1-seeded :—
Flowers 2-sexual. Leaves up to 7 in. in length, sub-coriaceous. ... ... 2. *M. macrocarpa.*
Flowers polygamous. Leaves up to 5 in. in length, membranous. ... ... 3. *M. Roxburghiana.*

1. Milliusa velutina, Hk. f. and Th. Vern. *Bor-Samphol*, Garo.

Rather a small-sized deciduous tree usually not exceeding 40ft. in height ; young branches and all other parts grey-tomentose. *Bark* dark-greyish-brown, rough, inside dun-brown, soft, ·7-1 in. thick, fibrous. *Leaves* very variable in size aud shape, 4-10 by 2·5-6 in., ovate-elliptic oblong or obovate, acute or shortly acuminate, more or less cordate at the base, sub-coriaceous, aromatic, thinly velvety-tomentose above, more densely beneath, turning yellow before falling ; lateral nerves 12-16 on either half, slender, slightly arched ; petiole ·1-·2 in. long. *Flowers* pale-yellow, about ·4 in. diam., on 2-4 in. long slender ebracteolate pedicels, which arise singly or 2-3 together from short leaf-opposed peduncles. *Sepals and outer petals* similar, ·1-in. long ovate, valvate in bud ; inner petals ·2-·3 in. long, broadly ovate, dark-brown, densely tomentose outside, glabrous inside. *Stamens* short ; filaments stout shortly apiculate ; anthers distinct and distant. *Carpels* 2-ovuled ; stigma subsessile. *Ripe carpels* ·5.-·75 in. in diam., ovoid or oblong, bluish-purple, on stalks ·25-·35 in. long. *Seeds* 2 on a parietal placenta.

Foot of the GARO HILLS in Sal-bearing tracts *e. g.* near Fulbari ; also on the Tokrabhandha and Chandordinga Hills of the North bank of the Brahmaputra in GOALPARA. Rare except in the above localities.

Wood weighs about 40 lbs per c. ft. and is moderately hard and durable, but being liable to warp is seldom used as timber.

Fls. 2-5, Fr. 8-10.

2. Miliusa macrocarpa, Hk. f. and Th.

A small tree ; branchlets thin dark-brown, lenticellate when old. *Leaves* 2-7 by 1-2·4 in., bifarious, oblong, oblong-lanceolate or oblanceolate, caudate-acuminate, more or less acute at the base, membranous or chartaceous, dull and glabrous above except the midrib which is puberulous or muricate, pale but perfectly glabrous and shining underneath ; main lateral nerves about 8 on either half, arcuate, slender but conspicuous, anastomosing to form a looped intramarginal nerve ; petiole ·12-·2 in. long, stout, channelled. *Flowers* ·7 in. across, extra-axillary or leaf-opposed, solitary or in few-flowered cymes on pedicels 1·25-2 in. long, which expand towards the upper extremity ; buds globose or ovoid. *Sepals* and *outer petals* alike, ovate, acuminate, reflexed, glabrous and granulate outside, dull rusty-pubescent within. *Inner petals* obovate, ·5-·6 in. long, erect, reddish-brown with red veins, glabrous except for a few fugacious hairs near the margins

and extremities on the inner surface. *Stamens* numerous intermixed with hairs; anthers linear. *Carpels* numerous, pubescent, stalked, 1-2-ovuled. *Ripe carpels* ·6-·8 by ·3-·4 in., oblong or obovoid, terete, generally 1-seeded; pericarp pulpy.

KHASI HILLS *e.g.*, Wah Mawkhap, and similar other localities 3-5,000 ft. Fls. 3-5.

3. Miliusa Roxburghiana, Hk. f. and Th. Vern. *Bon-ponial*, (Makum); *Chhag-loti*, *Chag-ladoi*, Ass. (N. Lakh); *Jora-bhanora*, Ass. (Darrang), *Dieng-khong*, Khasi, *Dieng-jwat*, Synt. *Tasemayang-changne*, Daff.

A small deciduous tree scarcely more than 20 ft. in height with spreading branches and pubescent young shoots. *Bark* grey, fairly smooth but often with vertical rows of lenticels, inside dark-brown, turning deeper brown after exposure. *Leaves* 2-farious, somewhat aromatic 2-5 by ·8-2 in., elliptic, oblong or lanceolate, acuminate, thinly coriaceous, upper surface glabrous except the puberulous midrib, lower at first pubescent, glabrescent with age; main lateral nerves about 10 on either side of midrib, arched and looped to form an intramarginal nerve away from the edge, tertiarias inconspicuous; base more or less rounded; petiole about ·1 in. long, pubescent. *Flowers* dioecious or polygamous about ·5 in. long, axillary, solitary or 2-3 together on pedicels ·5-1·5 in. long. *Sepals* and *outer petals* alike, small, lanceolate, reflexed, tomentose outside; *inner petals* red, ·5-·6 in. long, ovate, subacute, more or less saccate at the base. *Ripe carpels* oblong or subglobose, ·3-·35 in. long, glabrous, verrucose, on slender stalks ·4-·8 in. long, generally 1-seeded.

Occurs in most DISTRICTS ascending to 4000 ft. in KHASI HILLS.
Wood greyish-white, hard; tangential bars close, numerous, wavy; medullary rays of various thickness, very numerous; pores very scanty; weight about 50 lbs. per c. ft. The wood is fit to be used for agricultural implements and such other purposes. The bruised leaves are used by the Daffias as smelling salt when they get headache.

Fls. 3-4. Fr. 11-12.

9. SAGERÆA, Dalz.

Sageræa laurina, Dalz. Syn, *Bocagea Dalzellii*, Hk. f. and Th.

A middle-sized tree up to 60 ft. in height and over 3 ft. in girth with a conical crown and thin glabrous branchlets. *Bark* grey and fairly plain outside with very faint vertical fissures ·25-·5 in. apart, inside dull-white, consisting of alternate broad bands of fibrous tissue and similar bands of granular tissue. *Leaves* bifarious, 3-5 by 1-1·4 in., elliptic or oblanceolate, often somewhat unequal-sided, bluntly caudate-acuminate, abruptly cuneate at the base, chartaceous, glabrous and shining above, with minute transiucent dots, and resinous mango-like smell when bruised, turning yellow before falling, midrib prominent beneath, puberulous; lateral nerves about 10-12 on either half, faint and irregular; petiole ·2-·25 in. long flattened above, sub-verrucose beneath. *Flowers* dull-yellow, sweet-scented, ·25-·3 in., in diam.,

from axils of previous year's leaves, solitary or in fascicles of 2-10, on sessile or stalked tubercles; pedicel ·15-·5 in. long with scaly bracteoles at the base. *Sepals* about ·15 in. long, ovate, concave. *Petals* of both whorls similar in every respect, ·5 by ·16 in., thin in texture, more or less spreading. *Anthers* indefinite, dorsal. *Carpels* about 12; ovules about 12 in two rows; style short, lateral. *Ripe carpels* 4-10, shortly stalked, about 1 in. long, 1-seeded.

Only found so far on the Sanitarium Hill near Tura, GARO HILLS.
Wood of a slaty-grey colour even-grained, hard, weighing about 47 lb per c. ft; medullary rays moderately broad, very regular; appears to be suitable for cabinet work.

Fls. & Fr. 2-4.

10. ANONA, Linn.

Shrubs or small trees. *Leaves* pellucid-punctate. *Flowers* terminal or leaf-opposed solitary or in fascicles of 2-3, drooping, yellowish-green. *Sepals* 3, small, valvate. *Petals* 3 or 6; of the outer whorl fleshy and 3-quetrous above with a thinner concave base; of the inner whorl, if present, very small, strap-shaped. *Carpels* partly free in flower, afterwards confluent into a large syncarpous fleshy fruit, 1-ovuled, 1-seeded. *Seed* with fleshy albumen.

Leaves 1·5-5 in. long, dark-green. Fruit greenish-white, deeply areolate and tubercled.	1. *A. squamosa.*
Leaves 5-8 in. long, light-green. Fruit reddish-brown, faintly areolate, not tubercled.	2. *A. reticulata.*

1. Anona squamosa, Linn. Vern. *Ata*, Beng.: *Ata-Kothal*, Ass.; *Sitaphal*, Hind. The Custard Apple.

Small tree with a somewhat bushy habit; branches thin, glabrous. *Leaves* 1·5-5 by 1-2 in., oblong or oblong-lanceolate, obovate, obtuse or rounded at the extremity, acute at the base, membranous, glabrate, aromatic; lateral nerves about 8 on either half, slender, oblique; petiole ·3-·5 in. long. *Flowers* about 1 in. long, pubescent. *Fruit* 2-3 in. in diam., globose deeply white-areolate when ripe; pulp white, sweet, aromatic; seeds ·4-·5 in. long, oblong-lanceolate in outline, testa horny glossy-black.

Cultivated in LOWER ASSAM and SURMA VALLEY for the fruit.
The roots, bark, leaves and seeds have valuable medicinal properties.

Fls. 3-5. Fr. 8-11.

2. Anona reticulata, Linn. Vern, *Nona*, Beng. *Ramphal*, Hind.

A larger tree with longer branches and more open crown than the foregoing; branches thin dark-brown or black, glabrous; fibres reticulate. *Leaves* 5-8 by 1·5-2·5 in., lanceolate or oblong-lanceolate, acuminate, subcoriaceous glabrous, dark-green. *Flowers* 2-3 together, 1-1·3 in. long; inner whorl of petals usually present. *Fruit* 3-4 in. diam. ovoid in outline reddish-brown when

ripe, smooth, faintly areolate ; pulp pale, not so sweet or tasty as of the other species ; seeds similar.

Sometimes cultivated, but often runs wild in the same localities as the other species. The wood of neither species has any timber value.

Fls. 7-8. Fr. 11-3.

11. UVARIA, Linn.

Scandent or straggling shrubs usually stellately pubescent, *Flowers* 2-sexual, terminal or leaf-opposed, solitary or in fascicles of 2-4, or cymose, yellow, purple or brick-red. *Sepals* 3, valvate, often connate below. *Petals* 6, large, orbicular, oval or oblong in two rows, imbricate, often connate at the base. *Stamens* indefinite ; connective concealing the anthers. *Torus* depressed. pubescent or tomentose *Carpels* indefinite, linear-oblong ; style short ; ovules usually many in two series. *Ripe carpels* many. ovoid or oblong, stalked, dry or baccate, few or many-seeded.

1. Outer stamens sub-foliaceous :—
   - A. Leaves variously hairy. Ripe carpels tomentose :—
     - Peduncles extra-axiliarly, 1 flowered. Flowers brick-red, 2 in. in diam. — 1. *U. Hamiltoni.*
   - B. Leaves glabrous or nearly so. Ripe carpels glabrous :
     - Peduncles leaf-opposed. Flowers pale yellow, ·5 in. diam. — 2. *U. bracteata.*
     - Peduncles extra-axillary or terminal. Flowers purple, 1·5 in. in diam. — 3. *U. macropfiylla.*

II. Stamens all cuneate :
   - Leaves glabrous Peduncle leaf-opposed or terminal. Flowers brick red. 2 in. in diam. Ripe carpels glabrous. — 4. *U lurida.*

1. Uvaria Hamiltoni, Hk. f. & Th.

A large woody climber ; branchlets rusty-tomentose, often circinate. *Leaves* 4-8 by 1·8-4 in., elliptic-oblong or obovate, acuminate, rounded or slightly cordate at the base, membranous, adpressed-pubescent, ultimately glabrescent above, softly stellate-pubescent beneath ; lateral nerves 14-20 on either half, prominent beneath ; petiole ·15-·2 in. long. *Flowers* about 2 in. in diam., extra-axillary, solitary or 2-3 together ; peduncles ·75-1·8 in. long ; bract basal, suborbicular. *Sepals* broadly triangular, mucronate, membranous. *Petals* about 1 in. long, red, obovate, coriaceous, minutely tomentose, incurved. *Anthers* about ·2 in. long, subsessile. *Carpels* compressed, pubescent. *Ripe carpels* red, about 1·5 in. long, obovoid, tomentose ; stalks slender, 1-1·5 in. long, tomentose.

Var. *Kurzii*, King which differs from the type by having leaves with semi-cordate broader base and fewer nerves, somewhat smaller and yellowish flowers and shorter pedicels, has been found in the Guma Reserve in GOALAPARA and probably occurs in similar localities in other DISTRICTS.

The type occurs in all DISTRICTS in the BRAHMAPUTRA VALLEY and possibly also the SURMA VALLEY.

Fls. 6-7. Fr. 9-12.

2. Uvaria bracteata, Roxb.

A large woody climber ; young branchlets rusty-tomentose otherwise dark-brown. *Leaves* 3·5-7 by 1·25-2·5 in. oblong, oblong-lanceolate or oblanceolate, acute or shortly acuminate, tapering towards the rounded or subcordate base, chartaceous, thinly pubescent when very young chiefly along the midrib and nerves, afterwards glabrscent ; lateral nerves about 11-13 on either side of the midrib, slender, oblique, slightly arched ; petiole ·15-·3 in. long, glabrescent, shining. *Peduncles* extra-axillary, very short, generally 2 flowered ; pedicels ·3-·7 in. long, rusty-tomentose ; bracts 2 or 3, rather unequal, leafy. *Flowers* pale-yellow, ·6-·7 in. in diam. *Sepals* about ·15 in. long, suborbicular or broadly ovate, connate at the base, pubescent, recurved when the flower is fully open. *Petals* green at first, fading to pale-yellow, ·3-·4 in. long, broadly ovate, fleshy but with thin margins, concave, shining. *Anthers* sub-sessile, oblong. *Carpels* 10-18, linear, pubescent. *Ripe Carpels* about 2 by 1·3 in., oblong, rounded at both ends, yellow when ripe, glabrous ; seeds discoid.

SYLHET and GOALPARA, chiefly in shady ravines.
Fls. 5-6. Fr. 8-10.

3. Uvaria macrophylla, Roxb.

A stout woody climber ; young parts and petioles rusty-tomentose. *Leaves* 5-10 by 2·5-4 in., elliptic-oblong or ovate, abruptly acuminate, coriaceous, glabrous or glabrescent above except the tomentose midrib and main nerves, rusty stellate-tomentose below ; lateral nerves 11-18 on either half, very prominent ; base rounded or slightly cordate ; petiole ·2-·3 in. long. *Flowers* purple, 1·5 in. diam. on few-flowered extra-axillary or terminal bracteate peduncles. *Sepals* connate in to a 3-toothed cup about ·3 in. in diam. *Petals* ·5-·6 in. long, purple fleshy, tomentose outside, pubescent inside. *Anthers* sessile. *Ripe carpels* ·7-1·5 in. long, oblong, glabrous, on stalks ·5-1 in. long from a woody hemispherical torus 1 in. in diam. often with one or two shallow transverse depressions. *Seeds* numerous oval, compressed, shining.

Holongapar Reserve. SIBSAGAR DISTRICT. and possibly elsewhere in similar localities.
The ripe carpels are eaten.
Fls. 5-6. Fr. 9-11.

4. Uvaria lurida, Hk. f. & Th.

A large woody climber ; young parts with rusty-stellate scales. *Leaves* 4-7·5 by 1·25-2·4 in., oblong, oblong-lanseolate or oblanceolate, acute or shortly acuminate, rounded or subcuneate at the base, coriaceous, adult glabrous, dark-green and shining above, dull-green underneath ; main lateral nerves 8 to 10 on either half with often a few shorter ones between ; petiole ·15-·25 in. long incurved, verrucose. *Peduncels* terminal or leaf-opposed, 1-2 flowered, about 1 in. long, elongating in fruit, ebracteolate rough with scales ; buds globose (club-shaped with the peduncle). *Flowers* 1·5-2·25 in. across. *Sepals* 3, connate at the base, verrucose

outside, pubescent inside. *Petals* 6, uniform, in 2 series and imbricate until fully open, afterwards apparently in a single whorl with valvate margins, broadly ovate, with inflexed tips ; brick-red, densely scaly-pubescent outside, minutely pubescent within. *Authers* about ·15 in. long, cuneate with truncate tips. *Carpels* numerous, stalked. *Ripe carpels* 1·2-1·7 by ·6-·7 in. cylindrical but narrowed and strongly 3-quetrous at the base, 3-6 seeded ; stalks 4-6 in. long. *Seeds* in a single row compressed or globose.

Northern slopes of the KHASI HILLS. up to 2,500 ft., *e. g.*, near Um-Ran.

Fls. 3-5. Fr. 8-11.

12. ARTABOTRYS, R. Br.

Artabotrys caudatus, Wall. Vern. *Dhupa-lota*, Ass.

A large woody climber ; young shoots pubescent. *Leaves* 3-5 by 1·2-2·2 in. oblong or elliptic, abruptly bluntly-acuminate, margins often slightly recurved, subcoriaceous, glabrous ; lateral nerves 8-12 on either half arched and looped to form intermarginal veins, tertiaries laxly reticulate ; base cuneate ; petiole ·2-·3 in. long. *Flowers* ·6-·8 in. long, brown-silky 2-6 from the extremities of recurved and laterally-compressed peduncles. *Sepals* about ·15 in. long, broadly triangular-ovate, pubescent. *Petals* ·6-·8 in. long, narrowed to the apex, rusty-silky. *Ripe carpels* 4-5, 2 in. long, elliptic, dark-purple. *Seeds* 2, 1 by ·6 by ·25 in., brown, compressed, rugose, with shallow grooves along the faces and edges.

Garampani SIBSAGAR DISTRICT ; Makum Range, LAKHIMRUR DISTRICT. and possibly in all evergreen forests between those two localities.

Fls. 3-5. Fr. 10-12.

13. OXYMITRA, Bl.

Oxymitra fornicata, Hk. f. & Th. Vern. *Mota-bokol-bih*, Ass ; *Dumakhal*, Garo ; *Rampun-kung*, *Hruirang-moniai*, Tipp.

A woody climber, somewhat gregarious in habit ; young shoots brown silky-pubescent, stem dark-brown. *Leaves* 4-7 by 1·3-2·5 in., obovate, oblong or oblanceolate, membranous, glabrescent above, softly pubescent especially along the midrib and nerves beneath ; lateral nerves 14-18 on either half, nearly stratght, tertiaries transverse to the secondaries, more or less straight and parallel ; base subacute or abruptly rounded, sometimes slightly cordate ; petiole ·2-·3 in. long, densely rusty-tomentose. *Flowers* large, 6-7 in. across when fully-developed, green to pale-yellow, solitary and leaf-opposed or 2-3 on short leafless shoots ; peduncles ·5-·8 in. long, rusty-pubescent, bracteate at the middle, or sometimes only a little above the base. *Sepals* ·6 by ·2 in. ovate, acuminate, membranous, pubescent, deciduous. *Petals* membranous, pubescent, outer 2-4 by 1-1·7 in., flat. 5-7 nerved, inner much varying in size from ·3 by ·2 to 3·2 by 1 in.,

—conniving by a flexure at the base over the carpels and stamens. *Ripe carpels* about 10, subsessile, ·6-1 by ·2-·3 in., cylindrical, verrucose, coppery-puberulous.

There appear to be two varieties of this plant.—1. *Leaves* elongate, subacute at base, sparsely pubescent underneath when mature; *inner petals* small.—2. *Leaves* ovate or obovate, with a rounded or subcordate base, more densely pubescent underneath; *inner petals* only slightly smalier than outer.

The commonest Anonaceous plant in all evergreen forests of ASSAM. Fls. 4-6. Fr. 10-12.

14. MELODORUM, Dunal.

Climbing shrubs. *Flowers* terminal, axillary or leaf-opposed solitary or fascicled; buds triquetrous. *Sepals* 3, small, valvate connate below. *Petals* 6, valvate in two series; of the inner series, triquetrous above, hollowed and concave below. *Stamens* numerous; anther cells contiguous, dorsal. *Carpels* many, free style oblong; ovules 2 or more. *Ripe carpels* berried.

I. Leaves usually densely pubescent on both surface :--
  A. Flowers solitary or fascicled :--
    Stalk of ripe carpels 4-8 in long. — 1. *M. verrucosum.*
    Stalk of ripe carpels ·2-·3 in. long. — 2. *M. bicolor*
  B. Flowers solitary and axillary or in false terminal panicles of 4-6 flowers :—
    Stalk of ripe carpels 1-1·6 in. long. — 3. *M. rubiginosum.*
II. Leaves wholly glabrous at least above :—
  Flowers solitary or in fascicles of 2-3. stalk of ripe carpels 1 in. long. — 4. *M. Wallichii.*
  Flowers cymose, about ·25 in. long, — 5. *M. polyanthium.*
  Flowers cymose, minute. — 6. *M. rufinerve.*

1. Mslodorum verrucosum, Hk. f. & Th. Vern *Jyrmisoh-ram-khlow*, Khasi.

A large woody climber; young shoots rusty-tomentose; stem lenticelled. *Leaves* 4-6 by 1·2-2 in., oblong or oblong-lanceolate, acute or acuminate, thinly coriaceous, glabrous above except on the puberulous midrib, softly rusty-tomentose beneath, pinkish-brown when very young; lateral nerves 15-18 on either half, very oblique, almost straight, open with a few very short intermediate nerves, tertiaries very fine, about ·05 in. apart, subparallel; base rounded or sub-acute; petiole ·3-·4 in. long, rusty tomentose. *Flowers* solitary, generally leaf-opposed, pale-yellow, delightfully scented, ·5 in. long, on bracteate peduncles ·6-1 in. long. *Sepals* ·2 in. long, broadly ovate spreading, tomentose outside. *Petals* minutely tomentose or puberulous outside. *Carpels* strongly tubercled, rusty pubsecent, young club-shaped, ripe globose, 1·5-2 in. in diam., often with a sharp ventral ridge; stalk 1-6 in. long, stout, expanding upward. *Seeds* in two rows closely packed ridges along the edge; pulp aromatic, edible.

MIKIR HILLS and the Nambor Res. SIBSAGAR DISTRICT; Diriu, NORTH LAKHIMPUR; Nongstion, Raliang, Shongdain, etc. about the foot of KHASI HILLS; possibly in all ever-green forests of Assam especially near hills. The ripe berries are eaten with much relish.

Fls. 3-5. Fr. 10-1.

2. Melodorum bicolor, Hk. f. & Th. Vern. *Hed-bheduli,* Ass. (Sibs.) ; *Moja-kotta* Daff. ; *Rhuibom* Kuki.

A large woody climber ; stem black ; bark fibrous, brown inside, turning deeper-brown on exposure ; young shoots rufous-hairy. *Leaves* 3-7 by 1·3-3 in., oblong or elliptic-oblong, generally rounded at both ends, thinly coriaceous, glabrous above except on the midrib ; pilosely adpressed hairy underneath, the hairs sometimes varying in colour from light-grey to dark purplish-brown ; main lateral nerves 16-20 on either side of the midrib ; often with shorter intermediate ones between, slightly arched, not looped, tertiaries sub-transverse and sub-parallel ; petiole ·2-·5 in. long, swollen, slightly channelled, densely rufous-tomentose. *Flowers* generally leaf-opposed, ·7-·9 in, long, on peduncles ·2-·3 in. long which are bracteate at the base. *Sepals* ovate, spreading, rufous or grey pubescent outside ; glabrous inside. *Petals* leathery ; outer ·6-·8 in. long, ovate, yellowish, densely rufous or tan-silky outside, glabrous inside ; inner smaller, deep-red, glabrous. *Carpels* densely tan-silky. *Ripe carpels* about 1 in. diam., globose, mucronate, pubescent, on stalks ·25-·35 in. long ; torus spherical ; seeds 4-8 oblong.

Fairly common in ever-green forests in LAKHIMPUR, SIBSAGAR and DURRANG, also in the SURMA VALLEY.

Fls. 3-4. Fr. 8-10 (?)

3. Melodorum rubiginosum, Hk. f. & Th. Vern. *Thir Kalirang* (*Galirang*) Garo.

A large woody climber ; young parts rusty-tomentose. *Leaves* 3-10 by 1-4·5 in. oblong or elliptic, acute or abruptly cuneat or rounded at the base, coriaceous, pubescent or tomentose along the stout midrib and nerves otherwise glabrous above, densely rusty-velvety beneath ; lateral nerves 12-14 on either side of the midrib very prominent, oblique, only curving at the outer extremity otherwise straight ; tertiary nerves, transverse to the secondary, parallel; petiole stout, ·4-·55 in. long, densely rusty tomentose. Flowers axillary, solitary or in pairs, sometimes in false terminal panicles of 4-6 flowers due to the fall of the upper leaves, delightfully scented ; pedicles ·8-1·2 in. long with 1 or 2 small ovate bracteoles. *Sepals* ·1 in. long broadly ovate, acute, spreading. *Petals* with a broad concave base, outer 1-1·2 in. long, oblong, acuminate, inner more fleshy, smaller and narrower with a thick triquetrous limb. *Stamens* numerous ; anthers linear ; connective with a thin spathulate apical process. *Carpels* 8-10 densely silky ; style short ; ovules many, in 2 rows. *Ripe carpels* 1-1·2 in. long, obliquely ovoid, tomentose ; stalks 1-1·5 in. long.

Chandkhira in SYLHET : Rongrengiri, GARO HILLS : and possibly in all other similar intermediate localities between those two points.

Fls. 11-1.

4, Melodorum Wallichii, Hk. f. & Th.

A large woody climber ; branchlets often cirrhiform ; young parts slightly yellow-pubescent. *Leaves* 3-5·5 by ·8-1·5 in.,

oblong-lanceolate, acuminate, slightly rounded or sub-cuneate at the base, thinly coriaceous, glabrous and green above, sparsely adpressed-pubescent and pale beneath ; lateral nerves 10-12 on either half, oblique, slightly arched ; peteole ·2-·25 in. long, terete, slightly channelled. *Flowers* about ·7 in. long, generally leaf-opposed, solitary or in fascicles of 2-3, with 1-3 bracteoles at the base ; pedicels ·15-·3 in. long, elongating in fruit. *Sepals* ·25 in. long, ovate, connate at the base, puberulous. *Petals* fleshy, outer ·65 in. long, oblong-lanceolate, densely rufous-velvety outside, glabrous inside, inner shorter. *Stamens* numerous ; filaments short ; anthers linear with short, conical connectives. *Carpels* oblong, oblique. *Ripe carpels* about 1 in. long and ·75 in. diam., ovoid, mucronate ; stalks 1-1·4 in long.

CACHAR. *e. g.*, Phulertal ; UPPER ASSAM and the KHASI HILLS.
Fls. 11-12.

5. Melodorum polyanthum, Hk. f. & Th. Vern. *Karle-phingnu*, Mik.

A large woody climber ; young shoots very minutely puberulous or glabrous ; stem dark coloured. *Leaves* 3·5-7 by 1·5-2·4 in., oblong, elliptic or obovate, finely acute or shortly acuminate, subcoriaceous, minutely puberulous along the closely reticulated tertiary and quarternary nerves above, more palpably on the larger nerves and beneath ; lateral nerves 16-20 on either half, slender but raised and conspicuous underneath, only slightly curved near the free outer extremities, tertiaries very fine, parallel, transverse to the secondaries ; base rounded or subacute ; petiole ·3-·4 in. long, swollen, finely channelled. *Cymes* short, leaf-opposed or often slightly below the level of the axils, usually 4-8-flowered : pedicels ·2-·3 in. long, densely buff-pubescent, bracteate about the middle. *Flowers* ·3 in. long, pale-orange, sweet-scented. *Sepals* ·15 in. long, broadly ovate-triangular, spreading, puberulous. *Petals* ·2-·25. in long, broadly ovate, leathery, buff-silky outside, inner smaller, buff-puberulous outside especially at the tips. *Carpels* and their *styles* hairy.

Barpathar, Garampani and Tengalibam, SIBSAGAR and possibly in similar localities, generally along edges of glades or streams in ever-green forests.
The ripe fruit is eaten by the Mikfrs.
Fls. 11-2. Fr. 7-9. (?)

6. Melodorum rufinerve, Hk. f. & Th.

An imperfectly known large woody climber with slender dark-coloured glabrous branchlets. *Leaves* 5-10 by 2-4 in., elliptic, tapering to an obtuse or acute point, rounded or retuse at the base, thinly coriaceous, glabrous above, minutely pubescent and glaucous beneath ; lateral nerves 12-14 on either half, slender, arching ; petiole ·5-·65 in. long, glabrous. *Flowers* minute in few-flowered, leaf-opposed pubescent cymes ; pedicels ·25 in. long with a small bracteole about the middle. *Sepals* broadly ovate. *Petals* fleshy.
Believed to occur in SYLHET and CACHAR.

FAM. 5. MENISPERMACEÆ.

Usually climbing or twining shrubs ; wood with broad, medullary rays and large pores in wedge-shaped groups. *Leaves* alternate, simple, entire or lobed, rarely distantly toothed, usually palminerved, exstipulate. *Flowers* small, diœcious or polygamous. *Sepals* generally 6 in two whorls of 3, rarely 4-12, those of the outer whorl minute. *Petals* generally 6, similar to the sepals, exceptionally 3, or 3-5-8. MALE FLS: *Stamens* usually 6, opposite to the petals, free, or forming a column on which the anthers are borne. FEM. FLS.: *Carpels* 3, distinct, rarely 1,6 or more, usually 1-ovuled. *Staminodes* 6 or 0. *Style* terminal in flower, generally lateral or sub-basal in fruit. *Ripe carpels* drupaceous, 1-seeded. *Seed* curved, with a woody endocarp; albumen even or ruminate or 0.

I. Leaves ovate or orbicular, generally not much longer than broad :—
  A. Leaves peltate or sub-peltate, style scar basal or sub. basal :—
    1. Petals free :—
      Leaves generally glabrous.
        Flowers in axillary pedunculate umbels, style 3-6 partite. ... **1. Stephania.**
      Leaves pubescent. Flowers in axillary panicles ; style 2-partite. ... **2. Pericampylus.**
    2. Petals connate in male flowers. solitary in female :—
      Male flowers cymose, female racemed ; sepals 4 free : style 3-fld. ... **3. Cissampelos.**
      Flowers in axillary panicles :—
        Male calyx 4-5 lobed. Male petals 4-6. **4. Cyclea.**
        Male calyx 4-lobed. Male petals 0. ... **5. Lophophyllum.**
  B. Leaves not peltate :—
    1. Style scar terminal or sub-terminal : Flowers racemed, or panicled, generally axillary :—
      Leaves glabrous. Filaments connate : stigma capitate, seed flat. ... **6. Aspidocarya.**
      Leaves glabrous or not. Filaments free : stigmas forked : seed curved or ventrally grooved. ... **7. Tinospara.**
    2. Style scar sub-basal. Flowers in axillary panicles. Leaves hairy at the nerve axils. ... **8. Anamirta.**

II. Leaves oblong or oblong-lanceolate, generally 2-3 times longer than broad :—
  A Leaves coriaceous, acute or more or less rounded at the base glabrous (in the species here dealt with.) :—
    Leaves 3-nerved at the base. Flowers panicled Style-scar sub-basal :—
      Anthers cells bursting vertically. Style compressed. .. **9. Limacia.**
      Anther cells, bursting transversely. Style cylindrical. .. **10. Cocculus.**

Leaves 3-nerved. Flowers racemed. **11. Hæmatocarpus.**
Leaves penninerved. Flowers in axillary fascicles or panicles. **12. Pycnarrhena.**
B. Leaves membranous, generally sagittate at the base, softly pubescent beneath: style-scar sub-terminal. **13. Parabæna.**

1. **Exc.**—Leaves often elongate in some species of *Stephania* not included in this Flora and often not peltate in *Cissampelos Pariera.*

1. STEPHANIA, Lour.

Glabrous climbers. *Leaves* peltate, orbicular or deltoid. *Flowers* in simple or compound axillary umbels. MALE FLS.: *Sepals* 6-10, free. *Petals* 3-5, fleshy. *Anthers* 6, forming a ring on the top of the column formed of connate filaments. FEM. FLS.: *Sepals* and *petals* 3 each. *Carpel* solitary; style 3-6 partite. *Drupe* globose, glabrous; endocarp horse-shoe shaped, dorsally tubercled.

Leaves elongate-deltoid, petiole not exceeding 2 in. in length: umbels lax, long-peduncled. 1. *S. elegans.*
Leaves ovate-deltoid: petiole up to 4 in. in length umbels capitate, 2. *S. hernandifolia.*
Leaves orbicular; petiole up to 7 in. in length: umbles cymose. 3. *S. glandulifera.*

1, Stephania elegans, Hk. f. & Th. Vern. *Mi-soh-iong-rit.* Khasi.

A small climbing shrub; main stem spirally fluted; branchlets slender, slightly angled, glabrous. *Leaves* 2·5-4 by 1-1·7 in., peltate, deltoid, acute, usually truncate at the base, thinly coriaceous, glabrous, pale beneath; main nerves 4-6 besides the midrib, all basal; petiole ·7-1·5 in.; slender. *Flowers* small, purple or greenish, in umbels with many rays; peduncles 1-2 in. long, very slender *Drupe* red when ripe, of the size of a pepper-corn, endocarp tubercled on the periphery.

KHASI HILLS, 5,-6,000 ft.

Fls. 8-9. Fr. 3-4.

2. Stephania hernandifolia, Walp. Vern. *Tubuki-lot,* Ass. (Sibs.); *Galdua,* Ass. (Garo Hills) *Nimukha,* Beng. *Kharkha,* Garo.

A climber winding clockwise round supports; branchlets glabrous, striate. *Leaves* 3-6 in. long, often as broad as long or broader, broadly ovate-deltoid, peltate membranous, wholly glabrous, or glabrous and vivid-green above and pubescent or thinly felted especially along the nerves, or pale or glaucous beneath, margins even or wavy; basal nerves 8-10, tertiaries very finely reticulate; petiole 1-4 in. long. *Flowers* yellow; ultimate umbels often head-like with sessile flowers; peduncle axillary. 1-3 in. long. *Sepals* obovate. *Petals* 3-4. *Fruit* red when ripe, ·3 in. diam., globose.

Fairly common especially in the SIBSAGAR DISTRICT.
The roots have medicinal properties and the leaves are applied on boils and septic inflammations.

Fls. 2-4. Fr. 5-12.

3. Stephania glandulifera, Miers. Syn. S. *rotunda*, Lour. Vern. *Gana-grjo*, Nep. ; *Soh-pung-um-lang-sang*, Khasi.

A large climber with tuberous roots, and rather fleshy branches ; tubers globose, deep-yellow inside. *Leaves* 3-6 in. diam., orbicular, sometimes broader than long, usually peltate often with repand or lobed margins, membranous, glabrous ; basal nerves generally 9, intermediate nerves very slender and finely reticulate ; petiole 3-7 in. long. *Flowers* about ·2 in. diam., yellow ; peduncles axillary, 1·5-4 in. long. *Sepals* narrow-cuneate, puberulous ; *petals* shorter. *Drupe* globose, ·15-·25 in. diam.

Laluk, NORTH LAKHIMPUR ; Nauduar Reserve, DARRANG ; KHASI-HILLS ; Bamba block, GOALPARA.

The tubers are medicinal and the leaves are eaten by cattle and goats.

Fls. 11-1. (?) Fr. 4-5.

2. PERICAMPYLUS, Miers.

Pericampylus incanus, Miers. Vern. *Goria-loti*, Ass. *Baral-prati* Nep. ; *Mi-syntneg*. Khasi.

A climber, grey-tomentose all over. *Leaves* 2-4 in. diam., orbicular or very broadly ovate, very narrowly peltate or not peltate at all, acute or obtuse, mucronate, membranous, pubescent or soon glabrescent above, grey-tomentose beneath, densely ciliate along the margins ; basal nerves usually 5, tertiaries and quarternaries very fine, minutely reticulate ; base truncate or subcordate ; petiole 1-2 in. long, tomentose. *Flowers* small in 2-3 chotomons cymes ; peduncles axillary, fascicled, often superposed, 1-2 in long, tomentose. *Sepals* 6 in 2 whorls, villous, inner spatulate. *Petals* 6, shorter than the sepals, cuneate, with recurved margins, pale-green. MALE FLS. : *Stamens* 6, free ; anthers burstinng trausversely. FEM. FLS. ; staminoles 6, clavate ; carpels 3 ; style 2-partite. *Drupes* red, subglobes ; style-scar sub-basal ; endocarp horse-shoe-shapel, crested and echinate on the back.

Fairly common in NOWGONG and DARRANG, possibly also higher up the Valley ; KHASI HILLS ; CAHAR ; GOALPARA.

The long branches are used in NOWGONG for tying purposes in house-building and are considered to be stronger and more duiable than cane.

Fls. 4-5, Fr. ?

3. CISSAMPELOS, Linn.

Cissampelos Pareire, Linn. Vern. *Tubuki-lota*, or *Tabaki-lot*, Ass. (Sibs. & Lakh.) ; *Jyrmi-salla*, Khssi. ; *Baral-panrhe*, Nep. ; *Tupri-lewa*. Ass. (Kam.).

A dextrorse climber which grows annually from perennial rootstocks ; yonng parts usually tomentose or pubescent. *Leaves* 1-4 in. diam., orbicular, peltate or not, obtuse or sometimes retuse, mucronate at the apex, membranous or subcoriaceous, pubescent above, grey-tomentose beneath, or both surfaces glabrate especially the upper ; base cordate or truncate, 5-7-nerved with minute reticulations between, yellow before falling ; petiole as long as, or longer than the blade, tomentose or glabrate.

MALE. FLS. : cymose. *Sepals* 4-6. *Petals* 4, connate into a cup; *filaments* connate into a column with 4 connate *anthers* on top, which burst transversely. FEM. FLS. : racemed and crowded in the axils of leaf-like bracts. *Sepals* 2; *petals* 0 (or sepal 1 and petal 1), 2-nerved. *Carpel* 1; style 3-fid. *Drupe* ·15-·2 in. diam., obovoid-globose, compressed, hirsute, scarlet when ripe; style-scar near the base; endocarp horse-shoe-shaped with 4 rows of tubercles along tbe back.

Fairly common in all the DISTRICTS, especially on the MAJULI. (where however the variety with peltate leaves in rare), ascending to 2000 ft. in the KHasi hills.

The leaves and roots, are in used medicine.

Fls. 10-1. Fr. 3-5.

3. CYCLEA, Arnott.

Cyclea peltata, Hk. f. & Th.

A slender climber; branches longitudinally ribbed and pubescent or glabrate. *Leaves* 2-4 by 1·8-3 in., sometimes upto 7 by 5 in., deltoid or ovate, peltate, thinly coriaceous, glabrous or sparsely pilose above, glaucous and thinly pubescent beneath; basal nerves 9-13; petiole 1-2·5 in. long. *Flowers* small in axillary panicles 5-8 in. long. *Sepals* and *Petals* more or less connate; calyx exceeding the corolla. *Anthers* 4-6, connate and borne on the edge of the column formed by connate filaments. FEM. FLS. : *Sepal*, *Petal* and *carpel* 1 each, style with 3-5 radiating lobes. *Drupe* about ·15 bv ·12 in., globose or obovoid, pilose; endocarp horse-shoe-shaped, tubercled; style-scar sub-basal.

The climber undoubtedly occurs in UPPER ASSAM but is liable to be mistaken for *Cissampelos Pareira* or *Pericampylus incanus*.

Fls. 7-9. Fr. 11-1.

5. LOPHOPHYLLUM, Griffith.

Lophophyllum bicristatum, Griff.

A large climbing shrub. *Leaves* 3-7 by 2·5-5·5 in., ovate, broadly cordate acuminate, firm and coriaceous, glabrous above rusty-pilose beneath, palmately 7-9-nerved from the base; petiole 1·5-4 in. long, thickened at both extremities. *Inflorescence* a slender tomentose decompound paniele, axillary or from leafless nodes of the stem; *Flowers* minute. MALE; apetalous; FEM. : with 2 opposite lobed saccate sepals; buds ·03 in. diam. *Anthers* 4-5, connate into a peltate disk. *Carpel* 1. *Drupe* ·15-·25 in. diam. orbicular, compressed, tubercled.

KHASI HILLS. *Hk. f. Th.* / Apparently not very common. Distrib.—SIKKIM, BHUTAN, MANIPUR and BURMA.

Fls. 4-6. Fr. 8-10.

6. ASPIDOCARYA, Hk. f. & Th.

Aspidocarya uvifera, Hk. f. & Th.

A large evergreen climber; branches longitudinally ribbed. *Leaves* 4-6 by 3-5 in., ovate-cordate, tapering to an obtuse or

fine point, sometimes very narrowly peltate, thinly coriaceous, dark-green, glabrous or pubescent along the nerves beneath; basal nerves 5, tertiaries laxly, but quarternaries very finely and colsely reticulate; petiole 3-4 in. long. *Flowers* in very slender panicles from axils of fallen loaves. *Sepals* 12 in several rows, greenish, ciliate; *petals* 6, cuneate, concave. MALE FLS: *anthers* 6, on the top of the staminal column. FEM. FLS: *staminodes* 6, club-shaped. *Carpels* 3. *Drupes* ·7-1 in. long, compressed, keeled on the back, surrounded by a toothed wing; seed oblong, flat.

Rajgarh, near Dilmoor, N. E. FRONTIER; Jaipur Res., LAKHIMPUR, and possibly in other similar localities in those two DISTRICTS. Also Dikrang Vally, DARRANG.

Fls. 2-4· Fr. 6-8.

7. TINOSPORA, Miers.

Succulent deciduous climbers with corky or papery bark, generally sending down long ærial roots from the branches of of the tree on which they spread. *Leaves* generally cordate, not peltate, rather fleshy. *Flowers* in axillary or terminal racemes or panicles when the climbers are leafless. MALE FLS.: *Sepals, petals* and *stamens* 6 each, all more or less free; anthers oblique. FEM. FLS.: *Sepals* and *petals* 0; staminodes 6, club-shaped. *Carpels* 3. *Drupes* 1-3; style-scar terminal. *Seed* curved.

Leaves and new shoots glabrous:—
- Bark corky, Stamens free. Drupe ·3 in. long, globose; endocarp smooth. 1. *T. cordifolia.*
- Bark warted. Stamens adnate to the base of petals. Drupe 1 in. long, ellipsoid; endocarp tubercled. 2. *T. crispa.*

Leaves on both surfaces and young shoots hairy. Bark papery. Drupe ·4-·5 in. diam., sub-globose; endocarp tubercled. 3. *T. malabarica.*

1. Tinospora cordifolia, Miers. Vern. *Hoguni-lot,* Ass.; *Gulancha,* Beng,

A large succulent climber with corky bark; young shoots glabrous. *Leaves* 3-4 in. long and as broad. orbicular or broadly ovate-cordate, acute or shortly cuspidate-acuminate, glabrous; petiole 1·5-2·5 in. long. *Flowers* greenish-yellow, glabrous. MALES fascicled: FEMALES solitary on longer pedicels. Bracts. boat-shaped, the lower ones often leaflike. *Petals* cuneate. *Stamens* free; anthers oblong. *Drupes* 1-3, about ·3 in. diam., globose, shortly stalked, red and glossy when ripe.

Not uncommon in riparian forests *e.g.,* Majuli, DISTRICT SIBSAGAR.

A starchy extract is obtained from a cold infusion of the ærial roots and the thicker parts of the stem of this plant, which is much valued by Hindu phygicians as a tonic febrifuge. Elephants are very fond of the ærial roots which act as a good tonic on them.

Fls. 2-4. Fr. 3-4.

2. Tinospora crispa, Miers. Vern. *Hoguni-lot,* Ass.

A large glabrous climber; stem warted. *Leaves* 2-6 by 1-4 in., ovate-oblong, shallowly cordate at base, glabrous; petioles

1-3 in. long. *Flowers* yellowish-green: bracts ·15 in. long, subulate fleshy. *Stamens* adnate to the base of the petals; anthers square. *Drupe* about 1 in. long, ellipsoid, pale-yellow.

Occurs in similar localities as the foregoing species and probably possesses the same economic utility.

3. Tinospora malabarica, Miers. Vern. *Hoguni-lot,* Ass; *Pherua-mek-rikang, Phuroi-rikang,* Mikir; *Daolhuli,* Kach; *Wapel-ek-rang,* Kuki.

A large fleshy climber; bark papery, usually with lenticels which are often 4-fid; young shoots pubescent. *Leaves* 3-5 in. long and nearly as broad, broadly ovate or orbicular, cordate but abruptly truncate or cuneate and 5-7 nerved at the base, suddenly acute or acuminate; pubescent above and whitish-tomentose beneath; main lateral nerves 1 or 2 on either side of the midrib; ultimate reticulations minute; petiole 2·5-4 in. long. *Flowers* green, on racemes 1·5-4 in. long. *Mature carpels* 1-3, ·4-·5 in. diam., globose, turning at first yellow then bright crimson in ripening; endocarp tubercled.

Throughout UPPER ASSAM: the commonest species of this genus.
The stem tastes sweetish but is likely to possess the same medicinal properties as *T. cordifolia.*

Fls. 2-3. Fr. 3-5.

Tinospora Mastersii, Diels, Pflanzenreich 46. Heft. p. 140 Syn. T. crispa, Miers. in part.

A climber with reddish brown warted bark. *Leaves* suborbicular acuminate membranous usually glabrous, 4-6 in. across, base retuse or subcordate, 5-7 nerved, lateral nerves usually 2 above the basal, prominent beneath. *Flowers* unknown. *Female* inflorescence racemose, 2-3·2 in. long, pedicels ·5-·8 in. long, stout. *Drupe* juicy and fleshy, endocarp crustaceous, subreniform about ·6 in. long.
Griffith, ASSAM!

Fls. 8.

8. ANAMIRTA, Colebr.

Anamirta paniculata, Colebr. Vern. *Kakmari,* Beng. *Kakamari,* (crow's bane). Sans.

A powerful climber, wholly glabrous (except the axils of the nerves on the undersurface of the leaves); bark on old stems spongy outside and deeply cracked, smooth on branches, often sending down numerous rootlets. *Leaves* 3-10 by 2·5-8 in., ovate, shallowly cordate or truncate, bluntly sub-acute, coriaceous, glabrous, 3-5 nerved at the base, with 4-5 lateral nerves on either side of the midrib the axils of which are hairy, tertiaries indistinct; petiole 1-5 in. long, generally twisted at the base. *Panicles* 12-15 in. long, drooping from the old branches. *Flowers* green, scented, about ·2 in. diam, glabrous; buds globose, ·1 in. diam. MALE: apetalous but with 6 deciduous sepals; stamens numerous with 2 celled anthers round the top of a central column. FEMALE: with 9 club-shaped staminodes, all in one series; *carpels* usually 3 on a short gynophore; style lateral. *Drupes*

usually in pairs, ·4-·6 in. long, subglobose or reniform, black, on stout stalks; endocarp rugose; albumen oily.

Occurs in the same localities as *Tinospora cordifolia* and liable to be mistaken for it: also in the Khasi Hills.

The fruit is very bitter and is used to poison crows and fish. The oil of the seeds is said to be used for industrial purposes. An ointment prepared from the berries is used as an insecticide and in cases of obstinate skin diseases.

Fls. 5-9. Fr. 11-12.

9. LIMACIA, Lour.

Limacia cuspidata, Hk. f. & Th.

A somewhat stiff climbing shrub of the habit of *Smilax*; branchlets striate; very young shoots pubescent. *Leaves* 2-4 by ·8-1·5 in., ovate elliptic or lanceolate, acuminate, coriaceous, glabrous, glossy, 3-nerved and more or less rounded at the base with only 1 or 2 lateral nerves on either side of the midrib; petiole ·4-·6 in. long. *Panicles*:—MALE: ·8-1·3 in. FEM.: ·5-·6 in. long, from supra-axillary villous tubercles; rachis hairy; bracts minute. *Sepals* 6 in two series. *Petals* 6, much smaller than the sepals. *Stamens* 8-12 (Kurz).; *carpels* 3. *Drupes* ·4 in. long, globose, slightly compressed; style-scar near the base; seed curved; endocarp faintly tubercled.

Only once found by the writer on the western bank of the Gaurisagar tank: SIBSAGAR DISTRICT.

Fls. 6-7. (?). Fr. 9-10.

10. COCCULUS, DC.

Climbing shrubs, often sub-herbaceous, rarely small trees. *Flowers* axillary or infra-axillary, in short cymes or panicles, rarely racemose. *Sepals* 6 in two series, the inner larger. *Petals* 6, auricled at the base. *Stamens* 6, embraced by the auricles of the inner petals; anthers sub-globose, cells bursting transversely. *Carpels* 3-6; *drupes* compressed, horse-shoe-shaped, keeled and tubercled on the back; style-scar sub-basal.

Climbing shrubs:—
- Leaves broader than long, glabrous. Panicles 6-24 in. long from old stem. Drupe 1 in. long, obovoid-oblong. — 1. *C. macrocarpus.*
- Leaves ovate glabrate. Panicles axillary, shorter than the leaves. Drupe ·2 in. diam., tubercled. — 2. *C. mollis*

A small tree:—
- Leaves lanceolate, shining. Panicles axillary, Drupe minute, globose. — 3. *C. laurifolius.*

1. Cocculus macrocarpus, W & A.

A large woody climber; old stem with papery outer bark; branches dark-grey, striate. *Seales* 2-3·5 by 2·2-4·5 in. generally broader than long, rhomboid to broad-ovate, chartaceous, glabrous, shining above, glaucous or pale beneath; base truncate or cordate, 5-nerved; petiole 1·2-4 in. long. *Panicles*

6-24 in. long, pendulous from the old stem. *Flowers* small, pale-yellow. *Ripe carpels* obliquely obovoid. ·8-1 by ·4-·5 in., drying with an elongated depression in the centre; stone with transverse ridges.

KHASI HILLS, *Brandis !*

Fls. 2-5. Fr. 7-9.

2. Cocculus mollis, Wall, Vern. *Jyrni-mailum,* Khasi.

Branchlets blackish, slender, striate, pubescent. *Leaves* 1·5-4 by 1-2·2 in. ovate, acute or acuminate, truncate or suddenly cuneate, 3-5-nerved at the base, rarely cordate, thinly chartaceous, bright-green above, glaucous beneath, glabrate; lateral nerves 2-3 above the basal; petiole ·6-1 in. long, slender. *Panicles* usually axillary never exceeding the leaves, few-flowered. *Petals* notched. *Drupes* ·2-·25 in. diam., very shortly pedicelled, laterally compressed, sculptured on the back and with four lines of tubercles along the sides.

KHASI HILLS, 5,-6,000 ft., c. g., Sadew, Mawphlang etc.
Fls. 6-7. Fr. 9-10.

3. Cocculus laurifolius, DC.

A small evergreen tree with short trunk; branchlets grey or dark-brown, angled, uniformly striate, often pendulous, with a tuft of hairs at the base. *Leaves* 3-6 by 1-2 in., oblanceolate or elliptic, firm and chartaceous, glabrous, dark-green above, lighter green beneath, cuneate and 3-nerved at the base; petiole ·15-·5 in. long, often bearded at the base, *Panicles* axillary, solitary or 2 together, corymbose. *Flowers* minute; petals 2-lobed. *Styles* reflexed. *Drupe* ·15 in. diam., black when ripe; endocarp rugose.

Amteka in the Bijni Reserve, GOALPARA. Probably also in other similar Sub-Himalayan swamps.

The wood has belts of bast tissue alternating with woody bands, simulating annual rings. They often anastomose or are spirally disposed on a transverse section. The wood can only be used as fuel.

Fls. 4-6. Fr. 9-12.

HÆMATOCARPUS, Miers.

Hæmatocarpus Thompsoni, Miers. Vern. *Inramji-dukha,* Kach.

A very large woody climber spreading over the tallest trees; bark pale grey or brown somewhat rough, branches stout, wood consisting of consecutive layers of thin radiating plates. *Leaves* 3-6 by 1·5-2·5 in., oblong, bluntly acuminate, with an acute or obtuse 3-5-nerved base, rigidly coriacous, glabrous, pale beneath; basal nerves running nearly to the apex, minor nerves conspicuous. *Flowers* dioecious, small, in axillary or supra-axillary solitary or fascicled racemes; pedicels slender. *Sepals* 9-12 in the male flowers, ciliate. *Petals* 6, concave, with an auricled base. *Stamens* 6; anthers 2-celled. *Female fls.* not seen. *Fruiting racemes* woody and stout, up to 15 in. long. *Drupe* solitary or 2-4 together, 1·5-2 in. long by 1-1·3 in. diam., on stout stalks ·5 in.

long, oblong, oblique, dark-red outside and full of copious blood-red juice when ripe ; style-scar about half way down the drupe ; endocarp somewhat flat, crustaceous, densely fibrous.

Barail Reserve, NORTH CACHAR HILLS ; also KHASI HILLS, Not common.

The ripe fruit which is full of a sweetish blood-red juice is eaten by the local people.

Fr. 4-5.

12. PYCNARRHENA, Miers.

Pycnarrhena pleniflora, Miers. Vern. *Holok-lota,* Ass. (N. Lakh.)

A woody climber which generally creeps on its supports ; branches finely striate, pubescent. *Leaves* 5-7 by 1·5-2·5 in., oblong-lanceolate or oblanceolate, abruptly blunt acuminate, thinly coriaceous, wholly glabrous or puberulous on the midrib beneath, shining above ; main lateral nerves 7-9 on either side of the midrib, the lowest pair subbasal, depressed above, very prominent beneath, interlacing to form intermarginal loops, tertiaries laxly and quarternaries very minutely reticulate (meshes about 50 along an inch length); base cuneate ; petiole ·4-·5 in. long, swollen and channelled below, sub-terete. *Flowers* white, dicœcious, axillary, fascicled. MALE : fascicles sometimes forming short congested panicles, *bracts* 3. *Sepals* 6, inner 3 larger, orbicular, concave. *Petals* 6, sometimes 5, small lobed ; *anthers* 6-9, 4-lobed subsessile. FEMALE : on 1-2 flowered fascicled, bracteate, filiform, pubescent peduncles about ·25 in. long ; *bracts* 9, hairy ; *sepals* 3, concave ; *petals* 6, much smaller ; staminodes 6 (?). *Drupes* ·5 in. (?) long, broadly oblong, smooth style scar lateral, endocarp and seed reniform.

Mahmora, Gaurisagar tank and Majuli, SIBSAGAR DISTRICT : Panigaon and Bhoreli Reserve, NORTH LAKHIMPUR.

Fls. 2-4. Fr. 5-6 (?)

13. PARABÆANA, Miers.

1. Parabæna sagittata, Miers. Vern. *Chabailai-daugurung-gedeba,* Kach.

A rather slender climber, with milky juice ; branches longitudinally ribbed. *Leaves* 3-8 by 2-4 in. ovate-cordate or sagittate, acuminate, entire or distanly toothed, membranous, glabrous or glabrescent above, softly tomentose beneath, basal nerves 7 besides 3-5 lateral nerves on either side of the midrib ; petiole 1-4 in. long. *Flowers* small, axillary or slightly supra-axillary, solitary or geminate, few or many flowered, dichotomous cymes ; common peduncles up to 1 in. long. *Sepals* 6, sub-equal, subacute. *Petals* cuneate, often lobed. MALE : *anthers* 6, horizontal on the top of the staminal column. FEMALE : *staminodes* 6, *Carpels* 3 ; *style* recurved. *Drupes* ·2-·25 in. long, globose ; style-scar subterminal ; endocarp subglobose, sharply tubercled on the back.

Lanka and other places in the neighbourhood of Lumding. DISTRICT NOWGONG ; also KHASI HILLS up to 2000 feet.

Fls. 5-7. Fr. 10-11.

Tinomiscium micranthum, Diels in Pflanzenreich. Heft 46. P. 119.

A climber with deeply sulcate branches, young parts ferruginous pilose. *Leaves* 5·5-6·5 by 2·5-3 in. ovate oblong or narrowly ovate lanceolate, acuminate, glabrous above puberulous specially on the nerves beneath, chartaceous, base rounded to broadly cuneate, with 3-5 nerves, lateral nerves 2-3 (above the basal) on either side, ascending prominent on the undersurface ; petioles 2-2·5 in. long. *Male flowers* in pubescent spicate racemes 1·5-2·5 in. long, several of which are fascicled together from nodes on old wood. *Sepals* 9,3 outer small, externally pubescent, inner 6 oblong, about ·06 in, long *Petals* 6, with involute margins, glabrous, slightly smaller than the sepals *Stamens* 6, opposite the petals, free, subequal ; filaments short, thick, dilated towards the apex ; anthers introrse. *Female flowers* and drupe not seen. (In the genus, the female flowers have the sepals and petals similar to those of the male flowers ; staminodes 0. *Carpels* 3, glabrous, stigma peltate-capitate. *Drupes* 3 or few aborted, compressed, exocarp fleshy, endocarp crustaceous dorsally convex, ventrally flat or slightly concave, not intruded ; seeds with large flat cotyledons).

Rajbari, Assam, Watt. 11267 (the type for the species) !

Flrs. 3.

FAM. 6. BERBERIDACE.

Erect or climbing glabrous shrubs. *Leaves* alternate or fascicled, simple or compound, exstipulate. *Flowers* regular, yellow green or white. *Sepals* and *petals* free, hypogynous, caducous, in several series, usually imbricate. *Stamens* hypogynous, usually as many as the petals and opposite to them. *Carpels* 1-3, oblong ; *style* short or 0 ; *stigma* dilated. *Fruit* usually baccate.

Climbing shrubs : leaves digitate. Flowers 1-sexual : carpels 3 :—
- Stamens monadelphous. Leaflets up to 7. .. 1. **Stauntonia.**
- Stamens free. Leaflets up to 9. .. 2. **Holbœllia.**

Erect shrubs. Leaves simple, pinnate or 2-3 pinnate. Flowers 2 sexual : carpel 1 :—
- Armed shrubs. Flrs. yellow, solitary, fascicled or racemed :—
  - Leaves simple. .. 3. **Berberis.**
  - Leaves pinnate. .. 4. **Mahonia.**
- Unarmed shrub. Flrs. white, in panicles :—
  - Leaves 2-3 pinnate. .. 5. **Nandina.**

1, STAUNTONIA. DC.

Glabrous, climbing shurbs. *Leaves* alternate, digitate or pinnate ; leaflets 3-7, petiolulate, entire, generaly glaucous or pale beneath. *Racemes* axillary, solitary, or fascicled. *Flowers* 1-sexual. MALE : *Sepals* 6 in 2 series, linear. *Petals* 0. *Stamens* monadelphous. FEM. ; *Carpels* 3. *Seeds* large, imbedded in a yellowish pulp ; testa horny, black.

Leaves pinnately 3-foliolate :—
- Racemes solitary or few. .. 1. *S. Brunoniana.*
- Racemes numerous, fascicled. .. 2. *S. elliptica.*

Leaves digitately 3-7-foliolate. .. 3. *S. filamentosa.*

1. Stauntonia Brunoniana, Wall.

A large climber; old stem softly grey-corky; branches often tubercled. *Leaves* pinnately 3-foliolate: leaflets 2·5-5 by 1-1·5 in. narrow elliptic or lanceolate, caudate-acuminate, entire, glabrous and shining above, somewhat glaucous beneath; nerves 6-8 on either side of the midrib, the first pair being basal, prominent beneath, midrib depressed above; petiole 2-5 in. up to the lowest pair of leaflets; petiolules of the latter ·5-·7 in. long. *Racemes* solitary, or a few from scaly tubercles; rachis slender somewhat zigzag. *Flowers* greenish-yellow, ·3-·6 in. across on very slender pedicels. ·2-·3 in. long. *Ripe carpels* about 2 by 1 in., ovoid or oblong, many-seeded; seeds black, 3-gonous, immersed in a yellow pulp.

Sadiya, N. E. F. DISTRICT; Balijan, SIBSAGAR DISTRICT: KHASI HILLS. *Griffith! Hooker! etc.*
Fls. 8-10. Fr. 2-6.

2. Stauntonia elliptica, Hemal. Syn. Paravatia Brunoniana, Decaisne. Vern. *Krang-sin-dowha*, Kach,; *Jong-mot*, Kuki.

A large climber; branchlets striate. *Leaves* pinnately 3-foliolate; common petiole 2-5·5 in. long to insertion of leaflets, swollen and callous at the base; leaflets 2·5-4·5 by 1·4-2·7 in elliptic or ovate, acute or rounded at the tip, subcoriaceous, glabrous, shining above, glaucous beneath; margins slightly recurved, lateral nerves 6-8 on either half, slender, the first pair or two subbasal with lax reticulations between; base as a rule rounded; petiolules lateral ·4-1 in., terminal 1-2 in. long, swollen and callous at both extremities. *Racemes* 3-4·5 in. long in fascicles of 5-12 from imbricately bracteate axillary tubercles. *Flowers* greenish-yellow about ·3 in. across, on filiform pedicels ·2-·4 in. long. *Sepals* 6, ovate or elliptic, longitudinally ribbed. *Petals* 6, smaller than the sepals. *Stamens* 6, monadelphous. *Young fruit* of 3 distinct carpels; *mature* generally solitary 3-4 by 2 in.; seeds dark-brown or almost black, shining, irregularly facetted, with a thin grey papery arillus (or exocarp ?), imbedded in yellow pulp.

Garampani, Dipling, and Balijan, SIBSAGAR; Gauhati, KAMRUP; Sadiya and Dismor, N. E. FRONTIER; Haflong, N. CACHAR HILLS; Cherrapunji. KHASI HILLS.
Fls 8-11. Fr. takes 12 months to mature.

3. Stauntonia filamentosa, Griff.

A large climber with thick striated branchlets. *Leaves* digitately 5-foliolate; common petiole 3-6 in. long, swollen at the base; leaflets 5-7 by 2·2-3·4 in., oblong obovate, suddenly acuminate with a short tail, subcoriaceous, glabrous and green above, minutely densely glandular puberulous beneath; main lateral nerves about 10 on either side of the midrib, the first pair subbasal and continuous with the intermarginal loops of the other nerves; reticulations lax; petiolules ·8-1·7 in. long, the terminal being the longest. *Flowers* and *fruit* not seen.

Upper Dehing Reserve, also Tingrai, LAKHIMPUR.

2, HOLBŒLLIA, Wall.

Holbœllia latifolia, Wall. Vern. *Soh-lygn-kait, Mi-rang-k'sa,* Kh. ; *Soh-tymbra,* Synt. ; *Kram-sim-doukha,* Kach.

A fairly large climbing shurb ; stem corky when old. *Leaves* alternate, digitate, 3-9-foliolate. *Leaflets* very variable in size and shape, 3-5 by 1·5-2 in., broadly ovate, oblong or ovate-lanceolate, acuminate, coriaceous, glabrous, somewhat shining above, pale beneath, usually 3-nerved at the base ; common petiole 3-7 in., petiolules ·3-1 in. long. *Flowers* monœcious, green or purplish-green, sweet-scented, in axillary fascicles or racemes 1·5-4·5 in. long ; pedicels ·5 in. long, slender. *Sepals* 6 in 2 series. *Petals* 6, minute, orbicular. *Stamens* 6, free ; anthers ·2 in. long, apiculate extrorse, opening by slits. *Carpels* 3 ; stigmas oblong ; placentation parietal. *Ripe carpels* berry-like, 2-3 in. long, of the shape and size of a small plantain ; seeds black, generally compressed, imbedded in a yellow edible pulp.

KHASI and JAINTIA HILLS between 4, and 6.000 ft., *e. g.,* Jarain. Laitsoham, Khimawrah. Um Risa. *etc.* Also NORTH CACHAR HILLS. *e. g.,* Haflong, Gunjong. *etc.*

Fls. 2-5. Fr, 9-11.

There are two varieties of this plant.—Var. 1.—*latifolia* and Var. 2.—*angustifolia,* but only the former occurs in our area and the above description refers to it alone.

3. BERBERIS, Linn.

Berberis Wallichiana, DC. Vern. *Dieng-niang-mat-shynrang,* Kh.

An erect spinous shrub 6-10 ft. high ; branches sharply angled. *Leaves* simple, generally in fascicles of 3-4 from tubercles in the axils of alternate 3-partite spines, 2-3 by ·5-·75 in., oblong or oblong-lanceolate, acute at both ends, chartaceous or subcoriaceous, glabrous and shining on both surfaces usually serrulate with very sharp spines, sometimes entire ; lateral nerves very faint ; petiole ·1 in. long, flattened and channelled *Spines* 1-1·5 in. long. *Flowers* yellow, bisexual on 1-flrd. axillary peduncles ; peduncles in fascicles of 10-15, ·3-·5 in. long, red. slender, filiform, jointed at the top glabrous and shining. *Sepals* 6, petaloid, imbricate, in two series. *Petals* 6, in two series glandular at the base. *Stamens* 6, free. sensitive, anthers opening by two recurved valves. *Ovary* simple, stigma subsessile, broad ; ovules basal, erect. *Berries* ·3 by ·15 in., oblong-ellipsoid, deep purple when ripe.

This plant has four varieties only one of which Var. *microcarpa* occurs in the KHASI HILLS above 5000 ft. e. g. Mowphlang and the above description refers to it only.

The wood of this and the next species are yellow.

Fls. 8-9. Fr. 9-10.

4. MAHONIA, Nutt.

Mahonia nepalensis, DC. Syn. Berberis nepalensis, *Spreng.* Vern. *Dieng-phuh-rnong, Dieng-niang-mat, Dieng-soh-riang-mat-kynthei,* Kh. ; *Dieng-la-ranong, Dieng-larnong,* Synt, ; *Lek-chutra,* Nep.

An erect shrub or sparingly branched small tree with soft corky bark, leafy only towards the extremities of the thick branchlets. *Leaves* 6-18 in. long, sheathed at the base with a pair of subulate stipules. *Leaflets* 2-12 pairs besides the terminal one, 2-4 by ·8-1·8 in. ovate-oblong or lanceolate, sessile, firmly coriaceous, glabrous, shining above, pale beneath, with 3-8 large spinous teeth on either side, strongly 3-5 nerved from the base areoles very large. *Flowers* yellow, about ·2 in. long, fascicled in erect dense filowered racemes. *Racemes* 4-10 in. long, erect, each from the axil of a bract. *Bracts* 1-2 in. long, hyaline persistent, covering the ends of the branchlets; bracteoles small broadly ovate or oblong, concave, deciduous; pedicels ·3-·5 in. long. *Sepals* 6, petaloid, imbricate in two series, elliptic. *Petals* 6, in two series, glandular at the base. *Stamens* 6, sensitive; anthers dehiscing by ascending valves. *Ovary* 1-celled; style short, stigma capitate, large. *Berries* ·3-·5 in. long, elliptic or globose, purple with glaucous bloom.

KHASI HILLS 4-5000 ft. on sunny spurs and open hill slopes.
Flrs. 10-11. Fr. 11-1.

Takeda (Notes from the Royal Botanic Gardens Edingburgh, Volume VI. P. 215-224) maintains that the plants grouped under this name consists of a number of species. According to him M. nepalensis has not been hitherto collected outside Nepal. The plant described uuder this name should be called according to this view M. pycnophylla, Takeda, M. nepalensis var. pycnophylla, Fedde.

M. nepalensis is said to differ from our plant by its less coriaceous and somewhat narrOwer leaflets with more spines, larger bracts which are oblong to ovate oblong, obtuse and about ·15-·24 in. long and more ovules (4-5 tnstead of 2).

Mahonia acanthiflolia, Tekeda. Notes from the Royal Botanic Gardens. Edinburgh. Vol. VI. p. 219.

Differs from the plant described as M. nepalensis, DC. by its more numerous leaflets (up to 11 pairs) with few large teeth, aud flowers with very small outer sepals. Punduah, (Khasi Hiills) Wallich 1820, No. 1480C. There is no duplicate sheet at Calcutta herbarium.

M. manipurensis, Takeda. Notes from the Royal Botanic Garden Edinghburgh P. 222.

Leaflets 5-9 pairs, 1·2-2·4 by ·8-1·2 in. ovate to broad ovate, margins with few strong teeth, base truncate to subtruncate, or more or less cordate, 5-6 nerved, coriaceous. *Racemes* in fascicles of 5-8 up to 4 In. long, stout, dense flowered. *Bracts* ovate up to ·2 in. long, outer sepals ovate, larger nward, 1·5-·3 in long, 3-5 nerved. *Petals* oblong, ovate, bifid at the apex up to about ·27 in. long. *Ovary* with short style, 1-3 ovuled, *Fruit* unknown.

MANIPUR, Watt.

Flowers cold season.

M. Simonsii, Takeda. Loc. cit p. 222.

Leaflets 6-9 pairs, 2·75-4·25 by ·8-1·2 in. lowest pair much smaller close to the stipules, distant from the next upper pair : lanceolate, long acuminate, lower half of base rounded upper half subcuneate, margins serrate dentate, slightly glossy, coriaceous, nervules conspicuous,. *Recemes* in fascicles of about 8, up to about 6·25 in. long, sometimes branched towards the base, somewhat lax flowered : pedicels ·2-·25 in. long, slender much exceeding the minute triangular acute bracts. *Outer sepals* very small inner gradually longer about ·2-·27 in. long, elliptic oblong obovate. *Ptals* oblong, about ·2 in long, bifid at apex, nectaries minute. *Stamens* slightly shorter than the petals; fllaments a little longer than than the anthers. *Ovary* short styled, 3 ovuled. *Eruit* unknown.

Myrung, Simmons!

It is easy to distinguish from its lanceolate accuminate leaflets with prominent nervules which are as strong as the main nerves and the minute bracts much smaller than the slender pedicels.

Flowers 11.

The description has been based on a single sheet in Calcutta herbarium which is also the type sheet for the species.

5. NANDINA. Thunb.

Nandina domestica. Thunb., the *Sacred Bamboo* of the Chinese, is an unarmed ornamental shrub, 3-6 ft. in height, with 2-3 pinnate evergreen leaves and small white flowers in large terminal panicles. It is a native of China and Japan, but is often grown at Shillong.

Fls. 5-7.

FAM. 7. NYMPHÆACE.

Aquatic herbs with perennial rootstock. *Leaves* usually floating, often peltate, with involute margins in bud. *Flowers* solitary, borne on a naked scape. *Sepals* 3-5, free. *Petals* 3-5 or, numerous, free, coloured. *Stamens* many. *Carpels* 3 or more, free or connate or sunk in pits of the disk; ovules few or many. *Fruit* various; seeds naked or arillate; albumen floury or 0, embryo enclosed in a sac.

Sepals and petals 3 each. Carpels free; ovules few. Seeds albuminous ... 1. **Brasenia.**
Sepals 4-5. Petals and stamens indefinite :—
  Ovary inferior; carpel connate; ovules many. Seeds albuminous :—
    Sepals deciduous. Seeds minute, very numerous. ... 2. **Nymphæa.**
    Sepals persistent. Seeds large, 8-20. ... 3. **Euryale.**
    Sepals 4-5, Petals and stamens indefinite; carpels sunk in pits of the superior turbinate spongy disk. Seeds exalbuminous, ... 4. **Nelumbium.**

1. BRASENIA, Schreber.

Brasenia peltata, Pursh.

A slender plant with branching stem. *Leaves* alternate, 2-4 in. long, elliptic-oblong, floating; petiole covered with mucus. *Flowers* red, 1 in. diam.; peduncles axillary, pubescent, covered with mucus. *Sepals* 3, pubescent. *Petals* 3, red, linear. *Stamens* 12-18; anthers opening by lateral slits. *Carpels* 6-18, cylindrical; ovules 2-3, pendulous; carpels indehiscent. *Seeds* albuminous.

KHASI HILL in the neighbourhood of Nongkrem, 4,500 ft.

2. NYMPHÆA, Linn.

Large herbs with creeping rootstock. *Leaves* usually peltate or subpeltate. *Flowers* showy, white, red or blue, floating, supported by long cylindrical radical scapes. *Sepals* 4, adnate to the base of the disk. *Petals* 10-30, in many series, the inner gradually narrower and ultimately passing into stamens. *Stamens* indefinite; filaments flattened at the base; anthers introrse, opening by lateral slits. *Carpels* many, confluent with the disk. *Fruit* a spongy berry. *Seeds* minute, buried in pulp, with a fleshy aril.

Leaves large, 6 in. and over in length:—
- Leaves sharply sinuate-toothed. Flowers white or red. Sepals obtuse, ribbed; anthers without appendages. .. 1. *N. Lotus.*
- Leaves entire or obtusely-toothed. Flowers blue or white. Sepals veined, not ribbed; anthers with long appendages. .. 2. *N. stellata.*

Leaves up to 2 in. in length, entire. Sepals obtuse; anthers without appendages. .. 3. *N. pygmæa.*

1. Nymphæa Lotus, Linn. Vern. *Mokuwa, Nal,* Ass.; *Nial, Shaluk,* Beng. *Kumuda,* Sans. For Var. rubra—*Rakta-kamal,* Beng.; *Raktotpala,* Sans.

Corms nodular, 3-4 in. diam. *Leaves* 6-12 in. broad, oval or orbicular, sagittate when young, usually pubescent beneath, strongly veined. *Flowers* usually 3-5 in. diam., white or red. *Sepals* oblong, greenish outside with 5-10 white ribs. *Petals* oblong to linear. *Filaments* broadly subulate. *Carpels* 10-20. *Seeds* ellipsoid, rough.

Throughout the plains of ASSAM in still water of jhils and tanks. Var. *rubra* is, however, somewhat rare, specially in the BRAHMAPUTRA VALLEY. The tubers are eaten raw or roasted and the dried seeds after parching. Fls. 8-10. Fr. 9-11.

2, Nymphæa stellata, Willd. Vern. *Sundi, Nil-padma* Beng. *Nilotpala,* Sans. The fruit *Dhemp,* Ass.

Corm 2-3 in. long, ovoid, not nodular. *Leaves* orbicular or elliptic, usually blotched with purple beneath, entire or slightly sinuate, glabrous; veins not so strong but more closely reticulate than in *N. Lotus*. *Flowers* 2-3 in. diam., usually light-blue, sometimes white or pink. *Sepals* not ribbed, often streaked with fine purple lines. *Petals* 10-30. *Stamens* 10-50; appendage of anthers often foliaceous. *Fruit* 13-30-celled; *seeds* striate.

Occurs in the same localities as the preceding species but generally in shallower water.
The tubers and seeds are used in the same ways as those of *N. Lotus.*
Fls. 8-10. Fr. 9-11.

3. Nymphæa pygmæa, Aiton.

A very small herb; rootstalk with soft, black hairs. *Leaves* 1-2 in. long, oblong-orbicular, with two diverging acute lobes from the base. *Flowers* white, 1·5-2 in. diam. *Sepals* 4, obtuse. *Petals* 8-10, obtuse. *Stamens* in 3-4 series, without appendages. *Stigmatic rays* 4-8, spoon-shaped.

In swamps in he KHASI HILLS. 4-6000 ft.; *e.g.,* Nongkreim.

3. EURYALE, Salisb.

Euryale ferox, Salisb. *Shriew-u-pubon,* Khasi ; *Pukhal,* Sylh.

A very prickly aquatic herb ; rootstalk fibrous. *Leaves* 12-18 in. diam., orbicular, floating, green and glabrous but bullate and corrugated above, pink or deep-purple beneath, supported by stout but very porous interlacing ribs ; stout, recurved prickles on both surfaces along the ribs ; petiole prickly, pink or deep-green. *Flowers* about 2 in. diam., violet-blue or red. *Torus* prickly. *Sepals* 4, inserted above the ovary. *Petals* in many series passing into the stamens which are in bundles of 8. *Carpels* 8. *Fruit* spongy, prickly outside. *Seeds* about 20, arillate ; albumen farinaceous.

In tanks and jheels in SYLHET, CACHAR and the KHASI HILLS.
The seeds are considered good food for invalids and are eaten raw or roasted.
Fls. 5-7. Fr. 6-8.

4. NELUMBIUM, Tuss.

Nelumbium speciosum, Willd. Vern. *Podum* Ass ; *Padma* Beng. & Sans. ; *Soh-lapudong,* Khasi.

A large aquatic plant with milky opaque juice ; root-stock stout, creeping. *Leaves* peltate, 1·5-3 ft. diam., young generally raised above the water, old floating, often with scattered weak prickles ; petiole as long as the water is deep. *Sepals, petals* and *stamens* numerous, passing gradually into one another ; anthers clavate. *Carpels* many, 1-celled, sunk in the flat top of the large obconic extremity of the torus ; ovules 1-2. *Ripe-carpels* ·3-·5 in. long, ovoid, loose in the cavities of the enlarged spongy torus ; albumen 0 ; cotyledons fleshly ; plumule folded and enclosed by the cotyledons.

Throughout the PROVINCE up to 2000 ft. elevation.
The ripe carpels are eaten, raw or cooked. The flower is considered very sacred by the Hindus and Jains and is in much demand for worshipping or for decorating their temples.
Fls. 6-9 Fr. 11-12.

FAM. 8. PAPAVERACEÆ.

A small family of herbaceous plants with milky or yellowish juice. *Leaves* radical or alternate, exstipulate, lobed or cut. *Flowers* regular, 2-sexual. *Sepals* 2, rarely 3, concave ; perianth and stamens caducous, the later very numerous ; anthers erect, with lateral dehiscence. *Ovary* 1-celled or spuriously 2-4-celled by lamelliform placentas ; style very short or 0 ; stigmas radiating ; ovules in many series, parietal, anatropous. *Capsules* dehiscing by pores or valves ; seeds very small, with only albumen.

This Family of showy flowers is very poorly represented in Assam. The famous drug opium is obtained from scratches made on the capsules of

Papaver somniferum, Linn. Although the drug is much consumed the plant is not cultivated in Assam. Some beautiful strains of this plant are grown in gardens, specially in the HILLS.

The following is the only plant which was originally introduced from Mexico, and has now been naturalized in most parts of India.

ARGEMONE, Linn.

Argemone mexicana, Linn. Vern. *Kuhumkanta*, Ass. ; *Siyal-knata*, Beng. ; *Samshu*, Kach.

An erect thistle-like annual, 2-4ft. high, with bluish leaves and yellowish juice, *Cauline leaves* alternate 3-6 in. long, sessile or half-amplexicaul, pinnatifid, the lobes being further divided into large sections or teeth with sharp prickles at their apex. *Flowers* golden-yellow, 1·5-2 in. diam. *Sepals* 2 or 3 cuspidate. *Petals* 4 or 6. *Style* thick, very short : stigma 4-7-lobed ; ovules on 4-7 parietal placentas. *Capsules* ·8-1·5 in. long, oblong, usually prickly, dehiscing by short valves opposite each stigmatic lobe.

On dry waste lands throughout the PROVINCE. An oil can be expressed from the seeds which is used for lighting and possesses laxative properties. An infusion of the leaves and the yellow juice are also used medicinally.

Fls. 1-6 (chiefly). Fr. ·3-6.

FAM. 9. FUMARIACEÆ.

Herbs with watery juice. *Leaves* divided or dissected, sometimes decompoundly. *Flowers* irregular, 2-sexual, in racemes. *Sepals* 2, small, scale-like, deciduous. *Petals* 4, in 2 very dissimilar pairs, one or both of the outer pair spurred gibbous, the inner pair often cohering by their tips. *Stamens* usually 6 and 2-adelphous ; anthers 2-called on the middle stamen of each bundle, 1-celled on the other 4. *Ovary* 1-celled ; ovules 3 or more, amphitropous, parietal. *Fruit* a many seeded capsule or a 1-seeded nut. *Seeds* albuminous ; embryo minute.

A family of practically no forest importance.

Fruit a many-seeded capsule :—			
Both outer petals spurred.	...	...	**1. Dicentra.**
Only one outer petal spurred.	...	...	**2. Corydalis.**
Fruit a 1-seeded nut :—			
Only one outer petal spurred.	...	...	**3. Fumaria.**

1. DICENTRA, Borkh.

Slender climbing glabrous herbs. *Leaves* decompoundly divided the rachis ending in much-divided slender tendrils. *Flowers* yellow often tinged with purple, in leaf-opposed racemes. *Sepals* small, scale-like, deciduous. *Petals* 4, connivent, the 2 outer saccate at the base, the inner clawed, keeled, cohering by

the tips. *Capsule* dehiscing by valves ; seeds beaked, generally arillate.

Capsule upto 3 in. in length, slender torulose, dry. Seeds in one row, arillate and granulate. ... 1. *D. torulosa.*
Capsule within 2 in. in length, continuous, tapering. dry, Seeds in 2 rows, arillate. ... 2. *D Roylei.*
Capsule less than 1 in. in length, ovate cordate fleshy. Seeds in many rows, granulate. ... 3. *D. thalictrifolia.*

1. Dicentra torulosa, Hk. f. & Th.

A trailing plant with white sulcate stem. *Leaves* 2-4 in. long ; leaflets ·2-1·2 in. long, ovate obovate or elliptic, membranous. *Racemes* 6-8 flowered, sub-umbellate ; peduncle ·4-1 in. long. *Flowers* golden-yellow, ·5-·7 in. long, cylindrical ; pedicels ·1-·7 in. long ; bracts as long as the pedicels or sometimes shorter, fimbriate. *Capsule* 1-3 in. by ·12-·15 in., pod-like, torulose, 4-12-seeded. *Seeds* in one row, brownish, with a 2-lobed aril.

KHASI HILLS. 4,-6,000 ft.
Fls. 7-8. Fr. 9-11.

2. Dicentra Roylei, Hk. f & Th.

Closely resembling the preceding species in foliage and general appearance, but is smaller and more slender. *Flowers* somewhat larger, yellow, often tinged with purple, *Capsule* 1-2 by ·15-·2 in , tapering to a fine point, continuous ; *seeds* close in 2 rows, orbicular, compressed, with a small aril at the back.

KHASI HILLS *Griffith.*
Fls. & Fr. 6-9.

3. Dicentra thalictrifolia Hk. f. & Th.

A more diffuse plant than the other 2 species, with the same general appearance, but the leaflets sometimes attain 1·5 in. in length and 1 in. in breadth. *Flowers* generally shorter and more stout, yellow or purple ; pedicels filiform up to 1 in. in length, ovate or elliptic in outline. *Capsule* ·5-·7 by ·3-·4 in., more or less fleshy, tardily dehiscent, surmounted with the persistent style and stigma. *Seeds* in 4 rows, black when fully mature, shining, coarsely granulate on the back, often with a very small white aril.

KHASI HILLS, Kalapani, 5,000 ft. *Hk. f. & Th.* Nongkrem, *Collett.*
Fls. 5-6. Fr. 10-12.

2. CORYDALIS, DC.

Corydalis sibirica, Pers.

A much branched perennial leafy prostrate plant of pasture lands. *Leaves* pinnately lobed, the uppermost usually with 3 obovate or oblanceolate segments, membranous. *Racemes* few-flowered, terminal ; bracts small, lobed. *Sepals* 2, small. *Petals* yellow, tinged with purple ; spur broad, obtuse : back petal hooded, acute. *Stamens* 6, 2-adelphous, the posterior bundle spurred. *Ovary* 1-celled ; style short, filiform ; stigmas 2. *Capsule* ·3-·6

in. long, narrowed to the pedicel and surmounted by the persistent style and stigmas. *Seeds* few, small, shining.
KHASI HILLS 5.-6000 ft. *Mann.*

Fls. 5-8. Fr. 8-10.

3. FUMARIA, Linn.

Fumaria parviflora, Lamk. Vern. *Bansula*, Beng.

A much-branched fodder plant 12-18 in. high with sharply angled whitish stem. *Leaves* 1-2 in. long, much divided ; ultimate segments very narrow, glaucous. *Racemes* leaf-opposed, lax-flowered. ·8-2 in. long. *Flowers* about ·25 in. long, white or purple. *Sepals* 2, small. *Only* 1 outer petal spurred. *Fruit* a 1-seeded globose nut about ·07 in. diam.

Rice fields in LOWER ASSAM ; also SYLHET and CACHAR. Goes up to 4,000 ft. in the KHASI HILLS.
Fl. & Fr. 10-2.

FAM. 10 CRUCIFERÆ.

Herbs with watery juice which is often pungent. *Leaves* alternate, exstipulate, simple or pinnate, entire or variously lobed or cut. *Flowers* regular, usually racemed. *Sepals* 4, free imbricate, often saccate at the base. *Petals* 4, free, hypogynous, often opposite the sepals, placed crosswise, (whence the name of the family), imbricate. *Stamens* usually 6, tetradynamous ; 2 outer opposite the lateral sepals ; 4 inner longer, in pairs opposite the median sepals. *Disk* usually with 4 glands opposite the sepals. *Ovary* usually divided into 2 cells by a membranous partition (replum) or less often 1 celled or more rarely with transverse partitions ; style short or 0 ; ovules few or many on two parietal placentas, rarely solitary erect. *Fruit* either elongated and pod-like siliqua, valves opening from the base and deciduous ; or short and dehiscent or indehiscent. *Seeds* exalbuminous. *Cotyledons* large, foliaceous in germination.

This family contains several plants of considerable economic value but is of little importance for the Forester. The following is a brief account of the commoner plants found in Assam.

Fruit dehiscent :—

Flowers yellow. Sepals gibbous at the base. Siliqua terete, beaked :—

Siliqua long ; seeds in one series.	.. **1. Brassica.**
Siliqua short, turgid ; seeds in 2 series.	.. **2. Eruca.**

Flowers yellow or white. Sepals not gibbous at the base :—

Sepals spreading. Siliquas turgid.	.. **3. Nasturtium.**
Sepals erect. Siliquas flat, linear.	.. **4. Cardamine.**
Flowers white. Siliquas compressed, oblong.	.. **5. Lepidium.**

Fruit indehiscent, terete, beaked, transversely septate : Flowers white-tinged with light purple, large for the family. Lateral-sepals saccate a the base. .. **6. Raphanus.**

1. BRASSICA, Linn.

Fleshy herbs. *Leaves* large, pinnatifid or lyrate, rarely entire. *Flowers* yellow, rarely white, in long racemes. *Sepals* erect or spreading: lateral saccate or gibbous at the base. *Petals* with a long claw. *Siliqua* with a seedless indehiscent beak; replum membranous; seeds globose.

This genus includes a number of useful plants such as:—

The cabbage *Brassica oleracea*, L. Vern. *Band-kobi* and its varieties cauliflower, vern. phul-kobi and *Knolkfiol* or vern. *Gantfi-Kobi*, etc.

Cauline leaves amplexicaul, usually auricled at the base:—

Leaves more or less hairy and glaucous.	..	1. *B. campestris.*
Leaves quite glabrous, faintly glaucous beneath.	..	2. *B. napus.*
Cauline leaves not amplexicaul, narrowed to the naked petiole.	..	3. *B. juncea.*

1. Brassica campestris, Linn.

A stout erect herb often with a swollen tap-root; lower leaves lyrate, hairy or harsh; upper oblong or lanceolate, covered with bloom. *Siliquas* with a flat seedless beak.

Var. *Sarson*. Prain, the *Swet-sarisha* or *Swet-rai* of Bengal.

Fls. & Fr. in the plains cold season. In the hills about 5 months later.

2. Brassica napus, Linn. Var. dichotoma. *Prain*. The *Indian mustard*. Vern. *Suda-rai*, Beng.

A slender glabrous plant. *Radical* and lower cauline leaves pinnatifid, rather small. *Flowers* ·4-·5 in. diam., pale golden yellow. *Siliquas* 1·5-2 in. long including the beak which is ·5-·7 in. long, on pedicels ·6-·75 in. long, each containing 8-15 pale yellow or purplish-black globose seeds.

Much cultivated for the seed. The flowers and leaves are also eaten cooked.

Fls. 11-12. Fr. 1-8.

3. Brassica juncea, Hk. f. & Th. Vern. *Rai*, Beng.: *Lai* or *Lahi*, Ass.; *Mustard*, Eng.

Stout or slender according to the extent of cultivation given. *Leaves* long-petioled, not amplexicaul, often with small lateral leaflets or auricles along the petiole, glabrous or with scattered soft white hairs, or scabrous. *Flowers* bright yellow: pedicles and calyx spreading. *Siliquas* vertically compressed; beak short, acuminate. *Seeds* dark-brown, reticulate.

Cultivated both as a pot-herb and for it seeds throughout Assam.

Fls. 9-11. Fr. 11-1.

2. ERUCA, Tourn.

Eruca Sativa, Lamk. Syn. Brassica erucoides, *Roxb.* Vern. *Swet-sarisha, Turamani*, Beng.; *Horio* or *Horiho, Behari*, Ass.

A slender herb resembling the mustard with more or less glabrescent stem. *Leaves* 1·5-7 in. long, irregularly pinnatifid;

segments linear-oblong. *Flowers* white or lilac ; ·7-·9 in. long, pedicels short, slender. *Sepals* erect slender, ·4-·5 in. long, veined. *Siliquas* erect and appressed to the stem, about ·7-·9 in. long with a flattened seedless beak. *Seeds* globose, in 2 series.

Cultivated in the BRAHMAPUTRA VALLEY for the seed.
Fls. & Fr, 1-3.

3. NASTURTIUM. Br.

Terrestrial or aquatic herbs. *Leaves* entire, lobed or pinnatifid, glabrous or hairy. *Flowers* yellow or white, racemose. *Sepals* short, spreading, not saccte at the base. *Petals* short, scarcely clawed, sometimes wanting. *Stamens* 1-3 pairs. *Siliquas* long or short, cylindrical ; septum transparent. *Seeds* small, generally in 2 series.

An erect terrestrial herb, often with unbranched stems.
Leaves pinnatifid. Flowers yellow. .. 1. *N. indicum.*
A prostrate aquatic herb with much-branched stems.
Leaves pinnate. Flowers white. .. 2. *N. officinale*

1. Nasturtium indicum, D C.

An annual weed about a foot long, usually hairy ; stem simple or branching from near the base. *Leaves* 2-5 in. long, variously lobed or divided, coarsely toothed, rarely simple. *Racemes* 1-4 in. long. *Flowers* small ; *sepals* and *petals* equal. *Siliquas* ·5-1 in. long, linear or narrowly oblong, spreading, or ascending ; pedicels ·1-·25 in. long. *Seeds* numerous in 2 series, very small.

Var. benghalense, *DC.* which differs by having bracteate flowers and usually taller stems appears to be more common than the type in SURMA VALLEY and LOWER ASSAM.
Fls. and Fr. 3-5.

2. Nasturtium officinale, Br. *The Watercress,* Eng. Vern. *Ayr-soh-um,* Kh.

A much-branched perennial acquatic plant growing on wet mud or sluggish water. *Leaves* pinnate or 2-pinnate ; leaflets and pinnules opposite with a terminal one which is usually by far the largest. *Racemes* 1-4 in. long, rather lax-flowered. *Flowers* white, very small. *Petals* 2 or 3 times longer than the sepals, veined. *Siliquas* ·3-1 in. long, on slender pedicels ·3-·7 in. long. *Seeds* small, in 2 series.

The plant is much used as a vegetable, being eaten raw or cooked, and is often cultivated in gardens for that purpose.
Fls. and Fr. 4-11.

4. CARDAMINE, Linn.

Cardamine hirsuta, Linn. Var. sylvatica. *Linn.* Syn. C. debilis, *Don.*

A small suberect glabrous plant 3-9 in. long. *Leaves* 2-3 in. long, pinnate, sometimes pinnatisect ; *Leaflets* or *segments* ·2-·8 in. long, varying in shape from orbicular to ovate or elliptic, quite

glabrous, often dentate or lobulate. *Flowers* small. white in terminal racemes. *Sepals* very small, erect. *Petals* about twice as long as the sepals, erect, clawed. *Siliquas* ·5-1 in. long, ascending, linear, compressed, not beaked. *Seeds* 1-seriate.

Fls. 2-4. Fr. 6-7.

5. LEPIDIUM, Linn.

Lepidium sativum, Linn. The *Common cress*, Eng. Vern. *Halim*, Hind. & Beng.

A glabrous annual plannt 1-3 ft. high. *Radical leaves* long-petioled, 1-2 pinnate or pinnatisect, *upper* pinnatifid or lobed with the petiole gradually diminshing in length and the blades in width. *Flowers* white, ebracteate, in terminal elongating racemes ; sepals short, equal at the base. *Siliquas* ·16-·25 in. long orbicular, compressed, notched at the apex , pedicels erect, slender. *Seeds* solitary in each cell.

Cultivated in gardens at Shillong. The leaves and tender shoots are said to be good for liver complaints, being eaten raw or as a pot-herb.

Fls. and Fr. 11-4.

6. RAPHANUS, Linn.

Raphanus sativus, Linn. The *Radish*, Eng. Vern. *Mula* or *Muli*, Hind., Beng., *etc.*

An annual or biennial plant with generally a spindle-shaped white or red, fleshy taproot which is pungent in taste. *Basal leaves* 9-18 in. long, lyrately pinnate or pinnatisect, hispid : leaflets or segments coarsely toothed ; *cauline leaves* simple linear. *Flowers* usually white or lilac with purple veins, in long terminal ebracteate racemes *Sepals* erect, lateral ones saccate at the base. *Siliquas* indehiscent, elongate, terete, usually 1-2 in. long, with a long tapering beak, filled inside with white pith between the seeds. *Seeds* 2-8, globose pendulous.

The root as well as the young leaves and tender siliquas are eaten, raw or cooked, for which the plant is cultivated as a field-crop throughout India.

Fls. & Fr. 12-2.

FAM. 11. CAPPARIDACEÆ.

Trees, erect or climbing shrubs or herbs. *Leaves* simple or palmately 3-9 foliolate; stipules often spinescent or wanting. *Flowers* 4-merous, solitary or in racemes, corymbs or umbels. *Sepals* 4, free or connate. *Petals* usually 4, sometimes 2 or 0. *Stamens* 4 or numerous, exserted, generally inserted at the base of a gynophore; filaments filiform. *Ovary* 1-celled, (stalked in all woody genera); style short or 0, generally solitary. *Fruit* berried (woody genera), or capsular; seeds exalbuminous.

I. ERECT HERBS with linear or oblong capsular fruit :—
Gonophore 0. Petals open in bud. Stamens 4 to 8 inserted on the disk. ... 1. **Cleome.**
Gonophore present. Petals imbricate in bud. Stamens 6 on long filaments. ... 2. **Gynandropsis.**

II. TREES OR SHRUBS, the latter sometimes scandent. Fruit a berry, sometimes drupe like :—

A. Fruit many-seeded :—
Sepals 4, open in bud, adnate to the disk. Stamens 4-6, inserted high on the gynophore. Leaves 3-foliolate. ... 3. **Cratæva.**
Sepals 4, closed in bud, free. Stamens 8-indefinite, inserted at the base of the gynophore. Leaves simple. ... 4 **Capparis**
Fruit 1-seeded. Calyx of six 2-seriate segments. Stamens indefinite, inserted above the base of the short gynophore. Leaves simple. . 5. **Roydsia.**

1. CLEOME, Linn.

Cleome viscosa, Linn. Vern. *Hurhuria*, Beng.

An erect annual weed, 1-3 ft. high, stem striated and tomentose with mixed simple and glandular hairs. *Leaves* 3-5-foliolate, very variable in size; leaflets ·3-1·5 by ·2-·8 in., obovate, membranous, sessile, sometimes confluent, more or less hairy; petioles 0-2 in., striated and hairy like the stem. *Flowers* yellow ·5-·6 in. long, in leaf-bearing terminal racemes; sepals 4, spreading; petals 4, veined, imbricate in bud. *Stamens* 4-8, inserted on the disk. *Ovary* sessile. *Capsule* 2-3 in. long, narrowed at both ends, striated, the straitions frequently anastomsing. *Seeds* about ·04-·8 in. diam., reniform, rugose, dark brown, oily.

Common in abandoned fields, and on old ruins in the plains of ASSAM and BENGAL; goes up to 2,000 ft. in the hills.

The seeds are used medicinally as carminative, anthelmintic and stimulant.

Fls. & fr. throughout the year, but chiefly during the rains.

2. GYNANDROPSIS, DC.

Gynandropsis pentaphylla, DC. Vern. *Sada-hurhuria*, Beng.; *Hulhulia*, Hind.

Very similar to the above but is generally taller and more showy when in flower; strongly smelling. *Petiole* 2-3·5 in. long. *Leaflets* sessile, usually 5, ·5-1·5 by ·3-1 in., the middle one being the largest. *Flowers* white or purple, in corymbiform terminal racemes; pedicels filiform in flowers but stout in fruit; bracts 3-foliolate. *Stamens* 6, inserted on a gonophore; anthers purple. *Ovary* stalked. *Capsule* 2-4 in. long by ·2 in. diam. on a stalk longer than the pedicel. *Seeds* reniform, rugose brown or black.

As common as *C. viscosa*.

Fls. & Fr. Chiefly 7-9.

3. CRATÆVA, Linn.

Deciduous trees. *Leaves* palmately 3-foliolate glabrous, bitter. *Flowers* large, white or pale-yellow. *Sepals* 4, adherent at the base to the fleshy lobed disk. *Petals* 4, long-clawed, open in bud. *Stamens* numerous on a short column at the base of the gynophore. *Ovary* 1-celled, on slender gynophore; ovules many on two parietal placentas. Berry fleshy, many-seeded.

A large tree. Leaves small membranous, pale beneath; fruit globose, 1-celled; seeds reniform, smooth. 1. *C. Roxburghii.*
Middle sized trees:—
Leaves of medium size, membranous, glaucous beneath; fruit ovoid, 2-celled; seeds flat and angular. .. 2. *C. Nurvala.*
Leaves large, subcoriaceous glaucous beneath; fruit ellipsoid globose: seeds spinose-tubercled on the back. 3. *C. lophiosperma*

1. Cratæva Roxburghii R. Br., Syn. *C. religiosa*, *Forst.* var. Roxburghii, F. B. I. i. 172. Vern. *Barun*, Ass.; *Sibe-dotke*, Miri and Abor.; *Jong-sia*, Garo.

Often a large tree up to about a hundred feet in height and 9 ft. in girth; branchlets with tips pointed upward, and generally irregularly angled, and dotted with elongated lenticels. *Bark* grey or greenish grey outside, plain but covered with lenticellular warts, green underneath the thin corky layer; inside white mottled with brown strands. *Leaflets* 2-3 by 1-1·5 in. ovate, elliptic or lanceolate, the lateral oblique at base, abruptly acuminate, membranous, generally shining above, pale beneath; lateral nerves 7-9 on either side of the midrib; tertiaries laxly, and quaternaries very minutely and finely reticulate; common petiole 1·7-4 in., petiolules about ·2 in. long. *Flowers* white fading to pale yellow, appearing with, or immediately after the leaves, 1·5-2 in. across, open in buds in terminal corymbs 2-4 in. long; pedicels slender 1-1·5 in. long. *Sepals* ·2-·3 in. long, linear or narrow-lanceolate, strongly keeled and finely acuminate. *Petals* ·6-·8 in. long, boardly ovate or rhomboid, with a distinct midrib

and side-nerves, narrowed to a claw ·2-·3 in. long. *Filaments* filiform, 1·5 in. long, purple : anthers oblong. *Gynophore* 1-2 in. long, slender ; ovary oblong or ellipsoid ; stigma sessile. *Fruit* 1·5-2 in. across globose, speckled with round white lenticels stalked by the much thickened gynophore ; seeds about ·5 by ·3-·4 in., reniform, with a smooth, hard, dark-brown testa.

Common near Bomjur, Nizam-ghat, and along the Buri-suti, Janai and Dhikari streams, etc. in the N. E. FRONTIER DISTRICT, North Lakhimpur Sub-Division : also KAMRUP and GARO HILLS.

The wood is pale-white fine and even grained and is suitable for packing cases, toys, models, writing-boards, turnery, etc. The leaves are good for fodder.

Fls. 3-4. Fr. 11-1.

2. Cratæva Nurvala, Ham. Vern. *Barun* or *Borun* Ass. ; *Mibonju*, Kach. ; *Ngasentur*, Kuki.

A middle-sized tree up to 50 ft. in height and 4 ft. in. girth. *Bark* ashy-grey with close horizontal wrinkles, otherwise smooth, ·7 in. thick, inside granular, light reddish-brown (on very old trees). *Leaflets* not very bitter, 5-7 by 1·5-2·3 in., lanceolate, very gradually tapering from below the middle to a long acumen, also downward to a cuneate, and in the case of the lateral leaflets, an oblique base, chartaceous when fully mature ; lateral nerves 8-15 on either side of the midrib, arched, the intervening spaces very finely reticulate ; petiolules ·1-·2 in., common petiole 3-5 in. long. *Flowers* practically as in the preceding species, but the sepals are not keeled and less persistent and the corymbs are more laxly flowered. *Fruit* oblong (mature not seen), 2-celled ; seeds flat, closely packed.

Somewhat rare occuring sporadically on low hilly grounds, *e. g.*, round Lumding, NOWGONG DISTRICT ; at Boduti, North Lakhimpur, also Langting reserve and Daotuhaja, N. C. HILLS.

Fls. 4.5. 10-12 (?).

3. Cratæva lophosperma, Kurz. Vern. *Barun* or *Borun*, Ass. and Beng. ; *Bonhukha*, Kach. ; *Lai-emba-lei*, Manip. ; *Senatur*, Lush.

A small or middle-sized tree generally found along edges of sluggish streams. *Bark* plain, dark ashy-grey marked with numerous lenticels on branchlets, pale-white and granular inside, ·5 in. thick. *Leaflets* very bitter 5-8 by 1·5-3 in., lanceolate, tapering to a fine acumen from after a quarter of the length, lateral very oblique at base, subcoriaceous when mature, green and shining above, glaucous beneath ; midrib strong, reddish ; lateral nerves more numerous (often up to 30 on either half) and stronger than in the other two species, reddish, often nearly horizontal near the midrib, reticulations also stronger ; petiolules ·1-·2 in., common petiole 1·5-4 in. long. *Flowers* as in the

foregoing species, but the corymbs are often larger and more congested, the pedicels longer, up to 2·5 in., and the lanceolate sepals only faintly keeled. *Petals* white, turning yellow, obovate or rhomboid. *Filaments* about 2 in. long, purple. *Gynophore* 2-2·5 in. long. *Fruit* obovoid, elliptic, or globose, speckled, otherwise fairly smooth, 2-celled by the intrusion of the placentas. *Seeds* about ·5 in. long, crescent-shaped, spinous tubercled on the back.

The commonest species of the genus occurs in all DISTRICTS of UPPER ASSAM, Burisuti, Dikhumukh, the Majuli, Gotonga, etc.

Fls. 3-4. Fr. 7-9.

4. CAPPARIS, Linn.

Erect or climbing shrubs or small trees. *Leaves* simple, usually with stipulary thorns. *Flowers* usually showy. *Sepals* 4 in 2 series, imbricate. *Petals* 4, imbricate, not clawed. *Stamens* indefinite ; filaments long. *Ovary* on a long gynophore, generally 2-celled ; ovules many on perietal placentas. *Fruit* berried ; seeds many ; cotyledons convolute.

I. Flowers in panicled umbels or corymbs :—

Young shoots puberulous. Leaves glabrous, nerves inconspicuous. .. 1. *C. pumila.*

Young shoots glabrous. Leaves glabrous, nerves prominent beneath. .. 2. *C. assamica.*

II. Flowers in vertical series :—

A. Series of flowers many, 2-4-stichous, usually independent of leaves, many flowered :—

Young shoots glabrous, Fls. ·2 in. across ; fr. ·3 in. across. .. 3. *C. multiflora,*

Young shoots scurfy. Flrs. 1-2 in. across ; fr. 1-1·5 in. across. .. 4. *C. fiorrida.*

B. Series of flowers axillary 1-few-flowered :—

1. Usually climbers, always armed, Leaves bluntly acuminate :—

Branchlets brown-pubescent, Leaves subcoriaceous, Flowers large, Fruit beaked. Pedicels fairly stout. .. 5. *C. olacifolia.*

Branchlets glabrous, Leaves membranous. Flowers small. Fruit not beaked. pedicels filiform. .. 6. *C. tenera.*

2. Erect shrubs, usually not armed. Leaves taper pointed :—

Leaves ovate or oblong lanceolate 2-4 in. long. Flowers usually not more than 2 in each series, Fruit the size of a pea. 2-seeded. .. 7. *C. sabiæfolia.*

Leaves elliptic, 3-6 in. long, Flowers often up to 4 in each series. Fruit ·5 in, diam., many-seeded. .. 8. *C. viminea.*

1. Capparis pumila, *Champion.*

A shrub with straggling branches, branchlets softly greenish-grey puberulous; prickles small, recurved. *Leaves* 2-3·5 by ·7-1·2 in., elliptic or oblong-lanceolate, acuminate, subcoriaceous, glabrous; lateral nerves 6-7 on either half, extremely fine, almost invisible in green leaves; base subacute; petiole ·15-·2 in. long, channelled, puberulous. *Flowers* white, ·5 in. diam., in. corymbs or umbels arranged in terminal panicles; buds globose; pedicels ·15-·25 in. long. *Petals* oblong. *Stamens* about 20. *Fruit* ·5-·7 in. diam., 1-seeded, globose, glabrous; embryo curved.

Mikir Hills near Barapather. SIBSAGAR DISTRICT. Appears to be rare.

2. Capparis assamica, Hk. f & Th. (?) Vern. *Diengsia-sohsaw.* Khasi; *Thanim-nium-kra*, Duff.

A scandent (?) shrub with glabrous branches, innovations pubescent. *Leaves* 5-8 by 1·2-3 in., oblong-lanceolate acuminate, base acute, attenuate or cuneate, subcoriaceous, glabrous, lateral nerves prominent beneath, 9-13 on either half, arched and looping at the extremities; petiole ·2-·3 in. long, channelled, stipular prickles minute, straight. *Inflorescence* terminal or subterminal raceme-like, 6-11 in. long, bearing numerous small white flowers; rachis glabrescent; bracts subulate up to ·15 in. pubescent when young, those at the base of the inflorescence empty; pedicels in several rows, very slender ·4-·75 in. long, 1 or 2 superposed and slightly supra-axillary on the bracts. *Sepals* imbricate in pairs ·15-·2 in. long, subequal, concave elliptic to oblong-elliptic. *Petals* white ·2-·25 in long, white obovate oblong. *Filaments* filiform; gynophore ·4-·6 in. long. *Fruit* not seen.

Nongrang-koh, KHASI HILLS (My sheet 7248).

Flrs. 4-5.

Our plant differs in many respects from C. assamica as described in F. B. I. by Hooker & Thomson.

It should be studied further with more complete materials.

3. Capparis multiflora, Hk. f. & Th. Vern *Thanim-nium-kre*, Aka; *Thanim-nium-kra*, Daff.

A very variable erect bush 8-15 ft. high, generally sparingly branched, branchlets glabrous, terete or angled, with a large pith; thorns short, thick, straight or up-curved. *Leaves* membranous, glabrous, acuminate, of two different sizes and shapes; those below the flowers 6-10 by 2·5-6 by ·7-2·2 in., elliptic, oblanceolate, or lanceolate, somewhat more membranous; lateral nerves 6-8 on either half, depressed above, much curved, looped to form an intermarginal vein. *Flowers* white, ·2 in. across, very sweet-scented, in many. flowered vertical series which are close or somewhat distinct and 2-4-stichous; buds about ·1 in. across, globose; pedicels filiform. ·5-·7 in. long. *Sepals* 4, imbricate, ovate, glabrous or sparsely adpressed pubescent outside. *Petals* 4, broadly elliptic

or suborbicular, glabrous. *Stamens* about 12, filaments filiform. *Gynophore* of barren flowers ·2-·3 in. long, filiform straight; of fertile flowers about ·1 in. long, much thicker, spirally twisted. *Fruit* globose, about ·3-in. diam., glabrous.

Kalioni, Daigurung and Garampani, DISTRICT SIBSAGAR; Bhoreli Reserve and Dulongmukh, NORTH LAKHIMPUR; Bhalukpung, DARRANG.

Fls. 3-4. Fr. 12-2.

4. Capparis horrida, Linn. f. *Hunkara*, Sans; *Asaria, bagnai*, Beng.

A scandent or scrambling bush with greyish or pale brown somewhat rough bark; branchlets green, young parts covered with scurfy rusty, deciduous, tomentum. *Leaves* 2-4 in. by 1·2-2 in., lanceolate or elliptic ovate, acute or shortly acuminate, mucronate, base more or less rounded; lateral nerves 6-8 on either half, ascending, somewhat distant, forming loops at the extremity; petiole ·25-·4 in., more or less tomentose at least when young; stipular spines stout hooked with a yellowish-brown tip and broad base. *Flowers* usually superposed in extra-axillary, rows 1-4 together, white, turning pink 1-2 in. across; pedicels ·5-1 in. long. *Sepals* concave scurfy. *Petals* oblong obovate, exceeding the sepals, villous inside. *Stamens* numerous, purple, slender, up to 1·5 in. long; gynophore up to 1·7 in. enlarging and becoming woody in fruit. *Berry* 1-1·5 in. across, broadly ellipsoid or ovoid, orange red when ripe.

GARO HILLS—12th mile—Dalu road.

Flrs. 3-4. Fr. 8-9.

5. Capparis olacifolia, Hk. f. & Th. Vern. *Kota-har*, Ass; *Ingau-rikang, Ingau-waikom*, Mik.; *Borun-khosai. Borun-phitaphang*. Kach.; *Ling-uom*, Kuki *Deing-sia*, Khasi; *Gangathaisip*, Mech.

An erect shrub up to 15 ft. in height and 6-9 in. girth with blackish-grey, corky or warty bark and spreading branches; young shoots dark-brown, pubescent, terete, thorns usually straight and pointing upward. *Leaves* 2-6 by ·8-2·5 in., ovate-lanceolate, taper-pointed, chartaceous or thinly coriaceous, glabrous except that the midrib is sometimes pubescent in very young leaves, shining above; lateral nerves 7-8 on either side of the midrib, arched, rather prominent underneath; base rounded or subacute; petiole ·2-·3 in. long, puberulous in young leaves. *Flowers* solitary or two from the same leaf-axil, white, inodorous, 1·5 in. diam.; buds ovoid, glabrous; pedicles ·3-·5 in. long. *Sepals* lanceolate, ciliate with dense tomentum. *Petals* obovate-oblong or oblanceolate, pubescent, white, the lowest with pale-yellow or purple blotch. *Stamens* about 35; flaments 1-1·3 in. long, anthers white at first with purple veins, turning blue in fading. *Ovary* pubescent. *Gynophore* 1-1·5

in. long, gradually thickened towards the apex in fruit. *Berries* ·3-·6 in. across, globose or ellipsoid and with a stiff conical beak, red when ripe, insipid, glabrous but rugose shining; seeds 1-3 about ·2 in. across, globose, reddish-brown; cotyledons convolute.

Nizamghat. N. E. FRONTIER: from Barpathar westward in SIBSAGAR and NOWGONG DISTRICTS: Bhounraguri near Tezpur: DARRANG; Kulsi plantation, Andheri-juli, Luri, KAMRUP; Langting, Mupa, N. CACHAR; Shella, KHASI HILLS. Frequent in Sal and other deciduous forests.

Fls. 3-4. Fr. 12-2.

6. Capparis tenera, Dalz. Vern. *Premjila-khosa*, Kach.

A straggling glabrous climber; thorns recurved, whitish, very sharp-pointed, in pairs at the base of each leaf. *Leaves* 1·5-3 by ·8-1·7 in., ovate, elliptic or lanceolate, finely acuminate, generally rounded at base, membranous, glabrous; lateral nerves 4-5 on either side of the midrib, much arched, very faint; petiole ·2-·3 in. long, slender. *Flowers* white, 2-5 from each axillary series, ·3-·4 in. across; buds globose, glabrous; pedicels ·7-1·3 in. long, very slender. *Sepals* ·12-·15 in. long broadly elliptic or ovate, densely tomentose along the edges. *Petals* ·2-·3 in. long, oblong, woolly on both surfaces. *Stamens* 6-15; filaments very slender ·6-·9 in. long; anthers minute with a crooked tip. *Ovary* red, glabrous. *Gynophore* about as long as pedicel. *Fruit* pisiform, few seeded.

Diphu, Rengma and Nambor Reserves, SIBSAGAR: Dimapur, NOWGONG District; MANIPUR, *Watt.*

Fls. 3-4. Fr. 7-9.

7. Capparis sabiæfolia, Hk. f. & Th.

An erect shrub with thin glabrous branches; thorns 0, or minute increasing in size with age, conical, ascending. *Leaves* 2-4 by ·7-1·5 in., elliptic to oblong-lanceolate, long-acuminate, subacute, rarely rounded at the base, thinly chartaceous, glabrous; main lateral nerves about 8 on either half, slender, arched; petiole ·2-·3 in. long, channelled. *Flowers* white, ·2-·6 in. across, usually 2 in each series, often solitary, slender, pedicles ·5-·6 in. in flower, lengthening (including the slender gynophore) to 2-2·2 in. in fruit. *Sepals* about ·2 in. long, broadly abovate, glabrous except along the margins which are furfurious. *Fruit* about ·2 in. in diam., globose.

Appears to be common in the NAGA HILLS *King* ! *Prain* ! *Watts* ! and between 4-6,000 ft. in the KHASI HILLS, Shillong. *Hk. f. & Th.*

Fls. 4-6. Fr. 8-10.

8. Capparis viminea, Hk. f. & Th.

A glabrous bushy shrub 6-8 ft. high; stem and branches whitish. *Leaves* 2·5-6 by 1-2 in., ovate or elliptic, abruptly

long-acuminate, more or less acute at the base, membranous, glabrous; main lateral nerves 3-5, often with a few intermediate ones, much arched; petiole ·2-·3 in. long, rather stout, finely channelled. *Flowers* about ·5 in. across, 2-4 in each series, very channelled. *Flowers* about ·5 in. across, 2-4 in each series, very rarely solitary. *Sepals* as in the last species or narrower. *Fruit* ·5-·6 in. across, globose, many seeded.

In scrubs in the KHASI and N. CACHAR HILLS between 1-5,000 ft.

Fls 4-5. Fr. 7-9.

5. ROYDSIA, Roxb.

Roydsia suaveolens. Roxb. *Madhumalati*, *Madhabimalati*, Ass.; *Maonl*, Tipp; *Tille-saphlit*, Synt.

A large unarmed woody climber with speckled branches, *Leaves* simple 5-12 by 2-5 in., oblong or oblong-lanceolate generally thickly coriaceous, glabrous, glossy, deep-green above, pale underneath, generally minutely punctulate, with raised white dots on both surfaces, quite entire; main lateral nerves about 10-12 on either side of the midrib with 1-2 intermediate ones, the former looping to form an intermarginal nerve close to the edge, the intervening spaces strongly reticulate; base rounded or subacute; petiole ·8-1·7 in. long, terete, rugulose. *Racemes* axillary, or slightly supra-axillary, generally simple and solitary, but sometimes forming a terminal panicle 3-7 in. long; rachis and pedicels velvety-pubescent especially when young. *Flowers* ·4-·6 in. long, and about as broad, dull-white, very sweet-scented (resembling *Mignonette*); pedicels ·1-·2 in. long; bracts subulate, tomentose about as long as the pedicels; buds obovoid-globose. *Calyx* 6-partite, segments in two rows, velvety, slightly imbricate in bud. *Petals* 0. *Stamens* numerous; filaments white fading to pale-yellow, ·3-·5 in. long, somewhat expanded in the middle. *Ovary* 3-celled; *styles* 3, about ·08 in. long, subulate often slightly connate at base. *Gynophore* very short in flower enlarging to about ·25 by ·2 in. in fruit. *Fruit* a 1-seeded drupe, ·1-1·5 in. long, ellipsoid or obovoid, scurfy, pale-orange when ripe; pulp yellow, aromatic, sweetish.

Fairly common throughout UPPER ASSAM. Quite worth cultivating for the delightfully-scented flowers.

The ripe fruit is eaten.

Fls. 2-3. Fr. 10.-1.

FAM. 12. VIOLACEÆ.

Herbs, shrubs or (rarely) small trees. *Leaves* alternate, rarely opposite, stipulate. *Flowers* regular or irregular, 2-bracteolate. *Sepals* 5, persistent, equal or unequal, imbricate in bud. *Petals* 5, hypogynous, the lower dissimilar, often saccate or spurred. *Stamens* 5, hypogynous or slightly perigynous; filaments short; anthers free or connate, with a broad overtopping connective, opening by longitudinal slits or terminal pores; staminodes 0. *Ovary* sessile, 1-celled; style 1, stigma entire or lobed; ovules many on parietal placentas. *Fruit* usually a 3-valved loculicidal capsule. *Seeds* small; cotyledons flat imbedded in a fleshy albumen.

Annual or perennial herbs. Sepals produced at the base
Corolla irregular; lowermost petal spurred or saccate at the base. .. **1. Viola.**

Shrubs or trees Sepals rigid. Corolla regular; petals subequal. .. **2. Alsodela.**

1. VIOLA, Linn.

Erect herbs, sometimes with a perennial woody root stock. *Flowers* sometimes cleistogamous and smaller than the ordinary ones, but producing more seeds. *Sepals* produced at the base. *Petals* erect or spreading, the lowest usually the largest, spurred or saccate. *Anthers* connate, the connectives of 2 lower often spurred at the base. *Stigma* obtuse, lobed or cupular. *Capsule* 1-celled, 3-valved.

Stigma terminal, Capsule oblong or linear, many-seeded :—
Stemless and without stolon. Stipules adnate. Spur saccate. 1. *V. Patrinii*
Stemless but with stolon. Stipules free or nearly so. Spur globose. .. 2. *V. diffusa.*
With long leafy stems and stolons. Stipules free. Spur saccate. .. 3. *V. arcuata.*
Stigma lateral or oblique, Capsule globose, few-seeded :—
With long leafy stems and stolons. Stipules free. Spur saccate. ... 4. *V. serpens.*

1. Viola Patrinii, DC.

Root stock perennial. *Leaves* glossy-green, very variable in shape and size, generally 1-3 in. by ·3-1 in., more or less triangular in outline, crenate or serrate, cuneate or hastate at the base; generally glabrous, petiole about 3 times as long as the blade which is decurrent with it for some distance from above. *Flowers* lilac, scented, about ·5 in. long, generally with smaller colourless flowers from the rootstock; peduncle of larger flowers 3-5 in., of the smaller flowers 6-8 in long and more slender. *Spur* saccate, about ·2 in. long.

KHASI HILLS; KAMRUP *Masters*! ABOR HILLS, *Burkill*!; MANIPUR, *Watt*.

Fls. 3-5.

2. Viola diffusa, Ging.

Stemless herb widely spreading by stolons. *Leaves* ·5-2 by ·3-·8 in., globose obovate oblanceolate or spathulate, pubescent, crenate or crenulate, strongly ciliate along the margins; blade decurrent with the petiole throughout, which is ·5-3 in. long. *Flowers* ·3 in. across, dull-purple or nearly white, not scented; peduncle ·5-2 in. long, slender, with a pair of linear bracts about the middle; petals recurved; style slender at the base, thickening upwards to the stigma. *Spur* globose.

KHASI HILLS: NORTH CACHAR HILLS, Haflong, *Craib*!; NAGA HILLS, Konoma, *Watt*!; ABOR HILLS, Ponijihams, *Burkill*!

Fls. 2-3, Fr. 4-6.

3. Viola arcuata, Bl. (1825). Syn. V. distans, *Wall.*, (1828).

Stems slender, 2-9 in. long. *Stolons* slender often bearing leaves and flowers. *Leaves* ·5-1·5 in. long, usually as broad as long, sometimes broader than long, ovate deeply cordate or deltoid, more or less acute, crenate-serrate, glabrous or hirsute when mature; petiole ·5-1·5 in. long, slender, glabrous. *Flowers* about ·4 in. across, white or faintly blue; sepals acute; the lowermost petal sometimes smaller than the others; style straight, tapering to the stigma; peduncle 1·5-3 in. long, minutely bracteate usually above the middle. *Spur* saccate. *Capsule* about ·4 in. long, many seeded.

KHASI HILLS above 4,000 ft.., Shillong, Mawphlong, Myrang, Cherrapunji, *etc.*

Fls. 4.5.

4. Viola serpens, Wall.

Very similar to the foregoing species and quite as variable. *Stem* and *stolon* sometimes absent. *Leaves* 5 by ·4-2·5 in., ovate acute or acuminate, more or less deeply cordate with a narrow or broad sinus, crenate-serrate, glabrous or pubescent; petiole 2-4 in. long, slender; stipules toothed or fimbriate. *Flowers* ·4-·6 in. across, bluish or white, not scented; sepals about ·2 in. long, acute, canescent; peduncles 2-5 in. long, bracteate about the middle or a little above it. *Spur* saccate, about ·2 in. long. *Stigma* on an oblique or crooked, trumpet-shaped style. *Capsule* small, globose, few seeded.

KHASI HILLL; NAGA HILLS, Prain! MANIPUR, *Watt*!

Fls. 2-4.

The following two garden species are frequently cultivated at Shillong and other hill stations—

5. Viola tricolor, Linn. *The Heartsease or garden pansy.* An annual herb. The flowers are up to 2 in. across and very showy.

6. Viola odorata, Linn. *The Sweet violet.* A perennial herb. The flowers are of the shape of the indigenous violets and only slightly larger in size, but are very sweet-scented.

2. ALSODEIA, Thouars.

Shrubs or small trees. *Leaves* distichous, usually alternate stipules rigid. *Flowers* small, regular, axillary or terminal, solitary or in fascicles cymes or racemes. *Sepals* and *petals* 5 each, subequal; peduncles bracteate. *Stamens* 5, inserted inside or on an annular disk; connective produced into a broad membranous appendage. *Ovary* 1-celled with few or many ovules; style straight; stigma terminal. *Capsule* 3-valved, few-seeded; seeds glabrous.

Leaves small, scarcely exceeding 2 in. in length. Stamens exserted; anther cohering in a cone. Nerve-axils of leaves perforated. ... 1. *A. Roxburghii.*
Leaves middle-sized, at least 2-5 in. in length. Stamens included; anthers free :—
Nerve-axils of leaves bearded beneath. Flowers fascicled; peduncles 1-flowered. ... 2. *A. bengalensis.*
Nerve-axils of leaves not bearded beneath. Flowers in axillary erect racemes. .. 3. *A. racemosa.*

1. Alsodeia Roxburghii, Wall.

A small shurb with switchy, compressed and pubescent branchlets. *Leaves* ·5-2 by ·3-1 in. sessile, elliptic or lanceolate, cuneate at the base, acute or acuminate, entire or more or less crenulate, membranous or thinly chartaceous, glabrous above, usually pale and furfuraceous beneath; perforate at the axils of the lateral nerves which are about 4 on either half; tertiaries generally obsolete. *Flowers* white, axillary, subsessile, about ·1 in. across; sepals unequal, obtuse; petals linear, tips revolute. *Disk* 10-toothed. *Stamens* exserted; filaments glabrous; anthers white, tomentose at the base; appendage oblong. *Ovary* glabrous; style slender, filifrom. *Capsule* ·2-·3 in. long, pedicelled; tapering to the apex, 1-few-seeded.

Appears to have spread from Bengal into South Sylhet, *Wallich* ! Distrib. BEHAR, BURMA and the ANDAMANS.
Fls. 9-10. Fr. 11-12.

2. Alsodeia bengalensis, Wall.

A large evergreen shrub or small tree often with channelled branchlets. *Leaves* 2.5-7 by 1·2-3 in., elliptic-lanceolate, serrate or serrulate, thinly chartaceous, wholly glabrous; bearded at the axils of the lateral nerves; main lateral nerves about a dozen on either half, slender, arched; tertiaries transverse to the lateral about ·04 in. apart, subparallel; stipules ·5 in. long, lanceolate. *Peduncle* in fascicles of 5-8, ·3-·55 in. long, narrow-flowered, glabrous or pubescent. *Flowers* ·15 in. across, glabrous. *Sepals* 5, about half the size of the flowers, broadly ovate, subacute, puberulous. *Petals* 5, ovate elliptic. *Disk* fleshy, 5-lobed. *Filaments* 5, very short, expanded at the base and cohering into a tube;

anthers oblong, glabrous, with a broad, hooded, sub-apical membranous appendage. *Style* short, simple. *Capsule* ·25-·35 in. diam., globose, glabrous, 3-4 seeded. *Seeds* about ·15 in. in diam., globose, brown-speckled.

SYLHET, *Wallich and Griffith* !

Fls. 2-4-10. Fr. 4-9-12.

3. Alsodeia racemosa, Hk. and Th.

A handsome glabrous shrub or small tree with rigid branches. *Leaves* 2-6 by 1-2·5 in., elliptic or obovate, acuminate, cuneate at the base, membranous, more or less repand serrulate, glabrous, shining above; main lateral nerves 7-11 on either half, slender, irregularly arched, with no perforations or beard at their axils; minor nerves reticulate; petiole ·15-2 in. long, slender, puberulous; stipules as long as the petiole, subulate, scariose. *Racemes* 2-3 in. long, simple, erect or ascending, flower-bearing throughout their length, persistently bracteate; pedicels short, stiff, shortly 2-bracteolate at the base. *Flowers* ·12 in. diam. *Sepals* ovate, about ·08 in. long. *Petals* ·1-·12 in. long, oblong. *Filaments* subulate, glabrous, connate at the base and forming a cup with the disk; anthers ovate, hairy at the base, tip of connective broad, subacute. *Capsule* ·5-·6 in. long, glabrous; carpels boat shaped, strongly reticulate outside. *Seeds* ·16 in. across, globose, white throughout.

ASSAM, *Griffith* ! But I have not found it anywhere in this Province.

Fls. 3.4. Fr. 4-5.

13. BIXACEÆ.

(Warburg in Engler and Prantl's; Pflanzenfamilien; III. 6. 367).

Trees or shrubs with mucilaginous sap. *Leaves* simple, alternate, palminerved or palmately lobed; stipules minute, caducous. *Flowers* large, regular, 2-sexual. *Sepals* 4-5, free, imbricate. *Petals* 4-5, free, large. *Stamens* many; anthers 2 celled opening by slits or pores. *Ovary* 1-celled or spuriously 2-5 celled; ovules many, anatropous. *Fruit* a 1-5 celled dry capsule opening by valves. *Seeds* many, sometimes with long hairs; albumen copious; cotyledons foliaceous.

1. BIXA, Linn.

Bixa Orellana, Linn. Vern. *Jarat, Jolandhar, hatronga,* Ass.; *Latkan,* Beng. The arnatto.

A small evergreen tree up to 15 ft., in height, generally with long branches from near the ground. *Bark* brown, fairly smooth.

Blaze yellowish brown turning reddish, fibrous; young parts and inflorescence with rust coloured scurfy tomentum. *Leaves* alternate 3-8 by 2-5 in., broadly ovate to cordate, tapering acuminate, entire or more or less sinuate on the margins, chartaceous or subcoriaceous, glabrous and somewhat shining above, undersurface usually with minute scurfy dots, nerves prominent beneath, main lateral nerves 4-5 on either side (excluding the basal) arcuate, prominent beneath, secondaries subparallel; base 5 nerved, truncate to shallow cordate, often more or less oblique; petiole 2-3 in. long, dilated at the apex; base more or less pulvinate; stipules very short, broad, early deciduous, stipular scar almost annulate with a circular gland close to and on either side of the petiole. *Flowers* white or pinkish, 1-2 in. across, in short terminal panicles about 2·5-3·5 in. across; pedicels ·25-·35 in. long in flower, elongating to 5 in. in fruit, dilated upwards, apex with 5 persistent glands. *Bracts* and bracteoles very short broad, each often with a dorsal gland. *Sepals* 5, imbricate, deciduous. *Petals* 5, contorted in bud, oblong obovate about ·6 in. long. *Stamens* numerous, inserted on a rather stout torus; filaments very slender about ·4-·5 in. long; anthers opening by two terminal pores. *Ovary* 1-celled about ·1 in. long, covered with soft bristles; style slender about ·5 in. long, curved, dilated towards the top; stigma 2-cleft; ovules many on parietal placentas. *Capsule* 1·5-2 in. long, ovoid, densely but softly echinate, spines slender up to ·3 in. long, subulate. *Seeds* many, in a farinaceous red pulp, obovoid, ·2 in. long, albumen fleshy; cotyledons flat.

Introduced from Tropical America. *e. g.* near Nazira and many other places in SIBSAGAR DISTRICT, Lakhipur in CACHAR, SYLHET, Gomez! KHASI HILLS, 2500 ft., Clarke! MANIPUR, Watt! ASSAM, Jenkins! Masters!

The pulp surrounding the seeds is the well known arnatto or anatto dye, which is used to colour butter, and other food and also silk to which it gives various shades of orange and red colours. It is also used for dyeing the hands. A strong fibre is obtained from the bark which is suitable for ropes. The seeds and root bark have also valuable medicinal properties.
Flrs. 7-10. Fr. 10-12.

---

14. FLACOURTIACEÆ.

Trees or shrubs without mucilaginous sap. *Leaves* alternate, usually distichous, penninerved, rarely palminerved, often with translucent dots and dashes beneath; stipules small and caducous. *Flowers* bracteate, small, regular, 2-sexual or polygamous or dicœcious, axillary or on lateral appendages of various shapes. *Sepals* 4-many, free, hypogynous or more or less perigynous, sometimes connate in bud. *Petals* 0, or 2-3 to several

times as many as the sepals. *Stamens* usually more numerous than the petals, in 1-many series, sometimes in bundles opposite the petals; anthers opening usually by lateral slits. *Ovary* superior, sometimes half-inferior, more rarely wholly so, 1-celled with 2-8 (usually 3-5) parietal placentas, which sometimes meet in the axis making the ovary spuriously as many celled: ovules usually many, anatropous; styles as many as the placentas, often connate. *Fruit* a capsule or a berry which is sometimes drupaceous. *Seeds* 1 or more, albuminous; cotyledons foliaceous (*partly after Haines' Botany of Behar and Orissa*).

Petals present:—

Flowers in racemes, spikes or panicles. Fruit a dry capsule. .. .. .. 1. **Homalium.**
Flowers in fascicles or cymes. Fruit a berry with a hard rind:—
Stamens numerous (often up to 100 or more). .. 2. **Gynocardia.**
Stamens not exceeding 20 (in the species here described). .. .. 3. **Hydnocarpus.**

Petals 0:—

Fruit a succulent, sometimes drupaceous berry:—
Ovary 2-8-celled with 2-6 styles. .. 4. **Flacourtia.**
Ovary 1-celled with many connate styles. .. 5. **Xylosma.**
Fruit a succulent capsule. Ovary 2-8 celled with 2-8 styles. .. .. .. 6. **Casearia.**

1. HOMALIUM, Jacq.

Generally small tree. *Leaves* alternate, more or less crenate or serrate or entire, usually petioled, sometimes punctulate. *Flowers* small, hairy, in slender axillary or terminal, simple or panicled, racemes or spikes; bracts often prominent but caducous. *Calyx tube* adnate to the base of the ovary; segments 5-7, narrow, persistent. *Petals* 5-7, persistent. *Disk* tomentose. *Stamens* inserted at the base of the petals, solitary or in fascicles of 2-7, opposite the petals alternating with round hairy staminodal glands. *Ovary* half-superior, 1-celled; styles 2-6, filiform; stigmas capitate; ovules 2-many, pendulous on 2-6 parietal placentas at the top. *Capsule* half buried in the persistent calyx, coriaceous, 2-5 valved at the apex. *Seeds* usually few, albumen copious.

Racemes elongate. Stamens 1 opposite each petal. 1. *H. bhamoense var. Deb-barmani.*
Racemes panicled and divaricate. Stamens 3 opposite each petal. 2. *H. Scfilichii*

1. **Homalium bhamoense,** Cubit et Smith, var. Debbarmani, *Kanjilal. f.* Vern. *Shokshimarony*, Garo.

A tall tree. Bark nearly smooth outside, blaze dun-brown; young parts, petiole and inflorescence, grey tomentose. *Leaves* 2-farious, 3-6 by 2-3·5 in. variable, elliptic-oblong or elliptic,

* I follow Warburg in Engler and Prantl's "Pflanzenfamilien" vol iii. 6A in uniting *Casearia* and *Homalium* with *Flacourtia, Xylosma, Gynocardia* and *Hydnocarpus* into one family and calling it *FLACOURTIACEÆ*.

somewhat bluntly acuminate, crenate serrate, sub-coriaceous, puberulous along the midrib and often along the nerves, otherwise glabrous above, softly hairy especially along the nerves beneath ; main lateral nerves 7-10 on either side, tertiaries sub-parallel ; base more or less cuneate, often decurrent into the channelled petiole which is ·25-·5 in. long. *Flowers* small, in dense clusters on axillary racemes 3-8 in. long, which are sometimes branched ; pedicels slender about ·05 in. long. *Calyx* thinly pubescent outside, tube more or less ribbed, upto ·07 in. long ; lobes 5 or 4 about equalling the tube, linear, ciliate. *Petals* 5 or 4, ·06-·1 in. long, spathulate or oblanceolate, ciliate. *Stamens* one opposite each petal and exceeding them in length. *Free* portion of ovary thinly pubescent ; styles 4-3, sometimes 5. *Capsules* about ·08 in. long.

GARO HILLS. Distribution BURMA ; SIKKIM.
Fls. 3-4.

Typical H. bhamoense, Cubit and Smith, has, so far not been collected outside Burma. Our plant differs from it by its narrower, more softly pubescent leaves and somewhat larger flowers with less densely ciliate more elongate petals.

Forma glabra. Vern. *Sajira, Bolong,* Ass.: *Bolong-wati-vtfiri* ; *Boldu-jag-reng,* Garo—differs from var. Debbarmani, by its glabrous or glabrescent and broader—usually elliptic to broadly elliptic leaves.

CACHAR—Lalchera ; KAMRUP—Kulsi Range ; GARO HILLS, Distribution CHITTAGONG.

It would appear that H. bhamoense, and the plants here described constitute a north eastern race of H. zeylanicum, Benth, and that they should all be combined with it under one species. Intermediate forms seem to occur and it is often difficult to differentiate between glabrous forms of H. bhamoense and H. zeylanicum.

2. Homalium Schlichii, Kurz. Vern. *Dieng-soh-mara,* Khasi.

A tall tree about 100 ft. in height and 7 ft. in girth buttressed at the base when old, deciduous in the hills but usually evergreen in shady localities in the plains. *Bark* dark-brown and somewhat rough outside, inside hard, granular, rich dun-brown mottled with specks of deeper colour, ·5 in. thick. *Leaves* 3-7 by 1·5-2·4 in., elliptic, oblong or ovate, acute or cuneate at the base, shortly acuminate, distantly coarsely crenate or crenulate, subcoriaceous, glabrous, shining above, yellow before falling ; lateral nerves 8-10 on either half, arched ; petiole ·3-·5 in. long, stout, red on young leaves as also are the midrib, nerves and margins. *Flowers* small, up to ·2 in. across, on short divaricate terminal or subterminal grey pubescent panicles 2-4 in. long ; pedicels short, but stout, thickly grey tomentose. *Sepals* linear-oblong, pubescent. *Petals* elliptic to oblanceolate, also pubescent but somewhat larger. *Stamens* 3 before each petal alternating with hairy gland like staminodes. *Free* portion of ovary tomentose.

KASHI HILLS, e. g., Nongkhla, Wah Rangkhasaw, etc., also Badshaitila Reserve—SYLHET.

Flrs. 3-5. Fr. not known.

2. GYNOCARDIA, R. Br.

Gynocardia odorata, R. Br. Vern. *Chaulmugra,* Beng, & Ass.; *Bonsha,* Ass. (Darrang); *Bandarpele,* Ass.; *Lemtem,* Ass. (Sibsagar), *Dieng-soh-phailing, Soh-pheeling, Dieng-soh-liang,* Khasi; *Thebong-kok, Kampi-bumtal-arong,* Mik.; *Balibu, Masribu, Thithopha-bipha,* Garo; *Sibe-tulpi,* Abor; *Sibe-turpu,* Miri & Abor; *Taki-sidik, Taki ponju-asing,* Miri; *Takik-changne,* or *Takuk-changne,* Duff.; *Umphu,* Aka; *Khungkha-biphang, Thai-laokhrong, Thaila-phrong-baphang, athaiba,* (athaiba= fruit borne stem), Mech; *Thei-snong-pung,* Kuki; *Koitur,* Lushai & Kuki.

A small or middle sized glabrous tree with slender branches. *Bark* grey or greenish grey and generally warty outside, uniformly pale brown inside, ·25-·5 in. thick, green underneath the cuticle. *Leaves* bifarious, 6-10 by 1·5-3·5 in., oblong, abruptly acuminate, rounded or acute at base, entire, thinly coriaceous: lateral nerves 5-9 on either side of the midrib including the subbasal pair, very arcuate, tertiaries transverse to the midrib and often continuous from margin to margin; quarternaries openly reticulate; petiole ·5-1·5 in. long, continuous, channelled. *Flowers* dioecious, pale-yellow, sweet scented, in few flowered axillary fascicles or in large bunches (of about 40 flowers) from the trunk, ·5-1·5 in. across, female comparatively larger; buds globose; peduncles 1-2·5 in. long with minute bracts at the base. *Calyx* 5-lobed, saucer-shaped, leathery. *Petals* oblong or ovate, fleshy. MALE FLRS.—*Stamens* about 100; filaments wooly, FEMALE FLRS.—*Staminodes* 10 or 15, villous; ovary 1-celled; styles 5. *Fruit* 3-5 in. across, always on the trunk, globose but usually broader than long, with a thick, hard rind minutely lenticelled outside. *Seeds* about 1 in. long, obovoid or oblong, circular in cross section; embryo somewhat eccentric, cotyledons about ·05 in. thick, set in thick oily albumen.

Fairly common in evergreen forests throughout the province.

The seeds yield a somewhat thick brownish oil which is however of less medicinal value than that of *Hydnocarpus Kurzii.*

Flrs. 3-4. Fr. Cold season.

Sir David Prain (Bengal Plants, p. 232) has revived Ruxburgh's name CHAULMOOGRAH for this Genus, but as this is not the real Chaulmugra tree, it is perhaps better to supress that name.

3. HYDNOCARPUS, Gærtn.

Hydnocarpus Kurzii, Warb. Syn. **Taraktogenos Kurzii,** *King*; Hydnocarpus heterophyllus, *Kurz.* Vern. *Lamtem,* Ass.; *Chaulmugra, Dalmugri,* Beng.; *Dieng-soh-lap.* Kahsi; *Thibongthar, Thebongthar,* Mik; *Balibu,* Garo; *Kirta-Kirpang, Talo-asing,* Abor; *Siri-asing,* Miri; *Serbuli or Shailoukrongbuphang,* Kach.; *Rowai-thing,* Naga; *Mata,* Kuki; *Matta,* Lusha. & Tipp; *Uthou,* Manip. *Bandre,* Nep.; *Dieng-soh-lap,* Khasi.

A tree up to 50 ft. in height with a tall trunk and narrow crown with hanging branches. *Bark* fairly plain, grey, brown or almost black outside, often with white patches, uniformly yellow or yellowish brown and somewhat granular inside, ·15-·25 in. thick; young parts tawny, pubescent. *Leaves* very much as in *Gynocardia odorata*, but the petiole is longer and swollen and slightly geniculate at the upper end, and the blade generally somewhat more thickly coriaceous and almost always cuneate at the base; lateral nerves more oblique and longer. *Flowers* ·3-·5 in. across, pale yellow, inodorous, in few flowered axillary cymes, diœcious, though a few hermaphrodite flowers are sometimes found on male trees; pedicels up to ·7 in. long. MALE FLRS.—*Sepals* 4, in pairs, round, concave. *Petals* 8, in two rows, smaller than the sepals, each with a cuneate, fleshy gland at the base. *Stamens* 20-30. FEM. and 2- SEXUAL FLRS.—much like the male, but *sepals* and *petals* often fewer, and stamens when present, not more than 16. *Ovary* villous, 1-celled; placentas 4, parietal. *Fruit* chocolate-brown, 3-2·5 in. across, globose, but generally rather longer than broad with a hard, plain but scurfy and rather velvety rind and a stout beak (the remains of the stigmas). *Seeds* about 1 in. long, facetted, tightly packed in the fruit embryo central; cotyledons thin, broadly ovate, about ·3 in. long and as broad, 3-nerved; albumen copious, oily.

Common in evergreen forests throughout UPPER ASSAM, often forming gregarious patches.

The seeds of this tree yield the proper Chaulmugra oil which is much used for all cutaneous complaints. Modern Systematists have dropped the generic name *Taraktogenos* and replaced this tree under *Hydnocarpus*.

Fr. 11.

4. FLACOURTIA, Commers.

Trees or shurbs, usually thorny; young shoots often reddish, *Leaves* toothed or crenate, penninerved with the lowest nerves basal or subbasal. *Flowers* small, usually diœcious. *Sepals* 4-5, small, imbricate. *Petals* 0. MALE FLRS.—*Stamens* numerous; anthers versatile, opening by slits. FEM. FLRS.—*Disk* annular or lobed, glandular. *Ovary* 2-8-celled with deeply intruded placentas; styles 2-10, short, free or connate; ovules 2, superposed. *Fruit* a drupe with several 1-seeded pyrenes.

I. Leaves under 5 in. long not coriaceous, lateral nerves up to 5, slender:—
Leaves never long acuminate, spines usually under ·4 in. across. Flowers solitary or in imperfect few flowered racemes; spines sometimes bearing leaves and flowers. Leaves ·7-2 in. long. ... ... *1. F. sepiara.*
Leaves usually long acuminate, chartaceous, spines much branched when present, (absent on old trees). Fruit ·5-·7 in. across. *2. F. Catapfiracta.*

II. Leaves up to 10 in. long, thickly coriaceous; lateral nerves 10-12, strong. ... *3. F. sumatrana.*

1. Flacourtia sepiara, Roxb. Vern. *Thai-slao-gundi-khasiba*, Cach.

A shrub or small much branched tree attaining 25 ft. *Bark* grey, rough with exfoliating scales, spines usually axillary, stout, sometimes exceeding the leaves and bearing clusters of leaves or flowers, light yellow, somewhat granular, thin; young parts and petioles puberulous. *Leaves* ·7-2 in., obovate, obovate-oblong or elliptic to suborbicular, apex rounded to shortly blunt acuminate, crenate-serrate; base cuneate to subcordate, glabrous, or slightly puberulous on the nerves at the base beneath, main lateral nerves 3-4 on either side, arched, the lowest more or less paired at or close to the base; petiole ·1-·2 in. long. *Flowers* small, usually 1-2 together at the ends of short shoots, rarely in imperfect racemes. MALE FLRS.—*Pedicels* slender, up to ·3 in. long; sepals ovate, obtuse. FEMALE FLRS.—*With* shorter, and stouter pedicels and sepals broader than in male flowers. *Styles* usually 6-7. *Berry* with 6-7 pyrenes ·25-·3 in. across. *Pyrenes* rugose.

N. CACHAR HILLS, Gauhati (planted). Mann!

Flrs. 3-4. Fr. 4-5.

2. Flacourtia Cataphracta, Roxb. Vern. *Ponial* or *Poniol*, *Goch-poniol*, Ass. (Sibs); *Polian*, Ass., (Kam.); *Phinel*, Goalp; *Tokroi*, Sylh., Cach. & Comilla; *Luk-Luki*, Sylh.; *Dieng-soh-mluh*, Khasi; *Thengpi-kundu-arong*, Mik.; *Darichik*, Garo; *Phonial*, Mech.; *Duk-duki*, Tipp.

A small evergreen tree bearing compound spines on the trunk up to about middle edge, young shoots slightly pubescent; branchlets often with raised round lenticellular dots *Bark* cinnamon brown, fairly plain outside, uniformly light-brown inside, ·1 in. thick. *Leaves* 2-5 by 1-2 in., ovate or ovate-lanceolate, long-acuminate, crenate, thinly chartaceous, quite glabrous; main lateral nerves 4-5 on either side of the midrib, the first 1-2 from near the base; tertiaries faint, transverse to the midrib, anastomosing; base rounded and then suddenly cuneate. *Flowers* small, in lax racemes which are axillary or spring from the extremities of short lateral shoots. MALE FLRS.-*Buds* globose, open ·08 in. diam.; pedicels ·4-·6 in. long, very slender, glabrous; sepals orbicular, ciliate, hairy within; stamens about 50-80; filaments filiform, ·1-·12 in. long; anthers minute, globose. FEM. FLRS.—*Racemes* and pedicels somewhat shorter and the latter stouter; style conical, very short, stigmas 4-6, spreading. *Fruit* ·5-·7 in. across, globose, dark-purple when fully ripe, crowned by the persistent stigmas; stones 10-14.

Fairly common on both banks of the Brahmaputra below Sibsagar, *e. g.*, Akhoyphutia, Dikhoumukh, Garampani, Latabari, Lumding, Jamunamukh, Silghat, Tezpur, etc.; also KHASI HILLS. Not noticed in N.-E. FRONTIER and LAKHIMPUR DISTRICTS.

The wood is reddish, hard, compact and close grained and is used for agricultural implements. The acid ripe fruit is eaten.

Flrs. 3-4. Fr. 11-1.

3. Flacourtia sumatrana, Planch.

A small tree with spreading crown; very young shoots slightly puberulous; branchlets with close round lenticel dots. *Leaves* 6-10 by 2·5-4·5 in., ovate-oblong or elliptic, suddenly acuminate, somewhat thickly and firmly coriaceous, rather coarsely and irregularly gland-serrate, rounded but sometimes abruptly cuneate at the base, glabrous and shining above; lateral nerves 10-12 on either half, depressed above, very prominent beneath, slightly arched, with midrib very sparsely pubescent or glabrate; tertiaries prominent, subparallel, transverse to the secondaries; quarternaries very slender, about ·04 in. apart, transverse to the tertiaries, reticulate or subparallel; petiole ·4-·6 in. long, stout, shallowly channelled, puberulous or glabrate. *Flowers* very small, dioecious. MALE not seen. FEM. FLRS.—bracteolate, in axillary solitary or geminate panicles 1·5-3·5 in. long, rachis and its branches as well as the pedicels greenish grey pubescent. *Sepals* 5, broadly ovate-acuminate, concave, laciniose-ciliate, pubescent outside, minutely puberulous inside. *Dis* annular or slightly wavy, very fleshy. *Ovary* ovoid, glabrous; styles 4, tapering to a minute stigma, glabrous. *Drupe* berry-like, ·2-·25 in. long, ovoid or oblong; stones generally 6; albumen oily; embryo minute.

Only one found at Nagadhuli, near Mariani, DISTRICT SIBSAGAR, (Sheet No, 78I).

The above description applies to the form growing in our area.
Fr. 9.

Flacourtia inermis, Roxb.—Unarmed small tree: young parts puberulous. *Leaves* 4-8 by 2-3·5 in., ovate or oblong-lanceolate, acute or acuminate, coriaceous, glabrous and shining above, midrib pubescent beneath; petiole ·35-·5 in. long; *Flowers* 2-sexual in short fascicled pubescent racemes. *Ovary* 5-celled; cells 2-ovuled. *Fruit* red, size of a cherry, acid with 8-10 pyrenes.

Said to occur in SYLHET and to be cultivated in other parts of India presumably for its fruit. I have never come across it nor are there any specimens at Calcutta herbarium from our area.

5. XYLOSMA, Froster.

Differs from Flacourtia as shown in the diagnosis given in the generic key. *Style* usually 1, placentas usually 2, rarely more parietal.

Leaves generally oblong-lanceolate, firmly coriaceous; lateral nerves 8-12, short and slightly arched; tertiaries scarcely parallel, conspicuously reticulate. .. ... 1. *X. longifolium.*

Leaves generally elitptic lanceolate, thinly coriaceous; lateral nerves 6-8, long and much arched; tertiaries parallel or subparallel and transverse to the midrib. .. ... 2. *X. controversum.*

1. Xylosma longifolium, Clos. Vern. *Mota-koli,* Ass. (Sibs. & Darr.); *Kata-koli, Kotahar, Kata-ponial,* Ass.; (Kam.); *Mota-puli,* Ass. (Lakh.) & Miri; *Dieng-kani,* Khasi; *Thengpiani-arong,* Mik.; *Phul-wal,* Garo; *Tang-en-ising,* (N. Lakh.), *uli-tang-asing,* Miri; *Hagrani-sa,* Cach.; (wild tea).

A tree up to 60 ft., in height and 4 ft., in girth, thorny when young, often multiplying by root-suckers. *Bark* fairly smooth, but with large black warts, greenish below the cuticle, ·2-·5 in. thick, inside yellowish-brown, turning deeper brown on exposure. *Leaves* 4-7 by 1-2·5 in., oblong, rarely elliptic-lanceolate, acuminate, obtusely glandular serrate with recurved margin, firmly coriaceous, glabrous, pinkish when very young, shining above when adult; lateral nerves 8-12, slender, irregular, moderately arched, short; tertiaries rather strongly though laxly reticulate; base acute; petiole ·3-·5 in. long, narrowly margined. *Flowers* dioœcious, yellow, ·15 in. across, in short dense axillary racemes, which are fascicled or panicled, ·3-1 in. long; pedicels .15-·25 in. long, articulate near the base, lengthening in fruit, puberulous or glabrous; bracts minute, oblong to ovate-acuminate; sepals 5, orbicular or ovate, erose at the margin. MALE FLRS.—*Stamens* 15-20; filiform, surrounded by a disk with about 10 pink glandular lobes. FEMALE FLRS.—*Ovary* glabrous, seated on a lobulate glandular disk; style 1, short; ovules few. *Fruit* globose, more or less dry, red when ripe with 2-8 sector-shaped seeds (or stones ?).

Fairly common throughout UPPER ASSAM near swamps and streams.

The wood is pinkish, moderately hard and even-grained, weighing 55 lbs. per c. ft., not used as timber. The Mikirs prepare an extract from the tender young leaves which resembles opium and is used with it (whence the Mikirs name).

Flrs. mainly 11-1.

2. Xylosma controversum, Clos.

A small tree up to 35 ft. in height and 2 ft. in girth; stem with simple spines. *Bark* greyish-brown, rough with close-set warts and with distant horizontal wrinkles, inside dun-brown with small streaks of amber brown, finely fibrous, rather soft and "cheesy." *Leaves* 2-6 by 1-2·8 in., elliptic-ovate or obovate-lanceolate, finely acuminate, shallowly gland-serrate, thinly coriaceous, glabrous, shining above, dull underneath; lateral nerves 6-8 on either half, very oblique, prominent underneath; tertiaries subparallel, transverse to the midrib, anastomosing by very slender nerves of the next degree; base very gradually cuneate; petiole ·3-·4 in. long, sharply margined. *Flowers* almost as in the preceding species, but are always panicled and the panicles are larger being up to 1·5 in. long and somewhat more lax; pedicles shorter and the bracts usually narrower. *Sepals* suborbicular to ovate, unequal, erose-ciliate, adpressed silky inside. *Stamens* 25-40. *Fruit* as in the other species; seeds plano-convex, smooth, shining.

Kanib-beheti and elsewhere in the Mikir Hills, SIBSAGAR, 2-2500 ft. But the home of this tree is the KHASI HILLS, where it extends up to 5000 ft. Fls. 11-2. Fr. 7-10.

6. CASEARIA, Jacq.

Shrubs or small trees. *Leaves* distichous, often with translucent dots or dashes, entire or serrate; stipules small, lateral caducous. *Flowers* small, yellowish-green, regular, usually 2-sexual,

clustered in axils of the leaves ; pedicles short, jointed, surrounded by small scales. *Calyx* inferior, deeply 4-5-lobed, persistent. *Petals* 0. *Stamens* 6-10, united into a tube, with staminodes alternating with the free portion of the filaments or nearly free, hypogynous or sub-perigynous ; anthers introrse. *Ovary* 1-celled, ovoid ; style simple ; ovules numerous on 3-4 parietal placentas. *Capsule* succulent, 3-nerved, globse or ovoid. *Seeds* many with a scarlet aril ; embryo straight ; cotyledons flat.

I. Adult leaves and branches glubrous :—
Leaves elliptic or lanceolate, regularly crenate or crenulate. Calyx pubescent outside. Fruit ellipsoid. ... .. 1. *C. glomerata.*
Leaves elliptic or lanceolate, cuneate at the base, entire or obscurely crenulate. Calyx glabrous. 2. *C. esculenta.*

II. Adult Leaves and branchlets more or less pubescent :—
A shrub. Leaves oblong, closely serrate. Pedicels glabrous above, the articulation. Fruit small bright-red or orange globse. .. 3. *C. Vareca.*
A middlesized tree. Leaves lanceolate, narrowed at both ends, crenate or nearly entire. Pedicels very long, pubescent. Fruit middle-sized, ellipsoid. .. 4. *C. Kurzii.*

1. Casearia glomerata, Roxb. Vern. *Tel-bhurki*, Ass. ; *Kachidohkka, Dieng-chi-dokkha, Sia-dokha* (Fish-bone), Kh. ; *Han-bo-akarang*, Mikir. ; *Bolong-maindok*, or—*maindop*—*or maindot, Boldreng Bol-dujagreng*, Garo ; *Dukhenda, Datphenda*, Mech. ; *Midoumaphang*, Kach. ; *Kharo-an*, Kuki ; *Khelrel-thing*, Tipp. ; *Borkemla*, Nep.

Usually a small deciduous tree, (an individual tree 45 ft. in height and 6 ft. 3 in. in girth was met with in the Chima-Bangsi Reserve in the Garo Hills in March 1925) ; crown spreading. *Bark* ·3 in. thick, rough, greyish-brown outside, sometimes covered with a mealy black powder, green below the epidermis ; inside whitish, turning yellowish-brown on exposure with vertical strands of amber-brown. *Leaves* 4-8 by 1·7-4 in., lanceolate or elliptic-lanceolote, accuminate (bluntly when the leaf is elliptic), denticulate or crenate, never quite entire, thinly coriaceous when fully mature ; base acute or cuneate, never rounded or cordate ; petiole ·2 in long. *Flowers* small, greenish-yellow or yellowish-brown ; pedicels in very dense fascicles, pubescent, up to ·2 in. long or glabrous. *Calyx* small, funnel-shaped, more or less pubescent outside. *Stamens* 8-10, alternating with villous linear staminodes. *Fruit* (in March, apparently mature) ·65-·8 in. long, ovoid elliptic, pulpy. *Seeds* about ·15 in. diam., white or ovoid-globose.

Cemmon in the *BRAHMAPUTRA VALLEY* excepting in LAKHIMPUR and the N.-E. FRONTIER DISTRICT ; also in GARO, KASHI and MIKIR HILLS.

Wood white, not used. The young leaves and tender shoots are eaten, either as a vegetable or cooked with rice and fowl, specially by the Mikirs with whom it is indispensible for offerings to their Gods and in ceremonial feasts.

It coppices fairly well. The leaves urn copper-coloured before falling.

Flrs. 1-2. Fr. 3-5.

Casearia graveolens, Roxb.—appears to be hardly more than a form of this species. It is supposed to differ mainly by its pedicels being glabrous above the articulation. This character is however by no means constant. Typical C. graveolens is rare in Assam but does occur in NOWGONG and KHASI HILLS.

2. Casearia esculenta, Roxb. Vern. *Dieng-soh-lormao,* Kh.; *Bolduiagreng,* Garo ; *Kron-suri-arong,* Mik.

A small tree about 20 ft., in height and 18 in. in girth. *Bark* white, plain but warty outside, granular and yellowish with white vertical streaks inside. *Leaves* 3-5 by 1·2-2 in. elliptic-lanceolate, narrowed at both ends, entire or very obscurely crenate, subcoriaceous, glabrous and shining, reticulate beneath; petiole ·3-·5 in. long. *Flowers* axillary, yellowish. *Stamens* 8, united at the base with the disk. *Capsule* about ·5 in. long ; often attacked by gall insects ; aril bright red.

Mawlong forest in the KHASI HILLS ; Sugiri, GARO HILLS ; Haflong, N. C. HILLS, ascending to 3500 ft.

The Mikirs eat the leaves and tender shoots cooked in curry.

Flrs 9-10. Fr. 1-3.

3. Casearia Vareca, Roxb. Vern. *Bhagni* or *Roy-baghini, Chhagladoi* or *Chhagladuri, Sikrai* or *Sikraguti, Chhikramary,* Ass. ; *Bon-jhalukia,* Ass. (Sibs.) *Dieng-soh-rang, Dieng-sapet-khuntlung,* Synt. ; *Tiho-okron-arong, Jowmakron, Akron-arong,* Mik. ; *Abbuk-asung,* Abor ; *Saben-bukben-asing,* Miri ; *Asari-baphang.* Kach. ; *Nelo-chaugne,* Duff. ; *Thing-batiat,* Kuki ; *Daino,* Jharua (Dalu) ; *Nak-pek,* Tipp.

A large shrub, rarely a small tree (25 ft. high and 4 in. diam. in the Deroi Reserve, SIBSAGAR). *Branches* often starting from the base ; young shoots straight, rather angular, pubescent. *Bark* grey, warty with white blotches outside, green below the dead layers, light-brown, turning into red after exposure inside, about ·25 in. thick. *Leaves* 3-6 by 1-2 in., generally oblong-lanceolate, obtuse and often abruptly apiculate to acuminate, closely serrate or serrulate, subcoriaceous, glabrous above, pubescent or puberulous at least along the nerves beneath ; base cuneate ; petiole ·3-·5 in. long. *Flowers* greenish-grey, in dense axillary clusters ; pedicels very hairy below the joint, glabrous or nearly so above it. *Calyx* bowl-shaped, lobes broad ovate to suborbicular, about ·1 in. long. *Staminal tube* elongated ; filaments usually 8, rarely 10 a little shorter than the anthers, pubescent, alternating with the broad hair tipped staminodes. *Fruit* oval, ·2-·4 in. long, smooth, bright orange yellow. *Seeds* 4-6, oblong, attached to the middle of the valve, enveloped in a thin bright-red aril ; embryo straight, cotyledons cordate.

Distributed all over the province and up to 3,000 ft., in the HILLS.

The fruit is rubbed into a paste and given to people suffering from worms, while the juice of the fruit is dropped into the ear when attacked by ticks.

Flrs. 6-9. Fr. 10-4. (chiefly mid-winter.)

4. Casearia Kurzii, C. B. Clarke. Vern. *Dieng-bai-synrang,* Kh. (Shella); *Dieng-soh-mara,* Kh. (Nongkla), *Shokshi-maring, Boldujagreng,* Garo.

Generally a middle-seized tree up to 50 ft. in height, but sometimes attaining 80 ft., in height 5 ft. in girth; shoots pubescent. *Bark* grey corky outside, plain green underneath the cork, generally with horizontal wrinkles below each living or fallen branch; inside light greenish-brown, ·25 in. deep, with an unpleasant smell. *Leaves* 3-6 by 1·2-2 in. lanceolate or oblong, narrowed at the base, which is more or less oblique, acute or shortly acuminate, distantly crenate or nearly entire, subcoriaceous, glabrous above, with spreading yellow hairs beneath, specially when young; turning yellow before falling; petiole nearly ·5 in. long, puberulous. *Flowers* in fascicles of 4-6 from axillary tubercles; often attacked by gall insects; pedicels slender, pubescent, ·2-·4 in. long. *Calyx* minutely pubescent. *Stamens* generally 10. *Capsule* nearly ·6 in. long, black when ripe, eaten by birds.

Shella, Nangkhla etc., on the southern slopes of the KHASI HILLS; Haflong, N. C. HILLS; Rongmachakgiri, Fulbari, GARO HILLS: Subhimalayan Sal-track, GOALPARA, e. g. Bomba Block; Burduar Reserve, KAMRUP.

The fresh-cut wood is yellowish-white, even-grained, believed to be durable by the Khasis who use it for rafters.

Flrs. 4-5. Fr 1-2 (of the following year !)

---

15. PITTOSPORACEÆ.

Trees or shrubs sometimes climbing. *Leaves* alternate or subverticellate, entire, very rarely toothed. *Flowers* hermaphrodite. *Inflorescence* various, terminal or axillary. *Sepals 5,* imbricate, free or connate. *Petals 5,* hypogynous, imbricate, free or connate, *Torus* small. *Stamens* 5, free; anthers versatile. *Ovary* 1-celled with 2-5 parietal placentas, or as many celled by the projection of placentas; style simple, stigma terminal 2-5 lobed; ovules many. *Fruit* capsular or indehiscent (in some foreign species). *Seeds* many, albumen copious, embryo minute.

PITTOSPORUM, Banks.

Erect trees, shrubs or undershrubs. *Inflorescence* usually corymbose, subumbellate or paniculate. *Sepals 5,* free or connate below. *Petals* erect, claws connivent or connate, often recurved in fully opened flowers at the top. *Filaments* subulate; anthers

2-celled, introrse, opening by slits. *Ovary* incompletely 2-3 celled by the intrusion of the placentas ; ovules 2 or more on each placenta. *Capsule* 1-celled, 2-3 valved ; valves placentiferous in the middle and often striate with horizontal lines inside ; seeds covered by oily resinous pulp.

I. Tall shrubs or small trees :—
Flowers in simple racemes or corymbs ; capsule 3-valved, ·7-1 in. long ellipsoid or obovoid oblong. .. .. 1. *P. glabratum.*
Flowers in panicles, corymbs or umbels ; capsule 2-valved, ·3 in.across. globose. ... 2. *P. floribundum.*
II. Undershrubs, usually under 3 ft. in height. ... 3. *P. fumile.*

1. Pittosporum glabratum, Lindl. *Vern. Dieng-thyllong, dieng-sangar-um, dieng-lo-shiring-synrang, dieng-soh-tylluh,* Khasi.

An erect shrub 8-10 ft. high with light grey to blackish bark, blaze white, fibrous. *Branchlets* often whorled, young shoots and inflorescence covered with tufted, glandular hairs. *Leaves* opposite, or whorled, some alternate, very variable in size and shape, 1·5-7·5 by ·5-1·2 in., oblong-lanceolate, oblanceolate, obovate or elliptic, acuminate or acute, entire, margins slightly revolute, coriaceous, glabrous, shining above, pale beneath ; base attenuated, lateral nerves faint, impressed above, very oblique ; petiole channelled up to ·2 in. long. *Flowers* pale yellow in terminal and subterminal short racemes or corymbs, which are up to 2·2 in. long and covered at the base with small imbricating sharp-pointed triangular scales ; racemes 3-10 flowered ; bracts and bracteoles up to ·1 in. long. *Pedicels* slender, lax ·25-·5 in. long. *Calyx* ·1 in. long, more or less glandular hairy ; lobes triangular, ciliate. *Petals* ·5-·6 in. long, claws connate in a cylindrical tube or sometimes free, limbs spreading, obovate-oblong, sub-acute, slightly hairy within or entirely glabrous ; anthers apiculate, opening by slits. *Ovary* shaggy, shortly stalked ; ovules many. *Capsule* up to 1 in. long, obovoid or ovoid oblong or ellipsoid, usually with a narrowed base, tipped by the persistent style, shortly stipitate, 3 valved, prominently striate inside with horizontal lines. *Seeds* remaining long attached by funicles after dehiscence of capsule, somewhat compressed and facetted ventrally, pulp red or orange-red,viscid.

KHASI & JAINTIA HILLS, also MANIPUR and NAGA HILLS 3000-6000 ft. Flowers 3-6. Fr. 9-1.

2, Pittosporum floribundum, W. & A. Vern. *Dieng-mulo-shi-ing, dieng-si-ing* (=ginger tree from the smell of the bark), *dieng-duma,* Kh.

A small tree attaining about 25 ft. in height, branches subverticellate, bark grey with large warty lenticels, white and fibrous inside, *Leaves* crowded towards the ends of branches, sometimes subverticellate, 3-6 by ·7-1·5 in., oblong lanceolate oblanceolate or lanceolate, acuminate, margin undulate, subcoriaceous, nerves impressed above, secondaries rather obscure,

7-11 on either side of midrib, oblique, terminal portion parallel with the margin, tertiaries finely reticulate, base attenuated to the chanelled petiole which is up to 5 in. long. *Flowers* pale yellow about ·25 in. long, sweet scented. *Inflorescence* consisting of a terminal panicle of corymbs or umbels with the axis sometimes very reduced, much smaller than the leaves, usually up to 1·7 in. long by 3·5 in. across, glandular-pubescent, base often covered with early deciduous, broadly ovate, acute scales ·25 in. long ; bracteoles ·15 in. long, ovate oblong ; peduncles of the main panicle branches up to 1·5 in. long ; pedicels up to ·25 in. long. *Sepals* free ·1 in. long, ovate or elliptic-oblong, obtuse, pubescent or glabrate outside *Petals* ·25 in. long, narrow oblong. *Ovary* adpressed hairy ; style glabrous. *Capsule* orange-yellow, ·3 in. across-2 valved, globose, crowned by the remains of the style ; valves striate with horizontal lines ; seeds covered with scarlet pulp.

KHASI HILLS, 3000-4000 ft., usually on broken ground.
The bark has an unpleasant smell when freshly cut. The branches of panicles sometimes arise from upper leaf axils.
Flowers 3-5. Fr. 10-1.

3. Pittosporum humile, Hk. f. & Thom.

A small bushy undershrub 2-3 ft. high with greyish stem ; branchlets lenticellate ; young parts glabrous. *Leaves* 1-2·5 by ·2-·4 in. narrow lanceolate, gradually acuminate or acute, margins slightly revolute, coriaceous, glabrous, dark green and shining above, paler beneath, base tapering into the short channelled petiole, secondary nerves faint, oblique, tertiaries impressed above and prettily reticulated. *Flowers* white ·2-·25 in. long, in 2-5 flowered peduncled subumbellate, pubescent racemes, which are terminal or from upper leaf axils. *Peduncles* up to ·6 in. long ; bracteoles up to ·2 in. long, often gland ciliate ; pedicels up to ·2 in. long. *Sepals* ·1 in. long, free, oblong or ovate-lanceolate, acute or obtuse, often ciliate. *Petals* free, ·2-·25 in. long, strap-shaped, recurved at the tip in open flowers ; filaments glabrous. *Ovary* glabrous ; placentas 2 ; ovules several. *Capsule* subglobose, ·25 in. across, tipped by the persistent style, rugose outside, red and horizontally striate inside. *Seeds* compressed, laterally covered with deep red aril.

KHASI HILLS, 3000-5000 ft.
Flowers 4-6. Fr. 9-11.

Leaves towards the ends of shoots sometimes very small, The shoots smell somewhat like garlic when bruised.

FAM. 16. POLYGALACEÆ.

Erect or climbing trees or shrubs. *Leaves* alternate, simple, extipulate, quite entire, *Flowers* hermaphrodite, irregular, 2-sexual, 2-bracteate. *Sepals* and *petals* 5 each, imbricate, unequal, inner 2 sepals often petaloid and larger. *Stamens* 8, rarely fewer; filaments generally united into a hypogynous sheath. *Ovary* free, 1-3 celled, with 1 or more ovules in each. *Fruit* generally a capsule or indehiscent and 1 seeded and sometimes samaroid, or of indehiscent carpels.

Herbs or less often shurbs, fruit capsular ..	1. Polygala.
Climbing shurbs; fruit samaroid . .	2. Securidaca.
Trees (in our area); fruit indehiscent, not winged.	3. Xanthophyllum.

1. POLYGALA, Linn.

1. Polygala arillata, Hamilt. Vern. *Dieng-soh-tynka, Dieng-ja-kyba,* Kh.

A shurb 4-8 ft., sometimes more in height, young parts pubescent or puberulous. *Leaves* 3-6 by 2·5 in, lanceolate, elliptic-oblong, or obovate-lanceolate, acuminate, entire subcoriaceous, glabrous; base rounded or cuneate, nerves prominent, secondaries 6-8 on either half, arcuate and forming loops near the margin, tertiaries reticulate; petiole ·2-·4 in. long. *Flowers* ·5-·75 in. long, many, in pubescent drooping racemes 2·5-10 in. long, which are sometimes panicled when terminal; bracts minute, linear-or lanceolate early deciduous; pedicels ·15 in. long. *Sepals* glabrous, unequal, upper concave, ·3 in. long, two lower much smaller ovate, inner two petaloid, ·5-·75 in. long, purple, obovate. *Petals* 3, yellow, united at the base with the staminal sheath, the lower-most keel-shaped, crested with a tuft of linear segments and united to the lateral petals for about three-fourth their lengths. *Stamens* 8, united for their lower half into a hypogynous split sheath; anthers opening by pores. *Ovary* 2 celled; ovule 1 in each cell, pendulous. *Capsule* 2-celled, loculicidal, ·5-·6 in. across, broader than long, subreni-form, usually notched at the apex, margined, more or less fleshy rugose with prominent veins when dry; seeds 2, globose, strophiolate.

CACHAR, KHASI and JAINTIA HILLS up to 4000 ft.

Flrs. 5-8 ? Fr. 11-2.

The following herbs with woody rootstocks may be mentioned: —

1. P. crotalarioides, Ham.—An undershurb or a perennial herb attaining about 12 in., covered with spreading hairs. *Leaves* 1-2·5 in. long obovate or oblanceolate, apex rounded, often apiculate. *Racemes* usually shorter than the leaves, densely flowered: bracts and bracteoles minute, persistent. *Flowers* ·25-·3 in. long, purple or purplish white; pedicels minute *Capsule* ·15-·25 in. across, orbicular margined ciliate. *Seeds* hairy; strophiole deeply 3-fld.

KHASI HILLS.

Flrs. & Fr.5-9.

2. P. laptalea, DC.—A slender erect herb attaining about 20 in. with glabrous striate often angled branches. *Leaves* ·75-1·25 in. linear narrowed at both ends ; petiole scarcely any. *Flowers* pink, ·15- 2 in. long, in dense terminal and axillary racemes. *Capsule* broad obovoid, margined about ·15 fn. long. *Seeds* hairy.

CACHAR (Prazer). KHASI & JAINTIA HILLS up to 4000 ft.
Flrs. & Fr. 5-1.

3. P. glomerata, Lour.—A much branched undershurb or perennial herb attaining 24 in. *Stems* pubescent, ascending, switchy. *Leaves* variable 1-2·5 in. long, linear-lanceolate or oblong to broad ovate and elliptic mucronate, rounded or obtuse at the apex, glabrous or slightly pubescent ; petiole very short, hairy. *Flowers* drooping, greenish ·25-·3 in. long in few flowered, very short pubescent, extra-axillary racemes. *Outer sepals* ciliate, acuminate ; wings awned. *Capsule* ·15-·2 in. broad, as broad as or broader than long, narrowly-margined, notched at the apex,ciliate. *Seeds* silky, strophiole with 3 appendages.

KHASI & JAINTIA HILLS up to 5000 ft. CACHAR—Prain ! and probably also in other Districts.
Flrs. & Fr. 4-11.

4. P. sibirica, Linn.—A very variable perennial herb, attaining up to 18 in. in length, stems many, slender. *Leaves* ·4-1 in. elliptic-lanceolate, upper surface usually shining glabrate or with few minute hairs, veinlets prominently reticulate, margins slightly recurved ; petioles very short. *Flowers* purple. ·2- 25 in. long, in extra axillary racemes, which are usually ·3-1·5 in long, minutely pubescent and lax. *Outer sepals* subequal *Capsules* ·25 in. across, glabrous, ·suborbicular obcordate, notched at the apex, broadly margined. *Seeds* pilose, strophiole with 3 short appendages.
KHASI HILLS up to 5500 ft.
Flrs. & Fr. 3-10 ?

2. SECURIDACA, Linn.

Securidaca tavoyana, Wall. Vern. *Phakchena-lata*, Ass.

A woody climber with dark brown stem ; fibre strong, fine silky, young shoots puberulous. *Leaves* 3-5 by 1-2 in. elliptic, obovate-oblong or oblanceolate, abruptly acuminate, generally cuneate at the base, quite entire, thinly coriaceous, minutely and sparsely pubecent or glabrate and deep green above, more densely and permanently pubescent and pale beneath ; main lateral nerves 8-12 on either half, generally very oblique, the first pair sub-basal, tertiaries very openly reticulate ; petiole ·2-·3 in. long. *Flowers* pink., ·2-·3 in. across, in axillary and terminal panicles 4-9 in. long ; pedicels filiform, ·2-·5 in. long, gradually shorter towards the apex of each branch of panicle. *Sepals* ovate or elliptic. The two *innermost petals* from a keel to which the lateral petals are adnate at the base, the latter truncate and generally tipped with yellow. *Ovary* 1-celled, 1 ovuled ; style lateral and sharply curved near the extremity, developing into a wing in fruit. *Samara* 1-celled, 2·5-4 by ·6-1 in. with the wing ; wing oblique broadest towards the apex, tip rounded or obtuse, thickened at the inner edge, closely veined ; veins arcuate, furcate at the outer edge ; nucleus irregularly tubercled. *Seed* generally solitary, ·3-·35 in. long, suborbicular, compressed, exalbuminous ; cotyledons oily.

Fairly common in all Districts of UPPAR ASSAM excepting NOWGONG.
Flrs 9-10, Fr, 12-2.

3. XANTHOPHYLLUM, Roxb.

Xanthophyllum flavescens, Roxb. Incl. X. virens, *Roxb.*

A medium sized to large tree. *Bark* grey, warty and corky outside. *Leaves* 3-7 by 1·1-3 in., oblong-lanceolate to elliptic lanceolate, acuminate, coriaceous, glabrous, yellowish when dry; main lateral nerves 5-7, often with a few perforated glands at the axils or at the angles of nervules, nervules prominent beneath; petiole ·25 in. long. *Flowers* pale yellow, zygomorphic, ·3-·5 in. long in terminal and axillary pubescent panicles; pedicels up to ·2 in. long. *Sepals* 5, unequal, suborbicular, pubescent. *Petals* 4-5, subequal, much exceeding the sepals, lowermost keel-shaped. *Stamens* 8, 2 inserted on the disk, 6 attached to the base of the petals; disk hypogynous, annular, lobed. *Ovary* stipitate, densely strigose, 1-celled; ovules 1-12. *Fruit* indehiscent, globose, ·6 in. across with thick walls, 1-seeded. *Seeds* exalbuminous.

CACHAR—Haflong, GARO HILLS— Rongrengiri, KHASI HILLS, Kurz!

Flrs. 3-4.

FAM. 17. TAMARICACEÆ.

Ultimate branchlets slender and green, somewhat resembling the needles of pines. *Leaves* alternate, minute, usually scale-like and adpressed on the branchlet, sometimes amplexicaul or sheathing extipulate. *Flowers* regular, 2-sexual or 1-sexual, in simple or panicled spikes or racemes. *Sepals* and *Petals* usually 5, each imbricate, free or connate below. *Stamens* usually as many or twice as many as the petals, on a hypogynous or subperigynous glandular or lobed disk, free or connate; anthers versatile. *Ovary* free, 1-locular or imperfectly septate; styles 2-5, free or connate or stigmas sessile and 3-5; ovules 2- numerous on basal placentas. *Fruit* a capsule dehiscing into 3-5 valves. *Seeds* hairy or winged, albuminous.

TAMARIX, Linn. Tamarisk.

Tamarix dioica, Roxb. Vern. *Jhau* or *Lal-jahu*, Beng. & Ass.; *Rupun-asing*, Miri.

A handsome gregarious shrub up to 15 ft. in height with spreading branches; leaf scars concentric. *Bark* reticulately cracked. *Leaves* minute, about ·05 in. long, tubular and clasping the stem, acuminate, green but with white margins. *Flowers* pink, 5-merous about ·12 in. across, very numerous in compact peduncled usually panicled spikes, generally dioecious; bracts

up to nearly as long as the flowers, triangular, acuminate, keeled. *Sepals* about half as long as the petals, elliptic ovate or elliptic, margins membarnous. MALE FL.: *Petals* oblong. *Stamens* 5, longer than the petals, inserted between the notches of a 5-lobed disk ; filaments ligulate ; anthers purple. FEMALE FL.: *Petals* broader than in the males. *Staminodes* shorter than the petals usually with sagittate pale anthers, which are sometimes absent. *Ovary* 1-celled, 3-lobed ; styles 3, longer than the petals. *Capsule* conical, 1-celled, 3-valved ; seeds minute, plumose, numerous, compressed.

Very common along the banks of the Brahmaputra and its tributaries and generally under water during the rains.

Flrs. 7-9 Fr. 10-12.

FAM. 18. HYPERICACEÆ.

Herbs or shrubs rarely trees. *Leaves* opposite, extipulate, often punctate with pellucid glands or dark glandular dots, entire or gland toothed ; stipules 0. *Flowers* solitary or terminal, rarely axillary. *Sepals* and petals 5-4. *Petals* contorted in bud. *Stamens* indefinite, rarely definite, 3-5-adelphous, rarely free or all connate ; anthers versatile. *Ovary* 3-5 or 1-celled, with 3-5 filifrom free or united styles ; ovules many or few on axile or parietal placentas. *Fruit* usually capsular. *Seeds* exalbuminous, embryo straight or curved.

HYPERICUM, Linn.

Herbs or shrubs, rarely trees. *Leaves* usually sessile or subsessile. *Flowers* yellow, terminal or axillary ; inflorescence cymose. *Sepals* and petals 5, the former persistent, the latter usually oblique. *Capsule* septicidal or dehiscing along the placentas when one celled ; usually tipped by the persistent styles.

I. Stamens 5-adelphous ; ovary 5-celled ; styles 5 :—			
Leaves broad, 1·2-2 by ·5-1·2 in. Shrub 6-8 ft. high.	....	....	1. *H. Hookerianum.*
Leaves narrow ·5-1 by ·15-·5 in. Shrub up to 4 ft. high.	....	....	2. *H. patulum.*
II. Stamens 3-adelphous, ovary, 3 celled ; styles 3 :—			
Sepals with gland tipped teeth.		....	3. *H. elodeoides.*

1. Hypericum Hookerianum, W. & A.. Syn. H. oblongifolium, *Hk. f.* Vern. *Lasyn-heh.* or *Mat-iar-stem*, Khasi.

An evergreen shrub about 6-8 in. in height with reddish brown bark. *Branchlets* usually opposite, terete. *Leaves* usually 1·2-2 by ·5-1·2 in. ovate to ovate-oblong, subacute or obtuse, apiculate, margins revolute, thinly coriaceous, glabrous ; lateral nerves distant, 4-5 on either side of the midrib ascending and convergent towards the apex, pellucid punctate, undersurface glaucous ; petiole minute or nil. *Flowers* up to 2 in. across, yellow, in few flowered terminal corymbose cymes ; bracts leafy ; pedicels ·25 in. long, 2 bracteolate. *Sepals* up to ·25 in. long, unequal, broadly obovate, or elliptic, glabrous. *Petals* upto 1 in. long, suborbicular or broad ovate, often obliquely cuneate. *Stamens* 5-adelphous at the base ; filaments yellow. *Ovary* equalling the styles ; styles 5, exceeding the stamens, free nearly to the base, tips recurved. *Capsule* up to ·7 in. long, oblong-ovoid, seated in the persistent calyx.

KHASI AND JAINTIA HILLS 3000-6000 ft., NAGA HILLS.
Flowers 4-6. Fr. 10-11.
In some forms the leaves attain 3·5 in. in length.

2. Hypericum patulum, Thunb. Vern. *La-syn-rit, Diengsyntiasanam*, Kh.; *Dieng-soh-sarlain*, Synt.

A small shrub upto 4 ft. in height, with reddish brown sometimes nearly black bark. *Branchlets* close set, often opposite, stiff, more or less margined along the internodes below the insertions of leaves. *Leaves* usually ·5-1 by ·15-·4 in., usually distichous, narrow lanceolate, or oblong or ovate-lanceolate, subacute or obtuse, minutely apiculate, margin slightly recurved, glabrous, pellucid punctate, undersurface glaucous or rusty brown black dotted ; lateral nerves rather indistinct up to 6 on either side of midrib, ascending and convergent towards the apex, base narrowed to the minute petiole. *Flowers* yellow ·7-1·5 in. across, in few flowered terminal cymes. *Peduncles* with 2 foliaceous bracts near the top ; pedicels up to ·25 in. long ; bracteoles minute. *Sepals* 5, free, ·25-·3 in. long, elliptic, obtuse, glabrate, dotted with pellucid glands. *Petals* 5, ·4-·5 in. long, suborbicular, broadly obovate, often oblique, early deciduous. *Stamens* much shorter than the petals collected into 5 bundles at the base. *Ovary* exceeding or equalling the styles ; styles 5, lower portions connate. *Capsule* ovoid, ·4 in. long ; valves persisting for a long time.

KHASI & JAINTIA HILLS 3000—6000 ft., MANIPUR, NAGA HILLS.
Flowers 5-7. Fr. 9-10.
Leaves are usually small in the form commonly found in our area.

3. Hypericum elodeoides, Choisy.

A perennial herb or undershrub upto 2 ft. high. *Leaves* variable, usually ·5-1·2 by ·2-·4 in. sessile ; subamplexicaul, upper with a fringe of bristly glands at the base, lanceolate, oblong or ovate, acute or obtuse, subcoriaceous, pellucid-punctate, margins usually black glandular, secondary nerves convergent towards the apex.

lower 1-2 pairs basal. *Cymes* compound, terminal and subterminal. *Flowers* up to ·6 in. across, yellow ; bracts linear or oblong with setose gland-tipped teeth. *Sepals* connate at the base, ·3 in. long, lanceolate with long, glandular teeth. *Petals* exceeding the calyx, ·3 in. long, obovate, black dotted. *Stamens* 3- adelphous at the base. *Styles* 3, divided to the base, exceeding the ovary. *Capsule* ·3 in. long.

KHASI HILLS, 4-6000 ft.
Flowers 6-7. Fr. Autumn.
Leaves in some forms only ·1 in. broad.

H. monanthemum, *Hk.f. & T.* A slender perennial herb similar to some forms of the above *Leaves* ·5- ·75 in. long, oblong, elliptic or ovate ; obtuse, pellucid punctate, and marginally glandular. *Cymes* few flowered ; bracts glandular fringed. *Sepals* gland toothed. *Petals* with few black dots. *Style* shorter than the ovary. *Capsule* about ·25 in. across Hardly more than a herbaceous form of H. elodeoides.

KHASI HILLS, 6000 ft.
Flowers 4.

H. Sampsonii, *Hance.* — A perennial herb about 1 ft. high. *Leaves* sessile ·9-2 by ·4-·6 in. oblong, rounded at the apex, connate at the base, dotted on both surfaces ; lateral nerves 3-4 pairs, convergent towards the apex, undersurface glaucescent. *Flowers* comparatively small in lax terminal and axillary pedunculed cymes ; peduncles up to 1·2 in. long. *Sepals* 5, ·25-·35 in. long, oblong, subacute, black dotted, connate at the base. *Petals* 5, about equalling sepals, oblong. *Stamens* 3-adelphous at the base. *Styles* 3, much shorter than the ovary. *Capsule* ·25 in. long, enclosed by the persistent calyx and covered with resinous vesicles.

KHASI HILLS, NOWGONG, *Simmons.*

H. breviflorum, *Wall.*— An undershrub up to 18 in. long. *Leaves* 1-1·5 by ·2-·3 in. oblong, or oblong-oblanceolate, obtuse or subacute at the apex ; lateral nerves 3-4 pairs, ascending, undersurface gland dotted ; base narrowed to the minute petiole. *Cymes* axillary and terminal, few flowered, short pedunculed. *Sepals* 5, entire, oblong-ovate, obtuse about ·15 in. long. *Petals* not seen. "*Stamens* 9 in 3 bundles cohering for $\frac{1}{3}$ their lengths and separated by hypogynous scales."-*Hooker. Ovary* exceeding the sepals ; styles 3, shorter than the ovary. *Capsule* ·3 in. long, ovoid.
KHASI HILLS, 5000 ft. Hooker ! Kurz !

H. japonicum, *Thunb.*-A slender much branched annual 3-12 in. long. *Leaves* ·15-·3 in. long ovate, or elliptic, pellucid dotted, covered with black glands beneath. *Flowers* ·25 in. long in lax terminal dichasia or solitary in the upper axils. *Sepals* entire, narrow-lanceolate. *Petals* little shorter than the calyx, marcescent. *Stamens* connate at the base ; styles usually 3, shorter than the ovary. *Capsule* equalling the persistent sepals.

KHASI HILLS, Plains of ASSAM in scrubs and grass lands, KAMRUP, SYLHET, DARRANG, LAKHIMPUR, SADIYA, SIBSAGAR, LOWER ASSAM (Kurz)—probably all over the province.

Flowers 2-6 according to elevation. Fr. 8-11.

H. Lalandii, *Choisy.*-A slender unbranched tufted annual attaining 18 in. ; stems with fœtid smell. *Leaves* ·2-·4 in. linear oblong, rather thick. *Cymes* few flowered, lax. *Sepals* entire, oblong, ·25 in. long. *Petals* marcescent ; styles shorter than the ovary. *Capsule* equalling the persistent sepals.

KHASI HILLS, 5-6000 ft.

Flowers spring and summer. Fr. 7 (?)-10.

FAM. 19. GUTTIFERÆ.

Trees, rarely shrubs, almost wholly glabrous, generally evergreen and exuding gum-resin of various colours. *Leaves* opposite, entire, usually extipulate, evergreen, often with close fine parallel nervation *Flowers* regular, 2-sexual or polygamous, often showy. *Sepals* and *petals* 2-6, imbricate or in decussate pairs, generally concave. *Petals* 2-6, rarely more or 0, usually 4-5, imbricate, or contorted. Male flrs.-*stamens* many ; filaments free or variously united. Female flrs.-*staminodes* many, free or connate. *Ovary* 1-5-12 celled ; style usually 1 ; stigmas as many as cells in the ovary. *Fruit* usually indehiscent, often baccate. *Seeds* large, exalbuminous, cotyledons small and radicle large or cotyledons thick, with a very short radicle.

I Style short or 0 ; stigma large. Ripe fruit pulpy :—
  Ovary 2 or more celled, cells 1-ovuled :—
    Calyx of 4 or 5 sepals. .... 1. **Garcinia.**
  Ovary usually 2-celled, cells usually 2-ovuled :—
    Calyx enclosed before flowering, at length bursting into 2 or 3 valves or sepals. .... 2. **Ochrocarpus.**

II. Style long, slender ; stigma small. Ripe fruit dry or firmly fleshy :—
  A. Flowers solitary. Ovary 2-celled, cells 2-ovuled. Fruit a capsule. .... 3. **Mesua.**
  B Flowers panicled or racemed. Fruit drupaceous :—
    Ovary 1-celled with 4 ovules ; stigma 4-fid. .... 4. **Kayea.**
    Ovary 1-celled with 1 ovule ; stigma peltate. .... 5. **Calophyllum.**

1. GARCINIA, Linn.

Trees or shrubs exuding yellow or greenish gum-resin ; branches usually opposite, horizontal or pendulous. *Leaves* coriaceous, evergreen. *Flowers* polygamous, solitary or in cymes. *Sepals* and *petals* 4 or 5 each, imbricate. MALE FL. : *Stamens* numerous, free or more generally collected into a 4-5 lobed mass round a pistillode ; anthers 2-celled, rarely 4-celled. FEMALE and 2-SEXUAL FLS. : *Staminodes* or stamens 8 or many ; ovary 2-12-celled ; stigma sessile or nearly so, often large and spreading ; ovule 1 in each cell, attached to the inner angle of the cell. *Fruit* pulpy when ripe ; seeds often arillate ; embryo a homogeneous oily mass.

I. Flowers 5 merous :—
  Leaves large, oblong-lanceolate with an intramarginal nerve. ... 1. *G. xanthochymus.*

I. Flowers 4 merous :—
  A. Stigma deeply lobed :—
    1. Flowers terminal or axillary, solitary, umbelled or fascicled, anthers 2 or more celled :—

a. Middle sized to large trees. flrs. white or yellowish:-
  i. Petioles without fleshy ligules ; stamens in male flrs. collected in a 4 angled mass, fruit over 1·5 in. across :—
    Pedicels moderately stout, fruit obliquely obtuse at the top. ... 2. *G. Cowa.*
    Pedicels stout, fruit with a prominent mamillate protuberance at the top. ... *G. Kydia.*
  ii. Petioles with fleshy stem clasping ligules ; stamens in male flrs. in 4 bundles. Fruit under 1·5 in. across. ... 3. *G. affinis.*
b. A shrub ; flrs. red :- Stamens in male flrs. in 4 bundles of 4-5 fruit about 1 in. across. .. 4. *G. lancæfolia.*

2. Flowers from axils of fallen leaves ; anthers 1-celled opening transversely, fruit about ·7 in. long. .. 5. *G. Morella.*
3. Male flrs. in short terminal panicles ; stamens in male flrs. in a 4-angled mass ; anthers 2-celled ; female flrs. on stout 4-angled peduncles ·5-1·6 in. long. Leaves large .. 6. *G. pedunculata..*

B. Stigma entire:—
1. Bracts not leafy :—
  Male flrs. panicled ; female flrs. in spike-like stout racemes, ripe fruit about 1 in. across. .. 7. *G. paniculata.*
  Male flrs. usually 2 or 3 together on a peduncle, peduncles rarely panicled ; female flrs. usually solitary, ripe fruit 3 in. across. ... 8. *G. atroviridis.*
2. Bracts leafy:—
  Flowers in axillary cymes ; fruit 1-1·5 in. long. ... 9. *G. anomala.*

1. Garcinia xanthochymus, Hk. f. Vern. *Tepor*, *Tepol-tenga*. Ass. ; *Dephal*, Sylh. ; *Demphal*, *Tonkoy*, Tipp., *Arnak*, Garo ; *Thesampreng*, Mikir , *Dieng-soh-ryn-san*, *Dieng-soh-khyllung*, Khasi.

A small or middle sized tree with sombre-green foliage and a deep narrow crown : branchlets square, and usually sulcate, rather thick, green. *Bark* dark-brown exfoliating in small flakes, white or slightly pinkish inside, exuding pale-green gum. *Leaves* 8-16 by 2-3.5 in., narrowly oblong or oblong-lanceolate, coriaceous, shining on both surfaces ; lateral nerves irregular, almost invisible on green leaves, main about 30 on either half looping into an intramarginal nerve and alternating with as thick but shorter intermediate ones ; midrib stout, rather sharp on the back ; base cuneate ; margins thickened, slightly recurved ; petiole ·6-1 in., thick, angled, rugose, with a fleshy ligule at base. *Flowers* pentamerous, dull-white in 4-8 flowered fascicles from axils of fallen leaves on fleshy pedicels. MALE FLS.— *Sepals* 5, orbicular, about ·16 in. diam. fleshy ; petals 5, about twice the size of the sepals, orbicular, thin, veined ; *stamens* in 5 fleshy bundles of 3-5, alternating with 5 fleshy glands ;

anthers 2-celled. BISEXUAL FLS.—*sepals* as in the males; *petals* ciliate; *stamens* as in the males. *Ovary* usually 5-celled with a neck supporting a 5-6 lobed spreading stigma. *Fruit* 1·5-2·5 in. diam., pointed, crowned by the persistent stigmatic lobes, green, golden yellow when ripe; seeds oblong.

Fairly common in high evergreen forests where the soil is clayey.
Wood dark-greyish-brown, hard and close-grained, with numerous concentric white bands between the fine but irregular medullary rays; weight about 55 lbs. per c. ft. The fruit is very acid and is eaten raw and cooked.

Fls. 3-5. Fr. 10-2.

2. Garcinia Cowa, Roxb. Vern. *Kau-thekera, Kaugach*, Ass. (also *Kuji-thekera*, Ass. being often confused with G. Kydia); *Blachung-changne*, Daff.; *Kau*, Sylh.; Cach., Manip and Naga; *Khatoksi*, Mech, *Tekra, Rengran*, Garo.

A small or middle-sized tree up to 40 ft. in height with an oval crown and dark green foliage; branchlets terete or slightly 4-gonous. *Bark* brown greyish outside, nearly smooth, or on old trees rough with exfoliating scales, often with large white blotches, inside red, soon turning reddish-brown, exuding a yellow gum. *Leaves* 2-7 by 1-3 in., rather broadly elliptical lanceolate, gradually or abruptly acuminate, cuneate at base, somewhat fleshy when green, drying chartaceous, red to reddish-brown when young; main lateral nerves about 12 on either side, arcuate, meeting near the margin; petiole ·25-·6 in. long. *Flowers* dioecious, 4-merous, yellow. MALE FL.—2-3 in. across in dense terminal or axillary clusters; pedicels up to ·35 in. long, rather stout; sepals ·15-·25 in. broad ovate or suborbicular, thick, pale yellow, unequal. *Petals* twice as long, oblong brownished; anthers 4-gonous and 1-celled sub-sessile and close-set on a 4-cornered fleshy mass; pistillode minute. FEMALE FL.—larger than male flowers, terminal, solitary or more generally 3-5 together, shortly pedicelled; *staminodes* forming an interrupted ring consisting of 5-10 connate filaments round the ovary; stigma spreading into 6-8 crenate lobes. *Fruit* about 2 in. diam., globose but slightly tapering and somewhat oblique towards the apex, dull-red outside and orange inside when ripe, 4-8 seeded, crowned by the persistent stigma.

In all Districts; up to 3000 ft., in the KHASI HILLS.

The acid fruit is eaten and preserved in sun-dried slices in Assamese households for use in dysentery, but is considered to be somewhat inferior in quality to that of *G. Kydia*.

Flrs. 3-4. Fr. 6-8.

Garcinia Kydia, *Roxb.* Vern. *Kuji-thekera*, Ass.; *Hau*, Cach.; *Tarak-asing*, Miri and Abor; *Dieng-sofi-longksan*, Khasi; *Tekra, Denga-doti*, Garo; *Chop-chopa*, Ass. (Kamrup).

A glabrous evergreen tree 50-70 ft. in height with a narrow crown and drooping branches. *Bark* dark-brown and smooth outside with a thin cuticle, which peels off easily exposing a red-veined brown surface, blaze pale yellow, ·12-·3 in. thick, exuding a yellow gum. *Leaves* 2·5-5 by ·8-1·7 in., ovate-oblong to elliptic or oblong-lanceolate, acuminate, very gradually cuneate at the base, coriaceous, glabrous, shining above; lateral nerves very

slender, rather irregular, about 12 on either half with a few intermediate ones, all arched to form an intramarginal nerve about ·08 in. from the edge; petiole ·3-·4 in. long, slightly dilated at the base. *Flowers* dioecious, yellow, larger and on much thicker pedicels than in the preceding species. *Sepals* 4, ·2-·25 in. long, equal, ovate, fleshy; *petals* thick, about twice the sepals, concave at the base. MALE FLS.—in small terminal umbellets; *stamens* numerous, on a fleshy 4-lobed elevated mass; filaments very short; anthers 4-gonous, 4-celled. FEM. FLS.: *staminodes* 4, 2-3 cleft with glands at the extremities; *ovary* 6-8 celled; stigma sessile, spreading, irregularly 6-8 lobed, fleshy glandular. *Fruit* about 2 in. diam. globose, depressed at the apex with a mamillate protuberance; seeds straight along the inner face but rounded along the back, covered with a juicy, fleshy, acid aril.

Hardly separable as a species from the last in the herbarium. As it is usually comparatively easily differentiated in the field, it has been tentatively separated.

Fairly common in UPPER ASSAM up to about 2000 ft. except perhaps the N. E. FRONTIER DISTRICT, often cultivated in homesteads for its acid fruit, which is considered as a specific for dysentery also for external application in obstinate cases of headache.

Flrs. 2-4. Fr. 6-8.

3. Garcinia affinis, Wall. Vern. *Thekakhaksi*, Garo; *Dieng-soh-kwang-rit*, Khasi.

A fairly large tree with horizontal branches and grey bark exfoliating in large roundish flakes, blaze pink turning brown, exuding white gum. *Leaves* 4-6·5 by 1·5-3 in., elliptic oblong to oblong lanceolate, shortly blunt acuminate, or subacute, thinly coriaceous (when dry), glabrous, lateral nerves about 18-24 on either half, fine with many intermediate ones, ending in an intramarginal nerve; base subacute or acute; petiole ·4-·6 in. long channelled with a stem clasping fleshy ligule at the base. MALE FLS.—·75 in. across, yellowish in terminal fascicles of 3-9; buds globose: pedicels ·1-·3 in. long. *Sepals* and *petals* 4 each, the latter much larger. *Stamens* in 4 short bundles. FEMALE FLS.—solitary terminal; ovary 4-celled; stigma divided. *Fruit* nearly globose, mamillate, 1·25 in. across, dark purple, dry crowned by the stigma.

Rongrengiri reserve—GARO HILLS, Rangbyneg—KHASI HILLS; SYLHET, Wallich's sheet No. 4254 referred to by Hooker, but of which there is no duplicate at Calcutta. Identification based on incomplete material.

4. Garcinia lanceæfolia, Roxb. Vern. *Rupohi-thekera*, Ass. *Prangsu*, *Prangso-arong*, Mik.; *Shushru-thai*, Kach; *Pelte*, Lushai; *Thisuru*, Garo; *Kengrapel*, *Toiteng*, Kuki; *Dieng-soh-jadu*, Khasi; *Dieng-soh-swit*, Synt.

A handsome glabrous shrub up to 12 ft. in height growing under dense shade of other trees; stem dark-brown, decussately branched. *Leaves* dark glossy—green, 2·5-5 by ·7-1·2 in. lanceolate, long-acuminate, rather fleshy when green but drying almost membranous; lateral nerves 8-10 on either side of the midrib, very slender, irregular, meeting close to the margin; base tapering; petiole ·4-·6 in. long, margined. *Flowers* red, terminal, solitary or 2-3 together, bracteate. male about ·3 in. across, female on short thick pedicels. *Sepals* 4, ·15-·2 in. long, broadly elliptic; *petals* 4, somewhat shorter and slightly oblique.

Stamens in 4 bundles of 4-5 each; anthers 4-celled. *Ovary* obovoid; stigma 6-8 lobed, glandular-tubercled. *Fruit* obovoid, about 1 in. diam., bright orange-red, 6-8 seeded.

Fairly common in evergreen forests in LAKHIMPUR, SIBSAGAR, CACHAR, NOWGONG, KHASI HILLS up to 3000 ft., GARO HILLS, NAGA HILLS; often cultivated in villages for the fruit.

The leaves are subacid and are eaten cooked by Mikirs. The ripe fruit which is acid is eaten with relish.

Flrs. 2-3. Fr. 6-7.

5. Garcinia Morella, Desr., including G. elliptica, *Wall.* Vern. *Kuji-thekera*, Ass.; *Korbomba*, Kuki; *Sundar-kau*, Sylhet.

A small tree up to about 40 ft. in height. *Bark* dark greyish-brown about ·3 in. thick; inside cream-coloured in older trees mottled with dark-brown dots, exuding a yellow gum. *Leaves* 4-6 by 2-3 in.; elliptic to ovate-lanceolate, obtusely acuminate, coriaceous; lateral nerves oblique, irregular, ·2-·5 in. apart; base cuneate; petiole ·3-·5 in. long, thickened and shortly ligulate at the base. MALE FLS.: generally 3 together, in axils of fallen leaves, very shortly pedicelled, about ·3 in. across. *Sepals* and *petals* orbicular, the latter somewhat larger. *Stamens* on a 4-angled fleshy mass; anthers orbicular, shortly stalked, flattened, circumsciss. FEMALE FL. larger than male, solitary, subsessile; staminodes about 12, the filaments forming a ring round the ovary. *Ovary* globose; *stigma* sessile, round or 4-lobed, tubercled. *Fruit* about ·7 in. diam. globose or slightly elongate, seated on the persistent sepals and crowned by the imperfectly 4-lobed stigma, yellow when ripe. *Seeds* 1, slightly compressed; testa dark-brown, slightly muricate.

Jaipur forests, LAKHIMPUR; Bhalukpung, DARRANG; Bhutan Hills, Barak Line Reserve, CACHAR; SYLHET, KHASI & JAINTIA HILLS—*Hooker*, probably also the vicinity of MIKIR HILLS.

Wood yellow, fairly hard, mottled, with numerous wavy concentric bands; medullary rays moderately broad; weight about 56 lbs. per c. ft. The gum resin is the true gamboge which is useful as a dye and medicine, but its use is not known in Assam. The seed yields a fatty oil which can be used for illuminating purposes also as a substitute for ghi.

There seem to be two varieties of this tree, the leaves of the one having closer and more transverse lateral nerves than of the other. There are no doubt other differences also, but materials at hand are not sufficient to enable me to define them.

Flrs. 12-2. Fr. 5-6.

6. Garcinia pedunculata, Roxb. Vern. *Bor-thekera*, Ass; *Tabing-asing*, Miri & Abor; *ampri-arong*, Mik.; *Thaipomlien*, Lushai; *Soh-lyntraw*, *Dieng-soh-danei*, Khasi.

A fairly large tree up to 60 ft. in height with a fluted trunk and rather short spreading branches. *Bark* thick, spongy; nearly smooth and dark-brown or dark grey outside, pale-brown inside with a network of very fine red lines; gum scanty and slow to exude. *Leaves* 6-12 by 3-5.5 in., obovate or oblanceolate, rigid, subcoriaceous, midrib stout; lateral nerves ·3-·5 in. apart,

arched so as to be tangential to the margins, tertiaries very fine, about ·08 in. apart, transverse to the secondary nerves ; base cuneate ; petiole 1-1·5 in. long. MALE FLS.—pale green in few-flowered terminal panicles and on stiff pedicels 2-3 in. long, each with a pair of bracts a little above the base ; *sepals* ·3 in. across, orbicular, fleshy ; *petals* slightly longer than the sepals but narrower ; *stamens* numerous in a 4-cornered mass ; anthers 2-celled but 4-angled. FEMALE FLS. solitary, larger than male, terminal on a thick 4-angled peduncle, which is .5-1·6 in. long ; *staminodes* 20-30 in 4 bundles, which are connate below ; stigma peltate, spreading, about 10-lobed. *Fruit* globose 3-4·5 in. diam., fleshy ; *seeds* 8-10, reniform, enclosed in a fleshy aril.

Occurs sporadically throughout UPPER ASSAM up to 3000 ft

The acid fruit is eaten raw or cooked.

Flrs. 9-4. Fr. 12-2.

7. Garcinia paniculata, Roxb. Vern. *Sochopa-tenga*, Ass. ; *Thisru* ; Garo ; *Bombs*, Tipp., ; *Bombhathei*, Lushai ; *Bombathing*, Kuki ; *Dieng-soh-jadu*, *Dieng-soh-longkor*, *Dieng-soh-long-kydair*, Khasi.

A handsome dioecious evergreen tree up to 60 ft. in height and 4 ft. in girth, with oval crown and decussate branches. *Bark* dark-brown or brownish grey and nearly smooth outside, about ·3 in. thick ; inside pink with fine veins of deep red, soon turning deep reddish brown, exuding a yellow gum. *Leaves* 4-7·5 by 2-3·5 in. obovate, elliptic or oblanceolate, suddenly bluntly acuminate, cuneate at the base, subcoriaceous, smooth and shining on both surfaces ; lateral nerves 8-12 on either half, arched and vanishing near the margin without forming a continuous intramarginal nerve ; tertiaries very fine, transverse, subparallel, ·1-·12 in. apart ; petiole ·6-·9 in. long, stout, slightly dilated at the base. MALE FLS.—dull-white, very sweet-scented, about ·5 in. diam. in decussately branched conical terminal panicles 3-5 in. long, with angled branches ; *sepals* and *petals* 4 each, decussate, imbricate ; *stamens* numerous on an elevated glandular receptacle. FEMALE FLS.—larger, sessile or on very short pedicels in few flowered peduncled terminal spike-like racemes, which are sometimes shortly branched at the base ; *ovary* oval ; stigma sessile, convex, entire, tubercled with minute glands. *Fruit* about 1 in. long, globose or slightly elongate, crowned by the hemispherical granular stigma ; *seeds* generally 4, enclosed in a pulpy aril.

Holongapar, Naga janka, Garampani, etc. in SIBSAGAR ; CACHAR, KHASI and JAINTIA HILLS up to 3000 ft,, LUSHAI HILLS, GARO HILLS, NAGA HILLS.

Wood moderately hard, greyish-brown with closely packed wavy concentric bands ; pores scanty, fairly large ; medullary rays of three grades, of the last grade very fine and close. It is liable to split. Weight about 40 lbs per c. ft. The ripe fruit is eaten with much relish.

Fls. 12-2. Fr. 5-7.

8. Garcinia atroviridis, Griff.

A graceful tree up to 50 ft. in height; branchlets terete smooth, thick; bark blackish. *Leaves* 6-9 by 2-3 in. oblong-lanceolate, abruptly acute at the apex, contracted at the base, thickly coriaceous, glabrous, shining both above and beneath; lateral nerves about 50 on either half (about ·12-·16 in. apart), anastomosing along the margin, inconspicuous when green, prominent when dry; petiole ·5-1 in. long, reddish. MALE FLS. about ·6 in. across, 2, less often 3 together; peduncles up to ·7 in. long, sometimes panicled; *sepals* 4, the two outer smaller, orbicular, concave, streaked with red inside; petals similar to inner petals, deep-red, concave; stamens united into a ring. FEMALE FLS.—terminal, usually solitary, about 1·5 in. across; peduncle 1 in. long; *staminodes* in a discontinuous wavy ring round the ovary; *ovary* vertically ribbed, 10-16 celled; stigma umbrella-shaped, entire, broader than the ovary, fleshy, blood-red, entire but wavy at the margin. *Ripe fruit* 3 in. across, globose, yellowish-green, slightly lobed at the base, crowned by the sessile stigma, which then becomes concave.

This tree occurs in the N. E. FRONTIER DISTRICT. Not yet met with in the other DISTRICTS.

The fruit is edible.

9. Garcinia anomala, Planch. Vern. *Ikabung*, Manipur; *Thechu*, Garo: *Dieng-soh-kuang*, *Soh-lain-khlaw*, Kh.; *Dieng-sa-shung*, *Dieng-soh-lang-sain*, Synt.

A small tree, with brown or grey rough bark about ·12 in. thick; blaze yellowish or very light pinkish white, very finely fibrous, exuding yellowish gum. *Leaves* 3·5-8 by 1·5-4 in. elliptic to oblong lanceolate, shortly blunt acuminate, coriaceous; lateral nerves fine about 16-27 on either side, with many intermediate ones, anastomosing near the margin, joined by fine tertiaries, often nearly at right angles; base cuneate, subacute or rounded; petiole ·5-·75 in. long, channelled; base with a fleshy sheathing ligule. *Flowers* in 3-flowered axillary cymes supported by opposite leafy bracts ·3-·5 in. long, peduncles up to ·4 in. long, bracteoles opposite, caducous, up to 1 in. long, more or less concave. MALE FLS.—*sepals* 4, ·3 in. long, suborbicular, concave. *Petals* 4, yellowish-white, obovate-oblong, slightly oblique, ·5 in. long. *Stamens* numerous, surrounding and concealing the pistillode; anthers forming a globose mass dehiscing longitudinally. FEMALE FLS.·6 in. across, sepals and petals smaller than in the male flrs., otherwise similar. *Staminodes* connate at the base, shorter than the ovary. *Ovary* oblong; stigma expanded, edges revolute. *Fruit* 1-celled, supported by the more or less persistent recurved sepals, 1-1·5 in long, subglobose or ovoid, with a short thickened style.

Damra Reserve, GARO HILLS, NAGA HILLS, KHASI & JAINTIA HILLS, 3000-5000 ft.

Flrs. 11. Fr. 11-2 (?)

Garcinia spicata, Hk. f. Vern. *Dingso Kwang,* Khasi.

A middle sized tree (70'159"). *Bark* brown, about '5 in.t hick, pale inside. *Branchies* angular. *Leaves* 5-8 by 2.5-3 in., broadly elliptic or elliptic oblong, acute, coriaceous, glabrous; lateral nerves numerous, slender, transverse nervules oblique; base acute or obtuse; petiole '4-'6 in. long, transversely rugose. *Flowers* 5-merous, in fascicles, frequently lengthening out to spiciform racemes; males sometimes mixed with females in the same fascicles. *Ovary* 3-4-celled, ovoid. *Fruit* green, subglobose, beaked.

Sheet No. 5036 (U. N. Kanjilal) is identified at Sibpur Herbarium (Royal Botanic Garden) as G. ovalifolia, Hk. f.=Garcinia spicata, Hk. f. I have followed Brandis in accepting the older name. This is a new record in Assam.

Fruit is eaten.

Fls. Hot season. Fr. Cold season.

Imperfectly known species :—

1. Garcinia sp., Vern. *Tempor,* Ass. A tree generally resembling G. xanthochymus, but taller. *Bark* dark brown, exfoliating in large flakes, thin, red inside, changing to dark brown, resin at first white, then yellow. *Branchlets* sulcate, swollen at the nodes. *Leaves* 6-8 by 2·5-3 in. ovate lanceolate, elliptic, or oblong, short acuminate or obtuse; base subacute or broadly cuneate, coriaceous, shining, main lateral nerves about 15-22 on either half, meeting near the margin, with many intermediate ones between, petiole '5-1·2 in. stout, laterally angled, rugose wih fine horizontal wrinkles, and with a fleshy stem-clasping ligule at the base. *Flowers* white, 4-merous, monoecious. MALE FLRS.-about 1·2 in. across; sepals coriaceous orbicular or broader than long '5-'6 in. across, two outer a little larger. *Petals* 4, subequal a little larger than the sepals. *Staminal* mass 4 lobed; filaments many, very short, anthers 2-lobed, dehiscing vertically. FEMALE FLOWERS-a little smaller than the male flowers about '9 in. across; stigma indistinctly and rather irregularly 4 lobed, smooth, edges recurved. *Fruit* not seen.

Sheet No. 3632 Rajgarali—LAKHIMPUR.
Flrs. 3.

2. Garcinia sp.-A small tree upto 35 ft. in height with a narrow crown and slender branchlets, young shoots red. *Bark* dark brown or black about '1 in. thick exuding yellow gum. *Leaves* 3-4 by 1-1·7 in. lanceolate or oblong to elliptic-lanceolate, acuminate, thick and fleshy when green, drying thin glabrous, shining above, glaucous beneath; lateral nerves fine, rather indistinct, upto about 18 in each half with many intermediate ones, usually joining close to the margin to from an intermarginal nerve, tertiaries very fine, oblique more or less wavy or subparallel; base acute, narrowed to the short, ('2-'3 in. long) channelled petiole. *Flowers* 4-merous, axillary or terminal, solitary or 2-3 together. MALE FLRS.: small on stout pedicels about '25 in. long; bracts opposite, small. *Sepals* '05 in. long, ovate. *Petals* imbricate in bud, orbicular, about '1 in. long. *Stamens* in 4 erect bundles joined at the base, round a pistillode with an expanded rugose stigma; staminal bundles adnate and opposite to the petals; anthers many, almost sessile, 4-celled. FEMALE FLS. not seen.

Longai Reserve, SYLHET, evergreen forest in SYLHET and possibly in other Districts. Sheets Nos. 4942 and 6897.

Wood coarse fibred, perishable.

Flrs. 4.

2. OCHROCARPUS, Thouars.

Trees. *Leaves* opposite or ternately whorled, coriaceous. *Flowers* polygamous in short cymes or lateral or axillary fascicles. *Calyx* entirely closed at first, at length splitting into 2, sometimes 3 valves or sepals. *Petals* 4 or more. *Stamens* indefinite; filaments filiform, free or shortly connate at the base; anthers erect oblong or linear, dehiscing longitudinally. *Ovary* usually 2-celled; ovules usually 2 in each cell; style short, stout, or 0; stigma 3-lobed. *Berry* 1-4-seeded. *Seeds*

large, enclosed in pulp ; embryo of a large fleshy tigellus with the cotyledons reduced to a small mamilla or 0.

Flowers in dense fascicles :—
Pedicels thickened upwards ·5-·75 in. long :—
Fruit 1 in. long, obliquely ovoid. ... . *1. O. longifolius.*
Flowers solitary or in few fld. lax fascicles :—
Pedicels slender 1-2 in long ;—
Fruit 1·25 in. long, ovoid. .. .. .. *2. O. siamensis.*

1. Ochrocarpus longifolius, Benth. & Hook. f. ex T. Anders. Vern. *Suklong*, Lushai.

A small or large tree with dense deep green foliage ; young shoots obscurely angled. *Bark* greyish brown, inside reddish, turning brown, exuding milky sap. *Leaves* 5-7 by 1-2 in., oblong lanceolate, usually acute or bluntly pointed, firmly coriaceous, quite glabrous, midrib prominent, veins elegantly reticulated ; base obtuse ; petiole stout, about ·3 in. long. *Flowers* ·6 in. across, in dense short fascicles, in axils of fallen leaves or on old wood. *Buds* globose, orange red ; pedicels ·5-·75 in. long, thickened upwards ; bracts numerous, subulate. *Calyx* reflexed during flowering. *Petals* white streaked with red, ovate oblong, acute deciduous. *Stamens* sterile in female flowers ; style short, stout ; stigma broad, peltate. *Fruit* 1 in. long, obliquely ovoid, tipped by the hard pointed style.

LUSHAI HILLS (A fragmentary specimen was collected here and identified as above in the Calcutta Herbarium).

The flower buds have commercial importances and are used for dyeing silk.

Fls. Hot season. Frt. Rainy season.

2. Ochrocarpus siamensis, T. Anders.

A middle-sized evergreen tree, glabrous. *Leaves* 8-10 by 1·5-2·3 in., oblong or oblong lanceolate, entire, obtuse, coriaceous, glabrous, midrib prominent, reticulated ; base narrowed into a thick petiole ·3-·5 in. long. *Flowers* fragrant, white, solitary or laxly fascicled ; pedicels slender 1-2 in. long ; sepals 2, herbaceous. *Petals* broadly oblong lanceolate, blunt or rounded at the tip. *Fruit* ovoid, mucronate, 1·25 in. long, glabrous.

LUSHAI HILLS (B. C. Sen Gupta).

Fls. Hot season. Frt. Rainy season.

3. MESUA, Linn.

Mesua ferrea, Linn. Vern. *Nahor*, Ass. & Miri ; *Inje* or *Ingiasing*, Abor ; *Micharne* or *Phikcharne-arong*, Mik. ; *Khung-khari-baphang*, Kach.; *Ngai-ching*, Naga ; *Nageswar*, Sans. ; Sylh & Cach. ; *Karai*, *Khimdi*, Garo ; *Khershei*, Tipp. ; *Nasser-bippang*, Mech ; *Kherser*, Kuki : *Herse*, Lushai ; *Uthau*, Manip. ; *Dieng-ngai*, Khasi.

A pre-eminently evergreen middle-sized handsome tree with a dense conical crown in pole stage. *Bark* grey and smooth but generally warty in young trees, afterwards dark-brown or cinnamon, exfoliating in large white flakes, which expose a warty reddish

brown inner surface, coarsely fibrous and red inside, exuding an aromatic oleo-resin. *Leaves* opposite, decussate, very variable, 2·5-7 by ·5-2 in., lanceolate or narrowly elliptic-oblong, bluntly long-acuminate, rounded at base on young plants, gradually more acute with age, thinly but rigidly coriaceous, glabrous, shining above, generally covered with a wax-like white powder underneath, red when young and tender, persisting for at least two years; lateral nerves very fine, almost invisible, straight, nearly parallel, sub-transverse; petiole, ·2-·5 in long, slightly channelled. *Flowers* solitary, generally terminal, sometimes axillary, 1·5-3 in. across, very fragrant; peduncles rusty-tomentose, ·3-·6 in. long. *Sepals* ·5-.6 in. long, 4 in 2 pairs, imbricate, thick but with sharp margins, concave, velvety-puberulous outside, persistent. *Petals* 4, pure-white, much exceeding the sepals, cuneate, obovate or obcordate, curled and erose at the margins, very finely brown or purple-veined, caducous. *Stamens* very many, forming a globose yellow mass in the centre of the flower; filaments very slender; anthers golden-yellow, linear, ·1-·12 in. long. *Ovary* ovoid, 2-celled, with 2 ovules in each cell; style long; stigma peltate. *Fruit* 1· 2-1·6 in. across, ovoid, pointed, 1-celled 1-4 seeded, supported by the persistent sepals. *Seeds* variously facetted according to their number in each capsule, with a dark-brown shining horny testa; cotyledons fleshy, oily pale-yellow; radicle inferior.

Common and generally gregarious in almost all evergreen forests in UPPER ASSAM, where the ground is more or less hilly. Does best on well-drained shingly soil with an admixture of red clay. Goes up to 3000 ft. in the MIKIR HILLS. Thrives best in a locality with heavy rainfall and humid atmosphere. Much cultivated in gardens and avenues.

Seedlings and saplings and even small poles stand shade very well. Gregarious flowering takes place every third or fourth year and flowering trees do not put forth new leaves, at any rate not till September following.

Sapwood white. Heartwood dark-red, very hard and very heavy (about 75 lbs. per c. ft.). Pores of moderate size, not numerous, generally in radial and obliique strings of 2-5. Medullary rays extremely fine and numerous, uniform and equidistant with numerous wavy concentric lines of lighter tissue. Annual rings indistinct. The timber, though hard and strong, is not very durable being subject to dry rot. It is, however, much used as house posts and piles, also railway sleepers. The flowers are used medicinally and an essence is often extracted from them. The oleo-resin which can be tapped from the trees may be used for varnish. The seeds contain fatty oil which has been found excellent for soap-making. Strung with thin strpes of bamboo they are often used as candles which burn steadily with a reddish light but give a heavy smoke. About 150-200 seeds weigh 1 lb.

New leaves 2-3, and occasionally 9-10.
Flrs. 4-5. Fr. 8-10.

4. KAYEA, Wall.

Trees. *Leaves* opposite. *Flowers* hermaphrodite, solitary or panicled. *Sepals* and *Petals* 4 each, imbricate; stamens numerous; filaments slender, free or connate at the base; anthers small, subglobose, 2-celled with vertical dehiscence. *Ovary* 1-celled; style slender, terminated by a 4—cleft stigma; ovules 4, erect. *Fruit* subdrupaceous, indehiscent, 1-4 seeded. *Seeds* with crustaceous testa.

Leaves narrow-oblong or narrowly lanceolate 5-10 in. long :—
Flowers 1 in. across, panicle branches lax. ... 1. *K. floribunda.*
Leaves ovate-to elliptic-lanceolate, 3-5·5 in. long ;—
Flowers ·3 in. across ; panicle branches short. ... 2 *K. assamica.*

1. Kayea floribunda, Wall. Vern. *Kasukorol, Karol,* Cachar ; *Darchong-khub, Serpai,* Kuki ; *Phai-hershei,* Tipp. ; *Bolong,* Garo.

A large tall evrgreen tree with greenish-grey or brown bark with faint horizontal wrinkles exfoliating in round scales, ·15-·25 in. in. thick, blaze light pink, or pinkish brown, finely fibrous, sometimes exuding yellowish gum ; all parts glabrous. *Leaves* 5-10 by ·8-2·5 in.. narrowly oblong to lanceolate. acuminate. coriaceous, glabrous, green on both surfaces, pellucid dotted at least when dry ; main lateral nerves about 20-30 on either half, arched and meeting near the margins almost regularly alternating with intermediate nerves, which in their turn alternate with finer ones running about half way up, prominent on the undersurface ; base acute cuneate or rounded ; petiole ·5-·7 in. long. *Flowers* white about an inch across on terminal panicles ; bracts and bracteoles small, opposite, deciduous, the former at the base of panicle branches, the latter at the base of pedicels ; pedicels ·25-·3 in. long. *Sepals* ·3 in long or broad suborbicular, broader than long, accrescent in fruit. *Petals* about ·4 in. long, white, with pink edges oblong-obovate or obovate. *Anthers* golden yellow. *Fruits* indehiscent dry, almost encased within the hardened, rugose sepals -- and at this stage -- connate sepals, and tipped by the style ; depressed globose or transversely ellipsoid, 1·5-1·75 in. across, 1-2 seeded. *Seeds* with reddish brown smooth testa.

CACHAR, Bhuban Hill, Sonai reserve ; Lallacherra ; Katakhal reserve ; SYLHET, GARO HILLS, KHASI HILLS ; ascending to 3000 ft.

Wood heavy, pores distant, but rather large, medullary rays fine with concentric bands of soft tissue across the rays giving them a superficial resemblance to annual rings. The timber is used for dugouts and construction

Flrs. 3. Fr. 5.

2. Kayea assamica, King & Prain. Ind. For. xxvii. 61.- Vern. *Sia-nahor,* Ass. (Lakh).

A slow growing tall handsome evergreen tree much resembling Nahor in general habit ; branches terete yellowish. *Bark* light brownish-grey, often exfoliating in large square plates ; inside fibrous, reddish with fine and close whitish veins, soon turning brown. *Leaves* 3-5·5 by 1-1·8 in., ovate or elliptic-lanceolate, shortly acuminate and often very finely mucronate, cuneate at the base, firmly coriaceous, somewhat shining above, dull underneath ; lateral nerves arched, almost regularly of three grades, the main ones ·25-·6 in. apart and looping to form an uneven intermarginal vein, those of the last grade disappearing about halfway between the midrib and the margin ; petiole slender, ·4-·9 in. long. *Flowers* white, about ·3 in. across in

terminal or axillary fascicled panicles 3-6 in. long with short, decussate, slender glabrous, bracteate branches ; pedicels in flower very slender, ·1-·2 in. long, much enlarged and thickened in fruit, bracteolate ; bracts and bracteoles small, opposite, caducous, buds globose about ·08 in. diam. *Sepals* 4, in 2 pairs, imbricate, the outer about ·15 in. diam., orbicular, inner spathulate, both much enlarged in fruit so as to completely envelope it. *Petals* 4, white, about ·1 in. long, sub-orbicular, thin. *Stamens* numerous, longer than the sepals ; filaments free, capillary ; anthers small, globose. *Ovary* 1-celled ; style slender ; stigma 4-fid ; ovules 4, erect. *Fruit* depressed globose, scarcely 1 in. long but about 1·8 in. in diam., entirely or almost entirely enveloped by the accrescent hard sepals. *Seeds* solitary, globose but very depressed, 1-1·3 in. diam. ; testa reddish-brown, crustaceous, smooth ; cotyledons fleshy.

The above description has been based on actual specimens and differs in some points from that given by the authors in the Indian Forester, notably as regards the fruit.

This tree occurs only along the foot of the Himalayas in the NORTH LAKHIMPUR SUB-DIVISION.

Heartwood red at first, turning to dark-chestnut, hard, even-grained, weighing about 60 lbs. per. c. ft. Annual rings generally narrow, sharply separated by a thin band of softer tissue Pores of moderate size, irregularly but uniformly scattered, often filled with resin. Medullary rays very fine but not so close as in Nahor, the distance between them being about equal to the transverse diameter of the pores, uniform, fairly equidistant. Sapwood of a lighter brown. The timber is much valued for construction in the North Lakhimpur Sub-Division. The fruit is used for poisoning fish.

Flrs. 4-5. Fr. 2-4.

5. CALOPHYLLUM, Linn.

Calophyllum polyanthum, Wall. Vern. *Telo.* Cach. *Sentebel,* Kuki ; *Dieng-la-Karu,* Khasi.

A medium-sized to large evergreen glabrous tree. *Bark* grey or brown, sometimes almost black when covered with lichens, about ·3 in. thick, somewhat rough, exfoliating in oblong flakes, blaze red or reddish brown with whitish bands exuding an amber coloured aromatic gum. *Branchlets* 4-angled, compressed. *Leaves* 2·5-4·5 in., oblong elliptic or ovate-lanceolate, bluntish acuminate, margins undulate, slightly recurved, coriaceous ; lateral nerves sub-transverse, very close, parallel ; base acute or cuneate, narrowed into the margined petiole, which is ·25-·5 in. long. *Flowers* about ·2-·3 in. across, polygamous, 4-merous in many flowered, long, simple or branched racemes from the upper leaf axils, usually exceeding the leaves and on terminal panicles ; pedicels slender, ·15-·2 in. long. *Sepals* unequal, outer suborbicular, small, inner petaloid, longer. *Petals* rather longer than inner sepals, obovate, reflexed. *Stamens* very many ; filaments filiform, short ; anthers 2-celled.

Ovary 1-celled ; style slender ; stigma peltate ; ovule solitary, erect. *Fruit* a subglobose or ovoid drupe about 1 in. long, crowned by the short style ; *seed* egg-shaped, brown.

CACHAR, GARO HILLS—Tura, KHASI & JAINTIA HILLS up to about 2500 ft., ABOR COUNTRY.

Young leaves are red.
Flrs. 2-3 Fr. 12 (?)

FAM. 20. TERNSTRŒMIACEÆ.

Erect or rarely climbing shrubs, or trees. *Leaves* alternate simple, extipulate, usually coriaceous. *Flowers* regular, generally showy and bisexual, usually subtended by a pair of sepal-like bracts. *Sepals* and *Petals* usually 5 each, rarely fewer or more, imbricate, the latter often connate at the base. *Stamens* numerous, free or connate at the base, often adnate to the petals. *Ovary* 3-5 celled (many celled in Actinidia) ; styles as many as ovary cells, or if simple, usually with as many divisions ; ovules 2-6 or many in each cell, on axile placentas. *Fruit* capsular or baccate ; *seeds* few and large, or numerous and small ; albumen scanty or 0.

1. Peduncles 1-flowered. Erect shrubs or trees :—
   A. Flowers 2-sexual, often 1-sexual in *(Ternstrœmia japonica)*, normally at least ·5 in. diam. Seeds few, large :—
      1. Fruit indehiscent :—
         a. Style simple ; anthers basifixed :—
            i. Anthers glabrous, ovules 2 in each cell of ovary. .. .. **1. Ternstrœmia.**
            ii. Anthers pilose ; ovules many in each cell of ovary :—
               Ovary 2-3 celled ; seeds few. .. **2. Cleyera.**
               Ovary usually 5 celled ; seeds numerous. .. .. **3. Adinandra.**
         b. Styles 5 ; anthers versatile, glabrous. ... .. **4. Pyrenaria.**
      2. Fruit dehiscent. Styles 3-5 ; anthers versatile :—
         a. Large or medium-sized trees ; seeds winged :—
            Capsule globose ; seeds reniform winged all round except along the straight ventral edge. .. ... **5. Schima.**
            Capsule oblong ; seeds prolonged upwards into an oblong wing. ... **6. Gordonia.**
         b. Shrubs or small trees ; seeds not winged. ... ... **7. Camellia.**
   B. Flowers diœcious ; scarcely more than ·2 in. diam. Anthers basifixed ; styles usally 3. Fruit a berry ; seeds numerous. ... ... **8. Eurya.**

II. Flowers in cymes umbels or panicles, usually not less than ·5 in. in diam. Anthers versatile :—
1. Fruit pulpy, many seeded :— Trees or erect shrubs. Styles 3-5. ... ... **9. Saurauja.**
2. Climbing shrubs. Styles numerous. ... ... **10. Actinidia.**

1. TERNSTRŒMIA, Linn.

Ternstrœmia Japonica, Tnunb. Vern. *Pani-jikiri*, Ass. (Darrang), *Pani-bokul*, Ass (Sibs) ; *Dieng-la-saw*, Khasi.

A glabrous tree, medium-sized under favourable conditions, but very often stunted to the size of a shrub. *Bark* grey, warty, blaze light reddish white, soon turning dirty brown, finely fibrous, about ·5 in. thick. *Leaves* collected towards the extremities of shoots 2-3 by ·7-1·2 in. oblong-obovate, oblong-lanceolate or elliptic, bluntly apiculate or rounded at the apex, gradually narrowed to the ·3-·5 in. long petiole, entire or minutely crenulate near the apex, coriaceous, dark green above, paler beneath ; lateral nerves about 8 on either half, very indistinct. *Flowers* yellowish white, solitary, more or less nodding from axils of fallen or existing leaves, usually dioecious, but sometimes hermaphrodite, ·4-·6 in. across when fully open, males very sweet scented ; peduncles ·4-·7 in. long with a pair of small broadly ovate bracts below the flower. *Sepals* and *petals* 5 each, subequal, ·2-·3 in. long, imbricate, connate at the base, orbicular to broadly elliptic oblong, eroso-ciliolate. *Stamens* numercus ; filaments short ; anthers linear, basifixed, apiculate, glabrous. *Ovary* 2-3 celled ; style simple ; stigma with 2-3 broad lobes ; ovules 2 in each cell, pendulous from the apex. *Fruit* ·5-·7 in. diam., obovoid-globose, shortly beaked by the remains of the style and supported by the persistent sepals and bracteoles ; *seed* 3-4, red.

A native of the hills, but often found in marshy localities in the plains, e. g., Borjan in LAKHIMPUR ; the Diroi Reserve in SIBSAGAR ; Chengelimara and Charduar in DARRANG, NAGA HILLS, etc.

Flowers 4-6. Fr. 9-11.

Two varieties of this tree seem to occur in our area :—

1. With larger and flowers crowded on short thick angled subpatent peduncles.

2. With smaller, more distant flowers on slender terete nodding peduncles. The former is the one commonly found in the Khasi Hills and latter is the variety that generally represents the tree in the plains.

2. CLEYERA, DC.

Trees or shrubs. *Flowers* small solitary on axillary peduncles which are often fascicled ; bracts minute or O. *Sepals* 5. *Petals* 5, more or less connate at the base, much exceeding the petals. *Stamens* many ; anthers pilose. *Ovary* 2-3-celled ; styles simple elongate with a 2-3 fid apex ; stigmas slender ; ovules many. *Fruit* baccate. *Seeds* usually few.

Peduncles usually fascicled in leaf axils ; bracts obsolete. ... 1. *C. ochnacea.*
Peduncles usually solitary or in twos in leaf axils, bracts minute ... 2. *C. grandiflora.*

1. Cleyera ochnacea. DC. Vern. *Pani-bokul*, Ass. (Sibs).

A small tree having a superficial resemblance to *Ternstrœmia japoncia*. *Leaves* 2·5-4·5 by ·7-1·7 in. oblong-obovate to oblanceolate, quite entire and with recurved margins, apex subacuminate with a broad blunt tip, cuneate at the base, midrib very stout ; main lateral nerves about 12 on either half, slender, tertiaries also slender, laxly reticulating ; petiole ·3-·45 in. long, flattened, broadly margined. *Flowers* yellow, ·5-·7 in. across, peduncles in axillary fascicles, rarely solitary, ·6-·8 in. long, glabrous, thickened upward ; bracts 0 or obscure. *Sepals* 5, about ·1 in. long, orbicular or broadly ovate, minutely but stiffly ciliate. *Petals* 5, yellow, ·3-·4 in. long, elliptic. *Stamens* numerous ; filaments longer than the anthers ; anthers with white bristles. *Style* filiform, persistent. *Fruit* a berry.

Diroi Reserve in SIBSAGAR ; probably also in the MIKIR HILLS ; lower range of KHASI HILLS.
Fls. 7-8. Fr. 9-11.

2. Cleyera grandiflora, H. kf. & Th. Vern. *Dieng-tiw-la-mluh*, Khasi.

A small glabrous tree similar to the last but larger in all its parts. *Bark* dark brown outside, reddish with patches of brown inside. *Leaves* 3-4 in. (5·5 in. according to F. B. I.) elliptic, shortly and often somewhat abruptly blunt acuminate ; base cuneate or acute at the base, coriaceous, midrib stout, lateral nerves indistinct, but apparently over 15 on either side ; petiole ·3-·5 in. long. *Flowers* 1 in. across, white, scented. *Peduncles* rather stout, ·6-1 in. long, with 2 minute alternate deciduous bracts towards the top. *Sepals* ·1-·15 in. long, orbicular or nearly so, ciliate. *Petals* ·4-·5 in. long, fleshy, elliptic. *Anthers* with scattered bristles. *Fruit* not seen.

KHASI HILLS—Rangbyneng, 4,000 ft. (sheet No. 7199). Probably not specifically distinct from C. ochnacea.

Wood heavy, very fine-grained, reddish-brown, hard.

Flowers 7.

3. ADINANDRA, Jack.

Adinandra Griffithii, Dyer.

A small tree ; *bark* dark grey and warted outside, brown with streaks of lighter colour inside ; all parts glabrous. *Leaves* 3-6·5 by 1·25-2 in., oblong elliptic or oblong-lanceolate, somewhat bluntly and often abruptly acuminate ; base narrowed, rounded, acute or cuneate, entire with stiff translucent margin, dark green above, paler beneath, coriaceous ; lateral nerves slender, rather obscure, upto 15 on either side ; petioles ·1-·6 in. long, stout,

channelled. *Flowers* solitary, white glabrous : peduncles 1-1·5 in. long, thicker upwards, recurved with 2 small bracts at the top. *Sepals* persistent, ·3-·4 in. long, inner larger, suborbicular to orbicular-obovate. *Petals* 5, about equalling the sepals, connate at the base. *Stamens* many, adnate to the petals, sparingly hairy. *Ovary* 5-celled, glabrous ; style joined at the foot, deeply 5-fid, segments linear ; ovules many in each cell, pendulous. *Fruit* a many seeded ovoid berry usually crowned by the thickened base of the style, about ·8 in. long ; *seeds* numerous, exalbuminous.

KHASI HILLS, Mamloo.

Flrs. 4-5. Fr. 10.

4. PYRENARIA, Bl.

Shrubs or small trees. *Leaves* fairly large, serrate. *Flowers* large, axillary, subsessile. *Sepals* 5, unequal, imbricating, the outermost generally resembling the bracts, the innermost the petals. *Stamens* numerous ; filaments adnate to the base of the petals. *Ovary* 5-celled with 2 ovules in each cell ; styles 5, free or more or less united. *Fruit* indehiscent, drupe-like ; *seeds* without a wing, with a woody testa, exalbuminous.

Leaves and branchlets glabrous ; bracts smaller than and resembling the sepals.	... 1. *P. barringtoniæfolia.*
Leaves beneath and branchlets pubescent ; bracts foliaceous, larger than and very unlike the sepals.	... 2 *P. diospyricarpa.*

1. Pyrenaria barringtoniæfolia, Seem. Vern. *Bon-madhuri*, (Wild Guava), Ass. (Sibs and Lakh) ; *Janghali-tagar*, *Janghali-cha*, Ass. (Darrang) ; *Pata-popuk-changne*, Daff.

A shrub up to 20 ft. in height. *Bark* dark grey, with fine vertical fissures, blaze brown or reddish-brown, ·1-·12 in. thick. *Leaves* 7-12 by 2·2-4 in. spathulate or oblancoelate, abruptly cuspidate-acuminate, tapering to a channelled stout petiole ·5-·6 in. long, cuspidate-serrate ; thinly coriaceous, glabrous, main lateral nerves 10-12 on either half, tertiaries very openly reticulate ; midrib depressed above, very prominent beneath. *Flowers* pale-white, 1·2-1·6 in. diam., axiallary, solitary on short, thick, glabrous peduncles about ·2 in. long. *Bracts* ·1-·15 in. long ; *sepals* ·3-·4 in. long ; *petals* ·5-·7 in. long, all more or less orbicular, grey silky outside, more or less eroso-ciliate. *Stamens* very many forming a yellow mass at the centre of the flower ; filaments short, glabrous, connate at the base. *Ovary* silky ; styles distinct. *Fruit* 1·5 by 1 in., ovoid, minutely lepidote, 5-celled ; stones thin-walled, each with 1-2-seeds ; seeds about ·5 in. long, ellipsoid, laterally also often partially ventrally, compressed with a hard smooth brown testa.

Fairly common in the outskirts of evergreen forests in all the DISTRICTS of UPPER ASSAM except perhaps the dryer portions of NOWGONG.
Flrs. 4-5. Fr 12-3.

2. Pyrenaria diospyricarpa, Kurz.

A small tree upto 25 ft. in height ; young parts densely grey-pubescent. *Bark* dark-brown outside, but red inside. *Leaves* 4-8·5 by 1·5-2·8 in., obovate or oblanceolate, abruptly bluntly-acuminate, cuspidate-serrulate, almost membranous, glabrescent above, finely pubescent especially along the midrib and nerves beneath ; main lateral nerves 10-14 on either side of the midrib anastomosing ·25-·5 in. away from the margin ; tertiaries distant, faint ; petiole ·25-·3 in. long, pubescent. *Flowers* 1-1·3 in. across, dull white, solitary, axillary, subsessile. *Bracts* green, very unequal, ·4-·7 in. long, ovate to oblong, pubescent outside. *Sepals* about ·4 in. diam., orbicular or obovate coriaceous, very densely silky-pubescent outside. *Petals* about ·7 by ·4-·5 in., elliptic, thick in the centre with membranous margins, glabrous except on the centre of the back. *Stamens* as in the other species. *Ovary* villous ; styles 5, free at the apex. *Drupe* 2-3 by 1·5-2·3 in. cylindrical or slightly obovoid, waxy-yellow, supported by the persistent bracts and sepals.

Nambor and Doyang Reserves, SIBSAGAR, not common. Sheet No. 8951, 1709.
Flrs. 11-12. Fr. 1-2.

The above description differs in some respects from Kurz's, flowering and fruiting time is also different. It is a good variety and may turn out on further examination to be a new species.

5. SCHIMA, Reinw.

Evergreen trees. *Leaves* thinly coriaceous. *Flowers* handsome, 2 bracteate ; peduncles—1 flowered and axillary or the uppermost in short racemes. *Sepals* 5, subequal. *Petals* 5, much larger, connate at the base, unequal, the outermost concave and more or less hooded. *Stamens* many, adnate to the base of the petals ; anthers versatile. *Ovary* 5 rarely 4-6 celled ; style simple or slightly lobed at the apex with broad spreading stigma ; ovules 2-6 in each cell, attached laterally, subpendulous. *Capsule* woody, depressed, globose, usually tipped by the persistent style, loculicidal with a persistent axis. *Seeds* flat, more or less reniform, winged all round except on the hilum, albumen scanty.

Sepals glabrate outside, outer concave, petals glabrous except at the base. ... *1. S. Wallichii.*
Sepals densely wooly outside, outer concave, petals densely silky. ... *2. S. khasiana.*

1. Schima Wallichii, Choisy. Vern. *Noga-bhe*, Ass. ; *Cheknan-arong*, *Chingan-arong*, Mik., *Ingkhia-ching*, Naga ; *Kamsuri* or *Kamsuri-phang*, Kach. ; *Rangi-Rata*, Sylh. ; *Bonak*, Cach. ; *Gugra*, Mech ; *Man-khing*, *Man-thiang*, Kuki, *Man-kh ing-thing*, Tipp., *Dieng-shyr-ngan*, Synt. ; *Dieng-ngan*, Khasi.

A large tree upto 90 ft. in height and 11 ft. in girth with a narrow crown in youth but developing a very large spreading one after height is completed. *Bark* plain and of a slaty colour when young, but brownish grey to almost black and rather deeply longitudinally cracked into rectangular plates on mature trees, finely fibrous, blaze cheesy red, ·7-1·5 in. thick ; the juice is said to be caustic. *Branchlets* lenticellate ; buds and young parts adpressed pubescent or villous. *Leaves* 3·5-9·5 by 1·4-3·2 in., oblong or elliptic-lanceolate, acute or acuminate, usually entire, thinly coriaceous, glabrous and shining above, more or less pubescent, especially along the midrib and other nerves beneath, or glabrescent ; midrib depressed above, lateral nerves reddish, 12-16 on either side of the midrib, oblique, slightly arched, generally forked ; petiole ·6-·8 in. long, sharply margined, more or less pubescent. *Flowers* white, scented, axillary, solitary, 1·2-2 in. diam. ; peduncles ·7-1·7 in. long, with small caducous, alternate bracts, thickened towards the extremity in fruit, usually lenticellate ; buds globose. *Sepals* 5, imbricate, ·15-·2 in. diam., subequal, orbicular, or rounded, broader than long, densely silky inside, margins ciliate. *Petals* 5, connate and silky pubescent outside towards the base, ·6—·8 by ·5—·6 in. outer sub-cucullate, inner obovate. *Stamens* many ; filaments adnate to the base of the petals ; anthers yellow. *Ovary* hairy towards the bottom, upper portion glabrous. *Fruit* a 5-celled loculicidal capsule, 5-·7 in. diam., depressed-globose, grey-pilose when young, covered with minute warts when mature, supported by the persistent calyx. *Seeds* 2—6 in each cell, ·3—·4 by ·15—·2 in., surrounded by a wing except along the straight ventral edge.

Fairly common in the dryer and deciduous types of forests in all Districts of UPPER ASSAM.

The Khasya hill variety of the plant has larger leaves 5·5-9·5 in. long, and stouter, shorter peduncles ·7-·12 in. long.

Timber reddish-brown, fine grained, moderately hard, durable, pores a moderate size, uniformly distributed ; medullary rays very fine, short, uniform ; annual rings fairly distinct ; weight about 45 lbs. per C. ft. It is liable to warp and split but is made into dug-outs and is made as planks and scantlings in buildings.

Flrs. 5-6. Fr. 12-2.

2. Schima khasiana, Dyer. Vern. *Dieng-an*, *Dieng-ngan*, Khasi.

A large handsome tree, branchlets glabrate, often lenticellate, buds scales and young parts densely brown silky tomentose. *Leaves* 3-6·5 by 1-3 in. elliptic, oblong lanceolate or elliptic lanceolate, acuminate, sometimes obtuse, somewhat abruptly narrowed at the base to the petiole, serrate, thinly coriaceous, more or less pubescent with forked spreading hairs when young, glabrous with age, shining above ; lateral nerves arcuate 9-13 on either side of midrib, usually forked near the margin, tertiaries fine, reticulate ; petiole dilated at the base. *Flowers* white up to 2·5 in. across, usually solitary from the axils of fallen leaves,

often crowded at the ends of branches and then appearing racemed; peduncle stout dilated upwards ·4-·5 in. long, densely pubescent above the bracteoles when young, glabrate with age; bracteoles 2. *Sepals* upto ·25 in. across, rounded, much broader than long, wooly on both surfaces, ciliate. *Petals* imbricate, outer more or less hooded, densely silky brown, tomentose outside, less hairy within, inner orbicular or suborbicular, externally pubescent in the lower part. *Ovary* hairy at the base. *Capsule* depressed, globose, tipped with the persistent style, up to 1·2 in. across, usually lenticellate, 5-celled, tardily dehiscent; seed flat upto ·5 in. long, subreniform, winged all round, except on the ventral depression or line (hilum).

KHASI HILLS, NAGA HILLS, MANIPUR 4—6, 500 ft.
Fls. 7. Fr. 3—5. (next year).

6. GORDONIA, Ellis.

Gordonia excelsa, Bl.

A tree.. *Leaves* 2·5-5·5 by 1-2 in. elliptic or elliptic oblong, acuminate, tapering at the base to the short petiole; obscurely serrulate, rather coriaceous, glabrous; midrib depressed above, rather coriaceous; petiole ·25 in. long. *Flowers* about 1·5 in. across, axillary and sub-terminal, sessile or on short bracteate peduncles; buds ovoid, ·4-·6 in. long, silky outside; bracteoles passing to sepals and the latter into petals by gradation. *Sepals* and *petals* 5 each, silky outside, rather fleshy; stamens numerous. adnate to the petals; filaments slender, hairy only at the base. *Ovary* 5 (?) celled; ovules 4-8 in each cell. *Capsule* 1-1·3 in. long, oblong, woody, loculicidal with a persistent axis. *Seeds* ·3 by ·1 in. compressed, terminating in an oblong wing ·4-·2 in.

KHASI HILLS (sheet 6986) - specimen incomplete. There are no specimens from our area in Herb. Cal.
Flrs. 4-5. Fr. 12-2.

7. CAMELLIA, Linn.

Evergreen shrubs or small trees. *Leaves* serrate or serrulate. *Flowers* axillary, solitary or fascicled, bracteate. *Sepals* 5-6, unequal, the outermost smallest resembling bracts, the innermost largest resembling petals. *Petals* 5, slightly connate at the base, imbricate. *Stamens* many, the outermost more or less monadelphous and adherent to the base of the petals, the innermost free; anthers versatile. *Ovary* 3-5 celled: styles 3-5, more or less united; ovules 4-5 in each cell, pendulous. *Fruit* a loculicidal capsule, woody,. *Seeds* generally solitary in each cell, wingless, exalbuminous; radicle superior.

1. Flowers drooping, sepals persistent:—
   Branchlets glabrous. Leaves coriaceous, almost wholly glabrous. Filaments glabrous. Capsule usually 3-seeded. ... 1. *C. theifera.*
   Branchlets pubescent. Leaves membranous, pubescent along midrib. Filaments villous. Capsule 1-seeded. ... 2.. *C. caudata.*

II. Flowers erect, sepals deciduous:—
Flowers large : 1-1·25 in. across, stamens 70-80. ... 3. *C. drupifera.*
Flowers moderate sized up to ·75 in. across, stamens about 30. ... 4 *C. caduca.*

1. Camellia theifera, Griff. Syn. Thea chinensis, *Linn.* Vern. *Cha, Chah*, Hind & Ass. The tea plant.

A large evergreen shrub with glabrous grey branchlets. *Leaves* 3-6 by 1-2·5 in., obovate, elliptic-oblong or oblanceolate, acute or acuminate, closely serrate or serrulate, usually coriaceous, glabrous above, often slightly pilose along and near the midrib beneath ; main lateral nerves very slender, somewhat transverse, 8-12 on either side of the midrib, arched and forming an intermarginal nerve away from the margin ; petiole ·15-·2 in. long, flattened above and slightly margined. *Flowers* white, 1-1·5 in. diam., solitary or a few together ; peduncles very short with 2-3 sepal-like bracts. *Sepals* 5, ·1-·12 in. long, orbicular, concave, leathery, ciliate, glabrate, pubescent or sikly outside, persistent. *Petals* 5, ·5-·7 in., long, broadly obovate, slightly connate at the base, glabrous or puberulous outside. *Stamens* numerous ; filaments glabrous connate at the base also adherent to the base of the petals. *Ovary* 3-5 celled, villous ; styles 3, glabrous, connate beyond the middle. *Capsule* ·7-·9 in. diam., 3-cornered, leathery ; seeds generally 1 in each cell, rarely more, globose or facetted, smooth, pale brown.

Extensively cultivated in all the Districts of UPPER ASSAM, also found wild in parts of LAKHIMPUR and SIBSAGAR.

wood greyish-white or light cinnamon colour, very fine-grained with uniformly distributed numerous pores and very fine close medullary rays. Straight branches of unpruned shrubs make very good walking sticks and tool handles.

Flowers 12-3. Fr. 9-12.

2. Camellia caudata, Wall. Vern. *Phulkat*, Ass. (Sibs) ; *Dieng-chi, Dieng-tyrnem-synrang*, Khasi ; *Dieng-la-phyrno*, Synt.

A small evergreen tree with a spreading crown ; branchlets grey pubescent. *Bark* very thin, smooth, greyish or reddish-brown, brownish green underneath the membranous outer layer, blaze reddish brown inside. *Leaves* 1·7-3·5 by ·6-1·3 in. elliptic-oblong to narrowly oblong-lanceolate, caudate-acuminate, serrulate, membranous glabrous above, except the depressed puberulous midrib, more or less pubescent or pilose beneath, especially along the prominent midrib ; lateral nerves very slender oblique and irregular, 8-12 on either half, anastomosing ; petiole ·1-·2 in. long, slender, pubescent. *Flowers* white, faintly scented, about 1 in. diam., solitary or 2-5 together, nodding ; peduncles covered with imbricating bracts throughout. *Bracts* and sepals ovate, silky outside. *Petals* 5, spirally arranged, ·3-.4 in. long, gradually larger inward, obovate, puberulous or silky towards the apex outside. *Filaments* clothed with spreading silky hairs, outer coherent into a glabrate tube ·2-·3 in. long. *Ovary* and style densely white, villous ; the latter slightly

exserted, trifid at the apex, segments linear, glabrous. *Capsule* 1 by ·7 in., globose or more or less pointed at both ends 1-seeded, opening stellately.

Frequent in evergreen forests in LAKHIMPUR and SIBSAGAR very common round Garampani and behind Numaligarh ascending KHASI and JAINTIA HILLS up to 5,200 ft.

The wood is yellowish-white, fine and close-grained but somewhat soft and light

Flrs. 10-11.

3. Camellia drupifera, Lour. Syn. *C. Kissi*, *Wall.* *C. Mastersi*, *Griff.* Vern. *Dieng-tyrnem-bhor*, Khasi.

A shrub or a small tree. *Bark* grey outside, light red and paler towards the cambium inside: branchlets pubescent, buds silky. *Leaves* 2·5-4·5 by 1-1·6 in., elliptic-oblong, oblong-lanceolate or oblanceolate, acuminate or shortly caudate, tapering at the base to petiole, margins slightly recurved, slightly serrulate or almost entire, coriaceous, glabrous above, pilose or glabrescent beneath; lateral nerves rather indistinct, 8-10 on either side of midrib, forming loops close to the margin; petiole ·1-·2 in. long when young, glabrate with age. *Flowers* white, 1-1·25 in. across, erect; peduncles terminal and axillary 1-3 together, very short, at first closely invested by the imbricating bracts, ultimately marked with prominent annulate scars; bracts early deciduous, upto ·4 in. long, upper larger, suborbicular or broadly ovate, silky tomentose, grading into the sepals. *Sepals* deciduous, up to ·3 in. long, suborbicular, silky outside. *Petals* about ·7 in. long, obovate, more or less pubescent outside. *Stamens* about 70-80, glabrous, outer connate at the base, inner free. *Ovary* wooly; style with 2-3 fid. hairy towards the base. *Capsule* about 1 in., at first pyriform and pubescent, ultimately globose; seed usually 1 in each cell.

KHASI HILLS 3000-5000 ft., CACHAR HILLS (Prazer), NAGA HILLS, MANIPUR.

Flowers 7-11. Fr. 1-(?)

4. Camellia caduca, C. B. Clarke, Mss. Vern. *Dieng-tyrnem*, *Dieng-jlih-balieh*, Khasi.

A large shrub, somewhat resembling the last species but with smaller leaves of flowers. *Leaves* 1.7-3 by ·8-1·2 in. oblong or elliptic lanceolate, acuminate; base cuneate, acute or tapering, usually sharply serrulate or nearly entire, coriaceous, often minutely wrinkled, midrib pubescent, otherwise glabrous above, under surface pilose, specially towards the base and along the midrib or glabrate; lateral nerves obscure, 6-9 on either half, meeting near the margin in loops; petiole ·25-·3 in. long. *Flowers* white, scented, erect on short stout peduncles; ·6-·75 in. across; peduncles axillary or terminal, 1-4 together; bracts caducous, silky or thinly pubescent, larger upwards, more or less keeled, up to ·25 in. long, passing upwards into the sepals and leaving prominent scars on the

peduncles after falling. *Petals* unequal, inner larger up to ·5 in. long, obovate, nearly glabrous or slightly pubescent outside. *Stamens* 20-38, glabrous. *Ovary* tomentose; style usually 2-3 fid, hairy towards the base. *Capsule* up to ·75 in long, pyriform, pointed at the apex.

KHASI HILLS, 4,500-6,000 ft. ; common.

Flrs & Fr. 10-12.

8. EURYA, Thunb.

Shrubs or small trees. *Leaves* 2-stichous, usually serrate, generally shining above. *Flowers* small, generally dull-white, dioecious, in axillary fascicles, rarely solitary with persistent bracteoles. *Sepals* and *Petals* 5 each, imbricate, the latter united at the base. *Stamens* 12—22, from the base of the corolla ; anthers basifixed. *Ovary* usually 3-celled with 3 styles which are free or united. *Fruit* a berry containing numerous angular seeds ; albumen copious, oily.

Leaves usually serrate :—		
Generally shrubby ; branchlets angular, usually glabrous. Sepals glabrous or glabrate.	.. ..	1. *E. japonica.*
Often a middle-sized tree ; branchlets terete, pubescent Sepals pubescent	..	2. *E. acuminata.*
Leaves nearly entire.	... ..	*E symplocina.*

1. Eurya japonica, Thunb. Vern. *Saseni*, Ass., *Murmura*, Ass. (Lakh) : *Yabi-changne* Daff. ; *Pan-heng-heng*, Jharua ; *Chhamisi*, Garo : *Dieng-pyrsit*, Khasi.

A very variable shrub of the look of tea-bushes, occasionally a small tree up to 25 ft. in height ; branchlets angular with prominent decurrent lines from both sides of the base of the petioles, usually glabrous. *Bark* thin, dark-brown with lines of lenticels, blaze reddish greenish-white. *Leaves* dark-green, 1-3.5 by .6-1.4 in., elliptic obovate or oblanceolate, tip rounded or subacute, closely serrate, thinly coriaceous, glabrous except the midrib, which is hairy underneath ; main lateral nerves somewhat transverse, about 10 on either half ; tertiaries reticulate ; midrib impressed above, prominent beneath. *Flowers* about .1 in. long, white in fascicles of 2-5 rarely solitary, each with two minute bracteoles, with an unpleasant pungent smell, generally glabrous. *Sepals* unequal, the two outer smaller, suborbicular or broad ovate, obtuse. *Petals* white, about double the sepals, obovate. MALE FLS.—*with* no sign of pistil ; *stamens* 12-15, slightly exserted. FEMALE FLS.—*styles* generally 3, very slender, slightly united in flower, but often nearly to the top in fruit. *Berries* about .15 in. diam., mucronate with the remains of the styles, black and with a pinkish juice when ripe.

MIKIR HILLS and adjoining forests of SIBSAGAR and NOWGONG ; Jokai and Jaipur Reserves in LAKHIMPUR, not very common in UPPER ASSAM, NAGA HILLS, KHASI HILLS up to 6000 ft.

Flrs. & Fr. 6-1 : probably throughout the year.

Var. nitida, *Kortfis-Leaves* 1-2.2 by .5-.8 in. narrow elliptic or lanceolate, acute or shortly acuminate ; petioles very short ; styles united above the middle.

KHASI HILLS.

Var. *phyllanthoides*, *Blume*—branchlets silky pubescent at the tips. *Leaves* longer than in the type, narrow elliptic, or oblong lanceolate, acuminate styles united.

KHASI HILLS (Griffith).

Eurya japonica, Thunb. Var. *nitida*, *Kortfi*-forma Kanjilali, *Debbarman*, N. f.

A small tree, about 10-15 ft. tall. *Leaves* alternate. 1.5-5.7 by .3-.7 in., very narrow oblong or elliptic linear lanceolate, acute, some acuminate, narrowed towards the base ending in short about ·1 in. long petiole, margins distantly somewhat glandular serrate. *Flowers* dioecious, axillary, about .1 in. in diameter.

♂ Flower with 5 sepals, 5 petals, both subequal, glabrous outside, obscurely pubescent inside, caducous. *Stamens* 15 ; pistillode frequently present. *Ovary* 5-locular ; styles -2.

Habitat :—ASSAM, KHASI & JAINTIA HILLS, near Kynshi, 5th October, 1915, U. N. KANJILAL No. 6014 ; N. CACHAR HILLS, Dehingi Bank, 1500-1600 ft, 25th June 1915, U. N. KANJILAL No. 6780.

2. Eurya acuminata, DC. Vern. *Murmura*, Ass. (Sibs) ; *Theng-han-jang*, Mik. ; *Bon-dousa*, *Bon-sobai*, Mech ; *Dieng-la-pyrshit*, Synt. ; *Dieng-shit*, *Dieng-pyrshit-heh*, Khasi.

A small evergreen tree, sometimes up to 40 ft. in height ; branchlets terete, the decurrent ridges, if at all present, not prominent ; young parts generally grey-hairy. *Bark* dark-brown and fairly smooth outside, reddish inside, thin. *Leaves* 2-4 by .5-1.4 in. oblong to linear-lanceolate, generally caudate-acuminate, closely crenate serrate, subcoriaceous, glabrous and often shining above, midrib impressed above, prominent and hairy beneath ; main lateral nerves about 12 on either half alternating with shorter intermediate ones ; base subacute ; petiole very short, puberulous. *Flowers* .15-.25 in. long, white with a very heavy unpleasant smell, 2 bracteolate, nodding, up to 8 from the lower leaf axils and 2 or even 1 from the upper. *Sepals* concave, pubescent outside, outer 2 smallest. *Petals* white, alternating with the sepals, .1-.2 in. long, much exceeding the sepals. *Stamens* 15-24, shorter than the petals. *Ovary* pubescent ; styles 3-5, united beyond the middle in the type, free in var. *cuprista*, recurved in fruit. *Capsule* globose, .2 in. across, crowned with the remains of the style. *Seeds* bluntly trigonous.

Fairly common in all the DISTRICTS of UPPER ASSAM, KHASI and JAINTIA HILLS up to 5500 ft., NAGA HILLS.

Arrested shoots with imbricating lanceolate aristate greenish scales or less often reduced leaves, are sometimes formed in the leaf axils.

Flrs. 9-11. Fr, 1-6.

Var. *cuprista*, *Korths*, Vern. *Gaurchikrai*, Ass.— differs by having broader and more membranous leaves which are more or less pilose beneath and more glossy above, the *flowers* being usually solitary and the styles 4-5, free both in flower and fruit. Also the *sepals* and *ovary* are glabrous. *Bark* deeper red inside and in thin layers. Grows up to 35 ft. in height Found at Diffulu and the foot of the Tiru Hills, SIBSAGAR also in KHASI HILLS.

Wood reddish brown, soft, even grained with evenly distributed minute pores and very fine medullary rays, weighing about 40 lbs per c. ft. It is very good for fuel.

Var. *Wallichiana*, Stend - styles united.

KHASI HILLS, CACHAR.

Eurya trachyacarpa, Korth. - A shrub. *Leaves* resembling those of E. acuminata, but narrower, longer tailed, more closely serrate, and more membranous ; petiole slender ·1 in. long. *Peduncles* slender, glabrous .15 in. long, solitary or 2-3 in a fascicle, each with 2 small bracts. *Sepals* pubescent and styles united to $\frac{2}{3}$rd their lengths. Hooker records it from Khasi Hills on Griffithi's authority. There is no specimen at Calcutta Herbarium.

Eurya symplocina, Bl. - An evergreen tree, with dark grey bark. *Branchies* lenticelled ; leaf buds silky, narrow lanceolate. *Leaves* 2-4 by ·6-1·4 in. elliptic lanceolate, bluntly acuminate, thinly coriaceous, glabrous, or midrib beneath with adpressed pubescence, entire or serrulate above the middie ; base cuneate ; petiole ·15-·2 in. *Flowers* ·2 in. diameter, flatter than in E. acuminata but with similar unpleasant smell, mostly below the leaves, in 3-4 flowered fascicles from axils of fallen leaves ; pedicels ·15-·25 in. long, 3 bracteate. *Sepals* unequal, silky outside, more free than in E. acuminata. *Petals* ·15 by ·1 in. elliptic. *Anthers* long ; styles united more than half way up. *Fr :* ·15 in. diam , with remains of the style at the apex

No. 6223 from Sehrarim, KHASI HILLS. The specimens are rather incomplete for satisfactory determination.

Flowers 11.

9. SAURAUJA, Willd.

Shrubs or small trees generally with strigose or scaly branches. *Leaves* approximate at the ends of branches, generally glabrous above, usually serrate, with prominent parallel lateral nerves. *Flowers* usually 2-sexual, bracteate, in axillary cymes or panicles ; bracts remote from the calyx. *Sepals* and *petals* 5, each, much imbricate, the former persistent, the latter more or less united at the base. *Stamens* many ; filaments adhering to the base of the corolla ; anthers versatile, opening by pores. *Ovary* 3-5 celled ; styles as many as cells, free or more or less united ; ovules many in each cell, anatropous. *Fruit* a 3-5 locular pulpy berry, rarely dry or subdehiscent ; seeds many, small, albuminous.

I. Flowers under 1 in. diametre ; sepals not covered with scales :-

A. Flowers in long peduncled panicles 6-13 in. long :-

Sepals totally or nearly smooth, young parts covered with ferruginous tomentum and pointed scales mixed. .. 1. *S. napaulensis*

Sepals densely wooly outside, yonng parts covered with floccose rusty tomentum. .. .. 2. *S. Griffithii.*

B. Flowers in solitary or fascicled cymes from axils or axils of fallen leaves :-

Sepals smooth outside :-

Leaves glabrous and satiny underneath, lateral nerves 10-20 on either half, oblique and arched, petiole up to 1 in. Flowers ·25 in. across, white, fading to pink. ... .. 3. *S. Roxburghii.*

Leaves densely mealy rusty puberulous beneath, lateral nerves up to 40 on either half nearly straight ; petiole 1-2 in. long. Flowers ·7 in. across light pink. .. .. 4. *S. punduana.*

Leaves rusty tomentose beneath, lateral nerves up to 25 on

	either half, oblique and arched, minor nerves conspicuous, underneath ; petioles 1-2 in. long Flowers ·3 in. across, white turning pink.	..	5. *S. fasciculata.*
	All parts clothed with stiff long rusty or black hairs, leaves distant, stiff hairs on the principal and minor nerves above, more densely hairy beneath ; lateral nerves 15-25 pairs, arched, petioles ·5-1 in. long. Flowers ·25 in. across		6. *S. macrotricha.*
II.	Flowers 1 in. across, sepals densely covered with sharp pointed scales .— Peduncles solitary or fascicled from axils of existing leaves :— Leaves thinly puberulous or glabrescent beneath, lateral nerves up to 30, slightly arched. Flowers white with a bright red centre. ...	..	7. *S. cerea.*

1. Saurauja napaulensis, DC.

A small tree with reddish brown bark ; young parts covered with broad based acuminate scales and brown scurfy tomentum. *Branchlets* and petioles ultimately tuberculate with the persistent bases of scales. *Leaves* 7-12 by 2·2-6·5 in., elliptic, oblanceolate or oblong lanceolate, acute or short acuminate, serrate, upper surface glabrate, undersurface ferruginous tomentose, sometimes glabrate with age ; lateral nerves 25-35 on either half, prominent subparallel, connivent near the margin with the upper, tertiaries fine, base narrowed ; petioles 1-2·5 in. long, ultimately tuberculate and glabrate. *Flowers* pink, ·5 in. across, in long peduncled lax axillary panicles up to 16 in. long, usually from the ends of the branches ; branches up to 3·5 in. long ; bracts deciduous, elliptic acute, ·15 in. long. *Sepals* ·15-·25 in. long, broad ovate or suborbicular, obtuse glabrous or slightly pubescent towards the base, edges membranous, persistent. *Petals* broad, exceeding the sepals, marcescent tips recurved, margins fimbriate to about the middle, tube widened below ; *stamens* many, free. *Ovary* glabrous ; styles 5, radiating, united towards base. *Berries* ·35 in. across, green, sweetish, subglobose or broad ovoid, 5 lobed, green, mealy inside. *Seeds* reddish brown small.

KHASI HILLS, NAGA HILLS, GARO HILLS, MANIPUR, 2500-5000ft.
The ripe fruit is edible.

Flrs. 12-6. Fr. 11-1.

2. Saurauja Griffithii, Dyer.

A middle-sized or small tree, bark brown rough vertically fissured, blaze ·25-·3 in. very soft, whitish. *Young* twigs, undersurface of leaves, petioles and inflorescence covered with dense rusty or reddish brown floccose tomentum, specially when young. *Leaves* 10-13·5 by 5-7·5 in. broadly elliptic or obovate, shortly

apiculate or abruptly short acuminate, from the rounded apex, subentire or with distant spinulose teeth, base rounded ; lateral nerves 30-35 on either half, tertiaries subparallel near the margin, coriaceous, upper surface glabrous ; petioles 1·5-2·5 in. long. *Flowers* ·2-·3 in. across, in peduncled-much branched axillary panicles up to 13 in. long ; peduncles up to 7 in. long, main branches 2-3 in. long ; pedicels up to ·7 in. long ; bracts early deciduous, up to ·6 in., ovate or elliptic, lower leafy, bracteoles small, oblong. *Sepals* up to ·25 in. suborbicular broad ovate or elliptic, tomentose outside. *Petals* not seen in our specimens. *Styles* 5, combined at the base. Berry 5 grooved, about ·3 in. across, tipped by the style and seated in the persistent calyx.

GOALPARA, but usually found in SIKKIM in the hills between 3700 & 5000ft. The old leaves are sometimes glabrate on the undersurface.

Flowers 2-6.

3. Saurauja Roxburghii, Wall. *Bon-posola*, Ass. (Lakh & Sibs)., *Paniposala*, *Porbotia-sengunia*, Ass. (Darr.) ; *Hengunia*, Ass, (N. Lakh) ; *Chepu-changne*, *Chipung-changne*, Duff., *Nonthler-arong*. Mik., *Tong- bahu*, *Dia-ching*, Naga ; *Bon-loisu-phang*, Kach ; *Gogon*, Nep ; *Sing-khrau*, Manip. ; *Terpui*, Lushai ; *Deibru*, Mech. *Geng-sning*, *Bor-jir-sinning*, Garo ; *Arbeng-thing*, Tipp. ; *Dieng-soh-la pied*, Khasi.

A small tree up to 30 ft. in height and 30 in. in girth, generally with a narrow crown ; young parts covered with scurfy tomentum and subulate scales. *Bark* grey or greenish-grey and on old stems, corky outside and closely vertically fissured, on branches, green below the cuticle, greenish or pale pinkish-white inside, 3-·5 in. thick, finely fibrous, exuding copious watery sap during spring. *Leaves* 5-12 by 2-4·5 in., elliptic or elliptic oblong, acute or shortly acuminate, subacute or more or less rounded at the base, shallowly serrulate, subcoriaceous, wholly glabrous when mature, pale and with a satiny gloss underneath when green ; lateral nerves 10-20 on either half, somewhat distant oblique, arched often rather corky, tertiaries transverse and parallel, quaternaries very minutely reticulate ; midrib stout ; petioles 1-2 in. long, terete, glabrescent. *Flowers* ·25 in. across, urceolate, on shortly peduncled slender fascicled cymes from the axils of fallen leaves ; buds globose, about ·1 in. in diam. ; bracteoles minute. *Petals* ovate, white, fading pink, united at the base, tips recurved. *Stamens* about 50. *Ovary* glabrous ; styles usually 5, sometimes 4, united below, but abruptly stellately spreading above. *Berries* whitish, about ·2 in. diam., globose.

Common throughout the whole province up to 400 ft.

Wood yellowish when green turning reddish brown, soft, with a large pith pores and medullary rays very fine, very numerous. The leaves are good cattle and buffalo fodder and the ripe fruit is eaten.

Flrs. 3-5. Fr. 5-8.

4. Saurauja punduana, Wall. Vern. *Rata-gogon*, *Gaban*, Nep; *Dieng-ja-la-ngap*, Khasi; *Dieng-soh-la-pot*, Khasi (Nongstoin); *Dieng-soh-khipt*, Khasi (Nongkhlaw); *Dieng-soh-la-pied*, *Dieng-la-kampied*. Synt.

A pretty, small, evergreen tree about 20 ft. in height somewhat of a squat habit and with thin lepidote branchlets. *Bark* brown or brownish grey with large corky lenticels, vertically split on old stems, green underneath the cuticle on branches; inside greenish white changing to brown on exposure, finely fibrous, soft and slightly mucilaginous. *Leaves* 6-12 by 2·5-4·2 in., elliptic obovate or oblanceolate, finely acuminate, cuspidate serrate, coriaceous, glabrous above, finely buff or tan mealy tomentose beneath; lateral nerves 25-40 on either half, reticulating near the margin, on the undersurface, each with 4-6 minute subulate scales at regular intervals, tertiaries transverse or slightly oblique, subparallel, very fine; base cuneate, subacute or abruptly rounded; petioles 1-2 in. long; rather stout, covered with adpressed lanceolate scales. *Cymes* 2-3 in. long, fascicled or solitary from axils of present and fallen leaves; peduncles sometimes flattened, ramifications densely covered with acute scales; bracteoles broadly ovate, pointed. *Flowers* ·7 in. across, white, changing to pink; *sepals* 5, thin, glabrous; *ovary* ovoid or globose, glabrous; *styles* 5, united up to varying heights, tips spreading. *Berry* globose, white.

Along the foot of the NAGA HILLS in the LAKHIMPUR and SIBSAGAR DISTRICTS; e. g., the Jaipur and Desai Valley Reserves; also the MIKIR HILLS, GARO HILLS and KHASI HILLS up to 5,000 ft.

Wood light brown, soft, not of any particular use. The ripe fruits are eaten.

Flrs. 4-6. Fr.9-11.

5. Saurauja fasciculata, Wall. Vern. *Sare-gogon*, Nep.

A small tree affecting rocky streams and the vicinity of waterfalls: branchlets covered with densely rusty-tomentose and scattered adpressed scales mixed, bark brown. *Leaves* 6-12 by 1·3-3·2 in., narrow elliptic-oblong, finely acuminate, acute or rounded at the base, setose serrulate, coriaceous, glabrous above, softly and rusty tomentose underneath; lateral nerves 16-30 on either half, arched, looping at the extremities; midrib stout, covered with deciduous adpressed scales; petioles ·6-1·4 in. long, terete, covered with scattered scales, ultimately glabrate. *Cymes* up to 3 in. long, pedunculed, branches glabrous, 1-3 flowered; bracteoles minute, linear-deltoid. *Flowers* ·3 in. across, white, fading to pink; *sepals* ovate, obtuse.

Only once found near Borjan, Makum Forest, LAKHIMPUR.
The leaves are eaten by cattle and buffaloes.

Flowering and fruiting time unknown.

6. Saurauja macrotricha, *Kurz*. Vern. *Dieng-soh-jalbi*, *Dieng-soh lympied*. Khasi.

A small tree clothed with long stiff rusty brown, sometimes almost black hairs. *Leaves* 7-11 by 2-3·4 in. lanceolate or

elliptic-lanceolate, shortly acuminate, bristle serrate, chartaceous, covered with scattered spreading hairs along the midrib and the nerves above, more densely beneath, main lateral nerves 15-25 on either side of midrib, slightly arched and looped near the margin ; tertiaries fine ; base narrowed ; petioles hirsute, usually ·5-1 in. long. *Flowers* ·25 in. across, fasciculate on slender hirsute cymes from axils of present or fallen leaves, ·5-·75 in. long ; bracts minute, glabrous, lanceolate ; pedicels hirsute, ·3-·6 in. long. *Sepals* ·15 in. long, glabrous, elliptic or broad ovate, acute. *Petals* shortly exceeding the sepals, connate at the base, lobes rounded with reflexed tips. *Ovary* glabrous ; styles 5, united at the base. *Berries* globose, ·2 in. across exceeding the sepals.

Rare, LAKHIMPUR—Namchang, *Clarke* ! Margarita, *Pram* ! KHASI HILLS up to 5000 ft. (Kurz, Clarke)

Flrs. 4-6. Fr. 6-8 ?

Saurauja cerea, Griff. Vern. *Porbotia-hengunia*, Ass. (Darr) ; *Hero-changne*, Daff.

A small tree up to 20 ft. in height ; young shoots thick, covered with sharp pointed scales and having a large pith. *Bark* greyish with large lenticels outside, on branches smooth and shining, inside dark brown. *Leaves* 8-18 by 5-7·5 in., broadly cuneate-obovate, abruptly shortly acuminate, acute or rounded at the base, chartaceous, glabrous above, glabrescent and pale beneath ; midrib stout, generally sprinkled with adpressed pointed scales ; lateral nerves somewhat distant, 18-22 on either half, slender, slightly arched with distant adpressed scales ; tertiaries transverse, more or less wavy ; petioles ·5-1·5 in. long, stout, densely covered with pointed scales. *Flowers* 1 in. across, solitary on short densely scaly peduncles, which are usually fascicled in the axils of fallen leaves. *Sepals* orbicular, densely scaly and tomentose outside. *Petals* united at the base, orbicular obovate, white but with blood red base, waxy. *Ovary* densely villous ; styles 5, united and hairy at the base.

Bhalukpung, DARRANG, and possibly in other similar localities along the foot of the HIMALAYAS.

The ripe fruit is eaten.
Flrs. 4-5.

10. ACTINIDIA, Lindl.

Actinidia callosa, Lindl. Vern. *Mei-soh-khan*, *Mei-jaior*, Khasi.

A climbing or straggling shrub ; branchlets glabrous, lenticelled ; bark corky on old stems. *Leaves* 2-6 by 1·2-3 in. ovate-oblong or obovate, finely acuminate, generally cuneate at the base, setosely serrulate, membranous, glabrous, but often with scattered transverse stiff sharp bristles on the midrib above ; lateral nerves 8-12 on either half, very oblique and arched, prominent underneath, tertiaries transverse, parallel ; petioles ·7-·2 in. long, slender. *Flowers* whitish, polygamous or dicœcious, ·5 in. across

in few flowered axillary umbellate cymes ; peduncles ·3-·7 in. long, generally solitary ; pedicels about 1 in. long, slender. *Sepals* and *Petals* 5 each imbricate, the former ·15 in. long, broad ovate, tomentose ; petals ·2 in. long, obovate. *Stamens* many ; anthers versatile, opening by slits. *Ovary* oblong, villous, many-celled ; styles clavate, as many as cells in the ovary, elongating and spreading in fruit. *Fruit* up to 1·5 by ·7 in. long, ovoid, slightly rugose, buried in soft pulp.

MIKIR HILLS (behind Naharjan tea garden), SIBSAGAR District and is likely to occur further inside those hills, also CACHAR (Prazer), LAKHIMPUR-Margarita (Prain), KHASI HILLS up to 5000 ft., MANIPUR and ABOR COUNTRY.

The ripe fruit is acid and is eaten.

Flrs. 4-5. Fr. 8.

FAM. 21. DIPTEROCARPACEÆ.

Resinous tree (in Assam.) *Leaves* alternate, simple, entire, penninerved ; stipules small or large, generally fugacious, leaving a transverse scar. *Flowers* regular, 2-sexual, generally sweet scented, in terminal or axillary panicles. *Calyx* gamosepalous, campanulate, free or adnate to the ovary, 5-lobed, 2 or more of the lobes usually accrescent in fruit forming wings. *Petals* 5, twisted, sometimes connate at the base. *Stamens* 5-10-15 or indefinite, hypo-or perigynous, free or connate or adnate to the petals ; filaments short, often dilated at the base ; anthers 2-celled, connective produced into an appendage above or obtuse. *Ovary* slightly immersed in the torus, usually 3-celled, rarely 2-1 celled ; styles fused. *Fruit* nut-like or capsular, usually winged with the variously enlarged calyx-lobes. *Seed* exalbuminous ; cotyledons fleshy.

Stipules large, amplexicaul :—
  Calyx tube turbinate or urceolate enclosing the ovary but not adnate to it. Fruit with 2 large erect wings. **1. Dipterocarpus.**
Stipules small, not amplexicaul .—
  Calyx tube short, adnate to the ovary :-
    Fruit with 3 large and 2 small erect imbricate wings. **2. Shorea.**
    Fruit supported by accrescent subvalvate calyx lobes. **3. Vatica.**

1. DIPTEROCARPUS, Gærtn.

Tall trees with long cylindrical bole ; young parts often stellately hairy. *Leaves* coriaceous, entire or crenate ; lateral nerves almost straight and parallel, tertiaries transverse ; petiole somewhat swollen at both ends ; stipules large, clasping the stem and enclosing the terminal bud, caducous. *Flowers* large, white or

reddish, in few-flowered racemes or panicles. *Calyx* accrescent in fruit, free, 5-lobed, tube turbinate or urceolate. *Petals* spreading, somewhat cohering at base, usually pubescent outside. *Stamens* indefinite; filaments much dilated at the base; anthers linear, connective acuminate or cuspidate. *Ovary* 3-celled with 2 ovules in each cell; style filiform. *Fruit* a woody nut, generally 1-seeded, enclosed in the calyx-tube, with two of the calyx-lobes forming two erect strap-shaped or oblong wings, the other lobes remaining short and forming a crown round the apex of the nut. *Seed* fleshy, cotyledons unequal.

Leaves ciliate on the margins :—
- Young parts covered with fascicled bristles; calyx-lobes erect in flower, pointed. — *1. D. macrocarpus.*
- Young parts velvety tomentose; calyx lobes reflexed in flower, pointed. — *2. D. Mannii.*
- Young parts canescent; calyx lobes obtuse. — *Dipterocarpus sp.*

Leaves glabrous :—
- Young shoots glabrous. — *3. D. turbinatus.*

1. Dipterocarpus macrocarpus, Vesque. Syn. D. pilosus, *Roxb.* Vern. *Hollong* or *Holong*, Ass.

A very large gregarious tree attaining 150 ft. in height and 12-20 ft. in girth with a long cylindrical bole and a small spherical crown when mature; young shoots and petioles covered with dun-brown fascicled hairs; scars of fallen stipules oblique broad but not very prominent. young twigs compressed. *Bark* pale bluish-grey outside, plain or very nearly so with many large raised warts, reddish-brown inside but yellowish towards the cambium, .7-.9 in. thick. *Leaves* 10-18 by 5·5-9.5 in., elliptic-oblong, shortly acuminate, slightly repand and densely brown-ciliate, with fascicled hairs, membranous, sparsely pilose above when young, glabrous when mature, stellate pubescent beneath, especially along the nerves; lateral nerves oblique, straight, 18-25 on either half, tertiaries transverse, subparallel with reticulations between; base rounded; petiole 1.2-2 in.; stipules 3-5 in. long, obliquely set, membranous, densely pilose outside with long fascicled hairs, glabrous but punctate inside with the bases of the outside hairs. *Flowers* usually solitary, axillary, 2.5-3 in. long, pinkish; pedicels .12 in. long, stout, densely grey-puberulous. *Calyx-tube* turbinate, .6 in. long, .5 in. wide at mouth, velvety-puberulous outside, silky-pubescent inside, ordinary lobes 3 deltoid triangular, erect, enlarged lobes strap-shaped, .8-1 by .15-.2 in., coriaceous, velvety plain. *Petals* 5,2.5-by.6-.8 in., subfalcately oblanceolate, membranous, especially towards the tip and margins, faintly longitudinally nerved, imbricate, twisted generally to the left in bud, glabrate inside, stellately puberulous in close horizontal bands outside except on overlapped parts. *Stamens* about 30; filaments dilated at base, about .12 in. long; anthers oblong, .2-.3 in. long, with a pair of tubercles at the base; arista of connective weakly subulate up to .25 in. long. *Ovary* .25 × .16 in., ovoid, silky pubescent, obscurely longitudinally ribbed; style .6 in. long,

tapering from the top of the ovary, longitudinally ribbed, silky, hairy. *Fruit* 2 by 1.4 in.. ovoid, pointed towards both ends, itself densely dun-silky outside, but the encasing calyx-tube is glabrate and minutely punctate with the stellate bases of the fallen hairs. *Unenlarged* calyx-lobes about .8 by .8 in., orbicular-ovate, enlarged lobes 6-9 by 1.5-2 in., puberulous, leathery with three strong main nerves and 1-2 short more or less wavy marginal ones ; nervules transverse ; radicle apical, erect.

SIBSAGAR, LAKHIMPUR and NAGA HILLS generally on hilly ground, easily recognised from a distance by its towering over the heads of nearly all its associates.

Wood reddish brown, moderately hard ; weighing 40-45 lbs. per c. ft., medullary rays conspicuous, straight, fairly equidistant ; pores large, unevenly distributed generally in groups of 2 to 3. The timber is much used for house building especially for planking. On account of the resin it contains it is not used for tea boxes although otherwise very suitable.

Flrs. 6-7. Fr. end of cold season.

2. Dipterocarpus Mannii, King in herb. Calc. Nov. sp. Vern. *Hollong* or *Holong*, Ass.

A tree as large as the foregoing and growing in the same localities ; young shoots stout, nearly terete, softly grey-velvety with slightly oblique prominent scars of fallen stipules. *Bark* pale bluish-grey outside, closely vertically fissured, of a uniform cream colour outside. *Leaves* 7-12 by 4-7 in., elliptic ovate or oblong, shortly but rather finely acuminate, subcoriaceous, plaited parallel to the lateral nerves in bud, repand or shallowly crenate and thinly ciliate along the margins, glabrate above although the midrib is scarcely wholly without hairs, softly stellate pubescent along nerves and nervules beneath ; lateral nerves 16-22 on either half, straight and parallel, strong underneath, tertiaries transverse sub-parallel, very fine, close ; base rounded, sometimes slightly cordate ; petiole 1·3-2 in. long, rather stout, velvety stellate pubescent ; stipules 4-5·5 by ·7-·85 in., lanceolate, stellately silky-pubescent outside, glabrous and with 13-15 very fine longitudinal nerves inside. *Flowers* pinkish(?), 3 in. long, nearly subsessile in 2-5 flowered axillary panicles. *Calyx-tube* ·5 in. long and almost as broad at mouth, velvety-pubescent outside, silky inside; ordinary lobes broadly triangular with a thin and generally recurved margin ; wing lobes ·7 by ·18 in., densely brown-felted. *Petals* 2-2·2 by ·45-·52 in., oblanceolate or strap-shaped, membranous, faintly closely nerved, tufted pubescent in transverse wavy bands on exposed parts outside, sparsely puberulous inside, twisted generally to the right in bud. *Stamens* about 25, shorter than in preceding species ; filaments scarcely ·1 in. long, dilated, weak ; anthers about ·25 in. long with two basal tubercles, appendage of the connective up to ·15 in. long, bristle-like. *Ovary* globose, ·15 in. diam., brown-silky, tapering to the style which is 5 in. long or a little longer, longitudinally ribbed, silky. *Fruit* about 1·5 in. long, densely dun-silky outside ; the encasing calyx-tube globose with a some-

what constricted neck, ordinary calyx-lobes about ·8 in. long, globose, erect but with recurved margins ; wings 7-9 by 1.1-1·7 in., with only 3 longitudinal nerves and very complicately reticulate nervules.

SIBSAGAR and LAKHIMPUR on hilly grounds or table lands.

The following is an extract from a letter written by Sir D. Prain to Mr. G. Mann probably in 1884, which has been attached to a sheet of flowering specimen of this species collected by the late Babu Kripanath De from the Makum Forest, LAKHIMPUR.

"This is the species sent by you long ago (in F. B. I. page 296 sub D. pilose notalum videres). Mr. Clarke has marked on it ? Mekai x xx xx xxxx. As you now show us it is not Mekai (Shorea assamica), x x x x x x x x x x x. xxx x x x. I was inclined to think this is a very distinct variety of *D. Pilosus*, but Dr. King who has also gone over them with me apropos of your other plants says he would rather look on it as specially distinct and proposes to name it *Dipterocarpus Manni*, King Mss." I have followed Sir J. King in separating this from D. pilosus.

Flrs. 6-7. Fr. cold season.

3. **Dipterocarpus turbinatus,** Gærtn. Vern. *Kuroilsal*, Cach.; *Korjong*, Kuki, *Kherjong*, Tipp. *Kuroil*, Syl. The Gurjun oil tree.

Lofty tree attaining a diameter of about 36 in. with a long cylindrical bole and spreading crown. *Bark* grey or brown rough, vertically fissured, hard, deep brown inside, 1·5 in. thick ; young twigs glabrous or glabrate, stipular scars at first canescent, ultimately glabrate. *Leaves* 5-12 in. long by 2·5-5 in., ovate or ovate-lanceolate, shortly blunt acuminate, sinnate crenate or entire, coriaceous, glabrous on both surfaces ; lateral nerves straight, 12-20 on either half ; base rounded or subcordate ; petiole 1-1·7 in. long, glabrous ; stipules up to about 2 in. long, buff-tomemtose, hairs spreading towards the top. *Flowers* 1·2-1·4 in. long, white or pinkish, in few flowered short glabrous racemes from leaf axils of fallen leaves ; pedicels very short. *Calyx-tube* obconic, ·3 in. long, glabrous or pruinose, ordinary lobes broadly triangular, acute, very short, wing lobes ·3-·5 in. by ·1 in. *Petals* softly tomentose on exposed surface, 1-1.2 in. long. *Filaments* very short ; anthers ·2-·25 in. long excluding the subulate awn, tubercled at the base. *Ovary* densely pilose, tufted canno-tomentose, tapering to the apex. *Encasing Calyx tube* pruinose, unenlarged lobes ·3-·4 by ·2-·25 in., obtuse oblong, wings 4-5 by ·8-1.4 in., linear oblong, oblanceolate-oblong ; with one prominent nerve and two basal smaller nerves.

SYLHET, CACHAR & GARO HILLS.

Kurz calls the form above described D. lævis, Hamil.

"Yields a superior quality of wood oil in large quantities and exudes a dirty brown resin"-Kurz. Wood about 49 lbs per. c. ft., rough, moderately hard, heartwood reddish brown, pores large, medullary rays of two class-broad and fine, several of the latter between a pair of the former. Wood is not durable and is subject to attack by shot hole borers and white ants, suitable for packing cases but not suitable for tea chests on account of its resinous contents ; temporary buildings etc, for which its size should recommend its use.

Flrs. 3-4. Fr. 5-6. ?

Imperfectly known species.—

Dipterocarpus sp. near D. vestitus, *Wall,* Cat.- A large tree, "8-10 ft. in girth"-Mann. ; young shoots, petiole and inflorescence stellate canescent. *Leaves* 5 by 2·5-3 in. (from a solitary specimen) elliptic or elliptic oblong, subacute, or very shortly obtuse acuminate, margins sinuate crenate, ciliate, coriaceous, midrib above and nerves on the under surface stellate hairy ; lateral nerves 13-17 on either half ; base narrowed, obtuse ; petiole about 1.2 in. long, stipules brown stellate or fasciculate, tomentose *Flowers* about 1·7 in. long in short few flowered axillary racemes ; pedicel short, stout, up to ·2 in. long ; calyx-tube about 6 in. long, campanulate or obtusely obconic stellate pubescent outside, glabrous except about the throat within, ordinary lobes obtuse ·1-·15 in. long, wing lobes canno-tomentose, up to 7 in. long, linear oblong *Petals* twisted to the right in bud, falcate oblong, exposed, surface stellately canno-tomentose about 1·2 in. long *Stamens* about 35 ; filaments with dilated base, very short ; anthers about 2 in. long, tapering to the subulate appendage of the connective which is about ·15 in. long, base shortly two lobed. *Ovary* pilose, ribbed. *Fruit* not seen.

Pathari Hills-SYLHET-Mann. (!)

Flrs. 3.

2. SHOREA, Roxb.

Resinous trees, generally of large size. *Leaves* alternate, entire or repand, coriaceous ; stipules usually small, caducous. *Flowers* in axillary and terminal lax cyme-bearing panicles ; bracts and bracteoles caducous. *Calyx-tube* short, adnate to the torus, segments imbricate, hairy outside, accrescent in fruit. *Petals* imbricate, hairy outside on the exposed portions. *Stamens* 15-50 or more ; anther-cells equal, connective usually prolonged into an appendage. *Ovary* 3-celled, cells 2-ovuled ; style subulate. *Fruit* fleshy, usually 1-seeded, tightly embraced by the bases of the enlarged sepals which develop into erect wings of unequal lengths, generally 3 long and 2 short ; cotyledons fleshy, unequal, one embracing the other ; radicle superior.

Leaves ordinarily more than 2 in. in breadth ; flowers small ; calyx-segments ovate, ·08 in. long, fruit and wings not glabrous.	... 1. *S. robusta.*
Leaves scarcely more than 2 in in breadth ; flowers fairly large, calyx-segments lanceolate ·2-·3 in. long, fruit and wings glabrous.	... 2. *S. assamica.*

1. Shorea robusta, Gærtn. Vern. *Sal* or *Hal* Ass. ; *Hal-arong,* Mik., *Dieng-blei,* Khasi ; *Bolsal, Borsal, Borsar,* Garo. The sal tree.

A large tree, deciduous but seldom wholly leafless, with narrow conical crown when young, but with broad spreading crown when mature ; young shoots buff-tomentose. *Bark* of young trees blackish-brown, smooth or with a few longitudinal cracks and marked with minute grey specks, of old trees dark-grey, very thick, strongly fibrous, rough with deep irregular furrows, of overmature trees again more or less smooth, dark-brown. *Leaves* at first red or pinkish, afterwards pale-green, mature dark-green, old pale-yellow, drying brown, 4-12 by 2-7 in., ovate-oblong, shortly acuminate, ending in an obtuse point, thinly coriaceous but tough, wholly glabrous and shining when fully mature or the

nerves beneath more or less puberulous ; lateral nerves 12-15 on either half, strong underneath, secondaries slender, transverse, subparallel : base rounded or slightly cordate ; petiole terete, ·5-·8 in long ; stipules ·3-·5 in. long, oblong, slightly falcate, tomentose, caducous. *Flowers* ·3-·5 in. long, subsessile, unilateral on racemes 5-10 in. long, arranged in large terminal and axillary panicles, every part of the inflorescence covered with buff tomentum ; bracts caducous, bracteoles minute or wanting *Calyx-tube* short, adnate to the torus, segments about .1 in. long, ovate, imbricate, shaggy, all accrescent in fruit. *Petals* cream coloured, or yellowish, buff-silky outside, almost glabrous inside, about .5 in. long, tapering upwards, longitudinally 10-12 nerved. *Stamens* up to 50, much shorter than the petals ; filaments swollen at the base ; connective subulate, bearded, minutely trifid at the apex. *Ovary* globose, pubescent ; style subulate. *Fruit* ·5 in. long, ovoid, acute, indehiscent, densely canescent ; wings 5, 3 large and 2 small, the largest 3 by .6 in. and the smallest 1.5 by .25 in., spathulate, 10-12 nerved, always more or less pubescent.

The principal timber tree of at least four Districts of this Province, but does not extend east of Nowgong and north of Balipara in Darrang. Two patches evidently artificial, occur in SIBSAGAR, one near Sapekhati and another not far from Khumtai.

The timber is too well known to require a description. A brown dye is sometimes extracted from the bark. The opaline resin is used for caulking boats and is burned for incense. About 350-420 fruits weigh a lb.

New L. and fl. 3-4. Fr. 5-6.

2. Shorea assamica, Dyer. Vern. *Makai*, *Mekai* or *Mekahi*, Ass. (Lakhimpur).

A large gregarious tree, 100 ft. or more in height and 8 to 10 ft. in girth, with a cylindrical bole and large crown ; branchlets pendulous, young parts pubescent or puberulous. *Bark* reddish-brown, exfoliating in large overlapping plates, more or less in whorls, inside light-brown in thin layers, exposing darker-brown concentric bands, ·7 in. thick. *Leaves* generally 2-4 by 1.2-2 in., ovate and shortly acuminate but on young shoots up to 6 by 2.2 in., oblong lanceolate, tapering and long acuminate, quite entire, thinly coriaceous, glabrous and shining above, at first softly pubescent along the midrib and nerves but afterwards glabrate beneath, midrib prominent beneath, depressed above ; lateral nerves 16-19 on either side, arched, tertiaries faint, transverse, very close ; base rounded ; petiole ·3-·4 in. long, pubescent ; stipules 3-.65 by about .15 in. ovate to lanceolate, finely pointed, strongly 6-8 nerved outside, more or less pubescent, deciduous but not caducous. *Flowers* .5-.6 in. long on short pedicels in axillary or subterminal panicles 3-5 in. long ; bracts caducous ; bracteoles about .08 in. long, shaggy, caducous. *Calyx-tube* very small, segments 5, .2 in. long, lanceolate, canescent outside, pubescent within. *Petals* 5, somewhat unequal, about .5 by .2 in., velvety-pubescent outside where not overlapped, glabrous within. *Stamens* 15, very small, glabrous, adnate to the base of petals ;

filaments .02-.03 in. long, dilated at the base; anthers about .05 in. long, appendage of connective bristle-like, .06-.1 in. long. *Ovary* about .05 in. across, ovoid, somewhat compressed, glabrous or with a few scattered minute hairs, the ridges being almost ciliate; style filiform, about .2 in. long, with a few minute hairs near the base. *Fruit* about .8 by .5 in. glabrous, clasped by the bases of the enlarged calyx-segments; wings linear to spathulate, 2.5-4.5 by .3-.8 in., glabrous, shining, with 6-13 longitudinal nerves and strong and close transverse nervules.

Confined to the Makum Range, LAKHIMPUR & NAGA HILLS. There was a patch of very fine forest of this most handsome tree on the ground now occupied by the town of Margherita. Another patch of good forest occurs in the Jeypur Reserve between Tippum and Namchang. I have never met with it in SIBSAGAR.

Wood light-brown, fine-grained, soft, seasoning well; pores large, single or groups; medullary rays fine and close. Weight 36 lbs. per c. ft. It is very suitable for doors, windows, planking and tea boxes.

Flrs. 8-9. Fr. 10-12

3. VATICA, Linn.

Vatica lanceæfolia, Bl. Vern. *Morhal*, Ass. *Mir-kon-phor*. Mik.; *Keyo-asing*, Abor; *Kalang-asing*, Miri; *Dieng-Lang-Know*, Khasi; *Dieng-soh-kania*, Khasi (Nongpoh); *Morakur*, Lushai; *Mohal*, Cach; *Moal*, Sylh.; *Mekruk*, Manip.; *Kharkha-champa*, Meeh; *Lamakur*, Tipp.; *Kham-khor*, Garo.

A small or middle-sized evergreen tree; young shoots mealy puberulous. *Bark* greenish-grey outside with close horizontal wrinkles, otherwise nearly smooth, inside light greenish-brown, mottled with faint blotches and streaks of lighter colour, compact and hard, .15-.3 in. thick. *Leaves* 4-9 by 1.2-3.5 in., elliptic or oblong-lanceolate, finely acuminate, quite entire, chartaceous, glabrous above, minutely velvety-puberulous or glaucous beneath; lateral nerves 11-15 on either half, slender, arched, tertiaries reticulate; base rounded or sub-acute; petiole .3-.55 in. long, slightly swollen below the insertion of the blade; stipules fugacious up to about .2 in. long, lanceolate or ovate pubescent. *Flowers* white, fragrant, .4-.7 in. long, on axillary, solitary or fascicled, pubescent, panicles 2-5 in. long. *Calyx* small, about .1 in. long, velvety-puberulous outside; tube short, adnate to the base of the ovary; segments 5, deltoid-acute, uniformly accrescent in fruit. *Petals* 5, much imbricate, oblanceolate or strap-shaped, puberulous outside where not overlapped, twisted to the right in the cylindrical buds. *Stamens* 15, anther cells somewhat unequal, not contiguous, with a blunt beak at the base, connective flat, tapering to a pointed appendage which is about as long as the anthers. *Ovary* turbinate, puberulous about .08 in. long; style as long as the ovary, somewhat stout, clavate at the apex; stigma 3 toothed. *Fruit* ovoid-globose, .7-1 in. long, brown velvety, supported by thin ovate wings .6 by .4 in.; cotyledons fleshy.

Common in scrubby evergreen forests in all the Districts, excepting the NORTH EAST FRONTIER where it is some-what rare, ascending up to about 3000 ft. Generally very common with a gregarious tendency round swamps.

Wood light brown, compact, with scanty pores and fine medullary rays, but is seldom used except as firewood. It gives excellent charcoal. The clear white resin is used as an incense.

Fls. 4-5. Fr. 7-9.

Vatica Shingkeng, Dunn. Vern. *Shing-keng,* Abor.

A tall tree, glabrous, often gregarious. *Bark* thick, brownish; branches lenticellate. *Leaves* 3.5-7 in. long, alternate, lanceolate, long acuminate or caudate, chartaceous; lateral nerves 6 pairs, ascending; nerve prominent beneath; base rotundate; petiole .24-.4 in. long. *Flowers* not known. *Calyx*-outer segeme is ovate, obtuse, striate, 1-2 in long; inner .4-.6 in. long. *Fruit* dehiscent very late or not at all dehiscent, 8 in. long, globose, shortly acuminate, seated on the accrescent persistent patent calyx. *Seeds* angular, few.

N. E. F. TRACT (Rengging to Janakmukh).
(Burkill's No 36254, 36615, 37311 & 37453).

FAM. 22. ANCISTROCLADACEÆ.

only Genus. **ANCISTROCLADUS,** Wall.

Glabrous scandent shrubs without resin-ducts, branchlets often ending in hooked tendrils. *Leaves* alternate, simple, entire; stipules small, caduceous. *Flowers* regular, bisexual, small, in axillary or pseudo-terminal panicles. Calyx-tube ultimately adnate to the ovary, lobes imbricate, unequal, enlarged into wings in fruit. *Petals* 5, contorted, slightly connate at the base. *Stamens* 5-10; filaments short, broad and connate at the base; anthers opening lengthwise, 2-celled. *Ovary* 1-celled; ascending; style thick with three stigmas; ovule solitary. *Fruit* a nut adnate to the tube of the fruiting calyx and surrounded by the wings. *Seeds* globose, with copious albumen, testa often intruding between folds of the embryo; cotyledons folded and enclosing the radicle.

Ancistrocladus Wallichii, Planchon.

A large woody climber, branches thick, angular. *Leaves* crowded at the ends of branches, sessile, 4-16 by 1-3.5 in. oblanceolate, tapering to the sub-auricled base; subcoriaceous, punctate with minute scales on both surfaces, midrib stout, depressed above; lateral nerves rather obscured by reticulations of tertiary nerves a short distance from the midrib. *Flowers* purplish in dichotomously branched, pseudo-terminal panicles shorter than the leaves. *Fruit* pentagonous, turbinate, .4-.3 in. with 5 unequal, veined, glabrous wings 1-2.5 by .15-.8 in. linear oblong to oblanceolate.

SYLHET *De-Silva, Brandis; Cachar, Brandis,* not collected since and there are no specimens at Calcutta from our area.

Flrs. 3-4 (?) cold season (Brandis); Fr. 7-9 (?).

Ancistrocladus extensus, *Wall* ?.—A strong climber with black stems. *Leaves* up to 17 in by 4 in. oblanceolate, shortly acuminate, tapering to the sub-auricled base, thinly coriaceous, lateral nerves joined by intramarginal veins, obscured by many intermediates, tertairies prominently reticulated, upper surface punctate with minute scales *Panicle* repeatedly dichotomus, branches recurved, divaricate. *Wings* unequal, larger, 1.5-1.75 in.

KHASI & JAINTIA HILLS—elevation about 300 ft.
R cord based on a leaf specimen which matches with the species in the Calcutta Herbarium.

FAM. 23. MALVACEÆ.

Herbs, shrubs or soft wooded trees; young parts mostly covered with stellate hairs; bark with mucilaginous juice and tenacious fibre. *Leaves* alternate, stipulate, simple-lobed or digitately compound, usually palminerved. *Bracteoles* 3 or more, rarely absent, often forming an epicalyx. *Flowers* regular, generally 2-sexual, axillary or terminal, solitary fascicled or cymosely panicled. *Sepals* 5 more or less connate, valvate in bud. *Petals* 5, hypogynous, twistedly imbricate, often adnate to the base of the staminal column. *Stamens* generally indefinite, monadelphous or pentadelphous; anthers 1-celled, bursting longitudinally. *Ovary* syncarpous; carpels generally numerous; styles as many as carpels, more or less connate; ovules 1 or more from the inner angle of each cell. *Fruit* capsular or of dry cocci; seeds sometimes with silky tubular hairs (*cotton*); albumen scanty or 0; embryo curved.

I. Usually herbs or small shrubs, staminal tube entire or slightly divided at the apex, angled or lobed:—
  A. Fruit schizocarpic i.e. ripe carpels separating from the axis:—
    1. Bracteoles 0. Styles as many as the carpels. Seeds without cotton. Flrs. usually yellow:—
      Carpels 5-10, 1-ovuled. .. .. **1. Sida.**
      Carpels 5-20,2-or more ovuled. ... **2 Abutilon.**
    2 Bractcoles usually 5, narrow; stigmas spreading; carpels 5, spiny; styles 10, flowers red. .. .. **3. Urena.**
  B. Fruit capsular:—
    1. Stigmas spreading:—
      Ovary 5-celled. .. .. **4. Hibiscus**
    2. Stigmas connate:—
      Bracteoles 3, large, leafy, persistent; seeds cottony. .. .. **5. Gossypium.**
      Bracteoles 5, small, subulate, deciduous; seeds not cottony. .. **6. Thespesia.**

II Trees. Staminal tube deeply divided into bundles of stamens:—
  Leaves simple, lobed. Fls. less than 1 in. in diam., panicled. Bracteoles 4-6. Seeds without cotton. .. . **7. Kydia.**
  Leaves digitate. Fls .4 in. or more in diam., solitary. Bracteoles 0. Seeds with cotton. .. **8. Bombax.**

1. SIDA, Linn.

Herbs or undershrubs. *Leaves* simple, sometimes lobed. *Flowers* yellow, opening at noon ; peduncles generally jointed. *Bracteoles* 0. *Calyx* tubular below ; segments 5, valvate persistent. *Corolla* of 5 petals, connate below. *Staminal tube* divided above into numerous filaments. *Carpels* 5 or more, separating from the axis in fruit, generally 2-awned at the summit, each with a solitary pendulous ovule dehiscing irregularly and between the awns. *Seeds* solitary.

Leaves linear-lanceolate, acuminate, nearly glabrous, subsessile.	*1. S. carpinifolia.*
Leaves usually more or less rhomboid, stellately hoary underneath on petioles, .3-.7 in. long.	*2. S. rhombifolia.*
Leaves cordate-oblong, downy on petioles, 1-2 in. long.	*3. S. cordifolia.*

1. Sida carpinifolia, Linn. Vern. *Boriala*, Ass. (Darr) ; *Berela* or *Sweet-berela*, Beng. ; *Tmg-khilou*, Lushai ; *Bala-phomajivika*, Sans.

Small undershrub in grass lands. *Leaves* 2-3 in. long, linear lanceolate, acuminate. *Peduncles* short, jointed in the middle. *Carpels* 5-9, rugose, awned.

2. Sida rhombifolia, Linn. Incl. S. rhomboidea. *Roxb.* (sp). Vern. *Boriala* Ass. ; *Berela* or *Sweet-berela* Beng. ; *Soh-byrthit-rit*, Khasi ; *Mahabala*, *Atibala*, *Pitapushpa*, Sans.

A shrub up to 5 ft. in height, very variable in shape and size of leaf and length of peduncle. *Leaves* .5-3 in. long, generally rhomboid, more or less pubescent above, stellately grey-tomentose beneath ; base 3-nerved, usually cuneate ; sometimes obtusely ; petiole about ¼th the length of the blade. *Peduncle* .5-1 in. long, jointed above or below the middle. *Carpels* 10, awns generally inflected, sometimes (Var. *rhomboidea*) almost absent.

3. Sida cordifolia, Linn. Vern. *Berela*, *Bala*, Beng. ; *Batyalaka*, *Bala*, Sans.

A small undershrub generally found near moist places. *Leaves* 1-2 by .6-1.2 in. oblong, cordate, obtuse, crenate downy on both surfaces ; petiole as long as the blade. *Peduncles* jointed near the flower, lower longer than the petioles, upper very short. *Carpels* 10 ; awns exceeding the calyx and covered with stiff reflexed hairs.

The above three plants are common throughout the province up to about 3000 ft. They flower during the rains or shortly after. Their roots have valuable medicinal properties, and their stems yield a fine white silky fibre much superior to jute and therefore of considerable potential commercial value.

2. ABUTILON, Gærtn.

Abutilon indicum, G. Don. Sans. *Atibala*, *Kankatika* ; Vern. *Jhapa*, Ass. ; *Tepari* or *Petari*, Beng. ; *Sam-kunthon*, Cach.

A perennial herb sometimes up to 8 ft. in height, stem covered with soft velvety tomentum. *Leaves* .5-6 in., nearly as

broad as long, ovate or orbicular-cordate, acute or acuminate, entire or distantly irregularly toothed, stellate pubescent above, finely grey-felted and also with scattered hairs underneath, palmately 5-9 nerved at the base; petiole .3-4 in., felted; stipules small, deflexed. *Flowers* golden-yellow, 1 in. in diam., opening in the evening; calyx-segments ovate-acute, valvate; peduncles 1-3 in. long, 1-flrd., jointed about .25-.4 in. below the flower. *Stamens* as in Sida. *Fruit* broadly bell-shaped and flat topped; carpels 15-20, separating from the axis, coarsely felted but glabrescent, apiculate at the apex; seeds 1-3 in each carpel.

Occasionally met with in grass lands in NOWGONG, DARRANG & NAGA HILLS.

The leaves give a mucilaginous extract which is used as a demulcent. An infusion is prepared from the roots which is considered good as a cooling remedy in fevers. The seeds are used as a laxative and also as a demulcent. The stem gives a good fibre suitable for ropes.

Several exotic species of *Abutilon* are grown in gardens for their handsome flowers.

Fls. & Fr. 10-2.

Malvastrum coromandellanum, Gracke, Syn. **M tricuspidatum**, *A. Gray*. An erect undershrub or perennial herb upto 3 ft. high covered with stellate hairs the arms of which are adpressed on the undersurface of leaves, petiole and calyx. *Leaves* .7-3 in. long, ovate or ovate-lanceolate, irregularly serrate, 5 nerved at the base, strigose with simple hairs above; petioles upto 1·2 in. long; stipules linear. *Flowers* yellow, solitary, .5-.7 in across; bracteoles 3 half the length of the calyx. *Calyx*-lobes triangular cleft nearly half way down. *Petals* exceeding the calyx. *Carpels* 8-12, reniform, separating from a short central torus, indehiscent, strigose, and 3-cuspidate when mature.

An introduced [illegible] weed in several districts in LOWER ASSAM in waste lands. A good fibre can be obtained from the stems. Closely resembles a Sida from which it can be distinguished by the presence of bracteoles.

3. URENA, Linn.

Urena lobata, Linn. Vern. *Hon-boroloa*, Ass. (Sibs); *Sokamara*, Ass. (Dirr); *Agra*, Ass. (Kamrup); *Tangom*, Miri; *Nonthe-arong*, Mik.; *Sam-thai* Mech; *Sompok-pi*, Munipuri; *Samthai*, *Samkhonthai*, Cach.; *Dalle-kurro*, Nep.; *Samthe*, *Samthakkhari*, Garo; *Bagh-chhala*, Jharua and Mech; *Soh-byrthit*, *Soh-byrthit*, Kh.

An undershrub up to 5 ft. in height; more or less covered all over with spreading stellate pubescence. *Leaves* very variable in shape and size, .5-3 by .3-4 in., ovate to broadly cordate-orbicular, generally broader than long, persistent, 5-7 lobed, 5-9 nerved at the base, coarsely toothed or serrate, somewhat hispidly pubescent above but softly and more densely beneath; midrib and sometimes two adjacent nerves with a glandular pore; petiole ·2-2.2 in. long; stipules short, linear, both densely brown stellate pubescent. *Flowers* pink, with a darker centre, .6-1.2 in. across; one or more on axillary peduncles; pedicels short, clustered; bracteoles 5, connate below; lobes equalling the calyx. *Calyx* deciduous, tube short, lobes up to .2 in. long, ovate to oblong-lanceolate, ciliate, pubescent on the midrib outside, glabrous within. *Petals* 5, tomentose outside, connate below and aduate to the staminal tube. *Staminal-tube* cylindric. *Ovary* 5-celled, each

with one ovule; style with 10 capitate stigmatic branches; ripe carpels about .2 in. long, indehiscent, breaking off from the axis, densely tomentose as well as armed with stellately barbed bristles.

A common weed throughout this part of the province.
The root and bark have medicinal properties and the stem gives a strong white fibre suitable for twine and sacking.

Flrs. & Fr. 6-12.

4. HIBISCUS, Medik.

Herbs or shrubs or trees generally with large showy flowers. *Leaves* rounded or palmately lobed. *Inflorescence* generally axillary. *Bracteoles* 5 or more, free, connate, or spathaceous. *Calyx* 5 toothed or 5 fid, sometimes spathaceous. *Petals* 5, adnate at the base with the staminal tube. *Staminal-tube* giving off anther-bearing filaments along its entire length; anthers reniform, 1-celled. *Ovary* usually 5-celled; styles 5, connate below, spreading above. *Fruit* capsular; seeds glabrous or hairy.

I. A small tree. Bracteoles many, deciduous; seeds bearded with long silky hairs. *1. H. macrophyllus.*
II. A large climbing shrub. Bracteoles 5, persistent; seeds covered with long white hairs. *2. H. fragrans.*
III. Annuals or undershrubs :—
A. Bracteoles not provided with leafy appendages nor forked :—
Bracteoles numerous, deciduous. *H. Trionum.*
Bracteoles 6 or more, persistent but not accrescent. *H. Abelmoschus.*
Bracteoles up to 6, broad accrescent. *H. pungens.*
B. Bracteoles with leafy appendages or forked :—
A trailing prickly herb. Stipules semicordate auricled. *H. surattensis.*
Erect undershrub. Stipules linear. *H. radiatus.*

1. Hibiscus macrophyllus, Roxb. Vern. *Pohu-udal*, Ass. (Sibs.); *Pharna*, Mik.; *Misi-mugrong-buphang*, Kach.; *Baiza*, Lushai: *Jabo*, Tipp., *Chamia*, Sylh. and Cachar; *Mao-marli*, Ass. (Garo); *Kong-Krowai*, Kuki; *Tyllen-dkhar*, Khasi.

A small deciduous tree; young shoots, petioles, stipules and inflorescence shaggy with long tufted yellowish brown bristles, up to .4 in. long and stellate tomentum. *Bark* greyish white, somewhat rough on old stems, blaze at first yellowish-brown with streaks of brown tissue, turning darker brown after exposure. *Leaves* 7-12 in. across, orbicular, deeply cordate, abruptly short acuminate, entire or minutely crenulate on luxuriant shoots, thinly coriaceous, intricately stellate, tomentose on both surfaces especially the lower, palmately 7-9 nerved, turning yellow before falling; petiole 9-14 in. long; stipules 3-4 by .8-1 in., oblong, convolute. *Flowers* about 2·5-4 in. long and across, in axillary and terminal cymes, each supported by a pair of large—up to 2.3 in. long—spathaceous caducous bracts; pedicels 1.5-2 in. long, jointed. *Bracteoles* 10-12, linear, 1-1.2 in. long, connate at the base. *Sepals* 5, connate below into a 10-ribbed cup. *Petals* 5,

imbricate, pale yellow fading to pinkish brown, with a deep purple blotch at the base inside. *Staminal* column yellow. *Styles* deep purple. *Capsule* about 1.5 by 1 in., oblong, pointed ; seeds bearded with shining tawny hairs.

In open scrubs in the Mikir Hills, SIBSAGAR and NOWGONG, CACHAR, GAROHILLS, and foot of KHASI & JAINTIA HILLS, NAGA HILLS and SYLHET.

The heartwood is light purplish-brown, even-grained, soft but durable, weighing about 35 lbs. per c. ft. It is much used for rafters, posts and sill plates, especially in the Garo Hills. The inner layers of bark give fibre suitable for cordage

Flrs. 3-4. Fr. 5-6

2. Hibiscus fragrans, Roxb. Vern. *Pichhola-lata*, Ass. (Lakh.) ; *Susang-rudse*, Miri ; *Nrok-pen*, Naga.

A large scandent shrub spreading on tall trees especially near streams. *Bark* on old stems with short vertical furrows ; young parts and petioles minutely but closely stellate tomentose. *Leaves* 2-5 by 3.5-1.5 in., those near flowers much smaller, ovate, cordate, acute, distantly dentate or repand, at first stellately hispidulous above, buff-tomentose beneath, ultimately glabrescent, chartaceous, palmately 5-7 nerved ; petiole usually rather more than half the length of the blade, slender, terete ; stipules linear-lanceolate, about .7 in. long, caducous. *Flowers* white or light rosy-pink with a pale yellow centre, fragrant, 1·5-2·5 in. across ; pedicels axillary generally 1-3 together, rarely panicled, 1·5-2·5 in. long, slightly thinner than the petioles, tomentose, jointed, ·3-·8 in. below the flower. *Bracteoles* 5, ·4-·6 in. long, ovate, connate below forming a broad shallow cup, persistent. *Calyx* lobes similar to bracteoles but a little larger. *Petals* finely longitudinally veined, ·6-1 in. long, stellate pubescent outside. *Filaments* very slender, purplish. *Capsules* 1·4 by ·8 in. ovoid, tan-hairy outside ; seeds reniform, about 1 in. long, rugose, covered with radiating fine straight white or brown hairs, ·6-·8 in. long.

Common throughout UPPER ASSAM including the E. FRONTIER DISTRICT ascending up to about 1000 ft.

Fls. 12-1. Fr. 1-3.

Hibiscus Trionum, *Linn.*—A pubescent herb 4-5 ft. high growing annually from carrot like roots. *Lower leaves* orbicular, upper 3-5 lobed. It has large yellow flowers membranous ventricose deciduous calyx and numerous linear deciduous bracteoles *Capsule* 1-1·5 in. long, hirsute ; seeds glabrous.

Found in grass lands in NOWGONG.

Fls. 9-10. Fr. 11-12.

Not previously reported from this province,

Hibiscus Abelmoschus, *Linn.* Eng. Musk-mallow. Sans. *Latakasturika* ; *Ar. Habbeil-mushk, Gorukhia-korai* (Sibs) Ass.; *Iwmat-la-rit*, Khasi. A very variable hispid annual 3-5 ft. high. *Leaves* polymorphic palmate, 5-7 lobed or upper sagittate, 3.7 in. long, petiole with long deflexed hairs, shorter in upper leaves. *Flowers* about 4 in. across, yellow with purple centre on stout peduncles ; bracteoles linear, 6-13, up to 1 in. long, much shorter than the capsule not accrescent ; calyx spathaceous. *Capsule*, 1·7-3 in. long, beaked, sparsely setose ; seeds reniform, striate.

Cultivated in many parts of India. Recorded from grass lands in SIBSAGAR; KHASI HILLS up to 3000 ft-probably also in many other localities in UPPER ASSAM.

The seeds when rubbed or ground have the smell of musk and are used in perfumery on account of this odorous principle They are also used largely in Indian medicine. Coarse fibre suitable for cordage can be obtained out of the stem.

Flrs, 9-10. Fr. 10-11.

Hibiscus pungens *Roxb.*Vern, *Usipak, Usipag*, Miri ; *Sidum-sipiag*, Abor ; *Nam-afin-arong*, Mik. ; *Kakura*, Sylh.; *Musa-megon*, Meeh , *Tiew-malloi*, Khasi.—A bristly herb up to 12 ft. in height. *Leaves* 6-12 in. across, palmately 5-lobed ; lobes crenate ; petiole 5-10 in long *Flowers* 4-5 in. across, yellow with a purple centre on peduncles 2-3 in. long ; bracteoles 5, lanceolate up to 1 2 in. long, accrescent ; calyx spathaceous, membranous. *Capsule* 2 in. long, tapering to a point.

Fairly common in grass lands especially in the N. E FRONTIER DISTRICT, ascending up to 3000 ft.

The paste of the roots is used by Miris as a poultice for sprains and inflammations.

Flowers 9-10 Fr. 10-11

Hibiscus surattensis, *Linn.* Vern. *Hanstong*, Mik. ;—A sorrel-like trailing acid plant covered with sharp recurved prickles. *Leaves* 1·5-3 in. across, palmately 3-5 lobed or suborbicular, crenate-serrate,prickly along the nerves beneath ; petiole 1·5-4 in. long, prickly ; stipules broad, ear-shaped, ciliate. *Flowers* light yellow with a dark centre on peduncles up to 3 in. long. *Bracteoles* about 10, persistent, 5-·6 in. long, consisting of a bristly stalk supporting a peltately leafy, spathulate, ciliate blade with a linear caudate basal appendage ·25-·4 in. long. *Calyx* 5 cleft, accrescent in fruit chartaceous generally pink, lobes ovate acuminate with bristle-topped prickles along the margins and midrib, upper prickles hooked. *Capsule* covered with bristle-like, shining, white or yellow hairs, seeds downy.

Dipbu reserve, SIBSAGAR and similar localities round the Mikir Hills, GARO HILLS.

The Mikirs use the leaves and twigs as greens.

Flrs. & Fr. 10-11.

Hibiscus radiatus, *Willd.*—An undershrub armed with short scattered prickles. *Leaves* 1·5-3 by 1·5-2 in., usually palmately 3-5 lobed, lobes lanceolate or oblanceolate, serrate with few scattered bristles along the nerves beneath ; petiole up to 3 in. slightly prickly, more or less pubescent ; stipules linear up to ·25 in. long. *Flowers* yellow with purple centre about 2·5 in. across, solitary on short stout axillary peduncles. *Bracteoles* ·4-·6 in , about 10, often unequally forked, bristly along the margins. *Calyx* membranous accrescent in fruit, lobes ovate acuminate, ·5-·7 in. long, armed with bristle pointed prickles on the margins, upper prickles hooked. *Corolla* 2·5 in. long, bell-shaped. *Capsules* ovoid, densely setose ; seeds smooth.

KHASI HILLS, Hooker & Thomson; ASSAM without any locality-*Fisher (!)*.

The following species are commonly cultivated :—

1. H esculentus, *Linn.* Ochra, The edible Hibiscus, Lady's finger, Vern. *Dheros, Bhind*, Beng., *Bhindi*, Hind., *Bhendi*, Ass., *Tindisa*, Sans.—A tall annual with coarsely toothed 3-5 lobed leaves, deciduous linear bracteoles, yellow flowers with a crimson centre and pyramidal oblong pubescent fruits 5-10 in. long.

Largely grown for the unripe fruits which are in season during the later part of summer and the rains.

2. Hibiscus mutabilis, *L.* Vern. *Sthalpa ima*, Beng.,—A large shrub or a small tree with fairly large deeply cordate 3-5 lobed leaves, white or light rose, single or double flowers, 3-5 in. across which change to deep rose or red, and globose capsules.

3. H. Rosa-sinensis, Linn. Common garden Hibiscus, Chinese Shoe-flower. Vern. *Joba* (Ass. & Beng.), *Japa, Java,* Sans.—An ornamental shrub. *Leaves* up to 4 in. long, ovate acuminate, coarsely serrate, glabrous or nearly so, base 3 nerved. *Flowers* single and double ranging from orange yellow to salmon and crimson from the upper axils with linear lanceolate bracteoles. *Fruits* not formed in our area.

Flowers almost throughout the year in warmer districts but mainly from April to October.

4. H. syriacus, Linn.—A taller shrub than the last often with erect slender branches. *Leaves* ovate or sub-rhomboid, upper more or less 3-lobed, toothed, nearly glabrous, up to 2 in. long. *Flowers* white or light pink to lilac blue with a purplish centre.

Common, frost hardy and grown more commonly in hills than the last species.

5. H. schizopetalus, Hk. f. Leaves narrow, ovate, coarsely toothed, usually 1·5-3 in. long. *Flowers* red or orange. *Calyx* spathaceous. *Petals* deeply laciniate and reflexed, staminal column long, slender, pendulous. Cultivated in gardens in the plains; flowers in hot and rainy season. A native of Africa.

5. GOSSYPIUM, Linn.

This genus differs from Hibiscus by having 3 large leafy cordate bracteoles which with the calyx are sprinkled with black glandular dots and by the seeds being covered with intricate woolly hairs which is the cotton of commerce.

Gossypium herbaceum, Linn. Vern. *Kapaṭi* Ass., is cultivated by the hill-tribes of Assam e.g. the Mikirs, Nagas, Kukis, Dafflas and Garos. *Leaves* 3-5 lobed, nearly glabrous; stipules ovate or lanceolate. *Bracteoles* as long as the capsule and much exceeding the truncate calyx. *Flowers* yellow, generally with a purple centre. *Capsule* ovoid, 3-5 celled with 5-7 seeds in each cell, pendulous when open, presenting a striking appearance with the hanging balls of white cotton.

Fls. 8-9. Fr. 10-11.

6. THESPESIA, Soland ex Corr.

Thespesia macrophylla, Blume. Syn. T. Lampas, *Dalz. et Gibs.* An undershrub up to 5 ft. high; young parts rusty pubescent. *Leaves* 3.5-8 by 3-6 in., palmately 3-6 lobed, lobes usually acuminate, middle largest, upper smaller, rough pubescent or glabrate above, softly stellate tomentose beneath, both surfaces with raised dots, midrib with a glandular pore near the base on the under-surface; base usually 7-nerved; petiole up to 4 in. long; stipules subulate, caducous. *Flowers* 3-4 in. across, yellow with crimson centre, 1-3 on axillary peduncles up to 5 in. long; pedicels .3-.5 in. *Bracteoles* 5-8, setaceous, caducous. *Calyx* persistent, small, cupular, with 5 subulate teeth up to .3 in. long, from a truncate margin. *Corolla* lobes convolute, staminal tube 5 toothed at the apex. *Ovary* usually 5 celled; style club-shaped, 5 furrowed; ovules few in each cell of ovary. *Capsule* 1 in. long, ovoid, pointed, 5 celled, loculicidal; seeds smooth.

GOALPARA, NAGA HILLS, probably also in other areas.
Perennial or flowering shoots die down to the root?
Fls. 8-10. Fr. 10-12.

7. KYDIA, Roxb.

Trees with stellate pubescence and mucilaginous bark. *Leaves* palmately nerved, lobed or angled; 1-3 of the innermost nerves with a large oblong gland near the base. *Flowers* small, numerous, polygamous, in terminal panicles; bracteoles 4-6, connate at the base, accrescent and spreading in fruit. *Sepals* 5, valvate, connate at the base. *Petals* 5, obcordate, adnate to the staminal tube. *Staminal-tube* split half-way down into 5 segments each bearing at the apex 3-5 sessile anthers, which are imperfect in the female flowers. *Ovary* 2-3 celled; style 3-cleft; stigmas 3, imperfect in the male flowers; ovules 2 in each cell, ascending. *Capsule* depressed-globose, 3-valved; seeds reniform, furrowed.

Leaves downy beneath; bracteoles oblong or obovate, downy or hispid. .. *1. K. calycina.*
Leaves glabrate; bracteoles oblanceolate, glabrous, shining. .. *2. K. glabrescens.*

1. **Kydia calycina,** Roxb. Vern. *Pichhola,* Ass. (Sibs); *Bonkopah, Bon-kopahi, Kukuha,* Ass. (Nowg.); *Kukuha,* Ass. (Darr.); *Arlak-arong, Arlakso-arong, Pakrak, Star-misiri-arong,* Mik., *Modon-phang,* Kach.; *Labri-changne* Daff.; *Heppaching,* Naga; *Kubinde,* Nep. *Musamugon-buphang,* Mech; *Boldubak,* Garo; *Chakle,* Jharua; *Wok-thing-thel,* Kuki; *Kotra,* Ass. (Kamrup); *Dieng-misiri, Dieng-lainnep,* Khasi.

A moderate-sized fast-growing deciduous tree with a gregarious tendency; young parts covered with grey stellate hairs. *Bark* grey, exfoliating in long strips, reddish inside, green underneath the corky layer, innermost layers fibrous and lace-like; branches rough with large white specks. *Leaves* 3-6·5 in. long, suborbicular or orbicular, often broader than long, palmately 5-7 nerved and generally with as many lobes; base slightly cordate or truncate, glabrate above, downy and pale beneath; petiole 1-4·2 in. long. *Flowers* generally white, ·5-·7 in. across, numerous, polygamous, generally diœcious, in much branched axillary and terminal panicles; pedicels slender, ·5-·7 in. long, generally tufted, stellate-downy; bracteoles 4-6, oblong or obovate, accrescent, persistent, downy at first, afterwards hispid with the bases of fallen hairs, prominently veined and spreading. *Sepals* ovate, acute, accrescent and incurved over the fruit. *Petals* clawed. *Capsule* depressed-globose, about ·2 in. across, buff or yellow-villous.

Mostly in patches of deciduous forests in SIBSAGAR, DARRANG and almost throughout NOWGONG, e. g. Nichuguard, Kalioni, Kaziranga, Bhalukpung, Charduar, Silghat, Lanka, Dimapur etc.; LAKHIMPUR, GARO HILLS, N. E. FRONTIER, KHASI HILLS, KAMRUP, GOALPARA, North Cachar Hills, NAGA HILLS.

The wood may be found suitable for matches. The fibrous inner bark is used for tying purposes. The mucilaginous substance of the bark is used in Northern India for the clarification of sugar. About 900 seeds weigh 1 oz.

2. Kydia glabrescens, Mast. Vern. *Subi-asing,* Miri. *Kukuha,* Ass. (Darr.). This tree looks so very much like the foregoing

species that where they occur together the same vernacular names are applied indiscriminately to both.

A tall tree up to about 100 ft. in height and 7 ft. in girth; branchlets nearly glabrous. *Bark* grey outside, scurfy on old stems, cream-coloured inside with reticulating strands of firmer tissue which is reddish on old trees, green underneath the corky layers, ·5-·8 in. thick. *Leaves* 3-4·5 in. diam., orbicular, rather broader than long, those below the inflorescence much smaller and generally elliptical, 5-7 nerved at the base, not or very slightly lobed at the extremities of the three innermost nerves, chartaceous, glabrous at least when mature, tertiary and ultimate nervules visible but extremely fine and elegantly reticulated. *Old* leaves turn yellow before falling. *Panicles* terminal and axillary; pedicels fascicled, ·5-·7 in. long, filiform, obscurely stellate-hirsute; bracteoles 4-6, but generally 4 only, ·4-·6 by ·1-·15 in., oblanceolate, glabrous, shining, spreading in fruit. *Sepals* glabrous, nerved. *Petals* not seen. *Capsule* as in the last species.

Sadiya, Khairempani, Dorkang Chapuri, Songkong· etc., N. E. FRONTIER DISTRICT; Margherita, Borjan, Jeypur, Gagaldubi, etc., LAKHIMPUR, Dilli, Baruasali, Holongapar. etc., SIBSAGAR and in the Charduar Reserve in DARRANG. Probably never wholly leafless.

Squirrels and bears seem to be fond of the bark.

Fls. 8-9. Fr. 11-12.

8. BOMBAX, Linn.

Deciduous tree. *Leaves* digitate. *Flowers* solitary or clustered, congregated at the ends of branchlets appearing before the leaves; bracteoles O. *Calyx* leathery, cupshaped, irregularly 2-5 lobed or truncate. *Petals* obovate or oblong. *Stamens* indefinite, adnate to the petals; filaments often combined; anthers reniform. *Ovary* 5-celled; ovules many in each cell; style clavate. *Capsule* loculicidally 5-valved, cells woolly within. *Seeds* imbedded in dense wool; albumen scanty.

Filaments flattened at the base, stamens less than 100. .. *1. B. malabaricum.*
Filaments thread-like, stamens more than 400. .. *2. B. insigne.*

1. Bombax malabaricum, DC. The silk cotton tree. Sans. *Shalmali.* Vern. *Simal, Simul,* Hind. & Beng., *Simolu, Himolu, Himila,* Ass.; *Singi-asing,* Miri; *Pharkong-arong,* Mik.; *Bonju-phang, Ponju-phang,* Kach.; *Hebui-bang,* Naga; *Dieng-Kymphad, Dieng-syr-ah,* Khasi, *Dieng-kya-*Synt.; *Phunchong, An-pang,* Kuki, *Simla,* Mech., *Bolchhu,* Garo.

A lofty deciduous tree; stem continuous and straight, more or less buttressed at the base when old, covered with large conical prickles when young; branches whorled, horizontally spreading. *Bark* dark-brown or grey smooth on young trees but vertically fissured and rough on old trees, blaze light pinkish white, soft and fleshy with coarse strands of bast, green underneath the corky layer. Leaves digitate; common petiole 6-12 in. long. *Leaflets* 5-7; 6-9 by 3-5 in., lanceolate oblanceolate or obovate, acuminate, entire, chartaceous or coriaceous, glabrous; petiolules 1 in. long;

stipules small, caducous. *Flowers* 4-5 in. across, fleshy, near the ends of the branches on short fleshy pedicels. *Calyx* very fleshy, cup-shaped, white-silky inside, slightly lobed at the margin, deciduous. *Petals* crimson or orange, rarely white, 3-6 by 1-2 in., recurved, white-stellate canescent outside. *Stamens* shorter than the petals, arranged in 5 bundles and an inner bundle of 15, of which the 5 innermost are longest and forked; filaments 70-90, deep pink, sparingly covered with spreading hairs, flattened at the base; anthers twisted after dehiscence. *Style* 5, lobed at the apex, exceeding the stamens. *Capsule* 5-7 in. long, oblong-ovoid, woody, 5-angled. *Seeds* obovate, glabrous and smooth, embedded in silky wool.

Gregarious on river-flats but occurs sporadically in all sorts of forests throughout the province, more generally along open streams.

The wood is porous, soft and perishable, but durable under water or when seasoned in water; weight 17-30 lbs. per c. ft. It is pre-eminently the favourite tree for tea boxes, and is very suitable for well curbs, water-shoots etc. The cotton is used in upholstery and to stuff pillows and cushions. The seed is a nurishing food for cattle which also eat the flowers greedily. The roots of saplings are believed to possess valuable medicinal properties, as also the gum which sells in the bazars of N. India under the name of *mocŕas*. About 750-900 seeds weigh 1 oz.

Leafless 12-3. Fls. 1-3. Fr. 4-5.

2. Bombax insigne, Wall. Vern. *Dhumboil*, Cachar; *Tera*, Manipur; *pang*, Lush.; *Anphang-thing*, Kuki.

A Moderate sized to large tree with blunt prickles or unarmed. *Bark* fibrous exfoliating in numerous thin papery flakes, brownish grey outside on young stems but blackish brown on old trees, flesh coloured underneath the corky layers, light brown inside. *Petioles* 7-8 in. long; leaflets 7-9; 4.5-6.5 in. by 1.3-2 in., oblanceolate, or obovate shortly acuminate, glabrous, lateral nerves 15-18 pairs on either half, nervules finely reticulate, base narrowed to the short margined petiolule .2-.5 in. long. *Flowers* usually brick-red, solitary, scattered on the leafless branches, pedicels stout, short, jointed at the top. *Calyx* up to 2 in. by 1.5 in. across, silky inside, often warty outside, 2-lobed or finally deeply 2 cleft. *Petals* 5-6 in. by 1.5 in., reflexed when fully opened, stellate pubescent outside. *Stamens* in 5 phlanges, staminal tube short, filaments 400-600, filiform, shorter than the corolla. *Stigma* with 5 radiating lobes. *Capsule* 5-7 in. by 1.5 in., oblong, glabrous.

Not common. CACHAR, LUSHAI HILLS, SYLHET.

Wood similar to that of B. malabaricum but more durable and the pores are smaller. About 330-570 seeds weigh 1 oz.

Flrs. 12-1. Fr. hot season.

Eriodendron anfractuosum, DC. The white silk cotton tree. A tall deciduous tree with prickly stem when young. *Leaves* digitate, petioles 4-6 in. long, stipules caducous; leaflets 5-8, 2-5 in. long, lanceolate, entire, glabrous, glaucous beneath, petiolules very short. *Flowers* 1.5-2 in. across, white or yellowish at the ends of the branches; bracteoles 0. *Petals* wooly outside; ovary glabrous. *Capsule* 4-5 in. long, fusiform; seeds imbedded in silky wool.

Planted occasionally in the plains *e.g.* SIBSAGAR, native of S. AMERICA, WEST INDIES, CEYLON
The floss from the capsules commercially known as *kapok* is of better quality than that of Bombax malabaricum and is used for the same purposes.

FAM. 24. STERCULIACEÆ.

Trees or shrubs, rarely climbing; young parts usually covered with stellate pubescence, often inter-mixed with simple hairs. *Bark* mucilaginous and with strong-fibre. *Leaves* alternate, simple and lobed or digitate, stipulate. *Flowers* generally regular, 1 or 2-sexual or polygamous, in axillary or terminal cymes or panicles, rarely solitary or fascicled. *Calyx* usually gamosepalous; segments 5. *Petals* 5 or 0. *Stamens* usually monadelphous with 5 to 25 2-celled anthers. *Ovary* stipitate or sessile, free, 2-5 celled; carpels free or combined; styles as many as cells in the ovary, distinct or more or less connate; ovules usually 2-many in each carpel. *Fruit* capsular, indehiscent or follicular. *Seeds* not wooly.

I. Flowers unisexual or polygamous. Carpels distinct. Petals none. Trees :—
  Fruit carpels whorled, dehiscent. ... 1. **Sterculia.**
  Fruit carpels solitary, indehiscent. ... 2. **Heritiera.**
II. Flowers bisexual. Carpels combined. Petals present :—
  A. Erect shrubs or trees; capsule not echinate.
    1. Seeds not winged. Shrubs; leaves palmately lobed or angled :—
      Capsule cylindric, coriaceous. ... **Helicteres.**
      Capsule turbinate, membranous. ... 3. **Abroma.**
    2. Seeds winged. Trees; leaves entire, lobed or coarsely toothed :—
      Flowers solitary or in few-flowered cymes, usually large; staminal column with 5 staminodes. ... 4. **Pterospermum.**
      Flowers in many flowered corymbose panicles; rather small. Staminodes 0. ... 5. **Reevesia.**
  B. A climber :—
    Seeds not winged. Flowers' minute; capsule more or less echinate. ... 6. **Buettneria.**

1. STERCULIA, Linn.

Trees with simple, often lobed, or digitate leaves. *Flowers* polygamous in terminal or axillary panicles. *Calyx* tubular, generally coloured. *Petals* 0. Staminal column bearing at the apex a ring of sessile anthers. *Ovary* of 5 carpels; styles connate at the base; stigmas radiating. *Fruit* of radiating follicles,

woody or membranous, generally opening before ripening. *Seeds* one or more in each carpel, albuminous, sometimes winged or arillate.

I. Leaves digitate. Flowers small. Follicles coriaceous. .. 1. *S. versicolor.*
II. Leaves simple, palmately lobed. Calyx-segments shorter than the tube :—
Flowers small in long panicles. Follicles coriaceous. .. 2. *S. villosa.*
Flowers fairly large in short stiff panicles. Follicles papery. .. 3. *S. colorata.*
III. Leaves simple, usually not lobed. Calyx segments many times longer than the tube :—
A. Seeds 4-8 in each follicle, not winged :—
1. Leaves tomentose beneath. Pedicels up to ·3 in. long. .. 4. *S. guttata.*
2. Leaves wholly glabrous. Pedicels up to 1 in. long, capillary :—
Leaves rounded at base. Racemes short, erect. Calyx-segments never cohering at the tips. Follicles pink, downy. .. 5. *S. Roxburghii.*
Leaves tapering at base. Panicles long, drooping. Calyx segments often cohering at the tips. Follicles crimson, velvety. .. 6. *S. coccinea.*
B. Seeds numerous, prominently winged :—
Calyx-segments scarcely exceeding the tube. Leaves cordate, wholly glabrous. .. 7. *S. alata.*

1. Sterculia versicolor, Wall. Vern. *Durong-phang*, Kach. ; *Khai-pang-thing*, Kuki ; *Star-um*, Khasi.

A lofty tree with a long straight bole and spreading crown ; branchlets thick with a large pith and marked with prominent scars of fallen leaves and stipules. *Bark* grey or cinnamon-brown and with many horizontal wrinkles outside, exfoliating in papery flakes, inside white with reticulating thin strands of white fibrous tissue, the outer edge of blaze mottled brown, the rest with concentric layers of bast, ·6-·75 in. thick. *Leaves* digitate ; petiole 10-18 in. long ; leaflets 7-9, 6-11 by 2-4 in., elliptic, lanceolate or oblanceolate, very shortly petioluled, quite entire, subcoriaceous, glabrous above, puberulous or glabrescent beneath, lateral nerves 28-32 on either half, oblique, straight or slightly arched ; tertiaries subparallel, transverse to the secondaries, about ·06 in. apart ; ultimate nervules very closely though obscurely reticulated. *Panicles* 10-14 in. long, 8-12 crowded at extremities of branches above the current year's leaves ; flower-buds globose, ·05-·08 in. diam., buff tomentose. *Flowers* pale yellow, ·2-·25 in. long, very shortly pedicelled. *Calyx* campanulate ; segments oblong, inflexed, shorter than the tube. *Staminal column* curved. *Ovary* 5-lobed, buff-villous. *Follicles* 5-6, 3-3·5 by 1·5 in., slightly compressed, coriaceous, obscurely ribbed, covered with dark brown urticating brittle hairs. *Seeds* up to 10 in each follicle, ·6 by ·3 in., oblong, with a jet-black shining aril and a knob at the hilum.

At the foot of the NAGA HILLS near Nichuguard, Naojan, SIBSAGAR, N. CACHAR HILLS, KHASI HILLS up to about 2500 ft,
The seeds are eaten roasted.

2. Sterculia villosa, Roxb. Vern. *Udal, Odal, Odla,* Ass.; *Sergok-asing,* Miri & Abor.; *Chekong* or *Chikong-arong, Jinje-kong, Theng-chi-kong-long, Kongkulu,* Mik., *Dukhundu-phang, Tekundu-phang,* Cach. *Heppuk-bang,* Naga; *Udal,* Sylh., Cach. and Daff.; *Ubak, Upak, Umak,* Garo; *Dieng-star, Tluh,* Khasi; *Odal,* Mech; *Ruija,* Kuki; *Japui-kung,* Tipp.

A moderate-sized deciduous tree with a spreading crown and a gregarious tendency; branchlets thick, with large heartshaped scars of fallen leaves, more or less whorled on young trees. *Bark* grey, more or less smooth, 1 in. thick; inside light red, fibrous. *Young* shoots, petiole, and inflorescence brown tomentose with stellate and spreading hairs inter-mixed. *Leaves* crowded at the ends of branchlets, simple, but deeply 5-7 lobed, deeply cordate, 10-18 in. across, light red when very young; lobes oblong or ovate, acuminate, with entire distantly toothed or lobed margins, glabrescent or covered with scattered stellate hairs above, tomentose beneath; petiole 10-16 in. long, minutely tomentose; stipules lanceolate, acuminate, caducous. *Flowers* dun-yellow, ·25 in. across, in crowded drooping panicles 9-12 in. long from the ends of shoots, males more numerous than females; pedicels slender. *Calyx* campanulate, membranous, stellate-pubescent outside, lobes short, acute, erect. *Male fls.-Staminal* column with 10 anthers. *Female fls.-Gynophore* about ·2 in. long. *Ovary* globose, stellately hairy, staminodes in a ring beneath the ovary. *Follicles* 2-5, sessile, 2-3·5 by 1-1·2 in., reddish-brown and tomentose outside, scarlet and shining inside. *Seeds* ·3 by ·25 in. oblong, oily, with a shining black aril.

Common in deciduous forests throughout ASSAM, especially on gravel beds of hill-streams ascending to about 2500 ft.; often tending to become gregarious.

Wood soft, light and open-grained, weighing about 20 lbs. per c. ft. It can be used for tea-boxes. The inner bark yields a coarse strong fibre which is made into ropes or breast-bands for elephants for dragging timber. The seeds are eaten baked or roasted. The tree exudes a clear white gum which in other parts of India is used medicinally especially in veterinary practice. About 110-120 seeds weigh 1 oz.

Leafless 12-4. New leaves 4-5. Fls. 3-4. Fr. 4-6.

3. Sterculia colorata, Roxb. Vern. *Jhari-udal, Jari-udal, Kath-udal,* Ass.; *Sangkru-arong,* Mik.; *Bohog-odla,* Mech; *Bol-ajun, Chengsu, Walgem,* Garo; *Dieng-symphlor, Dieng-Sangkhlor,* Kh.

A spreading deciduous tree up to about 40 ft. in height and 5 ft. in girth, usually precocious; branchlets stiff but not very thick, glabrous. *Bark* about 2 in. thick on mature trees, dark-grey outside, white with bands of soft granular tissue alternating with strands of fibrous porous tissue inside. *Leaves* 4-10 in. long and as broad or slightly broader, very variable, usually deeply 3-5 lobed with caudate-acuminate lobes on saplings, slightly lobed or not lobed at all on mature trees, palmately 5-7 nerved, chartaceous, glabrescent on both surfaces; ultimate nervules very closely reticulate; base generally deeply cordate, especially on saplings; petiole about as long as the blade or

slightly shorter ; stipules caducous, lanceolate. *Flowers* about .7 in. long, solitary or in fascicles of 2-3 in short erect panicles from axils of fallen leaves, both densely covered with orange red stellate tomentum. *Calyx* funnel-shaped, lobes short, acute or obtuse, tube long, persistent in fruit, ultimately purplish outside, yellowish stellate tomentose within, with a ring of tufted hairs towards the base. HERMAPHRODITE FLRS.—*Anthers* 20-30, sessile on a long gonophore, which is ultimately exserted by .25-.3 in. beyond the calyx, surrounding the 5 very small flask shaped carpels ; styles recurved. MALE FLRS.—*Staminal* column about .2 in. long, carpels of pistillode smaller than those of hermaphrodite flrs. *Follicles* 2-3 in. long, stipitate, membranous, glabrous, pink outside, green inside, venose, opening long before maturity. *Seeds* 2-3 in each follicle, about .3 in. by .25 in., ovoid smooth, light green.

KHASI AND JAINTIA HILLS, GARO HILLS, NORTH CACHAR HILLS, GOALPARA, NAGA HILLS.
Leafless 12-4. Flrs. 2-3. Fr. 3-5.

4. Sterculia guttata, Roxb. Vern. *Hirikh*, Ass.

A large evergreen tree with a simple stem and oval crown ; young parts and inflorescence rusty stellate tomentose. *Bark* dark-brown, rough with warts outside, much cracked on old trees, fibrous, white mottled with brown, quickly turning uniformly brown inside. *Leaves* simple, not lobed, ovate elliptic or obovate acute or abruptly short acuminate, 6-10 by 3.5-6 in., entire, subcoriaceous, glabrescent and rugulose above, rusty tomentose beneath, often somewhat inequilateral, turning yellow before falling ; lateral nerves 10-14 on either half, with midrib very prominent beneath, tertiaries subparallel, transverse to the secondary nerves, quarternaries reticulate ; base rounded or slightly cordate ; petiole 1.5-2.5 in. long, stout, slightly swollen and geniculate, caducous. *Flowers* pale ; chiefly male, .5-.6 in. long, in narrow racemiform panicles ; buds lanceolate or spindle-shaped ; pedicels .2-.3 in. long, rusty hairy ; bracts lanceolate, ·3-.5 in. long. *Calyx* deeply 5-partite ; segments .3-.5 in. long, narrow-lanceolate, rusty tomentose outside, glandular and with scattered long hairs inside, sometimes cohering at the tips ; tube very short. MALE FLS.—*Staminal column* ·3 in. long, slender, curved ; anthers 10-15, very small, sessile. HERMAPHRODITE FLS. (functionally female ?). *Gonophore* stout. *Ovary* surmounting the ring of anthers, globose, woolly, 3-5 lobed ; styles curved. *Follicles* red, 1-5 ; 3-5 by 1.3-1.7 in., coriaceous, compressed, tomentose outside, smooth and pink inside. *Seeds* 3-4 in each follicle, ellipsoid, ·8 by .6 in., black, smooth ; albumen oily ; cotyledons elliptic.

Digboi, Borjan, Dulong Reserve and similar other places in the LAKHIMPUR DISTRICT.
The seeds are eaten roasted. In the Malabar coast a kind of coarse rug is made by beating and washing the inner bark which is opened and taken off whole in lengths of 6 ft. or so
Fls. 4-5. Fr. 8-9.

5. Sterculia Roxburghii, Wall. Vern. *Nag-phona*, *Nag-phena*, Ass. ; *Mimong-omak*, *Misi-chik-udari*, Garo.

A small or middle-sized tree. *Bark* dark-brown, somewhat rough outside, light brown inside, turning deep brown after exposure. *Leaves* 3-8 by 1-3.5 in., variable in size and shape, simple, ovate, obovate, elliptic-oblong or lanceolate, shortly cordate-acuminate, entire, chartaceous or subcoriaceous, glabrous ; main lateral nerves 6-8 on either half, oblique and much arched, the lowest sub-basal ; base rounded ; petiole .5-1.3 in., terete, swollen and geniculate near the insertion of the blade. *Racemes* 2-4 in. long, narrow, erect from axils of fallen leaves and also axillary ; pedicels .3-1 in. long, bracteate, slender, stellately hirsute. *Flowers* about .5 in. across, brick-red ; buds ovoid ; male flrs. more numerous. *Calyx* campanulate, 5 partite ; tube short. *Follicles* pink, 1-5, spreading, 2-3 by .7-.9 in., compressed, thickly coriaceous, beaked, downy. *Seeds* 4-8, black, ovoid.

Sporadic in evergreen mixed forests in LAKHIMPUR, SIBSAGAR and GARO HILLS.

The roasted seeds are eaten.

Flrs. 2-3. Fr. 6-7.

6. Sterculia coccinea, Roxb. Vern. *Nak-chepeta*, Ass. ; *Saglepapio*, Miri ; *Konkelu*, Mik., *Tatom-pelom-changne*, Duff.

A shrub or a small tree. *Bark* grey, warty, green below the cuticle, thin, whitish inside. *Leaves* 4-12 by 2-3.5 in., oblanceolate, abruptly short acuminate, often bluntly, and tapering to the narrow base, quite entire, chartaceous or sub-coriaceous, glabrous above, generally with stellate or simple minute adpressed hairs beneath ; lateral nerves about 12 on either side of the strong midrib, arched and anastomosing near the margin ; petiole 1-2 in. long ; terete, thickened and slightly geniculate below the insertion of blade ; stipules subulate, .2-.25 in. long, caducous, rusty pubescent. *Panicles* 4-7 in. long, axillary, rarely supra-axillary, generally long-peduncled ; branches of panicles and pedicels capillary, the latter .2-.3 in. long. *Flowers* pale, over 1 in. in diam., when fully expanded. *Calyx-tube* very short, lobes .5-.6 in. long, very narrow, patently white-hairy, free or cohering at the tips. *Follicles* 2-5, scarlet, 3-5 by .6-.8 in., thinly coriaceous, velvety outside, glabrous and bright-red inside. *Seeds* 4-8, ovoid, smooth.

Fairly common in LAKHIMPUR, SIBSAGAR and DARRANG also in the MIKIR, NAGA, GARO and KHASI HILLS (ascending to about 3000 ft.)

The tender fruit is eaten cooked like beans and mature seeds are eaten fried or roasted.

Flrs. 8-9. Fr. 4-5.

7. Sterculia alata, Roxb. vern. *Pahari*, Ass. (Sibs) ; *Bong-long-thing* or *Pong-long-thing*, Mik. ; *Thailokhrong*, *Bandar-pela*, Cach. ; *Khamari*, Nep. ; *Phunber-pui*, Lushai ; *Bantai*, Kuki ; *Mi-bol*, Garo ; *Dieng-klong*, *Dieng-soh-lakor*, Khasi.

A tall tree up to 150 ft. in height and 9 ft. in girth with a high narrow conical crown and horizontal branches ; young parts golden-pubescent. *Bark* greyish-brown, more or less smooth, but

with horizontal wrinkles and shallow vertical-fissures about ·25 in. apart; green underneath the corky layers, and dun-yellow, fibrous, with distant strands of light green tissue inside. *Leaves* simple, 4-10 by 3-8 in., ovate, cordate, subacute, chartaceous, glabrous; basal nerves 7, lateral 4 on either half, tertiary transverse to the main nerves; petiole 1.5-4 in. long; stipules subulate, caducous. *Panicles* from axils of fallen leaves, few-flowered. *Flowers* brownish-yellow, .6-1 in. across. *Calyx* campanulate, divided half way into 5-6 thick linear-lanceolate segments, densely rusty stellate-tomentose outside and with red veins inside. MALE FLS.—*Staminal column* .5-.6 in. long, bearing at the top 5-6 sterile carpels round which the subsessile stamens are arranged. *Hermaphrodite* (or functionally female?) flowers:—*Carpels* sessile; style recurved, stamens (staminodes?) arranged round the base of the carpels. *Follicles* 1-5; 3-5 in. across, shortly beaked, on stout stalks 2-3 in. long, woody, minutely brown-felted out-side, corky within. *Seeds* numerous, tightly packed, elliptic, compressed, 1 in. long with a white spongy terminal wing, 2-2·7 by 1·3-1·5 in.

Somewhat gregarious in evergreen forests along foot of the hills in all districts except perhaps the N. E. FRONTIER. Common near Garampani and Tikhang in SIBSAGAR and round the Dhansiri Station in NOWGONG.

A very handsome avenue tree. Wood white, soft, apparently elastic. Drums are made of the stem in Nepal. The Mikirs and Kacharis eat the seeds roasted. The fibre of the bark is sometimes used for rough cordage.

Flrs. 2-4. Fr. 11-3.

Sterculia ? sp.—A tree; young parts and petiole tawny stellate-pubescent. *Leaves* 5-8·5 by 1·5 in., oblong lanceolate, acuminate, entire, chartaceous, thinly millate hairy on the nerves on both surfaces, more densely pubescent on the nedrib, lateral nerves oblique about 6 on either half (excluding the basal pair); rvules finely reticulate; petiole 1-2 in. long, geniculate at the top; stipules mall, densely pubescent, early deciduous.

Irs. & Fr. not seen.

Umlowa-KHASI HILLS.

Sterculia khasiana (King Mss) Debbarman. Nov. sp.

A medium sized tree, shoots and inflorescence ferruginous tomentose. *Leaves* 3·6-7 by 1·6-3 in., entire, subcoriaceous, elliptic or obovate lanceolate, apices shortly acuminate, somewhat narrowed towards the base, smooth; stipules ·2 in. long, coriaceous, needle-shaped or lanceolate, caducous. *Racemes* apical, single at the axis, lax, rather spreading; peduncle erect, delicate. *Flowers* bracteate; bracts minute, ovate lanceolate, caducous; pedicels ·3-·5 in. long, erectopatent. *Calyx* lobes 5, puberulous inside; lobes ·4-·6 in. long, linear lanceolate, trinerved. *Petals* absent. *Staminal-column* ·1 in. long, thick, reflex, smooth; anthers 10, white on sessile column of the flowers. *Fruits* not seen.

Habitat:—ASSAM, KHASI HILLS, Griffith (Date of collection and No. not known); KHASI HILLS, 1873, Rutton, (comm. C. B. Clarke, Oct. 1877, No. 21884 A & D.) (Type in Calcutta Herbarium).

2. HERITIERA, Aiton.

Evergreen trees. *Leaves* simple, entire, coriaceous, peltate, scaly beneath. *Flowers* small, 1-sexual in axillary panicels. *Calyx* segments 5, sometimes 6-7. *Petals* 0. MALE FLRS.: *Staminal* column slender bearing a ring of 4-5 2-celled anthers at the top. FEMALE FLRS.: *Ovary* of 5 nearly free carples; styles short; ovules 1-2 in each carpel. *Ripe carpels* woody, indehiscent, keeled or winged. *Seeds* exalbuminous.

Leaves large ; petiole over 1 in. long. .. 1. *H. macrophylla.*
Leaves medium-sized to small, petiole under ·5 in. long .. 2. *H. acuminata.*

1. Heritiera macrophylla, Wall. Vern. *Tepop-pomik,* Abor ; *Thing-ansil,* Kuki.

A large evergreen tree, generally widely buttressed at the base when old. *Bark* dark-brown or nearly black, almost smooth, exfoliating in small square flakes, light red or nearly white inside, fibrous. *Leaves* simple, 6-18 by 2-7 in., elliptic-oblong or lanceolate, acuminate, narrowed to a sub-cordate or sub-peltate base, entire, thinly coriaceous, glabrous and dark green above, silvery beneath with stellate scales ; midrib very stout, main lateral nerves 8-11 on either half, very oblique, lowest sub-basal, tertiaries slender, transverse or reticulate ; petiole 1-3 in. long, geniculate at the apex, scaly. *Flowers* small, 1-sexual, pink, in axillary puberulous panicles. *Calyx* cleft to the base ; segments acute. *Staminal column* slender with a crown of 4-5, 2-celled anthers at the top. *Ovary* of 5 distinct carpels of which generally only one developes into fruit. *Ripe carpel* indehiscent, globose, about 1·5 in. across. rough outside, with an obliquely set, narrow winged beak about 1·5 in. long and ·3 in. broad.

A very handsome tree, found in the neighbourhood of Pasighat, N. E. FRONTIER DISTRICT. ; also according to Brandis in CACHAR.

Timber hard ; annual rings distinct, medullary rays uniform, joined by fine transverse lines, takes a fine polish, used for posts.

Flrs. 4-5. Fr. 9-10.

2. Heritiera acuminata, Wall. Vern. *Arkhar,* Lushai, Kuki ; *Thing-phelem,* Kuki, *Thing-saipho,* Tipp. ; *Rashwet,* Synt. *Ching-ren,* Naga, *Bondonthuphang,* Kach.

A medium sized tree often buttressed at the base ; young shoots, petioles and undersurfaee of leaves covered with star-like peltate brown scales which turn silvery with age. *Bark* grey and rough out-side, red inside with streaks of deeper red, inner layers lace-like. *Leaves* 2.5-7 by .8-2 in., lanceolate, oblanceolate or oblong to elliptic, acuminate, subcoriaceous or coriaceous, glabrous above, main lateral nerves 5-6 on either side, distant, upper arcuate, lowest pair basal ; base acute, obtuse or rounded ; petiole .25-.5 in., geniculate at the apex ; stipules very small, subulate, caducous. *Panicles* axillary, much branched, densely covered with stellate tomentose scales, 1.2-4 in. long ; bracts very small, caducous ; pedicels up to .25 in long, slender. *Calyx* campanulate, 4-5 lobed, lobes acute, recurved. MALE FLRS. : *Calyx* .1 in. long, staminal column slender, girt at base with a fleshy disk. FEMALE FLRS. ; *Calyx* .15-.2 in. long ; ovary of 4-5 distinct ridged carpels covered with scales and stellate hairs and with 2 minute staminodes between each carpel, styles red, recurved. *Ripe carpels* 2-4 together, 2-3 in. long, globose with an oblique parallel veined wing at the top, as broad as the diameter of the carpel

CACHAR, SYLHET, KHASI and JAINTIA HILLS, North Cacahar Hills, ascending to about 2000 ft.

Sap wood greyish brown ; heartwood red, annual rings clear ; medullary rays evenly distributed, joined by fine wavy transverse lines ; takes a good polish. Timber hard, used for posts and ridge plates.
Flrs. 4-5. Fr. 10-12.

Heritiera dubia, Wall.—*Leaves* 3-7 by 1-2.5 in., oblong lanceolate or ovate, finely acuminate, chartaceous, glabrous above, silvery lepidote beneath ; base acute or abruptly rounded, 3-nerved ; petiole .6-1 in. long. *Flowers* rusty villous in axillary panicles, 2-2.5 in. long. *Staminal* column fleshy. *Ovary* tomentose, style short, oblique, stigma 4 lobed. Fr. not seen.

KHASI AND JAINTIA HILLS—G. Gallataly (!)

Helicteres elongata, Wall :—A diffuse straggling shrub. *Leaves* about 3 by 1.5 in., oliquely ovate or oblong-lanceolate, thinly stellate pubescent. *Flowers* bisexual in axillary or terminal, many-flowered erect racemose cymes as long as or longer than the leaves ; bracteoles setaceous. *Calyx* 5-cleft ; campanulate. *Petals* 5, clawed. *Staminal* column adnate to the gynophore. *Ovary* 5-lobed, 5-celled ; ovules several in each cell. *Fruit* 1-1.5 in. long, cylindric, beaked, stellate hairy in some forms, shaggy outside, of united carpels opening along their inner edge.

ASSAM. Brandis Ind. Trees.
I have seen no specimens at Calcutta.

3. ABROMA, Jacq.

Abroma augusta, Linn. Vern. *Gorukhia-korai,* Ass. (Sibs) ; *Ui-sipak,* Miri ; *Ulat-kambal,* Beng. ; *Bon-kopahi,* Ass. ; (Kamrup) ; *Jhinuk, Thanthani,* Sylh. ; *Dieng-tyrkhun,* Khasi.

A shrub 8-12 ft. high with horizontal branches and velvety branchlets. *Leaves* 4-11 by 2.5-7 in., ovate or lanceolate, more or less cordate, finely acuminate, membranous, entire or repand denticulate, sometimes lobed, glabrescent above, softly pubescent or glabrescent beneath, 5-7 nerved at the base and with 4-6 main lateral nerves on either side of the midrib ; petiole .5-5 in. long ; stipules .2-.5 in. long, linear-lanceolate, deciduous. *Flowers* bisexual, purple, about 2 in. diam., in leaf opposed pedunculate few-flowered cymes. *Sepals* 1 in. long, lanceolate, persistent. *Petals* imbricate, caducous with a concave claw. *Staminal tube* short, staminodes 5, alternating with shorter fertile stamens opposite the petals. *Ovary* sessile, 5 lobed, pyramidal ; ovules many in each cell ; styles 5. *Capsule* 1.5-2 in. long, obpyramidal, finely pubescent or ultimately glabrescent, truncate at the apex, membranous, 5 angled, dehiscing septicidally and at the top, valves villous at the edges forming a triangular wing behind each carpel. *Seeds* numerous.

In scrub forest throughout ASSAM, ascending up to 4000 ft.
The bark of the twigs yields a strong silky fibre which may be used for a variety of purposes and for which the plant is well worth cultivating in plantations. The bark of the root is a valuable emmenagogue and has also demulcent properties,
Flrs. 6-9. Fr. 8-12.

4. PTEROSPERMUM, Schreb.

Trees, scaly or with stellate hairs. *Leaves* simple, lobed or not, bifarious, generally nerved from the base and oblique. *Flowers* axillary, 2-sexual, bracteate ; bracteoles often lanciniate.

Calyx deeply 5-cleft. *Petals* 5, deciduous. *Staminal column* short, adnate to the gynophore, divided above into 5 groups with 20 filamants, 5 of which are staminodes, alternate with groups of three anthers. *Ovary* 5-celled, inserted within the top of the staminal column ; style solitary ; stigma furrowed ; ovules many. *Capsule* generally woody, terete or more or less angled. *Seeds* winged at the upper extremity ; cotyledons wrinkled or corrugated ; albumen thin or O.

Branchlets thick ; leaves large and broad ; calyx-lobes 4-5 in. long, very fleshy ; capsule angled. .. 1. *P. acerifolium.*
Branchlets thin ; leaves small and narrow ; calyx-lobes 1.5-2 in. long, thin ; capsule terete. .. 2. *p. lanceæfolium.*

1. Pterospermum acerifolium, Willd. Sans. *Karnikara ;* Vern. *Tepopasing*, Miri ; *Tepop-paptok*, *Sipop-asing*, Abor ; *Morra*, *Moragos*, Ass. ; (Lakh.) ; *Hatipeala*, Ass. (Nowgong), *Mota-marulia*, Ass. (Jeypur) ; *Bon-marla*, Ass. (Darr.) ; *Larubanda*, Ass. (Kamrup) ; *Modubura*, *Lai-dorbuphang*, *Lau-gongrai-baphang*, *Rangirata*, Cach. ; *Kongla-arang*, *Lokong-krong-arong*, *Lopoklok-arong*, Mik., *Tagaru-changne*, Duff. ; *Kuakla*, Manipur ; *Hati paile*, Nepal ; *Waisil-thing*, Lushai ; *Modubura*, Sylh. ; *Avor*, *Ching-pha*, Tipp. : *Nakhar-theng*, Kuki ; *Bhot-odla*, *Laider*, Mech ; *Rikhabok*, *Mat-bul-japha*, Garo ; *Dieng-tharo-masi*, Khasi ; *Dieng-sla-um-pai*, Khasi ; (Nongpoh) ; *Dieng-myrhaw* , Khasi (Tharia) ; *Dieng-khoh*, Khashi (Shella) ; *Dieng-khong-swet*, Khasi ; (Hatmawdon). *Dieng-dit-la-khoh*, Kh. ; (Nongkla.)

An evergreen tree up to 80 ft. in height and 8 ft. in girth. with a heavy broad crown ; young parts and inflorescene floccose, rusty stellate tomentose. *Bark* dark-brown and rather rough outside, inside deep purplish red, variegated with streaks of white in marble-like pattern. *Leaves* 8-15 by 6-12 in. ; very variable in size and shape even in the same twig, somewhat obliquely obovate or orbicular, often lobed, entire or remotely toothed, deeply cordate or peltate, coriaceous, glabrous and deep green above, grey or brownish tomentose beneath, palmately 8-10-nerved from the extremity of the petiole and with 3-6 lateral nerves on either side of the midrib ; tertiary and quarternary nerves sub-parallel ; petiole 4-12 in. long, striate ; stipules multifid, caducous. *Flowers* solitary or in 2-3 flowered cymes, 5-6 in. accross, fragrant ; peduncles .5 in. long ; bracteoles multifid, deciduous. *Calyx-segments* 4-5 by .3-.5 in., linear, very fleshy, floccosely-brown tomentose outside, tufted villous along the middle, stellate downy on the edges within. *Petals* twistedly imbricate, a little shorter than the sepals, cuneately linear, pure white, thin. *Filaments* 15,1-1.5 in. long, filiform, glabrous, in threes against each calyx-segment, with a staminode 2-3 in. long between, all forming a tube about 1 in. long below the ovary and adnate to the gynophore ; anthers .5 in. long. *Ovary* oblong, obscurely 5-angled, brown-shaggy ; style simple, tapering to the club-shaped stigma,

stellate tomentose towards the base. *Capsule* 4-6 by 1.8-3.4 in., 5-celled, 5-angled, woody, floccosely brown-tomentose. *Seeds* in two rows of 8-10 in each cell, .3-.4 in. diam., rhomboid, compressed with a straight, oblong, thin, horny, shining, amber-coloured wing, 1.2-1.8 by .3-.5 in., having a thickened dorsal margin ; albumen scanty, waxy ; cotyledons corrugated.

Throughout the Province in mixed evergreen forests, often gregarious ascending to 2500 ft.

The heartwood being red is often smuggled as *Poma* ; Weight about 48 lbs. per c. ft. The leaves are good cattle-fodder and are laid on roofs under thatch or slates in some parts of N. W. India. A plaster made of the calyx is considered infallible in glandular swellings about the neck and ears.
Fls. 4-6. Fr. 12-3.

2. Pterospermum lanceæfolium, Roxb. Vern. *Motanahor, Bon-baguri,* Ass. ; (Lakh. and Sibs.) ; *Bon-nahor,* Ass. (Darr.) ; *Bon-tituli,* Ass., (Kamrup) ; *Nahorahu,* Miri ; *Theng-pitula* or *Theng-pitula-arong, Phong-arong,* Mik., *Pung-i-tabri,* Daff. ; *Ching-nai,* Naga ; *Singani,* Nep. ; *Lai-kulai-phang,* Cach. ; *Arkhar,* Kuki ; *Sakhipelhnam,* Lushai ; *Ban-barai, Narcha,* Sylh. ; *Phaibomarta,* Tipp. ; *Bol-nabat, Bokta,* Garo ; *Dieng-nor-sha, Dieng-pen-swang,* Khasi.

Usually a small or middle sized tree but occasionally up to 70 ft. in height and 7 ft. in girth, when the stem is buttressed at the base ; sometimes epiphytic ; branchlets thin ; young parts, undersurface of leaves, petioles and inflorescence felted, with fine stellate at first rusty, ultimately buff-tomentum. *Bark* greyish green and rough outside, inside reddish with white vertical streaks which soon turn reddish-brown. *Leaves* 2.5-6 by ·7-1.5 in., lanceolate oblong or obovate-oblong, finely acuminate, entire or obscurely repand in the upper half, glabrous and shining above, midrib stout ; main lateral nerves 5-7 on either half, slender, oblique, tertiaries parallel, transverse to the midrib, ultimate nervules (visible only when the leaf is held against the light, and fully mature) finely reticulate ; base more or less oblique, rounded or sub-cordate, sometimes very narrowly peltate ; petiole .1-.2 in. long ; stipules .2-.3 in. long, subulate with 2-4 filiform branches, .1-.25 in. long, caducous. *Flowers* 2-3 in. across, pale-white, fragrant ; buds oblong-lanceolate, 5-ridged ; peduncles 1.7-2 in. long, 1-flowered with 1 or 2, 2-5 fid bracteoles. *Calyx-segments* 1.3-1.6 by .15-.2 in., brown tomentose, outside white or grey with adpressed, stellately tufted hairs and fine tomentum within. *Petals* white, membranous, slightly longer and wider than the calyx-segments, tapering towards the base. *Stamens* about 1 in. long, including the linear anthers ; gynandrophore about ·15 in. long. *Ovary* gradually narrowed to the ribbed simple style, buff-tomentose. *Capsule* 2.5-3 by 1-1.7 in., lanceolate, terete, woody buff-felted outside, 5-celled, each cell with about 4 seeds. *Seeds* about .3 in. diam., orbicular, compressed with a terminal wing-like that of the preceding species but shorter and somewhat tapering.

Common specially in mixed scrub forests, ascending to about 2000 ft.
Wood moderately hard with numerous and close undulating medullary rays, but is not much used. The Dafflas chew the leaves to redden their lips. Squirrels seem to be fond of the bark.
Flrs. 4-6, Fr, 10-6.

Pterospermum Blumeanum, Korth.—A tree 40-50 ft. in height; branchlets covered when young with scurfy deciduous rusty stellate hairs. *Leaves* 3-5.5 in. by 1.35-2 in., very unequal sided, oblong to ovate or lanceolate oblong, entire or with a few coarse teeth towards the apex, acuminate, one side of base often subauriculate, densely brown tomentose when young, glabrous and dark green above, minutely tawny or brown tomentose beneath, with many brown stellate hairs specially on the nerves beneath, lateral nerves 5-7 on either half, prominent beneath; petiole short; stipules subulate, lanceolate. *Flowers* 2-3 in. long, axillary, solitary or in few flowered cymes. *Buds* cylindric, acute, about 2 in. long; sepals narrowly linear, acute, scurfy, stellate pubescent outside, silky within. *Petals* membranous, oblong-lanceolate or subspathulate, shorter than the petals. *Fertile stamens* about 10; staminodes 5. *Ovary* villous, 5-celled; style shorter than the staminal tube, glabrous. *Capsule* 3-4 in. long, woody, oblong, 5 angled, subacute, slightly narrowed towards the base.
According to Brandis (Ind. Trees) occurs in Assam. There are no specimens at Calcutta from our area.
Flrs. 4. Fr. 6.

5. REEVESIA, Lindl.

Reevesia Wallichii, Brown.

A medium-sized tree attaining about 50 ft. with grey and somewhat smooth bark exfoliating in round flakes, inner substance soft, cream-coloured. *Leaves* simple, 2.7-6.5 by 1.5-3 in., ovate, ovate-oblong, acuminate, coriaceous, entire, glabrous above, sparsely stellate pubescent beneath, main lateral nerves 6-8 on either half, lowest pair basal, base obtuse or rounded; petiole .5-1.5 in. long, geniculate at the apex; stipules early deciduous. *Flowers* white, fragrant, bisexual, in corymbiform panicle of cymes, usually shorter than the leaves; panicles terminal or from axils of fallen leaves; pedicels jointed, 2 bracteolate. *Calyx* ultimately 5-fid, ·15 in. long, persistent. *Petals* spathulate, clawed, exceeding the calyx. *Staminal column* exceeding the petals, adnate to the gynophore and bearing a globose head of anthers in 5 bundles of 3 each. *Ovary* 5-lobed with 2 ovules, in each carpel; stigma subsessile, 5-lobed. *Carpels* pubescent. *Capsule* 1.5-2 in. long, obovoid oblong, brown velvety outside, 5-celled, grooved between the cells, valves woody, dorsally slightly keeled, dehiscing septicidally and ultimately along the backs of carpels. *Seeds* 1-2, .8-1.2 in. long in each cell, winged downwards; wing membranous with brown veins, oblong, .6-.8 in. long, albuminous.

KHASI AND JAINTIA HILLS, 3500-4500 ft.
Flrs. 4. Fr. 12-2

6. BUETTNERIA, Linn.

Generally climbing shrubs with palmately nerved leaves. *Flowers* bisexual, 5-merous, small, in much branched umbellate cymes. *Sepals* connate at the base. *Petals* with a concave claw and with two lateral lobes. *Anthers* 5, extrorse, seated on a more or less

truncate staminal tube, opposite the petals and alternating with 5 staminodes which are opposite the sepals. *Ovary* sessile, 5-celled with 2 ovules in each cell. *Capsule* septicidal, globose, echinate, 5-celled, with one seed in each cell. *Seeds* exalbuminous; cotyledons spirally rolled.

Leaves chartaceous, entire, glabrate and shining above; capsule armed with stout conical prickles. .. 1. *B. aspera.*
Leaves membranous, serrulate, more or less pilose above; capsule covered with wiry thin barbed bristles. .. 2. *B. pilosa.*

1. Buettneria aspera, colebr. Vern. *Tikoni-borua,* Ass. (Sibs.); *Risut-ruibi,* Miri & Abor; *Warpokhu,* Mik.; *Pira-doukha,* Kach.; *Jong-long-rhui,* Lushai; *Lata-kuti, Dusi-phri,* Garo; *Ther-um, Tille-sa-phai, Mei-klong, Mei-slah,* Khasi.

A large woody climber with sulcate branchlets; young shoots and inflorescence grey or buff stellate pubescent. *Bark* dark-brown closely longitudinally or spirally furrowed on old stems. *Leaves* 4-8 in. diam., orbicular, cordate, abruptly acuminate, entire or obscurely repand, chartaceous, glabrate and shining above, puberulous along the nerves beneath, bright pink when young; midrib with one or more large glands near the 5-7 nerved base and 5-6 regularly arched lateral nerves; tertiaries sub-parallel and transverse to the secondary nerves; ultimate nervules very fine and closely reticulate; petiole 2-5 in. long, sulcate, puberulous; stipules ·5 in. long, linear lanceolate, early deciduous. *Flowers* pale brown, ·15-·2 in. diam., buds ovoid or pyramidal; pedicels slender, ·3-·5 in. long, jointed in the middle, cymosely umbelled on the ultimate ramifications of peduncled cymes; inflorescence up to 5 in. long; peduncles fascicled, axillary, up to 2 in. long: bracts and bracteoles subulate. *Petals* shorter than the sepals, terminal lobe fleshy, acute, lanceolate. *Capsule* 1-1·5 in. across, globose, woody, armed with stout sharp rather distant conical prickles. *Seeds* ovate oblong, solitary in each cell, immersed in watery sap, unarmed.

Fairly common in mixed evergreen forests throughout UPPER ASSAM and also NAGA HILLS ascending up to 2500 ft.
Young parts and bark macerated are used by Mikirs and Khasi women to wash the hair.
Flrs. 5-6 Fr. 11-3.

2. Buettneria pilosa, Roxb. Vern. *Dim-soh-doukha, Dum-shoh-doukha,* Cach.; *Manlang-rang,* Kuki; *Jirmi,* Khasi.

A large woody climber; branchlets grooved, at first densely pubescent, afterwards more or less strigose. *Leaves* 4-7 by 2.5-6 in., orbicular or ovate, cordate, abruptly acuminate, often more or less distinctly 3-5 lobed, closely serrulose-denticulate, membranous, somewhat harshly stellate-pubescent, 7-9 nerved at the base and with 3-5 lateral nerves on either side of the midrib, other nerves as in the preceding species; petiole 2-8 in long, shaggy while young. *Flowers* yellowish, about ·2 in. across; in much branched

pubescent compound cymes; bracteoles subulate, pedicels capillary several together on ultimate cymose umbels; petals shorter than the sepals, terminal lobe linear lanceolate; anthers yellow, spreading. *Capsule* spherical, .6-.8 in. diam., densely covered with barbed bristles.

In the lower hills or not far from the foot of the hills in SIBSAGAR (Barpathar, Naojan) and NOWGONG (Lumding, Amguri, Doboka).
Flrs. 10-11. Fr. 12-4.

Dombeya Mastersi, Hk. f. A large branchy shurb. *Leaves* 4-6.5 in. across, orbicular cordate, often obscurely 3 lobed, acuminate, thinly pubescent above, soften hairy beneath, palmately 7-9 nerved, crenate-dentate; petiole 1.5-3 in. long, villous like the pedicels and peduncles with long spreading hairs. *Flowers* white, 1-1.5 in. across in many flowered, axillary, pedunculed umbels; peduncles up to 1.5 in. long, sometimes forked towards the top, each branch bearing an umbel with a solitary flower in the fork; pedicels slender, 1-1.5 in. long, surmounted by an epicalyx of 3 deciduous, linear lanceolate, acuminate bracteoles about .75 in. long. *Sepals* .5 in. long, lanceolate, valvate, reflexed in flower. *Petals* .7-1 in. by .45-.5 in. oblique, imbricate. *Staminal tube* short, nearly enclosing the ovary; stamens in bundles of 3 with an interposed petaloid staminode having pinkish base, and linear ligulate limb which is longer than the stamens. *Ovary* densely villous; style free at the apex. *Capsule* 5 celled with papery valves; seeds rugose.
A native of TROPICAL AFRICA. Cultivated in public gardens in Shillong.
Flrs. 1-2.

FAM. 25. TILIACEÆ.

Trees, shrubs or herbs; bark usually mucilaginous and with strong fibres. *Leaves* alternate, simple or lobed, generally mucilaginous; stipules free. *Flowers* regular, 2-sexual or rarely 1-sexual, usually cymose. *Sepals* 3-5, free or connate, valvate. *Petals* as many as the sepals, rarely absent. *Stamens* indefinite, rarely few, free or connate, frequently inserted on a gonophore; anthers introrse dehiscing by lateral slits. *Ovary* free, 2-10 celled; ovules 1-many on axile placentas; style simple, or parted into as many divisions as cells in the ovary, or 0; stigmas terminal. *Fruit* baccate or capsular, 2-10-celled or spuriously many-celled, rarely 1-celled by abortion. *Seeds* solitary or many; albumen generally copious; embryo straight, usually with leafy cotyledons.

Fruits not winged :—
Trees or shrubs; fruit drupaceous. .... **1. Grewia.**
Herbs or undershrubs; fruit capsular :—
Petals glandular at base, capsules prickly or bristly. .... **2. Triumfetta.**
Petals not glandular, capsules unarmed. **Corchorus.**
Fruits winged :—
A tree. Leaves alternate. .... **3. Columbia.**
A climber. Leaves opposite. .... **4. Plagiopteron.**

1. GREWIA, Linn.

Trees or erect or sometimes straggling or climbing shrubs, usually stellate-pubescent. *Leaves* alternate, usually distichous,

often inequilateral, more or less toothed, with 3-7 basal nerves. *Flowers* generally yellow, less often white, in axillary, extra-axillary or terminal fascicles, cymes or panicles, sometimes solitary. *Sepals* 5, distinct, coriaceous, more or less coloured within. *Petals* 5, usually with a glandular scale* at the base within, generally much shorter than the sepals, sometimes wanting. *Stamens* indefinite, free, all fertile, inserted on a stout gonophore when the petals are glandular. *Ovary* 2-4 celled; style subulate. *Fruit* a drupe, more or less fleshy, entire or lobed; seed albuminous; cotyledons flat.

I. Trees.
  Flowers involucrate and panicled. ... *1. G. Microcos.*
  Flowers in axillary umbels which are generally fascicled :—
    Leaves oblong or ovate, more or less cordate, densely tomentose beneath. Flowers yellow. .. *2. G. elastica.*
    Leaves lanceolate, acute at the base, glabrescent. Flowers white. .. *3. G. Lævigata.*
II. Erect or straggling shrubs or undershrubs :—
  A. Leaves softly tomentose, pubescent or glabrescent, never rough :—
    1. Leaves broad, 5-nerved at the base :—
      Flowers yellow, drupe scarcely lobed. Undershrub with a thick underground root-stock and annual shoots. .. *4. G. sapida.*
    2. Leaves narrow, 3-nerved at the base :—
      Leaves nearly glabrous, green on both surfaces. Flrs. bisexual, white. ... *5. G. multiflora.*
      Leaves hoary beneath. Flrs. polygamous, yellowish . .. *6. G. hirsuta.*
  B. Leaves rough on one or both surfaces :—
    1. Erect shrubs or undershrubs; peduncles never exceeding the petioles :—
      Leaf 3-nerved at the base, thin; more or less lobed, fleshy, rind not crustaceous. Shrub with persistent shoots. .. *7. G. abutilifolia.*
      Leaf 3-5-nerved at the base, thick, rind crustaceous, undershrub or shrub, usually with annual shoots from a woody rootstock, drupe not lobed, rind crustaceous. ... *8. G. sclerophylla.*
    2. Straggling shrub; peduncle exceeding the petiole; drupe not lobed. ... *9. G. denticulata.*

1. Grewia Microcos, Linn. Vern. *Pisoli,* Ass.; *Theng-prankearong,* Mik.; *Heitup,* Manip.; *Bolchibins, Borsubret,* Garo; *Lakhul-guta, Koipura, Pipi,* Jharua; *Phisinda, Pesondi,* Sylh.; *Dieng-soh-dkhar, Dieng-soh-lieng-hadem,* Khasi.

A deciduous (?) tree up to 50 ft. in height and 5 ft. in girth; trunk often fluted; young shoots patently pubescent. *Bark* dark-brown or nearly black outside, exfoliating in thin flakes, finely fibrous, pink or red and in more or less distinct concentric layers near the cambium, fainter outward and variegated with brown or greenish-grey and leathery. *Leaves* bifarious, 3-7·5 by 1-3·5 in., ovate, oblong, obovate-oblong or lanceolate, serrulate or nearly

* The gland may sometimes be present or absent in one and the same species. Its presence appears to be correlated with the length of the gonophore.

entire, chartaceous, glabrescent but the petiole and main nerves are seldom wholly glabrous; main lateral nerves 6-7 on either side of the midrib, the lowest pair basal; base rounded or sometimes cordate, more or less oblique; petiole ·25-·6 in. long, terete; stipules more or less falcate, linear-lanceolote, ·25-·5 in. long. *Flowers* pale-yellow in heads of 3, supported by involucral bracts which are ·25-·3 in. long, lanceolate, coherent at the base and puberulous outside; heads pedunculate and arranged in terminal panicles 3-6 in. long. *Sepals* obovate-oblong, cream-coloured, about ·3 by ·1 in., hooded, pubescent. *Petals* about ·1 in. long, cream coloured, somewhat reddish on the back, glands about half the petals, slightly ciliate. *Filaments* shorter than the sepals. *Gonophore* and *ovary* glabrous, the former with a wooly fringe at the top. *Drupe* globose about ·3 in. across, smooth, glabrous; stone enveloped in a matted sac of strong fibres.

KAMRUP, NOWGONG, CACHAR, N. CACHAR HILLS, SYLHET, KHASI & JAINTIA HILLS, GOALPARA, GARO HILLS ascending up to 2000 ft., in deciduous forests.

Wood light-red, weighing about 50 lbs. per c. ft. seldom used except for firewood. In Burma leaves used for covering cigars for which it is considered to be the best leaf.

Flrs. 5-6. Fr. 11-1.

2. Grewia elastica, Royle. Syn. Grewia vestita, *Wall.* Incl. G. asiatica, *Linn.* Var. vestita, F. B. I., Vern. *Man-bijal*, Ass. (Now); *Bijol-goch* Ass. (Kam.); *Phuhura*, Ass. (Darr,); *Thusura*, Mech; *The-bong-dar-arong*, *Bong-der-so-arong*, Mik.; *Laiman-phang*, *Mikir-lata-phang*, *Thai-a-dou*, Cach.; *Sial-phosra*, Nep.; *Thai-girip-theng*, Kuki. *Bor-khentri*. *Khengkhriwakbik*, Garo; *Dhamna*, Jharua-Garo Hills; *Dieng-soh-langhri-that*, Khasi; *Dieng-tha-ballieh*, Khasi (Nongpoh).

A deciduous tree up to 60 ft. in height and about 5 ft. in girth; young parts densely grey-felted. *Bark* greyish-white on old stems exfoliating in hard rectangular pieces; inside whitish mottled with thick irregular pink streaks but soon turning deep brown obliterating the streaks. *Leaves* 3-5 by 2-2.5 in., obliquely ovate, oblong-ovate or elliptic, sometimes obscurely 3-lobed, acuminate, closely crenata-serrate, thinly coriaceous, dark-green and hispid with stellate hairs above, pale and softly felted beneath, pink when very young, basal nerves 5-6, nearly straight; lateral neves 3-4 on either side of the midrib, tertiaries transverse, parallel; petiole .2-.4 in. long; stipules subulatate, .3-.4 in. long. *Flowers* yellow. in fascicled or rarely solitary axillary cymes; peduncle .3-.5 in long, downy, each bearing 2-3 bracteolate flowers; bud globose to ovoid, not or very obscurely ribbed; pedicels .3-.4 in. long. *Sepals* .2-.5 in., linear-oblong, yellow inside. *Petals* yellow, oblong, much shorter than the sepals. *Stamens* numerous; filaments yellow, slender, glabrous. *Ovary* villous; style equalling the stamens or slightly exceeding them. *Drupe* globose, .2-.3 in. across, sometimes obscurely 2-4 lobed, slightly hairy, blackish when ripe.

In deciduous forests in DARRANG and NOWGONG, KAMRUP, N. C. HILLS, GOALPARA, KHASI & JAINTIA HILLS ascending up to 3000 ft.

Wood grey, close grained, tough and elastic, used in other parts of India for bows, spear-handles, banghy-poles, etc. ; weight about 50 lbs. per c. ft. The branches are lopped for fodder and the ripe fruit is edible. The bark yields a strong fibre suitable for ropes.

Flrs. 4-5. Fr. 9-11.

3. Grewia disperma, Rottl. Syn. Grewia lævigata, *Vahl.* Vern. *Senam-longda, Theng-rom-pa, Rampak-arong*, Mik. ; *Khau-khlem-maising-phang* or *Khau-khlem-marsi, Mithang-Samjia*, Cach. ; *Ganghthi*, Sylh. ; *Bol-mengu*, Garo ; *Thing-nhap-khir, Wai-thel-te-thing*, Kuki ; *Dieng-doh-thli*, Khasi ; *Dieng-tiew-ser*, Khasi (Shella) ; *Dieng-tiew-sat*, Khasi (Tharia).

A small tree but sometimes up to 45 ft. in height and 3 ft. in girth ; young shoots glabrous or nearly so. *Bark* thin, dark-grey or brown outside, uniformly cream-coloured inside. *Leaves* 3-7 by 1-2.4 in., green on both surfaces, oblong-lanceolate, accuminate, acute and 3-nerved at the base, glandular-serrate, membranous, glabrous or glabrescent ; lateral nerves about 6 on either side of the midrib, slightly arched, basal almost straight, tertiaries transverse, very slender ; petiole .3-.5 in. long, glabrous ; stipules subulate, shorter than the petals. *Flowers* 1-1.5 in. across, in 3-flowered axillary cymes ; buds oblong, ribbed ; peduncles .8-1.2 in. long, slender, 1-3 in each leaf axil ; pedicels nearly as long as the peduncles. *Sepals* .6-1 in. long, linear-oblong, fleshy, 2-ribbed, green outside, white within. *Petals* .1-.15 in. long, white, membranous, entire, tapering to the apex, claw dilated, gland exceeding half the petal. *Ovary* villous ; style glabrous ; stigma laciniate. *Gonophore* elongated, villous at the top. *Drupe* .25-.3 in. diam., 1-4 lobed, rugose when ripe.

In mixed scrub in all districts excepting LAKHIMPUR and the N. E. FRONTIER ascending to 3000 ft.

The leaves are used for fodder. The wood gives an offensive smell when burnt and is therefore carefully avoided as firewood for cooking purposes. The bark yields a good fibre which is suitable for cordage.

Fls. 9-10. Fr. 11-12.

4. Grewia sapida, Roxb. Vern. *Phukura, Thaura-guti* (the fruit), Ass. (Darr.) ; *Bong-der-so-arong*, Mik. ; *Pumi-aye* ; Miri.

A prostrate undershrub with a perennial woody rootstock throwing out annually a number of switchy shoots, which after producing leaves, flowers and fruit, are burnt or browsed down to be similarly renewed next year ; young shoots shaggy. *Leaves* 2-4 by 1.5-3 in., ovate, obovate, obovate-oblong or orbicular, usually doubly serrate, sometimes obscurely lobed, apex rounded or broadly acute, pilose or scabrid above, softly pubescent beneath ; base usually 5-nerved, oblique ; petiole .2-.3 in. long. grey-shaggy ; stipules .3 in. long, subulate, subpersistent. *Flowers* .4-.6 in. across, yellow, 2-5 on each peduncle ; peduncles 2-5 in each leaf-axil, .7-1.5 in. long, slender, hairy ; pedicels .5-.8 in. long ; bud obovoid, tomentose. *Sepals* reddish-brown inside,

oblong or oblanceolate. *Petals* yellow, elliptic, entire, often emarginate at the apex. *Drupe* .2-.8 in. diam., obscurely lobed, hirsute.

In large open dry grass-lands in all the DISTRICTS ascending to 2500 ft. A favourite fodder plant. The ripe fruit is edible.
Flrs. and Fr. 3-5.

5. Grewia multiflora, Juss. Vern. *Kukur-huta*, Ass.; *Barbi-asing*, Miri; *Singnam-longdak*, Mik.; *Papu-tadu-changne*, Duff.; *Mithaichora*, *Para-koroi*, Sylh.; *Dieng-tyrbhong*, Khasi; *Dieng-tiewsier*, Khasi (Hatmawdon).

A bushy shrub which often becomes procumbent with very small leaves due to excessive browsing; bark dark-brown outside, thin; white inside; branches thin; sparingly strigose. *Leaves* very variable in size and shape, irregularly distichous, 1.5-4 by .5-1.5 in. elliptic-lanceolate, acuminate, rounded or subacute at the base, glandular serrate, chartaceous, glabrescent, dark-green shining above; lateral nerves 5-6 on either half, the lowest sub-basal; petiole .15.-2 in. long, slender, strigose; stipules 1-2 in. long, subulate. *Peduncles* .5-.8 in. long, 3-flowered; pedicels nearly as long or longer. *Flowers* white, small; buds obovoid, ribbed. *Sepals* .3-.5 in. long, linear-oblong. *Petals* half the length of the sepals, entire. *Filaments* short. *Gonophore* glabrous with a fringe of hairs at the top. *Drupe* 1-4 lobed, about .2 in. across, globose, black or purplish, fleshy, glabrescent.

Throughout UPPER ASSAM. Very common in SIBSAGAR and the MIKIR HILLS.
The lac insect is reared on this plant and for this purpose it is often planted near homesteads in the Mikir Hills.
Flrs. 8-9. Fr. 9-11.

6. Grewia hirsuta, Vahl, Var. helictræfolia, *Wall* (Sp) Syn. G. polygama, *Masters*, not of Roxburgh.—Vide Journal of Botany Vol. XLIX P.356 et. seq. Vern. *Hukta-pata*, Ass.; *Soh-synting*, Khasi.

A spreading shrub attaining about 9 ft. with annual or periodic shoots; young parts and inflorescence pubescent. *Leaves* 2-5 by .4-.9 in., narrow lanceolate or oblong, acute or acuminate, closely toothed, stellate pubescent or glabrate above, grey or tawny tomentose beneath; lateral nerves (excluding the basal) 4-6 on either side of midrib; base rather oblique, usually 3-nerved; petiole up to .15 in. long; stipules subulate up to .2 in. long. *Flower* yellow, polygamous. *Peduncles* axillary, 1-5 together, 2-6 flowered, up to .5 in. long, but usually much smaller; pedicels up to .4 in. long; bracts subulate; buds obovoid, ribbed tomentose. *Sepals* linear-oblong, up to .4 in. long, usually with a tuft of hairs at the base inside. *Petals* obovate oblong, much shorter. *Stamens* many, usually exceeding 20; gonophore villous at the top, in male flowers, stamens much exceeding the hairs; in hermaphrodite flowers, stamens about as long as the hairs or slightly longer. *Ovary* villous. *Drupe* .2-.4 in. across, reddish brown and shining when ripe, rind crustaceous, covered with a few scattered hairs or glabrous when ripe, usually with 1-4 lobes.

Grass lands KAMRUP and KHASI and JAINTIA HILLS in lower elevations; probably also in other similar forests.
A very variable plant. Roxburgh's plant does not appear to be this species.
The fruit is edible and roots are considered to be tonic in Hindu medicine and the fruits are used in cases of diarrhoea and dysentery.
Flrs. rainy season. Fr. 11-1.

7. Grewia abutilifolia, Juss. Syn. G. aspera, *Roxb.* Vern. *Soh-eit-blang,* Kh.; *Bipo-bum-the-arong,* Mik.; *Bon-dusa-phang,* Cach.

A bushy shrub up to 10 ft. high with more or less smooth grey bark about .3 in. thick, blaze red with white streaks; young parts and inflorescence rough stellate tomentose. *Leaves* 4.5-8·5 by 2.5-6 in., broadly elliptic, elliptic ovate or suborbicular, sometimes lobulate, short acuminate, irregularly serrate, chartaceous when mature, rough stellate hairy on both surfaces, more densely beneath; lateral nerves 5-6 (above the basal) on either side of midrib, nervules finely reticulate; base 3-nerved, rounded; petiole .4-.6 in. long, densely tomentose; stipules subulate, adpressed hairy, .3-.4 in. long. *Peduncles* very short, 1 or more from leaf axils, 3-4 flowered; bracts caducous, lanceolate, ·25-.3 in. long; bracteoles linear, short; pedicels up to .2 in. long, elongating and stout in fruit; buds ellipsoid. *Sepals* .4-.7 by .1-.15 in., narrow oblong, glabrous, white, turning yellow and glabrous inside. *Petals* much shorter than the sepals, rounded at the apex, gland about half the length of the petal. *Filaments* white, very slender. *Ovary* villous; style exceeding the stamens; stigmas lobed. *Gonophore* glabrous with tufted hairs at the top. *Drupe* slightly 2-4 lobed. .4-.5 in. across, depressed, turbinate with scattered bristle-like deciduous hairs, fleshy.

NOWGONG-Sonaikusi reserve'; N. CACHAR HILLS; KHASI and JAINTIA HILLS—Barnihat, ascending to about 1000 ft.
Flrs. 4-5. Fr. 10-1?

8. Grewia sclerophylla, Roxb. Syn. G. scabrophylla, *Roxb.*

A shrub or an undershrub; young parts, petiole and inflorescence densely brown, rough stellate tomentose. *Leaves* 4.5-8 by 2.5-5 in., elliptic ovate or obovate to suborbicular, irregularly toothed, larger teeth often glandular at the tip, rather thick, rough above, stellate tomentose beneath; lateral nerves (excluding the basal) 5-6 on either side of the midrib, slightly arcuate; base 3-nerved, rounded or obtuse; petiole .3-.6 in. long, often with one or more glands at the top; stipules subulate, up to .4 in. long. *Peduncles* short, 1-few on leaf axils, each 2-3 flowered; pedicels stout, about .5 in. long. *Buds* .4-.5 in. long, oblong, ribbed. *Sepals* .5 in. long, oblong, yellow inside; petals half the length of sepals, obovate, notched at the apex, gland villous on the edges about a third of the petal. *Ovary* villous; style peltate, slightly exceeding the stamens. *Gonophore* glabrous, villous at the top and with tufts of hair between the petals at the base. *Drupe* globose, depressed at the top, .5-.8 in. across, rough stellate hairy, with a crustaceous rind and sweet viscid pulp, stones usually 4.

KAMRUP, GOALPARA, NAGA HILLS, lower elevation in KHASI HILLS, probably also in other areas in grass lands, Often burnt every year and then becoming very stunted with a woody rootstock.
The fruit is edible and the stem yields good fibre.
Flrs. 5-9. Fr. Autumn.

9. Grewia denticulata, Wall. Ann. Roy. Bot. Gard. Calc. IX. 10. t. 12. Syn. G. nagensium, *Prain,* Journ. As. Soc. Beng. Vol. LXIX. 2. 168.

A straggling shrub with terete branches, young shoots harsh with stellate hairs. *Leaves* bifarious, 4-7 by 2-3.2 in., ovate-or oblong-lanceolate, acuminate, subequally closely serrate, chartaceous, hispidly stellate-pubescent, sparsely above, densely beneath, especially along the nerves; lateral nerves 4-6 on either side of the midrib; base rounded, 3-nerved; petiole terete, .2-.3 in. long, densely rusty stellate pubescent. *Flowers* white (fading to yellow ?) in peduncled umbellate scabrid cymes: peduncles .4-1 in. long, stout; pedicels .6-.8 in. long, dilated upwards, elongating in fruit; bracts triangular, lanceolate, .2 in. long, stellate hairy outside. *Sepals* .4-.5 in. long, lanceolate. *Petals* about .2 in. long, ovate, the large basal gland occupying nearly the whole of the lower half. *Gonophore* adpressed villous. *Ovary* pubescent. *Drupe* 2-1, sometimes 3-lobed, globose but somewhat compressed, about .3 in. across, rugose with the lenticular bases of fallen stellate hairs.

SIBSAGAR, Deroi Reserve; Jaipur, Borjan, etc., LAKHIMPUR.
Fls. 8-9. Fr. 11-1.

2. TRIUMFETTA, Linn.

Herbs or undershrubs with stellate pubescence. *Leaves* usually serrate or dentate, sometimes lobed. *Flowers* yellow, in dense cymes which are axillary or leaf-opposed or imperceptibly pass into terminal spike-like inflorescence. *Sepals* 5, distinct. *Petals* 5, glandular and ciliate at the base. *Stamens* 5-many. *Ovary* 2-5 celled, cells 2-ovuled; style filiform. *Capsule* subglobose, with more or less hooked spines or bristles. *Seeds* pendulous, albuminous.

Upper leaves ovate or lanceolate; capsules .6-1 in. across (including the spines):-
Spines of capsules long, hispid. ... *1. T. pilosa.*
Leaves rhomboid, more or less lobed; capsule .25-3 in. across (including the spines):-
Spines of capsules short, glabrous. ... *2. T. rhomboidea.*

1. Triumfetta pilosa, Roth. Vern. *Soh-bythrid,* Kh.

A perennial herb or undershrub with a woody base and hispid stems; young parts rusty tomentose. *Leaves* 2.5-5 in. long, very variable, lower often lobed, upper ovate-lanceolate, acuminate, unequally serrate, membranous, pubescent above, tomentose beneath; base usually 5-nerved, rounded or subcordate; lower petioles up to 1.8 in. long, upper short; stipules obliquely lanceolate or linear, .25 in. long. *Flowers* .2-.3 in. long in

congested lateral cymes, much shorter than the leaves. *Stamens* 10. *Ovary* covered with short scales. *Capsule* .6-1 in. across, spines .2-.35 in. long, slender, hooked, patently hispid in the lower half.

Grass lands in SIBSAGAR, NAGA HILLS, KHASI HILLS ascending to 4500 ft., probably in similar localities in all dists.
Flrs. 7-9. Fr. 9-11.

T. cana, Bl.-*Leaves* ovate-oblong or lanceolate, 2-4.5 in. long, upper smaller. *Flowers* .15-2 in. long in tomentose extra-axillary cymes. *Capsule* about .6 in. across, globose, spines hispid. Scarcely more than a variety of the last.

KHASI and JAINTIA HILLS about 5000 ft.
Flrs. 7.

T. tomentosa, Bojr. *Leaves* 2-5 in. long, ovate lanceolate, upper narrower. *Stamens* 5-7. *Capsule* not exceeding .6 in., appears to be a tomentose state of *T. pilosa*.

SYLHET (Wallich) and probably in most localities where the latter is found.

2. Triumfetta rhomboidea, Jacq. *Jhinjharita*, Sans. *Agra*, Ass.; *Soh-byr-thit*, *Kh.*; *Bolughas*, Nep.; *Northe-arong*, Mik.

Herbaceous or suffruticose up to 6 ft. high. *Lower leaves* usually 3-lobed, 2-3 in. across, cordate, irregularly serrate, rounded or cuneate at the base, membranous, upper leaves smaller and narrower, not lobed; petiole 1-1.5 in. long, hairy, swollen at the junction with the blade. *Flowers* .3 in. long in dense leaf-opposed and terminal cymes. *Sepals* hooded at the apex. *Petals* shorter than the sepals. *Stamens* 10-15. *Capsules* .25 in. across, villous between the spines; spines about .1 in. long, glabrous, hooked, sharp pointed.

Very common along road sides, jhums and abandoned village sites in the plains of ASSAM, NAGA HILLS.
Flrs. 8-11. Fr. 9-12.

CORCHORUS, Linn.

Herbs or undershrubs. *Leaves* simple, serrate, the lower pair of teeth usually much prolonged into filiform appendages. *Flowers* small, yellow, bracteate. *Sepals* 4-5. *Petals* 4-5, not glandular at the base. *Stamens* generally numerous, on a short torus. *Ovary* 2-5 celled; ovules many in each cell; style short. *Capsule* elongated or subglobose, echinate or muricate, usually beaked, 2-5 valved, sometimes transversely septate between the seeds. *Seeds* numerous.

The following two species are cultivated in SIBSAGAR, LAKHIMPUR and DARRANG for jute fibre and their cultivation is gradually extending throughout ASSAM.

Capsule globose, muricate and ridged, not beaked; cells not transversely septate. .. *1. C. capsularis.*
Capsule elongate, glabrous, 10-ribbed, beaked; cells transversely septate. .. *2. C. olitorius.*

1. Corchorus capsularis, Linn. Vern. *Tita-mura-pat*, Ass.; *Nalita, Nalita-pat*, Beng.-The leaves of this species are bitter and are used as a bitter tonic, and dried leaves are kept in households in E. BENGAL for this purpose. This species is more generally cultivated in Assam than *C. olitorius*. Two varieties are ordinarily recognized, one being larger plant than the other.

2. **Corchorus olitorius,** Linn. Vern. *Mura-pat.* Ass. ; *Pat, Kosñta,* Beng. The fruit characters given above in the analysis are sufficient to distinguish it from the foregoing species. The leaves are mucilaginous, sweetish, and are used as a spinach.

In Watt's Dictionary of Economic Products most of the remarks as to the use of the leaves of these two plants have been mixed up.

Much of the wealth of rural E. BENGAL is due to these two plants which yield the jute of commerce and are very extensively cultivated for the fibre.

3. COLUMBIA, Pers.

Columbia floribunda, Wall. Vern. *Arlak-pi,* Mik. ; *Bra-rayang-phang,* Kach.; *Khasre,* Nep.; *Thaltre,* Lush.; *Antha-thung,* Kuki ; *Larubanda,* Ass. (Kamrup).

A deciduous tree up to 50 ft. in height and 3 ft. in girth ; stem fluted ; all young parts more or less scabrid with short stellate hairs. *Bark* grey and rough outside, reddish-brown or cream coloured inside, with broad streaks of lighter tissue, turning deeper brown on exposure, .3-.5 in. thick, finely fibrous, in thin concentric layers, scarcely mucilaginous. *Leaves* 4-6 by 3-7 in., upper small, rotundate ovate or obovate-oblong or sub-orbicular, acute or subacute, often shortly lobed, irregularly gland-toothed, subcoriaceous, rugulose and scabrous on both surfaces, minutely punctate beneath ; lateral nerves 3-5 on either side of the middle nerve ; base rounded or slightly cordate, 5-7 nerved ; petiole .7-2·2 in. long, swollen at the apex, scabrid. *Flowers* small, in few flrd. clusters ; clusters arranged in lax terminal panicles or shorter peduncles from upper leaf axils ; bracts leaf-like ; pedicels slender, pubescent. *Sepals* 5, distinct, red inside, .1 in. long. *Petals* 5, oblong-spathulate, as long or longer than sepals, yellow with scarlet dots, each with a small glandular cavity at the base. *Stamens* numerous, free on a raised torus. *Ovary* 3-5 celled, each cell 2-4 ovuled. *Capsules* .6-.9 in. across, of 3-5 indehiscent, 2-winged, pubescent, usually 1-seeded cocci ; wings venose. *Seeds* albuminous ; cotyledons flat.

A rather handsome tree with a gregarious tendency. Nichuguard and Dimapur, SIBSAGAR ; Lumding, Doboka, Amguri, etc., NOWGONG, LUSHAI HILLS ; NORTH CACHAR HILLS ; NAGA HILLS.

Flrs. 6-8. Fr. 11-1.

4. PLAGIOPTERON, Griff.

Plagiopteron suaveolens, Griff.

A very large woody climber. *Bark* brownish grey with shallow fissures outside, dull white with oval brownish patches inside ; young parts stellate pubescent. *Leaves* opposite, 4-6 by 2.5-3.5 in., elliptic to obovate, abruptly acuminate, entire, glabrous or slightly puberulous along the midrib underneath, nerves raised underneath, main lateral nerves 5-6 on either side, lowest pair basal, upper arcuate, tertiaries transverse to the secondaries ; petiole more or less stellate pubescent, .3-.5 in. long ; stipules short, linear,

caducous. *Flowers* small, greenish in peduncled panicles from upper leaf axils; peduncles 2-3 in. long. *Sepals* 5, minute. *Petals* 5, oblong, puberulous outside, much longer than the sepals, revolute. *Stamens* numerous; filaments filiform, exceeding the petals; anthers 2-celled, cells divergent at the base. *Ovary* pilose, 3-celled, with 2 ovules in each; style subulate. *Fruit* dry, turbinate, stellate pubescent, 3-winged at the top, 3-1 celled, wings oblong, elliptic or oblong, 1-1.7 in. long, unequal with subparallel veins, base of wings hollow and continuous with the cavity of the fruit.

KHASI & JAINTIA HILLS in low elevations.
Fr. 12.

FAM. 26. ELÆOCARPACEÆ.

Trees or shrubs without mucilage sacs. *Leaves* alternate, simple, not lobed, stipulate. *Flowers* regular, 2-sexual, in axillary racemes. *Sepals* 4-6, valvate. *Petals* 4-6, valvate, generally laciniate at the apex, inserted outside the disk. *Stamens* indefinite, inserted on a fleshy disk; anthers linear, opening by terminal pores. *Ovary* sessile, 2-5 celled; style columnar. *Fruit* a drupe with a bony stone or a capsule. *Seeds* pendulous with fleshy albumen; cotyledons flat.

Peduncles racemed. Torus raised. Fruit a smooth drupe.	... 1. Elæocarpus.
Peduncles 1-flowered. Torus depressed. Fruit an echinate or setose capsule.	... 2. Echinocarpus.

1. ELÆOCARPUS, Linn.

Trees. *Leaves* usually crenate or serrate and generally deep red when old. *Flowers* sometimes polygamous. *Sepals* 4-5, distinct, generally keeled within along the middle. *Petals* 4-5. *Disk* glandular. *Anthers* dehiscing by a transverse slit at the apex. *Ovules* 2 in each cell of ovary, pendulous. *Drupe* with a single horny tuberculate stone divided into 1-5 1-seeded cells. *Seeds* with hard testa.

I. Petioles continuous, drupe globose: Anthers bearded; ovary 5-celled, stone prominently tubercled. ... 1. *E. Ganitrus.*

II. Petioles geniculate and usually swollen at the apex; drupes elongate :—

A. Petals narrowed towards the base :—

1. Flowers under ·4 in. :—

a. Anthers bearded, but not awned at the apex :—

i. Petiole 1-2 in. long, thickened and with a pair of glands at the apex :—

Bracteoles minute, caducous ; glands at the apex of petiole minute :—
* Leaves and petiole glabrous or glabrescent :—
Leaves and sepals prominently pustulate when dry, stone indistinctly rugose. .. 2. *E. floribundus,*
Leaves and sepals not pustulate when dry, stone prominently rugose. .. 3. *E. robustus.*
** Leaves and petiole tomentose. .. 4. *E. Wallichii.*
*** Leaves glabrous ; glands at the apex of petiole usually prominent, often of leafy processes ; bracteoles fairly large, subpersistent ; stone tuberculate. .. 5. *E. sikkimensis.*

i. Petiole under 1 in. long and without any glands at the apex :—
Nerve axils glandular, anthers shortly ciliate at apex, dry leaves often minutely pustulate, stone rugose .. 6. *E. lanceæfolius.*

b. Anthers usually not bearded or awned at apex :—

i. Leaves glabrous, bracteoles minute, caducous :—
Leaves obovate, buds silky, pyramidal, 5-cornered. .. 7. *E. figgropfiilus.*
Leaves narrow-lanceolate, buds glabrescent, ovoid oblong, subterete. .. 8. *E. acuminatus.*

ii. Leaves ferruginous tomentose beneath, bracteoles laciniate or fringed, persistent :—
Petals laciniate to near the base. .. 9. *E. Braceanus.*

2. Flower over .4 in. across ; anthers awned :—

a. Large trees ; lateral nerves of leaves usually 12 pairs or more ; stone of fruit compressed, ridged, rugose :—
Leaves rather scattered, generally more or less acute at the base ; petiole up to 2 in. ; awn of anthers about as long as the anthers ; stone ridged along the faces. .. 10. *E. aristatus.*
Leaves usually closely crowded, generally obtuse at the base ; petiole on young shoots very short and stout or 0, awn of anthers shorter than the anthers. .. 11 *E. rugosus.*

b. Small tree ; lateral nerves of leaves 7-8 pairs :-
Leaves oblanceolate, often with prominent glandular pits at nerve axils beneath. .. 12. *E. obtusus.*

B. Petals dilated towards the base :-

1. Ovary villous, leaves more or less serrate :-

Lateral nerves of leaves over 12 pairs, usually glandular at the axils of bifurcations near the margin. Flowers (about ·5 in.) long; anthers awned.	.. 13. *E. varunna.*
Lateral nerves of leaves under 12 pairs, not glandular at the axils of nerve bifurcations. Flowers small, about .15-.2 in. long; anthers shortly beaked.	.. 14. *E. prunifolius.*
2. Ovary glabrous, leaves entire, anthers awned, flowers about .3 in. long.	.. 15. *E. integer,*

N. B. Species 2-6 are closely allied. The characters on which their separation has been based are variable in this genus, further field observations are therefore necessary for their classification.

1. Elæocarpus Ganitrus, Roxb. Vern. *Rudraksha,* Sans. & Beng., Ass.; *Rudrai,* Ass.; *Ludurai-asing,* Miri & Abor; *Boragi-asing,* Miri; *Lekam-arong,* Mik.; *Ludrai,* Sylh. & Tipp., *Van-tha-mu-thing,* Kuki; *Undurmala-biphang,* Mech.; *Ludrok, Udrok,* Garo.; *Soh-langskei,* Khasi.

A tree up to 60 ft. in height and 4 ft. in girth, generally buttressed at the base; young parts silky puberulous. *Bark* fairly smooth and greyish-brown outside with light reticulate fissures and large white blotches; uniformly pale but turning brown after exposure and fibrous inside, .3-.5 in. thick. *Leaves* 3-6 by 1-2 in., oblong-lanceolate, oblanceolate or sometimes elliptic, acute or acuminate, minutely crenate serrate or subentire, thinly chartaceous, almost glabrous, turning yellow before falling; main lateral nerves 8-12 on either half, slender, arched; base generally narrowed or acute; petiole .4-.6 in. long, sharply margined. *Racemes* about 3 in. long, often drooping, mostly from axils of fallen leaves. *Flowers* white, nodding, .3-.5 in. across; buds ovoid, conical; pedicels .3-.4 in. long, silky. *Sepals* .2-.25 in. long, linear-lanceolate, acuminate, silky canescent outside. *Petals* about .3 in. long, cuneate-oblong, pubescent along the margins near the base, laciniate one-third to half way down, into 10-15 processes. *Stamens* about 30; filaments very short; anthers .1-.15 in. long, one cell slightly longer than the other and bearing fine white bristles at the apex, torus pubescent, wrinkled. *Ovary* normally 5-celled, silky villous. *Drupe* .6-1 in. across, globose, deep blue and mealy outside, succulent when fully ripe; stone normally 5-celled, strongly tubercled and marked with as many longitudinal furrows as there are cells in the stone.

Unquestionably indigenous, occurs sporadically in all the DISTRICTS and ascending up to about 1000 ft., but nowhere so common as in the N. E. FRONTIER DISTRICT.

The wood is white, fine—and even-grained, tough and elastic. Weight 28 lbs. per c. ft.

The tree is much prized for its tubercled nuts which are strung up into rosaries worn by various sects of Hindus. Freaky nuts with fewer or more than 5 cells are believed to possess special merits attached to each number and therefore etch much higher prices.

Flrs 5-6. Fr. 11-12.

2. Elæocarpus floribundus, Bl. Vern. *Belphoi*, Sylh., *Jalpai*, Beng.; *Ok-hi-siming-ti*, *Theng-koreng-arong*, Mik., *Charphal*, Manip.; *Badarphang*, Kach.; *Ron*, Kuki; *Koying*, Nep.

A tree up to 60 ft. in the height and 8 ft. in girth; branchlets glabrous, buds silky. *Bark* greyish-brown, vertically fissured, and often with horizontal wrinkles outside; reddish and fibrous inside. *Leaves* 3-6 by 1·5-2·5 in., ovate-elliptic, bluntly acuminate, acute or cuneate, less often rounded at the base, coarsely repand-serrate, subcoriaceous, glabrous, blistered on both surfaces when dry, turning bright red before falling; main lateral nerves 5-7 on either half, arcuate; tertiary nerves obscure; petiole ·8-2 in. long, glabrous, thickened, geniculate and with a pair of small glands at the apex. *Racemes* 5-6 in. long, from axils of fallen leaves, 20-30 flowered; rachis minutely puberulous—glabrescent; pedicels ·3-·6 in. long, glabrescent. *Flowers* white, ·3 in. across. *Sepals* ·2 in. long, lanceolate, blistered outside when dry, scarcely keeled inside, thickened and tomentose at the margins. *Petals* as long as the sepals, triangular-cuneate, irregularly laciniate to varying depths into about 25-39 filiform processes, margins finely ciliate. *Stamens* 20-25; filaments very slender and weak, about ·05 in. long, minutely puberulous; anthers slender, slightly longer than the filaments; cells nearly equal, terminated by a few minute bristles. *Disk*, *ovary* and base of style silky villous. *Drupe* light-green, about 1·8 by ·8 in., externally resembling an olive, oblong, smooth; flesh pleasantly acid, edible; stone 3-celled or by suppression 2-celled, terete, tapering towards both ends, very shallowly rugose and with 3 fine furrows. *Seeds* ·75 by ·2 in., spindle-shaped; albumen oily.

In the Makum Range LAKHIMPUR and perhaps elsewhere throughout the upper parts of the ASSAM VALLEY, not common.

Often cultivated round homesteads in all the DISTRICTS, up to 5500 ft. in the KHASI HILLS (Shillong) for the fruit.

The fruit is eaten cooked or pickled.

Fls. 5-8. Fr. 11-12.

There seem to be two forms of this tree; 1. cultivated with narrower leaves, shorter pedicels and larger and more fleshy drupes and 2.wild with broader leaves, longer pedicels and smaller, harder and more astringent fruits.

3. Elæocarpus robustus, Roxb. Vern. *Poreng*, *Seleng*, Ass.; *Theng-phrang-ki-arong*, Mik., *Muya-phang*, *Bon-khong-krai-phang*, *Songrung-baphang*, Kach.; *Agong* or *Ragong*, *Bol-ragong*, *Gangmai*, Garo; *Tehei-chi-ching*, Naga; *Dieng-Lasaw*, Khasi (Tharia); *Dieng-ja-roi*, Khasi (Nongkla); *Dieng-soh-khyllam*, Khasi; *Huara*, Sylh.

A middle-sized tree up to 65 ft. in height and 6 ft. in girth; stem much fluted and with numerous ærial roots at the base in swampy localities; young shoots generally rusty pubescent. *Bark* light greenish-grey, nearly smooth and lenticelled on young trees, rough and warty on mature ones; fibrous inside, greenish yellow, on older stems mottled with deep brown dots. *Leaves* 4-9 by 2-4 in., ovate-oblong to ovate lanceolate, acuminate, rounded or cuneate at the base, cuspidately repand-serrate, thinly coriaceous, glabrous above, softly rusty tomentose, especially along the nerves

when young but afterwards glabrescent beneath, pinkish brown when very young; turning bright scarlet in the cold weather; main lateral nerves about 10-12 on either half, depressed above, prominent beneath, tertiary nerves laxly reticulate; petiole 1-2 in. long, swollen at both ends, geniculate and often with two processes near the apex. *Racemes* 2·5-5 in. long, generally from axils of fallen leaves; rachis grey, puberulous; bracteoles minute, caducous. *Flowers* white, fragrant, ·25-·3 in. across; buds globose at first, gradually turning ovoid; pedicels ·25-·5 in. long, grey puberulous, generally curved. *Sepals* ·15 to ·2 in. long, lanceolate, puberulous, rather strongly keeled inside, densely villous along the somewhat thickened margins. *Petals* irregularly laciniate into 30-40 very fine processes, basal portion densely ciliate along the margins. *Stamens* about 40; filaments very short; anthers about ·06 in. long, minutely glandular puberulous, the longer valve ciliate. *Disk* of 5 distinct globose silky glands. *Drupe* about 1 in. long, ovoid, greenish-yellow, 2-3 celled, oblong or ovoid, with 3 shallow longitudinal grooves, rather prominently rugose, albumen oily.

Fairly common throughout the PROVINCE except perhaps in the N. E. FRONTIER DISTRICT, ascending up to about 2500 ft.

Wood greyish white, soft, even-grained but porous, med. rays fine. Weight about 35 lbs. per c. ft., takes a fine polish.

Fls. 4-5. Fr. 8-9.

Very closely allied if at all distinct is **E. lucidus**, Roxb. A tree up to 60 ft. in height and 4-5 ft. in girth. *Bark* plain, greyish white, with vertical lines of lenticels and faint horizontal wrinkles; red underneath the corky layer, dark brown inside, shading off to yellow near the cambium, turning blackish brown after exposure. *Leaves* 3-7 by 1·5-3 in., glabrous or more or less puberulous along the midrib above and the petiole; base often unequal; lateral nerves 8-11 on either side of midrib; petiole ·6-1·8 in., generally with glandular spurs near the apex. *Flowers* somewhat smaller than *E. robustus*. *Stamens* 30 in 5 groups with reddish brown silky glands between the groups; filaments very short, longer anther cells with few or without apical bristles. Other characters as in *E. robustus*. *Drupe* not seen.

Dhansiri reserve NOWGONG, Umling reserve KHASI & JAINTIA HILLS, probably in all localities where E. robustus is found. There is no constant character by means of which the two can be separated.

4. Elæocarpus Wallichii, Kurz.

A small tree with brown smoothish bark; young shoots, undersurface of leaves along the nerves and petiole greyish or tawny tomentose. *Leaves* 6·5-12 by 3-5 in., oblong to elliptic, acuminate, distantly serrate or subentire, glabrate, except along the midrib and nerves above; lateral nerves 12-15 on either half, looping near the margin, prominent beneath; petiole 1-2 in. long, geniculate, often with two minute glands at the top. *Racemes* 4·5-8 in. long from the axils of fallen leaves, tomentose; pedicels ·3-·4 in. long. *Flowers* small; sepals tomentose, lanceolate, about ·2 in. long. *Petals* cuneate, deeply laciniate, ·15-·2 in. long; anthers bearded. *Ovary* villous, 3-celled with 2 collateral ovules. Fr. not seen.

GOALPARA.

Stem sometimes stilted on aerial roots.

5. Elæocarpus sikkimensis, Mast. Vern. *Seleng*, Ass.

Generally the names given to the foregoing species are applied to this tree also.

A middle-sized tree up to 50 ft. in height ; young shoots and inflorescence pubescent. *Bark* grey and rough with vertical fissures outside ; green underneath the corky layers, pale, gradually more yellowish towards the cambium and sometimes mottled with reddish-brown dots inside. *Leaves* 4-7 in. by 2-3.5 in., elliptic or ovate-oblong, acuminate, somewhat distantly cuspidate-serrate, acute, subacute or obtuse at the base, rather thinly chartaceous, glabrous, orange red during the cold weather ; lateral nerves 7-9 on either side of the midrib, much arched ; tertiary nerves very slender, laxly parallelo-reticulate underneath ; petiole 1-2 in. long, thickened but not pronouncedly geniculate at the apex, generally with two leafy processes a little below the base of the blade which are sometimes up to .6 by .1 in., falcate and with a distinct midrib. *Racemes* 2.5-4 in. long, from axils of current year's leaves ; thinly pilose ; pedicels .3-.6 in. long, slender ; buds silky, each supported by a large subpersistent boat-shaped hairy bracteole, .15-.25 in. long. *Flowers* about 12-20 in each raceme, .3-.4 in. across. *Sepals* narrow-lanceolate, sparsely pilose outside, thinly keeled and glabrous inside, tomentose at the thin margins. *Petals* white, cuneate, almost glabrous, divided above into 20-25 filiform processes. *Stamens* 25-30 ; tip of the longer anthers bearded with 2-4 very small white bristles. *Disk* small, silky, lobes obscure, contiguous. *Ovary* conical, silky ; style persistent. *Drupe* 2 by 1 in. ; stone tubercled.

Throughout Upper ASSAM in submontane tracts but more common in LAKHIMPUR than in the other DISTRICTS.

A more handsome tree than the preceding species.

Fls. 1-3.

6. Elæocarpus lanceæfolious, Roxb. Vern. *Dieng-soh-khyllam,* Kh. ; *Dieng-soh-lyngka,* Synt.

A middle sized evergreen tree with spreading dense crown ; young parts silky pubescent. *Bark* greyish brown and rugose with strings of lenticels outside, uniformly light red and fibrous inside. *Leaves* 2-6 by .75-2 in., lanceolate, elliptic-lanceolate or oblanceolate, acuminate, distantly crenate-serrate, glabrous or almost so, often minutely pustulate beneath, thinly coriaceous, turning bright red when old ; lateral nerves 6-8 on either side of midrib often with glands at axils, arcuate, repeatedly bifurcate, and forming loops near the margin ; base tapering or narrowed more or less to the margined petiole which is .3-.75 in. long and often rather obscurely geniculate at the apex. *Racemes* 2-3 in. long from the axils of leaves or of those of fallen leaves, puberulous ; pedicels slender, .15-.2 in. long ; bracts very small, linear lanceolate, caducous. *Flowers* white, small, buds lanceolate. *Sepals* .15-.2 in long, oblong-lanceolate, keeled, puberulous, often glabrate outside, depressed silky puberulous, often glabrate within, minutely wooly along the edge and the keel. *Petals* about as long as sepals, finely laciniate to about half the length, margins finely ciliate. *Stamens* up to 15, puberulous, anther cells

unequal, the larger or sometimes both, minutely bristly at the apex. *Disk* of 5 hairy, round, glands. *Ovary* villous, 3-celled. *Drupe* about 1-1.5 by .7-.9 in., ovoid, green with faint yellow specks, stone rugose with 3 longitudinal channels, 1-seeded.

KHASI HILLS, NAGA HILLS, GARO HILLS—Rongmachakgiri ascending up to 6000 ft.

The fruit is eaten. Wood brown with close annual rings and numerous extremely fine med. rays, pores few in short strings, soft, takes a good polish but is liable to crack in seasoning. Used for tea boxes, house building and charcoal.

Fls. 6-8. Fr. 11-12.

Var. *vestitus*—young parts and inflorescence brown tomentose. *Mature leaves* pubescent along midrib and nerves on the under surface, glabrate above except along the base of midrib; petiole upto .9 in., slightly or not margined, distinctly geniculate at apex, pubescent or puberulous. *Racemes* with stouter rachis than in the type; pedicels stout, 1 in. or less, buds ovoid lanceolate *Sepals* 2 in. long, brown tomentose outside, thinly silky within, more broadly lanceolate than in the type.

—KASHI & JAINTIA HILLS, 4500-5000 ft.

Flrs. 5.

7. Elæocarpus hygrophilus, Kurz.

A small tree upto about 50ft. in height and 3ft. in girth, young shoots terete, glabrous, shining. *Bark* greyish-brown and nearly smooth outside; light brown shading off to yellow near the cambium inside. *Leaves* 2.5-6 by 1.2-2.4 in., obovate, oblanceolate or cuneate-oblong, blunt-apiculate or rounded at the apex, cuneate at the base, crenately cuspidate-serrate, coriaceous, glabrous, shining above, pale or subglaucous beneath, turning yellow before falling; midrib stout; main lateral nerves about 7-9 on either side of the midrib, arched, slender, irregular, generally with large glandular pits in the axils; petiole .15-1 in. long, stout, flattened above, swollen at both ends, glabrous. *Racemes* 2-4 in. long, rachis rather slender, silvery-pubescent at first, afterwards glabrescent. *Flowers* small; pedicels .2-.25 in. long, silvery-silky; buds pyramidal. *Sepals* .25 in. long, acute, silky-pubescent outside, velvety along the margins. *Petals* a little longer than the sepals, glabrous. *Filaments* short, minutely puberulous; anthers not bearded. *Ovary* silky, 3-celled. *Drupe* lanceolate, pointed at both ends.

Specimens collected only from Diriu, NORTH LAKHIMPUR, but this tree probably occurs throughout UPPER ASSAM round swamps and along edges of sluggish streams like *E. obtusus* which it very closely resembles in habit and foliage and for which it is liable to be mistaken when not in flower or fruit.

Fls. 4-5.

Elæocarpus sp. near E. oblongus, Gærtn. Vern. *Chirai-guti-khowa,* Ass.; *Miri-Komker-asing,* Miri and Abor.

A small tree up to 40 ft. in height and 3 ft. in girth, generally growing near streams and throwing out numerous aerial roots. *Bark* dark-brown with many whitish lenticels outside; greenish brown inside. *Leaves* 3-5 by 1.5-2.5 in., obovate-or oblong-elliptic, acuminate, cuspidately crenate-serrate, thinly subcoriaceous, quite glabrous, red during the greater part of the year; main lateral nerves 6-8 on either side of the midrib, slender, much arched, tertiaries very slender and finely reticulated; base narrowed; petiole .75-1.4 in. long, margined, more or less pubescent, often with two setose glands at the apex. *Racemes* about 3.5 in. long from the axils of existing or fallen leaves, pubescent; bracteoles .15 in., ovate lanceolate, adpressed silky pubescent; pedicels stout, about .3 in. long, disk glands about 10, villous. *Drupe* (rather immature) 1-1.5 in., oblong-ellipsoid, pointed at both ends, 2-1 ? celled.

Specimens incomplete not definitely determined.
Near Bomjur in N. E. FRONTIER DISTRICT also Makum Range in LAKHIMPUR DIVISION.
Wood white, tough and stony.
Fr. 5-7.

8. Elæocarpus acuminatus, Wall.

A tree with lenticellate branches, bark greyish with shallow furrows. *Leaves* 2.5-5.2 by .6-1.2 in., narrow lanceolate, acuminate, coriaceous, glabrous, silky when very young ; lateral nerves impressed and rather indistinct above, 8-10 on either half ; base tapering to the short petiole ; petiole up to .4 in. long, geniculate and slightly swollen at the top. *Racemes* stoutish from the axils of fallen leaves puberulous, 1.5-3.5 in. long, pedicels .2-.25 in. ; buds oblong ovoid. *Sepals* .2 in. long, oblong lanceolate, nearly glabrous outside, adpressed pubescent, keeled within, minutely villous on the edges and the keel. *Petals* white, nearly as long as sepals or slightly shorter cuneate, apex laciniate to more than half the length into 16-18 segments, villous on the margins on the lower portion ; stamens 35-40 ; filaments about half the anthers, both puberulous ; anthers not bearded, shortly apiculate. *Disk* glands 5, broad, 2-lobed, pubescent. *Ovary* villous, 2-celled ; ovules in 2 rows in each cell. *Drupe* not seen.

KHASI and JAINTIA HILLS, Mowsmai, Chera, Thlongblei, up to 4500 ft.
Flrs. 9.

9. Elæocarpus Braceanus, Watt.

A small tree with warty brown bark ; young shoots, undersurface of leaves along the nerves and petioles, ferruginous tomentose. *Leaves* 2.5-5.5 by .75-2 in., elliptic, elliptic-lanceolate or oblong lanceolate, acuminate, glabrous and impressed along the nerves above, strongly 9-10 nerved beneath ; base narrowed ; petiole .3-.6 in., slightly swollen and jointed at apex. *Racemes* from axils of fallen leaves 1.5-5.5 in. long, tomentose ; pedicels stout, very short. *Buds* roundish or ovoid, supported usually by 3 long persisting, small, deeply laciniate bracteoles. *Flowers* small, brown tomentose. *Sepals* lanceolate, .15 in. *Petals* slightly smaller than the sepals deeply laciniate into numerous segments to near the base. *Stamens* 30 or more puberulous ; anthers not bearded. *Ovary* 2-celled with 2-collateral ovules in each cell, villous ; disk glands hairy. *Drupe* 1.25 by 1 in., abruptly pointed at the apex, stone ovoid, terete, very rugose with three rather indistinct grooves.

NAGA HILLS, KHASI and JAINTIA HILLS up to 5000 ft.
Flrs. 10. Fr. 6.

10. Elæocarpus aristatus, Roxb. Vern. *Gerela-sopa,* Ass. (Lakh.) ; *Nagini,* Ass. (Kam.) ; *Mirchobi,* Mik. ; *Lehau,* Manip. ; *Bon-champa,* Cach. ; *Karnakhar,* Tipp. ; *Chham-nangal, Gangma-jachhang,* Garo ; *Dieng-thang-khapiah,* Khasi (Nongkla).

A large tree up to 100 ft. in height and 8 ft. in girth, stem of large trees buttressed at the base ; branchlets thick, rough

with heart-shaped or oval scars of fallen leaves, coarsely rusty hairy towards the extremity. *Bark* dun-grey, nearly smooth, but with horizontal wrinkles and very fine vertical fissures outside; white with coarse brownish veins inside. *Leaves* somewhat crowded about the ends of the branchlets, erect and pinkish-green when young, 4-12 by 1.7-5.5 in., cuneate obovate or oblanceolate, rounded or subacute at the tip, usually cuneate at the base, distantly minutely serrulate or subentire, thinly but firmly coriaceous, glabrous, turning red before falling; midrib very stout; lateral nerves 12-22 on either half, slightly arched or almost straight, often glandular at the axils; petiole .6-2 in. long, swollen at both extremities, geniculate at the apex, flattened and rusty hairy above while young; stipules subulate, caducous. *Racemes* axillary, 4-6 in. long; rachis and pedicels rusty villous, but ultimately glabrescent; bracts leafy, cuspidate-toothed, often laciniate towards the base, up to .4 in. long, caducous; pedicels .5-.7 in. *Flowers* pale white, drooping, faintly scented, .8 in. diam.; buds lanceolate, 5-ribbed. *Sepals* .6-.7 by .1 in., narrow lanceolate, rusty-tomentose outside, glabrous within, margins rather thick, involute. *Petals* .5-.6 in. long, wedge-shaped, densely silky hairy outside, deeply laciniate. *Stamens* up to 55; filaments short; anthers about .2 in. long, linear, with an awn of about the same length. *Ovary* 2-celled, ovoid, very hairy; style subulate. *Drupe* about 1-1.3 in. long, oblong; stone sharply pointed at both ends, compressed, with a longitudinal ridge on each of the faces, rugose.

Fairly common throughout ASSAM except perhaps the N.E. FRONTIER DISTRICT, always in mixed high forests ascending to about 1600 ft.

Wood light dun-brown, moderately hard, weighing about 45 lbs. per c. ft. Medullary rays mostly very fine with occasional ones of moderate thickness; pores of moderate size, often subdivided, annual rings indistinct, used for tea-boxes.

Flrs. 4-5. Fr. 8-9.

11. Elæocarpus rugosus, Roxb. Vern. *Galronga*, Ass. (Lakh); *Phul-champa*, *Bor-chopa*, Ass. (Darr.); *Taruk-pai-asing*, Miri and Abor; *Kadeng-srang-arong*, Mik.; *bon-lai-su-phang*, Kach.; *Sanku-nuru*, Daff.; *Ankhi-si-phak*, Garo.

A lofty deciduous tree up to 100 ft. or more in height and 14 ft. in girth, in foliage and habit closely resembling *Terminalia Catappa*; stem of mature trees buttressed at base; branches spreading; branchlets thick, more or less rufous-hairy. *Bark* greyish, rough and more or less wrinkled outside; green underneath the corky layer, pale-brown and mottled with brown dots or streaks inside. *Leaves* crowded at ends of branchlets, 6-16 by 3-6 in., obovate, oblanceolate or subpanduriform. subacute, bluntly apiculate or obtuse, narrowed and generally obtuse at base, distantly and often minutely cuspidate-serrate or subentire, coriaceous, glabrous when mature, turning red before falling; midrib stout, triangular in section; lateral nerves 12-18 on either half, spreading, usually with large glands at the axils; tertiaries strongly reticulate; petiole 0 or very short on young shoots,

1-2.2 in. on flowering shoots, twigs, thick, swollen at both ends. *Racemes* axillary or from nodes below the leaves, 4-7 in. long; rachis buff-tomentose; bracts up to 1.2 in. long, leafy, oblanceolate, serrate, caducous. *Flowers* of the size of the preceding species; pedicels .5-.9 in. long, buds cylindric, ovoid, pointed, 5-ribbed; .6-.75 in. long. *Sepals* linear lanceolate acuminate, buff-tomentose or pubescent outside. *Petals* about as long as the sepals, cuneate oblong, densely buff-silky outside, glabrous inside. *Stamens* up to 60; filaments shorter than the anthers, pubescent; anthers unequal, awns shorter than the anthers. *Ovary* 2 celled, shaggy, pointed; style much longer than the ovary, tapering to a fine point. *Drupe* about 1.3 in. long, obovoid, greenish yellow; stone generally 1-celled, compressed and with sharp edges, pointed, strongly rugose.

Fairly common throughout UPPER ASSAM, especially in the N. E. FRONTIER AND LAKHIMPUR DISTRICTS, ascending to lower foot hills.

Wood white of similar structure as of the last species but more porous and lighter, about 38 lbs. per c. ft. and annual rings marked by a thin line of softer tissue. Suitable for tea-boxes.

Flrs. 3-4. Fr. 9-10.

12. Elæocarpus obtusus, Bl. Syn. E. Monoceros, *Cav.* Vern. *pani-sopa*, Ass. (Lakh.); *phutkuli*, Ass. (Darr.)

A small tree up to 30 ft. in height and 2-2.5 ft. in girth, generally branched from near the ground and with ærial roots near the base; branchlets glabrous. *Bark* grey, nearly smooth, shining but with scattered lenticels, scarcely 1 in. thick, leathery; blaze pale. *Leaves* 3-5.5 by 1.5-2.5 in., obovate-oblanceolate, obtuse or subacute, cuneate at the base, distantly cuspidately crenate-serrate, thinly coriaceous, quite glabrous, shining above, dull beneath, turning yellow to deep orange before falling; lateral nerves 6-8 on either side of the midrib, slender, much arched, generally with large glandular pits at the axils; petiole .6-1 in. long swollen at the ends, flattened above. *Racemes* 2-3 in. long, corymbose from the axils of existing or fallen leaves, 4-8 flowered; pedicels 1-1.5 in. long, slender, glabrate. *Flowers* .7-.9 in. long, dull white; buds lanceolate, 5-ribbed. *Sepals* .7-.8 in. by about .12 in. near the base, oblong lanceolate, glabrous inside, with thickened tomentose margins. *Petals* cuneate, oblong, slightly larger than the sepals, canescent outside, thinly pilose inside. *Disk* 10 lobed, grey-silky as also is the ovoid ovary. *Stamens* 50-65, one of the anther valves terminating in an awn rather longer than the anther. *Drupe* 1.5 in. long, ovoid, obtuse; stone 1-celled, terete, stongly tubercled.

Along edges of swamps or sluggish streams in LAKHIMPUR, SIBSAGAR and DARRANG: not very common.

The stones of the fruit are stung up in rosaries and given to children to wear.

Flrs. 5.

E. staffianus, Gagnep. A middle-sized to small tree with light greyish bark. *Leaves* mostly towards the ends of branchlets, 4-6 by 1.5-2.5 in., oblong to obovate, apex somewhat obtusely acuminate, serrulate or nearly entire, thinly coriaceous, glabrous, axils of nerves glandular; petiole .3-1 in. long. *Racemes* axillary or

few from the nodes below the leaves, lax, shorter than the leaves, lax few (usually up to 4) flowered; pedicels .8-1.2 in, long, buds ovate acute, glabrescent, .5-.65. in. long. *Sepals* .6-.7 in. long, glabrescent or thinly pubescent outside. *Petals* about as long as the sepals, silky pilose, apex 2 lobed and laciniate into 25-30 segments. *Filaments* pubescent, shorter than the anthers, awn as long as the anthers. *Drupe* ovate to oblong, stone 1 in. by .6 in., abruptly pointed at the apex and base, somewhat compressed, muricate, margins ridged, ridges denticulate.

Sadiya, Griffith 702 ! UPPER ASSAM.

Closely allied to the preceding if at all specifically distinct. Some of the sheets included under E. obtusus in Calcutta Herbarium are preferable to this species. These are apparently connected by good intermediates.

It differs mainly by fewer flowered, laxer racemes and more compressed ridged stone of the drupes.

13. Elæocarpus Varunna, *Ham.* Vern. *Bhadraik* or *Bhadraksha, Poreng* (?) Ass. (Sib.); *Niganibual,* Ass. (Lakh.); *Pong-o-test,* Naga; *Gangma-chiring,* Garo; *Mir-chobe.* Mik.; *Dieng-ri-lam,* Khasi; *Dieng-sia-sah,* Khasi (Umran); *Dieng-soh-dkhap,* Khasi (Nongkhlaw).

A fairly large tree up to 60 ft. in height and 6 ft. in girth with a large spreading crown; stem sometimes stilted on aerial roots; young parts grey silky pilose. *Bark* grey or brownish-grey, nearly smooth or lightly fissured, often with vertical lines of lenticels, blaze dirty or brownish yellow, fibrous and soft. *Leaves* 4-8 by 1.7-3 in., elliptic or oblong, finely acuminate, subacute or rounded at the base, regularly cuspidately crenate-serrate, firmly chartaceous or thinly coriaceous, grey silky when very young, afterwards bright green and shining, deep red before falling; lateral nerves 12-15 on either half, arched, repeatedly bifurcating near the margins, often with small glandular pits at the axils of the bifurcations; tertiaries conspicuous though fine, rather close, subparallel; petiole 1.3-2.5 in. long, thickened and geniculate below insertions of blade. *Racemes* 2.5-5 in., axillary, ascending, at first grey-silky, glabrescent; pedicels .25-.5 in. long, rather stout and stiff, curved. *Flowers* .5-.6 in. across, white; buds lanceolate, about as long as the pedicels, obsoletely 5-ribbed. *Sepals* densely bright silky, especially outside, lanceolate. *Petals* slightly shorter than the sepals, oblong, broadest at the base, pale silky except at the uniformly fringed apex. *Stamens* about 30; anthers shortly awned. *Disk* red, rather sharply 10 lobed. *Drupe* .7 by .5 in., oblong, rounded at the ends, shining, 1-celled, 2-seeded in all the fruits examined; stone subterete, pointed and with 3 minute apertures at the base, 3-furrowed, not prominently rugose, hirsute.

Common in mixed forests throughout Upper Assam, ascending to 3000 ft. in KHASI HILLS, GARO HILLS, NAGA HILLS.

Wood greyish-white, soft, weighing 30 lbs, per c. ft., fine and even-grained, suitable for tea boxes.

Fls. 2-3. Fr. 7-9.

14. Elæocarpus prunifolius, Wall. Vern. *Dieng-la-khmar, Dieng-ruin,* Synt. *Soh-khyllam-eit-blang, Soh-khyllam-ai-blang,* Khasi.

A small evergreen tree. *Bark* grey and slightly rough outside, blaze pale brown, yellow near the cambium, green on the edges below the corky layer. *Branchlets* glabrous or nearly so; young leaves reddish brown. *Leaves* 2-5 by 1-2.2 in., oblong-lanceolate to elliptic lanceolate, acuminate, crenate-serrate or subentire, subcoriaceous, glabrous, shining above; lateral nerves 6-9 on either side, slender; petiole .8-1.5 in., swollen and geniculate at the apex. *Racemes* mostly axillary, 1.5-3.5 in. long, at first silky pubescent, ultimately puberulous, lower bracts leafy, upper small, broadly spathulate, caducous; pedicels slender, about .25-.33 in. long, often more or less bent near the apex, buds oblong lanceolate, adpressed silky. *Flowers* white; sepals .2-.25 in. long, pilose or glabrate outside, keeled and thinly adpressed pubescent within, margins villous; petals up to .2 in. oblong, laciniate into 6-8 short segments at the apex; base slightly broader, sacciform with two pits which cover the disk glands, adpressed silky on both sides. *Stamens* about 15-25, minutely puberulous; filaments short; anthers not bearded, larger lobe with a short blunt beak. *Disk* glands 10, roundish, silky. *Ovary* 2-3 celled, silky; ovules superposed. *Drupe* .6-.7 in. long, oblong-ovoid, stone .4-.45 in. long, ovoid, slightly rugose, obscurely 3 angled, 3 grooved, pointed at the apex with 3 apertures at the base.

SYLHET, KHASI AND JAINTIA HILLS ascending to 4500 ft.
The fruit is said to be edible. Wood yellowish brown, pores scanty, medullary rays numerous, very fine between slightly thicker ones, takes a good polish, but cracks on drying, not used.
Flrs. 1-2. Fr. 10.

15. Elæocarpus integer, Wall. Syn. E. petiolatus, *Wall.* Vern. *Holthak*, Lushai, *Hun*, Tipp.; *Cheng-bichhal*, Sylh.

A medium sized tree. *Bark* greyish-brown, warty, more or less smooth, about .25 in. thick; blaze dun yellow, faintly mottled, shoots glabrate. *Leaves* usually 3-8 by 1.7-3.5 in., elliptic lanceolate or oblong elliptic, bluntly acuminate or acute, entire or distantly serrulate, glabrous, coriaceous; lateral nerves 7-8 on either half, nervules prominent, raised; base narrowed; petiole 1-3 in. long., geniculate at the top. *Racemes* axillary or from axils of fallen leaves, 3-5 in. long, glabrate; pedicels curved at apex, .25-.45 in., finely puberulous, buds ellipsoid, abruptly acuminate. *Flowers* .4-.5 in. across; sepals .25-.3 in. long, lanceolate, glabrate outside, puberulous and keeled within, margins finely villous. *Petals* nearly as long, oblong, finely laciniate and glabrous at the apex, silky on both surfaces, the hairs on the inner face reflexed, ridged in the centre, concave; base saccate with a sub two-celled pit and broader. *Stamens* 30; filaments less than half the length of anthers, finely adpressed pubescent, longer lobe of anthers awned, awns reflexed, disk of 2-10 rounded glabrescent glands. *Ovary* glabrous, 2-celled with 2 superposed rows of ovules. *Drupe* oblong ovoid, .6 in. long; stone slightly rugose, indistinctly 4-ridged.

CACHAR, SYLHET.
Flrs. 1.

E. bracteatus, Kurz.—A large tree. *Leaves* perfectly glabrous, elliptic, obovate, crenate, narrowed into a petiole .5-1 in. long, which is thickened and geniculate at apex. *Secondary* nerves 8-10 pair. *Racemes* short, corymbose. *Pedicels* 3 times the length of sepals, in the axils of oblong-obovate, often serrate bracts. *Sepals* .7 in. long. *Awn* nearly as long as anther, ovary 2-celled, tomentose, stone wrinkled.
UPPER ASSAM (After Brandis).

2. ECHINOCARPUS, Bl.

(Included under *Sloanea* Linn. in Engler & Prantl iii 6.5)

Trees. *Leaves* penniveined; petiole swollen and geniculate at the apex. *Peduncles* axillary, 1-flowered, solitary or fascicled. *Sepals* 4-5, imbricate. *Petals* 4-5, variously cut. *Stamens* numerous, free, on a thick flat disk; anthers linear. *Ovary* 3-4 celled, cells many ovuled; style subulate. *Fruit* a 3-4 celled or by abortion 1-celled loculicidal—capsule covered with prickles or bristles.

Capsules covered with wiry persistent spines, ·6-1 in. long :—	
Leaves large, membranous.	... 1. *E. assamicus.*
Capsules covered with deciduous bristles under .2 in long :—	
Leaves glabrous beneath, capsule about 1 in. across.	... 2. *E. dasycarpus.*
Leaves tomentose beneath, capsule 1.5 in. or more across.	... 3. *E. tomentosus.*

1. Echinocarpus assamicus, Benth. Vern. *Joba-hingori*, Ass.; *Phul-hingori*, Ass. (Sib.); *Bandor-kakoi* (monkey's comb), Ass. (lakh); *Sibe-taba*, Abor & Miri; *Tane-asing*, Abor; *Sibe-dumpuk*, *Sibe-tatar*, Miri; *Tophen-changne*, Duff.; *Phong-rong-arong*, Mik.; *Sarang*, Mech; *Sita*, *Sinta*, Sylh. & Cach.; *Phaithing*, Kuki; *Thing-pat-khui*, Tipp.

A deciduous tree up to 60 ft. in height and over 5 ft. in girth; old trees usually buttressed at the base. *Bark* fairly smooth, generally with horizontal wrinkles, grey or blackish outside, often with white blotches, thin; blaze rather granular, very light dun-brown. *Leaves* 4-16 by 2-6 in., elliptic or oblanceolate, abruptly acuminate, tapering down to a narrow but rounded often cordate base, obsoletely cuspidate-serrate, membranous, thinly pubescent and somewhat harsh beneath, ultimately glabrescent; lateral nerves 7-10 on either half, arched; petiole .4-2.8 in. long, thickened and geniculate at the apex. *Flowers* after leaf fall, pale creamy white, about .6 in. across; peduncles (in flower) 1-1.5 in. long, buff-tomentose, sub-fascicled or scattered between the leaves, shortly elongating and thickening in fruit. *Sepals* 4, about .4 by .2 in., densely buff-tomentose, especially outside. *Petals* 4, cuneately suborbicular, about as long as the sepals, densely pubescent. *Stamens* 60-150 on a flattened pitted torus; filaments about .2 in. long, densely pubescent; anthers about as long or slightly shorter, linear, sparsely puberulous, opening by an oblique terminal pore. *Ovary* 4-celled, ovoid, densely silky; style .3 in. long, conical, hairy. *Capsule* 4-celled, 2-3 in. across with the spines which are very dense, sharp-pointed and sparsely hispid. *Seeds* arillate.

A common tree in all the DISTRICTS and more or less gregarious on low banks of streams and reclaimed marshes.
Wood of a light cream-colour, light and soft, used for tea-boxes and planking.
Flrs. 10-11. Fr. 3-4. Leafless 9-10.

2. Echinocarpus dasycarpus, Benth.

A large tree up to 80 ft. in height and 7 ft. in girth, apparently evergreen. *Bark* greyish-brown, nearly smooth, with faint horizontal wrinkles; inside hard, light reddish-brown with streaks of pale tissue. *Leaves* 4-7 by 2-2.5 in., elliptic, oblong or oblanceolate, acuminate, more or less rounded or narrowed at the base, entire or distantly serrulate, coriaceous, glabrous; main lateral nerves 5-6 on either half, much arched, prominent beneath; petiole .8-1.4 in. long, much swollen at both ends. *Peduncles* usually axillary, solitary or sometimes two together, .5-1.5 in., elongating in fruit, puberulous. *Flowers* .5-.7 in. across, yellowish-white. *Sepals* slightly unequal ovate-lanceolate to broadly elliptic, buff-tomentose. *Petals* broadly obovate, variously cut at the apex and a little longer than the sepals, pubescent. *Stamens* 50-55, pubescent, awned, anthers with the awn about as a long as, or slightly longer than filaments. *Ovary* ovoid, villous. *Capsule* about 1 in. diam., globose, generally with 4 woody valves, covered with very dense weak deciduous bristles about .1-.15 in. long, somewhat flattened and obsoletely feathered with golden hairs. *Seeds* black, with a red arillus.

Jeypur Reserve, LAKHIMPUR, NAGA HILLS, KHASI HILLS, 3500-5000 ft.

Wood greyish-brown, soft; pores regular; medullary rays fine and moderately broad, closely packed, straight. Used for planking and tea-boxes in Darjeeling.

Flrs. 7-8. Fr. 1-2.

3. Echinocarpus tomentosus, Benth.

A moderate-sized tree. *Bark* dark brown corky outside; dull-white brown, mottled and coarsely fibred inside; young shoots brown tomentose. *Leaves* 6.5-9.5 by 3-5.5 in. (but sometimes attaining 12 by 8 in.), elliptic or ovate, acuminate, coarsely toothed, coriaceous, glabrous above, tomentose beneath along the nerves; lateral nerves 11 on either half, arcuate, prominent; base often narrowed, subcordate or rounded; petiole 1-2 in. long, pubescent, ultimately glabrate, swollen at the apex. *Flowers* .5 in. across, sepals 5, ovate, pointed. *Petals* oblong, concave, 4-5 toothed at the apex. Anthers apiculate. *Capsules* about 1.5 in. across, globose or ovoid, woody, 4-5 valved, rose-pink inside covered with bristles .1 in. long, somewhat dilated towards the top, plumose with hairs, seeds arillate.

KHASI HILLS up to about 4000 ft.
Wood white, soft with large often partitioned pores.

Flrs. 9 ? Fr. 10-12 ?

E. Sigun, Blume. A tree. *Leaves* 3-5 by 1-2 in., ovate, oblong or lanceolate, shortly acuminate, chartaceous, glabrous but with a tuft of hairs at the nerve axils; lateral nerves 5-6 on either side,

the first pairs subbasal, very oblique, base rounded, petiole 1-1.5 in. long. *Flowers* solitary, crowded at the base of current year's shoots; peduncle 1 in. long, dilated upwards. *Disk* thick, rusty tomentose. *Style* combined, .2 in. long. *Ovary* ovoid or conical dun tomentose (also with small bristles). Capsule subglobose about 1.4 in. long, generally 4 valved; prickles .2-.4 in. long, blunt, thicker at the base, irregularly set, about .1 in. apart.

Said to occur in KHASI HILLS, but the only specimens I have seen in Calcutta Herbarium are from Java.

Fr. 10-11.