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INDIAN TREES



INDIAN TREES

AN ACCOUNT OF TREES, SHRUBS, WOOLLY
CLIMBERS, BAMBOOS AND PALMS
INDIGENOUS OR COMMONLY
CULTIVATED, IN THE
BRITISH INDIAN EMPIRE

by
DIETRICH BRANDIS, K.C.I.E.

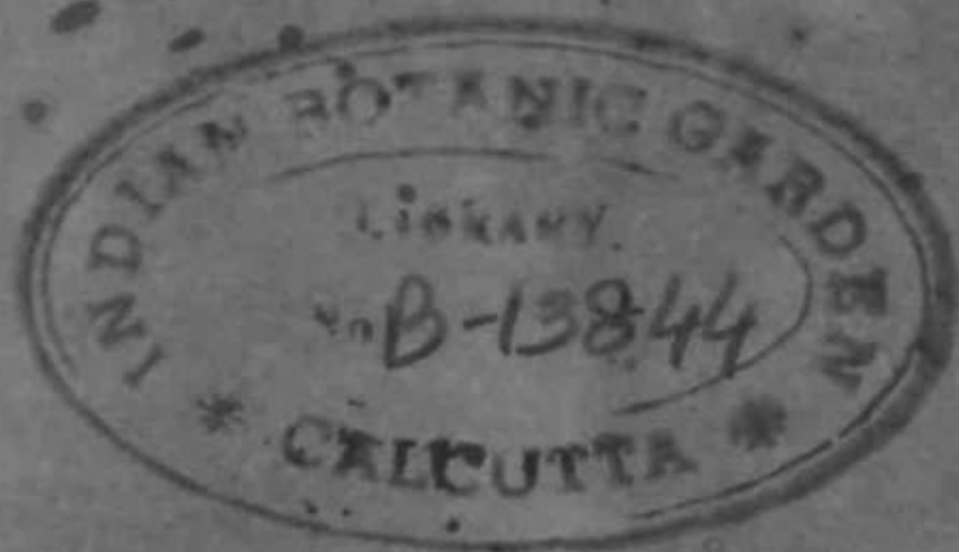
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Göttingen, Germany.*

ASSISTED BY INDIAN FORESTERS

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INTRODUCTION

The object of this work is restricted and is entirely practical. It is intended for Foresters and others, who may wish to make themselves acquainted with the immense variety of trees, shrubs, climbers, bamboos and ferns in the British Indian Empire. Ceylon and the Malay Peninsula are not included, and the book is limited to flowering plants; tree-ferns I have not been able to deal with. In this study the first step necessarily is to determine the name of a plant met with, and my principal aim has been to facilitate this difficult operation. To some extent I am told this has been accomplished for a portion of the Empire by the *Forest Flora of North-West and Central India*, which was commenced by the late Dr. Lindsay Stewart and completed by me in 1874.

Since I commenced the work about eight years ago, my hope has been that this book might facilitate the preparation of local Forest Floras, small portable handbooks, giving an account of the arborescent vegetation of limited areas, provinces or districts of the British Indian Empire. This hope has been strengthened by the publication in 1901 by Rai Sahib Upendranath Kanjilal of that excellent handbook, the *Forest Flora of the School Circle*, in what are now called the United Provinces of Agra and Oudh. The author was a pupil of Mr. J. F. Duthie, who taught systematic botany at the Dehra Dun Forest School from 1881 to 1892. Kanjilal has told me that his work has been greatly facilitated by the *Forest Flora of North-West and Central India*, but his book is full of original observations, made by him during his many years' work in the forests attached to the Imperial Forest School. Following the example set by him, I trust that the local Forest Floras of the future will be based mainly upon the study of the trees and shrubs as they grow in the forest, and hence as a matter of course they must be written in India.

The attainment of my principal object, to facilitate the identification of trees and shrubs, will I hope be furthered by the illustrations which I have been able to give of 201 species. I had hoped to induce Miss M. Smith, the accomplished Botanical Artist at Kew, to undertake this work. Unfortunately she had not sufficient leisure, and was only able to give me two figures in *Annonaceae*. For the greater part of the remainder I have had the good fortune to secure the services of Dr. Roland Anheisser of Cologne, and I feel sure that those who may use this book will be grateful to him for the help which his illustrations will give them. They increase the bulk of the book, but I have gladly given up over 60 pages to them. It will be noticed that no illustrations are given of trees which may be supposed to be generally known, such as Teak, Sal, Sissoo, Deodar.

The present book does not claim to be a *Forest Flora*, such as we have in Europe, giving all that is known regarding the internal structure, the marketable products, the mode and rate of growth, the biological features, the sylvicultural requirements, the treatment in the forest, and the insect and fungoid enemies of the different species. Such a work for the whole of the British Indian Empire would fill several volumes and could not be written at present. France has an exceedingly rich and varied flora, yet Mathieu's admirable *Flore Forestière de la France* (the last edition, 1867), only deals with 397 species, while in the present volume 4,400 species are described.

When forestry has made more progress in India, when successful systems of regenerating the oak and coniferous forests of the North-Western, the magnolias, oaks, laurels, and maples of the Eastern Himalaya have been established, when the effect of fire protection upon Teak and other trees has been determined by series of comparative valuation surveys in different districts when yield tables, showing the amount of timber production per acre per annum of the principal kinds under different circumstances, have been prepared, and when the chief enemies, insects and fungi, of these species are more fully known, then it will be time to publish complete and practical useful books, dealing with the most important trees in each province.

One branch of the subject has already been dealt with in a satisfactory manner: I mean the identification of the different timbers of India by their appearance, weight, hardness and other qualities, as well as by their structure, as far as this can be seen with the aid of a good pocket lens. The necessity of readily recognizing the more important Indian timbers had from the commencement of my Indian career in 1856 compelled me to pay attention to this subject. When in 1877 I was ordered by the Government of India to send to the Paris International Exhibition of 1878 a collection of timbers from all provinces of the British Indian Empire, I determined that all specimens should be correctly named, and this could only be accomplished by a methodical examination of their structure and other qualities. For this purpose I asked for and obtained the assistance of two young Indian foresters, Mr. J. S. Gamble and Mr. A. Smythies. The work commenced at Simla in August 1877, and early in November it was transferred to Calcutta, where a house with a large compound was hired, and where the logs and specimens sent from all provinces were collected and worked up. There we worked hard until February, the descriptions of the structure of each kind being usually dictated by me to my assistants. The result was the large collection of Indian timbers, correctly named, which was sent to Paris by the Government of India and a large number of duplicate collections deposited at the Dehra Dun Forest School, at the Offices of Conservators in the different provinces, at the Museum, Royal Botanic Gardens, Kew, at the Nancy Forest School and at other public institutions in Europe, America and India.

After despatching these collections I considered how to utilize the result of our labours for the benefit of Indian foresters, and I proposed to the Government of India, that Mr. Gamble should be entrusted with the publication of Government account of a *Manual of Indian Timbers*. The result has been the excellent handbook, which appeared in 1881, describing the structure and properties of the timber of 906 species, with notes regarding the distribution of the trees, their rate of growth and other matters. Since then Mr. Gamble has been indefatigable in collecting specimens of timbers not included in his *Manual*, examining them on the system established in 1877, and revising the descriptions previously made. The second edition of *Indian Timbers*, published by him on his own account in 1902, contains descriptions of 1,450 species, illustrated by excellent photographs, which greatly enhance the value of the work. This second edition is an entirely new book, not based upon the intimate knowledge of the species constituting the Indian forests, which the author had acquired during his long service in the forests Burma, Bengal, Madras and North-West India. He has greatly enlarged the notes on the geographical distribution and on the economic uses of the different species and has added notes on their mode of growth, their silvicultural requirements and their treatment in the forest. The suggestion made p. xix. of his Introduction, that keys of the distinguishing characters of timbers, as far as they can be seen, with the aid of a good pocket lens, be prepared for the trees found on limited areas, should be borne in mind by the authors of local Forest Floras.

It appears to me doubtful whether the local Forest Floras, the preparation

which will I trust be facilitated by the present book, can be enlarged so as to deal with those questions which are of real importance to the forest, viz., the internal structure of the different species, their mode of life, silvicultural requirements and treatment, as well as their protection against enemies in the shape of insects and fungi. The number of species is too large in India; it is essential that these local handbooks should be small and easily portable. The authors of future local forest floras must try to facilitate the identification of their principal timbers by means of keys to their structure and be content with the humble task which I have set before me in the present book, to make the work of determining the names of the species constituting their forests easier than it is at present. This, it is true, is not forestry, but it is a first step towards the systematic treatment of forests. This first step is singularly difficult in India, owing to the enormous number of species.

It may possibly be said that the present work as well as the local Forest Floras of the future should be limited to the more important trees. When I commenced the present work at Bonn about eight years ago, I had this intention, and proposed to limit myself to the more important kinds, and Mr. Gamble, with whom at that time I discussed the subject in the hope that we might perhaps undertake the work together, kindly drew up for me a list of what he regarded as the more important species. As the work progressed, I found the selection of the species that might be omitted exceedingly difficult, and I came to the conclusion that the usefulness of the book would be greatly impaired by such limitation. I pictured to myself one of my young colleagues in Burma who had come across a large tree, which from the wings on the fruit he recognized as a *Dipterocarpus*. If this book only contained a description of the more important species, such as *Dipterocarpus alatus*, *D. tuberosus*, *Hopea odorata*, *Pentacme macis*, and *Shorea robusta*, it would not help him, for there are upwards of 20 similar species in Burma, and he would have to study Kuntz's *Forest Flora of Burma*, the *Flora of British India* and the numerous subsequent publications. He would meet the same difficulty with species of other orders and genera. A book on this plan would give no real help to him.

My ambition has been to publish a path-finder through the bewildering variety of trees, shrubs, climbers, bamboos and palms, which constitute the forests in the different provinces of India. I do not maintain that foresters ought to know them all, but they ought to have the means of making themselves acquainted with them without undue loss of time. If my book accomplishes this, I shall be much gratified. Quite unexpectedly a shrub, a bamboo or a tree may be found to be of considerable importance from a forester's point of view, and he should then have easy means of identifying the species in question.

Though I have not limited myself to a selected number of species, I have given fuller descriptions in larger type of all common species and of those which at present are recognized as important. With the others I have dealt in small type, in a very summary manner. From the point of view of the taxonomist all species are of equal importance and ought to be treated alike. This book however is not intended for botanists, it is written for the use of foresters and of practical men, and for these classes of readers species which are common or valuable, obviously are at present infinitely more important than the others. Species which are doubtful or which are imperfectly known I have as a rule omitted altogether.

Many genera and species, in which some readers of this book are likely to have a special interest, I have to my great regret been compelled to leave out. I have not been able to deal with the species of *Dioscorea*, though the roots are most valuable in times of famine, nor have I seen my way to include the

All species are numbered, though in some cases I have refrained from giving a number. It must not be thought that the species in small type are regarded as unimportant.

tall grasses which form the Savannas of Burma and the Subhimalayan tract I have not been able to mention that most remarkable *Macarotaceous* soft wooded shrub of the Andamans, *Clitogyne grandis*, Benth., the stems tufted 10 ft. high, with broad elliptic leaves and conspicuous scented white flowers. Very few of the numerous important exotic species cultivated in India have been mentioned. Several of my younger friends have urged me to describe much larger number of introduced and cultivated kinds. This has been impossible. As it is, in spite of my efforts at shortening and condensing, the book has become inconveniently bulky.

In a few cases I have found it necessary to establish new species; as a rule I have left the task of naming new species to professional systematic botanists and have contented myself with briefly indicating the character by which species believed by me to be new differs from others; adding a reliable vernacular name whenever possible.

Regarding the limitation of species there will always be different opinions. My idea is, and always has been, that as long as the matter has not been fully studied in the field, it is better to leave old-established species alone and not to split them up. When writing my old *Forest Flora* I had to decide whether I should separate the Himalayan, and softly tomentose *Rhus celastria*, Wall., from the glabrous *R. Coffea*, of the Mediterranean region. I decided to leave both under *Rhus Coffea*, and my decision in this and in other similar cases has been accepted by the authors of the *Flora of British India* and by other botanists. For similar reasons I am unable to agree with Lt. Colonel Prain in his excellent paper on *Leguminosae* (*Journ. As. Soc. Bengal*, LXVI, 514) in separating the Himalayan *Albizia mollis* from *A. Julibrissin*, which I regard as a widely spread species, extending from the mountains of Abyssinia to Japan; or with the same author in dividing *Flemingia strobilifera* into 3 species. Mez in his valuable monograph of *Myrsinaceae* classifies the Indian forms of the very variable *Mussa indica* under 7 species. I think it quite possible that other botanists may partially adopt his views, but may be content with a smaller number separated by characters not exactly the same as those selected by Mez, the result of which will be numerous synonyms and possible confusion. Hence in this book *Mussa indica* appears as one species.

For foresters this multiplication of species goes too far, but I trust I may not be misunderstood. *Quercus sessiliflora* and *Q. pedunculata* are two clearly distinct species, differing not only by their leaves and other characters, but what is of much greater importance, by their mode of growth and by their requirements in regard to soil and companionship of other trees. Forests of these two species require different treatment, and yet they are united under *Quercus Robur* by Parlatore (*D. C. Prodrromus*, XVI, 2, 4) by Sir Joseph Hooker in his *Students' Flora*, ed. IV, 367, and by Professor Marshall Ward in his *Handbook of Forest Botany*, II, 213.

It is not possible to arrive at a final decision whether a form should be classed as a species or a variety. The fact that it comes true from seed does not settle the matter. In Burma good varieties of the Mango come true from seed, in India seedlings have to be grafted or inarched in order to produce good edible Mangoes. Sir Joseph Hooker regards the three Cedars as varieties only of *C. Libani*, though they come true from seed. To a great extent it is a matter of convenience whether we speak of species or of varieties, and the question ought not to be invested with undue importance. Guided by this consideration, that the question is not one of real importance, I have followed the *Flora of British India* in calling the Indian Oleander *Nerium odoratum*, though, as explained on p. 462, I hold that *N. Oleander*, *N. muscatense* and *N. odoratum* are local forms of one species, which extends from the Mediterranean region to China. In any case the forester will do well to take species in a wide sense, until it has been proved that they differ in regard to their mode of growth, their requirements and the treatment which they demand.

The necessity of condensing to the utmost has made it impossible to quote synonyms and literature more than was absolutely necessary. Under each Genus Bentham and Hooker's *Genera Plantarum*, and under each species Hooker's *Flora of British India* have always been quoted, otherwise as a rule literature has been given, with the exception of such illustrations as I might think to be accessible to those who may use the book in India.

With regard to the names of genera and species, I have, with very few exceptions, unless later authors had proved to my satisfaction the necessity of a change, followed the *Flora of British India*. In this matter I have proceeded with great caution, for the change of a name always causes inconvenience, loss of time, and often creates confusion. The arguments in favour of a change may at first sight appear to be decisive, but yet it often happens that some points have been overlooked. I have been able to follow Dr. Cooke, who, in his excellent *Flora of Bombay*, has the well-known *Zizyphus amaranthifolia*, W. et A., *Z. Alaudifolia*, Lam., nor do I feel justified in substituting *Mitragyna*, Korthals, for *epiphyne* of the same author.

Bentham and Hooker's *Genera Plantarum* has been my guide in regard to the sequence of orders, with this sole exception, that Gymnosperms have been placed at the end. In the following cases I have found it necessary, following generally the arrangement in Engler & Prantl, *Notürliche Pflanzenfamilien*, to adopt a different limitation of orders: (1) *Ancistrochloaceae* have been taken out of *Dipterocarpaceae*. (2) *Gluciferae* have been divided into the two natural and well defined orders of *Olacaceae* and *Tournefortiaceae*. (3) *Sapotaceae* here appear as three orders: *Scaphylosteaceae*, *Aceraceae* and *Sapotaceae* proper. (4) *Eriaceae* here comprise two orders of Bentham and Hooker's *Genera Plantarum*, *Eriaceae* and *Facchinaceae*. (5) *Hernandiaceae* consists of *Hernandia* and 2 genera, placed under *Crotalariae* in the *Genera Plantarum*. (6) *Urticaceae* have been divided into *Urticaceae*, *Moraceae* and *Urticaceae* proper, and (7) *Cupuliferae* into *Betulaceae* and *Fagaceae*. *Uliciferae* has been transferred from *Burseraceae* to *Sapotaceae*, *Heliotropia* from *Araliaceae* to *Caryaceae*, and *Reptantia* from *Myrsinaceae* to *Sapotaceae*. The practical advantages of these alterations are very great, and will I trust eventually be recognized by those who may use this book. In the case of *Artaceae* and in one or two other instances I have adhered to the classification of the *Genera Plantarum*, and have merely indicated the arrangement which in my opinion would be more natural. Wherever feasible I have followed other Botanists in adopting the termination *-aceae* for all natural orders.

The descriptions of orders and genera as a rule relate only to the general species included in this work. As regards botanical terms, I desire to remind the reader that a leaf is *oblong*, if its two sides are nearly parallel. This term is often used erroneously for leaves with curved sides, narrowing gradually towards the two ends. In such cases I employ the term *oblongo-elliptic* or *obovate-lanceolate* as the case may be. *Secondary* nerves are those which branch off from the midrib, and *tertiary* those which branch off from the secondary nerves. In accordance with some leading systematic handbooks the term *albuaea* has been used. It would have been more correct to speak of *perisperm* in the case of *Piperaceae* and of *cadasperm* in the case of the other orders. I have only done so in the case of bamboos and palms, as well as in the Synopsis of Orders. In the *Records of the Botanical Survey of India*, I noticed lately that the metrical system has been used for the dimensions of leaves and other organs. Most probably the metrical system will eventually be adopted in India and Great Britain, but until this is accomplished, foresters must continue to deal with acres, feet and inches. In some cases, when stating the diameter of vessels or other elements which can only be seen through a microscope, I had for obvious reasons to make an exception. The few abbreviations used: l. for leaves, n. for nerves, d. for

flowers, fr. for fruit, Haz. for Hazara, Bash. for Bakhair, Kun, for Kunaw, C.P. for Central Provinces, Kar. for Karen, will be readily understood.

Vernacular names of species, if sifted with care, are valuable whatever may be said to the contrary, and I have endeavoured to select those which seem to me most likely to be useful. Apart from the names recorded in my *Forest Flora*, and those collected by myself after 1874, those recorded in Kur's *Forest Flora of Burma*, in Beddome's *Flora Sylvatica*, in Gaillard's second edition of *Indian Timbers* and in his other publications, in Talbot's *List of Trees and Shrubs of the Bombay Presidency*, in the excellent lists of Burmese names by the late Mr. Corbett, I have received much help in this respect through the kindness of local forest officers and others. From Madras I have received a printed list, giving the names of trees and shrubs in the six principal languages of that Presidency. Similar lists, some in manuscript, others in print, I have received from many districts or forest circles in other parts of India. I hope that the selection which these abundant materials have enabled me to make will prove useful, but I know that the spelling of the names will be found to be the weakest point of the whole book. In the case of *Kag*, *Dipterocarpus tuberculatus*, I have adhered to the old spelling, as the name has, through the publications of Kuntz and others, become familiar to Botanists outside India. When the local Forest Floras of the future come to be prepared for the different forest circles or provinces, the spelling of the vernacular names in the different languages will doubtless receive due attention. In the case of languages spoken in limited areas, or otherwise less important for the forester, such as Lepcha, Sental, Kol, Gondi, Bhil, Shan, Chin, Karen, I have only given the names of a few common and important trees.

The materials, upon the examination of which the description of genera and species in this book are based, have been as follows. *First*: The magnificent and well-arranged collections in the Herbarium and Museum, with the library and the living specimens cultivated in the houses or the grounds, of the Royal Botanic Gardens, Kew. I value highly the privilege of having been permitted the free use of these matchless treasures. I have also consulted, whenever it seemed necessary, the specimens of Wallich's Herbarium at the Linnean Society, as well as the collections preserved in the Natural History Museum at South Kensington. I cannot sufficiently express my gratitude for the assistance I have received in this work from the Director of the Royal Botanic Gardens, from all members of his staff, as well as from the officers of the Natural History Museum and the Linnean Society.

Second: The collections made by me in the different provinces of India from 1856 to 1883. These collections might have been exceedingly valuable, for there are few important forest districts in British territory which I have not visited, often repeatedly at different seasons of the year. Collecting, however, was not my business. The object of my being appointed in January 1856 by Lord Dalhousie to the charge of the Pegu forests, was purely practical. My duty in Burma was to place the management of the Teak forests upon a safe footing, so as to ensure the maintenance and gradual improvement of the valuable growing stock, while utilizing timber not exceeding the amount annually produced in the forests. The difficulties with which I had to contend were great, and the opposition against mathematical forest management was powerful. This is not the place to give an account of my work in India; it must suffice to say that, unless I had had in Burma the steady support of the late Sir Arthur Phayre, and at a later date, after I had been summoned to Calcutta to assist the Government of India in organizing forest business in the other provinces, the protection and guidance of Colonel (now Sir Richard) Strachey, there would perhaps be no Forest Administration in India, and there would be no need for the present book. My work during the 28 years of my Indian service has never left me leisure for collecting systematically, or for working out scientific problems.

Whenever possible I took about with me Endlicher's *Genera Plantarum*, Burch's *Flora Indica*, Wight and Arnott's *Prodrangae*, and in later years Kurz's *Forest Flora of Burma* and other books as they appeared. Whenever I could snatch an hour or two I examined the trees and shrubs which I had found. Unfortunately for myself I never was a *l'es-a-partout*; however, gave me time during my life in Burma, from 1856 to 1862, to send descriptions with rough sketches of the plants examined. Many specimens of my old Burma collections are, in accordance with my wish, at Herbarium of the Royal Gardens, Calcutta, but a portion I have kept. Lt.-Colonel Prain has most kindly lent me some of my old specimens for examination. Thus I have been able to utilize for the present book a considerable portion of my old Burma notes, and this will I trust increase its value. It must not be supposed that in those days I knew the systematic names of the trees and shrubs of Burma. In January 1860, I was able to spend a few weeks with the late Dr. Thomas Thomson at the Calcutta gardens, and while there obtained the names of some of the more important trees and shrubs. Until then, and in most cases afterwards, I called them by their Burmese names. In 1859 I drew up a descriptive account of eighteen kinds of Jamboes, all well known to me by their dimensions, their mode of growth, their culms, sheaths and other characters, but until Meunier's *Monographie of Bupleurum* appeared in 1866, I only knew them by their Burmese names. After I left Burma and commenced work in the other provinces of the Empire, I had very less time for botanical studies. The result has been that to the end of my Indian career I remained ignorant of many trees and shrubs, to which my attention had not been specially drawn. Intelligent readers will discover in the Appendix appended to this book several species which I had omitted because I did not know them.

Third: The specimens and notes sent to me by my younger friends and by my former colleagues. Before speaking of forests I desire to state that the Superintendent of the Royal Gardens, Calcutta, has for several years past most kindly sent me duplicates, which it was thought might help me in my present work. Mr. John F. Duthie, the late Superintendent of the Saharanpur Botanic Gardens, has sent me specimens, and has enabled me to examine others collected by him in Northern India. Colonel A. A. Barrett was at different times sent me most valuable material, with full notes, from Aboothabad and from the Chitral valley, and Dr. T. Cooke has most kindly, in the case of difficult genera, permitted me to examine the specimens of the local collections made by him in the Bombay Presidency.

The first collection from forest officers came from Mr. A. E. Lewis, at that time in charge of the forests of Ajmer-Merwara. It consisted of an almost complete set of well dried specimens of the trees and shrubs of that district, with copious and instructive notes, accompanied in many cases by pieces of wood, which enabled me to understand difficult genera, such as *Cordia*, better than before.

From Mr. J. S. Gamble, C.I.E. and F.R.S., I have received repeated contributions of splendid specimens collected by him in Bengal and in the Madras Presidency, which have been a great help to me in this work. Moreover, when I had nearly finished *Handbook*, Mr. Gamble at my request most generously sent for my inspection and examination the specimens which he had received from India since the publication of his great work on the Indian Jamboes, including several new species named by him.

Mr. J. W. Oliver, when Conservator in Upper Burma, sent me several important collections, made, partly by him, partly by Mr. E. M. Buchanan, on the hills of the Ruby Mines district, and in that remarkable region of dry country on both sides of the Irrawadi river between Thayetmye and Mandalay. Upper Burma was annexed three years after I had left India, and these collections, with Mr. Oliver's notes, as well as a number of specimens sent me by Mr. A. Smythies, gave me some idea of the forest vegetation of that country. I had

never visited the Amalams, but it has been my good fortune that Mr. Gil Rogers, who for several years has had charge of the forests in these islands, has lately been able on several occasions to come to Kew and to give excellent information, chiefly regarding the palms and bamboos, which he studied with special care. The more important of his collections were available, but fortunately he was able to obtain for me materials for the study of several important species. Nor had I been in Baluchistan, and hence specimens and information which Mr. J. H. Lace has given me in regard to the forest vegetation of that country have been of the greatest value.

As soon as I had determined to undertake this work, I made my intention known to my young friends and former colleagues in India, and asking them to furnish me with material for this work. This request has been responded to from nearly all provinces in the most liberal manner. From Travancore Mr. T. F. Bourdillon has from the commencement supplied me with specimens and ample notes regarding new and difficult species. Mr. A. W. Lushington has furnished me with valuable notes and specimens from the Madras Presidency, Mr. Talbot has sent me notes with specimens of various species, Mr. G. M. Ryan has been indefatigable in supplying me with material from the Thana district in Bombay, and in sending replies to my inquiries. Mr. R. S. Hale has sent me notes and specimens from Jabalpur, Mr. R. L. Hainig notes and specimens of a bamboo from Chittagong; and to Mr. H. H. Haines I am indebted for splendid collections and most valuable notes from Singbham and Sikkim. The forest officers in Assam have favoured me with specimens and lists of bamboos in their districts. Feroz Rai Sahib Upendranath Kanjilal I have received numerous contributions, and Mr. J. H. Lace has most kindly lent me specimens illustrating difficult genera from the North-West Himalayas.

The collections received from Burma I can only mention briefly, although for my work they have been by far the most important. To Mr. F. B. Munnson I am indebted for a large collection of specimens from Tavay, Mergul, and other districts of Tenasserim, and to Mr. E. M. Buchanan for a consignment from Tharawadi. The late H. Shole and J. Messer, who have both died prematurely—a great loss for the progress of forestry in Burma—sent me notes and specimens, chiefly of bamboos; from Mr. Montague Hill I have received several large and most valuable consignments, with lists and notes, chiefly from the hill east of Bhamo, and Mr. R. S. Trapp has furnished me with excellent specimens and notes, chiefly of bamboos and palms. By far the richest and most important collections have come from Mr. C. B. Smeak. He commenced sending in 1868, and continued steadily until he came home on furlough in 1883. His specimens and notes are excellent, and they have enabled me almost to feel at home in the forest vegetation of Upper Burma. His was an instance of a keen sportsman turning his attention to the study of trees, shrubs and bamboos with excellent effect.

In spite of this wealth of material, which has been at my disposal, I feel strongly that, to do full justice to the task I had undertaken, I ought to have gone to the Royal Gardens, Calcutta, to consult the untold treasures which must have accumulated at that long-established splendid institution, the result of the labours of skilful collectors, some of them foresters. For this undertaking, however, I had neither the strength nor the means, and I feel that in many respects my work is incomplete.

The publications bearing upon the woody plants of India since the appearance of the *Forest Flora* of N.W. and Central India have been very numerous and very important. In 1872 and 1873, the years devoted to that work, the *Genera Plantarum*, by Bentham and Hooker, was only available to the extent of *Rubiaceae*, and Hooker's *Flora of British India* only to page 125 of the first volume. Of Boissier's *Flora Orientalis* the first 2 volumes had appeared. These three standard works are now complete, and in addition to them the whole of Engler u. Prantl's *Natürliche Pflanzenfamilien* and a number

monographs of important orders in Engler's *Pflanzenreich*, which will be found quoted in their proper place. Kurz's *Forest Flora of Burma* appeared in 1877, and it has been a real pleasure to witness how thoroughly this modest, but most important work is appreciated and how eagerly it has been used by foresters in Burma. A most important help has been the magnificent volumes of the *Annals of the Royal Botanic Gardens, Calcutta*, chiefly I. Ficus (1888), II. *Artocarpus, Quercus, Castanopsis* (1889), III. 2. *Magnoliaceae* (1891), III. 3. *Myristica* (1891), IV. 1. *Anonaceae* (1893), all by Sir George King, VII. *Dioscoreae* by J. S. Gamble (1896), and X. *Dalbergia* by Lt. Col. D. Prain 1904. The *Journal and Transactions of the Linnean Society* since 1875 contain numerous papers which have been utilized by me, and which are quoted in their proper place. The *Records of the Botanical Survey of India* brought a number of most important papers by Mr. Pottinger, Mr. G. A. Grammie, and C. Marshall Woodrow, Lt. Col. Wood, Signore Odoardo Beccari, Mr. Duthie, Lt. Col. Prain and Capt. Gage. Among the numerous publications in other languages which have been useful to me in this work, apart from the two general works edited by Professor Engler, I desire specially to mention Pierre, *Flore Forestière de la Cochinchine*, an important work for the study of Burmese trees, tab. 1-100, the last published in 1892, and Koorders on Valton, *Boomsorten op Java*, vol. I-X, the last in 1904.

The excellent *List of trees, climbers and woody shrubs of the Bombay Presidency*, by W. A. Talbot, ed. II. 1902, has been of the greatest use, and Mr. Gamble's *Indian Timbers*, particularly the second edition (1902), which I have been able to use from *Cypripodiaceae* onwards, has been invaluable, as well as his *List of Trees of the Darjeeling District*, ed. II. 1896. The *Flora of Sialta*, by the late Sir Henry Collett, 1902, with Miss Smith's excellent illustrations in that valuable book, will be found quoted under the species illustrated. Lt. Col. David Prain's *Bengal Plants* 2 vols., 1903, I have been able to use for the last Orders only, and the large number of additional localities quoted from that book under "addenda" will show how far from complete the specimens before me have been with regard to Chittagong and other portions of Bengal. The first volume of Mr. Duthie's *Flora of the Upper Gangetic Plain* and Dr. Cooke's *Flora of Bombay*, vol. I. and vol. II. to p. 131, have been most useful to me.

The *Journal of the Bombay Natural History Society* contains valuable papers by Bourdillon, T. set. Marshall Woodrow and Th. Cooke. A series of most important papers has been published in the *Journal of the Asiatic Society of Bengal*, the most prominent of which are the *Materials for a Flora of the Malay Peninsula*, by Sir George King, now continued by Mr. J. S. Gamble, which commenced to appear in 1890.

It may perhaps be expected that I should say a few words regarding the geographical distribution of the species dealt with in this volume. These remarks must be brief, and as a matter of course they must be limited to species described in this volume, trees, shrubs, etc. In the introductory essay to the *Flora Indica* by J. D. Hooker and T. Thomson of 1855, p. 115, four primary divisions were recognized, viz.: I. Hindustan, including the Western Peninsula from the base of the Himalaya to Cape Comorin; II. The Himalaya; III. Eastern India, or India east of the mouth of the Ganges; IV. Afghanistan and Baluchistan; and it was clearly set forth in that admirable essay that the vegetation of the Western Himalaya had great affinity to that of Western Asia and Europe, and that genera and species of China and Japan prevailed in the Eastern Himalaya.

Since then a number of excellent papers have been published, in which these great primary divisions have been subdivided, and a larger number of botanical regions established. The most important of these papers are: C. B. Clarke, the *Botanical Subarcs of British India*, illustrated by the *Distribution of Cyperaceae*, *Journal Linnean Society*, XXXIV. p. 1

1898, in Colonel Traill, *Introduction to Bengal Plants*, p. 2 (1903), Sir Joseph Dalton Hooker, *A Sketch of the Flora of British India* (1901).^{*} In this admirable paper Hooker divides British India primarily into three Botanical areas, a Himalayan, an Eastern and a Western, the two last-named being roughly separated by a line drawn meridionally from the Himalaya to the Bay of Bengal. These areas he divides into 9 provinces, 7 of which are included in the present work, viz.: (1) The Eastern Himalaya, (2) The Western Himalaya, (3) The Indus plain, (4) The Gangetic plain, (5) Malabar in a very extended sense, (6) The Deccan in a very broad sense, (7) Ceylon, (8) Burma, (9) the Malay Peninsula, 7 and 9 are not included here. In stating the distribution of the species described in this book it was obviously in most cases necessary to go into detail, and wherever feasible, the names of the 64 subdivisions were used which had already been indicated in the introduction to the *Flora Indica* of 1855, and which in his last sketch Hooker has arranged under the 9 provinces now adopted by him. In many cases, however, the distribution of species had to be further defined, and here to a great extent the administrative division of the Empire into districts and subdivisions has been used. It is assumed that those who may use this book are familiar with the geography of India. In the case of a few of the least common, but important species, I have added the locality and the dates on which they were found by me. It will I trust be understood that I had to indicate the geographical distribution of a species in as few words as possible, so that when a species is found in Central Nagpur and the Western Peninsula it may be assumed also to occur in Orissa, though this is not specifically stated. Again, when a species is found on the Khasi hills and in Chittagong it may be expected to occur also on the Lushai hills. The term Central India is sometimes used in a wide sense, comprising the Central Provinces.

The principal factors which influence the geographical distribution of trees in India are latitude, elevation, moisture and the nature of the soil. In addition to these, it must be borne in mind that there is a marked difference in the vegetation of the Western and Eastern divisions of the country. The influence of latitude and elevation above sea-level is obvious and is generally recognised regarding the influence of soil, moisture and the difference between West and East it may be useful to say a few words. Regarding the influence of soil upon forest growth in India, only a few isolated facts are known at present. Sand forests are found on sandstone, conglomerate and on the sandy gravelly and shaly soil of the Subhimalayan tract; *Eugenia Dipterocarpus tuberculata* chiefly affects laterite; *Hardwickia binata* most commonly grows on sandstone, and is found on trap, as in South Berar, the rock is rich in veins of quartz. *Mimosa leucandra*, as far as known, behaves in the same manner. *Cupressus torulosa* as a rule is only found on limestone. On the other hand *Tect* thrives well on the sandstone and calcareous shales of the Pegu Yoma, on granite, granite and other crystalline rocks east of the Salween river above Toungoo and in North Kanara, on trap in the Satpura range, and in the Khandeish Daugs, on limestone in the Thanaigyr forests of Tenasserim, and it also grows on deep alluvial soil. The same may be said of many important forest trees. *Ternstroemia tomentosa*, it is true, and *Diospyros* geological formations.

In Europe forest trees behave in a similar way. The *Beech* and the *Willow* thrive best on calcareous soils, but they will grow on soils differing greatly in regard to their physical and chemical constitution. The *Larch* in Switzerland and the Tyrol prefers crystalline rocks, which are poor in lime, while in Bavaria and Salzburg this tree is commonly found on calcareous and not on silicious soils.

The trees and shrubs, which grow near the sea coast and on the banks of

^{*}A chapter in the forthcoming *Imperial Gazetteer of India* (October 1902).

tidal streams, including the Mangrove formation, are quite peculiar; the extent of these littoral forests is considerable, the habits and structure of the principal species have been thoroughly studied; * this, however, is not the place to say more regarding them.

The reader will I trust not misunderstand me. The nature of the soil, and consequently the nature of the rock, by the disintegration of which the soil has been formed, is a most important factor in forestry. It will gradually be more fully understood that Teak forests on trap require a different treatment from those on gneiss, on limestone, on sandstone and calcareous shales or on alluvial soil; and doubtless Indian foresters will eventually find that many trees thrive better on certain classes of soil than on others. The large area covered with basaltic rocks in Western India affords opportunities for promising studies in this respect. The *Sal* tree on the Satpura range has its western limit on the sandstone of the Pachmarhi. It does not thrive on trap, and hence it is not found farther west in that region. A carefully prepared list of species found in the trap country of the Peninsula and of those which are wanting, though they are found on other formations in the same region, may prove instructive in many respects.

At the British Association assembled at Brighton in 1872, I had the honour to explain before the geographical section my views regarding the distribution of forests in India. My paper was published in *Ocean Highways*, 1872, p. 290, and in the *Transactions of the Royal Scottish Arboricultural Society*, VII. 88

(1873). It was illustrated by a map, on which I had, on the ground of the imperfect meteorological data then available, entered the regions of greater or less moisture, as indicated by the annual rainfall. I laid stress upon a subject which is now universally recognized, the intimate relation between moisture and forest growth in India. Since then the Indian Meteorological Department has been established, and the maps published by that Department are more accurate and much more detailed than the map which I ventured to compile in 1872. Still the great regions then established remain, and with the addition of the dry region in the Irawadi valley, not known to me in 1872, they are:

First: I. The arid region with a scanty and irregular rainfall, never exceeding 15 inches annually, and an atmosphere dry nearly throughout the year, comprising Sind, the southern Punjab and western Rajputana.

Second, the three dry regions, annual rainfall between 15 and 30 inches, viz: II. The northern dry region, adjoining the arid region on its north and east sides, comprising the greater portion of the plains of the Punjab to within a short distance from the foot of the Himalaya, Eastern Rajputana and a large part of what are now called the United Provinces, extending eastwards along the Ganges beyond Cawpore. III. The Peninsular dry region, comprising the greater part of the Deccan and Mysore. IV. The Eastern dry region in the Irawadi valley, comprising the following districts. West of the river: the southern portion of Shwabo, the eastern half of the Lower Chindwin, Sagaing, Pakokku and Minbu. East of the river: the western portion of Mandalay and Kyaukse, Myingyan, Maiktila and Magwe.

Third, the two moist regions, rainfall 75 inches and upwards, viz: V. The Western moist region, extending from the Gulf of Cambay to Travancore and comprising the country from the coast to some distance east of the crest of the Ghats. VI. The Eastern moist region, comprising the eastern Himalaya with a narrow strip along the outer ranges, extending north-west as far as the Ravi, the greater part of Assam, Eastern Bengal, the northern part of Upper and nearly the whole of Lower Burma.

* Schimper: Indo-Malayische Strand Flora (1891), *Plant-Geography*, p. 90, 287 (1899). Prain, *Flora of the Sundistan in Records Bot. Survey India II.* 240. Hooker, *Sketch of the Flora of British India*, 25.

* In the excellent large *Rainfall Map of India*, published by the late Henry Blanford in 1893, and in later maps published by the Meteorological Department, the regions are limited by lines of 10, 20, 30, etc., inches of the annual rainfall.

Fourth: VII. The intermediate region, comprising the remainder with a rainfall between 30 and 75 inches heavier in the belts adjoining the two moist regions, so hilly districts and in places along the sea-coast.

In the paper quoted I also mentioned the large extent of arid valleys in the inner Himalaya, and described the gradual but most remarkable changes in the forest vegetation experienced when ascending the valley of the Setlejr river, from the moist ranges of the Outer Himalaya into the dry and higher up, the arid region beyond Wangtu. Changes similar to these but much more striking, are noticed when ascending from the evergreen forest at the foot and on the slopes of the Western Ghats to the crest of the ghats and beyond into the dry country of the Deccan or Mysore. The evergreen forest disappears, its place is taken first by moist, further east by dry deciduous forest, until at last the thorny scrub of the Deccan takes the place of forest.

Excluding the Himalaya, the forester distinguishes two great classes of forests in India: the deciduous forest, which, unless specially protected, is burnt over every year, and the evergreen forest, into which as a rule fires do not enter. The deciduous forests, as is well known, are the most valuable, as they contain most of the really important species. Extensive areas of evergreen forest are only found in the two great moist regions, the western and eastern, and not everywhere in these, for there are large areas in the moist regions stocked with deciduous forest. As a rule the existence of evergreen forest indicates heavier rainfall and moister air, but there are cases where the nature of the soil seems to be an important factor in this respect. Thus in the lower portion of the Thanugyin valley on the British side there is a large stretch of evergreen forest on deep alluvial soil. Marching through this region on my way up the valley in March 1859, I found the mean height of this forest to be 300 ft., with a few specimens of *Antiaris toxicaria*† towering above it. The ground was stocked with trees of all ages, from seedlings to tall pole-wood and creepers, forming a dense mass of vegetation 200 ft. high. Higher up the valley on undulating ground deciduous forest with a considerable amount of Teak prevails. Something similar I have seen on the head waters of the Attaran river, where stretches of alluvial soil are stocked with evergreens, and hills or undulating ground with deciduous forest. Aspect also has something to do with the distribution of these two classes of forest. In Burma I have often seen one side of a valley clothed with evergreen, and the other with deciduous forest. The conditions which in the moist regions of India govern this matter will doubtless eventually be more fully examined. The Kans of the Sorub Taluka of Mysore, isolated patches of evergreen forest, in which the Pepper vine is cultivated, are specially recommended for study.

Stretches of evergreen forest are also found on hills in the intermediate and dry regions, for instance on the Shevaroy and Javadi hills, and in the Cuddapah and Kasnool districts of Madras, where the moisture is greater than in the country surrounding these hills. They are sometimes designated *Gambel's*, *Terminalia pallida*, *Eugenia alternifolia*, *Styphalon rotundifolium*.

On the east side of the Peninsula, near the coast, under the influence of the North-east Monsoon, extensive tracts of waste lands and low hills are stocked with a kind of nearly evergreen forest growth, which I have designated as semi-evergreen scrub, some of the prominent species of which are: *Flacourtia ramontchii*, *Pterospermum suberifolium*, *Bignonia Mystag*, *Erythrocylon canocephalum*, *Zizyphus Xylopyrus*, *Eugenia bracteata*, *Weberia corymbosa*, *Cathartina parviflora*, *Mabo burifolia*, *Carissa spinarum*, *Elaeagnus buxifolia*.

* The species of the evergreen forest, even more than Beech and Silver Fir in Europe, spring up and are able to live in deep shade.

† Brandis, *Suggestions on Forest Administration*, Madras, p. 110 (1838).

Every forester and all those who are likely to use this book are familiar with the paramount influence of latitude, elevation and moisture upon forest growth in India, but it is perhaps less generally known that there are numerous species, genera, and even "natural orders," which are found in the east and are wanting in the west and vice versa. As already stated, it is generally recognized that the vegetation of the Western Himalaya has great affinity to that of Western Asia and Europe, while types of China and Japan prevail in the Eastern Himalaya. Putting aside the Himalaya for the present, the affinity of the vegetation in the Western Peninsula* with that of Africa has long been recognized; it was Hooker who first drew prominent attention to it, and, as already mentioned, in his recent sketch, divides India into three great Botanical areas or regions, a Himalayan, an Eastern and a Western. The following remarks relate to the Western and Eastern Peninsulas of India and the provinces and districts north of the two peninsulas to the foot of the Himalaya. A line drawn from Calcutta northwards to near the foot of the Himalaya will be found convenient to separate these two great divisions, the western and eastern division of India outside the Himalaya.

The Western Peninsula has no *Cupuliferæ* (*Ectolacæ* and *Fagacæ*), no *Coniferæ* with the exception of *Podocarpus latifolius*, and no *Illicaceæ* or *Saxifragaceæ*, orders which are well represented in eastern India. *Acer* is absent from the Western Peninsula and so are *Thymelacææ*, with the sole exception of *Excoecarion*. Five of the 7 Magnoliaceous genera (*Magnolia*, *Manglietia*, *Talauma*, *Mlicium*, *Schizandra*) are not represented in the west. On the other hand, of *Capparidacææ* ? *Nelumbria*, *Morus* and *Culaba* are Western, while *Bacca* and *Boydia* are Eastern, the principal genus, *Capparis*, having species in both peninsulas. Of the 12 genera of *Ternstroemiaceæ* 5 (*Pycnanthus*, *Schinus*, *Cassipouia*, *Actinidia* and *Sarcocolla*) belong exclusively to the Eastern Flora. Two genera of *Burseraceæ* (*Boswellia* and *Balsamodendron*) belong to Africa, Arabia and the Western Peninsula, but are wanting in the East. Of the 68 species of *Meliaceæ* the majority are eastern or common to both sides, but *Turrea*, *Boddaemia* and *Chloroxylon* are exclusively western. *Sonneratia* may possibly yet be found in the dry region of Upper Burma. Of *Sapotaceæ*, *Gonio* and *Mischocarpus* are eastern, while *Dioscorea* and *Filicium* are exclusively western genera. Among *Anacardiaceæ*, *Nothopogon* is western, while *Parishia*, *Melanorrhiza*, *Nelufonia*, *Dracontomachus*, *Dracontopogon* and *Banca* are exclusively eastern genera. Of *Leguminosæ*, *Mundulca*, *Ongelina*, *Harbickia* and *Frosopis* are western, while *Azadirachta*, *Cratichneumon*, *Palaudra*, *Amherstia*, *Parkia* and others belong to the Eastern Division. Among *Rosacææ*, *Pyrus*, *Diospyros*, *Pourthia* and *Eriobotrya* are found in the Eastern but not in the Western Peninsula. Of *Myrtaceæ*, *Rhodomyrtus* belongs to the Western Peninsula, while *Leucospermum*, *Rhodanthe*, *Leptospermum*, *Tridax*, *Melaleuca* and *Planchonella* are Eastern genera. Of *Araliaceæ*, *Cornaceæ*, *Rubiaceæ* and *Palmeæ*, numerous genera belong exclusively to the Eastern Flora. In *Sipholacææ*, *Leontodon* is western, while *Sarcoperum* is eastern. *Saururus* is western, but no *Agave*, *Pentstemon*, *Slyria*, *Gomphocarpus*, *Congea*, *Lindera*, and *Morus* are found in the Western Region. Of Bamboos, *Ochloa* is western with one species in the Malay Peninsula; one section of *Oxytenanthra* is Western, while the other section belongs to the eastern peninsula. Most of the other genera have species in the eastern division only, while the 5 large genera *Arundinaria*, *Bambusa*, *Dendrocalamus* and *Leptostachyum* have species both in the western and eastern divisions.

Many genera besides *Oxytenanthra* have distinct sections of Eastern and Western species: for instance *Pterocarpus*, *Holigarna* and *Commersonia*. Further, a number of western and eastern species are so closely allied that

*The terms Western and Eastern Peninsula are used in Hooker's great *Flora of British India*.

they may be regarded as various species, unless it is preferred not to recognize any difference between them. As instances I may mention *Diplazium indicum* and *D. turbinatum*, *Elavestepus tuberculatus* and *E. gristatus*. These cases are analogous to the vicarious species on both sides of the Atlantic, such as *Cercis Siliquastrum* and *C. canadensis*, *Ostrya carpinifolia* and *O. virginiana*.

There are one or two instances of genera, which are found in Eastern India and tropical Africa, but which have not yet been discovered in the Western Peninsula. The most remarkable instance is *Dalbergia bracteata* and *africana*, two species so closely allied, that they have been united in the Flora of British India and of Tropical Africa.

The forester will naturally wish to know to what extent these remarks relate to the more important forest trees. Omitting the trees of the Himalaya, we may single out 60 as being by far the most important among the large number of species here described. Of these sixty, 29 are Western, such as: *Shorea robusta*, *Calorargyrea Societaria*, *Dalbergia latifolia*, *Pterocarpus Marsupium*, 17 are Eastern, such as: *Hopon, obovata*, *Pterocarpus dalbergioides*, *Pinus Khasia* and *Dendrocalamus giganteus*, while 23 belong to both divisions, among them *Xylia dolabriformis*, *Acacia Catechu*, *Terminalia Chebula*, *Lagerstrœmia flor-regia*, *Tectona grandis* and *Simulium arundinaceum*.

The preceding remarks must not be misunderstood. Many genera and species are common to both the Western and Eastern divisions of India. A comparison of localities similar as regards moisture and elevation will show this abundantly. A very remarkable instance of this is mentioned by Hooker on p. 83 of his late *Sketch of the Flora of British India*. He compares the Nilgiri flora with that of the cool regions of the far distant Khasi, Manipur, Naga hills and the hills in Northern Burma. Moisture, elevation and soil are similar, but these localities are separated by 14 degrees of latitude and 17 degrees of longitude. The following are the most remarkable instances mentioned by him: *Rubus*, of which 2 species are common to the Nilgiris and to the hills of Eastern India, is a large cosmopolitan genus. *Hypericum* and *Rhynchospora* belong to the Northern temperate zone, but have representatives in mountainous regions within the tropics, of which *Hypericum Hookerianum*, *H. mysorensis* and *separulense*, *Rhynchospora cingulata* and *R. Wightii* are found on the Nilgiris. Of *Viburnum*, a genus of the temperate and subtropical regions of the Northern Hemisphere, 15 species are found in India, and 4 of them—*V. pauciflorum*, *V. coriaceum*, *V. subantiochicum* and *V. crutescens*, are common to the Western and Eastern region (see p. 361). This most interesting comparison of the Nilgiris and the hills of Eastern India does not invalidate what has been said regarding Eastern and Western genera and species. The Nilgiris have no oaks, no pines, no *Pyrus*, no *Hammamelidaceæ*, no *Saxifragaceæ*, no *Lycopodium* or *Pteropteris*, and many other genera common on the hills of Eastern India, are wanting on the Nilgiris.

A most interesting and valuable account has lately been published by Capt. A. T. Gage, I.M.S., of the vegetation in the Mibui district, which forms part of the dry region of the Irawadi valley in Upper Burma. (*Records of the Botanical Survey of India*, vol. III, 17.) This district the author divides into three regions:—I. The mountainous zone comprising the eastern slopes of the Arakan Yoma and a lower range of hills running parallel to the Yoma. II. A narrow flat alluvial belt 4-5 miles wide fringing the western bank of the Irawadi river. III. The desert zone 20-30 miles wide, comprising the greater portion of the district. In this zone only 60 of the 700 species collected by him were found. The most striking feature in the vegetation of this zone, Capt. Gage states (p. 17), is the preponderance of Deccan and Indo-African species. At first sight this would seem to upset much that has been said regarding Western and Eastern species. On page 239 the author gives a list of the species found in the desert zone according to their geographical

distribution, and from this list it appears, that out of the 60 species 11 are found in the Deccan and 8 are distributed from Africa to India, while the rest are endemic in Burma, are distributed over other parts of India, over Malaya, China and Australia, or are found in a large portion of the tropical zone. Of the 19 Deccan and African species most are found in other parts of India besides the Deccan, and the remark made by Capt. Gage, interesting as it is, does not affect what has here been said regarding the difference in the vegetation of Western and Eastern India outside the Himalaya.

The effect of the climatic factors which have influenced the character of forest growth in India, the chief being elevation, latitude and moisture, is readily intelligible, while the difference in the vegetation of the Western and Eastern divisions is not so easily explained. It might be supposed that the soil in these two great divisions of India was different, and that this would account for the remarkable facts here mentioned. This view may be supported by the extensive area covered with basaltic rocks in the Western peninsula, a formation which, as far as known, is not found in the Eastern division of India. In spite of this fact, however, it cannot in any way be said that the character of the soils is essentially different in these two great divisions of the country. The difference between western and eastern species rather points to changes which in remote ages must have taken place in the configuration and climate of the country, a most interesting subject, which however cannot be discussed here.

One of the most important steps taken by Dr. Schlich, when organizing the Indian Forest School in connexion with the Cooper's Hill Engineering College, was to arrange, not only for the teaching of systematic botany, but to insist upon the students becoming familiar with the anatomy and physiology of trees, so that they should thoroughly understand the development, nutrition, and propagation of plants. Further, that their attention should be directed to important biological features, which are not generally dealt with in books on systematic botany. Professor Marshall Ward, whom Dr. Schlich fortunately secured to carry out this plan, managed to instil some of his own enthusiasm into his students, and it has often given me intense pleasure to witness the keen interest in general botanical questions on the part of young Indian foresters at home on leave, who had the privilege of his teaching. I feel assured that at the Delhi Forest School also, the necessity of studying the general branches of botany is fully understood.

Under these circumstances I thought myself justified in introducing here and there a few very brief remarks on such points in regard to the anatomical structure chiefly of the timber, and on important biological features, which I thought might be useful to foresters. Our knowledge of the structure of the stem, chiefly of climbing shrubs in India, is as yet very incomplete. What I have incidentally mentioned in this book may perhaps induce some foresters or others, to pay more attention to this subject. Equally important is the study of anomalous wood structure in the case of trees, such as *Coccoloba laurifolia*, most *Combrétaceæ*, *Dalbergia paniculata*, *Stychnos*, the woody species of *Plumbaginaceæ*, *Nyctaginaceæ*, *Amorcanthaceæ* and *Chenopodiaceæ*.

The bright colouring of the young shoots of evergreen trees, which delights the eye in *Mesua ferrea*, *Acer oblongum*, *Ancheritia nobilis*, *Quercus incana*, is well known, but has been fully described in the case of a few species only. The autumn colouring of deciduous species, which is so marked a feature in the temperate zone and which is not uncommon in the Himalaya (*Vitis alicoccata*, formerly known as *V. himalayana*, *Acer Campbellii*) is rare in the rest of India, yet there are noteworthy exceptions, such as *Terminalia Catappa*, *Anogeonnis latifolia*, *A. pedunculata* and *Antidesma diandrum*. Doubtless there are others besides. The study of gregarious species and of such as have the tendency to form pure forests naturally interests foresters. The factors, however, which enable *Shorea robusta*, *Dipterocarpus tuber-*

calafus, *Hardwickia binata* to get and retain the upper hand over other species and to form pure forests, are by no means fully understood. In connexion with this subject the coincidences in some cases of periodical flowering and gregarious habit should be mentioned (*Haraboo*, *Strobilanthes*, cf. Brandis in *Ind. Agr.* XXV. 1.). The nature of the reserve materials which nourish the germinating seedling, starch in *Samboos*, oil in the cotyledons of *Bazila*, and the endosperm of the *Coco nut*, the horny substance (cellulose) of the endosperm in *Coffea* and other *Rubiaceae* and in *Eleuter*, is by no means known of all Indian trees. Many woody climbers, but not all to the same extent, yield, when cut like the vine in Europe in spring, large quantities of watery fluid, and the joints of many bamboos at a certain age are full of water. An accurate record on the spot of observations on these and other important biological matters will prove to be of real value. What is required in the first instance is an accurate record of facts, on the ground of which general conclusions can be framed hereafter.

A thorough study of the life, the habits and the requirements of trees will be found to be of great assistance in devising measures for guarding against diseases and other calamities, and for gradually increasing the annual yield of timber and other forest produce per acre. It is chiefly when an unexpected and unexplained calamity arises, such as the Spike disease in sandal wood, that the forester feels the need of a more intimate acquaintance with the life of trees.

There is a class of shrubs which I am disposed to call plants of mountain torrents, and which merit the attention of those who are likely to use this book. The following may here be mentioned as instances: *Cassinia caudata*, *Rhynchos stricta*, *Rhabdia hylalides*, *Litsea angustifolia*, *Homonola ripens*, *Ficus semicarpa*, *Ficus lanceolata*. These and other shrubs grow in masses in rocky or shingly stream-beds, dry during half the year and entirely submerged several times, often for a week or longer, during the rains. Their organization must be peculiar, and merits special study.

I have thought it right in this book to mention a number of species which are only undershrubs, because I consider that their study may be useful to foresters and others in India. They belong to genera comprising large or middle-sized trees. After the fires of the hot season have passed through the grasslands of the Subhimalayan tract and of other parts of India, in the midst of the black desolation, which is the result of these fires, we often come across a large blossom coming out of the ground, looking at a distance like a beautiful rose with numerous long delicate filaments. This is *Cerypa herbarum*, closely allied to *Cerypa arborea*, a large tree of India and Burma. Soon after the flowers a tuft of leaves appears, and during the rains the fruit ripens, looking like a large green apple. Through the action of the leaves the woody rootstock underground steadily increases in size and, though the fires of the following season destroy all shoots above ground, the rootstock remains unharmed, and annually brings forth flowers, leaves and fruit. The undershrubs which behave in a similar fashion are very numerous, belonging to many orders. *Gracina repens* with edible fruit, *Ochna pumila* with large golden yellow flowers, *Erythrina roseo-planta* with an upright raceme of scarlet flowers may be mentioned as instances.* They must not be confounded with temporary undershrubs, such as are formed through the action of the annual fires, by all trees that coppice readily. Seedlings of *Sal*, *Teak*, *Zizyphus jujuba*, *Terminalia* and many other trees which spring up in grasslands or in the forest, are cut back to the ground by the annual fires, and here also, through the action of the leaves, a large woody irregularly-shaped rootstock is formed, which throws up coppice shoots that are destroyed by the fires of the hot season. But when the area is protected against these fires, these coppice shoots grow

* The more prominent species of this class, besides those mentioned, are: *Cinnam*, *Flemingia strobilifera*, *Combretum canariense*, *Marsipola indica*, *M. indicum*, *Indigofera Hamiltonii*, *Jacquinum Santalinum*, *Prema nana*.

up into trees.* What becomes of the permanent undershrubs here described, when the area is protected against fire, is not known; probably, they are smothered by the surrounding vegetation. That some of these undershrubs were cultivated long ago in the Calcutta Botanic Garden is evident from Roxburgh's *Flora Indica*, but no record exists whether they had changed their habit when no longer exposed to the régime of annual fires.

In the old *Forest Flora of North-West and Central India* I draw attention to a number of these remarkable undershrubs, and wrote regarding them on a later occasion *Ind. For.* XXVI. 10. It has given me great pleasure to find that Mr. Dutailie, in his excellent *Flora of the Upper Gangetic Plain*, has fully recognized the importance of these interesting species, and it is satisfactory that in the Park of the Dehra Dun Forest School Kanjilal has at my suggestion commenced to cultivate a number (particularly *Grevia sapida*) in order to see whether they will change their habits when no longer exposed to the annual fires. It is possible, though not proved, that trees or large shrubs may, by the continuous action of the annual fires, gradually have been converted into undershrubs. Against this idea, however, stands the fact that *Careya herbacea*, *Erythrina resinata* and most other species adverted to, differ from the arborescent species of the same genus by very definite characters in leaves, flowers and fruit. As far as known at present, *Prema* is the only genus which forms an exception in this respect. No less than 5 undershrubs are known in this genus, and 3 of these can hardly be separated by characters other than habit from species which are trees or large shrubs (cf. *P. plagiata*, *P. amplexicaulis* and *P. macrophylla*, p. 511). Similar undershrubs are known from tropical Africa, and there are species in the Arctic regions (*Corylus americana*, *C. canadensis*, *Rubus arcticus*), the shoots of which are killed annually by the frost of winter, the underground rootstock remaining alive.

I am fully aware that in speaking of these undershrubs and in describing them, in this book I lay myself open to the charge of inconsistency. At the outset I said that the object of this book was entirely practical. I admit that no forest revenue can be made out of these undershrubs, and that they are not likely ever to play an important part in the system of forest management. But foresters who may cultivate these remarkable species will thereby be induced more completely to study the laws which govern the habits of plants and the conditions which may under certain circumstances cause the development and mutation of species. Indeed, I go further, and would venture to suggest that some of these remarkable undershrubs be cultivated in Indian Forest Gardens, although they are not likely immediately to increase the forest revenue. Their study may quite unexpectedly throw light upon some important forest questions. At the present day this may be pronounced fanciful by my young friends in India, and they may regret that their old friend has indulged in such fancies. They will I hope relent when they find practical suggestions of other kinds in this book which I trust will be of real use to them in their work.

It now remains to express my deep gratitude to all those who have assisted me in this arduous work. During the progress of it I have had the great privilege of discussing many important points with Sir William Thiselton-Dyer, with Dr. Dukinfield H. Scott, Mr. W. B. Hemsley, Dr. Otto Stapf, Mr. C. B. Clarke, and with Dr. Augustine Henry. Mr. James Ramsay Drummond has kindly given me much valuable information regarding trees and shrubs of the Punjab. To Mr. C. H. Wright, of the Herbarium, Kew, I am indebted for the care which he has devoted to the index and for the assistance he has given me in preparing the manuscript for the press and in correcting the proofs. Mr. Martin Cole has been most useful in preparing excellent microscopic slides whenever I required them. Several Indian officers, while

* *Grevia scabrophylla* at times is an undershrub, when exposed to the annual fires; in other places it grows into a tall shrub. Other shrubs probably behave in the same manner.

on furlough at home, have assisted me materially in the work. Colonel A. A. Barrett has helped me to work up *Bombax*, and otherwise assisted me greatly. Mr. H. H. Haines has most generously devoted considerable time, while at home to furlough, in assisting me in *Cassipouira*, *Rhamnus* and *Amphidoxa*. Mr. A. Y. Brown, late Conservator of Forests in Ceylon and now Director of Woods and Forests in the Sudan, together with Mrs. Brown, have enabled me by their careful dissections and sketches to understand the species of *Stylococcus* and other difficult genera. Mr. C. B. Smeles has devoted a great part of his furlough from Burma to working up with me oaks and chestnuts, Ficus, palms and bamboos. His intimate practical knowledge of the bamboos of Upper Burma, their appearance and mode of growth, has been invaluable, and without his help I could never have mastered this difficult order. In connection with bamboos I wish to state that Dr. Otto Stapf has communicated to me the result of his as yet unpublished researches, which establish two great divisions of bamboos, one with, the other without endosperm in the ripe seed. Mr. T. F. Boardman has from the beginning been most useful in regard to the forest vegetation of Travancore. As already mentioned, Mr. Gilbert Rogers has given me most valuable information about palms and bamboos of the Andamans. Mr. A. E. Wild, late Conservator of Forests, Bengal, has helped me steadily from the beginning in examining the specimens at the Museum of the Royal Botanic Gardens, Kew.

I tender my thanks to His Majesty's Secretary of State for India for having purchased 300 copies of this book. Mr. C. H. Clarke has been a true friend in this matter; without his intervention the book would probably never have been published. The publishers have placed me under obligations by not losing patience with the long delay and the great bulk of the work, neither of which I anticipated when I commenced it.

I am keenly alive to the many imperfections of this work, and I know that numerous errors and omissions will be discovered in it. With the ever-widening mass of detail that had to be mastered, this, at my time of life, was perhaps unavoidable. In spite of these imperfections, the book will I hope in some respects facilitate the progress of good forest management in India. Not that the knowledge of species means good forest management. But it is the first step towards the study of matters which are of real importance to forestry: the habits, mode and rate of growth of trees, their ability to appropriate certain mineral substances from the soil, the capacity of their leaves and other green parts to take up carbon dioxide and to form timber, a capacity which varies in different species of trees to a degree not yet sufficiently recognized by botanists, and finally their habits of flowering and seeding, as well as their ability to regenerate themselves from coppice shoots or root-suckers. The study of the agricultural requirements of the different species is the foundation of a successful system of treatment, leading up to the greatest annual production of timber and other forest produce per acre. Foresters in India should always bear in mind that botany is not forestry, but that the knowledge of species is indispensable. With the enormous number of genera and species in India the acquisition of this knowledge is difficult. I hope I may have succeeded in smoothing the way a little, and in this hope I wish all my young friends, whether they have learnt their profession in Europe or at the Imperial Forest School in India, an honorable and prosperous career in the Indian forests. Should any one look down upon them because their work makes no show and does not bear fruit immediately, like that of the engineer and other public officers, they will console themselves with the proud consciousness that they are the guardians of the future and permanent interests of the 300 millions who inhabit the great British Indian Empire, and that they are contributing materially to ensure the comfort and welfare of future generations.

SYNOPSIS OF NATURAL ORDERS

The distinguishing characters are selected with special reference to the trees and shrubs described in this work.

First Class. ANGIOSPERMS.

Flowers bisexual or unisexual, as a rule with perianth, consisting of one or several whorls of leaves, free or connate (calyx and corolla). Ovary enclosed in an ovary, fertilized by the pollen-tube growing towards them through the tissue of stigma and style. Seeds enclosed in the fruit, embryo straight or curved, with or without endosperm.

First Sub-Class. DICOTYLEDONS.

The stem consists of pith, wood, bast and bark, which form concentric cylinders, wood and bast being separated in the growing stem by a continuous layer of thin soft cells (cambium), which are transformed into new wood on the outside of the wood cylinder, and into new bast on the inside of the hollow bast cylinder. The wood consists of wood-fibres, vessels, wood-parenchyma and medullary rays. Many climbers have anomalous structure, also the erect woody species of *Plumbaginaceae*, *Nyctaginaceae*, *Amarantaceae* and *Chenopodiaceae* and a few trees of other orders; *Coccoloba laurifolia*, *Dalbergia paniculata*, most *Celastraceae*, *Strychnos*, and the neo-Indian *Drimys*. Leaves net-veined. Parts of perianth, calyx or corolla usually in fours or fives. Embryo with two cotyledons which, when the seed germinates, are as a rule raised above ground (in *Garcinia*, *Ochrocarpus* and *Mexan* the embryo consists of a homogeneous fleshy mass).

I. POLYPETALÆ.

Flowers in the majority of species bisexual, as a rule with both calyx and corolla, the corolla consisting of distinct petals.

A. THALAMIFLORÆ (including *Dis(floræ)*).

Sepals in the majority of cases distinct, petals and stamens hypogynous, ovary free. A well-developed disk in Orders 13 *Tamaricaceae*, 25 *Rutaceae*, 26 *Samarubaceae*, 43 *Moringaceae*, in Orders 28-32, 34-41 and in a few genera of 7 *Cappariaceae*, 10 *Bixaceae* and 21 *Tiliaceae*.

1. *Simarubaceae*, p. 1. Sepals deciduous, often petaloid. Stamens 2, anthers adnate, longitudinally dehiscent. Carpels numerous, free, 1-celled.

2. *Tiliaceae*, p. 5. L. alternate, simple, pinnatifid, 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. *Magnoliaceae*, p. 3. L. alternate, simple, most genera with exserted deciduous stipules. Sepals and petals alike, in whorls of three, imbricate, deciduous. Stamens 8, anthers basifixed. Carpels numerous, usually distinct, generally on an elongated torus. Embryo minute, endosperm uniform.

4. *Alnus*, p. 9. L. alternate, simple, stipules none. Sepals 5, petals in one or two distinct whorls. Stamens usually 4, filaments short or none, anther-cells elongate in a broad connective. Carpels distinct in fruit (adherent in *Alnus*). Seeds large, embryo small, epispemia cuneate.
5. *Menispermaceae*, p. 21. Usually climbing with broad medullary rays and others of annual or woody structure. L. alternate, simple, mostly palmately, often peltate, stipules 0. Fl. small, unisexual, trimerous, sepals usually free. Stamens opposite to petals, usually 6, carpels free, as a rule 3. Embryo curved, with or without endosperm.
6. *Rubiaceae*, p. 27. L. alternate, glabrous, leaves 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. *Caryophyllaceae*, p. 31. L. as a rule alternate, stipules often present and spinous. Fl. usually bisexual, often zygomorphic. As a rule sepals 4, petals 4. Stamens generally numerous, filaments filiform. Carpels connate into a 4-celled ovary with 2-4 parietal placentas, often on an elongated gynostem. Embryo curved, endosperm 0 or scanty.
8. *Ranunculaceae*, p. 37. L. alternate, stipules minute or 0. Fl. in spikes or racemes, often zygomorphic, calyx 4-7-lobed. Stamens usually numerous, seated on a hypogynous disk. Carpels connate into a 1-celled ovary with 2-6 parietal placentas. Seeds numerous, reniform, endosperm 0.
9. *Violaceae*, p. 37. 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, connectives broad and often produced above, anthers connate or renate round the ovary. Carpels connate into a one-celled ovary with usually 3 parietal placentas. Seeds small, embryo straight in a fleshy endosperm.
10. *Biacree*, p. 38. L. alternate, simple mostly dentate, stipules small or 0. Fl. regular, 4- or 5-merous, stamens usually numerous. Ovary 1-celled, seeds few, renate or with pale testa.
11. *Pittosporaceae*, p. 42. 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.
12. *Asclepiadaceae*, p. 43. 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 flat sheath, anthers mostly opening by terminal pores.
13. *Tournefortiaceae*, p. 45. 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 2-5-valved, woody, lobed or winged.
14. *Hypericaceae*, p. 47. L. opposite, often gland-dotted, stipules 0. Fl. regular, bisexual, sepals 5, imbricate, petals 5, contorted in bud. Stamens numerous, anthers usually connate into 2 or 3 bundles, anthers versatile. Endosperm 0.
15. *Guttiferaceae*, p. 48. Juice resinous, yellow or greenish. Fl. opposite, simple, usually coriaceous, stipules 0. Fl. regular, unisexual or polygamous, sepals 5, mostly in decussate pairs, petals as a rule 2-6, balustrate or contorted. Fl. usually induplicate, seeds large, endosperm 0.
16. *Trochodendraceae*, p. 51. L. alternate, simple, generally coriaceous, stipules 0. Fl. regular, as a rule bisexual, sepals and petals usually pentamerous and pentandrous. Stamens generally numerous, ovary 3-5-celled.
17. *Dipterocarpaceae*, p. 53. Bedding trees. L. alternate, usually simple, penninerved, stipules large, enclosing the bud. Fl. bisexual, regular, segments 5, some or all as a rule much enlarged in fr. Petals 5, contorted, anthers 10 or more, anthers adnate to filaments. Fruit indehiscent, 1-seeded.
18. *Asclepiadaceae*, p. 56. Glabrous, woody climbers, not resinous. L. entire, stipules indurate, caducous. Fl. bisexual, regular, pentamerous, calyx adnate to the 1-celled ovary, segments much enlarged in fr.
19. *Melastomaceae*, p. 74. Wood soft and light. L. alternate, mostly stipulate, generally palmately, hairs usually stellate. Fl. as a rule bisexual, regular, supported by 3 or more bracteoles. Sepals 5, valvate, more or less connate, petals 5, hairs adnate to staminal-column, contorted in bud. Stamens numerous, filaments variously connate, anthers 1-celled.
20. *Scrophulariaceae*, p. 79. 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.
21. *Polemoniaceae*, p. 81. 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.
22. *Linaceae*, p. 106. L. alternate, simple, entire. Fl. bisexual, regular, sepals and petals pentamerous, sometimes tetramerous. Stamens 5 or 10, half the number often

sterile, filaments united at base, anthers versatile. Ovary 2-5-celled. Capsule dehiscing septically.

23. *Melastomaceae*, p. 108. L. usually opposite, simple entire, stipules small or 0. Fl. often zygomorphic, calyx 3-5-lobed, petals 5, often hairy. Stamens 10, sometimes unequal. Fr. usually of one or more winged samaras.

24. *Geraniaceae* (Juncaceae), p. 110. L. alternate, imparipinnate, stipules 0. Fl. bisexual, sepals 5 petals 5, stamens 10. Fr. fleshy, fleshy, 5-celled.

25. *Rutaceae*, p. 111. L. pinnate, 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.

26. *Simarubaceae*, p. 121. Bark bitter; L. alternate, stipules deciduous or 0. Fl. regular, small, often unisexual, sepals 3-5, usually alternate, petals 3-5. Stamens as many as petals or double their number, inserted outside the disk.

27. *Oxalidaceae*, p. 128. L. alternate, simple, glabrous, stipulate. Fr. regular, bisexual. Sepals 4 or 5, free, imbricate, persistent, petals 5 or more, deciduous, stamens 10 or 12, anthers imbricated. Fr. of 3-10 one- or few-seeded drupes.

28. *Hypericaceae*, p. 129. Resinous. L. alternate, imparipinnate, sometimes 1-foliate. Fl. small, regular, calyx 5-6-lobed, petals 5-5. 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.

29. *Malvaceae*, p. 131. L. alternate, generally pinnate, stipules 0. Fl. regular, in cyathose 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.

30. *Caulifloraceae*, p. 141. L. alternate, entire, stipules stipules deciduous. Fl. 1-sexual or polygamous, petals 5, notched or bifid, stamens 5, disk of 5 glands, alternating with stamens. Ovary pubescent 2-2-celled, ovules 2, collateral to each cell. Endosperm 0, cotyledons thick.

31. *Menispermaceae*, p. 147. L. alternate, stipules 0. Fl. small, as a rule bisexual, calyx small or wanting, stamens opposite to petals or 2. Ovary at base often 2-5-celled, small, pendulous from a free axile placenta. Drupe 1-seeded. In Engler & Prantl, *Natural Pflanzenfam.* III, 1, 231 placed near *Loranthaceae* and *Santalaceae*.

32. *Umbelliflorae*, p. 150. 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.

33. *Ericaceae*, p. 151. L. alternate, simple, usually coriaceous and evergreen, stipules minute. Fl. regular, usually 1-sexual, calyx 4-5-lobed, petals 4-5, alternate at base. Stamens 4-5, alternating with petals, disk 0. Fr. a drupe supported by the persistent calyx, some 1-seeded, 2 or more.

34. *Myrsinaceae*, p. 157. 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 2-5-celled ovary or partially enclosing it, stamens 4-5, rarely 10, inserted on the disk.

35. *Ranunculaceae*, p. 157. Branchlets or stipules often spinose, 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.

36. *Urticaceae*, p. 173. Climbers, L. alternate, often compound. Fl. regular, calyx small, entire or 4-5-dentate, petals 4-5, valvate in bud. Stamens opposite to petals, inserted outside or between the lobes of the disk. Fr. a berry.

37. *Scrophulariaceae*, p. 181. L. opposite, stipulate, compound, leaflets stipellate. Fl. regular, bisexual, pentamerous, stamens 5, inserted outside the disk. Ovary 2-celled.

38. *Scrophulariaceae*, p. 181. L. opposite, stipules 0. Fl. regular, polygamous, calyx 5-10-parted, deciduous. Stamens generally 8, inserted outside or upon (rarely inside) the disk. Fruiting carpels winged.

39. *Sepidaceae*, p. 184. L. alternate (opposite in *Decales*), stipules 0. Fl. sometimes zygomorphic, mostly polygamous. Stamens inserted between disk and ovary, filaments usually hairy, disk frequently unilateral. Ovary 3-celled, often 8-lobed.

40. *Solaneae*, p. 193. L. alternate, stipules 0. Fl. small, calyx 4-5-parted, stamens 4-5, opposite to petals, anther-cells distinct, usually adnate to a large connective.

41. *Asclepiadaceae*, p. 195. L. in most genera alternate, stipules 0. Fl. regular, calyx 5-5-cleft (pentamerous in *Obolus*), petals 5-5, rarely 0. Stamens alternating with petals, inserted inside, rarely on the disk. Ovary in 2 genera inferior, drupe 2-5-seeded.

42. *Cucurbitaceae*, p. 209. L. opposite, simple, stipules 0. Fl. regular, bisexual, pentamerous, stamens 10. Fruiting carpels 5, distinct, 1-seeded, enclosed in the persistent persistent petals.

43. *Moraceae*, p. 219. Wood soft, lobed, L. alternate, bi- or tri-pinnate, pinnae and leaflets opposite, glands at base of petioles and pinnae. Fl. large, bisexual, pentamerous, petals unequal. Fertile stamens 5, opposite to petals, alternating with sterile stamens. Fr. a long 1-celled 3-valved pod.

B. CALYCIFLORÆ.

Calyx gamopetalous, often adnate to ovary. Petals inserted on calyx, or on disk of calyx-tube.

- 14. *Cucurbitaceæ*, p. 270. L. alternate, imparipinnate or 1-foliate, leaflets entire, venation stipulate &c. Fl. usually bisexual and regular, pentamerous, petals linear. Many specimens in the uppermost segments generally shorter and often sterile. Calyx 5-lobed, usually hairy, lobes 2, adaxial. Fruiting calyx-tube 2-valved.
- 15. *Leguminosæ*, p. 274. L. stipulate, as a rule alternate and imparipinnate, fl. bisexual, petals 5, in the majority of genera zygomorphic, standard 10 or 2. Carpel one free, ovules usually numerous, attached to the inner suture. Fr. 1-celled pod, sometimes gibbously 0.
- 16. *Ranuncul.*, p. 277. 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.
- 17. *Scrophulariæ*, p. 281. L. simple. Fl. regular, 4- or 5-merous, calyx (5- or 4-lobed) adnate to ovary, stamens free, as many as petals, twice the number or numerous. Carpels 2 or numerous, usually distinct, apophanerous. Seeds small, embryo minute, in copious albumen.
- 18. *Hamamelidaceæ*, p. 284. L. alternate, stipules usually deciduous. Fl. in axils of leaves or spikes, usually bicellular, calyx-tube none or less adnate to ovary, ovary 2-celled, styles 2, usually persistent. Testa shining.
- 19. *Malvaceæ*, p. 292. L. opposite, stipules usually cartilaginous and entire, scars of petioles usually prominent, stipules interpetiolar, deciduous. Fl. regular, generally bisexual, calyx more or less 5-lobed, lobes 4-14-lobed, lobes as a rule persistent, petals 5 or more as petals, stamens usually twice the number of petals. Fr. various, usually 1-seeded.
- 20. *Casuarinaceæ*, p. 296. L. simple, entire, stipules 0. Fl. usually bisexual and regular, calyx-tube adnate to ovary and produced beyond its segments 4-5, lobes 4-5, petals often wanting. Stamens as many as calyx-segments or twice their number, persistent. Fr. generally angled winged.
- 21. *Myrtaceæ*, p. 300. L. simple, generally quite entire, either opposite with minute lowest glands or alternate without glands. Stipules 0. Fl. regular, as a rule bisexual. Ovary enclosed in and generally adnate to calyx-tube. Stamens 2, inserted with the petals in the mouth of calyx-tube.
- 22. *Melastomaceæ*, p. 302. L. opposite, calyx or nearly so, usually with 4-5-lobed lobes, no trichome glands, stipules 0. Fl. regular, bisexual, calyx-tube none or partially adnate to ovary, segments 4 or 5, deciduous. Stamens twice the number of calyx-segments, inserted with petals on the edge of calyx-tube, connective often persistent, segments valvate, often with intermediate teeth, petals when present imbricate and crumpled in bud. Ovary as a rule superior.
- 23. *Scandolaceæ*, p. 312. L. alternate, distichous, stipules small. Fl. regular, incompletely bisexual, generally bisexual. Calyx persistent, tube short. Carpels 2-3-valved, seeds numerous.
- 24. *Rubiaceæ*, p. 314. L. alternate, usually lobed. Fl. regular, unisexual in *Fagraea*, bisexual in *Psychotria*.
- 25. *Dialium*, p. 316. *Tournefortiæ*. L. deciduous, petiolate, broadly ovate. Fl. unisexual, 3-lobed, calyx deeply 3-lobed, petals 0, segments 4. Carpels crowded by the persistent calyx-segments, the valves terminating in the persistent styles.
- 26. *Cuculitaceæ*, p. 316. *Convolvulaceæ*. L. stems and branches erect, prostrate. Fl. regular, bisexual, solitary, calyx-tube adnate to ovary, petals numerous, imbricate, stamens 2. Fr. fleshy, seeds numerous.
- 27. *Araliaceæ*, p. 317. L. alternate, simple or imparipinnate. Fl. regular, usually pentamerous and umbellate. Calyx adnate to ovary, usually entire, petals 5-merous. Stamens inserted outside the epigynous disk, anthers didymous.
- 28. *Cucurbit.*, p. 324. L. entire, stipules 0. Fl. regular, calyx-tube adnate to ovary, limb persistent, segments small, petals 4 or 5, inserted with stamens round an epigynous disk. Fr. drupaceous.

II. GAMOPETALE.

Flowers in the majority of species bisexual, as a rule with both calyx and corolla, corolla gamopetalous.

- 29. *Caryophyllaceæ*, p. 327. L. opposite, stipules usually 0. Fl. bisexual, calyx-tube adnate to ovary, limb 5-lobed, corolla often zygomorphic, lobes 5. Stamens inserted on the corolla-tube.

61. *Abies*, p. 254. 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.
62. *Casearia*, p. 288. L. as a rule alternate, stipules 0. Inflorescence a dense brush of many small fl. sessile on a broad receptacle and enclosed in an involucre of winged or imbricate bracts. Calyx usually a ring of hairs on the top of the ovary, stamens on the corolla-tube, anthers usually connate, connective produced upwards.
63. *Podocarpus*, p. 300. (*Saxonia*). L. alternate, simple, stipules 0. Fl. bisexual, in short axillary cymes, calyx adnate to ovary, lobes 5. Corolla oblique, split on the back, stamens 5 inserted at the base of the corolla. Fr. a drupe, crowned by the enlarged calyx-segments.
64. *Ericaceae*, p. 300. 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 axillary placentae.
65. *Epacridaceae*, p. 312. (*Leskeaceae*). L. alternate, coriaceous, longitudinally nerve. Fl. 5-merous, anthers 1-celled, opening by a single longitudinal slit.
66. *Planchonaceae*, p. 413. L. alternate, entire. Fl. regular, bisexual, pentamerous, closed bud by laminae, calyx 5-ribbed, ovary 1-celled, ovule 1.
67. *Myrtilaceae*, p. 413. L. alternate, simple, generally 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.
68. *Scyphaceae*, p. 421. L. entire, usually alternate and coriaceous. Fl. bisexual, calyx persistent, segments 4-8, sinces distinct, corolla-tube short, lobes 4-24. Free 1-2-celled berry, seeds 2, with a crustaceous shining testa.
69. *Elaeagnaceae*, p. 428. L. entire, as a rule alternate, stipules 0. Fl. regular, usually dioecious, calyx gamosepalous, persistent and generally enlarged in fr., segments 3-6, corolla segments 3-5, stamens usually twice the number of corolla-lobes, filaments variously connate at base, often in pairs, anthers basifixed. Kind of fr. tuckersome, seeds embedded in soft or viscid pulp.
70. *Myrtaceae*, p. 437. 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 1-2-celled, ovules 1 or few on the inner angle.
71. *Celastraceae*, p. 442. 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.
72. *Sarcocodoneae*, p. 453. Glabrous, l. opposite, entire, stipules minute. Fl. small, tetramerous, calyx small, corolla membranous. Ovary free, 1-2-celled.
73. *Myrsinaceae*, p. 454. L. entire, as a rule opposite or whorled, stipules 0 or small, sometimes intrapetiolar. Fl. regular, bisexual, usually pentamerous. Calyx free, corolla-limb spreading, mostly contracted in bud, stamens 5, inserted in the corolla-tube. Carpels 2, usually distinct. Seeds often with a tuft of hairs. Endosperm fleshy.
74. *Andropogoneae*, p. 455. L. entire, as a rule opposite, stipules 0. Fl. regular, bisexual, pentamerous. Calyx inferior, sepals pubescent in bud. Stamens 5, inserted on the base of the corolla, anthers coherent or connate, enclosing the stigma, pollen-tube as a rule united into waxy masses. Corolla corolline or staminal. Carpels 2, distinct. Seeds usually winged and surrounded by a dense brush of hairs. Embryo large, in fleshy endosperm.
75. *Loasaceae*, p. 473. L. opposite, simple, generally connate by interpetiolar stipules or by a raised line. Fl. regular, usually bisexual, ovary free, 2-celled. Embryo stipules, in copious endosperm.
76. *Bombylaceae*, p. 478. 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, limb 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.
77. *Cassipouaceae*, p. 480. L. alternate, stipules 0. Fl. large, bisexual, regular, pentamerous, stigma distinct, persistent. Fr. a berry or capsule, seeds 2-4.
78. *Solanaceae*, p. 480. L. as a rule alternate, stipules 0. Fl. regular, pentamerous, calyx usually gamosepalous, ovary free. Fr. a berry or capsule, seeds numerous.
79. *Scrophulariaceae*, p. 481. (*Hydrocotylaceae*, *Broadia*). L. usually opposite, stip. 0. Fl. usually bisexual, corolla bilabiate, stamens 4, didynamous. Fr. a capsule, seeds numerous.
80. *Rhizophoraceae*, p. 491. 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.

81. *Asclepiadeae*, p. 494. L. usually stip. 5. Fl. bisexual, mostly irregular. Ovary free, 2-celled, style bifid, hind one much often obsolete. Capsule loculicidal, seeds scattered on hard curved woody supports.
82. *Fabaceae*, p. 502. L. usually opposite or whorled, stip. 0. Fl. bisexual or by abortion polygamous, usually zygomorphic. Calyx as a rule gamopetalous and persistent, lobes imbricate, stamens usually 1, rarely 2 or 4-celled, 1 ovule in each cell.
83. *Labiales*, p. 515. Mostly opposite branches usually 4-lobed, 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.

III. MONOCHLAMYDEÆ.

Fl. frequently unisexual, perianth as a rule simple, rarely a distinct calyx and corolla.

84. *Nyctaginaceae*, p. 517. (*Blasiea*) 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.
85. *Agrostaceae*, p. 517. Stip. 0. Fl. usually bisexual, perianth of 9 persistent sepals imbricate in bud. Stamens opposite the sepals, ovary free, 1-celled. Seed one, embryo horsehoe-shaped or annular, surrounding a fleshy endosperm.
86. *Chenopodiaceae*, p. 518. 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.
87. *Polypodiaceae*, p. 519. L. alternate, simple, stipules scarious or membranous, usually sheathing. Fl. small, usually bisexual, perianth of 1-6 persistent segments, imbricate in bud, stamens opposite the segments. Ovary free, 1-celled, compressed or trigonous. Fr. a small hard nut, seed one.
88. *Ardisiaceae*, p. 521. L. alternate, stip. 0. Fl. bisexual, perianth campanulate or tubular, 3-lobed or 3-lipped, ovary inferior, placentas parietal, ovules numerous.
89. *Piperaceae*, p. 521. (*Piper*) L. alternate, entire, basal nerves 8 or more, stipules membranous, enclosing the buds. Fl. usually dioecious or polygamous, in spathe-like spikes, perianth 0, stamens 1-4, hypogynous. Berry 1-seeded, seed globose.
90. *Muricaceae*, p. 523. Aromatic, l. entire, pinnatifid, 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 scillate, endosperm oily, resinous. In Engelm. & Prantl, *Natf. Pflanzenfam.* III. 2. 49 mostly placed near *Samolaceae*.
91. *Lamiaceae*, p. 526. Aromatic, l. as a rule entire and evergreen, stip. 0. Perianth regular, deeply 4-lobed, segments bisectate, 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, anthers 2 or 4, opening by valves. Ovary free, 4-celled. Fr. a berry or drupe, seed one, cotyledons thick, oily. In Engelm. & Prantl, *Natf. Pflanzenfam.* III. 2. 106 placed in the vicinity of *Berberidaceae* and *Melastomaceae*.
92. *Hamamelidaceae*, p. 527. L. alternate, stip. 0. Perianth of 4-10 segments, stamens 3-5, anthers 2, opening by valves.
93. *Pyrolaceae*, p. 528. L. hard, mostly alternate, stip. 0. Fl. bisexual, perianth of 4 segments, 4 lobes cohering into a cylindrical tube, sepals 2, free or curved. Stamens 4, filaments inserted on perianth-segments. Ovary free, 1-celled. Seeds few.
94. *Thymelaceae*, p. 514. L. simple, quite entire. Fl. usually bisexual, perianth tubular or campanulate, lobes 4 or 6, imbricate in bud. Stamens inserted on the perianth, usually twice the number of lobes. Ovary free, usually 1-celled.
95. *Desmodiaceae*, p. 540. Often succulent, with silvery or brown scillate scales or hairs. L. alternate, quite entire, stip. 0. Fr. indehiscent, entirely enclosed within the lower fleshy part of perianth, seed 1, radicle inferior.
96. *Lauraceae*, p. 547. Barnette in stems and branches. L. entire, usually opposite, sometimes wanting. Fl. regular, perianth 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.
97. *Nasturiales*, p. 553. Mostly root-parasites. L. entire, stip. 0. Perianth usually adnate to ovary, 5-8-lobed, stamens opposite to lobes, ovary 1-celled, ovules several. Drope or not 1-seeded.
98. *Euphorbiaceae*, p. 555. L. in most genera alternate, undivided and stipulate. Fl. as a rule unisexual. Perianth dactylicous, several genera with petals. Ovary superior, as a rule of 3 carpels, more or less lobed, styles 3, ovules 1 or 2 in each cell, pendulous from the inner angle.

90. *Urticaceae*, p. 568. L. distichous, undivided, stipulate. Perianth 4-5-lobed or of 4-5 sepals, stamens opposite to perianth-segments, rarely toward their boundary. Ovary of 2 carpels, usually 1-lobed, ovule 1, pendulous.
91. *Moraceae*, p. 567. L. usually alternate, stipules large, often appressed. Fl. unisexual, crowded on raceme or panicle, which are globose, cylindrical or hollow. A perianth of 4 sepals or segments often fleshy in fr. Ovary 1-lobed; ovule 1, usually pendulous.
92. *Urticaceae*, p. 568. L. alternate, stipulate, as a rule dentate, basal or 2. Fl. unisexual, sessile, usually in compact heads or clusters, stamens 1 or 2 opposite to perianth-segments, filaments hooked in bud. Ovary erect, orthotropous.
93. *Palmaraceae*, p. 613. L. alternate, palmately-veined, lobed, stipules large. Fl. monopalous, in unisexual globose heads on long axillary peduncles, sepals and petals minute, anthers distinct, almost sessile, ovaries hairy at base, as many as sepals. In *Eugenia* (Prantl, *Naturl. Pflanzenfam.* III, 26, 187, placed near *Hemipentaceae* and *Roureae*).
94. *Leguminosae*, p. 625. L. alternate, pinnate, stip. 0. Fl. monocious, 1 in lateral, pendulous catkins. γ in few- or many-fl. spikes, perianth adnate to the 1-lobed ovary, ovule 1, erect. (Cotyledons 2, endosperm 0.)
95. *Myricaceae*, p. 629. Aggregate, 1, 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.
96. *Cunilastraceae*, p. 629. Branchlets slender, deciduous, ridged, jointed, membranous dentate sheaths at the joints, the teeth alternating with the ribs of the next joint above. Fl. unisexual, γ in small oval spikes at the ends of lateral branchlets. Fr. a woody globose cone.
97. *Rutaceae*, p. 621. L. alternate, undivided, as a rule serrate, stipules deciduous. Fl. early in spring, 4 in drooping catkins, anther-cells as a rule distinct, γ in spikes, ovary 2-lobed, 1 pendulous ovule in each cell, styles 2, long, filiform, perianth 0 or minute to ovary.
98. *Euphorbiae*, p. 624. L. alternate, simple, pinnately-veined, stip. deciduous. Fl. monopalous, 1 in drooping catkins or in erect spikes, anther-cells not distinct. γ in monopalous, each fl. or group of fl. enclosed in an involucre of numerous bracts, enclosing spikes, each fl. or group of fl. enclosed in an involucre of numerous bracts, enclosing spikes, each fl. or group of fl. enclosed in an involucre of numerous bracts, enclosing spikes, each fl. or group of fl. enclosed in an involucre of numerous bracts, enclosing spikes.
99. *Solaneae*, p. 626. L. dichotomous, alternate, simple, stipulate. Fl. dioecious, in whorls similar to both sexes, 1 fl. in the axil of each bract, a disk at the base of stem, and ovary, perianth 0. Ovary 1-lobed, ovules ∞ or 2-4 parietal placentas. Seeds 2, minute, enclosed by long silky, deciduous hairs.

Second Sub-Class. MONOCOTYLEDONS.

Fibro-vascular bundles scattered in the cellular tissue of the stem, closely packed near the circumference and more sparse near the centre. Pith, wood and bark not distinct, no continuous cambium layer and no regular increase in thickness by the formation of concentric layers of new wood and bark. (*Dracaena* and *Cardiophila* abnormal.) Leaves on sheaths or broad-based petioles, the blade usually with longitudinal nerves and undivided transverse veins. Perianth, when present, stamens and usually carpels, in threes or multiples of 3. Embryo small, usually in cupious endosperm, cotyledon one, remains, γ enclosed in the germinating seed.

100. *Liliaceae*, p. 640. Perianth in 2 series, imbricate in bud, stamens mostly 6. Ovary 3-lobed, style 1, ovules attached to the inner angle of cells.
101. *Asclepiadeae*, p. 641. Stem solid, usually unbranched, in most genera with a terminal crown of pinnately or palmately divided l. petiole broad-based, pinnate or segments usually 1-lobed longitudinally. Inflorescence with large sheathing bracts, fl. unisexual or polygamous, ovary and corolla of 5 segments each. Carpels 3, usually united in a 3-lobed ovary. Endosperm fleshy or oily.
102. *Asclepiadeae*, p. 641. Stem solid, dividing into dichotomous branches, each branch with a tuft of linear sheathing l. in trichotomous spirals, edges and midrib usually spinous. Inflorescence clothed with leafy spathe, fl. dioecious, small, crowded, perianth 0. Fl. a sympodium of numerous more or less obovate fruits, endosperm oily.
103. *Gruinales (Boraginaceae)*, p. 643. Stems above ground hollow, jointed, branches usually fascicled at the nodes. L. linear or oblong, on long split sheaths. Fl. usually bisexual, in distichous spikes, each fl. in the axil of a bract (glume) with an inner usually 2- or 3-lobed bract (palea). Stamens 2 or 4, in a few species ∞ , usually supported by thin scales (lophanes). Seed 1, embryo with a large fleshy scutellum, and in most genera with a facium, ∞ endosperm.

- Page 204 line 8 from below, for TA: *see* read *Tide*
 205 " 12 from below, for 6 read 7
 " 21 from below, for T read 8
 " 206 " 21, add *Thyges*, Burma
 " 231 " 19, *see* *cross* read *cross*
 " 232 " 26 from below, for *Schippya* read *Schippya*
 " 241 " 23 from below, for *Erythraea* read *Erythraea*
 " 254 " 13, for *Ngayawon* read *Ngayawon*
 " 254 " 3, for *zollingeriana* read *Zollingeriana*
 " 272 " 23 from below, for *Jatua* read *Jatua*
 " 272 " 26 from below, for *Jaga* read *Jaga*
 " 287 " 4 from below, for *Jaga* read *Jaga*
 " 287 " 26, for *Hayara* read *Hayara*
 " 288 " 21, for *Harad* read *Harad*
 " 296 " 10, for 2 read 20
 " 300 " 13, for *Genaca* read *Genaca*
 " 312 " 12 from below, read *Kum*, for *Kan*
 " 312 lines 15-16, for *Cyrtoloma*, opposite in some species, whorled, read *L. petiolate*,
 opposite in some species whorled
 " 312 line 27, for *Thamala-nax* Burma, read *Thamala-nax*, Burma
 " 318 " 28, for *Anamala hills*, Ceylon, read *Anamala hills*—Ceylon
 " 319 " 27, for *Mehani* read *Mehani*
 " 341 " 12 from below, for *Hemelia* read *Hemelia*
 " 345 " 23, for *Singhblum Mahendragiri* read *Singhblum*, Mahendragiri
 " 346 " 19, for 5 read 4
 " 370 " 23 from below, for *Cochinchina*, stems read *Cochinchina*, Stems
 " 379 " 20, for *Kursum* read *Kursum*
 " 385 " 16 from below, for *formicarium* read *formicarium*
 " 411 " 7 from below, for *Moodejit* read *Moodejit*
 " 414 " 22, for 6 read 1
 " 417 " 19, for *Javadia* read *Javadia*
 " " 23, for 2 read 5
 " 424 " 14, for *Peractisoma* read *Peractisoma*
 " 422 " 3 from below, for *Tindarus* read *Tindarus*
 " 430 " 23 from below, for 2-3] read 2-3
 " " 18 from below, strike out slightly
 " 444 " 19, the object read *plant*
 " 470 " 26, for *Chimela* read *Chimela*
 " 484 " 26 from below, for *wedges* read *wedges*
 " 487 " 21, for A read B, and for *verticalis* read *verticalis*
 " 488 " 3, for *Saba* read *Saba*
 " 499 " 21, for *Zalot* read *Zalot*
 " 465 " 9, for *cratifolia* read *cratifolia*
 " 487 " 20, for 4 B, read 4, F.
 " 494 " 20, for *Thalot* read *Thalot*
 " 541 " 4, for H read F.
 " " 11 from below, for 2 read 7
 " 517 " 11 from below, for T read P
 " 527 head 100, read LAYRACAN for LAYRACAN
 " 533 line 30, for *Chimela* read *Chimela*
 " 536 " 26, for Ceylon II read Ceylon III
 " 541 " 13 from below, for *Ectol* L
 " " 2 from below, for *Daphniphyllum* read *Daphniphyllum*
 " 543 " 3 from below, for 2 read L.
 " 549 " 7 from below, strike out (solitary in *L. Stockii*)
 " 554 " 3, for XXXIX read XXIX
 " 564 bottom line, for 27 read 24
 " 573 line 24 from below, for *Peractisoma* read *Peractisoma*
 " 583 " 19, for 6 read 6
 " 589 " 3 from below, for *long* read *long*
 " 592 " 10 from below, for 107 read 107
 " 633 " 6, for *epiphyllum* read *epiphyllum*
 " 634 " 23, for 8 read 84
 " 640 " 13, for T read B.
 " 655 " 9 from below, for *Gurda* read *Gurda*
 " 654 " 13 from below, for *Babellina* read *Babellina*
 " 657 " 16, for P read T.
 " 661 " 28, for F, read *Thusa*

INDIAN TREES

ORDER I. RANUNCULACEÆ. (non. Pl. I. 1.)

Tribe Clematideæ. Root or rhizome scaly. Leaves opposite, usually compound, stipules 0, petioles often woody, twisted round support. Sepals perianth, corolla 5-lobed or 5-lobed with one perianth as ovule. Fruit a head of sessile or stalked subglobose.

Fl. white or
yellow

Fl. white or
yellow

1. CLEMATIS, Linn. Pl. Bot. Linn. 68.

Woody climber. Sepals usually 4, lobes 4, corolla usually with long feathery styles. Species 12. A few in tropical, mostly in temperate climates. Of the 22 Indian species only the larger and more common kinds are mentioned here.

A. Pedicels 1-lobed, in axillary fascicles, leaves trifoliate.

1. *C. montana*, Horn. Wall. Pl. As. Bar. 1. 217. Vern. Gur. I. Panchi; Kham, N.W.

Leaves fascicled on arched branchlets, leaflets ovate or ovate-lanceolate, coarsely toothed, 1-2 in. long. Fl. white, 2-3 in. diam., pedicels longer than leaves. Scented glabrous.

Himalayas from the Indian base, generally 1000-2000, ascending to 12000 ft. Khas hills, Fl. April-June. 2. *C. barbata*, Engelm. North West Himalaya 5000-10000 ft. Fl. white, white or purple, pubescent on both surfaces, anthers yellow.

B. Fl. in axillary panicles, sepals spreading, filaments glabrous.

3. *C. smilacifolia*, Wall. Syn. *C. subpeltata*, Wall. Pl. As. Bar. 1. 20. Syn. *C. Maurandia*, Wight III, 1.

Branches furrowed, leaves usually 1-lobed or thin 3-lobed, petioles twisted woody, leaflets cartaceous, glabrous, 4-6 in. long, ovate, imbricated, deeply cordate, entire or minutely serrate. Panicles 6-12 in. fl. 1-1 1/2 in. diam., sepals 1-3, cartaceous, along at length reflexed, outside dull brown tomentose, inside purple. Feathery styles to fruit 2 in. long.

Himalayas, Khas hills, Burma hills, West coast of India, South Kanam, Malabar, Java, Sumatra, Fl. C. 8-10. Ceylon, West coast of India, Malay Archipelago, 4. *C. grata*, Wall. Pl. As. Bar. 1. 20. Syn. *C. barbata*, Engelm. Himalayas, 1000-12000 ft. Fl. white, white or purple, pubescent on both surfaces, anthers yellow. 5. *C. integrifolia*, Linn. Pl. Bot. Linn. 68. Fl. white or yellow.

1. BANCUELLACEAE

(Clematis

3. *C. Gouriana*, B. & H. Wight Ic. 104-4. Vern. *Bellam, Bellanga,*
N.W.

Leaves pinnate, often bipinnate, leaflets ovate or ovate-lanceolate, serrulate,
entire or rarely slightly serrate. 2-3 in. long. 1/2-1 in. broad, nerves, upper part of
petiole often without leaflets, woody, twisted, round, supports a fl. greenish-
white 1/2 in. diam.

Sub-himalayan tract ascending to 1000 ft. Burma, India and Assam. Western
Ceylon. Fl. B. 8. 1845. Maly. Peninsula and Arunachal.

C. Wightiana, Wall. Wight Ic. 1. 1857.
Soft climber, leaves pinnate, leaflets usually 5, broadly ovate or ovate,
3-5 lobed, densely villous beneath. Fl. 4-5 in. diam. Sepals 12-15, spreading
outside, filaments with long white silk.

Western Ghats, from Malabar to the mountains of the N. W. Himalaya, glabrous
Jan-Feb. *C. orientalis* Link. Dry valleys of the lower N.W. Himalaya, glabrous
climber, leaves pinnate or bipinnate, leaflets 5-7, varying from 1/2-1 in. long
to 1-2 in. long, 1/2-1 in. broad, yellow, twisted, 1/2-1 in. diam.

C. Buchananiana, DC. Callot. Sinala Fl. fig. 1. Vern. *Kand, Bati,*
Jachs.

A large woody climber, greyish tomentose, leaves pinnate, leaflets 5-7,
broadly ovate, coarsely serrate or 3-5 lobed. Fl. campanulate, cream colored,
sepals ribbed, filaments linear, densely hairy.

Himalaya from the Punjab eastward to 1000 ft. Khasi hills. Fl. Aug. 18.
11. *C. diffusa*, DC. Himalaya from Kashmir eastward, mostly allied to 11, but
more extensive, smaller and petioles generally separate into 2 not 3 segments as
leading to 11. 12. *C. griseiflora*, DC. Himalaya from Khasi hills eastward, as
early tomentose, leaves pinnate, leaflets 5-7, broadly ovate, 1/2-1 in. long,
1/2-1 in. broad, serrate, filaments yellowish or greenish, 1/2-1 in. long,
1/2-1 in. broad, Khasi hills to Patna, many leaves trifoliate,
glabrous, leaflets ovate or ovate-lanceolate, entire or slightly serrate, fl. yellow,
sepals slightly pubescent, etc.

2. NARAVELIA, DC. Fl. Brit. Ind. 1. 0.

Climbing shrubs, leaves pinnate, leaflets 2 opposite, common petiole
prolonged into a tendril. Fl. in large axillary panicles. Sepals 4, petals 6-12,
linear-quadrangular, arches with long hairy styles. Species 2.

1. *N. zeylanica*, DC. Sp. Atropar. *zeylanica*, Linn. Roxb. Cor. Pl. 1.
188. Vern. *Sar-gu-mat, Bura, Nara-vel, Singhal.*
Branchlets, petioles and inflorescences pubescent, leaflets broadly ovate,
acuminata, 2-4 in. long, entire or with a few large teeth, softly tomentose
beneath, with 5-7 prominent basal nerves, tendril dehiscent at right angles to
the petiole. Fl. yellowish green, panicles lax, usually longer than leaves,
Sepals 4-5 in. tomentose outside, and dehiscent, petals as long as sepals,
linear spreading, calyxes hairy, with hairy style 2 in. long.

Sub-himalayan tract from Nepal eastward, ascending to 1000 ft. Burma, Western
Peninsula. Fl. B. 11. 1845. Sinala from Java and Ceylon, Malay Archipelago
South China. 2. *N. leuciflora*, Wall. Malabar and Tommarim, Malay Peninsula and
Arunachal, to the Philippines. Clusters, flowers yellow, petals linear, at the
end of a long pedicel.

ORDER II. DILLENIACEÆ. Gen. Pl. 10.

Trees or shrubs, rarely herbs, woody arborescent, with simple alternate pinnately veined leaves and dilated petioles, often winged and sheathing at base. Flowers large, bisexual, regular, white or yellow, single or in cymose fascicles. Sepals usually 5, persistent, imbricate in bud. Petals generally 5, deciduous. Stamens usually ∞ , hypogynous, free. Anthers basical, or laterally adnate to the connective. Ovary free, consisting of one or several more or less distinct carpels, styles always distinct. Seeds with an aril, albuminous, etc., minute.

*These differ in several characters. Bark never succulent, always woody, with a thin cellular and striated cortex, or with tough the pith. — Being valued in some species for their thick-walled fibres, in other species of the American genus *Wrightia*, which are used to polish wood and brass metals, by siliceous concretions in the cellular walls, and in some by seeds filled with resins penetrating along the surface. Medullary rays in the wood very broad, being on a radial section the remarkably marked appearance of the wood. The wood always has a radial pith.*

The genus *Saurauia* and *Artibeia*, named by Baillon and Gussone after a Prout tree with 120 in this order, appear included in the *Dilleniaceæ*.

- | | |
|--|-----------------------|
| Trees, flowers solitary or fasciculate, persistent, woody like <i>Elm</i> or <i>Ulm</i> , etc. | 1. <i>Indica</i> . |
| Shrubby, flowers 4 in cymose or terminal panicles, woody like <i>Apple</i> . | 2. <i>Terminata</i> . |
| Expressed in new species 2 in <i>India</i> . | 3. <i>India</i> . |
| Carpel 4, styles 2. | |

1. *DILLENIA*, Linn.: Pl. Brit. Ind. 1. 36.

Trees with large dentate or serrate leaves, crowded at the ends of thick branchlets. Secondary nerves numerous, parallel nearly straight, very prominent. Flowers cymose, with the opening by small terminal slit or pores, carpels 5-20, covering with the axis, ovules subulate, styles spreading. Fruit enclosed by the enlarged coriaceous or fleshy sepals. Species 25, India-Malaya-India.

A. Evergreen. Fl. white.

1. *D. indica*, Linn.—Syn. *D. speciosa*, Thunb.; Wight Ic. t. 823. Boid. Pl. Sylv. t. 103. Vern. *Chalta*, Beng. Hind. *Mitha*, Korym. Mar. *Kinangala*, Kan. *Talaga*, Burm. *Misong*, Kachin.

A middle-sized tree, trunk short, erect, branches spreading, leaves lanceolate, coriaceous, pubescent beneath, hard when old. Secondary nerves 30-40 pair, ending in the points of serratures. Petiole hairy 1-2, blade 10-14 in long. Carpels 20, styles linear recurved. Fruit 4-5 in diam., hard outside, fleshy within; seeds numerous, numerous, hairy along the edges, embedded in pulpy glutinous pulp.

Sylhet, Assam, Java, from Nepal eastwards. Most regions of both peninsular India along streams. Fructually planted. Fl. B. S. Ceylon.

2. *D. bracteata*, Wight Ic. t. 365.

Branchlets and petioles grey silky. Leaves coriaceous, broadly elliptic obtuse or emarginate, slightly serrate, on both sides glabrous, petiole 1, blade 3-5 in long. Secondary nerves 12-20 pair. Fl. in few lid racemes, 2-3 in diam., sepals silky, carpels 5.

Veligatla and other hills on the east side of the peninsula.

11. D. ... yellow solitary

4. *D. aurea*, Smith - K. ... Fl. ... Wall ...

Youngest shoots ... secondary nerves ...

... and ...

5. *D. pulcherrima*, Kuntz, F. ...

Supposed to differ from *D. aurea* by larger, elliptic leaves with a rounded base ...

6. *D. ...* appearing before the leaves, yellow, ...

5. *D. pentagyna*, Rea ...

Born grey or pale brown with shallow depressions of irregular shape caused by the exfoliation of the outer layers ...

... identified with *D. pentagyna*

6. *D. schubertii*, Rehb ...

Young shoots with long silky hairs ...

... differs by slightly ...

2 TETRACERA, Linn.; Fl. Brit. Ind. 1: 61.

Woody climbing or scandent shrubs, with entire, sometimes serrate, generally harsh leaves ...

gradually narrows into the filament. Carpels 3-5 (rarely 6 or 7), rarely 8 or 9, distinct when ripe. Species 24, in the tropics. Both hemispheres.

1. *T. laevis*, Vahl—Syn. *T. thurberi* DC.; Wight, Ic. 4, 70.

2. *T. glaberrima* Gilmer. Leaves elliptic-oblong, obtuse or distantly acuminate, 3-5 in. long, secondary nerves 6-8 pair. Fl. white 1 in. diam.

Malabar and Travancore, Ceylon, Fl. March. 2. T. Asia, DC. (China, Hong Kong, Burma, Malaya, Borneo) and Archipelago, in strong but not hairy branches.

3. DELINA, Gen. Pl. Brit. Ind. 3, 31.

Included under *T. tetraena* by Gilg in Engler u. Prantl, III, 6, 112.

Characters of *Tetronea*, but leaves cretate-serrate and carpel solitary, with 2-3 ovules. Seed solitary, with a cup-shaped, toothed aril in a cartaceous follicle. Species 2, one in South America.

D. sarmentosa, Less. Kunt, F. Fl. 1, 22.

An evergreen, large climber, with tough reddish-brown branches. Leaves elliptic, 4-6 veins 4 in. long, secondary nerves 16-20 pair, persistent beneath, very rough from minute, appressed scattered stiff hairs. Fl. small white, in large axillary and terminal panicles.

Asia, Ceylon, Philippines, Burma. Fl. B. S. Malaya, Borneo and Archipelago.

ORDER III. MAGNOLIACEÆ. Gen. Pl. 4, 16.

Trees or shrubs, sometimes climbing, often aromatic. Leaves alternate, in most genera with unplexant and sometimes pecunious stipules. Flowers solitary, generally large and bisexual. Sepals and petals similar, arranged as a rule in bilabrous whorls. Stamens long, numerous, anther cells adnate to filaments. Ovaries numerous, generally spirally arranged on the elongated axis. Ovules attached to the ventral suture. Embryo minute, in an abundant oily albumen.

Important morphological characters. Seed containing oil in the perisperm of leaves, often visible as transparent dots; wood nerves with bordered pits, the wood of *Dringia* (South America, Australia, Borneo), consisting entirely of such fibres with bordered pits, without vessels, resembling the wood of Conifers.

A. Shrubs or trees, stipules non-existent, embracing the leaflets. Fl. bisexual, carpels in fruit on an elongated axis.

a. Carpels adnate, dorsally, not separating from the axis.

Ovaries immediately over the stamens, usually separated from them by a short interval; carpels in fruit closely packed.

Ovules 2, fruit cylindrical.

Ovules 5 or more, fruit ovoid.

Ovaries separated by a distinct interval from stamens, carpels in fruit more or less distant.

1. *Magnolia*.

2. *Manglietia*.

3. *Miconia*.

b. Carpels detaching ventrally, or transversely, separating from the axis.

4. *Tournefortia*.

B. Shrubs, stipules 0. Fl. bisexual, carpels in one wheel.

5. *Delonix* (p. 16).

C. Climbing shrubs, stipules 0. Fl. unisexual.

Fruiting carpels in an elongated spike.

Fruiting carpels in a globose head.

6. *Schreanoria*.

7. *Rapanea* (p. 16).

1. **MAGNOLIA**, Linn., Fl. Brit. Ind. 1: 111.

Tree, rarely shrubby, leafy or leafless in the same state, whorled. Sepals 2, petals 6-12 in whorls of 3. No interval, or only a short interval between ovaries and stamens. Each ovary with 2 collateral ovules. Fruit a dense mass of dorsally dehiscing carpels, with few seeds or few smaller, outer layers of testa fleshy. Species 18, North America and Mexico, China and Japan, mountains of India.

1. *M. pierocarpa*, Blume, Catal. 11: 1, 1825. Ann. Bot. Gard. Calcutta 1: 72. — Syn. *M. sphenocarpa*, Wall. Fl. Brit. Ind. 1: 111.

A large evergreen tree, the youngest parts in very dense, glaucous pubescence, quite glaucous when full grown. Bark 1/2 in. long, secondary nerves 12-17 per inch. Flowers fragrant, terminal, campanulate, 2 1/2 in. across, on a short peduncle 1/2-2 in. long. Sepals 3, numerous, green outside, petals fleshy, white. Fruiting spike 5-7 by 1 1/2-2 in. long, cylindrical but being much broader at base, consisting of 10-12 seeds. Seeds orange.

Includes specimens from Nepal, Assam, Khasi and Garo, India, Nag Kora.

2. *M. Campbellii*, Hook. et Thunb., Ann. Bot. Gard. Calcutta 1: 61, 1822. Vern. Lal Champ, Nepal.

A large deciduous tree, bark very rough, leaves 4-12 in. long, underside pale, siliceo-tomentose when young, mostly glaucous when full grown, secondary nerves 12-16 per inch. Flowers terminal, 6-10 in. across, appearing when the tree is leafless, scented, the colour occasionally white. Sepals and petals similar, 12-16. Fruiting spike cylindrical, 6-8 in. by 1 in. Seeds red.

Himalayas, 10,000-11,000 ft. from Nepal eastwards. Malabar, Nizam. Fl. 1: 11.
 The other species may be referred to either:
 An interval between ovaries and stamens: 3. *M. glabra*, Hook. et Thunb., Ann. Bot. Gard. Calcutta 1: 61. Bark siliceo-tomentose, secondary nerves 12-16 per inch. Flowers white.
 4. *M. officinalis*, Linn., Fl. Brit. Ind. 1: 111. Bark siliceo-tomentose, secondary nerves 12-16 per inch. Flowers white.
 5. *M. grandis*, Hook. et Thunb., Ann. Bot. Gard. Calcutta 1: 61. Bark siliceo-tomentose, secondary nerves 12-16 per inch. Flowers white.
 6. *M. speciosa*, Linn., Fl. Brit. Ind. 1: 111. Bark siliceo-tomentose, secondary nerves 12-16 per inch. Flowers white.
 7. *M. champensis*, Hook. et Thunb., Ann. Bot. Gard. Calcutta 1: 61. Bark siliceo-tomentose, secondary nerves 12-16 per inch. Flowers white.
 8. *M. speciosa*, Linn., Fl. Brit. Ind. 1: 111. Bark siliceo-tomentose, secondary nerves 12-16 per inch. Flowers white.
 9. *M. speciosa*, Linn., Fl. Brit. Ind. 1: 111. Bark siliceo-tomentose, secondary nerves 12-16 per inch. Flowers white.

2. **MANGLIETIA**, Blume, Fl. Brit. Ind. 1: 111, 1825, under Magnolia.

by Prantl in Kuhn's Enzyklop. 2, p. 111.

Differs from *Magnolia* by the large number, 6 or more, of nerves in the ovary. Species 5, mountains of tropical Asia.

1. *M. insignis*, Blume, Ann. Bot. Gard. Calcutta 1: 75. — Syn. *Manglietia insignis*, Wall. Fl. As. Bat. 1: 182. Vern. Yungay, Mt. Burma.

A large evergreen tree, youngest branches petioles and pedicels pubescent, all more glaucous. Leaves thickly coriaceous, lanceolate, 5-10 in. long, secondary nerves not much more conspicuous than the shorter intermediate ones, which are aided by prominent polygonal veatins. Fl. axillary, 4-5 in. across. Sepals 3, dull red, with greenish veins, petals 9, pure white or whitish yellow, tinged with pink. Fruiting spike cylindrical, 3-5 in. long.

Burma, Tenasserim, Nepal, Assam, Khasi hills, Laos, Siam. Ruby, white, black, Ceylon, Burmah, 5,000 ft. 2. *M. Cavendishii*, Hook. et Thunb., Ann. Bot. Gard. Calcutta 1: 61, 1822. Bark siliceo-tomentose, secondary nerves 12-16 per inch. Flowers white.

3. MICHELIA, Lam., Fl. Brit. Ind. i. 41.

Trees, mostly evergreen, buds enveloped in the convolute stipules. Leaves thinly coriaceous, tertiary nerves prominently reticulate. Sepals and petals similar, 5-15, in whorls of 3. Filaments flat, anthers introrse. Ovaries separated from the stamens by a distinct internode, style generally much shorter than ovary. Fruit lax, rarely dense spike of woody or coriaceous dorsally dehiscent carpels. Species 10, Indo-Malayan region, mostly in the mountains.

A. Leaves small, 3-6 in. long, fl. white.

1. *M. Cathcartii*, Hook. f. & Th.; Ann. Bot. Gard. Calc. iii. t. 60. Vern. *Titi Champ*, Nep.

A large evergreen tree, heartwood dark olive-brown, young branches densely silky. Leaves pale beneath, acuminate, midrib hairy on both surfaces, chiefly on the upper. Fl. terminal, 3-4 in. diam., white, turning red in drying, perianth leaves 9, inner gradually smaller. Stamens more than 1 in. long, overtopping the ovaries, which are sessile and densely imbricate.

Sikkim Himalaya 5000-7000 ft. Nag hills. Fl. May, June.

2. *M. nilagirica*, Zunker; Wight Ic. t. 638; Bodd. Pl. Sylv. t. 62; Ann. Bot. Gard. Calc. t. 65.—Syn. *M. pubescens*, Wight Ill. t. 5.

A moderate sized tree, buds silky. Leaves shortly and bluntly acuminate. Fl. 1½-2 in. across, on short generally leafless axillary branchlets. Perianth leaves usually 12, the inner narrower. Stamens shorter than gynoecium. Ovaries silky, with 2-4 styles. Fruiting spike interrupted, 2-3 in. long, carpels warty, apiculate, mixed with many abortive carpels. Seeds bright scarlet.

Nilgiris, Palni and other hills in the peninsula, Ceylon. Fl. H. S.

B. Leaves moderate sized or large, 4-12 in. long.

3. *M. o*blonga, Wall.; Ann. Bot. Gard. Calc. iii. t. 67. Vern. *Bor Sappa*, Assa.

A very tall tree, entirely glabrous. Leaves thinly coriaceous, 4-6 in. long. Secondary nerves 7-9 pair, somewhat prominent beneath. Fl. yellowish white, 3-4 in. across. Fruiting spike lax, 6-7 in. long. Carpels sessile, woody, lenticellate, blunt.

Assam, Sibbet. Fl. t. 8. Nearly allied are the following, which are all entirely glabrous: 4. *M. Mannii*, King; Ann. Bot. Gard. Calc. iii. t. 70. Assam, Sibbet. Leaves rigidly coriaceous, fl. smaller, ripe carpels distant, oblong, slightly apiculate. 5. *M. pundaana*, Hook. f. & Thoms.; Ann. Bot. Gard. Calc. iii. t. 68. Assam, Khasi hills. Leaves thinly coriaceous, secondary nerves not much more conspicuous than the shorter intermediate and the reticulate tertiary nerves. Fl. 1½ in. across. Ripe carpels distant, compressed, not beaked. 6. *M. Khasia*, DC.; Ann. Bot. Gard. Calc. iii. t. 58 B. Khasi and Nepal 5000-7000 ft. rare in Sikkim. Leaves coriaceous. Fl. 1-1½ in. across. Carpels small, 2 in. diam., compressed, shortly apiculate.

7. *M. lanuginosa*, Wall.; Ann. Bot. Gard. Calc. iii. t. 62. Vern. *Gopyy Champ*, Nepal.

A large deciduous tree, branchlets and underside of full grown leaves densely pale-grey tomentose. Leaves lanceolate. Fl. axillary, yellowish white, 2½-3 in. across. Perianth leaves 12-18, oblanceolate. Ovaries densely lanate, style glabrous. Fruiting spike lax, 4-5 in. long. Carpels compressed, shortly stalked, woody, warty, ½-1 in. Seeds orange.

Eastern Himalaya, from Nepal eastwards, 5000-7000 ft. Khasi hills. Fl. H. S.

8. *M. excelsa*, Blume; Ann. Bot. Gard. Calc. iii. t. 63. Vern. *Rara Champ*, *Safed Champ*, Nepal.

A large deciduous tree, heartwood olive-brown, buds clothed with brown,

dark red or scarlet, a prominent dull green lentic nearly glabrous. Fl. axillary, white, scented, 4 in. across. Perianth leaves 12, obovate and spatulate. Fruiting spike hex. 4-8 in. long. Carpels 4 in., shortly beaked. Seeds 10.

Widdr. Journ. Bot. Soc. Lond. 2000-2001, p. 17. Khasi and Jaintia hills. Fl. March.

9. *M. Champaca*, Lindl. Binaria F. Fl. 1. — *M. aggregata*, Walp.; *M. As. Ind.* 1. 117. *Vern. Champak, Champo*, Blak.; *Sampitaj*, Kav.; *Cham-pakam*, Tel.; *Saralabaga*, Tam.; *Sama*, Bern.

A large vigorous tree, heartwood light brown, young shoots milky. Leaves nearly glabrous when full grown, blade 8-10, petiole slender, 1/2-1 in. Fl. yellow or orange, strongly scented, ob. ov. pedunculate, 2 in. across. Perianth leaves 16. Fruiting spike compact, 2-6 in. long. Carpels ovoid, blunt, lenticulate. Seeds brown.

Widdr. Journ. Bot. Soc. Lond. 2000-2001, p. 17. Khasi and Jaintia hills. Fl. March. A moderate sized tree, heartwood light brown, young shoots milky. Leaves nearly glabrous when full grown, blade 8-10, petiole slender, 1/2-1 in. Fl. yellow or orange, strongly scented, ob. ov. pedunculate, 2 in. across. Perianth leaves 16. Fruiting spike compact, 2-6 in. long. Carpels ovoid, blunt, lenticulate. Seeds brown.

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1. TALAUMA, Juss. F. Brit. Ind. 1. 49.

Differs from *Magnolia* by the structure of the fruiting spike. Carpels woody, and adhesion by the central suture, or spongy and indurated, but usually separating from the axis. Species 20, in the tropical and subtropical regions of Eastern Asia and South America.

A. Carpels woody, adhesion by the central suture, leaves glabrous beneath or hairy so.

1. *T. Hodgsoni*, Hook. fil. & Thoms. J. Ann. Bot. Gard. Camb. 10. July 47. *Daluchan*, Nepal.

A moderate sized tree, quite glabrous except the puberulous young carpels. Leaves serrate, 8-20 in. long, nerves 18-25 pairs, reticulate raised, prominent. Petiole 1-2 in. slender, base thickened. Fl. white, terminal, subsessile, 3 in. long, sepals and petals similar, fleshy. Fruit ovoid, 4-6 in. long, consisting of numerous indurated woody carpels, separating from a woody deeply pitted axis.

Sikkim, ascending to 10,000 ft. Assam, Khasi hills, Cachar, Jaintia, Upper Burma. *T. astamanica*, King, Ann. Bot. Gard. Camb. 10. 1. 1. Andaman. A large upright tree. Leaves subobovate, blade 10-14 in. petiole 1-2 in. Fl. white. 14 in. diam. *T. Andamanica*, Hook. fil. & Thoms. J. Ann. Bot. Gard. Camb. 10. 1. 1. Khasi hills, Meghal, Khasi. *T. Andamanica*, King, Ann. Bot. Gard. Camb. 10. 1. 1. *T. Andamanica*, Hook. fil. & Thoms. J. Ann. Bot. Gard. Camb. 10. 1. 1. *T. Andamanica*, Hook. fil. & Thoms. J. Ann. Bot. Gard. Camb. 10. 1. 1.

B. Carpels spongy or corky, indurated, or spongy, separating when ripe from the central woody axis, leaves pubescent beneath.



FIG. 1.—*Talauma Hodgsoni* Hook. fil. & Thoms.

S. grandiflora Hook. & Thoms. Ann. bot. Beech. 1845. p. 104. t. 1. f. 1. *S. grandiflora* Hook. & Thoms. Ann. bot. Beech. 1845. p. 104. t. 1. f. 1. *S. grandiflora* Hook. & Thoms. Ann. bot. Beech. 1845. p. 104. t. 1. f. 1.

... the arrangement of the ...

3. SCHIZANDRA, Malabar, Po. Brit. India, 44

Climbing shrub with ...

A. Filaments separate below, free above.

1. *S. grandiflora* Hook. & Thoms. Ann. bot. Beech. 1845. p. 104. t. 1. f. 1.

Leaves membranous, ...

... flowers ...

B. Filaments united into a fleshy tube.

2. *S. ...* ...

... Malabar ...

ORDER IV. ANONACEÆ. (Order PL. 1. 20)

Tree or shrub, erect or climbing, bark of branches ...



white on the inside of the head sometimes. Ovary beaked, as a rule hairy and uterous with the stigma. A row of stamens, rarely that of several bases. Fruit usually consisting of numerous 1- or many-seeded carpels, dry or succulent, on stalks, often long, which lengthen as the fruit ripens, rarely dilated or united in one fleshy fruit. Seeds large, embryo small, albumen ruminant, often separable into 2 halves marked by a longitudinal furrow on the testa.

Diagnosis—Spherical, globose or cylindrical, the seedling roots in the perianthium of deciduous, often visible as white dots. On a transverse section the number of all species 3-5, numerous from 1-10, always large, at right angles to the sagittate axis, consisting of wood parenchyma. Hairs when present, 1-2 on the leaf, 1-2 on the stem, 1-2 on the fruit.

- A. Rip. carpels 1-10, beaked, distinct, usually stalked.
- 1.—The 3 inner petals usually similar to sepals.
Ovary 1-5, inner petals 1-5, by them 1-5.
Ovary 1-5, inner petals 1-5, by them 1-5.
Ovary 1-5, inner petals 1-5, by them 1-5.
- 2.—Petals uniform in shape and texture, 6, globose or emarginate.
Petals imbricate in bud, ovules 6-12.
Petals valvate in bud, ovules 1-2.
- III.—Petals uniform, erect or spreading, the inner whorling in 2 species of *Urena*.
Rip. carpels numerous.
Petals valvate in bud.
Ovary 1-2, rip. carpels 1-2, beaked.
Ovary 2-8, 1-2 ovules, rip. carpels numerous.
Ovary many 2-ovulate, ovules 1-2, beaked.
Petals imbricate in bud, ovules many, 2-ovulate.
Petals imbricate in bud.
- IV.—Petals uniform, erect or spreading, the inner 1-4, the outer 1-4.
Rip. carpels 1-4.
- V.—All petals of the inner only, similar, showing very distinct and uniform.
2. Inner petals distinct, generally smaller, showing very distinct and uniform.
3. Inner petals narrow, linear, showing very distinct and uniform.
4. Inner petals narrow, linear, showing very distinct and uniform.
5. Inner petals narrow, linear, showing very distinct and uniform.
6. Inner petals narrow, linear, showing very distinct and uniform.
7. Inner petals narrow, linear, showing very distinct and uniform.
8. Inner petals narrow, linear, showing very distinct and uniform.
9. Inner petals narrow, linear, showing very distinct and uniform.
10. Inner petals narrow, linear, showing very distinct and uniform.
11. Inner petals narrow, linear, showing very distinct and uniform.
12. Inner petals narrow, linear, showing very distinct and uniform.
- B. Rip. carpels distinct, distinct.
- C. Carpels united into a large fleshy fruit.
1. SACCOPETALUM, Bennet, Fl. Brit. Ind. 1: 88.

Deciduous tree, n. bisexual. Inner petals erect at base, much larger than sepals and the three outer petals. Stamens indefinite, connective prolonged into a conspicuous appendage. Ovary indefinite, ovules 6 or more. Species 3, 1 Australian, the others of Eastern Asia.

1. *S. tomentosum*, Hook. f. & Thoms. Bot. Beechey, 4: 33. Ic. Pl. Ind. Or. 2: 44. Ann. bot. Soc. Lond. *Leaves tomentose*, Leach. Cat. Fl. N. Am. 1843: 17. *Yucca tomentosa*, Juss. *Yucca glauca*, HBK. *Milium tomentosum*, Kunth. *Milium glauca*, Hitchc. *Milium glauca*, Torr. *Milium glauca*, Gilg. *Milium glauca*, Ledeb. *Milium glauca*, Nutt. *Milium glauca*, Rostk. *Milium glauca*, Schreb. *Milium glauca*, Willd. *Milium glauca*, Zucc.

A large very succulent, tomentose, tree, 2-10 feet high, leaves glaucous, excepting on the sides. Fl. subsessile on long pedicels hairy very short, 2-3 in. long, minute bracteoles at the base. Sepals small, white, petals lanceolate spreading, inner petals $\frac{1}{2}$ in. long, dark red outside, bright purple, with a prominent vein, 1 in. diam., 2-3 seeded, on stalks $\frac{1}{2}$ in. long.

Cultivated about the Cape of Good Hope, Swaziland, Natal, Zulu, Kaffir, Orange River, Western Indian Archipelago, Mauritius, Madagascar, etc. *S. tomentosum*, Hook. f. & Thoms. Bot. Beechey, 4: 33. Ic. Pl. Ind. Or. 2: 44. Ann. bot. Soc. Lond. *Leaves tomentose*, Leach. Cat. Fl. N. Am. 1843: 17. *Yucca tomentosa*, Juss. *Yucca glauca*, HBK. *Milium tomentosum*, Kunth. *Milium glauca*, Hitchc. *Milium glauca*, Torr. *Milium glauca*, Gilg. *Milium glauca*, Ledeb. *Milium glauca*, Nutt. *Milium glauca*, Rostk. *Milium glauca*, Schreb. *Milium glauca*, Willd. *Milium glauca*, Zucc.



FIG. 2. *Milium glauca*, tomentose, Hook. f. & Thoms. Bot. Beechey, 4: 33. Ic. Pl. Ind. Or. 2: 44.

2. MILIUSA, J. Schreb. Fl. Brit. Ind. 4: 86.

Herbaceous tree, usually bisexual, in one species polygamous. Sepals 3, small, petals 6-8, 2 sepals, the outer similar to sepals, the inner thin, flat and much larger. Stamens definite or indefinite, respectively more or less spirally deorsum imbricate, linear-oblong, awles 1-2. Sperm. 2. Ind. Malayia.

1. *M. veitiana*, H. B. K. Thes. Bot. Beechey, 57. Ic. Pl. Ind. Or. 1: 87. Hook. f. & Thoms. Bot. Beechey, 4: 33. Ann. bot. Soc. Lond. *Leaves tomentose*, Leach. Cat. Fl. N. Am. 1843: 17. *Yucca tomentosa*, Juss. *Yucca glauca*, HBK. *Milium tomentosum*, Kunth. *Milium glauca*, Hitchc. *Milium glauca*, Torr. *Milium glauca*, Gilg. *Milium glauca*, Ledeb. *Milium glauca*, Nutt. *Milium glauca*, Rostk. *Milium glauca*, Schreb. *Milium glauca*, Willd. *Milium glauca*, Zucc.

A middle-sized tree, branchlets, leaves and flowers densely silky tomentose. Leaves 2-8 in. long from a point below, slightly cordate, base ovate-oblong, petioles short. Fl. on slender 2-3 in. long pedicels, at short racemes at the ends of short branchlets, generally with a few leaves at the base. Sepals small, outer petals lanceolate or ovate, inner petals 3 times their length, triangular or ovate, very tomentose outside, dark purple and glabrous inside. Ovaries subsessile, ovules 2. Rays var. 1-4 in. diam., 2-seeded, on stalks $\frac{1}{2}$ in. long, bearing a round seed.

Cultivated about 1000 ft from the Cape mountains, ascending to 1500 ft. Central India, Java, Sumatra, Nicobar Islands, Burmah, Fl. B. S. The young leaves appear in April or May. *Milium tomentosum*, Hook. f. & Thoms. Bot. Beechey, 4: 33. Ann. bot. Soc. Lond.

1. *M. glabra* (L.) Merr. & Rolfe. *Philipp. Journ. Sci.* 4: 305 (1909). A tree from the Kinabalu hills, Malay Peninsula, ascending to 5,000 ft., first described by Merr. & Rolfe. B. K. Wightiana, *Flora of the Malay Peninsula*, vol. 1, p. 101, *Ind. Or.* 1: 200. *Ann. Bot. Soc. Lond.* 29: 205. A small glabrous tree of the Titiwangsa and Titiwangsa hills, bases 2-4 ft., upper part 1/2 in. tall. Two glabrous, ovate-lanceolate leaves, base 2-4 in., upper part 1/2 in. long. Leaves 2-4 in. long. B. K. Wightiana, *Flora of the Malay Peninsula*, vol. 1, p. 101, *Ind. Or.* 1: 200. *Ann. Bot. Soc. Lond.* 29: 205. *Flora of the Malay Peninsula*, vol. 1, p. 101, *Ind. Or.* 1: 200. *Ann. Bot. Soc. Lond.* 29: 205.

2. *M. Roxburghiana*, Hook. f. & Thoms. *Ann. Bot. Soc. Lond.* 1: 259.

A tree, attains 100 ft. branchlets softly pubescent. Leaves lanceolate, long



FIG. 2.—*M. Roxburghiana*, Hook. f. & Thoms. Leaf B, fruit C.

acuminate, 3-6 in. Fl. dioecious or polygamous, sepals and 4 outer petals green, lanceolate or linear, reflexed, inner petals obtuse, fleshy, 1/2 in. long, dark greenish-red. Hypocarpels nearly glabrous, 1/2 in. diam. on slender stalks. Seed 1, rarely 2.

Schinus molle Merr. or *Schinus*, according to Merr. & Rolfe. *Philipp. Journ. Sci.* 4: 305 (1909). *Fl. H. B.* *M. roxburghiana*, Merr. & Rolfe, *Philipp. Journ. Sci.* 4: 305 (1909). A variety with larger leaves and flowers.

3. PHÆANTHUS, Hook. f. & Thoms. *Pl. Belt Ind.* 1: 72.

Trees or shrubs, often climbing, the outer petals small like the sepals, the inner large. Cor. coriaceous, ovate-triangular from a broad base. Stamens numerous, anther cells distant, consecutive broad, obtuse, often produced beyond anthers. Ovaries numerous, style cylindrical or clavate, ovules 1-2. Hypocarpels slender, 1-seeded.

1. *P. Andamanica* King, *Ann. Bot. Soc. Lond.* 29: 205 (1909). Lvs. thin, elliptic-lanceolate acuminate, glabrous, 5-7 in. secondary nerves slender, rarely at right angles to midrib, but much more prominent than tertiary nerves and intra-marginal veins.

2. *P. malabarica* Hook. f. *Ind. Or.* 1: 200. *Ann. Bot. Soc. Lond.* 29: 205 (1909). Outer petals twice as large as sepals, inner 1/2, thick and fleshy, twice the size of the ovary.

4. SAGERÆA, Dalm. *Geo. Pl.* 1: 22.

Glabrous evergreen trees or shrubs, leaves shining coriaceous, second nerves not much more prominent than intermediate and tertiary nerves. Fl. globose, bisexual or unisexual, fasciculate on woody tubercles, often on the old wood. Sepals small, connate at base or five and slightly imbricate. Petals imbricate.

style globose, cylindrical or clavate, equal or 2. Fr. clustered numerous, usually generally on long stalks. Species Ind. & African & Australian, the rest of tropical Asia.

A. Ovule 1, s. solitary.

1. *P. suberosa*, Benth. & Hook. f. *Bot. Beechey*, Pl. Voy. 1, 20; Ann. Bot. Soc. Lond. 7, 25; *Hartrie*, *Bot. Voy. Pl.* 1, 24. Vern. *Ku-mu*, China.

A small tree, bark hairy, branchlets pubescent. Leaves distichous, elliptic-obovate, sometimes broader at apex, glabrous when full grown, 2-4 in. Fl. small, on slender extra-axillary pedicels, shorter than leaf, bracts near base small, linear. Sepals less than half the length of petals, petals oval, reddish-brown, silky outside. Ripe carpels black, $\frac{1}{4}$ in diam. Stalks slender, longer than carpels, but not more than twice their length.

On the coast of Borneo, Northern Celebes, east side of the island, Ternate, Fl. Ind. 1845, China.

2. *P. cerasoides*, Benth. & Hook. f. *Bot. Beechey*, Pl. Voy. 1, 1; Ann. Bot. Soc. Lond. 7, 25; *Hartrie*, *Bot. Voy. Pl.* 1, 33. Vern. *Sau-thi-ou*, Mal.; *Gutti*, Tel.; *Chou-ti-ou*, Burm.

A middle-sized deciduous tree, branchlets tomentose, leaves distichous,



Fig. 1. *Tournefortia cerasoides* Benth. & Hook. f. *Bot. Beechey*, 1.

glabrous, oblong lanceolate, acuminate, glabrous above, pale and more or less tomentose beneath. Fl. $\frac{1}{2}$ in. diam., green, on tomentose pedicels, shorter than leaf, bracts 1 or 2, small or large, ovate. Sepals ovate, unequal, petals $\frac{1}{2}$ in. long, equal. Ripe carpels numerous, red, $\frac{1}{4}$ in. diam., on slender stalks twice their length or longer.

Habitat: China, Southern Northern China, Western China (near Nanyi), Vietnam, Laos, Cambodia, the peninsula, Burma, Java, the East Indies. Fl. February to May, and August to July. A glabrous tree, sepals short, petals 1 in. Carpels oblong, 1 in. long, on slender stalks. *P. adhaerens* Kurz, *Andam.* 2, 9. *Adhaerens*, a strictly branched tree with small sepals oblong. *P. densa* Benth. & Hook. f. *Ann. Bot. Soc. Lond.* 7, 25. Malay peninsula. A tree, 5-6 feet high.

4. Ovule 1, s. trilocular, umbellate or corymbose.

6. *P. longifolia*, Benth. & Hook. fil.; Bot. Beechey, SYZ. 698, Ann. bot. Soc. Lond., *Geoffroea longifolia* Wall. & Wright, Cat. Vesp. Inst., *Deeringiana* Hook. & Grev., Kew. Journ. Bot.

A tall tree, scarcely glabrous. Leaves lanceolate, long-vennate, aristate, pale beneath, 4-8 in. Fl. yellowish, green outside of the pedicels, in racemes or slender pedunculate umbels. Petals from a broad base lanceolate, long-vennate, spreading. Style 1/2 inch long. Ripe capsule round, 1/2 in. wide in diam.

Indigenous to the island, but introduced to several of the neighboring islands by the missionaries. It is common in Mexico.

7. *P. fragrans*, Benth. & Hook. fil.; Bot. Beechey, Bot. Journ. Geogr. Soc. London, 1830. Vesp. Geogr. Bot.

A large tree, branchlets minutely but densely hairy beneath. Leaves elliptic or ovate, shining above, dull, often pubescent beneath, 4-8 in. long. Secondary nerves 12-15 pair, pinnate, at least. Fl. or tongue of the style pedunculate, racemose, 1-2 in. long, 1/2 in. diam, small, orbicular, lanceolate, 1-1 1/2 in. long.

Endemic to the West Indies, from the Bermuda Strait southward to the North Sea. N. Y. mainland, Florida, & Mexico. A tree 12-15 in. high. Leaves 3-11 in. long and the same wide. Secondary nerves 12-15 pair, pinnate. Fl. 1/2 inch long. Petals from a broad base 1-1 1/2 in. long. Capsule 1/2 in. long, 1/2 in. diam, 1/2 in. high.

C. Ovary 2 or 3 superposed. Fl. solitary.

8. *P. Kuratii*, Benth. & Hook. fil.; Ann. bot. Soc. Lond., 1864. Syn. *Geoffroea Kuratii*, Donal. Wright, P. 1208.

A spreading shrubby scandent pubescent. Leaves scarcely glabrous, elliptic, serrated to both sides, 4-6 in. Secondary nerves not much more prominent than the reticulate veins. Fl. bright green, 1/2 in. long, on slender pedicels, 1-2 in. spreading. Capsule numerous, oval, 1/2 in. long, red when ripe, stalks short.

West Indies, from the Cape of Venezuela to the Bermudas. A tree 12-15 in. high. Leaves 4-6 in. long and the same wide. Secondary nerves 12-15 pair, pinnate. Style 1/2 inch long. Petals from a broad base 1-1 1/2 in. long. Capsule 1/2 in. long, 1/2 in. diam, 1/2 in. high.

7. UNONA, Linn. & Fl. Ind. Jungk. 18.

Tree or shrub, erect or climbing. Petals in the 3 lower often a little smaller, wanting in number, or. Stamens crowded, anthers yellowish at extreme, concealed by the calicle, or truncate, rarely obovate, apex of the lobes. Ovary 2-3, 1 serrate on the ventral surface. Ripe ovary 2-3, generally much restricted to the seeds. Species 30, tropical Asia and Africa.

A. Petals 6, in 2 rows.

1. *U. Desmos*, Donal. Ann. bot. Soc.

A spreading woody shrub, climbing, branchlets pubescent. Leaves thin, glabrous, shining above, sparsely pubescent beneath. Secondary nerves 8-12 pair, slender but prominent. Fl. solitary, nodding, on slender extra-axillary pedicels, 2 1/2 in. long. Petals numerous, obovate-lanceolate, 1-2 in. long. Ripe capsule numerous, stalked, glabrous, contracted between the 2 or 3 oval seeds, 1/2 in. long.

Wright, Catalogue, Lower Burma, Malay Peninsula. Fl. 1864.

3. *U. discolor*, Vahl: *Bolt. Ind. Pl. Ind. Or. & Mal. Ann. iv.*, p. 74. — *72*.

U. verticillata, Willd. *Pl. Berol.*, t. 3: 53.

An evergreen, often climbing shrub, sometimes almost pubescent. Leaves membranous, alternate-lanceolate, 3-7 in. Fl. solitary or subternately axillary; calyx leaf-connate pentamerous, 1-2 in. long. Petals greenish-yellow, 2-3 in. long. Capsule numerous, purple-stained, $\frac{1}{4}$ in. long, seeds 2-3, the remaining 10-15 between the plates striated and pubescent.



FIG. 1.—*Uvaria discolor*, Vahl. (Fig. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

U. verticillata, Willd. *Pl. Berol.*, t. 3: 53. — *72*.
 The bark is very hard. Leaves pubescent, 2-3 in. Flowers solitary or small cymes, mostly white with greenish-yellow. Capsule purple-stained, 1-2 in. long. *U. verticillata*, Willd. *Pl. Berol.*, t. 3: 53. — *72*.
U. verticillata, Vahl: *Bolt. Ind. Pl. Ind. Or. & Mal. Ann. iv.*, p. 74. — *72*.
U. verticillata, Willd. *Pl. Berol.*, t. 3: 53. — *72*.
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U. verticillata, Vahl: *Bolt. Ind. Pl. Ind. Or. & Mal. Ann. iv.*, p. 74. — *72*.
U. verticillata, Willd. *Pl. Berol.*, t. 3: 53. — *72*.

4. Petals 5, sometimes 3 only, those of the inner row spreading.

6. *U. Darymaschala*, Blume: *Ann. l.*, p. 81.

An evergreen scrambling shrub, almost wholly pubescent. Leaves thinly scurfy, oblong-lanceolate, 4-8 in. long. Fl. solitary, nodding, 1-3 in. long, sometimes 1-1 in. Petals 4-5, lanceolate, 2-4 in. long. Capsule numerous, on short stalks, 1-2 in. long.

Lower Burma, Andaman. Fl. June. Malacca Peninsula and Sumatra. *U. verticillata*, Willd. *Pl. Berol.*, t. 3: 53. — *72*.
U. verticillata, Vahl: *Bolt. Ind. Pl. Ind. Or. & Mal. Ann. iv.*, p. 74. — *72*.
U. verticillata, Willd. *Pl. Berol.*, t. 3: 53. — *72*.
U. verticillata, Vahl: *Bolt. Ind. Pl. Ind. Or. & Mal. Ann. iv.*, p. 74. — *72*.

Uvaria verticillata, Willd. *Pl. Berol.*, t. 3: 53. — *72*.
Uvaria verticillata, Vahl: *Bolt. Ind. Pl. Ind. Or. & Mal. Ann. iv.*, p. 74. — *72*.
Uvaria verticillata, Willd. *Pl. Berol.*, t. 3: 53. — *72*.
Uvaria verticillata, Vahl: *Bolt. Ind. Pl. Ind. Or. & Mal. Ann. iv.*, p. 74. — *72*.
 The bark is very hard. Leaves pubescent, 2-3 in. Flowers solitary or small cymes, mostly white with greenish-yellow. Capsule purple-stained, 1-2 in. long. *Uvaria verticillata*, Willd. *Pl. Berol.*, t. 3: 53. — *72*.
Uvaria verticillata, Vahl: *Bolt. Ind. Pl. Ind. Or. & Mal. Ann. iv.*, p. 74. — *72*.
Uvaria verticillata, Willd. *Pl. Berol.*, t. 3: 53. — *72*.
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Uvaria verticillata, Willd. *Pl. Berol.*, t. 3: 53. — *72*.
Uvaria verticillata, Vahl: *Bolt. Ind. Pl. Ind. Or. & Mal. Ann. iv.*, p. 74. — *72*.

7. UVARIA, Linn.: *Fl. Bot. Linn.*, p. 47.

Climbing or scrambling shrubs, generally with delicate pubescence. Fl. yellow, purple or lavender, usually large and showy; sepals 4 often 5, lanceolate to long. Petals 4, sometimes nearly equal, spreading. Stamens 4 or more.

radicative wood or separate stems, and/or roots lateral. Ovaries usually in whorls or a ring, many or few, on the central stem. Torus apex of pedicel generally much enlarged in fruit. About 110 species, a few African, Australian, the rest in tropical and subtropical Asia.

A. Full grown leaves densely tomentose beneath.

1. *U. macrophylla*, Hook. & W. Pl. As. Rar. t. 122; Deff. Ic. Pl. Ind. Or. 1. 51; Ann. Entom. Soc. Thailand, etc. Barn.

A large cluster of umbels; all petioles rusty tomentose. Leaves large, ovate-elliptic, shining, sometimes broader towards the apex, base rounded or slightly cordate, upper surface glabrous except for tubercles which are raised, lower lax crenate-margined, 2-12 in. long. Secondary nerves 10-15 pair, prominent, so small as to be scarcely visible, and intramarginal veins. Fl. 1-12 in. diam., dark purple, in short axillary racemes, sometimes solitary, sepals erect, imbricate. Ripe carpels glabrous, oblong, blunt at the base, 1-1 1/2 in. stalks 1-1 1/2 in. long, on the sides widely enlarged torus. Seeds numerous.

Siberia, Caucasus, etc. (Deff.) Fl. Hb. Asia, Malay Peninsula, Java, etc.

2. *U. parviflora*, Hook. & W. Pl. As. Rar. t. 122; Deff. Ic. Pl. Ind. Or. 1. 51; Ann. Entom. Soc. Thailand, etc. Barn. A large cluster of umbels; all petioles rusty tomentose. Leaves large, ovate-elliptic, shining, sometimes broader towards the apex, base rounded or slightly cordate, upper surface glabrous except for tubercles which are raised, lower lax crenate-margined, 2-12 in. long. Secondary nerves 10-15 pair, prominent, so small as to be scarcely visible, and intramarginal veins. Fl. 1-12 in. diam., dark purple, in short axillary racemes, sometimes solitary, sepals erect, imbricate. Ripe carpels glabrous, oblong, blunt at the base, 1-1 1/2 in. stalks 1-1 1/2 in. long, on the sides widely enlarged torus. Seeds numerous.

B. Full grown leaves entirely glabrous or pubescent along nerves only.

3. *U. Narum*, Wall. Ann. tr. Acad. Sci. Ind. Ind. 8. Varn. Nymphaeaceae, etc.

A large cluster; all parts except inflorescence glabrous. Leaves pair by pair beneath, oblong-lanceolate, 6-10 in. long. Secondary nerves slender, not prominent. Fl. 1-12 in. diam., yellow, solitary, 2-3 sepals, palmately 4-5 in. long. Petals connate at base, sometimes also 10-12. Fruit of carpels numerous, glabrous, sessile, cylindrical or oval. Stalks 1-2 in. long.

Example 1. One of the Western Ghats from Deccan, southern India. Fl. & Fr. Col. K. Nag. Ann. 17. 1848, p. 25, and Col. Pl. Rar. t. 122, square. This is the *U. Narum* of Wall. in the work with which we are here dealing in both India, the West Indies, and Japan.

The other species of this series may be classified as follows:

- 4. *U. parviflora*, Hook. & W. Pl. As. Rar. t. 122.
- 5. *U. miranda*, Hook. & W. Pl. As. Rar. t. 122.
- 6. *U. parviflora*, Hook. & W. Pl. As. Rar. t. 122.
- 7. *U. parviflora*, Hook. & W. Pl. As. Rar. t. 122.
- 8. *U. parviflora*, Hook. & W. Pl. As. Rar. t. 122.
- 9. *U. parviflora*, Hook. & W. Pl. As. Rar. t. 122.
- 10. *U. parviflora*, Hook. & W. Pl. As. Rar. t. 122.



The flowers of the ... leaves ...

... leaves ...

9 ALPHONSEA, H. & T., Fl. B. I. 1. 1. 86

Evergreen tree or shrub. Leaves generally ...

A. Jaten, Hook. & Thunb., Bot. Beech. Fl. Or. 1. 30. 1801 ...

A. ...

10 OROPHEA, Blume, Fl. Bat. Ind. 1. 19

Trees or shrubs, fl. small, sometimes unisexual ...

A. ...

R. ...

2-3 in. long, 1/2 in. diam. 1-2. G. arthrocarpa, Hook. & Th. Ann. Bot. Beechey Ann. Bot. Beechey, 1845, p. 103. Leaves 2-4 in. long, 1/2 in. diam. 1-2. G. arthrocarpa, Hook. & Th. Ann. Bot. Beechey Ann. Bot. Beechey, 1845, p. 103.

11. MITREPHORA, Blume, Fl. Brit. Ind. 1: 702.

Evergreen trees, the sometimes numerous petals of the flowers appearing yellow, the 4 inner narrowed into filaments, lobes obscure, coherent at the edges and vaulted over the stamens. Stamens 2, connate, approximate based, truncate or triangular. Ovaries 2, free, 2-4 in. diam. 1-2. Species 11, tropical Asia.

1. M. Mangayi, Hook. & Th. Trans. Ann. Bot. Soc. Lond. 1845, p. 154. M. mangayi, Hook. & Th. Trans. Ann. Bot. Soc. Lond. 1845, p. 154.

A large tree, branches to 20 ft. tall, leafy. Leaves elliptic or ovate, 5-7 in. long, secondary nerves 12 pair, prominent beneath. Fl. white, slender pedicels generally 2-3 in. short, bearing woody bractlets, chiefly set with the veins of the primary bractlets. 2-petales densely silky outside, 2-3 in. long. Petals yellow, mottled with red, the outer pedicels 11-12 in. the inner linear claws, lobes coloring by their hairy edges. Ripe capsule 1 in. long, broadly oval, densely punctate, seeds 1, stalks stout, 1/2 in.

Borneo, Fl. Borneo, April, Malay Peninsula, Java. 2. M. ginsburgii, Blume, Fl. Brit. Ind. 1: 702, Pl. Raffles, 1857, Ann. Bot. Soc. Lond. 1857, p. 154. South Korea, China, India, B. Borneo, Java, Sumatra, Malacca, 1857, p. 154. M. ginsburgii, Blume, Fl. Brit. Ind. 1: 702, Pl. Raffles, 1857, Ann. Bot. Soc. Lond. 1857, p. 154. M. ginsburgii, Blume, Fl. Brit. Ind. 1: 702, Pl. Raffles, 1857, Ann. Bot. Soc. Lond. 1857, p. 154. M. ginsburgii, Blume, Fl. Brit. Ind. 1: 702, Pl. Raffles, 1857, Ann. Bot. Soc. Lond. 1857, p. 154.

Ovaries 2, free, 2-4 in. diam. 1-2. Ripe capsule 1 in. long, broadly oval, densely punctate, seeds 1, stalks stout, 1/2 in. long. Petals yellow, mottled with red, the outer pedicels 11-12 in. the inner linear claws, lobes coloring by their hairy edges. Ripe capsule 1 in. long, broadly oval, densely punctate, seeds 1, stalks stout, 1/2 in.

12. GONIOTHALAMUS, Blume, Fl. Brit. Ind. 1: 72.

Shrub or small tree. Secondary nerves joined by more or less distinct intramarginal loops. Distichous woody bracts on peduncles. Petals 6, inner smaller, clavate, coherent, scales form a vaulted cap over stamens and ovaries. Stamens numerous, expansive, produced beyond anther cells into a narrowly shaped process. Ovaries many, style cylindrical or subulate, simple or 2-lobed. Ripe capsule 1 in. long, often supported by the persistent bracts or sepals. Species 17, eastern tropical Asia.

1. G. cardiopetalus, Hook. & Th. Trans. Ann. Bot. Soc. Lond. 1845, p. 154. G. cardiopetalus, Hook. & Th. Trans. Ann. Bot. Soc. Lond. 1845, p. 154.

A shrub or small tree, branches to 20 ft. tall, leafy. Leaves thick, entire, or slightly serrate, 2-4 in. long, 1/2 in. diam. 1-2. Secondary nerves 12 pair, prominent beneath. Fl. white, slender pedicels generally 2-3 in. short, bearing woody bractlets, chiefly set with the veins of the primary bractlets. 2-petales densely silky outside, 2-3 in. long. Petals yellow, mottled with red, the outer pedicels 11-12 in. the inner linear claws, lobes coloring by their hairy edges. Ripe capsule 1 in. long, broadly oval, densely punctate, seeds 1, stalks stout, 1/2 in.

2. *G. sesquipedalis*, Hook. filia Thoms. Ann. 1. 1831. Syn. *Guttaria sesquipedalis*, Wall. in Pl. As. Bar. 1. 205.

A glabrous shrub. Leaves rigidly coriaceous, oblong-lanceolate, 6-14 cm. both surfaces shining, the lower part secondary nerves 12-18 pairs, prominent beneath as well as the interangular loops. Fl. greenish yellow, axillary, extra-axillary, solitary or in pairs, on short stout pedicels. Hips cartilag. firm, nearly sessile. Seed obovate, 1-2 mm. long, orange red when ripe, supported by the persistent veined broadly ovate sepals.

Tree of Pinakia Hill, Assam, 2000 ft. - 2004 ft. Assam, Barren. G. G. Wright, Hook. fil. & Thoms. Bot. Beech. Ind. 1845. 63. Ann. 1. 1831. Also in Assam, Chittagong and Tenasserim, a small tree with pale yellow, rather numerous, 2-4 in. l. G. wrightii, Hook. fil. & Thoms. Ann. 1. 1831. Wundt, a large shrub. Leaves 2-11 in. secondary leaves persistent below. 5-6 in. small, black, like *G. Thoms.* Ann. 1. 1831. Kinnel hills, fringed to 1000 ft. on both sides of a narrow river, near the mouth. Leaves 2-11 in. secondary leaves 18-20 pairs, not beneath. G. G. Griffith, Hook. fil. & Thoms. Ann. 1. 1831. In Tenasserim, 8-10 in. mostly ovate, more obtuse, lanceolate, a umbellate flowering.

13. MELODORUM, D. Don, Fl. Ind. 1. 1. 178.

Shrubs, mostly climbing. Leaves large, elliptic or lanceolate-oblong, secondary veins numerous, prominent. Fl. both perianthial or tubular. Sepals 3 small, sessile at base, petals thick, fleshy, concave, the 2 inner generally smaller, tripartite above, bell-shaped below on the inner face. Ovary solitary, cylindrical, generally short, with 3-4 or more. Species 35, tropical Asia.

A. Leaves rusty tomentose or pubescent beneath.

1. *M. rubiginosum*, Hook. fil. & Thoms. Ann. 1. 1831.

Branchlets rusty tomentose. Leaves 3-4 in. coriaceous, elliptic, or lanceolate, 1 in. long, stalk tomentose, 1/2-1/3 in. long.

Assam, Chittagong, Marahan, Tenasserim, Fl. C. S. 1. 1831. G. G. Wundt, Hook. fil. & Thoms. Ann. 1. 1831. Sikkim, Assam, Barren. Leaves strongly tomentose beneath, 2-4 in. Fl. mostly outside, coriaceous, 1-1/2 in. long, stalk 1/2-1/3 in. G. G. Wundt, Hook. fil. & Thoms. Ann. 1. 1831. Kinnel hills, Yunnan. Leaves lanceolate, 3-5 in. Coriaceous, densely tomentose on both sides, narrowed to 1/2-1/3 in.

B. Leaves glabrous beneath.

1. *M. Wallichii*, Hook. fil. & Thoms. Ann. 1. 1831. Assam, Kinnel hills. Leaves elongate-lanceolate, 8-8 1/2 in. long, secondary nerves 12-15 pairs, interangular 1 1/2 in. from vein. Fl. 1/2-1/3 in. G. G. Wundt, Hook. fil. & Thoms. Ann. 1. 1831. Assam, Kinnel hills, Chittagong hill tract. Leaves elliptic, 2-3 in. long, secondary nerves 12-15 pairs, mostly pubescent beneath. G. G. Wundt, Hook. fil. & Thoms. Ann. 1. 1831. Andamans, a tree, leaves elliptic-lanceolate, 2-3 in. long, secondary nerves 12-15 pairs, mostly sessile 1/2-1/3 in. long, tips coriaceous, 1/2-1/3 in. long, perhaps 1/2-1/3 in. long to the green.

Xylocarpus parviflora, Hook. fil. & Thoms. Bot. Beech. Ind. 1845. 63. Fl. Ind. 1. 178. Ann. 1. 1831. 63. Malacca & Java. Tree with large buttresses on the buttresses. Leaves of Tenasserim, also in Ceylon. Leaves elongate, 2-3 in. long, secondary nerves indistinct, reticulate veins visible on both sides. Fl. small, 1/2-1/3 in. long, yellow, interangular lobes subacute, lobes. Fl. 1/2-1/3 in. long, from a broad base, rather linear, silky pubescent outside, thick and with a granular base. Ovary 2-lobed, pubescent, style as long as ovary. Abruptly elongate longer than style, hairy. Hips very slender, tapering to the base, pubescent, 1-1/2 in. long. The representative in India of a large genus, 10-15 ft. tall, in the tropics of both hemispheres.

14. ARTABOTRYS, R. Br. ex Fl. Ind. 1. 1. 58.

Evergreen, scrambling or climbing shrubs. Pedicels extra-axillary, hooked recurved, generally thick and woody, often encircling supports, bearing single flowers, leaf axils of the. Petals 6, nearly equal above of all convex, closing over stamens and ovaries, limb spreading. Ovaries 1 or 2, or numerous, axes 2, erect, collateral. Species 55, tropical Africa and Europe Asia.

3. Petals and calyx elliptic.

1. *A. zeylanica*, Hook. in A. Thoms. Bot. Hb. L. P. Ind. O. 37. Ann. Bot. Soc. London, p. 43, t. 53.

Arborescent climber. Leaves ovate-lanceolate, long-petioled, 2-4 in. long, 1-1.5 in. broad, coriaceous, serrate. Petals ovate, long-lobed, limb entire, densely glandular, the outer lobes long, the inner 2-3 in. smaller. Hilum of ovary small, bilobed, suborbital.

Examined from the Western Ghats from Kanya southward. Fl. November-December.

2. *A. odoratissima*, A. DC. Ann. Bot., t. 50.

A large scrambling glabrous shrub. Leaves thick, ovate, long-petioled, 1-2 in. long. Fl. solitary or in pairs, greenish yellow, exceedingly fragrant; petals white, minutely serrated, 1-1.5 in. long. Ovary glabrous. Hilum of ovary 8-10, pyriform, apically narrowed into a short stalk, 1/4-1/2 in. long, yellow.

Collected in Travancore (1877), Fl. C. 3014 and Ceylon (collected through Mr. J. H. S. M. S. & Kurru, the N. I. & Thoms.; Ann. Bot., t. 50, a drawing in describing the plant as being the first introduced from the British West Indies, Fl. C. 3014; Ann. Bot., t. 50, a drawing in describing the plant as being the first introduced from the British West Indies, Fl. C. 3014).



FIG. 12. *Artocarpus zeylanica*, Hook. & Thoms. (Bot. Hb. L.).

FIG. 13. *Artocarpus odoratissima*, DC. (Ann. Bot., t. 50).

B. Petals fleshy, ovate or clavate or ter-petrous.

3. *A. suaveolens*, Baker & Kurz, F. Fl. 2, 52; Ann. Bot., t. 61.

A large climber. Leaves shiny, acuminate, 2-4 in. long. Fl. fasciculate, in recurved flat woody panicles, which sometimes lengthen out to 5 inches. Petals fleshy, ter-petous, long blade cylindrical or clavate. Hilum of ovary, elliptical, glabrous, 1/4 in. long.

Collected in the Western Ghats, Peninsular India, Fl. C. 3015. A. *surinamensis* A. DC. Ann. Bot., t. 61. Mung. Panicle leaves 4-7 in. long, petioles 1/2-3/4 in. long. Hilum of ovary 3-10, sub-pendulous, lined by the first intraxillary vein; petals narrow, long 1 in. long. *A. speciosa* Kurz, Ann. Bot., t. 61. Anthers white, yellow 1 1/4 in. long.

Cyathium repens, C. DC. Ann. Bot., t. 61. Hook. Bot. Beechey, Fl. C. 3016. *C. repens* in the evergreen forests of the Western Ghats, from South Kanyakumari to Malabar, India, in the most luxuriant and fertile soil. Petals 1/4-1/2 in. long, very fleshy, very thick, very glutinous, and very mucilaginous. Hilum of ovary 2-3, sub-pendulous, lined by the first intraxillary vein; petals narrow, long 1 in. long. *A. speciosa* Kurz, Ann. Bot., t. 61. Anthers white, yellow 1 1/4 in. long.

Macaranga pruriens, A. Gray: Ann. Bot., t. 61. *Macaranga pruriens*, Hook. Bot. Beechey, Fl. C. 3017. *M. pruriens* A. Gray: Ann. Bot., t. 61. *M. pruriens* A. Gray: Ann. Bot., t. 61. *M. pruriens* A. Gray: Ann. Bot., t. 61. *M. pruriens* A. Gray: Ann. Bot., t. 61.

15. ANONA, Lindl.; Fl. Bot. Edin. 1793.

Tree or shrub with woody stem. Sepals small, petals of 3, stamens trifid, or divided into 5, lobes, the lobes linear, sometimes very long, the middle. Carpels united into a large fleshy berry, seeds numerous, embedded in a soft pulp.

A. squamosa Lam. *Guaiacum* A. DC. *Verat. Antiquum* & *quadrifidum* Lam.

Wholly glabrous, leaves with long petioles, 2-3 in. long, cordate, distinct, with a pointed apex. Fl. greenish, clustered in racemes or panicles at the end of a branch. Exterior petals 5, ovate, triquetrate, thick and fleshy, 1-1.5 in. long. Interior united in whorls. Fruit 2-4 in. diam., seeds oblong, 1-2 in. long.

Collected in the West Indies, and lately discovered at Cayenne, and also in the district of Maracaybo, Guayana in the Parish of St. Paul.

Other species collected in India & America, Lindl. *Guaiacum* & *quadrifidum*, Lam. *Ballou's Guaiacum*, V. Miller & C.

Order V. MENISPERMACEÆ. Gefh. Pl. 1. 30.

* Climbing or trailing, rarely erect shrubs. Leaves alternate, usually petiole-pressed, often petiole stipules. Fl. small, flowers or polygamous. Petals usually 5, the outer 3 often minute. Petals usually 6, sometimes wanting. Stamens compound 6, free, opposite to petals or inserted in a staminal column. Carpels distinct, 3 sometimes more, of 1-2 cells, ovary 1-2 in *Fiberis*. Fruit generally dehiscent, the seed enclosed in a woody or coriaceous endocarp, usually curved or horse-shoe shaped, scar of style often near the base of carpel.

Essential nature and characters—The wood of all species is remarkably heavy, alternating with broad wedges of wood, and has a pale very soft pith. Many species have concentric bands of hard (siliceous) in the wood. This is the quality *Chamaepitys* *Phytolacca*, *Spina*, *Herposiphonia*, *Thalassia*, *Maritima*, *Phytolacca*, and also in *Chamaepitys*, and in the tree trunk in this order. These bands of hard in the wood have been called *concentric*, *imperfectly* because they are partial, alternating various of wood and hard, excepting a few, and only of the circumference.

The following species, and probably many more, have no kind of hard in the wood: *Agropyron*, *Levisticum*, *Thalictrum*, *Chamaepitys*, and *Chamaepitys*.

- | | |
|--|---|
| A. Ovary 1, style near base, leaves generally petiole-pressed, sepals 4-5, petals 5-6, free. | 1. <i>SPINARIA</i> |
| Sepals 4-5, petals 5-6, free. | <i>GUAIACUM</i> (p. 25) |
| Sepals 4-5, petals 5-6, free. | 2. <i>SPINARIA</i> |
| Sepals 4-5, petals 5-6, free. | <i>LEVICISTICUM</i> (p. 25) |
| B. Ovary 2, style near base, terminal. | 3. <i>THALICTRUM</i> |
| <i>Phytolacca</i> distinct. | 4. <i>LEVICISTICUM</i> |
| Anthers of a class not distinct, seeds 12. | <i>Phytolacca</i> (p. 25) |
| Anthers of a class not distinct, seeds 12. | <i>GUAIACUM</i> distinct, leaves generally not petiole-pressed. |
| C. Ovary 2, sometimes lower, style near base of fruit, generally not petiole-pressed. | 5. <i>AGROPYRON</i> |
| <i>Chamaepitys</i> , at base. | <i>CHAMAEPITYS</i> (p. 25) |
| Seed ellipsoidal, horse-shoe shaped, scarless. | 6. <i>THALICTRUM</i> |
| Sepals 4, petals 5-6. | 7. <i>AGROPYRON</i> |
| Petals 6, ovary 12. | <i>CHAMAEPITYS</i> (p. 25) |
| Petals 6, ovary 12, style with. | 8. <i>LEVICISTUM</i> |
| Petals 6-8, ovary 2. | <i>SPINARIA</i> (p. 25) |
| Seed small, scarless. | <i>PHYTOLACCA</i> (p. 25) |
| Sepals 4, petals 5-6. | <i>CHAMAEPITYS</i> (p. 25) |
| Sepals and petals 6, stigma 12. | <i>CHAMAEPITYS</i> (p. 25) |
| Sepals 6-12, petals 6, stigma 12. | <i>CHAMAEPITYS</i> (p. 25) |
| Sepals 6, petals 6, stigma 12. | <i>AGROPYRON</i> (p. 25) |

1840. From the Garden of Berlin.
Fl. Brit. Ind. 1. 1840.
The wood, of the palm-tree of India.
The bark, of the palm-tree of India.
The fruit, of the palm-tree of India.

ANAMIKTA, Colebr.
Fl. Brit. Ind. 1. 1840.

Species 2. 1. In the garden of Berlin.
Fl. Brit. Ind. 1. 1840.

A. paniculata, Colebr., Trimen
Himal. Coyon. 1840. Fl. Brit. Ind. 1. 1840.
Wight et Arn. Journ. Kew. 1838. 1840.

The powerful glaucous climber
stem woody, 4 in diam. twigs
small, opposite, and spreading.
Numerous axillary, bark thick,
in age deeply cracked. Leaves
oblong ovate, cordate, serrately
marginate, blade 4-8, petiole 2-6 in long.
total length 1-2. Fl. green, axillary,
in long pendulous panicles, sepals 5,
petals 10. Numerous 2-3 lined
stamens, round the top of a short
central column. Style 4-6 carpels
style lateral. Inguis usually 2
back, 1 in diam, on short thick
stalks, in simple panicles.



Fig. 1. Anamikta paniculata, Colebr.
at 1st fruit.



Fig. 2. Anamikta paniculata, Colebr.
at 2nd fruit.

Var. 1. In the Garden of Berlin.
Fl. Brit. Ind. 1. 1840.
The fruit, of the palm-tree of India.
The bark, of the palm-tree of India.
The wood, of the palm-tree of India.

Coccoloba penetrans, Colebr.
probably in the Himalayas.
Fl. Brit. Ind. 1. 1840.
The fruit, of the palm-tree of India.
The bark, of the palm-tree of India.
The wood, of the palm-tree of India.

TILIACORA, Colebr.
Fl. Brit. Ind. 1. 1840.

T. racemosa, Colebr., also only
species. Vesp. Baromet. Outh, Tiliacora
Beng.

A large evergreen climber perfectly
glabrous, leaves ovate, blade 2-5 in,
petiole 1 in long, 3 basal nerves.

the lowest pair of secondary nerves from near the base, subparallel veins connecting. Fl. yellow, surrounded by small white or secondary perianth. Petals 5, 2 on the inner much larger (petals), minute stamens 6, 2 on each side of tube, 1-10, 10 short styles, broad to long, reflexed, stigma 1 and base of tube ultimately only, acylated and linear. Bark black, inner red, West of Peninsular. Fl. B. S. L. 1828. V. 1830. 1831. 1832. 1833.

COCULUS DC. Fl. Bor. Ind. 1: 101.

Small to large woody climber. Fl. racemose, pale, the lower bracts pointed, shorter than the space of the lower cord. Stamens 6, 2 on each side of tube, 1-10, 10 short styles, broad to long, reflexed, stigma 1 and base of tube ultimately only, acylated and linear. Bark black, inner red, West of Peninsular. Fl. B. S. L. 1828. V. 1830. 1831. 1832. 1833.

1. *C. laurifolius*, DC. ; Bracon V. Fl. B. S. L. 1828. V. 1830. 1831. 1832. 1833.

An erect, prostrate shrubby or woody climber, the lower bracts pointed, shorter than the space of the lower cord. Stamens 6, 2 on each side of tube, 1-10, 10 short styles, broad to long, reflexed, stigma 1 and base of tube ultimately only, acylated and linear. Bark black, inner red, West of Peninsular. Fl. B. S. L. 1828. V. 1830. 1831. 1832. 1833.

2. *C. macrocarpus*, Wight et Arn. - Syn. *C. glaucocarpus*, Kurz. Fl. B. S. L. 1828. V. 1830. 1831. 1832. 1833.



FIG. 11. *Cocculus laurifolius* Wight et Arn. Fl. B. S. L. 1828. V. 1830. 1831. 1832. 1833.

A gigantic glabrous woody climber, stem as thick as a man's leg, bark smooth, branchlets with numerous slender rays, leaves 1-2 ft. long, 1/2 to 1 in. broad, long petiole 1/2-1 in. long, 3-5 basal nerves. Fl. numerous, pale yellow, in pendulous panicles 1-2 ft. long, arising from the old wood. Ripens to a 2-lobed, obovate, nearly 1 in. long, tapering into a short beak, each carp with transverse teeth.

Went on the Peninsula, from Malabar, Malabar, Kasauli, Chittagong, D. H. Burma Fl. February-March, 1893. West of Peninsular, Malabar, Kasauli, Chittagong.

Two small woody climber, stem as thick as a man's leg. *C. villosus*, DC.

Persea indica (Gaertn.) DC. - Bark black, inner red, West of Peninsular. Fl. B. S. L. 1828. V. 1830. 1831. 1832. 1833.

Persea indica (Gaertn.) DC. - Bark black, inner red, West of Peninsular. Fl. B. S. L. 1828. V. 1830. 1831. 1832. 1833.

8. LIZACIA, Lamour. Bot. Bot. Indes 10

Woody climber, leaves opposite, petioles 1/2 inch long, ...

L. cuspidata, Hook. et Thoms. Bot. Beechey's Voy. ...

Psychotria vicia, Mart. Bot. Indes 10, ...

Psychotria pendula, Mart. Bot. Indes 10, ...

Psychotria ... (faded text)

Psychotria ... (faded text)

Order VI. BERBERIDACEÆ, Gen. Pl. 1. 40.

(Berberidaceæ)

Laetiglobus and Herb. Indes, Karst. et Prant, Bot. 2, pp. 67, 70

Habitus scandens, scandens, climbing. Leaves alternate, simple or ...

- A. ... B. ... C. ... D. ... E. ...

HOLOBELLIA, W. & A. Bot. Beech. 1: 166.

Species 2, both from India.

1. *H. latifolia*, W. & A.: *Druidia*, in *Fl. Brit. Ind.* 2: 436, *Hort. Kew.*, N. W.

A large climber, the ends of branches often transformed into tendrils. Upper leaves ovate, deeply 3-5-veined vertically. Wood of axis with large vessels, separated by very broad medullary rays; pith rays of wood in the wood. Leaves 2-8 (11) cm, leathery-succulent, ovate-lanceolate, base 3-4, petiole 1 in. Fl. in racemes, purple-green, axillary-axillary. Sepals 6, petals 6, anthers 6, ovary 6. Fruit consisting of 2-3 fleshy scales along surface, 2-4 in. long, seeds numerous, in several vertical rows, immersed in pulp.

Himalaya 1500-2000 ft. from Kashmir eastwards. Khasi hills, Manipur, Chittagong, Mysor.

Pavetta bromelioides, DC. *Prodr.* 7: 42, *Fl. Brit. Ind.* 2: 180, *Annals Kew. Herb. Trop.* 2: 254, *Pl. Ind. Bengal.* 2: 224. A large climbing shrub with trifoliate leaves. Fl. scarlet, greenish yellow in axillary fasciated racemes. Ripe capsule 1-1 1/2 in. long, 3/4 in. diam., woody.

Dioscorea insignis, Hook. & Thoms. *P. Acad. Sci. Philad.* 10: 44, *Trans. Acad. Sci. Philad.* 1: 243, *Fl. Brit. Ind.* 2: 166, *Annals Kew. Herb. Trop.* 2: 254, *Pl. Ind. Bengal.* 2: 224. A large climber with a few leathery, ovate leaves and a sort of large imbricately branched, 2-10 in. long, branch arising from the axillary node, and a small, branched, above horizontal or subterminal, fl. green, branches, 1-1 1/2 in. long. Sepals 6, petals 6, anthers 6, ovary 6, capsule 1-1 1/2 in. long, 3/4 in. diam., woody. Fruit consisting of three scales, fleshy, with spreading lobes, red-drumy. Wood vertical, medullary rays various, pith large.

9. BERBERIS, Linn. *Fl. Brit. Ind.* 2: 438.

Shrub or arbutus with yellow wood. Leaves young-toothed, simple or imparipinnate. Fl. yellow, sepals 6, tuberculate in two series, with a few appressed bracts, petals 6, imbricate, anthers 6, another cell opening by recurved valves. Ovary 1, stigma lobate, sessile or on a short style, ovules usually few, basal. Fr. a berry. 1-pound of 100 berries, many variable, closely allied, and difficult to keep apart. Temperate and subtropical regions of the northern hemisphere and temperate South America.

Section I.—Mithoid. Leaves imparipinnate, leaflets opposite.

1. *B. nepalensis*, Spreng. *Syn. R. Leschenaultia*, Wall. *Wight Ic.* 1: 340. Vern. *Kanli*, *Naror*, *Chambar*; *Khor*, *Jansa*, *Morantia*, *Trav.*

An evergreen shrub. Leaflets 6-12 pair, ovate-lanceolate, 1-5 in. long, the lower pair often very the base much smaller and nearly orbicular, common petiole articulate at the insertion of leaflets, frequently two small subulate stipules on its broad, nearly sheathing base. Upper leaves often reduced to sheathing bracts. Bark very rough, scaly, vertical at the ends of branches. Berry blue-glaucous, oval, glaucous on the Nilgiris.

Oxley Himalaya, 4000-5000 ft. from the Barren hills. Khasi hills, Manipur, Duria hills Nilgiris. Fl. October-April.

Section II.—Berberis proper. Branches ribbed, leaves simple, gradually narrowed into a short petiole, those on a rugated stem generally reduced to simple or 3-7-toothed spines, in the axils of which are arrested branchlets, bearing tufts of leaves. The stems with elongated internodes generally grow from the terminal bud of a short arm of branch.

A. Fl. in racemes, terminal or umbell.

2. *B. vulgaris*, Linn.: *Hort. Kew.* *Fl. Brit. Ind.* 2: 438. Vern. *Chambar*, *Chauchar*, *Hana*.

D. glaucous, dark grey, branchlets red. Leaves membranous or thinly coriaceous, glaucous beneath, serrate with equal spiniflex teeth, or cleft or arrested bipinnately in the axils of 3-4d, rarely 5-6d or single spinous. Racemes pinnulate, slight beyond sessile. Berry ovoid or cylindrical, as long as or shorter than pedicel, usually red when ripe.

North-West Himalaya, mainly in the valley of the River Ravi, Surinagar, Chitral, 19000 ft. Fl. March-June. Tibet, Northern Asia, Japan and China, Afghanistan, Europe. A tree with thick, coriaceous leaves in Kashmir etc.

4. *B. arizata*, DC. Brand. F. Fl. 12; Coll. in Sindh Fl. Ind. Bot. Soc. Ind. *tinctoria*, Lessing; Wright Bot. Soc. Yarn. *Kashmiri*, *Kashmiri*, *Kashmiri*, *Sarala*, *Bagi*, *Solan*, *Kan*, *Kashmiri*, *Kashmiri*.

Branches spreading, reddish-brown, slightly drooping. Leaves coriaceous, more or less persistent, obscurely oblanceolate, green beneath, entire, or with few large distant spinous teeth. Fl. yellow, six long drooping compound racemes, much longer than leaves, peduncles and pedicels slender. Berries spindle-shaped, tapering into short style, stigma small, sagittate.

Outer Himalaya, India to China, 10000-15000 ft. Szechuan, Yunnan, Fl. March-June. On high exposed ridges, shrubby with smaller leaves and short racemes.

5. *B. Lycium*, Roemer; Brand. F. Fl. 12. Vern. *Kashmiri*, *Choshite*, *Choshite*, *Sindh*.

An erect shrub, bark grey or whitish, branches rigid. Leaves narrow, lanceolate or oblanceolate, coriaceous, mucronate, generally entire, bright green above, glaucous beneath. Fl. small, pale yellow, in corymbose, at times compound racemes, which generally are as long as or a little longer than leaves. Petals slender, longer than the five ovoid berries, style distinct, stigma sagittate.

Outer North-West Himalaya, on craggy slopes along the roadside, often gregarious, from Kashmir to Gilgit, 10000-15000 ft. Fl. March-April, a fortnight earlier than *B. arizata*.

6. *B. asiatica* Koch. Brand. F. Fl. 12.

Bark pale, the arrested leaf-bearing shoots often at the top of short woody tuberculate branchlets of previous years. Leaves rigidly coriaceous, white beneath, ovate, some lance-nearly orbicular, nerves and veins strongly reticulate, dense below. Branchlets 5-6d. Seedlings have broadly ovate leaves, tuberculate, more than twice the length of blade. The juvenile state of other species (*B. Wallichiana*, *B. aristata*) is similar. Fl. in short corymbose racemes. Berries large, oval, often nearly globose, red or black, stigma capitate or sessile, style distinct. Outer Himalaya from Sindh to Kashmir, calling it *B. D. Pinnata* in Behar (H. S.).



FIG. 12.—*Berberis asiatica* Koch. —(Left) and fruiting branch. —

ORDER VII. CAPPARIDACEÆ. Gen. Pl. v. 101.

Capparidaceæ

Herbs, shrubs, or trees, sometimes climbing. Leaves simple or 2-3 lobed, stipules mostly wanting, in some a pair wanting. Flowers generally with 5 or 6 sepals. Sepals 4-5, free, sometimes partially connate. Corolla with 5 or 6 lobes, open or not. Stamens 6 or 8, generally numerous. Ovary 1-3 celled, 1-2 distant carpels, generally 3-lobed, or a single sessile lobed ovary elongated by an inferior style, or a long style with a dilated stigma. Seeds 2-10, or numerous, embryo straight.

Maerua is distinguished by the presence of a long style with a dilated stigma, and is distinguished by the presence of a long style with a dilated stigma.

Capparis is distinguished by the presence of a long style with a dilated stigma.

Leaves 3-5 lobed, generally 5-7 lobed.
Leaves simple, lobed, or fruit sessile.
Leaves simple, lobed, or fruit sessile.
Sepals 4-5, free, sometimes partially connate.

1. *Xylocarpus*
2. *Maerua*
3. *Capparis*
4. *Capparis*

Sepals 4, imbricate or in 2 pairs, free or connate.
Stamens 6-8, inserted high up on the corolla tube.
Stamens numerous, inserted at the base of corolla tube.
Ovary 1-3 celled.

1. *Capparis*
2. *Capparis*
3. *Boerhaavia*

1. NIEBUHRIA, DC. Fl. Ind. Ind. 1: 171.

Species about 8, most in South Africa.

N. linearis, DC. Fl. Ind. Ind. 1: 174. Syn. *Maerua linearis*, Pax in Engelm. & Payson, in 2: 231.

A small tree with pale grey bark and 3-5 lobate leaves, leaflets 10-15 lobate, 1-2 in. long, midrib distinct, secondary nerves scarcely visible. Racemes terminal, few fls. Corolla tube short, limb 4-5 lobed, valvate, petals 5. Stamens 6, inserted on the corolla tube considerably above its base. Ovary numerous on 2-3 perianth placentae. Berry small, 1-seeded, obovoid-fleshy, urdate.

Hilliers in East India, the Western Provinces.



2. MAERUA, Forskall

Fl. Brit. Ind. 1: 171.

Species about 21, some in Africa, in 1 to tropical Africa.

M. arenaria, Hook. & Thoms. Trans. Zool. Soc. Ceylon 1: 58. Syn. *M. multiflora*, Vahl; Choisy, Fl. Bonin 1: 41. Vern. Ghas, Guzerat.

A large woody climber, bark light grey, leaves 3-5 lobed, 1-2 in. long, 1-2 in. wide.

Fl. Ind. Ind. 1: 171.

elliptic or elliptic-lanceolate, 1-1½ in. Fl. greenish white, as from an inflorescence of lateral axils. Style tube lined by a disk on the edge of which the disk or petals are inserted. Ovary x inserted on 2 parietal placentae. Fruit yellow, 1-1½ in. long, 3-4 ribs or striations, white seeded, each seed 3-partite forming almost a separate berry. Catechu-like fleshy, in young.

Dwarf part of North-West India and Pakistan. Fl. B. Ind. 1, 172.

Banksia variabilis Coll. et Hemsley. Journ. Linn. Soc. ser. III, 2, 1845, p. 106. *Banksia variabilis* Kuhn. F. Fl. Ind. Med. Ind. and the East. In *Flora Indica*. A small tree, which produces leaves similar to those of *Banksia variabilis* but is distinguished by a fleshy similar to the bark of *Banksia variabilis* with a small number of other small plants.

3. CRATÆVA, Libos. Fl. Brit. Ind. 1, 172.

Deciduous tree with alternate leaves. Fl. large, sometimes umbelliferous or cymose. Sepals 4, deciduous, petals long, adnate, fused in bud, both inserted into fleshy often lobed disk. Stamens numerous on 2 parietal placentae with long of a ribbon, anthers 2 with numerous grains. Spikes 14, in the tropics of both hemispheres.

1. *C. religiosa*, Forst. & Bell. F. Sylv. 1, 176. *Cratæva religiosa*, R. Br. & Kuhn. F. Fl. Ind. Med. Ind. and the East. *Cratæva religiosa*, H. B. K. Fl. Ind. Med. Ind. and the East. *Cratæva religiosa*, H. B. K. Fl. Ind. Med. Ind. and the East. *Cratæva religiosa*, H. B. K. Fl. Ind. Med. Ind. and the East.

A moderate-sized tree, large white flowers and branches, bark with grey, irregular, wrinkles, wood yellowish white, green ribs, and a smooth-grained. Leaves clustered at the ends of branches, common, petioles 1-1½ in. long, blade ovate-lanceolate, acuminate, the lateral veins an oblique line, petioles articulate. Fl. 2 in. diam., green, 5-6 lobed. Enveloped by glabrous 2-3 in. diam., red hard, rough, with numerous white spots, seeds 1 in. long, numerous, reddish, in a yellow pulp.

Subtropical tree, 10-15 ft. tall, bark smooth, according to H. B. K. Fl. Ind. Med. Ind. and the East. *Cratæva religiosa*, H. B. K. Fl. Ind. Med. Ind. and the East. *Cratæva religiosa*, H. B. K. Fl. Ind. Med. Ind. and the East. *Cratæva religiosa*, H. B. K. Fl. Ind. Med. Ind. and the East. *Cratæva religiosa*, H. B. K. Fl. Ind. Med. Ind. and the East. *Cratæva religiosa*, H. B. K. Fl. Ind. Med. Ind. and the East.

4. CADABA, Forst. & Bell. Fl. Brit. Ind. 1, 172.

Upright shrub. Leaves simple or 3-foliate. Sepals free. Petals clawed, 4-5, mostly 5. Disk imbricate, lobed, 4-6, inserted high up on the gynophore. Ovary x on 2-4 parietal placentae. Fruit slender, fleshy, 1 distal, deciduous. Catechu-like, in young. Spikes 14, in regions of Western Asia and Tropical Africa, also in the Malay Archipelago and North West Australia.

1. *C. indica*, Lamour. Verc. *Cratæva indica*, Kuhn.

A straggling tree or shrub. Leaves simple, 1-1½ in. Fl. yellowish white, petals 4, imbricate. Disk process 1 in. curved, pink. Fruit cylindrical, irregularly torulose, 1-1½ in. long.

Local names: Beng. *Cratæva indica*, Desv. *Cratæva indica*, H. B. K. Fl. Ind. Med. Ind. and the East. *Cratæva indica*, H. B. K. Fl. Ind. Med. Ind. and the East. *Cratæva indica*, H. B. K. Fl. Ind. Med. Ind. and the East. *Cratæva indica*, H. B. K. Fl. Ind. Med. Ind. and the East. *Cratæva indica*, H. B. K. Fl. Ind. Med. Ind. and the East.

Cratæva indica, H. B. K. Fl. Ind. Med. Ind. and the East. *Cratæva indica*, H. B. K. Fl. Ind. Med. Ind. and the East.

trunk short, erect, often 4-6 ft., with branches numerous, green, divaricating, forming a dense rounded crown. Wood close-grained, tough, roots numerous, spreading deep and wide. Leaves on young shoots only, glaucous, linear, $\frac{1}{2}$ in., occasionally larger spatulate, to $\frac{1}{2}$ in. long, stipular thorns yellowish, straight. Fl. 1 in. diam., red or scarlet, rarely yellow, in corymbs on short lateral branchlets. Fruit 2 in. long, $\frac{1}{2}$ in. diam., red, on a gynophore $\frac{1}{2}$ in. long.

Arid and dry regions of the Western Peninsula, from the Punjab and Sind to Fatah Gharh. Fl. October-June.

8. *C. Roxburghii*, DC.: Wight Ic. t. 1018. Vern. *Poorri*, Mar.

A large woody climber, branchlets finely tomentose. Leaves 2-3 in., glabrous, elliptic, petioles $\frac{1}{2}$ in., stipular thorns sometimes wanting. Fl. white, $\frac{1}{2}$ in. diam., in corymbs of 4-10 at the ends of branches. Fruit globose, $1\frac{1}{2}$ -2 in. diam., on a woody stalk $2\frac{1}{2}$ in. long.

Evergreen forests on the Western Ghats from North Kanara southwards, also on the east side of the peninsula (Sriharikottai) Fl. R. S. Nearly allied, but quite distinct, is *C. Mocini*, Wight: Triumf. Handb. Ceylon, 1. 63, Western Ghats, from Khandala southwards, Ceylon. A very ornamental shrub, branchlets brown, glabrous, shining. Leaves elliptic-oblong, 2-4 in. Fl. white, 1-3 in. diam., in many fld. corymbs at the ends of branches, peduncles stout 2-3 in. long. Fruit globose, 2-4 in. diam., on a woody stalk.

10. *C. grandis*, Linn. fil. Vern. *Fachijada*, Katarai, Mar.

A small tree, generally unarmed, trunk thick, short, branchlets and leaves softly tomentose beneath. Leaves 2-3 in., rhomboid-ovate or obovate; secondary nerves 8-10 pair, distinct, as well as the reticulate tertiary nerves between. Fl. white, $\frac{1}{2}$ in. diam., in many fld. corymbs at the ends of branches, pedicels thick, tomentose. Fruit purple, size of a nutmeg.

Chanda, Deccan, and east side of the peninsula. Fl. March to October, Ceylon. Kurz, F. Fl. I. 64, states that it is frequent in the dry forests of the Prase district. A specimen marked by him *C. goudotii*, L., and *harziana*, Kurz, is different; the flowers are smaller and they are on very slender pedicels.

11. *C. parviflora*, Hook. fil. & Thoms., southernmost parts of the Western Peninsula, a large spreading shrub unarmed. Leaves 2-5 in. elliptic-lanceolate, acuminate. Fl. less than $\frac{1}{2}$ in. diam., on slender pedicels, in 8-10 fld. shortly pedunculate umbels. Fruit purple. 12. *C. pedunculosa*, Wall. Western Ghats, from Matheran southwards, also on the east side of the peninsula. A spreading shrub with stipular thorns, varying in length, leaves broadly ovate, 1 in. long. Fl. $\frac{1}{2}$ in. sessile or slender pedicels $\frac{1}{2}$ in. long. Fruit globose. Not specifically distinct is *C. longispina*, Hook. fil. & Thoms., with straight divaricate long stipular thorns. 13. *C. diversifolia*, Wight et Arn. Southern part of the Western Peninsula. A glabrous shrub with dense branches. Leaves on some branches linear, $1\frac{1}{2}$ in. long, on others ovate-lanceolate, stipular thorns sharp, recurved. Fl. purple, $\frac{1}{2}$ in. diam. in few fld. terminal corymbs. Fruit ovoid, $\frac{1}{2}$ in. long.

C. Fl. in umbels or corymbs. Eastern species and species common to both regions.

14. *C. sepiaria*, Linn.: Beauv. F. Fl. 15; Kurz, F. Fl. i. 66. Vern. *Katān*, *Katācan*, Merwara.

A thorny shrub or small tree. Branchlets pubescent. Leaves 1-3 in. elliptic or elliptic-lanceolate, downy beneath. Fl. white, $\frac{1}{2}$ in. diam., in many fld. terminal or axillary umbels, pedicels filiform. Fruit globose, black when ripe, $\frac{1}{2}$ in. diam.

Punjab and north-west, not common, Merwara hills. Common in the arid districts of both Peninsulas, Eng. forest of Burma. Fl. February-May-Ceylon, Malay Peninsula and Archipelago. 15. *C. orbiculata*, Wall. After Burma, is a rigid spreading shrub. Leaves 1-1 in. long, from a slightly cordate base broadly obovate, or nearly orbicular, stipular thorns sharp, recurved, from a thick downy base. Fl. small, in pedunculate umbels, pedicels filiform, peduncles slender. Kurz, F. Fl. I. 64, is disposed to identify

C. leaves ... *C. ...* ... *C. ...* ... *C. ...* ... *C. ...* ... *C. ...* ...

D. Fl. ...

21. *C. ...* ... Leaves ...

C. *C. ...* ... *C. ...* ... *C. ...* ... *C. ...* ...

E. Fl. axillary and intra-axillary, in vertical lines on the branches.

22. *C. horrida*, Linn. fl. Wigat 161. ...

A ... climbing shrub ... Leaves ...



C. horrida, Linn. fl. Wigat 161.

pink filaments purple. Fruit obovoid or globose, 1-1½ in. diam., reddish brown.

Plains and lower hills in most parts of India and Burma. Fl. December to April. Also Ceylon, Malay Peninsula and Archipelago. *C. costata*, Willd. Fl. Brit. Ind. t. 178, may possibly only be a form of *C. horrida*.

A scrambling, thorny shrub, common on the Aravalli hills in Merwara (*Gilbran*), branchlets and l. softly tomentose, l. broadly elliptic, 2-3 in., second. n. 10-15 pair, fr. 1 in. diam., glabrous shining, gynophore stout, has not yet been named.

27. *C. tenera*, Dalt.; Vern. *Sun let the*, Burm.

A straggling glabrous armed climber. Leaves membranous or thinly coriaceous, 1-3 in. Fl. white, ½-¾ in. across, 2-3 in a vertical series, pedicels biliform, ¼-1½ in. long, petals tomentose outside. Fruit small, few-seeded.

Evergreen forest of the Western Ghats, Kaulin and North Kanara, Assam, Manipur (cultivated as a hedge plant), Andaman, Lower and Upper Burma. Fl. H.S.—Ceylon. To this possibly belongs *C. dielska*, Kurz, F. Pl. t. 62.

The following species of this section all belong to the Eastern region: 28. *C. multiflora*, Hook. fil. & Thoms., Sikkim, up to 5000 ft., Manipur, Upper Burma. A large unarmed shrub or small tree with long branches. Leaves 6-12 in., membranous, secondary nerves 8-12 pair, with shorter intermediates as well as intramarginal nerves prominent beneath. Fl. small, on slender pedicels, in long rows along twigs, forming elongated many-fl. racemes, generally with a few leaves at the top. 29. *C. olacifolia*, Hook. fil. & Thoms., Sub-Himalayan tract from Nepal eastwards in Sikkim under Khasi and Saiso along river banks. A sm. Shan State, Upper Burma. A large shrub. Branchlets pubescent. Leaves 4-5 in., glabrous, ovate-lanceolate, acuminate. Fl. 1½ in. across, white, anthers blue. Fruit ½ in. diam., red or black, shining. 30. *C. viminea*, Hook. fil. & Thoms.—Syn. *C. macrophylla*, Kurz, F. Pl. t. 61. Sikkim (to 4000 ft.), Assam, Britan, Upper and Lower Burma. A large glabrous shrub, thorns wanting or minute. Leaves membranous, 5-6 in. long, elliptic, abruptly acuminate. Fl. 1 in. across, white, 2-5 in a vertical row. Fruit purple, ½ in. diam. 31. *C. sabiaefolia*, Hook. fil. & Thoms. Khasi and Naga hills, Yunnan. A large unarmed glabrous shrub. Differs from 30 by ovate-lanceolate leaves 2-3 in. and smaller platform 1-2-seeded fruit. 32. *C. andracantha*, DC. Pegu, Tenasserim, Malay Peninsula. A large shrubby small tree, glabrous, thorns minute. Leaves 4-8 in., coriaceous, shining, secondary nerves 6-8 pair, prominent beneath. Fl. white with a blue centre, 1½ in. across, 2-4 in a vertical series, pedicels ½ in. long. Fruit ovoid, 2-3 in. diam. 33. *C. xanthophylla*, Coll. et Hemsl., Journ. Linn. Soc. xxxvii. 20. Dry forest of the middle Irrawaddy, Yunnan. Thorns minute. Leaves coriaceous, 2-3 in., narrowed into petiole ¼ in. long. Buds and flowers rusty-tomentose.

34. ROYDSIA, Roxb.; Fl. Brit. Ind. t. 180.

Unarmed woody climbers. Branches often lenticellate. Leaves simple, Fl. in racemes or panicles. Calyx deeply 6-partite, segments biserrate; petals 0. Stamens 20 inserted at the base of the cylindrical gynophore. Ovary 3-celled, ovules biserrate in the angles of the cells. Fruit fleshy, endocarp woody or crustaceous, 3-valved, 1-seeded. Seed 1, cotyledons fleshy, unequal, the larger embracing the smaller. Species 6, eastern tropical Asia.

A. Styles 3, ovules many.

1. *R. suaveolens*, Roxb. Cor. Pl. t. 189. Vern. *Khuyng*, Ass.; *Ngau* etc. Burm.

A large climber. Branches with raised white dots. Leaves 6-12 in., acute or abruptly acuminate, glabrous. Fl. ¾ in. diam., sweet-scented, anthers bright yellow. Drupe 1½ in., orange-coloured, covered with a thin brittle rind, endocarp smooth.

Sikkim ascending to 3000 ft., Assam, Britan, Khasi hills, Manipur. Upper Burma. Fl. Feb.-May. 2. *R. obtusifolia*, Hook. fil. & Thoms.; Low. Burma, plains of the delta

and valleys. Leaves 1-2 in. long, 1/2-1 in. wide, smooth, glabrous, serrate.

R. stylis L. with 3-lobed style.

3. *R. parviflora*, Willd. Fl. Brit. Ind. i. 499.

Leaves glabrous, 4-7 in. long, 1-2 in. wide, serrate, smooth, glabrous. A large stipule or terminal rachis, ovate, about 1 in. each side.

Fls. Ceylon. India. Malay Peninsula. *R. truncata*, Willd. Fl. Brit. Ind. i. 499. Banks of Yomahon, Java. India. Young branches, under side of leaves and underneath of primary branches, leaves 4-6 in. long, 1/2-1 in. wide, in short hairs, etc.

Order VIII. *Rosodendron*, *Leptodermis* (Gaertn.) Willd. Fl. Brit. Ind. i. 499. India, Malabar, mostly regions of Western Ghat and South Eastern Africa. *R. b. b. b.* (Gaertn.) Willd. Fl. Brit. Ind. i. 499. Leaves 4-12 in. long, 1-2 in. wide, serrate, glabrous. Petals 5, long 1/2-1 in. long. Ovary 3-lobed, 10-12 in. long, 1/2-1 in. wide, in short hairs, etc. Fruit a white fleshy berry.



FIG. 15.—*Megala macrodon*, Roth. 1.

Order IX. VIOLACEÆ. Gen. Pl. i. 114.
(Violaceæ)

Herbs or shrubs, leaves alternate, stipulate. Fl. regular or zygomorphic, pentamerous, filaments short, anthers produced beyond the anther cells, (rarely 1-lobed, ovules many) of 3 parietal placentae. Fruit a 3-valved capsule, albumen few.

1. *ALSODEIA*, Thunb.; Fl. Brit. Ind. i. 186.

Shrub or rarely tree. Leaves simple, tertiary nerves distinct, parallel, stipules rigid. Fl. small, regular, sepals 5, yellow, petals 5, polypetalous with many layers. Stamens 5, inserted on the edge of an annular disk or inside of it, consecutive, produced into a broad membranous appendage. Style straight, stigma terminal, seeds 6. Spices 64 in the tropics and both hemispheres.

1. *A. bengalensis*, Wall.; Kurz, F. Fl. i. 73.

An evergreen shrub at times a small tree, attaining 25 ft., entirely glabrous. Leaves 3-5 in., serrulate, stipules narrow. Fl. 1/2 in. diam., glabrous, fasciculate in the axils of leaves or of fallen leaves, disk thick, 5-lobed, stamens included, anthers free, ovary and style glabrous.

Nikita, Nepal, East Ind. Archipelago, Lower Burma. Fl. Herb.

2. *A. zeylanica*, Trév. in Bedd. Bot. Syle. 1: 226.
 Differs by pubescence branched, the leaves absolutely serrulate, stipules
 usually subulate and conspicuous, pedicel
 ... A. Beckingham, ...
 ... A. ...
 ... A. ...
 ... A. ...
 ... A. ...

ORDER X. BIXACEÆ. Gen. Pl. 1: 122.

Bixaceæ. Wedberg in Engler and Prantl, Bot. Jahrb. 6: 36, and a section of
Flacourtiaceæ, Bot. Jahrb. 6: 12

Trees or shrubs, with alternate simple leaves. Sepals 5, adnate or early
 deciduous. Fl. regular, often 1-sexual, tetramerous or pentamerous. Anthers
 2-ovuled, bursting by splits or pores. Disk thickened, fleshy, glaucous. Ovary
 one, usually 1-celled, ovules 2 or several, parietal placentae. Seeds frequently
 with an arillus or a pulpy testa, embryo enclosed in a fleshy, generally oily
 albumen, cotyled. 2 foliaceous.

The 2 first genera, *Chloroxylon* and *Alchornea*, Mart. in Syst. Bot. and Beech.
 K. and Palm. in Linn. Journ. 1: 1, see under *Flacourtiaceæ*.

- A. Fl. tubular, petals 4-5
 - Leaves palmately lobed or divided
 - Leaves entire, fl. large, petals 4-5, style 1-nerved
 - Leaves entire, fl. small, petals 4-6, style 2-nerved
- B. Fl. 2-lip, like the large petals 5
 - Ovary 1-celled
 - 2 Folioseae
 - 1 Xyl.
- C. Fl. tubular, petals 4-5, style 1-nerved, ...
 - 1 Centrosema
 - 1 ...
 - 2 ...
 - 3 ...
 - 4 ...
 - 5 ...
 - 6 ...
 - 7 ...
 - 8 ...
 - 9 ...
 - 10 ...
 - 11 ...
 - 12 ...

I. COCHLOSPERMUM, Karst. Fl. Bras. 1: 109

Trees or shrubs. Leaves palmately lobed or divided. Fl. tubular, sepals 5,
 deciduous, petals 5, covering in bud with 5 coriaceous, inward-curving
 without glands, surface cells opening with a short slit at the top. Ovary
 numerous on 4-5 parietal placentae, style 1-nerved. Capsule 3-5-angled,
 seeds numerous, reniform, with long woody hairs. Albumen oily. Species 13,
 1 in India, 3 in Africa, 2 in Australia, the remainder in tropical America.

1. *C. Goarypium*, Bl. in Bedd. Bot. Syle. 1: 173, Karst. Fl. 1: 72. Vam.
Kambo, Kambé, Binlar *Keim*, Sabar *Haraj*, Xil. *Uasid*, Gosa, *Gosa*.
Bedd. Bot. Syle. 1: 173, Godefroy *Keim*, Mar. *Keim*.
 A very woody decid. tree, 20-30 ft. high, slender branches. Leaves more
 the ends of branches palmately 5-lobed, 4-8 in. diam, lobes shortly acuminate,
 entire, gray, venation reticulate, petioles 1-2 in. Fl. 4-5 in. diam, golden
 yellow, sepals silky, corolla pear-shaped, 3-4 in. long.

... (faint text describing a plant species)

... (faint text describing a plant species)

SCOLOPIA, Schubert, Fl. Bot. Jb., 5, 1841

Tree or shrub with axillary branches. Leaves alternate, the lowest pair of pairs ... (faint text describing Scolopia characteristics)

1. *S. crenata*, Blom., Hand. Fl. Syst., 1, 78. - *S. a. acuminata* Choisy. (faint text)

A milky-sap tree with young glabrous except in the scabrous wood ... (faint text describing S. crenata)

... (faint text describing S. crenata distribution and uses)

FLACOURTIA, Choisy, Fl. Bot. Jb., 1, 191

Tree or shrub, to 20 m. tall, with spicose branches, young shoots and ... (faint text describing Flacourtia characteristics)

1. *F. cataphracta* Rook. Kurr. Fl. Pl., 74. - *Vern. No-pis, Dufur.*

A milky-sap deciduous tree, wood thick, close-grained, stem armed with ... (faint text describing F. cataphracta)

... (faint text describing F. cataphracta distribution and uses)

the Malay Archipelago, cultivated in Java, in a part of the island of Sumatra. An ornamental specimen has been introduced from Java to the Botanic Garden, London.

3. Leaves ovate or obovate, length of blade not more than twice its greatest width.

5. *F. sepium*, Roxb. Cor. pl. 2. 68. Vern. Tombak; Malay, *Milidi*, Kau.

A much-branched shrub or small tree, the branches are a rule terminating in sharp rigid spines, which bear leaves and flowers. Leaves 1-2 lvs, glabrous, obovate from a cuneate base. Fl. yellowish. Involucres 3-4, distinct. Drupe purple, 1/2 in. diam.

Original localities: Malabar, Cochin, Travancore, Ceylon, the Nicobar Islands, Decan, Katak, Kerg, Nilgiri, Travancore, P. O., Ceylon, Java.

6. *F. Ramontchi*, J. Haenke: Berlin, F. Fl. 18; Wight Ind. 25.—Syn.

F. sapida, Roxb. Cor. Pl. 2. 69. Vern. *Kudai*, Hind. *Kavari*, C. P. *Gargol*, Benar. *Nehala*, K. I. *Kankara*, Martara; *Kudakey*, Banskara; *Poker*, *Andra*, *Mhatal*, *Towlot*, Mar. *Gupud*, Chong.

A large shrub, under favourable conditions a moderate-sized tree, with a short trunk and thorny branches, wood tough, close-grained. Leaves dark green, 1-5 in., variable in shape (long ovate to obovate), glabrous above, more or less pubescent beneath. Fl. yellowish-green, in short, simple or compound racemes, generally pubescent. Style 5-11. Drupe 1/2 in., dark-red or black, edible, stones interspersed in two tiers.

Native to India, from the Punjab to the Malabar, Behar, Central India, the Deccan and the Malay Peninsula, in dry rocky places, lowland rocky hills, Malabar, low and high forests of the lowland valley (Kort, F. Fl. 18). The leaves fall in January-February, the new foliage appears April and May. Fl. November-March. Also cultivated in Malabar, Amboyna.



FIG. 11.—*Ficus* *Ramontchi*, J. Haenke.

4. XYLOSMA, Poester: Fl. Brit. Ind. 1. 181a.

Characterised, *Flacourtia*, but every 1-celled placenta, 2, rarely more, parietal, axilla long. Style 4, short. Fruit a small 2-3 seeded berry. Species 30 tropical and subtropical regions of both hemispheres.

1. *X. longifolium*, Cass: Brand. K. Fl. 1. Vern. *Chingida*, *Chiruvada*, Pl. Katpalla, Katar, Hind.

A glabrous tree, glabrous, often armed with strong straight axillary spines. Leaves 4-9 in., coriaceous, shining, lanceolate, (oblong-lanceolate). Secondary nerves 8-10 pair, arching. Fl. small, discoid, in short axillary cymose panicles. Stigma is distinctly 1-lobed, berry 1/2 in. diam.

Malabar, Java and other hills ascending to 5000 ft. from the Punjab eastward Malabar. Fl. January-March. C. P. *X. controversum*, Cass. Near Kinnaird hills, Assam, China. Slightly allied, but by longer leaves, 9-12 in., 2-3 secondary nerves 6-8 pair. *X. latifolium*, Roxb. Cor. Pl. 2. 68. Hind. *Chingida*, Mysore. A large shrubby tree, branched, pubescent and indurated bark, pubescent, pericarp slender. Berry 1/2 in. diam.

5. GYNOCARDIA, R. Br.; Fl. Br. Ind. 1. 225.

G. odorata, R. Br. in Roxb. Cor. Pl. 2. 268 (the only species). Vern. *Chandungra*, Beng.

A large evergreen tree, strictly glabrous, wood hard, red or brown. Leaves

Small tree or shrub, with scarious bark. In Java on sandy soil, 2000-3000 ft. Small white flowers. Upper 20 ft. of tree. Western Ghats from the Khasi to the Nilgiri. Fl. January-June.

5. *P. malabaricum*, Wight & Arn., *Wight & Arn. Bot. Beechey's Journ. Botanic Garden Calcutta*, 1838, p. 115. *Malabaricum* small tree, 12 ft. in height, in flower. Petals 5, the 2 inner largest, petaloid wings. Petals 3-5, unequal, the lowest smallest, generally keel-shaped. Stamens 4-8, filaments usually united into a sheath, anthers mostly joining by terminal pores. Ovary 1-2-celled, 2-4-lobed. Capsule 2-4-lobed, 2-4-angled.

H. Krascheninnikoff, in *Leaves*, 1871, p. 115.

6. *P. eriocarpum*, Rydberg, *Berl. Bot. Ges. Verh. Reise Japan*, North-West Provinces.

A small tree with spreading branches. Bark of leaves and underneath yellowish beneath. Leaves 2-8 in., secondary part of 8-10 pairs. Fl. pale yellow, in short, compact, terminal panicles. Sepals 1-2-celled, densely tomentose. Capsule 2-celled, 2-4-angled, valves thick, woody, broad at tip.

India, North-West Himalaya, in India to Sikkim, 2000-3000 ft. Fl. March-April.

7. *P. dayazumum*, N. Walp., *Bot. Beechey's Journ. Krascheninnikoff's Journ. Reise Japan*, North-West Provinces. Leaves 2-8 in., secondary part of 8-10 pairs. Fl. pale yellow, in short, compact, terminal panicles. Sepals 1-2-celled, densely tomentose. Capsule 2-celled, 2-4-angled, valves thick, woody, broad at tip. Young leaves reddish. Bark of leaves and underneath yellowish beneath. Fl. pale yellow, in short, compact, terminal panicles. Capsule 2-celled, 2-4-angled, valves thick, woody, broad at tip.

Order XII. POLYGALACEÆ. Gen. Pl. i. 134.

Polygala.

Herb, rarely trees or shrubs, erect or scandent. Leaves alternate, simple, sessile or short-stipitate. Fl. zygomorphic, bisexual, 2-merous. Sepals 5, in 2 rows, the 2 inner largest, petaloid wings. Petals 3-5, unequal, the lowest smallest, generally keel-shaped. Stamens 4-8, filaments usually united into a sheath, anthers mostly joining by terminal pores. Ovary 1-2-celled, 2-4-lobed, 2-4-angled.

Herbaceous, simple, capsule 2-celled	1. <i>Polygala</i>
Tree or shrub, bark of leaves and underneath yellowish beneath	2. <i>Xanthoxylum</i>
Shrub, bark of leaves and underneath yellowish beneath	3. <i>Schinus</i>

1. POLYGALA, Beauv., *Fl. Bot. Ind. i. 290.*

Mostly herbs, a few shrubs. Sepals often persistent, the 2 inner petaloid. Petals 3, united at the base with the terminal lobes, the lowest keel-shaped and spreading, winged. Stamens 8, filaments united in their lower half into a sheath. Ovary 2-celled, one ovule in each cell. Capsule 2-valved, 2-4-lobed. Species 127, in both Lemnias, mostly in subfamily *Polygalinae*.

8. *P. grillata*, Hamilton, *Wall. Pl. As. Bar. i. 109*; Wight, *Bot. Beechey's Journ. Botanic Garden Calcutta*, 1838, p. 115. *Grillata*, Hook. & Kuhn, *V. Fl. i. 72*.

A large shrub, attaining 12 ft. young shoots pubescent. Leaves alternate, elliptic-lanceolate, 4-6 in., petiole 1-2 in. Fl. 2-4 in., yellow and purple. Capsule 2-celled, 2-4-angled, valves thick, woody, broad at tip. Young leaves reddish. Bark of leaves and underneath yellowish beneath. Fl. pale yellow, in short, compact, terminal panicles. Capsule 2-celled, 2-4-angled, valves thick, woody, broad at tip.

Artes. *Himalaya* from Nepal downwards, 2000-7000 ft. Hills, Lower Upper Burma, Hills of the west. Fl. Jan.-August. Lower Malay Peninsula, China.
Z. F. Karstianum, Korts (*Chassagnon*), *Agrostoides*, Kurz, *F. Fl.* 1, p. 110. Small glabrous shrub, fragments on the hillsides of *Tamboo*, *Lawsonia*, *D.*, *Lesser*, *hirsutula*, pale beneath, shrubby but a little bit in long. Fl. white, with pale blue tips in some individuals. Caps. blue in color, membranous, seeds white, glaucous.

2. XANTHOPHYLLUM, Roxb., Fl. Berl. Ind. p. 218.

Tree or shrub, leaves turning yellow in drying. Sepals 6, nearly equal. Petals 4 or 5, unequal, zygomorphic, the lowest keeled. Stamens 8, distinct, partly with long filaments. Disk annular, fleshy, black, hypogynous. Ovary 1-celled. Fruit indehiscent, fleshy. Seed without albumen, surface smooth. Species 10, from India to New Guinea and tropical Australia.

A. Flowers more than 1 in long, ovules 1-14.

X. flavescens, Roxb., *Fl. Ind.* 2, p. 54; Kurz, *F. Fl.* 1, p. 81. Syn. *X. densiflorum*, Wight, *Bomb. Manual* 1, p. 4. Vern. *Madhul*, Tam. *Thoppu*, Burma.
 A large glabrous evergreen tree. Leaves 6-8 inches long 4-7 in secondary nerves 6-7 pairs, finely and not prominently reticulate veins between them. Fl. 1-1 1/2 in. long, yellow, in axillary or terminal panicles. Sepals finely tomentose. Ovary densely appressed, with pluricellular hairs. The number of ovules varies from 1-12, the largest *X. angustifolium*, Wight, *III*, p. 22, and *X. densiflorum*, Roxb. Cat. *B.*, p. 281; Kurz, *F. Fl.* 1, p. 81, have only 1 ovule. Fruit globose, 1/2 in. diam., olive green, walls very thick.

West side of the peninsula, from the Sikkim mountains, hills, Chittagong hills, Lower and Upper Burma, Fl. February-May. Also on the hills of Yunnan, Kailash, Kurz, *F. Fl.* 1, p. 81. Yunnan, Malay Peninsula. A small tree. Leaves thickly tomentose, with long tomentose panicles. Sepals 6-7.

B. Flowers less than 1 in long, ovules 4.

X. glaucum, Wall.; Kurz, *F. Fl.* 1, p. 81. Vern. *Thoppu*, leaves, *Thoppu*, in Upper Burma.

A glabrous evergreen tree. Leaves 4-8 inches long, 2-3 in broad, reticulate veins distinct. Fl. white, 1/2 in. long, in large lax, slightly pubescent panicles, ovary with 1-celled hairs. Fruit globose, verrucate, 1/2 in. diam.

Upper and Lower Burma, in dense evergreen forests, partly on hills, partly on low ground. Fl. March-April. Malay Peninsula.

X. undatum, Kurz, *F. Fl.* 1, p. 81. Vern. *Thoppu*, in Upper Burma. A small tree. Leaves thickly tomentose.



Fig. 19. *X. flavescens* (Kortz) W. & A.

... many other species... X. ...

SECURIDACA, Lamour. Fl. Brit. Ind. 4: 27.

Species 20. Leaves 2-lin. long by 1-lin. broad.

S. javanica, Wall. - Syn. 8. ... A large ...

Order XIII. TAMARICACEÆ Gen. Pl. i. 159.

(Tamarix, Salix)

Undershrubby plants, rarely trees, or perennial herbs. Leaves alternate, small, generally scale-like, sessile, with a long hair, ...

- Medusa ... 1. TAMARIX
Medusa ... 2. TAMARIX

TAMARIX, Lamour. Fl. Brit. Ind. 4: 248.

Shrub or small tree, woody, rays broad, very prominent on rather ... leaves narrow, scale-like. In the juvenile state the leaves are ...

... it is an ... yellow ...

A. ... T. gallica, Lamour. Vigia. Illust. 211. ...

A glaucous, succulent shrub or small tree, 20 ft. tall. Leaves alternate, petiole short, spatulate, petiole at base of upper surface. Fl. in axils, bisexual, pedicels, calyx, white, sepals crowded on long slender spikes collected in dense panicles. Abundant in branches and forming large irregular masses of flowers. Bract lobes more than fl. Last slightly 3-lobed. Ovary globose, minutely punctate at base, style short, stigma often almost sessile. Capsule 3-lobed, more than twice the length of the withered style supporting it.

From Saigon, Tonkin, a base of several tall trees, collected by the French and the British. Found in the mountains of Annam and Laos. Western Peninsula of India, in the hills of the Western Ghats, Malabar, Cochin, and the hills of the Eastern Ghats. Widely distributed in the countries bordering the Indian Ocean, throughout northern and northern Asia, in China and Japan. Kuhn, *F. Pl. 3*, 23, 1, 1841, first described it from the Philippines. It was afterwards described by Wight and Wight from the hills of the Western Ghats, Malabar, Cochin, and the hills of the Eastern Ghats. It is now known from the mountains of the Western Ghats, Malabar, Cochin, and the hills of the Eastern Ghats. It is now known from the mountains of the Western Ghats, Malabar, Cochin, and the hills of the Eastern Ghats.

3. *T. dioica*, Roth: *Botch. Fl. Fl.*, 1, 177, *the Vitis, Botch. Fl.*, 1, 177, 1777. *Banyan-tree*, Upper Burma.

A glaucous, succulent shrub. Leaves alternate, petiole short, spatulate, petiole at base of upper surface, with a broad white margin. Fl. in axils, pentamerous, purple or bright pink, in stiff compact cylindrical panicles collected at the ends of branches. It is a tree 20 ft. high, generally 10 ft. high. Stamens alternating with the leaves of the leafy stalk, anthers distinctly sagittate. Style 3-lobed, thickened at the base, longer than ovary. Capsule 3-lobed, about twice the length of the withered style and petiole supporting it.

Throughout northern India, especially in the hills of the Himalayas, in the Western Peninsula, Bengal, Assam, Burma, throughout the Indian Archipelago, and in Sumatra in river beds. Fl. May-July.

4. *T. articulata*, Vahl: *Botch. Fl. Pl.*, 7. — Syn. *C. articulata*, Roth: *Vern. French, Fl.*, 1, 177, 1777. *India*.

A middle-sized tree with an erect trunk, frequently 20 ft. in diameter, white branches articulate at base of sheath, often grey with callosities. Leaves alternate, sheath 1/2 to 1 in long, oblique, truncate apex, truncate base, acute, appressed. Sheath and apex with impressed glands. Fl. bisexual or hermaphrodite, loosely scattered on long slender spikes, which are generally collected at the ends of branches in loose panicles. Bract shorter than fl. Last entire or indistinctly 3-lobed. Capsule 1 in long.

Found, according to 120 ft. in height, in the hills of the Western Ghats, Malabar, Cochin, and the hills of the Eastern Ghats. It is now known from the mountains of the Western Ghats, Malabar, Cochin, and the hills of the Eastern Ghats. It is now known from the mountains of the Western Ghats, Malabar, Cochin, and the hills of the Eastern Ghats. It is now known from the mountains of the Western Ghats, Malabar, Cochin, and the hills of the Eastern Ghats.

B. Stamens 10.

5. *T. ericoides*, Roth: — Syn. *T. ericoides*, Wight: *Ann. Wight*, 1825, 24, B. 1, 2. *Vern. Javanese, Malacca, Java, Java, Java, Malacca, Nicobar, Penang, Labang*.

A beautiful shrub or small tree. Leaves ample, alternate, hardly sheathing, 1/2 to 1 in long, serrulate, acuminate. Fl. larger than any of the others, 1/2 to 1 in long, bract-like, pale pink, at times white, on short pedicels, in crowded terminal spike-like racemes. Bract 3-lobed, alternate, strongly striate. Capsule 1 in long.

Western Peninsula of the hills of the Western Ghats, Malabar, Cochin, and the hills of the Eastern Ghats. It is now known from the mountains of the Western Ghats, Malabar, Cochin, and the hills of the Eastern Ghats. It is now known from the mountains of the Western Ghats, Malabar, Cochin, and the hills of the Eastern Ghats. It is now known from the mountains of the Western Ghats, Malabar, Cochin, and the hills of the Eastern Ghats.

1. GARCINIA (Linn.) Pl. Bur. Ind. Arch.

Tree, rarely shrubs, with tall, entirely glabrous, to short, spines with a yellow rarely white resinous exudate in the leaf-pith and wood-camp, (partly absent in the wood). Leaves evergreen, rarely semi-decid. Fl. stems solitary, polygamous. Sepals 4-6, pointed or 5-6-lobed. Male Stamens numerous, clustered in a ring or in several bundles, which surround a rudimentary ovary, often in a central strand composed of several; base of female flower with 3-4 beaked ovary enclosed by a large yellow stigma, which is usually sessile, rarely solitary in each cell attached to the locular angle. Stamens of female stem usually surrounding the ovary. Fruit with solitary or few seeds attached to the wall. The seeds, one or several large, brownish, fleshy, more or less of a nut are either without. Species 18, tropics of the old world.

1. 17 specimens, preserved, in the same tree, from near Malacca. Male Stamens in bundles surrounding a rudimentary ovary.

1. *G. Karthochymus*, Hook. fil. — Syn. *Anthochymus pictorata*, Hook. & Th. Bot. Beech. Fl. Syst. 1: 88. *Vern. Javanica*, Max. *Des. garia*, Jacq. Hort. Asiae, t. 1, fig. 1. *Madag.*, Burtt.

A small tree with dense dark green shining foliage, leaflets quadrangular, obtuse below the petiole. Leaves thickly coriaceous, oblong, elliptic-oblong, acute, blade 8-14, petiole 1-1.5, thick, channelled on the upper side, secondary nerves numerous, parallel, alternating with shorter intermediate nerves. The foliage on thick, uneven axillary protuberances, pedicels long, 1/2-1, long, tubular, spreading thin. Male Stamens in 2-3 long branches of 3-4, or a few, basal disk. *Herbert.* ovary 2-celled, stigma lobed. Fruit dark yellow 2-3 in diam.

Sukho, forest of white, in a small plain and hillside, in the Western Annamite Western Annamite, in the Chinese hillside, in the evergreen forests of the Western Annamite, from N. to K. and southward. Pl. Bur. Fl. C. S. Ann. 11, 1894.

2. *G. spicata*, Hook. fil. — *Vern. Hamul. Cayl.* 1: 88. — Syn. *G. ovalifolia*, Pl. Bur. Ind. 1: 79. *G. spicata* is the older name and *G. ovalifolia*, Oliver, is an African species. *Vern. Haldi*, Max.

A moderate-sized tree, with wide-spreading branches, uncinately cuneate, leaves broad, elliptic, obtuse, secondary nerves numerous, blade 8-14, petiole 1-1.5, with short pedicels, fasciculate on axillary protuberances, underdeveloped branched, which frequently lengthen out and form spiniform processes up to 1/2 in. long. Ovary 3-4 celled, stigma 3-5 lobed. Fruit green, 1/2-1 in diam.

Western Ghats, from Malabar to the coast. On the east side near the P. H. of Malabar, P. H. S. — Also in Ceylon. A var. *G. spicata* (L.) B. & C. the plant of the *G. spicata* of Roxb. Fl. C. S. (C. S. Fl. Bombay) 1: 79. *G. ovalifolia*, King. *Annals of Botany*, 1894, 1: 191. Branches short, angular, pubescent. Leaves 8-14 in. long, 2-4 in. wide, glabrous, secondary nerves 14-16 pairs, prominent beneath. Fruit bright yellow, 1-1 1/2 in. diam., by the persistent 5-lobed stigma.

3. *G. detransversata*, Mal. Stamens surrounding a rudimentary ovary. Pedicels ovary 3-12 celled.

4. *G. Mangostana*, Linn. *The Myrsinaceae*. *Vern. Mangost. Burtt.*

An evergreen glabrous shrub-like tree, attaining under favourable conditions 20 ft. in height. Leaves thickly coriaceous, 6-10 in., elliptic-oblong, secondary nerves numerous, parallel, alternating with shorter intermediate nerves joined by distinct intramarginal veins. Fl. as a rule bisexual, solitary or in pairs at the ends of branchlets, 2 in. diam. (but more rarely, than often double, but at base and sometimes minute solitary ovary-oblong, 2-celled. Ovary 3-5 celled, stigma sessile, thick, 5-8 lobed. Male fl. described by Burtt.

Fl. yellow, orange. σ : Numerous 2-celled anthers on short filaments upon a 4- or 5-angled central receptacle. Bisexual or σ . Stamens 6-21, 4 or sterile, from compound in bundles, surrounding the ovary, which is 4-10 celled, stigma 6-10 lobed. Fruit varying in shape, 2-3 in diam., yellow or reddish, with 4-10 deep furrows which are confined nearly to the apex.

Extends from along the Western Ghats from Kanchi southwards. Fl. Oct. and Nov. S. F. B.

19. *G. indica*, Choisy; Pierre, Fl. For. Océan. 1. 80—Syn. *G. purpurasc.* Boiss. Bodd. In. Pl. Ind. Océ. 270. Vern. Kékura, Hindi; Marjol, Kan. *Balambel*, Mar.



FIG. 22.—*Guttifera indica*, Choisy. σ .

alternating with petals. Ovary 4-7 celled, stigma 6-7 partite, each lobe with 2 lines of tubercles. Fruit globose, $\frac{1}{2}$ in diam., not covered, purple, seeds embedded in a red acid pulp.

Western coast and Western Ghats from Mathura southwards. Often cultivated. Fl. November-February. Fr. April-May.

Closely allied are: 20. *G. microcarpa*, Kurz, F. Fl. 1. 91. A small shrubby or woody shrub, not uncommon on South American. Leaves similar to but larger than those of *G. indica*. 21. *G. lanceifolia*, Roxb. Wright le. 1. 163; A. DC. Fl. Ind. 1. 118. Nilgiri, Chittagong hills. A shrubby bush. Leaves 2-4 in. long, 1-1.5 in. broad, lanceolate, acuminate, pale yellowish-green; petals bright red. Anthers yellow. Seed $\frac{1}{4}$ in. diam., with 1-2.

E. Fl. tetramerous. σ : a central 4-sided mass with 4- or 5-angled anthers

22. *G. Cowa*, Roxb.—Syn. *G. Kytao*, Roxb.; Wright le. 1. 147; Kurz, F. Fl. 1. 91. Vern. *Puangthale*, Burm.

A large tree with drooping branches. Leaves 4-5 in. membranous, broadly lanceolate, secondary nerves faint, axillary oblique, 6-10 pair. Fl. yellow or reddish yellow, $\frac{1}{2}$ in. diam. σ : In 3-8 adnate cells, stamens numerous densely covering a fleshy almost 4-cornered central mass; rudimentary pistil 9, anthers 4-celled, the cells at the 4 angles of a thick connective. σ : Ovary globose 6-8 celled, style grooved, stigma broad, granular. Fruit, the size of a small orange, yellow or dark purple, 6-8 grooved, terminated by a nipple-shaped protuberance.

Assam, Nilgiri, Chittagong, Chota Nagpur, Nilgiris and elsewhere in the Peninsula, Lower Burma, Andaman. Fl. February-May. Fr. May-June.

Nearly allied to 23. *G. mucifolia*, Kava (1872) F. Fl. 1. 9146; *lanceifolia*, T. And. Fl. Brit. Ind. 1. 261 (1874). Upper Burma, Sittang and Irrawaddy valleys in Lower Burma. Leaves lanceolate, 2-4 in. long.

ovate-lanceolate, mostly the only. Branches with a rugulose or ridged bark, very rarely dark, fleshy, the cells filled with oil. Spines at the tropics of both hemispheres.

A. Petals 4.

1. *C. inophyllum*, Lamour. Wight *Ind. J.* 77. — *Almondia lancea*, Lamour. Malaya.

A middle-sized scrambling tree, with the glabrous, dark bark, with minute



FIG. 28.—1. *Celastrum inophyllum*, Lamour. 1.

rusty hairs. Leaves elliptic, elliptic-lanceolate or obovate, blade 4-8, narrowed at the petiole 1-1 1/2 in. long. Fl. axillary, white, 1 in. diam., in axillary racemes. Fr. yellow, 1 in. diam.

A tropical tree, on the coast near from Bombay, on the east coast from Mysore southwards. At Cochin and Travancore. Fl. C. S. On the sea coast, 500 in the height from Malabar to Australia and the Pacific. Often cultivated. The seeds yellow.

2. *C. elatum*, Bodd. *Fl. Sylv.* 1. 2. This and *C. leucostemon* are known as the *Poa speciosa*.

A tall tree, wood light red, shining. Branchlets and petioles glabrous. Leaves elliptic-lanceolate, blade 3-5, petioles 1-1 1/2 in. long. Fl. in axillary terminal panicles, sepals hairy, the 2 outer small, the 2 inner pointed, and as large as petals. Fr. oval, speckled, 1 1/2 in. long.

— *Evergreen*, forest of the Western Ghats, and adjoining hills near South Kanara, in the Palk. Fl. January-February. 3. *C. tomentosum*, Wight *Ind. J.* 110. — *Roburium* Lamour. of North Kanara, Assamites and *pauciflorum* — *roburium* Lamour. Fl. in axillary panicles, the sepals of nearly equal size. 4. *C. polyanthum*, Wall. — *glabrum* Lamour. Khasi hills, hills east of Truongkin (Kha). Fl. C. S. A large tree, almost entirely glabrous. Leaves lanceolate, blade 4-7, petioles elongate, 1-1 1/2 in. white, in axillary racemes and terminal panicles. Fr. yellow, 1 in. diam. 5. *C. repens*, Lamour. Travancore, *capitata* Lamour. Fl. C. S. A large tree, leaves ovate, 1-1 1/2 in., narrowed into short petiole. Fl. white, 1 in. diam., in axillary racemes and the ends of branches. Fr. oval, speckled, 1 1/2 in. long.

B. Petals none or early deciduous.

6. *C. Wightianum*, Wall. — *Syn. C. decipiens*, Wight *Ind. J.* 112. This *Poa speciosa* of Travancore. Vern. Bodd. Mar. *Ira*, *Iaru*, Kan. *Katto* panna, Travancore.

A tree, 100 ft in Travancore, middle-sized elsewhere, almost entirely glabrous.

Apical lobe, which may be from 5 to 15 times as long as the lobes of the ovary. Style 1-2 in. long. Anthers yellow. Fruit globose, 1-2 in. diam. at maturity.

KAYEA, Walp., Bot. Beist. Ind. 1: 276.

Trees glabrous, secondary nerves distant, not prominent. Sepals 5, lobes 5, imbricate, striate or distinct, ovary 1-lobed, ovules 1, 1 by 2 nerves, style long, filiform, stigma 4-5 l. Fruit indurated, in some species enclosed in the greatly enlarged calyx, pericarp cartilaginous, seeds 1-2, cylindrical, large, heavy species of the eastern peninsula and the Ionian Archipelago.

1. K. floribunda, Walp. Pl. As. Bor. 1: 296.

A large tree. Leaves 5-9 in., ovate-oblong, acute-lanceolate, 5-11 in. large terminal panicles, sepals green, mostly orbicular, perianth white with pink calyx, anthers golden-yellow. Fruit 1-seeded, enclosed by the thick wrinkled yellow seed enlarged calyx.

Sikkim: G. A. B. 1847. Assam: Khasi hills, Dima hills, east of Jorhat. 2. K. nervosa, T. Anders. & Kurz, F. Pl. As. Bor. 1: 296. Leaves ovate-oblong, 2-4 in. long, terminal panicle. Fl. 11 in. diam. solitary or 2-3 together, terminal, axillary, sessile. Fruit supported by the calyx enclosed in the enlarged calyx. 3. E. Mauli, King, Ann. Gard. 1: 262. 4. 2. 144. Assam: Khasi hills, 5-7 in. Fl. 1 1/2 in. diam. at maturity, pale yellow in the light.

ORDER XVI. TERNSTRÆMIACEÆ. Gen. Pl. 1: 177.

Thunberg, Enchirid. and Prantl in G. 175, with the exception of Saurauja and Adiantum, placed under Guttiferæ in the 125, 126, and 127 genera, which occupied Gilg's Order Myricaceæ in the 1821.

Shrubs or trees, rarely climbing. Leaves alternate, simple, often serrate, stipules 0. Fl. usually showy and 5-6-meral, regular, generally pentamerous, sepals and petals in a few cases more numerous. Stamens generally numerous. Ovary free, half inferior in Anacardium, cells 3-5, numerous in Adiantum, styles usually 2 cells.

- | | |
|---|------------------|
| A. Perianth 1-lobed, calyx 1-lobed, 1-2 in. diam. at maturity. | 1. Ternstroemia |
| Ovary free, 3-5-lobed, 2-5-meral, 1-2 in. diam. at maturity. | |
| Ovary free, 2-5-lobed, 2-5-meral, 1-2 in. diam. at maturity. | |
| Ovary 3-lobed, 3-5-meral, 1-2 in. diam. at maturity. | 2. Anacardium |
| Ovary 2-lobed, 2-5-meral, 1-2 in. diam. at maturity. | 3. Guttaria |
| Ovary free, 2-5-lobed, 2-5-meral, 1-2 in. diam. at maturity. | 4. Erythra |
| Ovary 2-lobed, 2-5-meral, 1-2 in. diam. at maturity. | 5. Anacardium |
| B. Perianth 1-lobed, calyx 1-lobed, 1-2 in. diam. at maturity. | 6. Ternstroemia |
| Fruit 1-lobed, 1-2 in. diam. at maturity. | |
| Style 1-2 in. long. | 7. Ternstroemia |
| Seeds 1-2, cylindrical, large, heavy. | 8. Ternstroemia |
| Seeds 1-2, cylindrical, large, heavy. | 9. Ternstroemia |
| C. Fl. 5-6-meral or 10-12-meral, anthers 1-2 in. long, style 1-2 in. long, 1-2 in. diam. at maturity. | |
| Fl. 5-6-meral, anthers 1-2 in. long, style 1-2 in. long, 1-2 in. diam. at maturity. | |
| Style 1-2 in. long. | 10. Ternstroemia |
| Fl. 5-6-meral, anthers 1-2 in. long, style 1-2 in. long, 1-2 in. diam. at maturity. | 11. Ternstroemia |

1. TERNSTRÆMIA, Linn. fil., Pl. Bot. Ind. 1: 280.

Glabrous trees or shrubs. Leaves petioles, entire or dentate. Fl. axillary, calyx supported by 2 bracteoles. Sepals 5, petals 5, both imbricate and sessile, anthers 5. Stamens many, free, filament, usually short, anthers basitaxial,

Ternstroemia ... in each ... fruit ... Seeds ...

1. *T. japonica*, Thunb. - Syn. *T. japonica* ...

A large tree ... leaves ... flowers ... fruit ...



Fig. VI. Ternstroemia japonica.

ADINANDRA, Juss. ; Pl. Rep. Ind. 1804

Species 12, and more, in China and Formosa, the islands of the Malay Peninsula and Indian archipelago.

1. *A. villosa*, Thunb. ; Kurz, F. Fla. 1847.

A small tree ... leaves ... flowers ... fruit ...

Lower flowers ... fruit ...

CLEYERA, DC. ; Pl. Brit. Ind. 1830.

Included under *Espeya* by Engler & Prantl in 1893.

Species 6, India, China, Japan, Central America and the West Indies.

1. *C. ochracea*, DC.

A small tree ... leaves ... flowers ... fruit ...

Upper leaves ... fruit ...

the annulations of Chinese paper. Leaves large, ovate, 7-10 in. white, above green, there is the difference. *E. frutescens* has round, thin, flimsy, 5-6 in. hills with larger leaves, a solitary flower is present, but the quality is poor.

4. **EURYA**, Thunb., Fl. Brit. Ind. 3: 231.

Shrub or small tree. Leaves mostly serrate. Fl. fasciate, sessile and 4-5 in. umbels, petals united at base, stamens 12-16, attached to the base of the petals, anthers adaxial. Ovary mostly 3-celled, style 2, distinct or partially united. Fruit beak-shaped, seeds numerous, small, angular, albumen copious, oily.

1. *E. japonica*, Thunb. Kurz, F. Fl. 1: 191; Boid. Fl. Syst. 1: 122. Syn. *E. frutescens*, Wight, Fl. 1: 181. *Vern. Jalingo*, Nep. *Hulung*, Nilgiris. *Tanda hupit*, *Tau hupit*, *Sold tea*, Burma.

A slender small tree, prominent raised line on laminalets descending on both sides from the insertion of leaves. Leaves 2-5 in., lanceolate or ovate-lanceolate, obtusely serrate, glabrous, rarely pubescent when young. Fl. small, white, on short nodding pedicels 2 or 3 together, rarely solitary in the axils of leaves, sepals quite glabrous, style deeply 3- rarely 4-lobed, berries numerous, the size of a pepper-corn, unguiculate.

Outer Himalaya, from Sikim westward to 10,000 ft. Western Ghats and hills extending from from Kasim south side, hills of Upper and Lower Burma. Fl. throughout the year, shade. B. S. Also Ceylon, from 100 ft. up to the Malay Archipelago, China, Japan, Korea, Fiji Islands.

2. *E. acuminata*, DC. Royle III. p. 25. *Vern. Sani jirama*, Nep.

Supposed to differ from *E. japonica* by young shoots being hairy, by its more narrowly lanceolate leaves, often hairy beneath and by the flowers in dense fascicles of 5 or more. In the F. Fl. of North-West and Central India, p. 24, I united them, Kurz, Trincha and the Flora of Brit. Ind. keep them separate.

Outer Himalaya, from the Jangra mountains, 8000-10000 ft. Khasi, Garo, Jaintias & Burma hills, eastern Plateau, lower Burma. Malay Peninsula and Archipelago. *E. xyloctena*, Kurz, Bulletin 3: 66-700 ft. Bhotan, Assam, eastern Nepal, Manipur, Burma, less readily identified. Leaves 2-5 in., secondary nerves soft and milky distinct, pedicels silky, sepals silky outside, style milky. *E. trichocarpa*, Kurz, Khasi hills, Bhotan, Assam. Pubescent, young shoots silky, style united to 2 of their length.

5. **ANNESLEA**, Walp. Fl. Brit. Ind. 1: 280.



1. *A. fragrans*, Walp. Fl. 3: Mar. 1: 3. *Flora* only species, Poir. Fl. Fr. 1: 127.

A moderate-sized tree 24 ft. tall, branched at the ends of branches, 4-8 in., narrowed into petiole 1 in. long. Secondary nerves indistinct. Fl. white, pedicels 2-3 in. Stamens 7, glabrous, anthers long-sperulate, tips enlarged, cup-shaped, passing into a calyx tube, white in the 3-celled ovary.

FIG. 25.—*Anneslea fragrans* Walp. True color given.

ovary beak of each of the perianths. Fruit beak dilated, provided by the style with a pale, fleshy, warty, or tuberculate, thin, slightly reticulate, and slightly hairy surface.

Manila. Common in the lowlands of the plain and in the mountains. *Burma*. Fl. January-April. *Malay Peninsula, Ceylon, India, and the Philippines*. *Java*. Fl. April-September. *Siam*. Fl. May-October. *Sumatra*. Fl. May-October. *Borneo*. Fl. May-October.

1. *PYRENARIA BURTONII* Hol. Ind. 2289.

Leaves mainly alternate, nodes in line, or partially united. Ovary beak dilated, scales 2 in each cell. Frustrated, or, rather, rudimentary, seeds obscure, stout, with a warty, or tuberculate, surface. *Sumatra*. Fl. May-September. *Java*. Fl. May-October.

1. *P. burtonii* Hol. *Sumatra*. Fl. May-September. *Java*. Fl. May-October. *Burma*. Fl. January-April. *Malay Peninsula, Ceylon, India, and the Philippines*. *Java*. Fl. April-September. *Siam*. Fl. May-October. *Sumatra*. Fl. May-October. *Borneo*. Fl. May-October.

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Sumatra. Fl. May-September. *Java*. Fl. May-October. *Burma*. Fl. January-April. *Malay Peninsula, Ceylon, India, and the Philippines*. *Java*. Fl. April-September. *Siam*. Fl. May-October. *Sumatra*. Fl. May-October. *Borneo*. Fl. May-October.

2. *SCHIMA WALLINGII* Craey. Fl. Ind. Ind. 2289.

Ever-green tree. Leaves entire or serrate. Fl. Solitary or axillary peduncle with dentate bractlets under calyx. Sepals 5, nearly equal, small, 5, strongly connate at the base, the innermost connate often hood-like, stained many-colored, minute, 5-lobed petals, attached to the back of anthers above base of ovary. Ovary beak dilated, simple colored at the apex with broad spreading stigma, scales 2-4 in each cell. Anthers bilobed. Capsule globose, 4-5, 4-lobed, with a warty, or tuberculate, surface. Seeds few, kidney-shaped, winged on the back, alveolate, thin, cylindrical, sides are reticulate inferior, curved upwards, smooth over 1, warty on 2, broad and subrotund.



FIG. 26.—Schima Wallingii Craey. Fl. and fr.

A. Flowers nodding, capsule supported by the persistent sepals.

1. *C. Thea*, Link. : Brand, F. Fl. 25.—Syn. *C. Bohua*, Griffith, the China plant, and *C. lucifera*, Griffith, the indigenous Assam plant; *C. theifera*, Fl. Brit. Ind. 1:292; *Thea sinensis* (Walp.) Wight & Arn., Journ. Sp. Plant. The Tea plant. Vern. *Le'pet*, Burm.

A shrubby small tree, glabrous or slightly pubescent. Fl. solitary, peduncles with a few distinct bracts, sometimes a second lower in the axil of one of them. Sepals round, very distinct. Petals white, obovate, dense, glabrous or pubescent on the back. Stamens glabrous, ovary yellow, styles 3 glabrous, connate beyond the middle. Capsule depressed, 3-angled, 3-seeded. Testa hard, shining.

Indigenous in Upper Assam (discovered 1834) and in the hill country to the east of the same Assam plant has much more acuminate leaves, and has a more upright habit than the shrubby cultivated form in China. Also indigenous in Upper Burma, Kasa district 2000 ft., Ruby Mines district 7,000 ft., and the northern Shan States. Cultivated ages ago in China and Japan. Since 1840 cultivated extensively in Assam, Yunnan, Sikkim, the NW. Himalaya and the Nilgiris. Grown in Ceylon on a large scale. Fl. 2-8.

2. *C. caudata*, Wall. : Kurz, F. Fl. 1:108.

A small tree with a spreading crown, branchlets, petioles and under side of leaves hairy. Leaves 3-4 in., lanceolate, long-acuminate. Fl. $\frac{1}{2}$ -1 in. diam. singly or 2 together, peduncles short covered with imbricating bracts, sepals and petals silky outside. Stamens clothed with long hairs, ovary and styles hairy. Capsule $\frac{1}{2}$ in. diam., 1-celled, 1-seeded.

Burma, Khasi hills, Burma, hills east of Toungoo, Fl. Nepal 1:3-March.

B. Flowers erect, sepals deciduous.

3. *C. drupifera*, Linn.—Syn. *C. Klasi*, Wall. As. Researches xiii. 450 and Pl. As. Bar. 1:256. Vern. *Hingua*, Nep.; *Le'pet*, Burm.

A large shrub or small tree, branches spreading, branchlets and petioles more or less hairy. Leaves elliptic-lanceolate, acuminate, serrulate in the upper half, 3-4 in. long, secondary nerves 6-8 pair, faint. Fl. white, erect, on short peduncles, bearing broad silky imbricating bracts, solitary or 2-3. Petals obovate, $\frac{1}{2}$ -1 in. long, falling soon after flowering. Stamens 20-30, glabrous $\frac{1}{2}$ in. long, filaments free, dilated below. Ovary hairy, style glabrous, in the upper half 2-3-lid, ovary and style $\frac{1}{2}$ in. long. Capsule nearly 1 in. diam., depressed globose, peduncle marked by the scars of bracts and sepals.

Himalaya, from Nepal eastwards, 4,000-7,000 ft., Assam, Khasi hills. Burma, hills east of Toungoo, 2000 ft.; Ruby Mines hills, 6,000 ft. Fl. C. 8.

Closely allied to *C. caduca*, C. B. Clarke MSS., Khasi hills, above the Bishop's falls in large quantity in the river bed on rock and sand submerged during floods. Burmah, Sikkim. Leaves narrower, on both sides minutely wrinkled, secondary nerves quite obscure. Fl. much smaller, petals $\frac{1}{2}$ in., punctate, emarginate, very silky outside. Stamens 2-4 in., outer series 30, filaments in their lower half united into a tube, inner series 3-10, free. Capsule pyriform, pointed, $\frac{1}{2}$ in. 5. *C. intescens*, Dyer, Mishmi hills, Assam. Leaves 2-3½ in., caudate-acuminate, closely serrate, secondary nerves 6-8 pair, distinct. Fl. fragrant, white, turning yellow. Stamens 20-22, filaments broad, the outer combined into a short irregular fleshy tube. Ovary globose, densely silky, styles short, recurved.

10. ACTINIDIA, Lindl.; Fl. Brit. Ind. 1:285.

Climbing shrubs, structure of wood normal, vessel-bearing cells in many members. Fl. polygamous or dioecious, in axillary whorls or essential oils known. 5, imbricate. Stamens ∞ , free, anthers versatiled in the case of *Dryobalanops*, styles as many as cells, divergent, elongated at tip, these essential oils are embryo straight in copious albumen. Species from the Himalaya.

1. *A. callosa*, Lamell., *Veg. Trin. Ind. Nep.*
 A large climber, stems attaining 4 m. diam. Bark grey, brown, rough.
 Leaves elliptic, 1-1.5 m. long, serrate, glabrous, apex obtuse,
 acuminate, style clavate. Fruit 1 in. diam. perianth hard, corolla
 Heads of fruiting calyx towards base of fl. Rays like Masfuz, San Hill,
 at 2000 ft. Fl. Mar., June. Also in China and Japan. *A. strigosa*, Hb. K. Fl. Ind.
 China, Sibthorp, vol. 8, 1807, fl. contains about 100 stamens. Petals white and
 pubescent, lobes deep red with long hairs. Fl. 1 to 1.5 in. diam. Fruit light pink, pale
 slightly pubescent. Fruit 1.5 in. diam.

II. SAURAUJA, Willd., Fl. Hist. Ind. 3: 28. (Synonymy, 1812-13
 Engler u. Prantl, in G. 127.)

Trees or shrubs, shoots more or less strigose or scaly. Leaves approximate
 at the ends of branches, usually serrate, secondary veins prominent, parallel.
 Fl. usually bisexual, in cymose panicles, axillary or from the old wood. Sepals
 5, strongly imbricate, petals 5, obovate at base, imbricate, often forming a cup-
 shaped corolla. Stamens numerous, anthers opening at the top by a process
 short slit. Ovary 2-3 celled, ovules numerous, axils or 3-5 distinct or united.
 Fruit indehiscent, generally somewhat fleshy. Seeds small, with copious albumen.
 Species in tropical and subtropical Asia and America.

A. Flowers in axillary pedunculate cymose panicles, bracts deciduous.

1. *S. napaulensis*, DC.; Wall. Pl. As. Ind. 1: 178; Brandegee, F. Pl. 24.
Veg. Voy. Gouan, Guyana, Hind. ; Rheedii, Jamaica.



FIG. 2.—*Saurauja napaulensis*, DC.

Small tree or large shrub, wood soft, spongy, boughs ending in tufts of
 leaves among which are the flower panicles. Young shoots pubescent and under
 side of leaves covered with scaly tomentum, mixed with hairs. Leaves
 rounded or ovate. Leaves 10-15 in. long, strongly serrate, secondary veins 25-30
 pair. Fl. pink, in pedunculate panicles, styles 4 or 5 distinct, compound.

Outer Himal. on 9, 1811, 1812, from the Jammu towards Atasi hills Masfuz. Fl.
 (S. B. S. Fruit erect, calyx 2 & 3-lobed. D. 2-3 in. Petals 5, obovate, and outer valves
 1-1.5 in. diam. Young and inflorescence densely clothed with soft woolly
 tomentum. Leaves light green above, brown, softly tomentose beneath,
 5-15 by 1-4 in. with sharp spinous web, petals 2-3 in. Panicle on peduncle 5-6 in.

H. Flowers on the top of the stem, the fruit is a globose drupe with a long stalk.

3. *S. Roxburghii*, Wall. Journ. Pl. Ed. Hort. Vind. 1806, p. 100, t. 1, f. 1.

A small tree, 10-15 feet high, the young parts covered with a dense covering of white tomentum. Leaves 8-12 in. long, hairy, more dotted with white glands, 1/4-1/2 in. diam. Stamens 2, styles 3-5.

Found in the hills near the city of Ava, in the Kingdom of Burma, 1800.

4. *S. ...* Wall. Pl. Ind. Austr. 1810, p. 100, t. 1, f. 1.

A small tree, 10-15 feet high, the young parts covered with a dense covering of white tomentum. Leaves 8-12 in. long, hairy, more dotted with white glands, 1/4-1/2 in. diam. Stamens 2, styles 3-5.

Found in the hills near the city of Ava, in the Kingdom of Burma, 1800.

5. *S. ...* Wall. Pl. Ind. Austr. 1810, p. 100, t. 1, f. 1.

A small tree, 10-15 feet high, the young parts covered with a dense covering of white tomentum. Leaves 8-12 in. long, hairy, more dotted with white glands, 1/4-1/2 in. diam. Stamens 2, styles 3-5.

Order XVII. DIPTEROCARPACEÆ. Gen. Pl. 1. 189.

(Dipterocarpaceæ)

(Benth in Journal Linnæan Society, vol. xxiii (1855) p. 1.)

Branches irregularly striate, mostly evergreen, leaves alternate, ovate, simple, serrated, densely tomentose, petioles mostly thickened below the node. In the axils and inter-axils calyx and outside of petals in the petiole pale, and hairs thick, generally stellate or fasciculate. Stipules small, linear, pentaneuric, in some species, they often unilateral and nearly parallel. The spruce-like foliage is of a bluish-green color, bearing on the upper dorsal surface, the segments of which, as a rule, are much enlarged in length. Branches sometimes hairy, or more, rather, in some species tomentose, which are mostly short, the compound being often enlarged below the nodes. Stems branched, often prolonged into a single upright stem, sometimes at the upper receptacle. Two glabrous scales in each cell, attached to the inner angle. Fruit sessile, jetted, or sessile, subglobose. Seed with or without albumen, cylindrical, or lobed, if stipitate, in most species filled with starch, in others with oil which may contain both.

The following are the most important species:—*D. ...* is found in the hills near the city of Ava, in the Kingdom of Burma, 1800. It is a small tree, 10-15 feet high, the young parts covered with a dense covering of white tomentum. Leaves 8-12 in. long, hairy, more dotted with white glands, 1/4-1/2 in. diam. Stamens 2, styles 3-5. Found in the hills near the city of Ava, in the Kingdom of Burma, 1800.

6. *S. ...* Wall. Pl. Ind. Austr. 1810, p. 100, t. 1, f. 1.

...with

... ..

... ..

... ..

- I. *Dipterocarpus* - Calyx tube enclosing the fruit 2 lobes
- II. *Shorea* - Calyx as a tubular
- III. *Podocarpus* - Calyx valvate
- IV. *Podocarpus* - Calyx tubular

DIPTEROCARPUS, Gaertn. Cat. Fl. Bot. Ind. 4: 26.

Leaves generally shaped as in the preceding. Leaves are renewed at the end of the leaf sheath from the old leaves. Secondary nerves prominent, straight, and 1 by parallel tertiary nerves. In bud the two halves of the corolla are joined together and the sections between two secondary nerves are not based on lobes. Fl. large, pink, in short few-fl. axillary panicles. Receptacle obscure, continued into a campanulate or obconical calyx, with 5-lobed corolla, lobes which are larger. Stamens 2, connative prolonged into a long slender style, style cylindrical, style diliform, stigma minute. Tube of the calyx enclosing fruit, but not adnate to it, dilated at ovary, usually with 3 cells, 2 or 3, alternating with calyx segments, two of which lobes are large longitudinally, with 5-lobed. Pedicels thin at the base, thick at apex, lobed at tip, etc. The styles of the remaining seed are inserted in the receptacle and fringed with calyx, being attached to the base of the pedicel. Species of

1. D. ... 10 ...

A. ...

- 1. *D. turbinatus*, Gaertn. Cat. Fl. Bot. Ind. 4: 26. ...
- 2. *D. ...* ...
- 3. *D. ...* ...

1. *D. obtusifolius*, ...

Leaves ovate, petioles and inflorescence densely clothed with long soft hairs. Leaves broadly ovate, obtuse to 9 in. long, pubescent above with long hairs beneath, secondary nerves 12-14 pair. Fl. showy, pink, axillary, pedicels somewhat axillary incescent. Fruit 1 1/2 in. diam.

1. *D. ...*

Leaves ovate, petioles and pedicels densely clothed with many fasciated hairs. Leaves elliptical-oblong, sharply acuminate, 4-14 in. long, glabrous above, pubescent beneath, secondary nerves 20-25 pair. Fruiting calyx 2 1/2 in. diam. ...



B. Tub. of fringing calyx with 16-20 small teeth.

5. *D. tuberculatus*, Rostr. & Kunt. F. Pl. Brit. Ind. 1. 110. Var. *longipes* Rostr. & Kunt. F. Pl. Brit. Ind. 1. 110. Setae 4-5 in long. Tub. of fringing calyx with 16-20 small teeth. Secondary derived 15-18 pairs, arising from large, pale 14 in long, tubular calyx. Fruiting calyx tube with 16-20 small teeth. Tub. of fringing calyx with 16-20 small teeth.

Throughout the history of the dragonfly nymph, the tub. of fringing calyx is a very important part of its life. It is usually present in the nymph, and it is a very important part of the life of the nymph. It is a very important part of the life of the nymph. It is a very important part of the life of the nymph.

C. Tub. of fringing calyx with 16-20 small teeth.

6. *D. alatus*, Rostr. & Kunt. F. Pl. Brit. Ind. 1. 110. Var. *longipes*, Rostr. & Kunt. F. Pl. Brit. Ind. 1. 110. Setae and calyx tubular. Leaves oval or elliptic, pale green, with a distinct margin vein. Secondary derived 12-15 pairs, blade 4-6 in long, white, 1-2 in long. Whorls on fringing calyx tube 16-20, half the diameter of tube or more.

Fig. 2.—*D. phoeniceus*, Rostr.

... the tub. of fringing calyx is a very important part of the life of the nymph. It is a very important part of the life of the nymph. It is a very important part of the life of the nymph. It is a very important part of the life of the nymph.

2. ANISOPTERA, Kuntze; Pl. Brit. Ind. 1. 67.

Stipules small, early deciduous. Nerves 20-30, number of the dorsal veins active produced into a long vein. Stylepodium thick, fleshy, bearing 3-4 nodules 4-6, short styles. Fruiting calyx white, lobes 10, bearing 2 segments much larger than the others, with 3 nodules bearing nodules 2, and numerous transverse veins. Species 15.

In some instances the tub. of fringing calyx is a very important part of the life of the nymph. It is a very important part of the life of the nymph. It is a very important part of the life of the nymph. It is a very important part of the life of the nymph.

1. *A. glabra*, Kunz. Fl. Fl. 1: 112. Vera. *Dio-*
carpa Bern.

Shrub, glabrous, erect, the tabescent upper
branches with horizontal or drooping growth. Leaves ellipti-
cal, glabrous. Fruiting calyx-tube much
contracted at the mouth, the 2 large segments
obovoid, with 11 prominent longitudinal nerves,
veins at right angles to conspicuous transverse
veins.

Fls. Malacca, Celebes and Cochinchina. Fl. Arch.
Nov. 1844, although from London in 1846. Kunz. *Flora*
Siam. Tab. 7: 44 and 45. In the dried herbarium
the calyx-tube is almost entirely gone.

3. HOPEA, DC. Fl. Berl. Ind. 1: 68.

Shrub, small or minute, rarely deciduous. Fl.
in umbels of 10 or 20, arranged in
simple or more branched cymes, glabrous, petals
always large, corolla. Ovary 2-locular, intricate, the
locules growing out into thin horizontal wings
at the broad apex. Stamens 20, of which 10 are
long and spread out in a fan or skirt, rather bulbous
at the base, the filaments prolonged into a long awl, the
pollen generally large. Seeds without callus,
cotyledons 2, very fleshy, curved, and growing the
outer side, like to the base a handle and portion of cortex, the
inner a small flattened handle of the same size, but with the handle
with the remains of the cotyledon. Intercosts between the lobes of the nuts
are provided with small nodules, the former generally prevailing. Fls. in
axils and in 2's or 3's.

Shrub 2-3 m high, 2-3 dm in diameter, with a trunk
1-2 m high, 2-3 dm in diameter, through the bark.

Sept. 4.—Hab. Java. Secondary woods, not more than 10 feet, not approp-
riate.

A. Galy, 1869, Amsterdam.

1. *H. odorata*, Roxb. Cor. Bot. 2: 10. Vera. *Thyrsiflora* Bern.

Erythraea, small yellowish-green, close and cylindrical, very durable.
Glabrous, except underneath. Leaves ovate-lanceolate, acuminate, nerves
12 pair. Fls. fragrant, in axillary gray-tomentose panicles, petals ellipti-
cal-obovate, rather long. Ovary gradually narrowed into conical style,
pedicel and long cylindrical style. Ovary and style pedicel pubescent.

Shrub 10-15 m high, in the southern part of the Lower Peninsula, from the
mountains to the coast. Andaman. Also reported from Chingai. N. C. 1847.
Fls. March, April. Fruit May, June.

2. *H. parviflora*, Bedd. Fl. Selw. 1: 7. The *Truncata* of Malabar.
Vera. *Thyrsiflora* Kunz. *Nitida* Bern.

Shrub from 1-2 by petals not ciliate, rather small, orbicular, very and
obovoid, glabrous, stigma 10-12, cylindrical, oval, contracted at the base.

Shrub 10-15 m high, from South Kanara eastwards. Fl. March.
3. *H. capitata*, DC. Fl. Ind. 1: 68. Secondary woods 10 feet, leaves 2-3 m
at the apex, dark green, ovate-lanceolate, ciliate, 2-3 m. N. C. 1847. *Thyrsiflora* Bern.
Thyrsiflora DC. Fl. Ind. 1: 68. Secondary woods, 10-15 m high, leaves from 1-2 m
long, 1-2 m wide, ovate-lanceolate, ciliate, 2-3 m. N. C. 1847. *Thyrsiflora* Bern.



Fig. 25. *Thyrsiflora*
capitata Kunz.

B. Calyx glabrous.

5. *H. Wightiana*, Wall.; Wight III. t. 37. Vern. *Kalad*, Mar.; *Hala*, Kan.; *Ho po-gu*, Tam.

Youngest branchlets and petioles softly pubescent, otherwise glabrous. Leaves coriaceous, oblong, 6-8 in. long, petiole short. Pl. in axillary cymes or panicles, shorter than the leaves, petals pubescent outside. Upper portion of ovary pubescent, stylodolum glabrous, slightly verrucose; style short. Round echinate galls frequent in the axils of leaves.

Evergreen forests at the foot of the Western Ghats from North Kanara southwards. Often gregarious, covering large tracts in the hot country of South Kanara. Fl. March-June. 6. *H. glabra*, Wight et Arn. — *H. Wightiana* var. *glabra*. Bodd. Pl. Ind. t. 93. Ghats of Tinnevely and Travancore. Leaves lanceolate, 3-4 in. long, sessile, nerves 8 pair. Ovary stylodolum and outside of petals slightly pubescent. 7. *H. racophloea*, Dyer — Syn. *H. waldarica*, Bodd. Pl. Ind. t. 100. *Karad*, *Kooya*, Tam.; *Pelarah*, *Kooya*, Mal.; Travancore. A large glabrous tree, bark dark, peeling off in long recurved strips, which hang all round the trunk. Leaves ovate, cuneate-acuminate, blade 2-4½, petiole decurrent, 1½ in. long. Panicles 2-1½, each of axils. Stylodolum cylindrical, slightly narrowed at base. Larger segments of fruiting calyx spatulate, obtuse, with 7-11 longitudinal nerves.

Sec. II. — Dryofolioloides. Secondary nerves numerous, approximate, often obscure.

8. *H. Griffithii*, Kurz. Mergui, Malay Peninsula. Main secondary nerves 14-20 pair, with numerous shorter intermediate nerves joined by very closely reticulate veins. Panicles glabrous, axillary, much shorter than leaf. Stylodolum broad, contracted at base, glabrous.

1. PENTACME, A. DC.; Brandis in Journ. Linn. Soc. vol. 31 (1860) 72. Species 3, Eastern Peninsula and Philippines.

P. suavis, A. DC. — Syn. *P. amocensis*, Kurz. F. Fl. v. 149; *Shawia sinensis*, Miq.; Fl. Brit. Ind. t. 34. Vern. *Eugalia*, Burm.

A large tree, heartwood brown, hard and durable, on dry ridges a shrub leafless during part of the hot season, when the tree is covered with large panicles of showy flowers. Leaves ovate, whitish-tomentose beneath with large young. Fl. 1 in. across, petals orbicular, at flowering time forming a hollow globe, open at the top, enclosing stamens and ovary. Stamens 10, anthers oblong, cells equal, the valves of each cell, as well as the connective, prolonged into a short arm, so that each anther has 5 subulate appendages. Ovary glabrous, prolonged into conical stylodolum, style filiform, 1½ in. long. All calyx segments enlarged in fruit, but the three outer much larger than the others, all narrowed into a stalk, which expands into a broad base, appressed to the base of fruit, but not enclosing it. Gynodolum thick, fleshy, stipitate, concave, apiculate, each other, filled with fat and oily radiata short, plumula conspicuous.

Throughout the Eastern Peninsula, extending to 25° N. Lat. Occurs also in Upper Burma and Cochinchina, scattered in the Kerguelen of Lower Burma. Fl. H. S.

2. *SHORTRA*, Roxb.; Fl. Brit. Ind. t. 363.

Stipules in a few species large and persistent, in most small and early deciduous. Leaves coriaceous, secondary nerves prominent, tertiary mostly parallel. Flowers as a rule in unilateral spikes or racemes, which are distichous and regularly alternating on the branches of large axillary and terminal panicles. Each flower subtended by 2 bracteoles, mostly deciduous, in a few species persistent and conspicuous. Sepals strongly imbricate, hairy. Petals hairy outside. Anther cells generally equal; connective as a rule prolonged into a pointed appendage. Segments of fruiting calyx with their broad bases

larva by becoming thickened, the 3 sides unequal, and broad, being 1/2 in. broad. Coloured dusky, with 1 white streak on the 1st, 2nd, 3rd, 4th, and 5th, and the 6th, and the head, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32nd, 33rd, 34th, 35th, 36th, 37th, 38th, 39th, 40th, 41st, 42nd, 43rd, 44th, 45th, 46th, 47th, 48th, 49th, 50th, 51st, 52nd, 53rd, 54th, 55th, 56th, 57th, 58th, 59th, 60th, 61st, 62nd, 63rd, 64th, 65th, 66th, 67th, 68th, 69th, 70th, 71st, 72nd, 73rd, 74th, 75th, 76th, 77th, 78th, 79th, 80th, 81st, 82nd, 83rd, 84th, 85th, 86th, 87th, 88th, 89th, 90th, 91st, 92nd, 93rd, 94th, 95th, 96th, 97th, 98th, 99th, 100th. Spots 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200.

1. *S. robusta* (Germ.) is a large, stout, dark brown, coarse and cross-grained, hard, heavy, strong and tough, leaves when full grown glaucous and shining, 4-10 in. long, from a rounded or cordate base broad-ovate, more or less acuminate ending in an obtuse point, secondary nerves 10-12 pair, stipules caducous, petiole 1/2 the length of blade. Fl. yellowish or short pedicels, in unilateral racemes arranged in large compound axillary and terminal panicles. Calyx and petals softly gray tomentose outside, calyx lobes short, triangular, double the length of calyx, outside inside. Wings of fruiting caterpillar elongate, oblong or spatulate, the longer 2-3 in. long, with 10-15 parallel longitudinal nerves and distinct straight or oblique transverse veins.

2. *S. robusta* (Germ.) is a large, stout, dark brown, coarse and cross-grained, hard, heavy, strong and tough, leaves when full grown glaucous and shining, 4-10 in. long, from a rounded or cordate base broad-ovate, more or less acuminate ending in an obtuse point, secondary nerves 10-12 pair, stipules caducous, petiole 1/2 the length of blade. Fl. yellowish or short pedicels, in unilateral racemes arranged in large compound axillary and terminal panicles. Calyx and petals softly gray tomentose outside, calyx lobes short, triangular, double the length of calyx, outside inside. Wings of fruiting caterpillar elongate, oblong or spatulate, the longer 2-3 in. long, with 10-15 parallel longitudinal nerves and distinct straight or oblique transverse veins.

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4. *S. robusta* (Germ.) is a large, stout, dark brown, coarse and cross-grained, hard, heavy, strong and tough, leaves when full grown glaucous and shining, 4-10 in. long, from a rounded or cordate base broad-ovate, more or less acuminate ending in an obtuse point, secondary nerves 10-12 pair, stipules caducous, petiole 1/2 the length of blade. Fl. yellowish or short pedicels, in unilateral racemes arranged in large compound axillary and terminal panicles. Calyx and petals softly gray tomentose outside, calyx lobes short, triangular, double the length of calyx, outside inside. Wings of fruiting caterpillar elongate, oblong or spatulate, the longer 2-3 in. long, with 10-15 parallel longitudinal nerves and distinct straight or oblique transverse veins.

5. *S. robusta* (Germ.) is a large, stout, dark brown, coarse and cross-grained, hard, heavy, strong and tough, leaves when full grown glaucous and shining, 4-10 in. long, from a rounded or cordate base broad-ovate, more or less acuminate ending in an obtuse point, secondary nerves 10-12 pair, stipules caducous, petiole 1/2 the length of blade. Fl. yellowish or short pedicels, in unilateral racemes arranged in large compound axillary and terminal panicles. Calyx and petals softly gray tomentose outside, calyx lobes short, triangular, double the length of calyx, outside inside. Wings of fruiting caterpillar elongate, oblong or spatulate, the longer 2-3 in. long, with 10-15 parallel longitudinal nerves and distinct straight or oblique transverse veins.

6. *S. robusta* (Germ.) is a large, stout, dark brown, coarse and cross-grained, hard, heavy, strong and tough, leaves when full grown glaucous and shining, 4-10 in. long, from a rounded or cordate base broad-ovate, more or less acuminate ending in an obtuse point, secondary nerves 10-12 pair, stipules caducous, petiole 1/2 the length of blade. Fl. yellowish or short pedicels, in unilateral racemes arranged in large compound axillary and terminal panicles. Calyx and petals softly gray tomentose outside, calyx lobes short, triangular, double the length of calyx, outside inside. Wings of fruiting caterpillar elongate, oblong or spatulate, the longer 2-3 in. long, with 10-15 parallel longitudinal nerves and distinct straight or oblique transverse veins.

7. *S. robusta* (Germ.) is a large, stout, dark brown, coarse and cross-grained, hard, heavy, strong and tough, leaves when full grown glaucous and shining, 4-10 in. long, from a rounded or cordate base broad-ovate, more or less acuminate ending in an obtuse point, secondary nerves 10-12 pair, stipules caducous, petiole 1/2 the length of blade. Fl. yellowish or short pedicels, in unilateral racemes arranged in large compound axillary and terminal panicles. Calyx and petals softly gray tomentose outside, calyx lobes short, triangular, double the length of calyx, outside inside. Wings of fruiting caterpillar elongate, oblong or spatulate, the longer 2-3 in. long, with 10-15 parallel longitudinal nerves and distinct straight or oblique transverse veins.

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9. *S. robusta* (Germ.) is a large, stout, dark brown, coarse and cross-grained, hard, heavy, strong and tough, leaves when full grown glaucous and shining, 4-10 in. long, from a rounded or cordate base broad-ovate, more or less acuminate ending in an obtuse point, secondary nerves 10-12 pair, stipules caducous, petiole 1/2 the length of blade. Fl. yellowish or short pedicels, in unilateral racemes arranged in large compound axillary and terminal panicles. Calyx and petals softly gray tomentose outside, calyx lobes short, triangular, double the length of calyx, outside inside. Wings of fruiting caterpillar elongate, oblong or spatulate, the longer 2-3 in. long, with 10-15 parallel longitudinal nerves and distinct straight or oblique transverse veins.

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FIG. 10. *S. robusta* (Germ.) is a large, stout, dark brown, coarse and cross-grained, hard, heavy, strong and tough, leaves when full grown glaucous and shining, 4-10 in. long, from a rounded or cordate base broad-ovate, more or less acuminate ending in an obtuse point, secondary nerves 10-12 pair, stipules caducous, petiole 1/2 the length of blade. Fl. yellowish or short pedicels, in unilateral racemes arranged in large compound axillary and terminal panicles. Calyx and petals softly gray tomentose outside, calyx lobes short, triangular, double the length of calyx, outside inside. Wings of fruiting caterpillar elongate, oblong or spatulate, the longer 2-3 in. long, with 10-15 parallel longitudinal nerves and distinct straight or oblique transverse veins.

4. *S. Talura*, R. & S. *S. lacellum*, Hems. Bot. Fl. Syst. 1: 41.
Vatica lacellum, Wright in Journ. Vera. Talura, Talage Tam: Jalari Tel.
Nall, Kan.

A large tree, perfectly glabrous, only petals pale-rose on the inside, and sepals ciliate on edges, wood very hard, heartwood small. Leaves 3-4 in., ovate more or less rounded base, elliptic-oblong obtuse, petiole 1-1½ length of blade. Fl. light pink, 1 in. long in deeping axillary panicles ramifications slender, almost filiform. Stamens 15, in 3 rows. Anthers of the 5 anterior stamens longer than the others, appendage of connective equal to anther, subsessile at the end. Large wings of fruiting calyx in bud, cup-shaped above the broad base, which completely encloses the fruit.

Hills of the southern Decan, also on the west coast in the great forest from North Kanara southwards. Fl. S. 1, closely allied and perhaps not so well distinguished as *S. parashorea*, Kurz, F. Fl. III. Transact. Bot. Soc. Lond. 1857.

5. *S. assamica*, Dyer. Vera *Makri*, Ar. in.

A tall tree, shoots, stipules and young leaves rusty tomentose stipules ½ in., lanceolate, nearly falcate. Fl. 2 in. on very short pedicels, sepals and petals hairs outside. Stamens 15, appendages long, glabrous. Ovary and base of style hairy, style filiform, longer than ovary. Fruiting calyx glabrous, wings carinaceous, the longer 3-5 in., the shorter more than half as long.

Types Assam, found at the foot of the Naga hills, in Sibsagar and Lakhimpur districts. Fl. September 7. *S. cratichna*, Dyer. Trees 20-30 ft. tall, with small round expanded panicles of flowers. Length of calyx and petals 1½ in., length of ovary and style 2-3 in., length of style and base of style 1½ in., length of wings of fruiting calyx 3-5 in., the shorter more than half as long.

6. PARASHOREA, Kurz, F. Fl. 1: 117.

Species 4, 1 in Sumatra, 2 in the Philippine Islands.

1. *P. stellata*, Kurz, Pierre, Fl. For. Cochinch. 1: 221—*Sp. stellata*, Dyer, Fl. Brit. Ind. 1: 394. Vera *Kampong*, Rum.



Pl. III.—*Parashorea stellata*, Kurz, l.

A tall evergreen tree, attaining 150 ft. Leaves pale beneath, blade 4-6, petiole 1 in., long, secondary nerves 8-10 pair, tertiary veins numerous, parallel, not very conspicuous, with the reticulate veins between them. Fl. small, crowded, colored in large axillary and terminal panicles. Sepals almost calvate on end, like the petals gray-yellow outside. Stamens 15, anthers bicarinate short, obtuse. Ovary hairy, glabrous, prolonged into a cylindric furrowed style, and stylopodium. Segments 5, fruiting calyx nearly equal, tube not enlarged, the lower segments very fruit less and exposed.

Virehana and Tera, also Malay Peninsula, Sumatra in the southern portion of the Pen. Yunn. Fl. Straits Arch.

7. BALANOCARPUS, Reddine, Prodr. Manoh. 247.

Trees glabrous except pubescence, stipules minute, deciduous. Fl. supported by 2 bracts, as in unilateral racemes, arranged in compound panicles. Calyx on a flat base, distinctly bilobate. Stamens 15, in some

young leaves with silicles; young leaves clear to all parts, the primary veins of secondary veins long, thin, rather straight, trifurcating at base and middle, and thickening at the tips; secondary veins straight, parallel, and thickening at the tips, with numerous raised lines. Species 11, Y. (Catalpa) of the Malay Peninsula, 1 in Burma, 2 in India.

1. *B. rotunda* (Rott.) Pl. Syll. 2: 331-332. *Indica longifolia* (Lour.) Th. Bur. Linn. 1: 247. Vern. *Kong-kong* and *Kamareh*.

A large, spreading bush and tree, with many large, alternate, ovate-lanceolate leaves, 10-12 pairs, tertiary parallel, lobes on both sides of the leaflets 1/2-1/3 as long as the primary ones, 1/3 the length of the leaflets. Fruit globose, 1/2-1/3 as long as the leaflets, not ribbed.

Tender twigs with a greyish bloom. Flowers 2. A large tree, 10-12 ft. tall, with flowers 2-3 in. long, with numerous raised lines. Fruit globose, 1/2-1/3 as long as the leaflets, not ribbed.

8. Vatica, Linn. f. Bot. India 701.

Vatica Linn. f. Bot. India 701. *Vatica* and *Vatica*, Trimen Herald. Journ. Linn. Soc. Bot. 2: 124, 125. *Vatica* and *Vatica*, King Journ. Bot. Soc. Beng. 2: 102, 103, 127.

Tree or shrub with a large, woody, tertiary, curved rachis and 1/2-3/4 pairs of primary veins, the rachis in terminal and axillary positions. Leaves alternate, ovate, petiole as long as the leaflet, base of leaflet cordate-ovate, rounded, 1/2-1/3 as long as the leaflet, 1/3-1/2 as wide as the leaflet. Primary veins of the leaflets 1/2-1/3 as long as the leaflets, 1/2-1/3 as wide as the leaflets, 1/2-1/3 as long as the leaflets. Secondary veins of the leaflets 1/2-1/3 as long as the leaflets, 1/2-1/3 as wide as the leaflets, 1/2-1/3 as long as the leaflets. Fruit globose, 1/2-1/3 as long as the leaflets, not ribbed.

1. *V. rotunda* (Rott.) Pl. Syll. 2: 331-332. *Indica longifolia* (Lour.) Th. Bur. Linn. 1: 247. Vern. *Kong-kong* and *Kamareh*.

1. *V. Roxburghiana*, Blume: Ind. Fl. Sylv. 1: 95; Trimen Herald. Journ. Linn. Soc. Bot. 2: 124, 125. *Vatica* in Journ. Linn. Soc. Bot. 2: 119. The name *Vatica* but the tree does not grow in China, and Blume's name is better known. Vern. *Kong-kong*, Mal.

A moderate-sized tree, young shoots and leaves with slightly pubescent leaves. Fruit globose, 1/2-1/3 as long as the leaflets, 1/2-1/3 as wide as the leaflets, 1/2-1/3 as long as the leaflets. Primary veins of the leaflets 1/2-1/3 as long as the leaflets, 1/2-1/3 as wide as the leaflets, 1/2-1/3 as long as the leaflets. Secondary veins of the leaflets 1/2-1/3 as long as the leaflets, 1/2-1/3 as wide as the leaflets, 1/2-1/3 as long as the leaflets. Fruit globose, 1/2-1/3 as long as the leaflets, not ribbed.

2. *V. lanceolata*, Blume: Kurz, F. Fl. 2: 122. Vern. *Kong-kong*, Mal.

A large shrub, sometimes a tree, with many large, alternate, ovate-lanceolate leaves, 10-12 pairs, tertiary parallel, lobes on both sides of the leaflets 1/2-1/3 as long as the primary ones, 1/3 the length of the leaflets. Fruit globose, 1/2-1/3 as long as the leaflets, not ribbed.



... in the ... as well as ...

... the ...

... the ...

... the ...

... the ...

B. Subgenus *Synaphea*. Ovary ...

... partially immersed ...

... segments of fruiting calyx ...

... long wings.

4. *V. grandiflora*, Dyer = *Synaphea* ...

... Kurtz, Fl. Ind. II 111

A middle-sized ...

... and ...

... with ...

... petals 5-7, ...

... petals

... calyx

... petals

... calyx

... petals

... calyx

... petals

... calyx

... petals

... calyx

Fig. 12.—*Vateria indica* (Wight) Fl. Ind. II 111

... the smaller one-third their length.

... the ...

... the ...

... the ...

5. *V. Scopulata*, Dyer, Fl. Ind. II 130. Vern. *Budh* ...

... (H. B. K.)

A large tree. Leaves elliptic-oblong, ...

... the upper half ...

... underneath, tertiary nerves parallel and reticulate. ...

... in simple terminal panicles, ramifications and calyx ...

... petals white, nearly plane, ...

... the ...

... the ...

... the ...

3. VATERIA, Lam., Fl. Ind. II 313

Species 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

1. *V. indica*, Lam., Bot. Cor. p. 288; Wight Ill. Bot. Ind. II 111. Vern. *Budh* ...

... (H. B. K.)

... (P. B. Smith) ...

... (R. Br.) ...

A large handsome evergreen tree, young shoots and inflorescences clothed with woolly stellate tomentum. Leaves coriaceous, glabrous, elliptic-oblong, blade 4-10, petiole 1-1½ in. long, secondary nerves 11-16 pair, prominent beneath as well as midrib. Fl. 1 in. across, in large terminal panicles, lobes longer than calyx segments. Petals spreading, slightly pubescent outside. Stamens 40-50, filaments short, anthers linear, hairy at base, cells unequal, the outer much longer, appendix or connective as long as anther. Ovary tuberoso-stylate, style bifurcated, stigma bilobed. Fruit ovoid, 2-3 in. long, splitting open into 3 valves, fruiting calyx small, segments relaxed. Cotyledons filled with fat Piney tallow.

Evergreen forest along the Western Ghats, as well as the 1000 ft. Plateau largely a handsome tree, occurring also in the higher parts of districts of Mysore, V. H. S.

Order XVIII. ANCISTROCLADACEÆ. Planchon; Gilg in Engler u. Prantl, Nat. Pflanzenfam. iii. 6. p. 274.

Only Genus: **ANCISTROCLADUS**, Wall.; Fl. Brit. Ind. 3. 299.

Evergreen, glabrous, woody climbers, numerous strong hooked tendrils terminating the principal branches, the leaf- and flower-bearing branchlets being axillary. Leaves entire, sessile, lanceolate, usually in pairs at the ends of branchlets, stipules minute, caducous. Fl. bisexual, calyx adnate to ovary lobes 3, imbricate, petals 3, slightly emarginate. Stamens 5 or 10, filaments short, anthers connate at base. Ovary 1-celled, ovule solitary. Fruiting calyx much enlarged. No resin ducts. Species 5, one in tropical Africa, the others in eastern tropical Asia.

A. Leaves oval, with more than 4 times their length.

A. extensus, Wall.; King, Journ. As. Soc. Bengal, vol. 62 ii. (1893) 137.

A strong climber. Leaves coriaceous, obovate or broadly obovate, secondary nerves distinct, joined by intramarginal veins. Panicle repeatedly dichotomous. Lobes of fruiting calyx unequal, the lower 1½-1¾ in. long.

Lower Burma, Andamanis. Fl. U. S. 3. A. Seynoanne, Wall.; Wied. Bot. t. 187-88. Karst, Kew. Bot. Misc. Western Ghats, from the Thana district, southern part, in evergreen forest. Leaves elliptic-lanceolate, secondary nerves not more conspicuous than the venetial veins below, panicle twice dichotomous. Lobes of fruiting calyx unequal, with distinct parallel nerves.

B. Leaves narrow, with less than 4 times their length.

A. Wallichii, Planchon; Kurz, F. Fl. 111.

A large woody climber with dark brown twisted stems, numerous strong black hooked tendrils on the branchlets. Leaves lanceolate and oblanceolate, 1-2 in. long, midrib stout. Fl.



FIG. 111.—*Ancistrocladus extensus*, Wall. 4.

English, in specimens, lower margin shorter than upper. Finding only lower margin slightly glandular.

Stems, leaf stalks, and young twigs hairy. Flowers yellow. Petals 5, yellow, with a greenish tinge. Stamens 5, yellow, with a greenish tinge. Ovary 3-lobed, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge.

Order XLV. MALVACEÆ. Gen. Pl. 3, 195.

Malvaceae and *Simulacrae*. Engelm. and Pringle in *Gen. Pl.* 3, 195.

Herbs, rarely shrubs, or young sprigs as a rule without woody bases. Leaves alternate, rarely stipulate, generally palmately 3-5-lobed, rarely pinnate. Petals 5, yellow, with a greenish tinge. Stamens 5, yellow, with a greenish tinge. Ovary 3-lobed, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge.

- 1. Stamens 5, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge. *Hibiscus*
- 2. Stamens 5, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge. *Hibiscus*
- 3. Stamens 5, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge. *Hibiscus*
- 4. Stamens 5, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge. *Hibiscus*
- 5. Stamens 5, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge. *Hibiscus*
- 6. Stamens 5, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge. *Hibiscus*
- 7. Stamens 5, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge. *Hibiscus*
- 8. Stamens 5, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge. *Hibiscus*
- 9. Stamens 5, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge. *Hibiscus*
- 10. Stamens 5, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge. *Hibiscus*

1. HIBISCUS, Linn. in *Bot. Ind.* 1, 334.

Herb, shrub, or tree. Leaves alternate. Calyx supported by a skirt of long, narrow, pointed lobes. Stamens 5, yellow, with a greenish tinge. Ovary 3-lobed, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge.

1. *H. macrophyllus*, Koenig, Wall. Fl. Ind. Bat. 1, 334. *Hibiscus* (Linn.)

Herb, shrub, or tree. Leaves alternate, petioles and young twigs hairy, clothed with soft tomentum. Petals 5, yellow, with a greenish tinge. Stamens 5, yellow, with a greenish tinge. Ovary 3-lobed, yellow, with a greenish tinge. Capsule 3-lobed, yellow, with a greenish tinge. Seed 1, yellow, with a greenish tinge.

Asplenium (Linn.) Moench, *Bot. Beech.* 1805, p. 107. — *Asplenium* (Linn.) Moench, *Bot. Beech.* 1805, p. 107. — *Asplenium* (Linn.) Moench, *Bot. Beech.* 1805, p. 107.

3. *H. filaceum*, Linn.: *Bell. Malac.* 29 t. iv. f. 1. — *Syn. Bot.* 1753, p. 107. — *Wright In.* t. 7. *Vern. Acyph.* Mal. 2. *Synonym.* Burm.

A small tree or shrub, 10-15 ft. high, with a trunk 2-3 in. diam. at the base, and a dense, rounded canopy of leaves. The leaves are alternate, ovate, 3-5 in. long, 1-2 in. wide, with a prominent midrib and secondary veins. The flowers are axillary, solitary or in small clusters, with a calyx 2-3 mm. diam. and a corolla 2-3 mm. diam. The petals are yellow, and the stamens are white.



FIG. 31.—*H. filaceum*, Linn. f.

...the woody. Capsule 10-celled, seeds slightly pubescent. ...

H. filaceum is found in the mountains of Java, Sumatra and Ceylon. It is also found in the mountains of Malacca, Penang, and Singapore. It is a common tree in the tropics of the East Indies.

2. **THESPESIA**, Gaertn.: *Fl. Brit. Ind.* 1: 245.

The stem simple. Bractees less than one, sometimes wanting, thin, translucent, or slightly webbed. Staminal tube 5-6 lines long. Style 1-2 lines long. ...

1. *T. populnea*, Gaertn.: *Wright In.* t. 8. *Bell. Fl. Selt.* 1: 61. *The Atlas of Botany* (Linn.). *Vern. Panch.* Beng.: *Dumbka*. *Sanskrit: Harsala*. Mar.: *Harsala*. Kan.: *Thalpa*. *para*. *para*. *para*. *para*.

A small tree or shrub, 10-15 ft. high, with a trunk 2-3 in. diam. at the base, and a dense, rounded canopy of leaves. The leaves are alternate, ovate, 3-5 in. long, 1-2 in. wide, with a prominent midrib and secondary veins. The flowers are axillary, solitary or in small clusters, with a calyx 2-3 mm. diam. and a corolla 2-3 mm. diam. The petals are yellow, and the stamens are white.

...the woody. Capsule 10-celled, seeds slightly pubescent. ...

2. *Chrysopsis*, *Thunbergia*, and *Chrysopsis*. Fl. Bur. Ind. 1: 349. (1836, Burmann)
 Schumann in Engler's *Prisid.* ii. 172.



Fig. 21.—*Tournefortia japonica*, Curran.

2. *Tournefortia japonica*, Curran, *Fl. Bur. Ind.* 1: 349. (1836, Burmann)
 Schumann in Engler's *Prisid.* ii. 172.

3. **ERIODENDRON**, DC. Fl. Bur. Ind. 1: 349. (1836, Burmann)
 Schumann in Engler's *Prisid.* ii. 172.

Species 2, mostly American.

E. anfractuosum, DC. Fl. Bur. Ind. 1: 349. (1836, Burmann)
 Schumann in Engler's *Prisid.* ii. 172.

E. occidentale, Kunz, F. Fl. 131; *Chrysopsis pentandria*, Schumann
 A large deciduous glabrous tree, branches pendulous, in whorls, stems armed
 with woody scurfy prickles. Leaves elliptic to ovate, 3-7, long, serrate, beneath
 the veins, 1-1 1/2 in. long, in numerous axillary leaf whorls, short stout
 tubular, near the ends of branches, spreading with age before the young leaves.
 Calyx campanulate, with 5 or 6 teeth, persistent. Petals 5, in 2 or 3
 rows, 1-1 1/2 length, 1 calyx. Stamens 5, coherent at base into 2 or 3
 lobes, 3-5 in., tubular, persistent, 5-lobed, cells lined with long white silky
 wool. Seed glabrous, bearing a few dense tufts of silky hair.

Collected in the Malay Peninsula and Archipelago, it is found
 in the Malay Peninsula and in Java, Jh. January-May.

1. **BOMBAX**, Linn.
Fl. Brit. Ind. 1: 349.

The shrubby tree with distichous leaves. Petioles scabrous, downward, ascending in the end of branch. Leaves ovate, 3-5-lobed, with 5-7 lobes, splitting irregularly. Staminal tube short, divided into numerous filaments. Style long, late, with many 5-6-lobed anthers. Ovary 3-lobed, styles numerous. Capsule 4-angled, 6-ribbed, inside thickly clothed with a silky hair, in which the seeds are embedded. Leaves with large downy mark added, enclosing the seeds, almost entire. Species 4-5, chiefly in Central and South America, a few in Africa.

1. *B. malabaricum*, Th. & Wight Ill. t. 2: Pl. S. Ind. 82-83. *B. malabaricum*, Gray, Journ. Bot. Soc. Lond. 247. *The Cotton tree*, Vent. *Siam, described*, Hind. *Ind. Kaly. Siam, Mac. Turc. Arab. Kan. Bur. Ind. Carina, Tel. Java, S. Ind. Malay. Laos, Ind.*



Fig. 21.—*Bombax malabaricum*, Th. & W.

A very large tree, sometimes with large buttresses at the base, bark white, grey, becoming dark on exposure. Branches in whorls of 3-5, spreading nearly horizontally. The stem of young trees covered with short, white, pubescent hairs. Leaves 5 or 7, lanceolate, 4-8 in long, 2-3 in wide, long veins more than lateral. Fl. appearing before the leaves, large, scarlet, occasionally white, calyx inside silky tomentose. Petals 2-3 in long, white, ciliate on both faces. Filaments about 70, much longer than staminal column, the 5 longer, thick at the top, each branch bearing an outer, white, pubescent, tube simple, the numerous outer ones at the base united in 5-6 tubes. Anthers long, obtusely pointed. Capsule oblong, hard, woody, 4-5 in long. Seeds glabrous, embedded in silky wool.

Bombax malabaricum, from the Malay Peninsula, according to A. W. C. Smith, Journ. Bot. Soc. Lond. 247. *Bombax malabaricum*, from Java, according to A. W. C. Smith, Journ. Bot. Soc. Lond. 247. *Bombax malabaricum*, from Java, according to A. W. C. Smith, Journ. Bot. Soc. Lond. 247. *Bombax malabaricum*, from Java, according to A. W. C. Smith, Journ. Bot. Soc. Lond. 247.

1. *B. malabaricum*, Th. & W. *Bombax malabaricum*, Th. & W. *Bombax malabaricum*, Th. & W. *Bombax malabaricum*, Th. & W. *Bombax malabaricum*, Th. & W.

Asplenium digitatum, Willd., Bot. Tab. 52, p. 156, t. 447, f. 10. - *Asplenium* *digitatum*, L., *Sp. Pl.*, 1284, p. 156, t. 447, f. 10. - *Asplenium* *digitatum*, L., *Bot. Beech.*, p. 156, t. 447, f. 10. - *Asplenium* *digitatum*, L., *Bot. Beech.*, p. 156, t. 447, f. 10.

Asplenium digitatum, Willd., Bot. Tab. 52, p. 156, t. 447, f. 10. - *Asplenium* *digitatum*, L., *Sp. Pl.*, 1284, p. 156, t. 447, f. 10. - *Asplenium* *digitatum*, L., *Bot. Beech.*, p. 156, t. 447, f. 10. - *Asplenium* *digitatum*, L., *Bot. Beech.*, p. 156, t. 447, f. 10.

Asplenium digitatum, Willd., Bot. Tab. 52, p. 156, t. 447, f. 10. - *Asplenium* *digitatum*, L., *Sp. Pl.*, 1284, p. 156, t. 447, f. 10. - *Asplenium* *digitatum*, L., *Bot. Beech.*, p. 156, t. 447, f. 10. - *Asplenium* *digitatum*, L., *Bot. Beech.*, p. 156, t. 447, f. 10.

5. CULLENIA, Wight; Fl. Brit. Ind., t. 1, p. 109.

C. excelsa, Wight in Journ. Bot. Soc., t. 1, p. 109, t. 1, p. 109. - *C. excelsa*, Wight, Journ. Bot. Soc., t. 1, p. 109, t. 1, p. 109.

A tall tree, wood considerably soft, not aromatic. Bark yellowish white. Leaves ovate-lanceolate, dark green above, paler below, glabrous above, beneath with silvery pubescence of fine tomentose hairs. Stipules 0. Fl. reddish brown, in large clusters at the end of a raceme. Bracts 5-angled, as well as bracteole, into a tube splitting irregularly into 5 lobes. Calyx tubular, obscurely 5-lobed, as well as bracteole, into a completely even, 5-lobed, perianth. Pistil 0. Staminal tubes exerted, divided into 5 segments, each segment bearing along its length numerous minute anthers on long filaments. Ovary 5-angled, ovules 2 on each side. Style hairy. Capsule striate, stigma sessile. Fruit 4-5 in long, densely covered with long pubescent hairs. Wood hard, shagreened, brownish, covered by a dense fleshy white arillus. Cotyledons 2, flat and albuminous.

Western Ghats of India, N. Malabar, near Kannur, F. H. C. Wight, Journ. Bot. Soc., t. 1, p. 109, t. 1, p. 109.

6. KYDIA, Roxb., Fl. Brit. Ind., t. 1, p. 110.

K. numerosa, Roxb. and Boiss. In large terminal panicle. Bracts linear, mostly sessile at the base, in fruit accrescent and spreading. Calyx 5-lobed, 5-toothed. Petals 5, longer than calyx, attached by their base to the base of marginal tubum. Staminal tubes divided into 5 linear segments, 5-angled anthers at the end of each segment, style 6-angled. Capsule globose, 5-lobed, opening 5-lobedly, 5-seeded. - Species 2, 1 line.

K. calycina, Roxb. Journ. Bot. Soc., t. 1, p. 110, t. 1, p. 110. - *K. calycina*, Wight Journ. Bot. Soc., t. 1, p. 110, t. 1, p. 110. - *K. calycina*, Wight Journ. Bot. Soc., t. 1, p. 110, t. 1, p. 110. - *K. calycina*, Wight Journ. Bot. Soc., t. 1, p. 110, t. 1, p. 110.

A large shrubby or small tree, wood growing white, soft, or heart wood, brownish.

lary rays generally white, rarely yellow, but 5-parted, hairy, or, including wood of Anacardium. Young stem, in the lower part, and lower part of the stem, grey or reddish, scabrous. Leaves mostly elliptical, cordate or oblong, cuneate, base long-auriculate, apex, when the stem is upright, acuminate, or, in the lower part of the stem, capitate mucronate, with the mucron.

Stems usually 1-2 m. high, but the lower part, when it is the stem, may be much shorter. The leaves are about 10-15 cm. long, the lower part of the stem is about 10-15 cm. long, the upper part is about 10-15 cm. long. The stem is about 10-15 cm. thick. The stem is about 10-15 cm. thick. The stem is about 10-15 cm. thick. The stem is about 10-15 cm. thick.

Order XX. STERCULIACEÆ. Gen. Pl. 1. 214

Tree or shrub, glabrous or hairy, frequently succulent, with 2-3 leaf pairs. Leaves alternate, usually opposite. Flowers sessile, rarely pedicelled. The corolla is usually 5-lobed. Calyx more or less deeply divided into 5 nearly equal, usually rounded or serrated. Petals 5 or none. Stamens 5 or none. Ovary 1 or 3-lobed, with 1 to 3 or 5-angled seeds. Fruit capsule of 1 to 3-angled or rounded, usually dehiscent capsules.

- A. If the capsule is 3-angled, the seeds are small. 1. Sterculia
- If the capsule is 2-angled, the seeds are small. 2. Hura
- B. If the capsule is 3-angled, the seeds are large. 3. Sterculia
- If the capsule is 2-angled, the seeds are large. 4. Sterculia
- C. If the capsule is 3-angled, the seeds are small. 5. Sterculia
- If the capsule is 2-angled, the seeds are small. 6. Sterculia
- D. If the capsule is 3-angled, the seeds are small. 7. Sterculia
- If the capsule is 2-angled, the seeds are small. 8. Sterculia
- E. If the capsule is 3-angled, the seeds are small. 9. Sterculia
- If the capsule is 2-angled, the seeds are small. 10. Sterculia

Trichosanthes Choisy. Illustrations of the W. & A. Index and adjoining part of India's Arborescences in the N. India and elsewhere. The seeds will grow.

STERCULIA. Linn.: Fl. Brit. Ind. L. 334. *Sterculia*, *Boltonia*, *Pterocarpus*, *Pteridium*, *Schinus* ex Engelm., Prantl in G. G. 47.

Tree, wood soft light, often spongy, vessels large, medullary rays numerous. Leaves very large. Hairs stellate. Leaves entire, lobed or digitate. Fl. white or yellowish. Calyx more or less deeply 5-angled, usually 5-lobed, usually coloured. Petals none. Anthers 5 or 10. Fl. in small spikes 20 or 30 in a terminal column, which in the female and terminal flow. Petals white, short stipitate. Ovary of 3-angled capsules, 2-3 cm. long in each. Fruit

erupts dull red, spreading, woody, surface, or thin furrows, or along the 2
the inner edge. Calyx and petals yellow with thin, whitish, spreading
them, of others black and fleshy without albumen. Species 10-120, chiefly
in tropical Asia, one species (*L. indica* Merr.) in Australia.

4. *L. foliolosa*, a tree or shrubby, flowering when the leaves ripen.

(1) Leaves digitate.

1. *L. S. foetida*, Jacq.: Wight Is. = 161, 361. Vern. *Jajaput* (Banda, Hind.
Javan; Tam.: *Lakka*, *Samarang*, Bura).

A large succulent tree. Leaves 7-12, simple, ovate-lanceolate, wing pale, above
sericeous and glabrous beneath, petioles 4-6, reddish, stipules slender, a or lance-
olate and yellow to dull purple, small, not offensive, in racemose panicles
1-2 in. long. Calyx deeply 5-lobed, the lobes 1/2 in. long, oblong or lanceolate,
surrounding gyno. base as long as or longer than calyx tube. Ovary 1-lobed,
falling freely, smooth almost glabrous. Style 1/2 in. long. Seeds black,
1/2 in. long. (Vern. *Jajaput* thick, fleshy, albumen 1/2).

1. *L. S. foetida*, Jacq.: Wight Is. = 161, 361. Vern. *Jajaput* (Banda, Hind.
Javan; Tam.: *Lakka*, *Samarang*, Bura). A small, erect tree, from eastern tropical Africa to New
Australia. 2. *L. vernicata*, Wall. Pl. As. Kunz. 10. Upper Burma. A small tree, from
New Guinea to small in panicles 2-12 in. long, leaves 1/2 in. long, 1/2 in. wide,
surrounding gyno. base as long as or longer than calyx tube, and somewhat at the top.

(2) Leaves simple, palmately lobed.

2. *L. S. urons*, R. & Sch. Pl. G. B. 1841, 1841. Vern. *Jajaput* (Hind.
Javan; *Jajaput* (Central Province), *Jajaput* (Kam), *Kam* (Muz), *Kulaw* (Pala), *Makha*).

A large succulent tree, leafy growth, white or greenish-gray, abundant in
large thin, irregular plates. Leaves crowded at the end of branches, tomentose
beneath, nearly glabrous along, ovate, shallowly 3-lobed, base entire,
ovoid-lanceolate 8-12 in., petioles 6-10 in. long. Fl. in crowded, erect, many
of less pyramidal panicles, clustered with a dense sticky tomentum of glandular
stellate hairs, a few branched, mixed with a large number of thick, fleshy
3-4-staminate stamens about 20. Gynophore short, thick.
Fruit of 4-5, woody, radiating, stalk, thickly covered with stellate hairs, which
when ripe, covered outside with stiff stinging bristles. Seed 3/4 in. long,
shape of egg, dark brown.

1. *L. S. urons*, R. & Sch. Pl. G. B. 1841, 1841. Vern. *Jajaput* (Hind.
Javan; *Jajaput* (Central Province), *Jajaput* (Kam), *Kam* (Muz), *Kulaw* (Pala), *Makha*).
A large succulent tree, leafy growth, white or greenish-gray, abundant in
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of less pyramidal panicles, clustered with a dense sticky tomentum of glandular
stellate hairs, a few branched, mixed with a large number of thick, fleshy
3-4-staminate stamens about 20. Gynophore short, thick.
Fruit of 4-5, woody, radiating, stalk, thickly covered with stellate hairs, which
when ripe, covered outside with stiff stinging bristles. Seed 3/4 in. long,
shape of egg, dark brown.

4. *L. S. villosa*, Bern.: Handel. K. K. 1841, 10. Vern. *Jajaput* (Hind.
Javan; *Jajaput* (Central Province), *Jajaput* (Kam), *Kam* (Muz), *Kulaw* (Pala), *Makha*).

A woody-stemmed succulent tree, leafy growth, white or greenish-gray, abundant in
large thin, irregular plates. Leaves crowded at the end of branches, densely
tomentose beneath, deeply 5-7-lobed, lobes oblong or ovate-oblong, toothed or
ciliate, blade 12-18 in. across, petioles as long as blade. 8-10, pale, large, broadly
lanceolate, deciduous. Fl. yellow, on slender pedicels, loosely arranged in the
inflorescence. Ovary 5-8 panicles at the end of thick, woody, branch, clothed
with the scales of fallen leaves. Male and medicinal flowers in 1/2 the former
are numerous. Calyx expanding, outside clothed with stellate hairs. Gynophore
as long as calyx tube. Ovary globose, surrounded at its base by a
conspicuous ring, adnate to the gynophore and bearing on its edge 10-15
bristles. Follicles 2-5, sessile, cartaceous, bright red when ripe, 1/2-1 in. long, clothed
inside and outside with stiff stellate hairs, each several in each follicle.

1. *L. S. villosa*, Bern.: Handel. K. K. 1841, 10. Vern. *Jajaput* (Hind.
Javan; *Jajaput* (Central Province), *Jajaput* (Kam), *Kam* (Muz), *Kulaw* (Pala), *Makha*).

Woods, K. (1852) *Andaman Islands*. Calcutta: The Asiatic Society, vol. 1, p. 100.
 Journal of the Botanical Society of London, 1852, p. 100. Fl. March 1852.
 P. 20. (In the *Asiatic Researches*.)



Fig. 1. *Stenochlaena ornata*, Hook. f.

1. *S. ornata*, Wall.; Kurz, F. Fl. 1. 1861; King in Journ. As. Soc. Bengal, vol. 1852, 62. — Syn. *S. nemata*, Mast. in part. Vern. *Shan-ku*, Burma.

A middle-sized deciduous tree, young shoot tomentose with soft crimson hairs when dry, often glandular hairs. Leaves from a deeply cordate base almost regular, more or less deeply divided into 5 or 7 acute lobes, under side densely tomentose, upper side sprinkled with minute fascicled hairs. Petioles with tomentose, serrated at the ends of the thick branches, 8-10 in. long, many covered. Fl. large, calyx widely campanulate, 4 in. diam., pale white, colored with a reddish base. Follicles 3-4 in. long, first deeply

10. *S. ...* ... dark purple with long hairs ...

... (Detailed botanical description of the plant in item 10, mentioning its growth habit and leaf characteristics.)

11. *S. alata*, Hook. & Grev. Bot. Beechey, Pl. 287. Syn. S. ...

... (Detailed botanical description of *S. alata*, including leaf shape and flower details.)

... (Location and collection details for *S. alata*.)

12. *S. ...* ...



The above illustration is from ...

... (Detailed botanical description of the plant in item 11, including leaf and flower characteristics.)

Fig. 2. *Heritiera* L. in fruit. The fruit is a large, rounded, woody capsule, opening very early in the season. The seeds are small, round, and black. The tree is a small, bushy tree, with a trunk that is 2-3 feet high. The leaves are large, ovate, and have a prominent midrib. The tree is native to the East Indies, and is cultivated in many parts of the tropics.



Fig. 2. *Heritiera* L. in fruit. Fl. Ind. 1.

an eastern coast of the Pigeon Peninsula, Malacca Peninsula, Celebes, Java, Malacca, Amboyna. A large, dense, bushy tree. Leaves broadly ovate from a cordate base. Petioles 2-3 in. Long. Compound, as a rule persistent in fruit. Petioles 2-4 in. long, membranous, veined, usually soft in an old specimen, dark green, purple or black, with a few brown lines. Wood at the base of the foliage very soft.

2. **HERITIERA**, Adm; Fl. Brit. Ind. 4: 92.

Evergreen tree. Leaves simple, coriaceous, quite entire, all very sessile beneath. Fl. small, unisexual, in axillary panicles. Calyx 4-5, sometimes 4-7 whet. Petals 9-12. Staminal column slender, bearing a ring of 4-8 2-celled anthers at the top. Ovary of 5 nearly distinct carpels with 1 or 2 ovules. Base of the ovary woody, indurated, keeled or winged. Cotyledons thick, alternately opposite 0 or 5, rarely of the old world and of Australia.

3. *Heritiera* L.

1. *H. littoralis*, Dryander: Bot. Manual t. 14, fig. 6. *Vern. Ind. 4: 92*.

A middle-sized, grassy tree, heart-shaped dark red, very hard, woody. Rays reddish, intervening tissue dark red. Leaves simple, ovate from

17. *H. elliptica* (L.) Jack. — *Macra* 2-4 in. long, 1-2 in. wide, rounded at the tip, the base of the petiole gradually narrowed to the base. *H. elliptica* (L.) Jack. is a polychaete, shining, with a strong sharp keel.



FIG. 47. *Hedyotis elliptica*, (L.) Jack.

18. *H. elliptica* (L.) Jack. — *Macra* 2-4 in. long, 1-2 in. wide, rounded at the tip, the base of the petiole gradually narrowed to the base. *H. elliptica* (L.) Jack. is a polychaete, shining, with a strong sharp keel.

H. Inland species.

19. *H. macrophylla*, Wall. : Kurz, F. & L. II. Bot. Mag. 1. 71 G.

A large tree. Leaves elliptic-oblong, acuminate, bright glossy beneath, 7-14, petiole 2-4 in. Tendrils large, half the length of leaves. *H. macrophylla* (Wall.) Kurz, F. & L. II. 71 G.

Kuala Lumpur, Malacca, Upper Tenasserim (Pines), Penang, Singapore, 2-200 feet, a few feet below of the Malacca coast. *H. macrophylla* (Wall.) Kurz, F. & L. II. 71 G. Leaves lanceolate, long acuminate, 1-2 in. long, 1/2 in. wide, shining, with a strong sharp keel.

Stems silver or tomentose. Fl. in large terminal panicles or umbels
or a dense cyme. Calyx tubular, entire, lobes 5, usually 3-lobed.



FIG. 12.—*Eriolaena indica* (Wight) Planch. Fl. Ind.

style hairy, capsule oval, 1 in. long, valves slightly tubercled at base, white
mucous.

Western Peninsula, chiefly on the coast, but from Deccan's mountains. Fl. July,
August.

B. *Bracteola entire* (L.) nearly 60 petals usually 4.

α. *E. spectabilis*, Planchon—Syn. *Wulfschia spectabilis* DC. in *Mém.*
Mus. Paris x. (1823) p. 6.

A small tree, young shoots and under surface leaves with short grey or rusty
pubescence. Fl. in large terminal panicles, in clusters of 2-4 linear rarely
dentate bracteoles 1 in. below flower. Capsule $\frac{1}{2}$ in. long, style 1, stamens
10-20, style hairy below, glabrous above. Capsule 1½ in. long.

Upper Malabar, in forest in one place at Nertal. N. Malabar, in forest, also
in open grassy places with *Acacia* etc. Fl. April, May.

4. HELICTERES, Linn. Fl. Brit. Ind. t. 363.

Shrubs, rarely trees. Fl. bisexual. Calyx tubular, entire or less equally 5-lobed.
Petals 5, clawed, usually asymmetric. Staminal column adnate to gynophore,
bearing 5 or 10 anthers. Ovary 5-lobed, beaked, several ovules in each cell.
Fruit carpels 5, opening along their inner edge, straight or slightly incurved.
Chambers scaly, striations folded round the radicle. Species only tropical
of both hemispheres.

A. Fruit spirally twisted.

1. *H. Isora*, Rinn. & Wight in Journ. Bot. Soc. Camb. *Metrop. Gard. Royal Hort.*

Arundinaceae, Siam, Java, China, Burma, Borneo, Malaya, Sumatra, Ind. Archipel.
Kurr, Kurr, Kurr, Tern, Java, Borneo.

Large woody climber or shrub. Leaves linear or lanceolate, often
 obtuse, base broadly ovate or orbicular, sheath pubescent, irregularly
 toothed, sometimes slightly lobed, blade 4-5, petiole 1-2, basal node
 always present, sheathes. Fl. branched, axillary, sometimes with axil-
 lar fascicles, pedicels shorter than calyx. Calyx 1-2 mm., petals 1-2 mm.
 and 2-3 mm., sepals 1-2, the 3 others with two teeth at the radial claw. Fruit
 1-2 mm. long, on a synchaete nearly as long, cylindrical, hairy, twisted.

Native of India, from the district of Mysore, throughout Coorg, India, Java,
 Sumatra, Malaya, and probably Borneo. Fl. April to December, fresh in
 Malaya, Borneo, Malaya, and Australia.

1. Fruit straight, not twisted.

H. Murata, Lam. ; Kurr, F. Fl. i. 146. King, Journ. As. Soc. Bang. 12,
*1914, 82. — *H. spirata* C. C. B. Fl. Brit. Ind. i. 107.*

Stem densely tomentose. Leaves ovate or ovate-lanceolate, basal sheath
 dark purple or deep blue, ligula with pink, an short axillary panicle.
 Fruit 1-4 mm., cylindrical, acuminate, densely covered with long white
 and soft prickles, very lustrous very densely woolly.

Sumatra, Malaya, Malaya, Borneo, Malaya, Borneo, Malaya, Borneo, Malaya, Borneo.
*Kurr, F. Fl. i. 146. — *H. argus* Lam. *Herb. Mus. Bor. Par.*
Sumatra, Malaya, Malaya, Borneo, Malaya, Borneo, Malaya, Borneo.
Sumatra, Malaya, Malaya, Borneo, Malaya, Borneo, Malaya, Borneo.
*Sumatra, Malaya, Malaya, Borneo, Malaya, Borneo, Malaya, Borneo.**

About 1/2 m. long, base 1/2 m. wide. Fruit 1/2 m. long, base 1/2 m. wide. Fruit
 in Malaya. The fruit is persistent, naturalized in many parts of
 India, throughout the island. Leaves and stem are soft pubescent. Leaves
 linear-lanceolate, base rounded or slightly lobed, ligule 5-7. Panicle branched
 with 2-3 large rays, 1-2 m. long, 1/2 m. wide, 1/2 m. long, 1/2 m. wide, 1/2 m.
 long, 1/2 m. wide. Fruit 1/2 m. long, 1/2 m. wide, 1/2 m. long, 1/2 m. wide.
 The fruit is persistent, naturalized in many parts of India.

BUETTNERIA Lica, Fl. Brit. Ind. i. 379

Large woody climber or shrub, joints in axillary and branched clusters. Fl.
 petals 5, a narrow leafy blade, with 2 small lateral lobes on 4 corners of
 base. Staminal tube with 5-branched truncate or emarginate teeth, and between
 them 5 sharp hooks. Capsule globose, echinate, 5-angled, 5-valved, the
 tube twisted. Species of a few tropical and subtropical Asia and Africa.

1. *B. pilosa*, Koch. Kurr, F. Fl. i. 151. Vern. *Totten-sidi*, Batak.

A large climber, the stem as thick as a man's thigh. Leaves cordate
 serrulate, acute, 5-7 lobed, large acuminate blade 2-4, petiole 1-2 m.
 Corolla glabrous, 4 m. diam., densely covered with long brown tickled
 hair-like bristles.

Malaya, Borneo, Malaya, Borneo, Malaya, Borneo, Malaya, Borneo. Fl. Mar-
 July.

B. supera, C. C. B. Kurr, F. Fl. i. 151.

A petioled woody climber, often with a tree-like stem. Leaves cordate,
 lobes glabrous and shining above, blade 5-8, petiole 2-5 in. Capsule globose,
 1/2-2 m. diam., armed with many long sharp spines.

Pteris caudata, L. 1759, f. *caudata*, Willd. *Bot. Bch. Tabern. Icon. Pterid. p. 107*.
P. caudata, L. 1759, f. *caudata*, Willd. *Bot. Bch. Tabern. Icon. Pterid. p. 107*.
P. caudata, L. 1759, f. *caudata*, Willd. *Bot. Bch. Tabern. Icon. Pterid. p. 107*.
P. caudata, L. 1759, f. *caudata*, Willd. *Bot. Bch. Tabern. Icon. Pterid. p. 107*.

6. **PTEROSPERMUM**, Schimper: Fl. Bot. Ind. Ind.

Trees rarely shrubs, hairs stellate. Fl. dissected, bracts pedate, lobes deeply 3-
 cleft, declinate. Stachial flowers short, sessile to the gynophore, 5-10 long
 20 elements, 15 with linear anthers, 5 without anthers. Petals 1-2, ovary
 3-5 celled, stigma club-shaped and narrowed. Capsule woody, 2-3 celled,
 opening by lid-like pericarpium. Siliqua winged at the end, striated, sometimes
 woody, not lidless when lid is closed. Species 18, tropical Asia.

A. Western species.

1. *P. suberifolium*, Lam.: Ternstroem's Handb. Voy. Ind. 1. 1. 3. Ternstroem's
 Voy. Ind. 1. 1. 3. Ternstroem's Voy. Ind. 1. 1. 3.

A small tree, branches and induracens densely clothed with fine
 ferruginous or rusty
 stellate hairs. Leaves
 distichous, 2-3 dm. long,
 a small leaf is narrower
 above, with a serrate
 line, rarely 1 dm. long,
 with 10-15 pairs of
 white. Linnæus
 1759, f. 1. 1. 3. Ternstroem's
 Voy. Ind. 1. 1. 3.



11. *Pteris suberifolium*, Lam.
 Fl. 1. 1. 3.

2. *P. Heyneanum*, Wall.: Wright in. 480. Ternstroem's Voy. Ind. 1. 1. 3.

A small tree, branches, petioles and induracens rusty to fulvous.
 Leaves greenish-brown, lanceolate, length variable in shape, ordinarily oblong,
 scarcely notched at apex, base 1-4, petiole 1-2 dm. long, base cordate, lobes
 palmately 3-5, on petioles 2-3 in. long. Peduncles axillary, a little longer
 than petioles, 1-2 dm. cruce to palmatifid, calyx 2 in. long, petals 3-5
 lobed. Capsule brown-woody, 3-5 in. long.

Western Pteris, on the west side of the coast and inland on the hills. Fl. 1. 1. 3.
 Nearly allied to *P. reticulatum*, Wright in. 480. Ternstroem's Voy. Ind. 1. 1. 3.
 Ternstroem's Voy. Ind. 1. 1. 3. Ternstroem's Voy. Ind. 1. 1. 3.
 Ternstroem's Voy. Ind. 1. 1. 3. Ternstroem's Voy. Ind. 1. 1. 3.

10. *P. lanceifolium*, Boiss. *Diagnos. 3*: Pl. 12.

Shrubby tree, young shoots and under side of leaves with short tomentum, glaucous beneath. Leaves lanceolate from a rounded, mostly equal-sided base. Fl. fragrant, axillary, or peduncles longer than calyx. Calyx lobes few, often trifid, segments subulate. Calyx 1 1/2 in., petals white. Capsule lanceolate, calyx 2 1/2 in. by 1 1/2 in.

Kandahar, Mughal Gardens, P. H. Boiss. *Diagnos. 3*: Pl. 12. In Kashmir a related form *P. muscatorum*, Kuntz. King in Journ. bot. Soc. Lond. 1845, p. 124. *P. muscatorum* is Kurz and Ag. in Journ. bot. Soc. Lond. 1845, p. 124. Also in the paper and Transactions, Malay Peninsula and Archipelago. The two species are distinguished by the presence of the extra 2 in. capsule merely, with the rest of the tree.

Leptomastix glabra, Duran. *Ann. F. P. 1880*. A small tree in the mountainous parts of the Western Ghats, from the Cochin coast southwards to Tenasserim, the Andaman, the Malay Peninsula and And. Malay. Leaves subulate-lanceolate, with the upper being lanceolate to ovate-lanceolate, petioles short, about 1/2 in. long, bearing a small tubular sheath bearing an imbricate series of 5 short dorsal lobes. The stem is covered with small, subulate-lanceolate and between these two with a kind of 10-ribbed, Deptford-like, but less, rugose, and reddish black. *P. glabra* is the form *P. glabra* 1844; *P. glabra* Boiss. Kurz, supposed to differ by the absence of the extra 2 in. capsule, but the same species.

7. REEVESIA, Lindl. Fl. Brit. Ind. 1: 660.

Shrubs or trees, leaves simple, entire, serrated, the inner part of lateral veins level. Fl. terminal, in terminal corymbose panicles, calyx lanceolate, lobes 5, petals 5, claws. Stamens 5, filamentous to rigid, long, 2 or 3 longer than petals, bearing a white head of 2 or 3 filaments. Ovary 1, 2-lobed, 2 ovules in each cell. Capsule ovate, apically flattened, with a small *Stemmatia* or *Stemmatium*, foliaceous, in a deeply imbricate species of the eastern Himalays to China.

R. Wallichii, Brown, Journ. bot. Soc. Lond. 1845, p. 124. A small tree, 10-15 ft. high, with a rounded crown. Fl. white, very fragrant. *R. Wallichii* is the form *R. Wallichii* Kurz, and the form *R. Wallichii* Kurz, and the form *R. Wallichii* Kurz. It differs by pale green leaves with a broad often nearly white base, and pink flowers.

Reevesia venetosa, H. B. & Kuntz, Wight III. 1: 51; Boiss. Fl. Ind. 1: 660. A tree indigenous in tropical America, but often planted in India. Leaves entire, lanceolate, long petioles long, serrated. Fl. terminal, small, yellow, and very fragrant. Calyx 5-lobed, lobes 5, petals 5, claws. Stamens 5, filamentous, anthers of 2 short segments. The central tube 5-angled, striated, alternating with 5 filaments, with 5 or 6 small lobes. Capsule ovate, widely ribbed, resembling a nutberry.

Koehleria velutina, Boiss. Fl. Ind. 1: 660. A small tree, 10-15 ft. high, with a rounded crown. Leaves entire, lanceolate, long petioles long, serrated. Fl. terminal, small, yellow, and very fragrant. Calyx 5-lobed, lobes 5, petals 5, claws. Stamens 5, filamentous, anthers of 2 short segments. The central tube 5-angled, striated, alternating with 5 filaments, with 5 or 6 small lobes. Capsule ovate, widely ribbed, resembling a nutberry.

Eleocharis hospita, Linn. Bot. Man. 1: 4. A shrubby tree, indigenous in the west of the Mekong river, on the border of the Malay Archipelago, but also introduced in tropical East Africa and Australia, cultivated in the Western Ghats. Leaves 7-8-nerved, broadly ovate, often with a cordate base. Fl. rose-colored, 1-2 in. in long, terminal panicle. Sepals 5, distinct, equal, petals 5, unequal, the longest slightly longer than the widest, spreading into a broad cap, with 5 or 6 small, 3-lobed, white, cells divergent. Five small white, pinnate leaves, spreading, capsule inflated pyriform, with 5 or 6 small, 3-lobed, white, cells divergent, ribbed, 5-angled, 5-angled.

ORDER XXI. TILIACEÆ. Gen. Pl. 3. 228.

(*Floracarpus* and *Tilium*, Schumml. in Engl. Bot. Jahrb. 1877, p. 105.)

Tree or shrub, some genera herbaceous. Leaves alternate, simple, stipulate, petiolate. Fl. regular, generally bisexual, but pentamerous, axillary, from axillary axils. Stamens numerous, free, sometimes in bundles. Anthers 2-4, very long, 2-loricate, scales attach. 1 to each placenta. Stamens and styles fertile in an elevated androgynophore. Sepals and petals of the base of the ovary without albumen.

Not containing any large amount of starch, but the seed parenchyma. The seed albumen is the essential part of the embryo and *Pohliacarpus*. This is the reason for several *Pohliacarpus*.

- A. Sepals 5-7, 2-3-lobed, 2-3-lobed, 2-3-lobed.
- B. Sepals 5-7, 2-3-lobed, 2-3-lobed.
- C. Sepals 5-7, 2-3-lobed, 2-3-lobed.
- D. Sepals 5-7, 2-3-lobed, 2-3-lobed.

Pohliacarpus *concolor*, (H. B. K.) DC. Journ. Bot. Hort. Bot. (1841) 1: 118. Kurz, F. Fl. 1: 171. A tree or shrub of the Himalayas. Leaves opposite, elliptic-oblong, acuminate, 4-5 in. long, 1-2 in. broad, green above, brownish beneath. Bark thin, smooth. Flowers axillary, small, white, 2-3 in. diam. Fruit dry, with 2 seeds, 1 in. diam. Kurz names this species as *Malpighia*.

1. BROWNLOWIA. Roxb.; Fl. Ind. Ind. 4. 381.

Tree, with woody or spongy pubescence. Leaves with 2-3 basal nerves. Flowers in large terminal panicles. Calyx campanulate, irregularly 2-5-lobed. Sepals 5, woody, membranous, free or a raised tube. Anthers 2-4, long, nearly 2-lobed. In the stamens surrounding the ovary, 5-petaled, 2-lobed, opposite the petals. Carpels 3, more or less coherent, each with 2 or 3 ovules ultimately free, 2-lobed, 1-lobed. Albumen none, copious, thick. Spines. Species 10-15, tropical Asia.

- 1. *B. elata*, Roxb. Gen. Pl. 4. 265; Kurz, F. Fl. 1: 171.
- A little evergreen tree, young shoots rusty or hoary-puberulous. Leaves ovate, petiole 2-4 in. long, coriaceous, glossy above, glaucous and puberulous beneath. Fl. yellow, 1-2 in. diam. Calyx 1/2 in. long, woody, persistent. Carpels woody, usually 2-3, 1-1 1/2 in. diam., woody, slightly puberulous, entire prominent.
- This is the most common and best known. Fl. H. 3. 2. *B. lasiocarpa*, (H. B. K.) A little evergreen tree of the Himalayas, forest of the Burmah peninsula. Leaves ovate, petiole 1-2 in. long, coriaceous, pale beneath. Fl. small, yellow, 1-2 in. diam. *B. petata*, (H. B. K.) Kurz, F. Fl. 1: 171. *B. Hilliana*, (Poir.) Fl. Ind. Ind. 4. 139. A small tree of Temasecum: leaf round, petiole long, 2-3 in. long, leaf with 2 basal nerves, 2-12 in. long, calyx white, persistent.

PENTACE, Baerb., Fl. Brit. Ind. i. 381.

Trees with leathery leaves and numerous small flowers in terminal panicles. Calyx campanulate, 5-lobed. Stamens numerous, filaments usually 5-7, anthers 2-3, short. Ovary 3-celled. Fruit dry, an lobed sort, becelled, besegmented with 5-10 large membranous wings. *Buriera* large in a thin bark. Sp. Pl. 15. Burma and the Eastern Peninsula.



FIG. 45.—*Pentace burmanica*, Kunt.

1. *P. burmanica*, Kunt., Fl. Brit. Ind. Veru. *Pentace*, Burma.

A large tree, green tree, wood reddish white when fresh cut, shining, not hard, even greenish medullary rays prominent in radial section, could shed pubescent. Leaves alternate or subverticillate, ovate, acute, glossy above, pale and pubescent beneath. Secondary nerves 5-7, 5-7, the lowest pair basal. Inflorescence axillary-tomentose. Stamens in 5 bundles of 4-7 each, the anthers

alternating with long linear staminodes. Capsule with 5 broad membranous wings, 1-1 1/4 in. long.

Evergreen and semi-evergreen forests on the hills of Burma. Fl. February-March. Also on the hills of Cambodia. 2. *P. Griffithii*, Kunt., in Journ. As. Soc. Bengal, x. 4. 1841. 101, of Tenasserim, has leaves with 5 basal nerves, the 2 outer close to the margin, the 3 inner very prominent, large flowers (1 in. diam.) and a capsule with 10 wings.

3. *BERRYA*, Roxb., Fl. Brit. Ind. i. 383.

B. Ammonilla, Roxb., Cor. Pl. 264. The only species. Wright Ill. t. 34. Bedd. Fl. Sylv. t. 58. Veru. *Pentace*, Burma.

A tall tree with smooth pale bark, heartwood dark red, very hard. Leaves cordate, acute, bright green, with 5-7 basal nerves, margin undulating, glabrous above, glabrous or slightly pubescent beneath. Petiole 2-4, blade 5-8 in. long. Stipules 1/2 in. long, linear-setaceous. Fl. white, numerous, 1/2 in. diam. in lax terminal panicles. Stamens ∞ , free, no staminodes. Ovary 3-4-celled. Capsule supported by the persistent calyx, globose, pubescent, with 6 horizontally spreading, light, papery wings 1 in. long. See is 1-4 in each cell.

Malabar, Travancore, Ceylon, Andaman, Burma. Fl. J. S. Pierre, Fl. For. Cochinch. t. 103, regards the tree of the Eastern Peninsula, leaves softly tomentose beneath, as a distinct species—*B. a 916*, Wall.

4. *GREWIA*, Linn., Fl. Brit. Ind. i. 383.

Trees or shrubs, mostly deciduous, at times scrambling or climbing. Branchlets, leaves and sepals mostly clothed with stellate hairs. Simple hairs on petals

androgyne and ovary. Lower part of leaf distinctly serrate, rarely lobed, generally elliptic with 3-5 rays. Calyx 5-toothed, rarely FL in umbelliform, generally umbelliform axils. Sepals minute, often caducous, 5, the middle deciduous. Petals minute, three sepals or more species with 5 thin, long, slender, bearing on the inside an area, generally papillose, surrounded by a densely villous, semicircular or circular rim. Stamens 5, 2-4 free together with the ovary, one raised more or less - style torus, androgyne of an anther, the ridges of which alternate with the petals, the lower part glabrous, the upper hairy or tomentose. Ovary 2-4-lobed, in most species 2-lobed, style 1, style as a rule 8. Stigma generally lobed, more or less distinctly lobed. Fruit a drupe, often deeply lobed, with 1-2 pyrenes, which may be 4 or 5, usually the end carpel often sessile, surrounded by a fleshy mesocarp. One leafy petiole tropical and sub-tropical, from Africa to Queensland.

1. FL in axils, petals with a distinct claw.

2. Petioles mostly solitary, cal opposite, rarely terminal or axillary, blade of petiole like the length of claw.

1. *G. oppositifolia*, Berk. Wight Ic. t. 81: Bravdia, F. Fl. t. 11. Vern. *Kabir, Basha, Pannan, Phoran, Athant, Hool, Bohl* North West Himalaya.

A small tree, wood white, with small irregularly shaped leaves. Leaves 2-4 in. long, ovate, serrulate. Petioles single, leaf opposite, 2-3 in. long. Stipules 1-3, supported by linear deciduous bracts. Sepals 5-1 in. Petals 5-10 than sepals, yellowish red, 1/4 to linear, twice the length of claw. Drupe deep 2-4 lobed, fleshy. Fruit olive green, then black, with a flattened hairy. Calyx 5-toothed, sepals 5-10, salverge. Stamens 5, ascending, sessile. Style 1, 2-lobed, according to 2700 ft. The leaves are shed in March, the flowers continue to be April and May. Fr. March, June.

2. *G. populifolia*, Vahl: Trimen Hatt. Ceylon t. 18. Vern. *Garuga, Gaugada, Happona*.

A shrub with stiff divaricate branches, bark white, wood pinkish-white, smooth. Branchlets and leaves slightly rough with short stellate hairs. Leaves broadly ovate, sometimes oblong, rarely ovate, blade 1-2 in. petiole slender, 1/2-1 in. long. Petioles slender, generally cal opposite and solitary, with 2-3 large white bracts. Sepals 1 in., blade attached to back of claw. Gyno, long glabrous, with 5 densely villous teeth. Ovary globose or 4-lobed. Drupe 2-lobed, orange, of 2-4 distinct globular lobes, each with a 2-lobed stone.

Dry and arid regions of North-east India, Sind and the Deccan. Salt ranges, but not North West Himalaya according to 2700 ft. Fl. July-December. Distribution of *G. populifolia* Vahl. Fern, tropical Africa.



FIG. 2.—*Grewia populifolia*, Vahl.

6. Peduncles mostly solitary and axillary; leaves with 3 basal nerves. Western species.

6. *G. columnaris*, Smith; Wight *Ind. Fl.* 41. Vern. *Tamil*, *Tel.*

A scrambling at times almost climbing shrub, rough with short scabrous hairs. Leaves 2-3 in., ovate-lanceolate. Peduncles mostly solitary, axillary, extra-axillary or terminal, $\frac{1}{2}$ in., with 3-5 yellowish-white, branched or short less than pedicels. Sepals 1, petals 1 in., blade triangular, margin entire and nearly as long as claw. Gynophore long, cylindrical, tomentose part with 3 white teeth, stigma minute 3-lobed. Drupes pyriform, lobe mostly 1-lobed.

Both sides of the Western Peninsula. Fl. after November. Ceylon, Sri Lanka, Ceylon, India, *G. emarginata*, Wight & Arn. *J. Bot.* vol. 2. *Nepenthes* Paines and J. *Ind. Fl.* 41. Leaves mostly beneath. Flowers large, white, drupes large and 1-lobed, deeply 2-lobed.

7. *G. orientalis*, Long. *Travels Handb. Ceylon* 170. Vern. *Tamil*, *Tel.*

A scrambling often climbing shrub. Leaves 3-4 in., nearly globose, ovate-lanceolate. Peduncles solitary, terminal, axillary or extra-axillary. Fl. large, white. Sepals $\frac{1}{2}$ in., petals $\frac{1}{2}$ in., blade triangular, as long as claw and at chord of its base. Gynophore as in 6. Drupes of 1-lobed, scarcely 1-lobed.

Mostly shrubs of the Western Peninsula, India, *Nepenthes* Paines, *J. Ind. Fl.* 41. Leaves mostly beneath, not specifically different from *G. arborescens*, Hill, *Hills of the Karikal*. Drupes solitary, 2-4-lobed, hairy.

7. *G. umbellifera*, Benth. *Syn. G. Buchler*, Maske. *Fl. Ind.* 189.

A 1-2 m. scandent shrub, at times a tree, the stem of the base often woody with blunt woody, tuberaceous. Branchlets, petioles, and inflorescence with rusty stellate pubescence. Leaves 4-5 in., long, elliptic-oblong, mostly serrate, the 2 lateral basal nerves extending to the middle of the blade beyond it. Peduncles 1-4 in., generally 1-axillary, 2-5-lobed, axillary bearing 5-15 large flowers. Sepals 1-2, petals 1-2 in., blade as long as or longer than claw, gynophore long cylindrical, tomentose, the lower glabrous portion very short. Fruit of 4 distinct drupes, $\frac{1}{2}$ in. diam.

Western side of the Western Peninsula. Nearly allied to *G. bicolorata*, Meisner. In evergreen forests of the Western Ghats from North Kanara and Mysore. A large tree, leaves large, petioles and inflorescence of leaves rusty-hairy above. Peduncles 1-4 in., long, axillary or leaf-opposed. Fruit unknown. *G. exaltata*, Benth. *King. of Ar. Bot. Bengal* vol. 10 (1841) 119. In Malabar, not a tree, but found in the Western Peninsula.

8. Peduncles mostly solitary and axillary; leaves with 3 basal nerves. Eastern species and species of both peninsulas.

8. *G. scabrata*, Wall. & Kurz. *F. Fl.* 1. 168.

An evergreen shrub. Branchlets, petioles and inflorescence shortly rusty-tomentose. Leaves 5-6 in., ovate-lanceolate, serrate, chartaceous, rough with short stellate hairs, especially beneath, the tertiary nerves parallel and prominent beneath. Peduncles axillary, short, bearing 2-5 flowers. Sepals 1-2, petals $\frac{1}{2}$ in., blade as long as or longer than claw. Gynophore $\frac{1}{2}$ in. long, the glabrous part very short, the tomentose portion scribbled. Drupes $\frac{1}{2}$ in. diam., slightly 2-4-lobed.

Young *Tamil*, *Fl. September*. Nearly allied to *G. nigrescens*, Vahl. *J. Bot.* vol. 2. *Nepenthes* Paines, *J. Ind. Fl.* 41. *Ind. Fl.* 168. *Am. Bot.* Leaves chartaceous. Fruit of 2 distinct drupes of 1-lobed.

9. *G. hirsuta*, Vahl. Vern. *Thamir*, *Tha.*, *Chopal*, *Tamil*, *Kanara*, *Upper*, *Khet*, *Lower*, *Barma*.

A small or middle-sized tree, wood white, soft. Leaves 4-7 in., oblong-lance-

longer than the main
leaves, or very glabrous
leaves, with the sides
with a few scattered
hairs. Secondary
nerves 4-5 pairs, the
lowest pair from the
base. Peduncles and
bracts pubescent with
hairs. Fruit generally
covered with fine
pubescence. In
some specimens, the
leaves are larger
than the fruit. The
fruit is generally
covered with fine
pubescence, or is
glabrous, or is
covered with a few
scattered hairs. The
fruit is generally
covered with fine
pubescence.

14. *G. ...*
leaves, or very glabrous
leaves, with the sides
with a few scattered
hairs. Secondary
nerves 4-5 pairs, the
lowest pair from the
base. Peduncles and
bracts pubescent with
hairs. Fruit generally
covered with fine
pubescence.



Fig. 17. *G. ...* Wurt.

15. *G. ...* leaves, or very glabrous
leaves, with the sides
with a few scattered
hairs. Secondary
nerves 4-5 pairs, the
lowest pair from the
base. Peduncles and
bracts pubescent with
hairs. Fruit generally
covered with fine
pubescence.

16. *G. ...* leaves, or very glabrous
leaves, with the sides
with a few scattered
hairs. Secondary
nerves 4-5 pairs, the
lowest pair from the
base. Peduncles and
bracts pubescent with
hairs. Fruit generally
covered with fine
pubescence.

17. *G. ...* leaves, or very glabrous
leaves, with the sides
with a few scattered
hairs. Secondary
nerves 4-5 pairs, the
lowest pair from the
base. Peduncles and
bracts pubescent with
hairs. Fruit generally
covered with fine
pubescence.

A simple or small, branched, dark brown, hairy, branchlets, inflorescence
and upper side of leaves white or grey, with short pubescence. Leaves 2-4 in.
long, ovate-lanceolate, edge entire, serrulate or serrulate. Peduncles
dense, with 2-3 conspicuous yellow flowers. Sepals $\frac{1}{2}$ in. on both sides silky,
petals $\frac{1}{2}$ in. (the claw larger than claw, base of claw hairy). Fruit generally
covered with fine hairs.

18. *G. ...* leaves, or very glabrous
leaves, with the sides
with a few scattered
hairs. Secondary
nerves 4-5 pairs, the
lowest pair from the
base. Peduncles and
bracts pubescent with
hairs. Fruit generally
covered with fine
pubescence.

19. *G. pilosa*. Lam. & Brande R. Fl. 39. Vera-*Tunggu*, *pinnatifida*.
Rabatana, *Tubi*, Tel.

A large straggling shrub, branchlets, petioles, inner side of leaves and inflorescence
covered with fine light-brown stellate hairs. Leaves 2-4 in. long, ovate
lanceolate, serrulate. Secondary nerves 4-5 pairs, the lowest pair from
the base. Bracts small, at an angle of 45°; buds hirsute, constricted in the

shrub, 1-2 m. tall, in some of our gardens near the Negro village with much of the ground covered with it. The branches are very brittle, and break easily. The leaves are very large, and are very dark green above, and very dark green below. The flowers are very large, and are very dark red. The fruit is very large, and is very dark red.

17. *G. villosa*, Willd.; Brandis, F. Fl. Ind. Arch. (1841), p. 101, t. 1, f. 145. A shrub, often gregarious, leafy branches and inflorescences densely hairy with long stellate hairs. Leaves ovate, very triangular from a cordate base, 1-4 m. diam., upper transverse veins numerous, prominent and parallel, tufts of silky hairs on the serratures. Petals dull yellow, peduncles very short, many together in corymbose clusters. Sepals linear, prominently 1/2 in. long, cordate with petioles with short stellate, outside also with long simple hairs, the base often with a long bristly and stellate process. Blade of petal about the length of claw. Fruit globose, with distinct crustaceous brown rim, with tufts of long stellate hairs, pulp pleasant.

18. *G. villosa*, Willd.; Brandis, F. Fl. Ind. Arch. (1841), p. 101, t. 1, f. 145.

19. *G. rotundifolia*, Jacq. Ann. Mus. Hist. Nat. Paris, p. 179, t. 1, f. 145.

Leaves half in. green underneath, densely tomentose above, with prominent venation, the veins larger than flowers. Both the leaves and the flowers are very dark red. The fruit is very large, and is very dark red. The pulp is very pleasant.

20. *G. rotundifolia*, Jacq. Ann. Mus. Hist. Nat. Paris, p. 179, t. 1, f. 145.

21. *G. asiatica*, Lamour. Act. Phyt. Phytol. Paris, p. 101, t. 1, f. 145.

A shrubby plant with bark greyish white or greyish brown, inner bark reddish brown, small, irregularly shaped, dark brown. Herbage very hairy, with long, varying from 1/2 to 1 in. long, and 1/2 to 1 in. wide, and very soft, and very much branched. Stipules very large, and are very much branched. The leaves are very large, and are very dark red. The fruit is very large, and is very dark red. The pulp is very pleasant.

22. *G. asiatica*, Lamour. Act. Phyt. Phytol. Paris, p. 101, t. 1, f. 145. This extremely variable form was described by Willd. as *G. villosa* by Jacq. and by Kunth as *G. villosa*. My specimens vary much in leafy branches, and in the fruit, and in the characters of the leaves, and in the characters of the fruit. The characters of the leaves are very much branched, and are very much branched. The fruit is very large, and is very dark red. The pulp is very pleasant.

23. *G. asiatica*, Lamour. Act. Phyt. Phytol. Paris, p. 101, t. 1, f. 145. This form is very much branched, and is very much branched. The fruit is very large, and is very dark red. The pulp is very pleasant.

24. *G. asiatica*, Lamour. Act. Phyt. Phytol. Paris, p. 101, t. 1, f. 145.

25. *G. villosa*, Willd.; Brandis, F. Fl. Ind. Arch. (1841), p. 101, t. 1, f. 145. A shrub, often gregarious, leafy branches and inflorescences densely hairy with long stellate hairs. Leaves ovate, very triangular from a cordate base, 1-4 m. diam., upper transverse veins numerous, prominent and parallel, tufts of silky hairs on the serratures. Petals dull yellow, peduncles very short, many together in corymbose clusters. Sepals linear, prominently 1/2 in. long, cordate with petioles with short stellate, outside also with long simple hairs, the base often with a long bristly and stellate process. Blade of petal about the length of claw. Fruit globose, with distinct crustaceous brown rim, with tufts of long stellate hairs, pulp pleasant.

19. *G. acutifolia*, Juss., *Revue Fl. Ind. Néerl.*, Vism., *Batavia*, *Tropisch*, 1817, p. 121. — *Fl. Burm.*, 1828, p. 107. — *Fl. Ind. Néerl.*, Vism., *Batavia*, 1828, p. 121. — *Fl. Ind. Néerl.*, Vism., *Batavia*, 1828, p. 121.

A shrub 10-15 m. tall, sometimes only a few feet high. Branches woody and pubescent, slightly villous-tomentose. Leaves 1-8 in. long, usually ovate, rarely orbicular, often slightly lobed, tertiary nerves distinct beneath. Petioles very short, with a distinct axillary gland. Heads 1-2, pedicels not long. Calyx 5-lobed, lobes long as claw. Stamens numerous, outer calyx lobes sometimes as long as between petals. Anther singly 2-4-lobed, 1-2 in. long, white.

Flowers white. Fruit globose, 1-2 in. diam. In the fruit the calyx lobes are persistent, and the petals are not distinct.

20. *G. acutifolia* II. — *G. acutifolia* II. — *Fl. Burm.*, 1828, p. 107. — *Fl. Ind. Néerl.*, Vism., *Batavia*, 1828, p. 121. — *Fl. Ind. Néerl.*, Vism., *Batavia*, 1828, p. 121.

A shrub 10-15 m. tall, sometimes only a few feet high. Branches woody and pubescent, slightly villous-tomentose. Leaves 1-8 in. long, usually ovate, rarely orbicular, often slightly lobed, tertiary nerves distinct beneath. Petioles short. Heads 1-2, pedicels not long. Calyx 5-lobed, lobes long as claw. Stamens numerous, outer calyx lobes sometimes as long as between petals. Anther singly 2-4-lobed, 1-2 in. long, white.



FIG. 15.—*G. acutifolia* II. In flower and fruit, lateral sepals three times enlarged.

Flowers white. Fruit globose, 1-2 in. diam. In the fruit the calyx lobes are persistent, and the petals are not distinct.

21. Inflorescence a large terminal panicle. Fl. mostly at side, in 3-nd. head supported by bracts, lobes often lacinate below, stigma minutely 2-4-lobate.

22. *G. Microcos*, Linn., *Wright Fl.* t. 81. — *Syn. G. acutifolia*, Roxb. *Vern. Hist.*, Burm.

A medium-sized tree, at times only a shrub, young shoots and petioles slightly pubescent. Leaves ovate- or oblong-lanceolate, acuminate, 4-8 in. long, secondary nerves 5-8 pair, the lowest pair basal, stipules lanceolate. Fl. pale greenish white, sepals 5, petals 5, in. blade equal to claw, often bifid. Gynoecium glabrous, with a woolly fringe at top, ovary glabrous. Fruit 1-1.5 in. diam., not dried.

Flowers white. Fruit globose, 1-2 in. diam. In the fruit the calyx lobes are persistent, and the petals are not distinct.

23. *G. adaphylla*, Roxb., *Fl. Ind. Néerl.*, Vism., *Batavia*, 1828, p. 121. — *Fl. Ind. Néerl.*, Vism., *Batavia*, 1828, p. 121.

G. *G. ...* ... *G. ...* ... *G. ...* ...

B. Fl. bisexual, male without a distinct claw.

23. *G. orbiculata*, Koenig; Fl. Brit. Ind. 2: 487, 1777.

Branchlets, leaves and inflorescence hairy. Leaves elliptic, 1-1½ inch long, dentate. Sometimes 5-nerved, with grey pubescence beneath. Petioles short. Panicle-bearing pedicels 2-4-angled with 4-angled lobes a length of two sepals. Bracts broad or globose, sometimes individually flattened. Sepals 4, the petals thin, veined, 4-lobed, obtusely 2-lobed with only a few hairs on the slightly thickened base.

Distribution: ... in the ... of ...

24. *G. leptopetala*, sp. nov. — Syn. *G. thurifera*, Doh. Fl. Ind. 2: 109.

Branchlets and under side of leaves ... from glabrous to densely and thickly ... leaves from broad-ovate to ... elliptical ... stipules varying from linear to ... usually ... Petioles axillary, slender ... in fascicles of 2 ... each bearing 2 ... Petals thin, veined, linear-obovate or linear, ... at tip, ... glabrous ... a few hairs on the slightly thickened base. ... generally 2-lobed, 1 ...



Fig. 10. G. leptopetala. Branchlet, panicle and leaf, petals, sepals, etc., enlarged.

A North West Province of ... branchlets ... under side of leaves ... lobes ...

A North West Province of ... branchlets ... under side of leaves ... lobes ...

In the ... also belongs ...

C. Fl. polygama, generally male and bisexual.

28. *G. polygama*, Barb.; Bonpl., P. Pl. 42.

A shrub or small tree, bearing ... Branches ... branchlets, ... under side of leaves ... with long stellate hairs. Leaves lanceolate, 3-4 in., sharply serrate. Petioles short, slender, axillary, generally fasciculate. Sepals 4, petals 4, bracts equal to claw, which is hairy on back. Stamens ... 10-12 ... but sometimes more numerous. Stigma 5-lobed, lobes spreading. Style ... into numerous segments. Fruit 1 in. diam., ... hairy.

Distribution: ... in ...

29. *G. hirsuta* Vahl; Koenig, Fl. Ind. 2: 109. *Vern. Kunduray*, Barb.

A small shrub. Branchlets, ... under side of leaves ...

... .. Sepals 4,
... ..
... ..
... ..

... ..
... ..
... ..
... ..

COLUMBIA, Peru, Species 7, very abundant.

1. *C. ...* Wall. & Kunz, P. Fl.
... ..
... ..
... ..
... ..
... ..
... ..

... ..
... ..
... ..
... ..
... ..

ECHINOCARPUS, Blume; Fl. Brit. Ind. 1: 399. Included under
... .. by Schumann in Engler & Prantl III, 6: 51.

Tree with prominent leaves.
... ..
... ..
... ..
... ..

1. *E. ...* Benth. Fl. Brit. Ind. 1: 401. Varn. *... ..*

A large tree, young shoots pubescent.
... ..
... ..
... ..
... ..

2. *E. ...* Blume & Kunz, P. Fl. 1: 103.
... ..
... ..

A large tree, young shoots
... ..
... ..
... ..
... ..

3. *E. ...* Benth. Varn. *... ..* Assam.

A small tree.
... ..
... ..
... ..

4. *E. ...* Benth. Fl. Brit. Ind. 1: 401. Varn. *... ..*

A large tree, young shoots
... ..
... ..

D. Ovary 2-celled, each cell with 2 rows of superposed ovules. Fl. middle-sized, sepals $\frac{1}{2}$ - $\frac{3}{4}$ in., petals cuneate, deeply cut, anthers terminated by a long awn or bristle.

13. *E. aristatus*, Roxb.: Wight Ic. t. 43. — Vern. *Garrul*, Assam.

Leaves obovate or oblanceolate, blade 5-12 in., gradually narrowed into a petiole 1-2 in., which is thickened and geminate at the insertion of blade, upper side glabrous, underside with a few hairs on nerves. Secondary nerves 10-20 pair, prominent beneath. Racemes pubescent, 10-15 fl., pedicels nearly as long as sepals, sepals $\frac{1}{2}$ - $\frac{3}{4}$ in., densely pubescent outside. Petals yellow. Roxb. Fl. Ind. ii. 630, white in leaves Roxburghiana, with long soft hairs at the base. Stamens 45-50, awn equal or nearly equal to anther. Ovary tomentose. Stone rugose with two raised ridges (deeply tuberculate in a specimen from Sikkim).

Sahimalayan tract from Sikkim eastward. Dwarf (a large tree) Khasi Hills, Chittagong, Burma, Andaman. Fl. April, May. This probably is *E. longifolius* Kurz, F. Fl. 165.

14. *E. tuberculatus*, Roxb.: Bedd. Fl. Sylv. t. 113. — Syn. *Mauocera tuberculata*, Wight et Arn.: Wight Ic. t. 62, III. t. 35.

Similar to 13, but leaves pubescent beneath; inflorescence rusty-tomentose. Stamens more numerous, up to 80. Fl. white, stone compressed, deeply tuberculate.

Common in the evergreen forests of the Western Ghats and adjoining hills ranging from Malabar to the southwards. Fl. C. S. I am disposed to think that it and *E. longifolius* are the same species. *E. tuberculatus* has been collected by the Konkan, while tomentose specimens called *E. tuberculatus* are known from Burma. The other characters are not more reliable than the pubescence of leaves. 15. *E. rugosus*, Roxb.: Wight Ic. t. 61. Chittagong, Malak forest, Assam, D. R. Arn. 1870. Leaves approximate near the ends of branches, glabrous above, beneath, lower part narrow, with a rounded base, widening gradually into a broad apex, blade 6-12 in., petiole 6 or very short and broad, inflorescence rusty-tomentose. Sepals 1 in., pedicels longer than sepals. Petals pale yellow (Roxb. Roxburghiana) silky on both sides. Stamens 45, ovary grooved, tomentose. Stone rugose. *E. rugosus* Kurz, F. Fl. 165, with larger leaves, gradually narrowed into petiole, and glabrous beneath, may possibly belong to this.

16. *E. ferrugineus*, Bedd. Fl. Sylv. t. 112. — Syn. *Mauocera ferruginea*, Wight Ic. t. 93.

Bractlets, petioles, under side of leaves and inflorescence densely rusty-tomentose. Leaves coriaceous, elliptic, the two halves bent back so as to be boat-shaped. Blade 4-6, petiole $\frac{1}{2}$ -1 in. long. Racemes 6-12-flowered, pedicels as long as or shorter than sepals. Sepals $\frac{1}{2}$ in. long, silky outside, glabrous inside, petals silky on both sides. Petals oblong-cuneate, upper edge with 10-15 yellow teeth. Stamens 20, awn not half as long as anthers. Ovary tomentose, 2-celled, or else numerous, superposed. Drupe oval, $\frac{1}{2}$ in. long.

Nilgiris. Palni and Anamalai hills. Fl. April. 17. *E. aurantiacum*, Mass. Evergreen forests of the Western Ghats from the Konkan southwards. Leaves perfoliate, oblanceolate, chartaceous, crenate. Blade 2-4, petiole 1-1 $\frac{1}{2}$ in. Racemes short, with 3-10 flowers. Sepals $\frac{1}{2}$ in. long, slightly pubescent outside. Stamens 20, awn shorter than anther. Ovary 2-celled, tomentose. 18. *E. acuminatus* W. & A. B. Ind. v. 26. Assam and Khasi hills. Leaves glabrous, lanceolate, narrowed into short petiole. Racemes short, pedicels twice the length of sepals, which are $\frac{1}{2}$ - $\frac{3}{4}$ in., midrib prominent on inside. Petals cuneate, hairy on both faces, teeth 10-15, lanceolate, glabrous. Stamens 20-25 filaments glabrous, as long as anthers, thickened at the base. Awn short, hairy at anther. Ovary 2-celled, glabrous.

E. Ovary 2-celled, each cell with two rows of superposed ovules. Fl. large, sepals $\frac{1}{2}$ in. and longer. Petals cuneate, deeply cut. Anthers terminated by a long awn or bristle, rarely mucronate.

19. *E. obtusus*, Blume: King in Journ. Ag. Sci. Beng. vol. viii. 1884.

slightly serrated. Ray slender and E. *Microglossa*, C. C. Brit. Ind. Bot. Soc. 1885, and the leaf used by the Indians.

Leaves perfectly glabrous, obtuse-lanceolate, gradually into a slender petiole. Blade 3-7, petiole 1-2 in. Secondary nerves 6-10 pair. Keel-like rugulose, shorter than leaves, with 4-8 serrate-veins. Petioles and pedicels slender, the latter longer than sepals; corolla 1-2 in., narrowly linear-lanceolate. Petals oblong-ovate, divided into 2-3 incise segments, slightly notched



Fig. 20. *Encyrtus* *Varicosa*, Horn. 1.

with appressed hairs, less thickened and hairy inside. Tereb. smaller, double, 2-3-lobed. Stamens up to 50, filaments hairy, anthers long as anthers, hairy beyond. Drupa oval, obtuse, 1/4 in. long. Stone strongly tuberculate.

Locality: Mexico, Yucatan, Campeche, Abasco, Yucatan, 11 May. *Microglossa* *Microglossa*. Type probably *E. obscurus*, Kuntze, *Fl. Mex.* 1: 11, 1845. *E. senilis*, Horn. *Fl. Mex.* 1: 121. *Microglossa* *Microglossa* of 1845, with some characters of *Microglossa* *Microglossa*, but differs in some characters.

E. grandiflora, Smith & Kurz, P. Fl. Ind. - Pierre, Fl. Ind. Ind. - Syn. *M. grandiflora* Hance, Bot. Mag. 1883. Very variable form. A large shrub or small tree, entirely glabrous, except flowers. Leaves alternate, ovate, serrate, petiole 1/2-1/3 in. long. Flowers small, axillary, long-tubed, 1/2-3/4 in. long. Sepals 5, 1/2-3/4 in. long. Petals 5, 1/2-3/4 in. long. Ovary 2-3-lobed, 1/2-3/4 in. long. Fruit a drupe, 1/2-3/4 in. long.

E. grandiflora, Smith & Kurz, P. Fl. Ind. - Pierre, Fl. Ind. Ind. - Syn. *M. grandiflora* Hance, Bot. Mag. 1883. Very variable form. A large shrub or small tree, entirely glabrous, except flowers. Leaves alternate, ovate, serrate, petiole 1/2-1/3 in. long. Flowers small, axillary, long-tubed, 1/2-3/4 in. long. Sepals 5, 1/2-3/4 in. long. Petals 5, 1/2-3/4 in. long. Ovary 2-3-lobed, 1/2-3/4 in. long. Fruit a drupe, 1/2-3/4 in. long.

E. grandiflora, Smith & Kurz, P. Fl. Ind. - Pierre, Fl. Ind. Ind. - Syn. *M. grandiflora* Hance, Bot. Mag. 1883. Very variable form. A large shrub or small tree, entirely glabrous, except flowers. Leaves alternate, ovate, serrate, petiole 1/2-1/3 in. long. Flowers small, axillary, long-tubed, 1/2-3/4 in. long. Sepals 5, 1/2-3/4 in. long. Petals 5, 1/2-3/4 in. long. Ovary 2-3-lobed, 1/2-3/4 in. long. Fruit a drupe, 1/2-3/4 in. long.

E. grandiflora, Smith & Kurz, P. Fl. Ind. - Pierre, Fl. Ind. Ind. - Syn. *M. grandiflora* Hance, Bot. Mag. 1883. Very variable form. A large shrub or small tree, entirely glabrous, except flowers. Leaves alternate, ovate, serrate, petiole 1/2-1/3 in. long. Flowers small, axillary, long-tubed, 1/2-3/4 in. long. Sepals 5, 1/2-3/4 in. long. Petals 5, 1/2-3/4 in. long. Ovary 2-3-lobed, 1/2-3/4 in. long. Fruit a drupe, 1/2-3/4 in. long.

E. grandiflora, Smith & Kurz, P. Fl. Ind. - Pierre, Fl. Ind. Ind. - Syn. *M. grandiflora* Hance, Bot. Mag. 1883. Very variable form. A large shrub or small tree, entirely glabrous, except flowers. Leaves alternate, ovate, serrate, petiole 1/2-1/3 in. long. Flowers small, axillary, long-tubed, 1/2-3/4 in. long. Sepals 5, 1/2-3/4 in. long. Petals 5, 1/2-3/4 in. long. Ovary 2-3-lobed, 1/2-3/4 in. long. Fruit a drupe, 1/2-3/4 in. long.

E. grandiflora, Smith & Kurz, P. Fl. Ind. - Pierre, Fl. Ind. Ind. - Syn. *M. grandiflora* Hance, Bot. Mag. 1883. Very variable form. A large shrub or small tree, entirely glabrous, except flowers. Leaves alternate, ovate, serrate, petiole 1/2-1/3 in. long. Flowers small, axillary, long-tubed, 1/2-3/4 in. long. Sepals 5, 1/2-3/4 in. long. Petals 5, 1/2-3/4 in. long. Ovary 2-3-lobed, 1/2-3/4 in. long. Fruit a drupe, 1/2-3/4 in. long.

E. grandiflora, Smith & Kurz, P. Fl. Ind. - Pierre, Fl. Ind. Ind. - Syn. *M. grandiflora* Hance, Bot. Mag. 1883. Very variable form. A large shrub or small tree, entirely glabrous, except flowers. Leaves alternate, ovate, serrate, petiole 1/2-1/3 in. long. Flowers small, axillary, long-tubed, 1/2-3/4 in. long. Sepals 5, 1/2-3/4 in. long. Petals 5, 1/2-3/4 in. long. Ovary 2-3-lobed, 1/2-3/4 in. long. Fruit a drupe, 1/2-3/4 in. long.

E. grandiflora, Smith & Kurz, P. Fl. Ind. - Pierre, Fl. Ind. Ind. - Syn. *M. grandiflora* Hance, Bot. Mag. 1883. Very variable form. A large shrub or small tree, entirely glabrous, except flowers. Leaves alternate, ovate, serrate, petiole 1/2-1/3 in. long. Flowers small, axillary, long-tubed, 1/2-3/4 in. long. Sepals 5, 1/2-3/4 in. long. Petals 5, 1/2-3/4 in. long. Ovary 2-3-lobed, 1/2-3/4 in. long. Fruit a drupe, 1/2-3/4 in. long.

Order XXII. LINEÆ. Gen. Pl. 1, 241.

Linnaea var. *E. throughiana*, Engelm. & Gray, Proc. Acad. Nat. Sci. Philad. 1852.

Herb, shrub or small tree. Leaves alternate, simple, generally ovate. Fl. sessile, in a terminal raceme. Sepals 5, petals 5. Stamens 5, filaments united at base. Anthers versatile, 2-lobed. Ovary 2-3-lobed, 1/2-3/4 in. long. Fruit a drupe, 1/2-3/4 in. long. Several species of *Linnaea*, *Belmontia* and probably also of other genera are somewhat less account of their size and polymorphic flowers with varying relative length of styles and stamens.

- Species 10, fruit a drupe, several seeds, seeds on 1/2-3/4 in. long.
- Species 10, fruit a drupe, several seeds, seeds on 1/2-3/4 in. long.
- Species 10, fruit a drupe, several seeds, seeds on 1/2-3/4 in. long.
- Species 10, fruit a drupe, several seeds, seeds on 1/2-3/4 in. long.

Fl. Ind. Ind. - Pierre, Fl. Ind. Ind. - Syn. *M. grandiflora* Hance, Bot. Mag. 1883. Very variable form. A large shrub or small tree, entirely glabrous, except flowers. Leaves alternate, ovate, serrate, petiole 1/2-1/3 in. long. Flowers small, axillary, long-tubed, 1/2-3/4 in. long. Sepals 5, 1/2-3/4 in. long. Petals 5, 1/2-3/4 in. long. Ovary 2-3-lobed, 1/2-3/4 in. long. Fruit a drupe, 1/2-3/4 in. long.

1. *Fl.* 1-2 long. *Trochæ* (long) speculate, length 5-6 mm. *Stylæ* 1-2 long. *Stamens* 10-15, *filamentæ* long 2-3 mm. *Stylæ* 1-2 long.

2. *Fl.* 1-2 long. *Trochæ* (long) speculate, length 5-6 mm. *Stylæ* 1-2 long. *Stamens* 10-15, *filamentæ* long 2-3 mm. *Stylæ* 1-2 long.

B. Eastern species.

1. *E. Zenitatum*, Wall. *Kurz F. Fl.* 1: 111. *Kuhn Bot. Zeit.* 1847, p. 12. *Flournoy - M. March-May*. A slender pedunculate tree. Leaves elliptic-lanceolate, serrate, glaucous above, glaucous beneath. *Fl.* 1-2 long. *Trochæ* (long) speculate, length 5-6 mm. *Stylæ* 1-2 long. *Stamens* 10-15, *filamentæ* long 2-3 mm. *Stylæ* 1-2 long.

ORDER XXIII. MALPIGHIACEÆ. Gen. Pl. 1: 247.

Climbing shrubs, rarely erect. Leaves opposite, simple, stipules none or minute. *Fl.* regular or zygomorphic, bisexual, pentamerous. Calyx usually 5-lobed, petals free, 5-lobed or none. Stamens 10. Ovary free. Seed 1 or 2, lobed or solitary. Fruit cartels 1-3, usually winged.

Fl. regular, petals 5, unequal, 1 or 2 larger.

1. *Fl.* regular, petals 5, equal, 1 or 2 larger.

Fl. regular, petals 5, equal, stamens equal, style 1. 2. *Fl.* irregular.

1. HIPTAGE, Gaertner; Fl. Brit. Ind. 4: 118.

Fl. generally white, zygomorphic, the 5th petal larger and colored. Calyx glands adnate to the pedicel below the calyx. Stamens 10, all anthers free, 5 or 6 much longer than the rest. Fruit of 1-3 cartels, connate at the base, each terminating in three long wings. Species 8, south-eastern Asia.

1. *H. Madablota*, Gaertn. *Wright III. t. 62*. *Gen. Gaertner Bot. Tabulæ Hort. Vind. Pl. t. 18*. *Von Muller Bot. Madagasc.* *Humb. Bot. Tabulæ Pl. t. 18*. *Habitat in Madag.* *Upp. Burma.*

A small scandent and climbing shrub, the trunk stout, erect. Branchlets young leaves and inflorescence hairy or appressed tomentose, full grown leaves glabrous. Leaves elliptic-lanceolate, acute or slightly acuminate, 4-12 long, secondary nerves 1-6 pair. *Fl.* 1-1 in diam., very fragrant, petals 5, the 5th petal dashed with yellow. Wings 3 or 4, the middle one 1-2 long or oblongate, 1-2 in long, the 5th lateral half as long, the 3rd long.

South-eastern India: in the hills, ascending ascending to 2000 ft. *Fl.* 1-1 in diam., very fragrant, petals 5, the 5th petal dashed with yellow. Wings 3 or 4, the middle one 1-2 long or oblongate, 1-2 in long, the 5th lateral half as long, the 3rd long. *Fl.* 1-1 in diam., very fragrant, petals 5, the 5th petal dashed with yellow. Wings 3 or 4, the middle one 1-2 long or oblongate, 1-2 in long, the 5th lateral half as long, the 3rd long. *Fl.* 1-1 in diam., very fragrant, petals 5, the 5th petal dashed with yellow. Wings 3 or 4, the middle one 1-2 long or oblongate, 1-2 in long, the 5th lateral half as long, the 3rd long.

2. *H. candicans*, Hook. & Thunb. *Kurz F. Fl.* 1: 111. *Vern. Cat. Philippin. Lower; D. 1-4*. *Upp. Burma.*

A small scandent and climbing shrub. Branchlets and inflorescence pubescent.

of leaves below, or yellowish green above. Lower surface of lobes 2-4 lobed. The pointed lobes of upper or lateral leaf with a bright yellow blotch near the base, wings prominent like the lower side. Fr. 2-3, the two lateral being often 1/2 in. long.

Very rare and common in the mountains of the Himalayas, Malabar, India, etc. Fl. March, Cutchin, India. A. B. setosa, Hook. M. Journ. Bot. Soc. Lond. 1845. A woody climber, branches and young shoots covered with a white tomentose pubescence of short, spreading hairs. Wings of the fruit somewhat like those of A. B. setosa, but shorter and broader.

ASPIDOPTERYS. A. Juss. Fl. Brit. Ind. 1. 119.

By quadrangular, yellow or white, in axillary or terminal panicles, or glomerate, sessile, petals quite entire, not clawed. Stamens 10, equal. Ovary 2-lobed, at first glabrous, stigma capitate. Fruit of 8 elongated, curved, winged, separate when mature, each surrounded by an orbicular or oblong, winged, flattened seed. Species 14, tropical Asia.

A. Leaves tomentose beneath, or nearly so.

1. A. Roxburghiana, A. Juss. — Syn. Triopteris latifolia, Hook. Bot. Beechey, Pl. 1. 116.

A woody climber, leaves ovate, cordate-pinnatifid, long-petioled, petioles and rachis with a tomentose rusty pubescence. Leaves elliptic-obovate, base 3-4, petiole 4-6 in. long. Fruits 1 in. long. Wings of fruit oblong, 1/2 in. long.

Malabar, Assam, Khasi and Nagpalla, Western Provinces. Fl. August-October.

A. B. setosa, Kurz. Ternstroem and Vahlmanns Synonymy, 2. 4. 179. A woody climber, leaves ovate, cordate-pinnatifid, long-petioled, petioles and rachis with a tomentose rusty pubescence. Wings of fruit oblong, 1/2 in. long.

The following description is for the small species and of course not applicable to A. Roxburghiana. A. B. setosa, Hook. Ternstroem and Vahlmanns Synonymy, 2. 4. 179. Leaves ovate, cordate-pinnatifid, long-petioled, petioles and rachis with a tomentose rusty pubescence. Wings of fruit oblong, 1/2 in. long.

A. Fl. covered with villous hairs. Wings of fruit ovate, 1/2 in. long.

Malabar, Assam, Khasi and Nagpalla, Western Provinces. Wings of fruit orbicular, thinly hybrid, untruncated sides.

B. Leaves tomentose or pubescent beneath.

2. A. nutans, Hook. fil. & Kurz, F. Fl. 1. 175.

A woody climber, young shoots and inflorescences pubescent, leaves ovate,

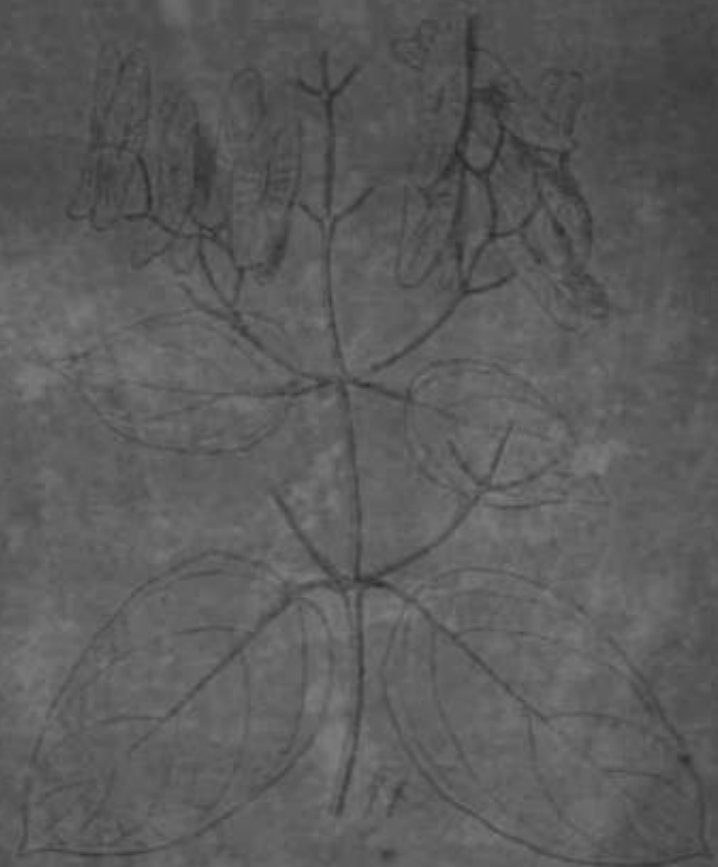


FIG. 52.—Aspidopterys Roxburghiana, A. Juss.

Fig. 34.—*Dichaparyx cuneata*, Hook. & G.

of the leaf is an oblong-oval, silky leaflet, 1½ to 2½ in. long, 1 to 1½ in. wide. Wing of fruit, broad, ovate, 1½ in. long.

SIRAJI, in Journ. N. I. Ind. Mus., Ser. Botany, Vol. 1, p. 10, 1854. Theobald, in Journ. Bot. Soc. London, Dec. 1854, p. 10. A. Juss., *Bot. Voy. Ind. Océan.*, Vol. 1, Pl. Ind. Océan, p. 10, 1854. Przewalski, in Journ. Bot. Soc. London, Dec. 1854, p. 10. Young, in Journ. Bot. Soc. London, Dec. 1854, p. 10. Young, in Journ. Bot. Soc. London, Dec. 1854, p. 10. Young, in Journ. Bot. Soc. London, Dec. 1854, p. 10.

T. A. WALLICH.

Hook. & G., *Fl. Borac.*

Ind. Océan., Vol. 1, p. 10.

Benalla, F. F., *Fl. Ind.*

A large, simple,

young, simple, simple.

side of leaf and inflorescence clothed with soft white or gray tomentum. Pedicels arise from a cordate or rounded base, acuminate. Heads 4-5, petals 5. Panicle graceful, lax, pendulous, petals ½ in., very clothed with long white hairs. Wings of fruit oval, 1½ in. long.

—Malabarayan tract, from Dakra Dun to Nepal, according to Willd. R. Hoffm. & A. cordata, A. Juss., Western coast and Western Ghats, from Bangalore to Mysore. Young clothed with a silky tomentum, clothed with white tomentum. Leaves cordate or ovate, heads 4-5, petals 5. Wings of fruit, broadly suborbicular. (M. J. Juss., *Bot. Voy. Ind. Océan.*, Vol. 1, p. 10, 1854. Przewalski, in Journ. Bot. Soc. London, Dec. 1854, p. 10. Young, in Journ. Bot. Soc. London, Dec. 1854, p. 10. Young, in Journ. Bot. Soc. London, Dec. 1854, p. 10.)

ORDER XXIV. GERANIACEÆ. Gen. Pl. 5, 269.

Tribe *Geranieae* (*Geraniaceae*, a distinct order in Engelm. & Prantl, l. c. p. 15). Mostly perennial herbs, rarely trees or shrubs. Leaves alternate, usually compound. Fl. bisexual, regular, sepals 5, imbricate in bud, perianth petals 5, free or slightly connate at base. Stamens 10, the 5 outer of which are sterile, shorter and at times sterile, filaments slightly connate at base. Ovary beakled, styles 5 distinct.

AVERRHOA, Linn.: Fl. Brit. Ind. 1, 439.

Trees. Leaves imparipinnate, sensitive, leaflets nearly opposite, stipules 9. Fl. in cymose panicles, ovules numerous in each cell. Fr. oblong, fleshy, indurulent. Embryo straight, with thin foliaceous cotyledons in a heavy albumen. Species 2, cultivated in the tropics of the old and new world, native country unknown.

1. A. Carambola, Linn. *Syst. Naturæ*, Vera. *Karambol*, *Karambolga*, *Madag.*: *Pullche*, Mal.; *Sung-gum*, Burm.

Leaves ovate, slightly serrate. Fl. small, variegated white and purple, pedicels axillary, sometimes on the old wood. Calyx persistent, the corolla lobes usually minute and sterile. Petal yellow, elliptical, 1/2 in long, with a prominent ridge. Fruit red, 2-seeded, into a 2 by balance, irregularly cut with.

Abundant in some parts of the forest in the hills of Malabar (or northern Mysore). Fl. Feb.-Aug. 1877. T. A. Smith, Lond. Bot. J. 1878, p. 111. *Woods* *Malabar*. Hind. Calicut and the hills in tropical India. 2. *Woods* *Malabar* 3-4 pair. *Fl. Malabar* 1877, p. 111. In long 1/2 in long, on the outside of stem and branches, indurated and color rusty pubescent. Fruit yellow, 2-seeded, 1/2 in long, into a 2 by balance, irregularly cut with.

ORDER XXV. RUTACEÆ. Gen. Pl. v. 278

Shrubs or trees, a few genera herbaceous, as a rule strongly aromatic. Leaves alternate (except *Evodia* and *Melicope*), exstipulate or simple, dotted with punctate glands, stipules none. Fl. regular, 4-5-merous, rarely 3-merous, sepals free or connate. Stamens as a rule 4-5 or 8-10, filaments usually free, inserted on the outside of an annular or cylindrical disk. Corolla usually 5-toothed.

Flowers sometimes the result of the staminal tube. Stamens and tube as well as the disk are a important characters of this order, separating it from *M. fovea* and other allied orders. The essential oils derived from these cavities from the stamens and tube form the aromatic essential oil *Rutaceæ*. In most cases they can readily be separated from the glands.

- | | |
|--|----------------------------------|
| A. Broadly leaved, opposite, leaflets entire, flowers polygamous. | 1. <i>Evodia</i> |
| Sepals 4-5 | <i>Melicope</i> (p. 111) |
| B. Broadly leaved, imparipinnate. | 2. <i>Guaiacum</i> |
| Sepals short, persistent, leaflets 1-5 rarely 7 | 3. <i>Melicope</i> |
| Sepals deciduous, rarely linear, 2-toothed | 4. <i>Melicope</i> |
| Sepals deciduous, rarely 4-toothed | 5. <i>Clusia</i> |
| Stamens 10, filaments 4-toothed | 6. <i>Acronyctia</i> |
| Stamens 8 or 10, filaments dilated below the tube | 7. <i>Sesuvium</i> |
| C. Narrowly leaved, 3-foliate, flowers polygamous. | 8. <i>Zanthoxylum</i> |
| Fl. 4-merous, pinnate 8 | 9. <i>Leucaena</i> |
| Fl. 5-merous, pinnate 8 | 10. <i>Pinus</i> |
| D. Mostly arched, leaves 3-foliate or imparipinnate, petiole often winged. | 11. <i>Evodia</i> |
| Sepals 3-5, flowers often individual | 12. <i>Tournefortia</i> |
| Sepals 4-10, flowers terminal | 13. <i>Tournefortia</i> (p. 110) |
| E. Orbsentate, 3-5 in each cell. | 14. <i>Amelanchier</i> |
| Leaves 3-foliate | 15. <i>Parasitaria</i> |
| Leaves 5-foliate | 16. <i>Evodia</i> |
| F. Mostly arched, leaves 5-foliate. | 17. <i>Evodia</i> |
| Fl. 5-merous, pinnate 8, leaflets 5-7 | 18. <i>Evodia</i> |
| Fl. 4-5-merous, leaflets 4-6, entire | 19. <i>Evodia</i> |
| G. Mostly arched, leaves 1-foliate. | 20. <i>Evodia</i> |
| Sepals 2 through 4 | 21. <i>Evodia</i> |
| Fl. 2-5 in number of ovules, numbers 4-10 | 22. <i>Evodia</i> |
| Fl. 2-5 in number of ovules, numbers 4-10 | 23. <i>Evodia</i> |
| Fl. 2-5 in number of ovules, numbers 4-10 | 24. <i>Evodia</i> |
| Fl. 2-5 in number of ovules, numbers 4-10 | 25. <i>Evodia</i> |
| Fl. 2-5 in number of ovules, numbers 4-10 | 26. <i>Evodia</i> |
| Fl. 2-5 in number of ovules, numbers 4-10 | 27. <i>Evodia</i> |
| Fl. 2-5 in number of ovules, numbers 4-10 | 28. <i>Evodia</i> |
| Fl. 2-5 in number of ovules, numbers 4-10 | 29. <i>Evodia</i> |
| Fl. 2-5 in number of ovules, numbers 4-10 | 30. <i>Evodia</i> |

1. *EVODIA*, Forst. Fl. Brit. Ind. 1. 187.

Evodia, mostly aromatic shrubs or trees. L. opposite, simple or compound, leaflets quite entire. Fl. small, polygamous, 4-5-merous, in

A. M. Murray, *Ann. & the Journ. of Bot.* 1870, p. 107, Ind. 1, 500. In *Talbot's Journ. of Botany*, 1870, p. 20, 8. Kurz divides *Q. parvifolia* into 20 species, 7 of which are found in British India. 2. *Q. montana*, Poiret, a small tree in Cochinchina, possibly not found in Upper Burma, perhaps very old, stamens unequal, 5 shorter, anthers non-apiculate, style hairy, as long as ovary. A species, probably new, of a small tree 20 ft. high in an agave forest, Pathe, Upper Burma (Smiles *Fl. Burm.*, p. 100, Journ. Journ. Journ. 7, 9, plate torn, large, spreading, petals partly pubescent, calicines 11, short, the 4 petals smaller, almost sessile.

3. MURRAYA, Linn.: *Fl. Brit. Ind.* 4, 569.

Shrub or small tree. L. imparipinnate, leaflets alternate. Fl. axillary, pentagonous, petals imbricate, stamens 10. Ovary on a neck of the almost total linear, 2-celled, style deciduous. Fr. a 1-2-seeded berry, globose, or, with white placo-cortex. Species 4, of the Indo-Malayan region.

1. *M. exotica*, Linn.: *Wight Ic.* 1, 99; *Bald Fl. Sylv. Manual* t. vii, p. 2; *Bongars Fl.* 48. *Vern. Macchula*, North-West; *Bihar, Dun.*; *Otaf, Kol.*; *Karepala, Tel.*; *Kouff, Tam.*; *Thauafu, Burma*; *Mokongayok, Pyinmana* (Thou).



FIG. 54.—*Murraya exotica*, Linn.

A large shrub or small tree, evergreen, youngest parts pubescent. Bark whitish, wood white, close-grained, resembling boxwood. Leaflets usually 5-7, quite glabrous, shining, 1-3 in. long. Fl. campanulate, 1/2 in. across, white, fragrant, in short axillary and terminal racemes. Ovary linear, 2-celled, style still in stigma capitate. Berries 1/2 in. long, red, acuminate at both ends, 2-seeded.

Upper Himalaya from the Juma eastward, ascending to 1200 ft. Assam, Burma, Upper and Lower, Sikkim ranges, Hills of the Peninsula. Fl. March-September. The bark used as a vermifuge by Burmese ladies. 2. *M. chinensis*, Alph. DC.; *Fl. Belg.* Ind. 1, 508. *Des.* Burma, Wall-b. Leaflets 4-5 in. Berry 1/2 in. long. May possibly only be a variety.

3. *M. Koenigii*, Spreng.—*Syn. Bergenia Koenigii*, Linn.; *Roxb. Cor. Pl.* t. 112; *Wight Ic.* 1, 45. *Vern. Chundala, Ghantala, Kallanta, Hind.*; *Karepala, Tel.*; *Karepala, Tel.*

A small pubescent tree with a short trunk and a close shady crown, leaflets being a short time in the hot season, all parts with a powerful peculiar anti-

Leaflets 11-25, linear or oblong, base cuneate-lanceolate, 1-2 in. long. Fls. in a terminal corymbose panicle. Ovary 5-celled, stylob. Berry, cylindrical, 1-2 in. diam., thick, rugose.

Occur Himalaya, from the Eastward, ascending to 5000 ft. Assam, Sikkim, Burma Upper and Lower. Evergreen outside India; various of the Prolegomena, others unknown. Fl. H. 8.

1. MICROMELUM, Blume; Fl. Brit. Ind. 1: 201.

Species 6, Indo-Malayan region.

1. *M. pubescens*, Blume; Belg. Fl. Syst. Manual t. vii. f. 1. Register Plant. III. 4, 186 fig. 107. Vern. *Tungifo*, Burm.

A small evergreen tree, the younger parts pubescent. Ls. alternate, unperipinnate, leaflets 7-15, alternate or nearly opposite, 4-6 in. long, base oblique, base ovate-lanceolate, entire. Fl. strongly scented, 1-4 in. diam., in large heavy terminal corymbose compound cymes, calyx cup-shaped, entire or 5-toothed, petals 5, tomentose outside, thick, valvate, or slightly imbricate, bud 1 in. long, stamens 10. Ovary hairy, 5-celled, style artic. above with ovary, stigma capitate. Berry dry, glabrous, 1-2-seeded. Almonds cotyledons lobed and crumpled.

Nepal, Sikkim ascending to 5000 ft. Assam, Khas and Nag hills, Burm., Java, Sumatra, Batak, Chittagong, Upper and Lower Burma. Fl. Ind. Malay Peninsula, beyond Malay Peninsula and Archipelago, China. E. H. Johnston, Oliver, Kuhn, F. Fl. 1: 167. Burma Upper and Lower. A few shrubs, densely hairy, leaflets smaller, equal-errate. Ovary densely hirsute. Fruit lobes persistent. It differs only a variety of *M. pubescens*.

5. CLAUSENA, Burm.; Fl. Brit. Ind. 1: 204.

Shrubs or trees with unperipinnate, mostly deciduous leaves, leaflets membranous. Fl. small, 4-5-merous, petals imbricate, stamens 10, the alternate shorter, filaments dilated below the subulate tip. Ovary stipitate, 4-5-celled, ovules 2 in each cell, style deciduous immediately after flowering or later. Albumen 0, cotyledons plano-convex. Species 14, chiefly Indo-Malayan, a few in China, Africa and Australia.

A. Ovary hairy.

1. *C. pentaphylla*, DC.; Brandis, F. Fl. 49. Vern. *Budjoko*, Pegu, Hind.

A strongly aromatic shrub, young shoots and inflorescence silky-hairy, all-green leaves pubescent. Leaflets 5 or 7, nearly opposite, 4-6 in. long, secondary nerves prominent beneath. Fl. yellowish, in terminal panicles. Berry verrucate, pale orange, 1/2-1 in. long.

Submalayan tract, thicket in Sikkim, Quid-terren. Fl. H. 8.

2. *C. excavata*, Burm.; Kurz, F. Fl. 1: 188. Vern. *Ote Aron*, Koi, Siam, Burm.

A shrub or small tree (an undershrub in Sal and Zug forest) strongly and unpleasantly aromatic, young shoots and inflorescence pubescent or tomentose, leaflets 15-20, alternate, pubescent beneath. Fl. greenish-yellow, tetramerous, in lax terminal cymose panicles. Berry 1/2 in. broadly oblong.

Submalayan tract, from Nepal eastward, Chittagong, Sikkim, Chittagong, Burma, Upper and Lower. Fl. H. 8. Malay Peninsula and Archipelago. E. C. Wight, Hance, a small nearly glabrous, pleasant aromatic tree, a variety of *Clusia*, is given in gardens; berry white, size and shape of a gooseberry.

B. Ovary glabrous.

1. *C. indica*, Oliver; Trimen Handbook Ceylon, 1: 27. Vern. *Tandil*, Tam.

A shrub or small tree, leaflets 7-15, chartaceous, alternate, 1-2 in long, base very oblique, edge wavy, thin, glabrous on both sides. Fl. 5-nerved, greenish-white, partly arranged in a terminal corymbose panicle, partly glabrous, thin, $\frac{1}{2}$ in long. Ovary 2-5-celled, glabrous, tuberculate. Somewhat resembles *Miconia pubescens*.

Evergreen forests of the Western Ghats, from North Kanara southwards. Fl. H. S.

C. C. Willdenowii, W. et A. Prodr., Trianae Hamb. Ceylon, 1. 211. Vern. Nat. Papillei, Tom. 1. 111. 363.

A shrub or small tree, young shoots pubescent, leaflets 7-15, membranous,



FIG. 5.—*Clausena Willdenowii*, W. et A. 4.

11-25 in long. Fl. 4-5-nerved, white, in slender simple axillary racemes, shorter than leaves. Ovary on a short narrow gynophore, slightly 4-5-lobed at tip, 4-5-celled, fruit globose, $1\frac{1}{2}$ in. diam.

Evergreen forests of the Western Ghats from Sattara southwards, Sikkim, Nagas hills, Burma, Ceylon. Fl. H. S. Ind. Fl. Sylv. Manual, 1. 111. p. 2. resembles the variety as hairy. The following Eastern species with alternate leaflets belong to this genus:—1. *C. in terasul panicles*; 2. *C. heptaphylla*, W. et A. Leaves several times longer than broad; 3. *C. macrophylla*, Hook. fil. Ternstroemia. S. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846. 847. 848. 849. 850. 851. 852. 853. 854. 855. 856. 857. 858. 859. 860. 861. 862. 863. 864. 865. 866. 867. 868. 869. 870. 871. 872. 873. 874. 875. 876. 877. 878. 879. 880. 881. 882. 883. 884. 885. 886. 887. 888. 889. 890. 891. 892. 893. 894. 895. 896. 897. 898. 899. 900. 901. 902. 903. 904. 905. 906. 907. 908. 909. 910. 911. 912. 913. 914. 915. 916. 917. 918. 919. 920. 921. 922. 923. 924. 925. 926. 927. 928. 929. 930. 931. 932. 933. 934. 935. 936. 937. 938. 939. 940. 941. 942. 943. 944. 945. 946. 947. 948. 949. 950. 951. 952. 953. 954. 955. 956. 957. 958. 959. 960. 961. 962. 963. 964. 965. 966. 967. 968. 969. 970. 971. 972. 973. 974. 975. 976. 977. 978. 979. 980. 981. 982. 983. 984. 985. 986. 987. 988. 989. 990. 991. 992. 993. 994. 995. 996. 997. 998. 999. 1000.

8. *Z. ovalifolium*, Wight. Bot. Fl. Sylv. Manual 2, 1837, p. 107.

A large shrub or small tree, quite glabrous, often much branched. Leaves alternate, leathery 8-12 in. long, ovate-oblong, acuminate, ven. n. numerous, distinct, parallel, silky. Trunk and other valleys, ascending to 2000 ft., Assam, Khasi Hills, Western Ghats, Deccan, Karnataka southwards. Fl. March, April. 4. *Z. hastulocaulis*, W. & A. Bot. Beechey, Assam Upper Burma, a large tree, being with stems on trunk and branches a large corky conical base, leafless and petioles pubescent or velvety. Leaves 4-8 pair, opposite, entire 4-7 in. long on both surfaces with a few distant longitudinal veins prominent. Fl. green in short axillary panicles. 5. *Z. tetraspermum*, W. & A. Western Ghats fr. Coorg southwards, Nilgiris, Arundals, Ceylon, a large shrub with long rigid-like stems, set with woolly terminal spine-tipped prickles, petioles and venation armed with numerous small detached spines, leafless opposite, 4-6 pair, very fleshy, densely serrate, ven. n. slender, numerous. Fl. yellowish-pink in short axillary panicles.

9. *Z. oxyphyllum*, Edgew. Vern. *Siritaklanji*, Lepcha.

A glabrous shrub, often climbing over tall forest trees, prickles usually recurved. Leaflets lanceolate, 3-10 pair, alternate and opposite. Fl. tetramerous, large, diam. 1-1½ in. diam.

Outer Khasiys, from Garhwal westward, 4000-5000 ft., Khasi Hills, Manipur. Fl. H. S. R. S. 7. *Z. tomentellum*, Hook. fil. Sikkim and Bhutan to 5000 ft., a small tree with horizontal branches, sparingly prickly, branchlets, petioles, under side of leaflets all thickly covered velvety, leaflets alternate, entire, 1-8 pair. 8. *Z. Khasianum*, Hook. fil. Khasi Hills, a wandent shrub, very fragrant, sparingly prickly, leaflets 8-10 pair, alternate, rarely opposite, lanceolate, serrulate, 1-2 in. long, petioles axillary pubescent.

1. Canham, petiole not winged, sepals 4, petals as many. Panicle terminal, ramifications opposite, pith large, septate.

9. *Z. Rhetsa*, DC. Vern. *Rheta*, Miao, Tai (the *Assam* tree, Hook. Fl. Ind. 3, 417); *Tirphal*, Mar.; *Jamonia*, Kan.; *Mulliam*, Khasi, *Muvallw*, Mal.

A large tree, prickles numerous on trunk, branches and petioles, those on the old wood with a solid conical base. The prickly stem resembles that of *Rouletia*. Leaflets opposite, 8-20 pair, glabrous, very oblique, entire. The terminal often wanting. Fl. yellow, in large terminal panicles.

Western Ghats and coast, from the Konkan south to the Malabar coast, in most of the Khasi hills, the woodlands. Northern China. Fl. July-November. 10. *Z. Khasia*, Wall. *Himalia*, Burma, Assam, Khasi Hills, Deccan, Chingong, Lower Burma, Khasi Hills, regions opposite tree, trunk spinous, prickles in branches few, scattered, leaflets 10-15 pairs, oblong-ovate, thin, glabrous, few oblique. Fl. red. Fl. H. S. *Rheta*, L. 4. *Z. Khasia*, Wall. with *Z. Khasia*.

9. LIMONIA, Linn.: Fl. Ber. Ind. 1, 507.

Shrubs or small trees, often spiny. Leaves 3-foliate or imparipinnate, venous, petiole scirped. Fl. 4-6-merous, petals imbricate or lacin. Stamens 8-10, filaments subulate. Ovary 4-6-celled, style deciduous, ornate 1-2 in. each cell. Berry globose, 1-4-celled. Species 2-3, tropical Asia.

1. *L. acidissima*, Linn.: *Brasilia* F. Pl. 47.—Syn. *L. eximpta*, Roxb. Cor. Pl. 1, 80. Vern. *Bel*, Hind.; *Menda*, Uras; *Nagi bel*, Kan. *Thamethy*, Burm.

A glabrous shrub, sometimes a small tree, branches rigid, berries 4-6-merous, straight, 1-1½ in. long. L. imparipinnate, leaflets opposite, wings between inserted, leaflets oblong or obovate, wings and leaflets serrate. Fl. whitish, numerous, white, fragrant, in short axillary racemes, often with 1 or 2 leaves. Petals pellucid-punctate. Ovary 4-celled, 1 ovule in each cell. Berry black when ripe, 1-1½ in. diam.

Outer Khasiys, Nagas to Garhwal, ascending to 4000 ft., Assam, Khasi, Western Ghats, India. Fl. H. S. A pubescent form, found by J. W. Oliver in the Pakhal district of Upper Burma, may possibly be *L. pubescens* Wall. 2. *L. alternans*, Wall. Pige.

Elephantium. A small tree, common in the hills of the Western Ghats, and in the Western Ghats, Malabar, Kerala, A small glabrous tree, 10-15 ft. high, with a single upright stem and the lateral branches. Fl. 4-5-merous, in dense racemes. Berries 1-2 in. diam. Berry globose, 1/2 in. diam.

10. FERONIA, Gaertn. Fl. Brit. Ind. 1. 516.

F. Elephantum, Corr. (the only species); Roxb. Cat. Pl. 1. 141; Wight Pl. Ind. Brit. Fl. Syst. 1. 121. — *Elephant* or *Hand Apple*. Vern. *Bilva*, *Malba*, *Kiri*, *Ind.*, *Hind.*; *Ko*, *Ma*, *Malay*, *Palau*, *Ind.*; *Bilva*, *Kan.*; *Elephant*, *Tamil*, *Burma*.

A middle-sized glabrous, dense woody tree, armed with strong straight axillary thorns. L. alternate, imparipinnate, leaflets opposite, 1-4 pair, acuminate or ovate, crenate at the tip, venation pinnate, often narrow-veined. Fl. dull red, generally unisexual, in lax panicles, male and bisexual flowers frequently on the same inflorescence. Stamens 10-12, filaments short, anthers from a leaved villous base. Fr. globose, grey, rough, 2-3 in. diam., rind hard, woody, seeds numerous, oblong, imbedded in fleshy white pulp.

Generally cultivated in both Peninsular and Singapore in South India and Ceylon. Fl. Feb.-April.

11. ÆGLE, Corr. Fl. Brit. Ind. 1. 519.

Species 2 in the Indo-Malayan region, 1 in Japan, and 1 in tropical West Africa.

A. Marmelosa, Corr. — Roxb. Cat. Pl. 1. 141; Wight Pl. Ind. Brit. Fl. Syst. 1. 191. — *The Hand Tree*. Vern. *Bilva*, *Malba*, *Kiri*, *Ind.*; *Malba*, *Gand.*; *Bilva*, *Malba*, *Kan.*; *Marmela*, *Tamil*, *Burma*, *Amboina*, *Malacca*, *Burma*.

A small or middle-sized tree, armed with axillary straight sharp spinous thorns. L. alternate, trifoliate, leaflets sometimes 5, ovate-lanceolate, serrate, with a long honey-scent. Calyx 5-merous, greyish-white, petals imbricate, stamens numerous, filaments short, anthers linear. Fr. 4-5 in. diam., rind smooth, green or yellow. Seeds numerous, oblong, flat, to be densely clothed with aromatic pulp.

Wild in the hills and on the coast and on the hills, from the Malabar coast to the coast of Ceylon throughout India and Java.

12. TODDALIA, Juss. Fl. Brit. Ind. 1. 497.

Shrub or tree with strong pungent smell. L. alternate, 3-foliate, FL. 3-merous, 2-5 or 5-merous, stamens alternating with petals. Ovary 2-5-celled, 3 or 4 in each cell. Seeds 1-2 in each cell, testa coriaceous, albumen fleshy; embryo curved.

1. *T. aculeata*, Pers.: Wight Ill. t. 96. — Syn. *Xanthoxylum floribundum* W. & A. Fl. As. Bar. t. 232. Vern. *Kiri*, *Hind.*; *Tindagard*, *Uriya*; *Morinda*, *Tamil*; *Kyasa*, *Telugu*, *Burma*.

A large woody shrub or tree with numerous large woody conical tubercles, terminated by short curved spines, young shoots rusty-tomentose, leaflets crumpled, greatly varying in length, in the semi-evergreen scrub near Malabar. 1-2 in. long, often 4 in. long, called *T. floribundum*. Fl. small, yellowish-green,



FIG. 57.—*Toddalia aculeata*, Pers.

in axillary panicles longer than petiole. Fr. globose, 1/2 in. diam., orange-colored, 2-3-celled.

Outer Himalaya, from Kashmir to westward, extending to 5000 ft. Khasi hills, Burma, Western Peninsula. Fl. October, January.—Ceylon, C. Sina. *T. trifoliata* W. & A. *Bold* 16. *Ind. Or.* t. 407. Western Ghats, Anaimalai, Tattorelli hills. Travanore, a tree, with dense dark green foliage, unarmed, leaflets always 5, not 6-10. Fl. Brit. Ind. quite entire, shining, 6-10 in. long. Fl. 2-3-merous.

Triphasia trifoliata, DC. is a small glabrous, spiny shrub, the original home uncertain. Frequently grown in gardens, often runs wild. *L. trifoliata*, leaflets serrulate, the lateral smaller, oblique. Fl. white, fragrant, 1/2 in. long, axillary, solitary or in twos. Calyx 3-lobed, petals 4, imbricate, stamens 8. Berry oval, 1/2 in. long, seeds 1-2.

13. **LUVUNGA**, Hamilton; Fl. Brit. Ind. i. 508.

Glabrous, climbing shrubs, usually armed with strong axillary spines. L. 3-foliolate, leaflets coriaceous, quite entire. Calyx cup-shaped, entire or irregularly 4-6-lobed. Petals 4-5, thick, imbricate. Stamens 8 or 10, inserted around a cupular fleshy disk, filaments subulate. Ovary 2-4-celled, stylobotry deciduous, ovules 2, superposed in each cell. Berry large, rind thick, very resinous, seeds 2-3, cotyledons fleshy, albumen 0. Species 4, tropical Asia.

1. *L. cleutherandra*, Dalz.; Trimen Handb. Ceylon i. 224.

Branches long hexose, set with stout, sharp, woody, often deflexed thorns white. Leaflets 3-8 in., elliptic or elliptic-oblong, glabrous axillary fasciculate racemes, fl. just before opening 1/2-1 in., filaments free. Berry globose, 1/2 in. diam. Western Ghats, evergreen forest, from the Konkan southwards. Fl. H. S. Ceylon, Malay Peninsula. Closely allied, and perhaps not specifically distinct: 2. *L. scandens*, Ham. Assam, Sikkim, Burma, Cochin-China, Malay Peninsula and Archipelago. leaflets 5-12 in., elliptic-lanceolate, filaments more or less connate.

14. **ATALANTIA**, Correa; Fl. Brit. Ind. i. 511.

Evergreen shrubs or trees, mostly spinose. L. 1-foliolate, coriaceous. Fl. in racemes or corymbs, calyx 3-5-lobed, petals imbricate, free or adnate to stamens. Stamens 6-10, rarely more, filaments free or connate, anthers

petals. Ovary 2-5-celled, style 3-angled. Pet. large, 1-4-celled, thick, clypeolous, fleshy, pinnate-vein, aboumen 0. Species 13, 1-1. Malayan range.

A. Filaments connate into a tube.

A. monophylla, Correa. Bot. Fl. Syst. Manual 4. p. 1. ad. Syn. *A. monophylla*, Wight Ic. t. 161. *Atalapha monophylla*, Linn. ? Herb. C. C. Pl. t. 80. *Vernonia Lindb.*, *Mabua Lindb.*, Mart. *Kata Neringe*, Uryu. *Kata nasipua*, Linn. *Adia nimma*, Jeyar. *amam amam*, Tel.

A glabrous shrub or small tree, wood yellow, hard, and 4-angled; branches pubescent, rigid, the older armed with short spines. Lvs. 3-10, often generally notched at the tip. Fl. white, 1-1 in. long, in axillary corymbose pedicels slender, 1-1 in. long, calyx expanding irregularly, petals 4, anthers 8, elliptic, inserted on the triangular tooth of the staminal tube, style long, cylindrical. Ovary with a short staminal disk. Fr. Lvs. 3-10, 1-seeded.

Kanara: Western districts of Mysore Nilgiris. Hills of the Western Ghats, the Cochin districts and the Karantik.

Siam: Kham hills, Abhimansu Burma. Fl. Oct. D. Ceylon: Hiale; Perak: same; Malacca: Kura 1-2 variety with larger leaves and fruits. *A. racemosa*, W. in *A. Javanica*'s *malaccensis*, Wight Ic. t. 71. Ternu, evergreen forests of the Western Ghats from Khamhale southwards. Differs by short pedicels, 2 in. long, calyx long, calyx regularly 2-lobed; anthers cells divergent at base, disk inconspicuous. Possibly not specifically distinct.



FIG. 28.—*Atalapha monophylla*, Correa. 1.

B. Filaments free.

A. missionis, Oliver.—Syn. *Elanoid missionis*, Wight Ic. t. 175.

A small thorny glabrous tree. Lvs. ovate, apex acute or rounded. Fl. numerous, pedicels 4-6-nerved, in erect panicles 1-3 in. long, stamens 8 or 10, filaments slender, quite distinct, anthers linear-oblong, ovary 4-5-celled, narrowed into a short stalk, 2 collateral ovules in each cell. Fr. globose, 1 in. diam., seeds numerous, globose, embedded in glutinous mucilage.

Evergreen Forests of the Western Ghats from North Kanara southwards. Hills of the Karantik. Fl. Dec.-April.—Ceylon. *A. ceylanica*, Oliver; Nilgiris, Aramulale, Ceylon. Fl. in short racemes, calyx 4-lobed, ovary 2-celled. *A. cantata*, Hook. fil. Kham hills a glabrous, unarmed shrub, branches slender. Lvs. elliptic, sessile, reticulate-venose, tip broad, 2-lobed. Fl. 1-1 in. diam. white, fragrant in short slender racemes.

15. PARAMIGNYA, Wight. Fl. Brit. Ind. t. 540.

Ever or climbing evergreen shrubs, often with axillary spines. Lvs. 1-foliate, quite entire. Fl. axillary, solitary or fascicled. Petals 4-5. Stamens 8-10, inserted at the base of a columnar disk (gynophore), filaments

Fls. rather villous. Berry oval, often flattened, white, rim thick, seed 15. Species 6, tropical and subtropical Asia.

1. *P. monophylla*, Wight III, 12. Verna, *Arborescentia*, Mart.
A large climbing thorny shrub, spines sharp, recurved. L. ovate-elliptic or elliptic-lanceolate, serrulate, 4-6 in. long. Petals 2-3, unequal, and outside of petals woolly pubescent, calyx lobes 5, short, truncate, filaments slightly hairy. Berry pyriform, 1 in. long or more.

Collier, Bhatara, Khasi hills, Tonkin. Western Ghats, Malabar, India. *P. Strychnalis*, Ceylon, Philippines. 2. *P. grandiflora*, Oliver; Tonkin, Java, species 1, no calyx unguiculate, lobes unguiculate, petals 1 in. ovary 15. 3. *P. acuta*, Oliver; Boid, 10, 170. Western Ghats, Assam, Ceylon, Malabar, India.



FIG. 50.—*Paraulogyne monophylla*, Wight. 1.

calyx segments broadly triangular, petals 1 in., berry 1 of filaments thick, woolly. The following species have smaller flowers: 4. *P. longispina*, Hook. f. *P. serrata*, Kurz, erect spines in pairs below petioles, 4-6 in. long, petals 1 in., berries 2-3-lobed, angular. 5. *P. Griffithii*, Hook. f. *Arborescens*, Malay Peninsula, scandent, spines 1 in., calyx small, cup-shaped, with 5 short lobes, ovary 10-15. 6. *P. citrifolia*, Hook. f. *Sittapong*, Assamensis; scandent, petals 1 in.

10. CITRUS, Linn.; Fl. Brit. Ind. 1764.

Evergreen shrubs or trees; generally armed with axillary thorns, wood close and even-grained. L. coriaceous, simple, petiole often winged. Fl. white or tinged with red, scented, sometimes unisexual. Calyx cup-shaped, 4-5-lobed. Petals 4-5, rarely more, thick, gland-dotted, imbricate in bud. Stamens 20-25.

filamentous or less numerous or smaller. 3 or 4 or 5 large angular or sub-triangular seeds, cells numerous. 10-15 seeds. 180-200 μ in each cell. The cell wall or surface lined with glands. Each with apical cell. Surface cell walls divided by thin membranous dissepiments into 5-10 cells which are filled with numerous granules, some containing sweet or acid bodies. Seeds few in each cell. Testa leathery, glaucous, none. Embryo straight with a short radicle and short hypocotyl, which in the germinating seedling is enclosed in the testa. Often 2 or 3 embryos in one seed.

1. *C. medica*, Linn.; Brande F. Fl. Br. The Citrus, Lemon, Sweet and sour Lemon. Vern. Nankh.

Young shoots glabrous, purple. L. glabrous, 3-6 in., elliptic-oblong, base or acute-obovate, petioles naked or winged. Fl. white, often pink. Sepals 4-5, acute, stamens 20-55. Generally bears flowers and fruit all year long except in the year.

Found in a wild apparently wild form in the outer valleys of Kashmir (1875, 54); in Nepal (1881); 2 on the Trichmool hills, Centr. Prov. (1881, 77). A glaucous, elliptic-obovate-oblong fruit in the outer valleys of Sikkim (1876, 11, 116-2); 4 in the outer valleys (1876), a tree with pinkish or red high in the hills (1876, Upper Xanthi valley, near Lamasas, in swamps and near streams (1880). L. elliptic-oblong, none. Reported as wild in the eastern Dha on the Satpara hills and the Western Ghats in the Bombay Presidency (Talbott in Chittagong and on the Khass hills (Hooker & Thunberg).

Of glaucous important cultivated forms may be mentioned: a. The Citrus. b. Large, oblong, smooth or irregularly shaped, and olive, black or figured, and thick, very aromatic. c. The Lemon (Zitron German). Fr. round, pale yellow, knotted, and with pale segments, very acid. d. The sour Lemon of India. e. The sweet Lemon of India. f. Olive green, slender, glaucous, smooth skin, adhering to the pulp, like the citron.

2. *C. Aurantium*, Linn.; The bitter and sweet Orange. Vern. Norange.

Young shoots glabrous, greenish-white. L. glabrous, 3-6 in., elliptic or ovate, acuminate, petioles naked or winged, wings often obovate, as large as the blade or nearly so. Fl. pure white, bisexual, stamens 15-30. Fr. globose, most depressed. Bears flowers and fruit generally at two seasons of the year (84).

Found with a apparently wild or without them on the Kunwar, Darachang, Sikkim and the Khas hills (Hooker), Manipur (Watt), mountain forests in the Himalayas (Hooker).

Of the more commonly cultivated forms may be mentioned: 1. The lemon-like Orange, grown in many places in India and Burma, on a large scale in the valley above Cash, where Cheera Fruit, and at other places on the south face of the Khas hills, where they ripen in autumn. Also at Nagpore, where they yield two crops in the year, the first from November to January, and the second in March and April. 2. The common sweet Orange, the skin lightly adhering to the pulp. The Sour or Naranja Orange is rarely cultivated in India.

The following summary of the Citrus and Lemons cultivated on the island of Malacca in the Malay Peninsula (Malacca, 1885, p. 74, restricts *C. medica* and *C. aurantium* to *C. aurantium*, while he regards them as separate species, *C. indica*, Linn., Engelm. in Engelm. in Pranch, III, 1, 20, mentions *C. indica* and classes 1. *C. aurantium* and 2. *C. indica*.

3. *C. Swartzii*, Linn., the Seedling or Nankh, young shoots pubescent, rim thick, surface of leaf pubescent, is also cultivated in various.

ORDER XXVI. SIMARUBACEÆ. Gen. Pl. 1: 370.

In Engler & Prantl III, 4, 355 *Indruffia* is placed under *Zyzyphellaceæ*.

Shrubs or trees with bitter bark, l. alternate, simple or compound, long gland-dotted, stipules none, sometimes stipular prickles, hairs almost always 1-celled. Fl. regular, often unisexual, sepals 3-5, usually connate, petals 3-5, mostly imbricate in bud. Stamens as many as petals, or double the number, inserted outside the disk, which is annular, cupular, sometimes elongate into a gynophore, filaments free. Ovary 2-1-5 usually more or less distinct carpels, generally 1 ovule in each. Fr. carpels 1-seeded.

A. L. simple, entire.

L. 7-10 in. long, elliptic-oblong, coriaceous, shining. 1. SAMADERA.

L. 1 in. long, linear spatulate, silky velvety. SCHEERIA, DC.

B. L. 2-foliate, fl. 2-sexual, 3-nerved, stamens 10.

2. BALANITES.

C. L. imparipinnate or 3-foliate.

Fl. bisexual, 4-6-nerved, stamens 8-12. 3. HARRISIA.

Fl. polygamous, fr. winged. 4. ALATIUM.

Fl. polygamous or unisexual, fr. not winged.

Leaflets 15-20 pale, coriaceous, 1-5-nerved, stamens 5. 5. BURNIERIA, p. 127.

Leaflets 1-6 pale, 3-4 5-nerved, stamens 1-5 nerves 2-4.

Drupes supported by persistent calyx and petals. 5. PROCRISIA.

Calyx and petals deciduous. 6. BACCIA.

1. SAMADERA, Gaertn., Fl. Brit. Ind. 1: 518.

Species 7, from Malagastar to Polynesia.

S. indica, Gaertn.; Wight III, t. 68. Vern. *Karimkoto*, Mal.; *Kitha*, Burm.

A small glabrous tree, wood soft, bark transversely cracked. L. ovate, coriaceous, shining, elliptic-oblong, quite entire, 7-10 in. long. Fl. bisexual, 4-nerved, pinkish-yellow, in pedunculate umbels, petals oblong, 1-1 in. long, stamens 8, filaments with a small hairy scale at base, ovary with gynophore, deeply 5-lobed. Fruit of one carpel, thickly coriaceous, shining, compressed, keeled, 2 by 1½ in.

South Konkan and Malabar on banks of streams, Marath. Fl. Marath. (Bombay), India; Archipelago. Bark (wedges) used as a febrifuge. Oil made of the seeds. *S. indica*, Wall. Pl. As. Rat. t. 1091. Tenasserim, Andaman Islands, umbels on short peduncles, fr. smaller, strongly reticulate, probably is only a variety.

Baccia hirtella, Jinn., is a small shrub common on the sea coast throughout the Indies. On the Andaman, may be found on the coast of Burma, rare in Ceylon. Leaves simple entire, linear-spatulate, 4 in. long, silky velvety. Fl. yellow on short axillary racemes, petals 4 in. long.

2. BALANITES, Delile; Fl. Brit. Ind. 1: 521.

Shrubs or small trees, usually armed with axillary or supra-axillary spines, leaves 2-foliate, leaflets entire. Fl. bisexual, 3-nerved, stamens 10, inserted at the base of the fleshy cup-shaped 10-furrowed disk. Ovary 1-celled, 4 ovules in each cell. Fr. a drupe, endocarp hard or crustaceous, seed 1. Coriaceous thick, plane-convex, albausen 0. Species 2 or 3, in the dry regions of North Africa, Abyssinia, Arabia, and Syria.

B. Roxburghii, Planchon; Boissis, P. Fl. 5th.—Syn. *B. aegyptiaca*, Wight, l. c. 274. Vern. *Hingju*, *Hingtu*, *Hingtu*, Hind.; *Ted-paloo*, Burm. A scraggy shrub, in favourable situations a small tree 30 ft. high, wood

pubescent, white, or scarcely
hairy, usually very short,
white, sometimes in the
darker species bark yellow.
The flowers are the same
as in the other species, but
usually at a considerable
distance from the
trunk, always large, often
leaf axillary, branch,
less young leaves and in-
florescence pubescent, in
dry localities bear tomentum.
Fl. white or green,
fragrant, lateral racemes
or panicles. Drupe oval,
1-2 in. long, 5-angled,
pulp bitter with an offensive
greenish, stony hard,
tubercles.

Occurs in the drier parts of
India and Borneo as far north
as Delhi, common in the open
country, particularly on stiff
dry soil. New leaves in
March, A. H. S. This species is
called *S. muricata*,
both by Kugel & Prantl in
1850.

HARRISONIA, R.

Brown, Fl. Brit. Ind. 1. 512

Shrub or tree, leaves im-
paripinnate, or 3-foliate,
3-5-angled, sessile,
in axillary racemes. Stamens 8-12, hairy scales at the base of filaments.
Ovary globose 4-5-celled. Species 4, tropical Africa, Asia and Australia.

1. *H. Bennetil*, Hook. fil.: Kurz, F. Fl. 1. 293. Vera. *Tala*, Burn.

A small deciduous tree, armed with short straight stipular prickles, young
shoots pubescent. Leaves imparipinnate, the common petiole narrowly
winged, leaflets opposite, obliquely ovate, 1 in. long, 2 white, pentagonous,
cordate at the ends of branches. Fruit globose, 2-5-celled, 1/2 in. diam.

1. *H. Bennetil*, Hook. fil.: Kurz, F. Fl. 1. 293. Vera. *Tala*, Burn.
A variety, possibly a distinct species, in Upper Burma, branchlets and leaves grey
pubescent, 10-12-nerved, scales half the length of filaments. 2. *H. Brownii*, A. Juss.
Annam, Philippines, North Australia; leaflets 3-foliate, leaves 3-angled, serrate,
the terminal largest, 8-10-nerved.

1. AILANTHUS, Desf.; Fl. Brit. Ind. 1. 518.

Large tree, wood soft, white, leaves pinnate, approximate at the ends
of branches. Fl. polygamous, in large axillary panicles, calyx small,
5-lobed, petals 5, spreading, valvate, the edges bent inwards; 3; Stamens 10,
7 Stamens 2-lobed; 2; Stamens 0. Carpels 1-5 more or less distinct. Fruit
of 1-5 flat membranous linear-oblong carpels, the seed in the middle. Species
7, India, Malaya, China, Australia.

1. *A. excelsa*, Roxb. Cor. Pl. 1. 23; Wight, Ill. 1. 67; Brandis, F. Fl. 58



Fig. 10.—*Samadon indica*, Gaertn. 1.

malabarica, Tel. Mal.

Deidnomyana; *Moharuch*, Hind., Mar.; *Maha nina*, Uryak; *Poddy*
hi, Pongilam, Mal.

Bark grey, leaves tomentose, up to 3 ft. long, leaflets 8-14-palt,

FIG. 61.—*Atlantus malabarica*, DC. 1.

nearly opposite, from an unequal-sided base broadly falcate-lanceolate, deeply serrate, often lobed. Panicles ample, shorter than leaves, fl. yellowish, petals glabrous, filaments glabrous, shorter than anthers, ripe carpels 2 in.

Indigenous in the Peninsula, commonly planted throughout India as far north as

3. *A. granulosum* (L.) Hitchc. & Thwaites, New Foug. Malacca, Singapore, Malay, Java, Sumatra, & Borneo; also found in Northern India. It is a small tree with white flowers and white fruit. It is distinguished by its white flowers and white fruit. It is distinguished by its white flowers and white fruit.

4. *A. malabarica*, DC.: Wight, Journ. Bot. Ind. Brit. Fl. Brit. Ind. I. 122. Vern. *Dhau Gungul*, Amp. Kan.; *Taru*, Tam.

A leafy tree, bark thick, rough, often with bright reddish grains. Leaflets 10-12 pair, glaucous, entire, lanceolate, filaments glaucous, much longer than anthers. Style carpets along rounded at base, ends 4-6 by 1/2 in.

Found in the mountains of Western Ghats from the Konkan southwards from the sea to 1000 ft. Near Yercaud, in Malabar, Kurz, F. Fl. I. 201. F. Flora Ind. Malay Peninsula, 1899.

Lychnis longifolia, Link. Flor. Asiae, Malay Peninsula and Andamanas, 1825. Evergreen shrub or small tree, leaves imparipinnate, leaflets 12-20 pair, serrate, shining above, entire, shining above, pale beneath, panicles axillary, simple, 1-2 in. long, at the ends of branches, 1-2 in. long, 1/2 in. diam. Flowers 1-2 in. diam. Drupes 2-4, black, ascending with petals, 6 prolonged scales (anthers) opposite to petals. Drupes 2-4, stipitate, hard, wood 1/2 in. long.

5. PICRASMA, Bl., Fl. Brit. Ind. I. 529.

All parts very bitter, leaves imparipinnate, fl. unisexual, 4-5 nervous, in axillary panicles. Stamens 4-6, carpels 2-5, distinct on a thick disk, styles free at base and long, connate in the middle. Fr. of 1-3 fleshy or cartilaginous drupes, supported by the persistent calyx and petals. A straight embryo in heavy albumen. Species 3, tropical and subtropical countries of both hemispheres.

1. *P. quassioides*, Bennett & Brandis, F. Fl. Ind. I. 30. Vern. *Tutu*, *Tithai*, *Tita*, Ph. N.W.

A tall, scrambling shrub. L. and inflorescence pubescent. Leaflets opposite, nearly sessile, 4-6 pair, serrate. Fl. small, greenish, generally pentamerous. Drupes black, 1/2 in. diam.

Gather Himalaya, Kashmir to Nepal ascending occasionally to 8000 ft. Himalaya. F. April-June, India.

2. *P. javanica*, Blume, King in Journ. As. Soc. Beng. vol. 22, 2, p. 183 (1853). 28. Includes *P. nepenensis*, Benn., and *P. andamanica*, Kurz.

An evergreen glabrous tree, leaflets 1-3 pair, entire, acuminate. Fl. tetramerous, greenish-white, drupes 2-4, white, 1/2 in. diam.

Nepal, Sikkim, Khasi hills, Aniamans, Lower Burma. Fl. March. India, Cochin, Ceylon, Java.

6. BRUCEA, Miller, Fl. Brit. Ind. I. 529.

All parts very bitter, leaves imparipinnate, fl. polygamous, minute, tetramerous in axillary panicles. Stamens 4, inserted beneath the 4-lobed disk. Ovary deeply 4-lobed. Drupes 4, ovoid, somewhat fleshy. Albumen 0. Species 3, tropical, from Africa to Australia.

1. *B. sumatrana*, Roxb.: Kurz, F. Fl. I. 282.

A large evergreen shrub, branchlets, leaves and inflorescence tomentose pubescent, leaflets opposite, 4-6 pair, ovate-lanceolate, coarsely serrate. Fl. purple, in small distant racemiform panicles, often as long as leaves. Drupes black, ovoid, 1/2 in. long.

Assam, Tenasserim, Fl. March. Malay Peninsula and Archipelago, South China. 2. *B. mollis*, Wall. Sikkim, Khasi hills, Bhutan, Manipur, Burma (Cantonese, H. N. 1893), leaflets nearly glaucous, lanceolate, entire, drupes 1/2 in. long.

ORDER XXVII. OCHNACEÆ. Gen. Pl. 1. 316.

Shrubs or trees. L. alternate, simple, glabrous, stipulate. Fl. yellow or orange, on jointed pedicels. Sepals 5, free, imbricate, petals 5 or more. Stamens 10 or indefinite, anthers linear. Ovary deeply 3-lobed, 1-2-lobed, with 2-3 cells 1-ovulate, style 1-locular. Fr. of 3-10 drupes, sessile upon the enlarged torus or disk. Albumen none.

Stamens 10
Sepals 5

1. Ochna
2. Ochna

1. OCHNA. Schimper: Fl. Bip. Indi. 523.

Deciduous. L. serrate, stipules distinct, almost intrapetiole. Fl. yellow, sepals colored, persistent, petals 5-12, stamens 20, shorter than petals, anthers generally opening by terminal processes often persistent. Sepals 5-10, tropical Asia and Africa.

A. Filaments shorter than anthers.

1. *O. squarrosa*, Roxb. Cor. Pl. t. 80; Wight, Ill. t. 60. Vern. *Koelaga*, *Uliya*.

A shrub or small tree. L. elliptic or elliptic-lanceolate, acute, narrowed into a short petiole, 2-5 in. long, finely serrulate, veins numerous, slender, parallel. Fl. white in leaf, fragrant, in cymes or racemes, mostly at the ends of short leafless woody branchlets, pedicels 1-1½ in., petals 5-12, as long as sepals, anthers many times longer than the short filaments. Stamens 1 in. long, fruiting sepals generally erect.

Asia, Burma, Western Peninsula. Fl. Feb., March, Ceylon. In the peninsula belongs to *Chloroxylon*, Planchon, Pagan. *O. frutescens*, Kurz, F. Fl. 1. 266, little different from *O.*, according to Nixon in (Galtsoff, 1907) also in the Yang-tze of Upper China (Hance), *Indochina*, Burma, a low shrub 2-3 ft. above perennial stems, 1-1½ in. across, appearing before the leaves in 4-5-lobed umbels, at the end of short branchlets, petals 5-8. *O. pumila*, Ham. & Brandis, F. Fl. 69, Sabah, Malaya, China, chiefly to soil forests, from the Dehra Dun to Sikkim, Eastern Sanyin hills, a low tree or shrub with a perennial rootstock, throwing up annually (after the people burn the forest) a number of short suberulous stems, bearing leaves and flowers, leaves glabrous, serrate with cuspidate teeth. Fl. appear with the leaves, 1-2 in. across, in 2-4-lobed bractlets umbels on pedicels 1-2 in. long, petals 5.

2. *O. Gambleri*, King & Seale: *Kochia* *bochi*, Tel.

A large shrub or small tree, branches stiff erect. L. coriaceous, glabrous, often whitish, broadly elliptic, obtuse, sometimes obtovate, sessile, often with cordate base, 3-5 x 2-3 in. Fl. ½-1 in. across, on slender pedicels, 1-2 in. long, in dense many-lobed cymes at the ends of short woody leafless branchlets, sepals 4-5, petals 6-8, filaments ½-1 length of anthers.

Western Peninsula, from Gambia to Travancore, common on the dry rocky hills of Amalapuram, Coimbatore, and on the Vengalad. Kambakam hill (Det. 1881). F. II. 2.

B. Filaments as long as anthers or longer.

3. *O. Wallichii*, Planchon; Kurz, F. Fl. 1. 265. Vern. *O. andamanica*, Kurz. Vern. *Yolaga*, *Lower*, *Indrag*, *Uli*, Upper Burma.

A tree, attaining 50 ft. L. 4-8 in. long, inflorescence similar to *O. squarrosa*, appearing with or before the leaves, petals 5, much longer than sepals,

anthers shorter than filaments, drupes 4-5 in. long on a large hemispherical disk.

Siber, Andaman, Nicobar, Lower and Upper Burma. Fl. Feb.-April. Malay Peninsula.

6. *O. Wightiana*, Wall.; Wight, Ic. t. 223; Trimen Handb. Ceylon i. 233.

A shrub or small tree, glabrous. L. 11-2 in. Fl. after the leaves, solitary or 2-3 together, 1/2 in. across, anthers as long as stamens.

Southern part of Western Peninsula, fl. May, June. Ceylon.

2. **GOMPHIA**, Schreber; Fl. Brit. Ind. i. 525 (*Giratea*, Aubl.; Engl. n. Prantl iii. 6. 140).

Species 80-100, tropical, more than half in America, a number in Africa and a few in Asia.

1. *G. angustifolia*, Vahl; Trimen Handb. Ceylon i. 235.

A small much-branched tree, glabrous. L. 3-7 in., coriaceous, lanceolate, secondary nerves 20, parallel, joined by distinct intramarginal veins. Fl. 1/2 in. across, in pyramidal, terminal and axillary panicles, petals twice as long as sepals, obovate, narrowed into a linear claw; stamens 10, anthers nearly sessile, opening by terminal pores. Ripe carpels quite distinct, on the sides of a large convex disk.

West side of the Peninsula, chiefly in evergreen forests, from the South Konkan southwards. Fl. R. S. 2: *G. sumatrana*, Jack, closely allied, differs by larger petals and only 4 fluse panicles, and as given by Kurz, F. Pl. I. 290, for Tenasserim on the sea coast.

ORDER XXVII. L. BURSERACEÆ Gen. Pl. i. 321.

Resinous trees or shrubs. L. generally alternate, imparipinnate, 3-foliate, in some cases 1-foliate, stipules generally 0. Fl. mostly small, bisexual or polygamous. Calyx 3-5 cleft, petals 3-5. Stamens as many as petals or twice their number, inserted on the edge or outside at the base of disk, anthers 2-celled, dehiscence longitudinally. Ovary free, 2-5-celled, ovules generally two in each cell, hanging side by side from the top of the central angle. Fruit drupaceous, either indehiscent with a 3-6-celled hard stone or valvately dehiscent with several separate stones. Albumen 0, cotyledons often bilobed, generally twisted or crumpled.

Resin canals in the bast (phloem), in some species also in the pith.

- Fr. dehiscent, 2-valved 1. BOSWELLIA.
- Fr. an indehiscent drupe.
 - Calyx 3-6-l. valvate, drupe usually trigonous 2. CAXAIGUA.
 - Calyx 4-5-toothed or lobed.
 - Calyx campanulate 10-ribbed, 5-cleft, lined by a thin crenate disk 3. GAMBIA.
 - Calyx 4-6-lobed, disk annular 4. BURSERIA.
 - Calyx 4-toothed, small, fl. paniculate 5. PROCTIS.
 - Calyx 4-toothed, fl. few, fasciculate 6. BALSAMODENDRON.

Egicium, Thwaites, is classed under *Sapindacem*.

1. **BOSWELLIA**, Roxb.; Fl. Brit. Ind. i. 527.

Species 10. North-Eastern tropical Africa, excepting *B. serrata*.

B. serrata, Roxb.—Syn. *B. glabra*, Roxb. Cor. Pl. t. 207; Bodd. Fl. Sylv. t. 124; *B. thurifera*, Colebrooke; Brandis, F. Fl. G1. Vern. *Sadal*, *Saler*, Hndl.; *Satya*, South.; *Andaka*, Tel.; *Maddi*, Kan.; *Kundrikara*, Tam.

Ash-colored, well-leaved tree with a spreading flat crown. Bark nearly 1/2 in. thick, greenish-buff-colored, peeling off in thin scales. Bases of young shoots and leaves pubescent, with simple hairs. L. imparipinnate, crowded at the ends of branches; leaflets 8-15 pair, opposite or nearly opposite, ovate, lanceolate, serrate or less deeply crenate, apex generally obtuse. St. 6-8-axial, calyx small 5-7-toothed, petals 6-7. Stamens 10-12 inserted at the base of the red annular, fleshy disk. Ovary 3-celled, half immersed in the disk, 3 collateral ovules in each cell. Fr. 3-valved, the valves separating from the disc parents, which remain attached to the axis. Seeds 3, enclosed in hairy, spongy arceses attached to the lower angle. Cotyledons 2, lobes linearly reniforme superior.

Small fragrant fruit from the Sikkim mountains and throughout the range of the Western Himalayas within 10-20 miles of the Western Ghats. Always in the dense forest, and often gregarious, forming open forest associated with *Scrophularia* spp. The leaves fall about March and April, the fruit volume comes out in June. If about the time the leaves sometimes before the old leaves fall or after the fresh leaves have appeared. Coppices well and grows readily from cuttings.

2. CANARIUM, Linn.: Fl. Brit. Ind. i. 301.

Evergreen balsamiferous trees. L. imparipinnate, sometimes stipulate, leaflets serrate. Fl. polygamous, the male in long, the female (with rudimentary stamens) in short panicles, usually trimers, calyx cup-shaped or campanulate. Stamens 6, filaments connate into a tube, or free and inserted on the edge of or outside an annular disk, ovary 2-3-celled, ovules 2 in each cell. Drupe more or less distinctly trigonous, some 1-3-celled, rarely 4-5- or 6-terry. Species 30-50, tropics of the Old World.

A. Filaments connate into a tube.

1. *C. strictum*, Roxb.; Bot. Fl. Sylv. t. 128; King in Journ. As. Soc. Beng. vol. 62 (1863), t. 11. *Black dammer tree*. Vern. *Manda dhup*, Mad. *dhup*, Kan.; *Kandri Kasa*, Tam.; *Thetti*, Mal.

A very large tree, the young foliage brilliant crimson; branchlets, petioles and ribs and nerves beneath densely clothed with soft reddish-brown tomentum; leaflets 3-4 pair, serrate or crenulate while young, 3-6 in. long, 5-6 in. prominent beneath. ♂: Fl. 1 in. long in a narrow racemiform panicle 0.5-1 in. long; calyx tubular with 3 shallow broad teeth, petals orbicular-oblong, rudimentary ovary depressed, lobed, hispid. ♀: Fl. 1/2 in. long, in short few-fl. racemes. Drupe 1 1/2 in. long.

Large green forests along the Western Ghats to 1500 ft. from the Malabar coast to N. H. S. Fr. 0.8. A black lacinate exudes from incisions in the trunk, and is an article of local trade. 2. *C. bengalense*, Roxb.; King loc. cit. *Amra* and *Silba*. (Vern. *Nazhi*, Khasia). A tall glabrous tree, leaflets 5-6 pair, ovate 3-7 in. long; calyx campanulate, 3 broad yellow teeth, drupe 1 1/2 in. A clear amber like resin exudes from wounds in the bark. 3. *C. euphyllum*, Kerr. North America and West. Andaman, branchlets very short, youngest above pubescent. L. glabrous above dull green, 1-3 ft. long, leaflets with an unequal-angled base, rounded or cordate; calyx cut halfway down into 3 broad teeth, drupe oval, not flattened. 1 1/2 in. long.

4. *C. althimense*, King, loc. cit. Vern. *Goyul dhup*, Nepal.

A very tall tree, wood white, open grained, soft, light; branchlets, petioles and under side of leaves rusty-tomentose. Leaflets 5 pair, broadly ovate or elliptic, minutely crenate-serrate, upper surface glabrous, shining. Calyx campanulate, cut to 1/2 its length into 3 broad obtuse teeth. Drupe narrowly cylindrical or obovate, 1 1/2 in. long.

Sikkim, only valleys to 2000 ft. Resin used as incense. 5. *C. resiniferum*, King. Assam and Khasia hills, King loc. cit. 11 (*Dhaka* or *Dhoo*, Assam), leaflets above glabrous, pairs used to make barches.

D. *filamentosa* (Vahl) Hook. & Arn. is inserted on the edge of or outside the disk.

B. G. excelsa *peruviana* Kunz. South America, stems rather woody, leaves ovate, 10-15 cm. long, stipules large, persistently lobed, base of longer than leaf, lower ones 2-3 sides, upper 7-8. Main stem with small branches, branches woody, pubescent, base of stem entire, white, and small thick, woody, and branches, along stem, 1-2 cm. long, thick, woody. Dried, stems with a strong, but not very, odor, like that of *B. G. excelsa*.

B. GARUGA, Boerb., Fl. Bor. Ind. i. 593.

Species 3, Indo-Malayan.

B. pinnata, Boerb. Cat. Fl. i. 28; Fl. Bor. Ind. i. 118; Brandis, F. Fl. Ind. Vern. *Kanjar*, *Kanjar*, *Hual*, *Dakota*, *Nep*, *Javan*, *Kan*, *Kanjar*.



FIG. 51.—*Bursera pinnata*, (Vahl) B.

South: *Oliveri*, *Gudal*, *Kudak*, *Mar*, *Qadita*, *Kan*, *Garuga*, *peruv*, *Tel*, *Chaly*, *Born*.

A large deciduous tree, young shoots and inflorescence gray-pubescent. L. imparipinnate, crowded near the ends of branches, leaflets 6-8 pair, opposite or nearly so, lanceolate or ovate-lanceolate, crenate. Fl. yellow, in

axillary panicles, several at the ends of branches. Calyx campanulate, 10-ribbed, 5-cleft, lined by a thin disk with a crenate margin, at the sides of which the 5 petals and 10 stamens are inserted. Ovary 4-5-celled, 2 collateral ovules in each cell. Fr. a globose fleshy drupe, enclosing 2 rarely more, large, 1-seeded, tuberculate stones.

Subbimghyan tract and outer valleys, ascending to 3500 ft. from the Jumbha southwards, often in 800 feet. Deciduous forest in the greater part of the Western Peninsula and Burma. Leafless during the greater part of the dry season. Fresh twigs in April or May, with the fl. or after them. Grows readily from cuttings. Fruite eaten raw and pickled.

1. BURSERA. Lam. ; Fl. Brit. Ind. t. 580.

As here accepted, 40 species, mostly of tropical America.

* *B. acerrata*, Oelebe; Kurz, F. Fl. t. 308.—Syn. *Protium acerratum*, Engler. Vern. Najar, Assam; *Kandior*, Kol; *Saru pateri moi*, Uriya; *Thudi*, Lower, *He path*, Upper Burma.

A large evergreen tree. L. imparipinnate, pubescent or nearly glabrous, leaflets opposite, elliptic-oblong, acuminate, serrate or nearly entire, blade 3-4 inches long, petiole 1/2 in., tertiary nerves conspicuously reticulate. Panicles axillary, lax, shorter than leaves. Fl. green, pentamerous, calyx small, lobes rounded, petals valvate in bud, stamens 10, nearly equal, ovary hairy, surrounded by a level crenate disk. Drupe on thick peduncles, globose, often 2-3 furrowed, red, 1/2 in. diam., containing 1-3 one-seeded nuts.

Assam, Cachar, Chittagong, Chota Nagpur, Orissa, Northern Circars, Burma, Upper and Lower. Fl. March, April.

5. PROTIUM, W. et A. ; Fl. Brit. Ind. t. 580.

Aromatic trees. L. 3-7-foliate or imparipinnate. Fls. polygamous, small, in much-branched panicles, 4-6-nerved, disk lining the bottom of the calyx tube, stamens 8-12, unequal on the free edge of the disk. Ovary 2-4-celled, ovules 3 in each cell. The only real difference between this and *Balsamodendron* is in the inflorescence. Engler unites the 2 genera under *Cosmomyrica* and Trimen includes *P. caudatum* under *Balsamodendron*. As here defined *Protium* includes 3-4 species:

1. *P. caudatum*, W. et A.; Beld. Fl. Sylv. t. 125. Vern. *Kandia masi*, *Kandia masiddi*, Tel.; *Kilucot*, Tamil; *Kandia masu*, Kan.

A middle-sized deciduous tree, bark smooth, takes off in large pieces. L. imparipinnate, leaflets opposite, 1-5 pair, 2 in. long, broad ovate-lanceolate, as a rule long-acuminate. Panicles dichotomous, lax; linear bractlets at the base of ramifications. Ovary 2-celled. Fr. a fleshy drupe, 1/2 in. diam., stone 1-seeded.

Western Peninsula: the young leaves appear with the flowers in March. *Cosmomyrica pubescent*, W. et A., Anamalai hills, closely allied, leaflets pubescent, distinctly acuminate, panicle denser, ramifications not dichotomous.

* **6. BALSAMODENDRON, Karth. ; Fl. Brit. Ind. t. 521.**

Small trees or shrubs, yielding aromatic resin; branches often thorny. L. crowded at the ends of short branchlets, imparipinnate or 1-3-foliate. Fls. polygamous, fasciculate on axillated branchlets, calyx campanulate or procelate 3-4-cleft, petals 3-4, stamens 4-8, on the edge of an erect cupular disk. Ovary 4-celled, surrounded by the disk, 2 collateral ovules in each cell. Fr. a drupe, the end splitting more or less irregularly into 2-4 valves, leav-

ing the pulp exposed, which in some the nuts, which are heavy, rounded and partially reniform. Embryo straight, the radicle pointing upwards, cotyledons thin, crumpled and plaited. Species 10, India, Arabia, tropical and southern Africa.

1. *B. Berryi*, Arn.; *Bald. Fl. Sylv.* t. 126; *Bravais, F. Fl.* 65.

A small fragrant, very thorny tree, branchlets spinose, at right angles to



Fig. 63. — *Bursera Berryi*, Arn.

leaves. Lvs. foliolate, petioles slender, leaflets sessile, obovate, glabrous, generally entire, the terminal larger than the lateral ones. Fl. subsessile, 4-5-lobed, disk small, bearing 4-8 stamens alternately smaller, the longer ones opposite to petals, in the male flower stamens longer than calyx. Drupe obovate, apiculate.

Dry forests of the southern Deccan, cultivated as a hedge plant all over South India. Fl. February, March. Dry parts of Orissa. 2. *B. pubescens*, Stocks, Hook. Journ. Bot. t. 1 (1840) p. 5. *Cassipouera pubescens*, Engler (*Bayer, Bot. Belgich.*) *Bala-litana* and *Bala-litana* Western Sind, as far south as Kara-ul, an unarmed pubescent tree with small, trifoliate, generally crowded on short arrested branchlets, distant or approximated and then often impetripinnate. Mid-nervous stamens 8-10, drupe red, pulp orange-colored.

3. *B. Mukul*, Hook. & Stocks in Hook. Journ. Bot. t. 1 (1849) t. 8. *Bravais, F. Fl.* 64. Vern. *Gogri*, Sind, Rajputana.

A stout shrub or dwarfed tree, branches thick, spreading, branchlets often subsessile. Trunk knotty, the outer bark coming off in rough flakes, leaving exposed an inner layer, which is bright, shining, and peels off in rolls like thin paper. Lvs. generally approximate at the ends of thick short arrested branchlets, obovate, almost sessile, the tapering base entire, the upper part toothed. On luxuriant shoots the leaves are distant, trifoliate, the lateral leaflets small. Fl. unisexual, subsessile, 2 or 3 together, petals 4-5, strap-shaped, stamens 8-10, alternately longer. Drupe red when ripe.

4. *B. Roxburghii*, Arn. *Cassipouera Axaliocha*, Engler, Assam, Nalhet, Esch. *Bonapl.* spinose. Lvs. on slender petioles, at the ends of which are often 2 minute leaflets, fl. red.

Sind, Beluchistan, Kattawar, Rajputana, Khandesh, Bellary. Fl. Aug.-October.

ORDER XXIX. MELIACEÆ. Gen. Pl. 1: 817.

Trees or shrubs. L. alternate, generally pinnate, leaflets or rays, veins quite entire, stipules 0. Fl. regular, mostly bisexual, cymes, cymes or panicles. Calyx small, mostly 4-5-lobed. Petals free, rarely connate. Stamens in a rule double the number of petals. Filaments generally united into a tube, anther 2-celled. Disk, when present, between stamens and ovary, often forming a tube, enclosing the ovary partly or entirely. Ovary 3-5-celled, axis 1 or stigma sessile; ovules, either 1-2 in each cell or numerous. Fr. a capsule or indehiscent, mostly with coriaceous pericarp, seeds with or without albumen.

Key to Keyes, p. 200, III. places *Chlorophora* under *Balanocarpus*. Study the position of the glandular glands in the leaves, which form one of the distinguishing characters of that order.

I. Ovary 3-5 in each cell, seeds not winged.

I. Staminal tube half the length of stamens or less, or stamens free. Leaflets always sessile.

L. hypericoid, leaflets 2. Panicles axillary, cymes
long pendulous, tube half the length of stamens, capsule 2-valved.

1. HEYNEA.

L. imparipinnate, 3-lobed or 1-lobed. Panicles
terminal or axillary, stamens free or sessile, 1-2
in. long.

2. WALSBYA.

Leaflets often serrate, anthers sessile only at base.
Fr. woody.

3. CHLOROPHORA.

II. Staminal tube complete, oblong or short.

L. simple.

4. TITREA.

L. trifoliate.

4. SANDORHIA.

L. pinnate, leaflets entire.

Fl. bisexual, oblong, anthers short, ovules 2.

5. DRYODENDRON.

Fl. very protracta, linear, anthers linear, ovules 1.

6. CHLOROPHORA.

L. pinnate, leaflets mostly serrate.

Petals covering half way, disk tubular 1-1.5 in.

7. MYRZAYA (p. 200).

Petals free, disk membranous 2-3 in.

7. ANISODENDRON.

L. 13 or 14-pinnate.

8. MALLA.

III. Staminal tube complete, globose, 2, 3, 4-celled.

Leaves of trees, leaflets 3-7, anthers 6.

9. EMBAYA.

Shrubs or small trees on the Ghats, leaflets 1 or 2,
anthers 5 or 6.

10. HEMIPHYLLA (p. 141).

IV. Staminal tube complete, globose, 4, 6-celled.

Petals 5 or 6, ovary 3-celled, anthers 3-10, capsule
dehiscent.

11. ANISODENDRON.

Fl. 5-merous, anthers 5 or 6, dry, indehiscent.

11. AGALIA.

Fl. 5-merous, anthers 10, fr. fleshy.

12. LANSBYA.

V. Ovary 1-merous, seeds winged, staminal tube complete.

Seeds winged at both ends.

13. SORCERER.

Seeds winged at one end.

Petals 1-2 in., capsule 3-4 in.

14. SORCERER (p. 141).

Petals 1 in., capsule 1 in.

15. CHLOROPHORA.

VI. Ovary 8-12 in each cell, seeds winged, stamens distinct.

Stamens 1-3, ovary 3-celled.

16. CORYLIA.

Stamens 10, ovary 3-celled, translucent glands in leaves.

17. CHLOROPHORA.

9. HEYNEA, Roxb.; Fl. Brit. Ind. 1: 565.

United with *Balanocarpus* by Kurz and others. Species 3 Indo-Malayan region.

H. trifuga, Roxb. Cor. Pl. 1: 200.—Syn. *H. officina*, A. Juss.; Bodd. Fl. Selu. 1: 134; *Balanocarpus trifuga* and *pubescens*, Kurz, P. Fl. 1: 235; *Vernia trifida*, Macr.; *Korea*, Kurz; *Korea haldii*, Mal.

A tree, sometimes shrubby. L. imparipinnate, leaflets (up to 4 pair, 2-4

leaves and other parts pubescent beneath. Fl. white, in axillary cymes
 umbels, peduncles nearly as long as leaf. Calyx campanulate, 4-5 lobed, petals
 calyate in bud, staminal tube 8-10 n.l., segments 2-dentate, anthers between
 the calyate toothed segments. Capsule 1-1.5 in. diam., valves 2, broad, obtuse.
 Seed each in a thin white arillus, testa orange, brown afterwards.



FIG. 64.—*Hopea thurifera*, Hook. & Th. f. 1.

Sikkim-alayan trees, from Kumaon eastward, ascending to Sikkim to 4000 ft.
 Naga hills, Manipur, Singbhum, Bumpo hills, Ghalavry district, Western Ghats
 from Panna to the Nalgiris. In Burma on the hills between Sittang and Salween.
 Fl. February-June. L. reserved H. S. near upper Sikkim. Yunnan, Tinkin, Carabaria.

2. **WALSURA**, Rehb. : Fl. Brit. Ind. 1. 533.

Trees with imparipinnate, 3-foliate or unifoliate leaves, leaflets opposite,
 quite entire, often pale and glaucous beneath. Fl. small, bisexual, in axillary

terminal panicles. Corolla 5-lobed, petals 5, ovary 2-celled, style 1, stigma 2-lobed, imbricated or nearly valvate. Filaments 8 or 10, free or partly coadunate. Disk annular, fleshy. Ovary 2-celled, embedded in the disk, with 2 collateral locules each. Fecunda shortly tumidulous berry, 4 rarely 2-seeded, seed without albumen, enclosed in a fleshy arillus. Species 12, in the Malayana.

1. *W. piscidia*, Harth. Wight, Ill. p. 55. Vern. Kere. Hillana, Tel. Palmar, Trin.

A glabrous, generally middle-sized, at times a large tree, with red-coloured bark and hard reddish-brown wood, tough, made into canals. L. trifoliate, leaflets 2-3 in. long. Filaments broad, flat, hairy inside, slightly exserted.



Fig. 66.—Walnut piscidia, Roxb. Tr. fl. 1.

at base. Fr. ovate, bright-yellow. Seed 1, completely enveloped in a white pulky arillus.

Western Peninsula, on both sides south of the Godavari river. Fl. 3 number December. Ceylon, *W. ternata*, Roxb. Northern China, and Malacca. Habit. A small tree, leaves trifoliate, leaflets coriaceous, shining, whitish beneath, lanuginous. In Howdite. In axillary panicles shorter than leaves.

3. *W. villosa*, Wall.; Kurz, F. Fl. i. 224. Vern. G. G. Burma.

A moderate-sized tree, leafless in the hot season, leaflets petioles and ligatures densely pubescent. Leaflets 2 pair, 2-4 in. long, slightly pubescent beneath. Filaments flat, connate $\frac{1}{2}$ of their length, hairy.

Common in Lower and Upper Burma, often straggling in Kayah on p. 100. Fl. March 1, April. Okhoshima. 4. *W. hypoleuca*, Kurz (p. 246), identical with *W. villosa*, Kurz. Lower Burma and Assam, leaflets 6-7 in. long, glabrous. Filaments only connate at base, is united with $\frac{1}{2}$ by Pierre, Fl. For. Cochin. 5. *W. cordata*, King. Assam, leaflets 5-6 in. long, pubescent. 6. *W. multiflora*, King. Upper Burma (King), Malay Peninsula and Archipelago. Leaflets 2-4 pair, coriaceous-glabrous, dull beneath, 2-4 in. long.

W. robusta, Roxb.: *Vern. Opuntia*, Burm.
 A tree 60 ft. tall, with a trunk 10 in. diam. standing 100 ft. high. The bark is reddish-brown, the leaves are 4-6 in. long, 2-3 in. wide, with a thick, waxy, glaucous surface.

W. robusta, Roxb.: *Vern. Opuntia*, Burm.
 A tree 60 ft. tall, with a trunk 10 in. diam. standing 100 ft. high. The bark is reddish-brown, the leaves are 4-6 in. long, 2-3 in. wide, with a thick, waxy, glaucous surface. Fr. 1 in. diam., 3-5 lb. seed 1.
 Common in the hills, Lower Burma, Assam, etc. Fl. May.

Opuntia fruticosa, Blume: (*Melastoma fruticosum*, Juss.) *Bodl. Fl. Sylv. Mex.* t. 8. *Vern. Opuntia fruticosa*, Chittard, Kun. *Philipp. Ind.* Capri Naguan, Oribon, Western Province, Lower Burma, Ceylon, Java, Philippines. A shrub or small tree. The leaves are 4-6 in. long, 2-3 in. wide, entire or scarcely serrate. Fl. white, in axillary panicles. Fr. 1 in. diam., 3-5 lb. long, velvety on both elements broad, common at least in the hills, with the seeds, 1-4 in. long, with a winged axis. Ovary 5-celled. Fr. 1 in. diam., 3-5 lb. seed, 1-4 in.

3. *TURRÆA*, Linn.: *Fl. Brit. Ind.* t. 541.

T. simplex. Calyx campanulate, 4-5-lobed, petals 4-5 elongate. Linear or spatulate, imbricate in bud. Staminal tube long, anthers 8-10 inserted within the mouth, alternating with the teeth of tube. Ovary 6- or more-celled, 2 superposed ovules in each cell, albumen capitate. Capsule loculicidal, valves woody or coriaceous, separating from the winged axis. Albumen fleshy, mucous, hilarsous. Species 40, tropical, chiefly in Africa and Madagascar, a smaller number in Asia and Australia.

T. villosa, Benn.: *Wight Ic.* t. 189d.

A tree 60 ft. tall, with a trunk 10 in. diam. standing 100 ft. high. The bark is reddish-brown, the leaves are 4-6 in. long, 2-3 in. wide, with a thick, waxy, glaucous surface. Fr. 1 in. diam., 3-5 lb. seed 1.

Western Ghats, from Malabar to the southern end, also reported from the coast. Fl. April-May. 2-3 in. diam. a glabrous shrub with shining coriaceous leaves. Capsule woody, with the tip anthers shorter than the exserted teeth of staminal tube. Fr. 1 in. diam., 3-5 lb. seed 1. Doubtful whether a native of the Peninsula.

4. *SANDORICUM*, Cav.: *Fl. Brit. Ind.* t. 687.

Evergreen trees with trifoliate coriaceous leaves, the lateral shortly, the terminal long-petiolate. Fl. 6-merous, in axillary panicles. Disk enclosing ovary and base of style. Ovary 5-celled, on the enlarged torus, 2 collateral ovules in each cell. Fr. globose, fleshy, 3-5-celled, 1 seed in each cell, coriaceous thick, fleshy, and albumen. Species 6, all Ind-Malayan.

S. indicum, Cav.: *Roxb. Cor. Fl.* t. 261; *Bodl. Fl. Sylv.* t. 319. *Vern. Sandorica*, Burm.

Attains 60 ft. wood close-grained, moderately hard, med. rays conspicuous in radial section. Branchlets, inflorescence and leaves velvety. Fl. yellow, in narrow axillary panicles. Staminal tube 10-dentate, style articulate at base, clavate above, ending in a thickened ring, bearing 6 obtuse stigmatic lobes. Fr. globose, 3 in. diam., yellow and velvety when ripe, encircling a fleshy woody pulp, the outer lining the cells, horny, covered with a densely felted mass of long pilicellular hairs over 1 in. long. Cotyledons filled with starch and oil.

Cultivated in Java and Tenasserim largely cultivated in Burma. Fl. Oct. Fr. H.

5. **DYSOXYLUM**, Blume: Fl. Brit. Ind. 1: 349.

Evergreen trees, leaves pairs, rarely imparipinnate, leaflets entire, base oblique. Fl. bisexual, 4-5 merous, calyx deciduous, petals slightly imbricate or valvate, anthers short, inserted inside the staminal tube below its edge. Disk tubular, as long as or longer than ovary. Ovary usually hairy, 1-4-celled, ovules 2 in each cell. Capsule coriaceous, 4-5-valved, 1-umbonate. Seeds without albumen, cotyledons thick, fleshy, plumule often hairy. Species 104, Indo-Malayan.

A. Fl. in ample pyramidal panicles.

1. **D. procerum**, Hiern: Kurz, F. Fl. 1: 214. Vern. *Lo-mai*, Nep.

Wood bright red, moderately hard, medull. rays the colour of the intervening tissue, young shoots slightly pubescent. Leaflets 7-12, opposite or alternate, 6-14 in. long, fl. white on short bracteolate pedicels, in ample panicles about as long as leaves. Disk woolly inside, twice the length of the hairy 3-4-celled ovary. Fr. 2 in. diam.

Sikkim, Khasi hills, Assam, Manipur, Pegu and Tenasserim. Fl. G. S. Malacca, & D. Hamilton, Hiern, Sikkim, Assam, Sikkim, leaflets 10-18, opposite or nearly so, hairy beneath, very oblique. Fl. small strings of pearls. 2. **D. thyrsoides**, Griff., South Andaman, Malay Peninsula, leaflets 6-8, alternate, shining, 4-10 in. long, disk densely hairy & woolly. 3. **D. grande**, Hiern, Sikkim, leaflets 12 alternate, 5-9 in. long, disk glabrous outside. 4. **D. arborescens**, Miq., South Andaman, Malay Peninsula and Archipelago, small tree, leaflets opposite, 2-3 pair, panicle lax, 2-4 in.

B. Panicle contracted, racemiform, sparingly branched.

6. **D. binectariferum**, Beck. fl.—Syn. *D. macranthoides*, Thunberg (not of Blume); B. H. Fl. Syst. 1: 150. Vern. *Kada-gadda*, Kan.

A large tree, wood close-grained, young shoots and inflorescence minutely pubescent. Leaflets alternate, 6-8, obliquely ovate-lanceolate, 4-6 in. long, tertiary nerves indistinct. Fl. white, tetramerous, 1/2 in. long, calyx cup-shaped truncate obscurely toothed, disk glabrous inside, 8-dentate, closely surrounding the hairy ovary. Fr. 2 1/2 in. long, red, 4-celled, 4-seeded, seeds polished, dark purple.

Sikkim, Khasi hills, Chittagong, Western Ghats from Khasi hills southwards. Fl. G. S. Ceylon, Cochinchina. 7. **D. reticulatum**, Kurz, Journ. As. Soc. Beng. vol. 10, p. 1897, t. 1. Sikkim, Cachar, leaflets mostly alternate, tertiary nerves prominently reticulate. Fl. 1/2 in. long, disk fleshy, glandular-pubescent. Capsule pyramidal, 3 in. long.

8. **D. malabaricum**, Beld.—Syn. *D. glandulosum*, Talbot List 39. Vern. *Velli-ayil*, Mal.

A large tree. L. 12 in. long, young shoots gray-pubescent with minute hairs, petiole sharply angled, leaflets 6-10, nearly opposite, 4-9 in. long, set. n. conspicuous beneath. Panicles contracted, with few branches, shorter than leaves. Fl. 4-merous, 1/2 in. long, calyx deeply 4-lobed, disk truncate, hairy inside. Fr. 2 in. long, nearly globose, bright yellow and verrucose when ripe. Seeds 3-4, angular, dark brown.

Evergreen forests of the Western Ghats, North Kanara Coorg, Anamalai, Travancore. 19. February. Yields the white cedar wood of Travancore. Nearly allied: 9. **D. beddomei**, Hoop (dwarfed), Tam., South Travancore, evergreen forest, a very large tree, wood pale yellow and scented, petioles terete, leaflets alternate. Fr. purple, smooth, globose, 2-3 in. diam. 10. **D. patens**, Hiern, Sikkim, Khasi hills, Pegu, Assam, leaflets 6-10, alternate, 4-10 in. long, set. n. prominent, calyx deeply 4-lobed, disk glabrous on 100 sides. Fr. 1 1/2 by 1 in.

The only species with glabrous ovary is 11. **D. Overyi**, n. spec. & described in the evergreen forest above Kutha 6000 ft., Dake Miss district (J. W. Overy, May, 1876), nearly allied to the Malayan *D. reticulatum*, Miq. (*D. beryper*, Hiern) leaves glabrous particularly on upper petiole angular, leaflets opposite, 6-24 in. long, set. n. 14-16 pair, prominent beneath, panicle ample, as long as leaves; fl. 1/2 in., white, 5-toothed, rays

8. MELIA, Lam.: Fl. Brit. Ind. 1: 543.

Trees with bipinnate or tripinnate leaves, calyx 5-lobed, 2-5, short. Petals 5-10, linear, spatulate. Stamens 10-12, axillary, anthers inserted on the edge of the tube between the teeth. Ovary 3-6, celled, 2 superposed ovules in each cell. Fr. a dry or fleshy drupe, the stone 5-celled, each cell with one pendulous seed, cartilaginous, hilumous, albumen thin. Species 12. India, Malaya.

1. *M. Azedarach*, Lam.: Wight, *Icones*, 100; Bodd. Fl. Sylv. 1: 43. Vern. *Alak*, Vern. *Droka*, Ph.; *Babain*, Hind.; *Ac*, Din.; *Yera*, Nep.; *Taraki*, Nep.; *Hutchu*, Bern.; *Kan*, 5; *Umbu*, Tam.; *Mal*.

A middle-sized deciduous tree, young shoots and inflorescence sparingly clothed with deciduous stellate hairs, heartwood light red, annual rings marked by a belt of large vessels. Pinnae 3-4 pair, more or less opposite. Leaflets 3-12, ovate-lanceolate, serrate or less deeply serrate, sometimes lobed. Fl. lilac, with a strong honey-scent. Staminal tube purple, $\frac{1}{2}$ in. long, teeth 20-30, linear, anthers glabrous, shorter than or as long as teeth. Stigma clavate 5-toothed. Drupes yellow when ripe. 3-4 in. long.

Cultivated and naturalized throughout India and Burma. Standard name in the New Provinces, 1840-50, in the Sindh (Chitral). Specimens of 1840-50 in the Botanic Garden and the Jhelum valley in Kashmir. Fl. H. S.

2. *M. composita*, Willd.: Bodd. Fl. Sylv. 1: 12; King in Journ. As. Soc. Bengal, vol. 64 (1865) 48. Syn. *M. roseata*, Boxb. Fl. Ind. 1: 307; *M. Asida*, Fl. Brit. Ind. 1: 545 (not Cav.). Vern. *Lobala*, Nep.; *Alaka*, Nep.; *Umbu*, Tam.; *Mal*.

A tall tree of rapid growth, heartwood reddish. Young shoots and inflorescence clothed with mealy stellate hairs. L. bipinnate, leaflets ovate, white-lanceolate, sometimes serrulate. Fl. white, staminal tube $\frac{1}{2}$ in. long, hairy, mouth woolly, divided into 10 more or less lacinate teeth, anthers longer than teeth and inserted between them. Stigma 5-toothed. Drupes oval 1-1 $\frac{1}{2}$ in.

3. *M. indica*, according to G. G. G. (Gambel's list 19), Nambur Forest, Assam (H. B. Merrill, 1870) Gannur hills, Northern Circars. Western Ghats from Bombay southwards. Fl. Jan-March. Ceylon, Malay Peninsula, Cochinchina, Java, China, Australia. Specimens from the Khasi hills and Manipur. The staminal tube $\frac{1}{2}$ in. long, drupe nearly globose, 1 $\frac{1}{2}$ in. long, have been referred to *M. Benzoeana*, Sieb. et Zucc. of Japan. Hardly distinct from *M. benzoeana*, Kurz, F. Fl. 1: 213 (*Taxi thomsonii*, Hornem.), Pogo, Burma, supposed by King to be identical with *M. benzoea*, Boxb.

9. CARAPA, Aublet: Fl. Brit. Ind. 1: 566.

Evergreen glabrous trees. L. pinnate, leaflets opposite, quite entire. Fl. bisexual, in axils of panicles. Calyx short, in the Indian species dentate, rarely 4-lobed, all lobes overlapping, contorted in bud. Staminal tube truncate or globose, more or less lobate, anthers inserted between the teeth, nearly imbricated. Ovary globose, 4-celled, the base immersed in the thick fleshy disk, cells with 2-8 ovules, style short, stigma broad discoid. Fr. globose, large, pericarp fleshy, dehiscing by 3 valves. Seeds large angular without albumen, cotyledons contain starch and oil. Species 6, tropical, mostly littoral.

1. *C. obovata*, Blume; Kurz, F. Fl. 1: 226. Syn. *C. castoroides*, Bodd. Fl. Sylv. 1: 136 (not of Lamk.); *Alysicarpus obovatus*, A. Juss.; Harris in Engler u. Prantl III 4: 278. Vern. *Phu*, Burm.; *Kachibelli*, Thailand, Siam.

A small tree, heartwood reddish-brown, hard, leaves 3-6 in. long, leaflets 1-2 pair, coriaceous, obovate, apex broad, obtuse, base narrowed. Panicles $\frac{1}{2}$ -2 $\frac{1}{2}$ in. long, stout, few-flowered. Fruits 7-10 in. diam.

— *Seeds* in the fruit. — *Flowers* about 2 in. diam. — *Leaves* 12 in. long, 4 in. wide, serrated, glaucous, Barma, Andaman, Ceylon. — *Fl.* B. S. Malay Archipelago, Fiji Islands, Africa, Australia. The leaves of young plants are slightly pubescent. — *1. C. muticosa*, Lamk. — *2. C. merrillii*, Merr. — *3. C. merrillii*, Merr. — *4. C. merrillii*, Merr. — *5. C. merrillii*, Merr. — *6. C. merrillii*, Merr. — *7. C. merrillii*, Merr. — *8. C. merrillii*, Merr. — *9. C. merrillii*, Merr. — *10. C. merrillii*, Merr. — *11. C. merrillii*, Merr. — *12. C. merrillii*, Merr. — *13. C. merrillii*, Merr. — *14. C. merrillii*, Merr. — *15. C. merrillii*, Merr. — *16. C. merrillii*, Merr. — *17. C. merrillii*, Merr. — *18. C. merrillii*, Merr. — *19. C. merrillii*, Merr. — *20. C. merrillii*, Merr. — *21. C. merrillii*, Merr. — *22. C. merrillii*, Merr. — *23. C. merrillii*, Merr. — *24. C. merrillii*, Merr. — *25. C. merrillii*, Merr. — *26. C. merrillii*, Merr. — *27. C. merrillii*, Merr. — *28. C. merrillii*, Merr. — *29. C. merrillii*, Merr. — *30. C. merrillii*, Merr. — *31. C. merrillii*, Merr. — *32. C. merrillii*, Merr. — *33. C. merrillii*, Merr. — *34. C. merrillii*, Merr. — *35. C. merrillii*, Merr. — *36. C. merrillii*, Merr. — *37. C. merrillii*, Merr. — *38. C. merrillii*, Merr. — *39. C. merrillii*, Merr. — *40. C. merrillii*, Merr. — *41. C. merrillii*, Merr. — *42. C. merrillii*, Merr. — *43. C. merrillii*, Merr. — *44. C. merrillii*, Merr. — *45. C. merrillii*, Merr. — *46. C. merrillii*, Merr. — *47. C. merrillii*, Merr. — *48. C. merrillii*, Merr. — *49. C. merrillii*, Merr. — *50. C. merrillii*, Merr. — *51. C. merrillii*, Merr. — *52. C. merrillii*, Merr. — *53. C. merrillii*, Merr. — *54. C. merrillii*, Merr. — *55. C. merrillii*, Merr. — *56. C. merrillii*, Merr. — *57. C. merrillii*, Merr. — *58. C. merrillii*, Merr. — *59. C. merrillii*, Merr. — *60. C. merrillii*, Merr. — *61. C. merrillii*, Merr. — *62. C. merrillii*, Merr. — *63. C. merrillii*, Merr. — *64. C. merrillii*, Merr. — *65. C. merrillii*, Merr. — *66. C. merrillii*, Merr. — *67. C. merrillii*, Merr. — *68. C. merrillii*, Merr. — *69. C. merrillii*, Merr. — *70. C. merrillii*, Merr. — *71. C. merrillii*, Merr. — *72. C. merrillii*, Merr. — *73. C. merrillii*, Merr. — *74. C. merrillii*, Merr. — *75. C. merrillii*, Merr. — *76. C. merrillii*, Merr. — *77. C. merrillii*, Merr. — *78. C. merrillii*, Merr. — *79. C. merrillii*, Merr. — *80. C. merrillii*, Merr. — *81. C. merrillii*, Merr. — *82. C. merrillii*, Merr. — *83. C. merrillii*, Merr. — *84. C. merrillii*, Merr. — *85. C. merrillii*, Merr. — *86. C. merrillii*, Merr. — *87. C. merrillii*, Merr. — *88. C. merrillii*, Merr. — *89. C. merrillii*, Merr. — *90. C. merrillii*, Merr. — *91. C. merrillii*, Merr. — *92. C. merrillii*, Merr. — *93. C. merrillii*, Merr. — *94. C. merrillii*, Merr. — *95. C. merrillii*, Merr. — *96. C. merrillii*, Merr. — *97. C. merrillii*, Merr. — *98. C. merrillii*, Merr. — *99. C. merrillii*, Merr. — *100. C. merrillii*, Merr.



FIG. 6.—*Carapa glabrata*, Blume.

Podium differs from *Carapa* by petals and strongly striate in bud, anthers 5-angled narrow, on a thick cordiform, very hairy, 3-veined, disk with 2 lobes.

1. *C. indica*, Hook. f. *Western Ghats* from Coorg to Cape Comorin. A large shrub, young shoots lepidote. Leaves 3-7 in. long, leaf 1-1.4 in. long, rough with close set rusty toles. 2. *C. simplicifolia*, B. & H. *Fl. Sylv.* 1. 135. *Western Ghats* common, from South Kanara to Travancore.

A small tree, leaflets solitary, 3-6 in. long, fruit oblong, size of a pigeon's egg, acute at both ends, densely rusty-tomentose.

10. AMOORA, Roxb. | *Fl. Brit. Ind.* 1. 350.

Evergreen trees, leaves imparipinnate, leaflets oblique. Fl. polygamous, male fl. usually paniculate, fertile fl. often racemose or spicate. Calyx 3-5-merite. Petals 3 (4 in 2 species) thick, concave, strongly nerved. Staminal tube nearly globose, anthers 8-10, included, in one row. Disk inconspicuous. Ovary 3-celled, cells 1-2-ovuled, stigma sessile. Capsule 3-5-lobed or indehiscent, seeds 1-3, enclosed in a fleshy arillus. — Species 25, one Australian, the rest India and Malayan.

A. Leaflets opposite.

1. *A. Rohituka*, W. & A. *Bull. Fl. Sylv.* 1. 132. Vern. *Schaga*, Galla; *Baweliphal*, Nep; *Silacora*, Kol; *Talit*, Burm.

A small tree, with a heavy crown, in Burma attains 60 ft., wood pale red, youngest shoots pubescent. Leaflets 5-7 pair, 3-9 in. long, secondary nerve prominent beneath, 10-15 pair. Fl. sessile, ♂ in panicle spikes, ♀ in solitary spikes much shorter than leaves. Anthers 6, attached to the

tree at its base. Fruit globose, yellow when ripe, 1-1.5 in. diam., the only characteristic. Seed one, oblong with a scarlet aril.

Colombia - small tree, 1-2 ft. tall, very common in parks to 1500 ft. alt. in the Cordillera Occidental and other hills except on the southern slopes. P. B. S. Cochin Malay Peninsula.

2. *A. cucullata*, Roxb. *Coccol. Pl.* t. 258. Vern. *Jante*, *Lantur*, *Sun-Jils*; *Ditai*, Burm.

A glabrous, middle-sized, at times a large tree, heartwood soft. Leaves 2-4 pair, lanceolate, very oblique at the base, 2-6 in. long; secondary veins indistinct. Fl. pedicellate, 3 in panicles, 3 in short low fl. cups - axillary or cymose. Anthers 6. Fruit globose, 2½ in. diam., pericarp leathery, 3-valved. Seeds 3 with an orange-colored aril.

Kind like *Spondias*, Burm. Fl. B. S. C. S. J. A. Wallach, *King*, *See*, *See*, *See*. *A. cucullata*, Fl. B. Ind. t. 511; Kura, Fl. C. 211, *Arum*, *Burma* and *Andaman*, *See* and female flowers on the same branch. Branches, leaves 1-6 leafy panicles. *A. cucullata*, Burm. et Hoch, *Western Ghats* from the Koonkan southwards. Leaves 2-4 pair, sometimes alternate, only cup-shaped, 3-toothed, petiole 2, sometimes 1, anthers 6 or 7.

B. *Leaves alternate*

3. *A. Lawii*, Bl. Fl. Sylv. t. Ind (*Bawa*), *Malay Peninsula* from the west side of the Peninsula from the Koonkan southwards. Leaves 2-5, slightly serrated, very 3-toothed. *A. chitraganga*, Hirt., *Bhutan*, *India*, *Andaman*, *See*. Leaves 2-7, ovate, cup-shaped, 3-toothed, anthers 2, very 3-toothed. *King*, *See*, *See*. *A. chitraganga*, Bl. Fl. Ind. t. 511, *See*. *A. chitraganga*, Burm. et Hoch, *Western Ghats* from the Koonkan southwards. Leaves 2-4 pair, sometimes alternate, only cup-shaped, 3-toothed, petiole 2, sometimes 1, anthers 6 or 7.

11. AGLAIA, Lour. : FL. Reit. Ind. 1, 551

Evergreen trees, leaves imparipinnate. Fl. polygamous, small, globose, pediculate, in a rare pentamerous, petals indurate, staminal tube more or less globose, anthers usually 3, rarely more, included or half-exserted. Disk inconspicuous, stigma sessile or nearly so. Fr. indurated, 1-2-celled seeds 1 or 2 testa often with a fleshy outer layer, resembling an aril. Species 7, Indo-Malayan region, China, Polynesia.

A. Shoots and inflorescence scaly, white leaves glabrous, leaflets 1-4 pair.

1. *A. odoratissima*, Blume; King, *Jour. As. Soc. Beng.* vol. 14, 1865, 67. *Sed. et. Barbaryana*, Miq.; *Beht. Fl. Sylv.* t. 130; *Millett Barbaryana*, Wight, *Le.* t. 1091. Vern. *Yara Adoga*, Kan., Tel.; *Cheula*, Tam.

A large tree (near the coast in Kanara a shrub), wood bright red, hard, very tough, youngest shoots and inflorescence clothed with round peltate scales. Leaflets glabrous, opposite, 1-3 pair, 2-5 in. long, pale beneath, naked part of common petiole as long as the upper portion. Fr. buff-colored, velvety, 1-2 in. diam. Seeds ovoid, surrounded with a white thick slightly acid white pulp, embryo green.

Western Peninsula, the northern limit Moul. Also on the west and Malacca, the east side. Fl. B. S. C. S. Cochin, Malay Peninsula, Sumatra, Java. *A. glaucophylla*, Miq., *Tenasserim*, Malay Peninsula, Sumatra. Leaflets 4-2 pair. Fr. globose, supported by the remains of persistent calyx. *A. glaucophylla*, King, South Andaman. Leaflets 2-3 pair. Fl. tetramerous. *A. glaucophylla*, King, South Andaman. Leaflets 3-4 pair. Panicles at leaf axils. Fl. 4- or 5-merous. *A. khasiana*, Hurst, *Kand.* 4-6 in. *A. Wallachi*, Hirt. *Sikkim*. Leaves opposite 3-4 pair, elliptic-lanceolate, 2-4 in. long. Fl. small in short panicles. *A. paniculata*, Kura, Fl. C. 209, *Pura*, *Yara*. Leaflets alternate, 2 pair, 4-5 in. long. Fl. small in simple very short panicles.

B. Sheets and inflorescence ready, leaves dark green, beneath glaucous.

1. *A. crassifolia* Karst. Young tree. Leaves 4-10 in. long, serrulate, beneath glaucous. 2. *A. Ganga* Miq. South Andaman, Nicobars, Sumatra. Leaves 4-7 pair, 1-2 in. long, the rounded lobes 1/2-1 in. long, the lower lobes distant. 3. *A. andamanica* Hook. *Amorpha andamanica* Karst. Young tree. Leaves 4-10 in. long, 4-10 pair, 1/2-1 in. long, the rounded lobes 1/2-1 in. long. 4. *A. parvifolia* Hook. Sikkim, Khasi hills, Assam. A small tree. Leaves 4-10 pair, 1/2-1 in. long, the rounded lobes 1/2-1 in. long, the lower lobes distant. 5. *A. argentea* Hook. Para Yoma



FIG. 67.—Aghala (Melaleuca), Bl. 4.

N. B. The Malay Peninsula and Archipelago. A small slender tree, young shoots, the upper surface and underside of leaves densely covered with round silvery or pale tomentum, interspersed with stellate hairs, beneath 4-5 pair, 5-12 in. long, the terminal leaflets secondary nerves prominent.

C. Sheets and inflorescence with scales and stellate hairs, underside of leaves pubescent or tomentose.

15. *A. adusta*, A. Gray (identified by King with *A. (Chlostea) C. DC.*) Sikkim, Nepal, the N. Assam, hills, Malay Peninsula. Leaves 4-10 pair, 1-2 in. long, upper surface glabrous, the lower sparsely pubescent, fr. subsessile, densely rusty-tomentose. 16. *A. Griffithii* Karst. F. Fl. 125. Mergul Malay Peninsula. Leaflets 4-6 pair, 1-2 in. long, upper surface glabrous, except tomentose in the nerves.

the lower surface, rarely rugulose, it runs into the depression of the stem. Young trees long, rarely half the length of petals. *Swietenia* (1739) is larger. *A. mangrove* Boiss. & P. Ind. Or. L. 186. *Amabilis*, *Limbovalensis*, *Travancora* Champ. about 2000 ft. Leaves 4-5 pair, lower surface densely rusty-tomentose, *h. puberula* 2 in. diam., *h. h. h.* 2 the length of petals.

Several of these 15 species will probably be united when they are studied in the herbarium and not from *Swietenia* specimens only.

12. LANSIUM, Rumphius; Fl. Brit. Ind. l. 557.

Differs from *Aglaia* by having 10 anthers in 2 rows, the shorter ones included, the longer partly exerted.

1) *L. anamalayana*, Poir. Fl. Sylv. t. 131. Vern. *Sraffana*, *ley*, Tam. Leaves alternate, 3-5, 3-4 in. long, densely acuminate. Fr. oblong, 1 in. diam., 2-seeded, seeds covered with a fleshy integument.

Evergreen forests of the Western Ghats from Kataka southwards. Fl. April-May. 2) *L. decantrum* King l. c. 51 (*Masson decandrum*, Hieron. Fl. B. Ind. l. 324), rather Himalaya from Nepal eastwards, ascending in Sikkim to 6000 ft. has 2-3 pairs, 2-5 pair, fl. red, 4- or 5-merous, 2 in axillary panicles, 2 in axillary spikes, fr. globose-obovoid 1-2-celled, 1½ in. diam., 3-10, 4-5 seeds. 3) *L. domesticum*, Jack. Malay Peninsula and Archipelago. Cultivated on account of its fruit in tropical India. Leaves 3-5 alternate, cartaceous broadly elliptic, spikes of horizontal fr. from the trunk and larger branches, fr. 1-2 in. diam., seeds 2, 2-celled, in each transparent, oily.

13. SOYMIDA, ADR. JUSS.; Fl. Brit. Ind. l. 567.

One Indian species, and one or two from East Africa.

S. febrifuga, ADR. JUSS., the only species; Boiss. Fl. Sylv. t. 8; Brandis P. Fl. 71.—Syn. *Sicotonia febrifuga*, Roxb. Cor. Pl. t. 57. Vern. *Roban*, Hind.; *Suul*, Tel.; *Sahan*, Uriya; *Soyinda*, Paikonda hills; *Soyamara*, *Suahi*, Kan.

A large tree, trunk tall, straight, symmetrical, bark bitter, heartwood distinct, bright red when fresh cut, dark reddish-brown when dry, very hard and very durable. Leaves paripinnate, petiole with a short-stemmed base, leaflets opposite, 3-5 pair, 2-4 in. long. Secondary nerves 10-11 pair, alternating with shorter intermedial ones, tertiary nerves prominently reticulate. Fl. bisexual, pentamerous, greenish-white, in large terminal panicles with triangular bracts. Petals obovate, narrowed into a claw, contorted in bud. Staminal tube cup-shaped, 10-cleft, each segment with 2 short fleshy teeth, the anthers between them on a short filament. Capsule 1-2 in. long, 5-celled, the 5 valves separating from the dissepiments, which remain attached to the thick spongy axis. Seeds numerous in each cell, flat, imbricated, winged at both ends.

Western Peninsula and Central India, extending to the hills south of Mysore to the east, and to Mysore in the west. Doubtful in Burma. The young foliage is eaten in April and May, while part of the old leaves are still on the tree. Fl. April, May.

Swietenia Mahaguni, Linn., the Mahogany tree of Central America and the West Indies, differs by an urceolate 10-lobate staminal tube and seeds winged at the upper end only. 2) *macrophylla*, King, is a considerable variety or species, found at the Calcutta bot. Gardens from Bencoolen seed in 1822. Leaves, capsule 6-8 in., and seeds much larger, growth more rapid. Seeds more fleshy at both ends.

14. CHUKRASIA, ADR. JUSSICA, Mém. Mus. Hist. Natur. xxx. (1839) p. 251.

Wight and Arnott altered the original name into *Chukrasia*.

Fl. Brit. Ind. i. 567.

C. tabularis, A. Juss., the only species; Wight. Ill. t. 50; Boiss. Fl. Sylv. t. 9.—*Chittayong wood*. Vern. *Chikraasi*, Beng.; *Pobba*, Mar.; *Kul bothari*, Kan.; *Dal'mara*, Coorg; *Yimma*, Burma.

A tall tree, usually dichotomously branched, branch with a rather lustrous glaucous green, glabrous, lower pubescent. Fl. white, 1 in. long. Petals slender, erect, persistent in bud. Staminal tube cylindrical, with 10 short teeth, anthers on the side of the tube. Ovary cylindrical, usually 3-celled, with numerous imbricate ovules in each cell. Capsule oval, 1 1/2 in. long, valves usually 5, woody, separating entirely from the broad axis. Seeds numerous, flat, closely packed, evenly winged.

Soils in Malacca, Andaman, Burma, Western Peninsula, along the Western Ghats, also in the hilly hills of the Deccan. Fl. H.S. and R.S., Ceylon, Malacca Peninsula, Java, Sumatra, C. retusa, Boissier; Java, R. Fl. 1: 227. Burma, Ceylon, India, Malacca, Java, and Sumatra, very common; capsules of the Malay Peninsula, but distinct species of very marked variety.

15. CEDRELA, Linn.; Fl. Brit. Ind. 3: 58

Trees with pinnate leaves and pinnate (asexual) fl. Wood light, soft, red, but without vessels large, conspicuous on a vertical section. Petals 5, erect, 1/2-1 inch, thereby 5-lobed, cylindrical. Filaments 4-6 inserted on the side of the disk, anthers globose, versatile. Ovary 3-celled, narrowed into a style, stigma broad, often 5-lobed, ovules pendulous, imbricate, 5-12 in each cell. Capsule opening by 5 valves, the valves separating from the dissepiments, which remain attached to the axis, forming a leathery and whitish 1/2-1 white path. Seeds numerous, imbricate, flat, winged. Ailanthoid, rarely, umbels straight with lacinious styles on the radial points and upwards. Species 14, tropical Asia, America and Australia.

Cedrela glabra, Linn. and other species furnish the West Indian Cedar wood. The American species have a cylindrical disk and a long and broad seed only. The Asiatic and Australian species with short flat and evenly winged at the top or at both ends have been placed in a separate genus, *Toum*, by Phlegel, Fl. For. Coch. u. Malay-Halbins. Engl. u. Franz. II: 4, 20 and others.

C. Toron, Bush. Cor. Fl. 1: 238; Wight Ic. 1: 461; Bodd. Fl. Sylk. 1: 10; Brandt, F. Fl. Ind. The Tern, Java, Tern, Tern, Malacca, Batak, Ketchikan, Kol., Lolo, Mar., Tandu, Dendari, Kan., Naga, Olong, The Malayan, Java, Malacca, Malacca, Malacca, Lower Tern, Upper Burma.

A large woody growing tree, nearly evergreen. Wood red, not hard, shining, does not split or warp, annual rings marked by wider vessels. L. glabrous, paripinnate, leaflets opposite or nearly so, 5-10 pair, lanceolate or ovate-lanceolate, acuminate, often unequal-sided and inequilateral, entire or undulate, length 3-5, petiole 1/2-1 in. Panicles terminal, cymose, generally shorter than leaves, the last ramifications pubescent. Fl. white, heavily scented, 1/2-1 in. long. Sepals 5, ciliate distally, retain ciliate on the edges, otherwise glabrous, on the inside thickened. Stems 5, inserted on 5 fleshy orange-colored hairy lobes of the disk. Filaments glabrous, ovary hairy, capsule smooth, 1-1 1/2 in. long. Seeds with membranous wings at both ends.

Subindian tract, from the India eastwards, according to Murrill. Evergreen forest of the Western Ghats and other hills of the Western Peninsula (not in Ceylon), West Hills, Manipur, Upper and Lower Burma. Cultivated extensively on the young species. The tree grows in the plains of the Peninsula but grows freely afterwards. The leaves are shed gradually during the cold season, the young foliage comes out February-April, with the fl. and ripens May-July, the empty capsules remaining in the tree for months.

C. serrata, Royle III. 1: 25; Brandt, F. Fl. 73; Collett, Simla Fl. 1: 25. Java, Tern, Ind., Dulu, Dulu, Kresling, S. W. Hindia.

Differs from *Toum* by leaves generally imparipinnate, leaflets mostly serrate, 20 or above, glabrous beneath. Panicles longer than leaves, drooping. Fl.

usually hexastrom. Sepals and petals often not entire, petals at the base on the inside frequently hooked, filiform stamens also alternating with stamens. Ovary glabrous, seeds winged at the top only.

Outer Himalaya, from the hills to the Nepal boundary (S. 310) to Nepal, Upper Burma (*Chomolungwa*, Wall. Fl. Brit. Ind. 2, c. *macrocarpa*, DC.), Outer Himalayas, Khasia, Khasia, extending eastwards to Assam, Upper Burma. Leaves mostly alternate, shining above, glabrous below, also serrulate, and also serrulate at base, blade 3-5, petiole 1-1.5. Fl. 1-1.5, sometimes longer, filiform, hairy. Ovary hirsute, capsule 1-1.5, winged, hairy, upper wing of seed usually 1-1.5 long. 4. *C. multijuga*, Kurz, Pegu Yema, eastern states, Burmah, 2, 3, 3, 3, 3. Young leaves and common petiole grey pubescent, leaflets mostly opposite, serrulate below, study. *C. hirsuta*, King MSS., Sikkim, may possibly be the same. 5. *C. sumatrana*, DC., (Thunb. *Gen. Prodr.*, Pierre Fl. For. Cochin, & the mountains of Cochinchina, leaflets alternate, petals hairy, calyx, ovary and filaments hairy, seeds winged at both ends, will probably be found in Upper Burma. Leaf dissected by veins in a regular manner collected by J. W. Oakes along streams in Upper Burma (stud. 1, 2, 3, 4, 5) will be specimens coll. by Thunb. in the hill forests east of the McVillie river, (Burmah, Assam).

16. CHLOROXYLON, DC.: Fl. Brit. Ind. 2, 568.

C. Swietenia, DC., the only species. Wight Ill. C. 3, 68; Bell Fl. Sylv. 2, 11. Syn. *Saccolata Chloroxylon*, Roxb. Cor. pl. 1, 61. *Saccolata*, V. & B. *Bacut*, Hind.; *Bakou*, Goud.; *Somol-soll*, Kol.; *Billo*, Tel.; *Harayin*, Man.

A middle-sized tree, wood yellow, hard, heavy, with a scanty white latex; inner wood darker, but no distinct heartwood. Young parts, petioles and inflorescence clothed with short grey pubes. L. *paripinnate*, *pedicels* 10-20 pair, gland-dotted, unequal-sided, obtuse, 1 in. long. Fl. hirsute, greenish-coloured, in small terminal and axillary panicles. Petals small, well spreading, imbricate in bud, disk fleshy, 10-12. Stamens 10, inserted inside the disk at its base, anthers ovate, approximate, versatile. Ovary immersed in the disk, 3-celled, ovules 8 in each cell. Capsule oblong, coriaceous, beakless, longitudinally dehiscent, the dehiscent parts remaining attached to the valves. Seeds imbricate, oblong, winged.

Common in the deciduous forests of the Western Peninsula, its limit being the northern edge of the malaric range. Fl. March-April, the leaves always green in May. Dry region of Ceylon.

ORDER XXX. CHAILLETUCEÆ. Gen. Pl. 1, 340.

(*Dichapetalum*, Fagieu & Prunell, dict. 345.)

Trees or shrubs. L. alternate, quite entire, stipules deciduous. Fl. small, mostly polygamous, sepals 5, none or less united, petals 5, free, notched or bilobed, stamens 5, alternate with anal sometimes adnate to base of petals. Disk of 5 glands, alternating with stamens, ovary pubescent or villous, 2-lobed, ovules in pairs, pendulous from the top of each cell. Drupe pubescent or hispid, often didymous, embryo large, milk small, asperous, cotyledons thick, albumen 0.

CHAILLETIA, DC.: Fl. Brit. Ind. 2, 570.

(*Dichapetalum*, Du Petit Thouars; Englem. Forest II, 4, 318.)

1. *C. gelonioides*, Hook. fil., Bell. Fl. Sylv. Manual 1, 11. Syn. *C. sumatranum*, Miq.; Trimen Handb. 1, 254; *Metcurenia gelonioides*, Rostk.

A small tree or shrub, twigs slender, young shoots pubescent. L. alternate, lanceolate, acuminate, reticulate veins distinct, blade 3-5, petiole 1-1.5 long.

supplies in U. racemosa pubescent, unequal; V. pale-green, in axillary or extra-axillary compact racemes; petals concave, pubescent, petals broad, stamens five dilated, styles 2 very short. Fl. 1-2 in. diam. compressed, angular, dryness, (delicious, necessary) bright red.

Western limits from the Kenon southwards. Anacolis, Khasi hills, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

ORDER XXXI. OLACACEÆ. Engler in Engler u. Prantl iii. 1. 281.

(*Olacaceæ*, tribus *Olacaceæ*, *Opilione*. Gen. Pl. 343.)

* Trees or shrubs, often climbing. Leaves almost always alternate, stipulate. Fl. small, as a rule bisexual, calyx small or wanting, petals (or segments of perianth) free or connate, stamens as many as petals and opposite to them, or more numerous. Ovary at base, often 2-3-celled, ovules 1 or few, pendulous from a free axile placenta. Drupes 1-seeded, embryo minute, in the apex of the fleshy albumen.

- A. Stamens as many as petals, stamens and styles numerous, more than petals.
 - 1. Petals 2, not bearded, stamens 3, stamens 5, calyx enlarged in fruit. *1. OLEA*
 - 2. Petals bearded, stamens 8-10. *2. NECTARIA* (p. 148)
- B. Stamens as many as petals, calyx and corolla present. Fl. usually pentamerous.
 - 1. Calyx 5-lobed, lobes to ovary, enlarged in fr. *3. PTEROSTYLIS* (p. 149)
 - 2. Calyx cup-shaped, petals free, calyx white. *4. SIDA*
 - 3. Calyx truncate, supported by a tubular corolla, lobes 5-angled. *5. SCALYPTA* (p. 149)
 - 4. Calyx 5-lobed, petals free, thick connate at base. *6. ANACOLIS*
- C. Stamens as many as petals or segments of perianth, no calyx.
 - 1. Fl. 4-merous, bracts small, perianth deeply lobed. *7. CAYASTA*
 - 2. Fl. 4-merous, bracts large, perianth divaricate. *8. LEPIDODENDRON* (p. 150)
 - 3. Fl. 3-merous, bracts covered by large imbricating bracts, segments of perianth free. *9. OLIXA* (p. 150)

1. OLAX, Linn., Fl. Brit. Ind. 1. 574.

Shrubs, small trees, or climbers. Leaves entire, petioles short. Calyx cup-shaped, enlarged after flowering; petals 3-6, fertile stamens 3-5, and 3-5 sterile stamens; ovary free 1-celled or with 3 imperfect cells. Drupes 1-3, less enclosed by the accrescent calyx. Embryo small, near the apex of the fleshy albumen. Species 25-30, tropical of the Old World.

1. *O. scandens*, Roxb. Cor. Pl. t. 102; Brandis F. Fl. 75; Vern. *Ram-bhai*, Kol.; *Khiv*, Smith.; *Dosterin*, Uriya; *Dardali*, Mar.

A powerful climber; structure of wood normal; vessels large. A few short thorns on the older branches. Branchlets, petioles and midrib pubescent. Leaves distinct, ovate-oblong, 2-3 in. long. Fl. white, in short axillary racemes; petals erect, less than half the length of σ_3 , petals more or less covering ovules 3. Drupes yellow, three-fourths enclosed in the enlarged calyx.

Sinhala-laxa, tract of Kumbura. Ouda forest. Behar; Western Peninsula. Burma.

Pl. Brit. Indian Archipelago, 2. *S. wickhamii*, Wall. Barkley, climbing woody climber on the west side of the Peninsula, from South Kaituma northwards. L. glabrous, shining, 4-6 in. long, apex rounded. Fl. axillary, often compound, corolla tubular, spreading longer than half the lower drupe, nearly covered by the calyx. Ovary 5-lobed. 1. *S. imbricata*, Roxb. Clutterbuck, Ternate, Moluccas, Andaman, in the Archipelago; an evergreen climber, branchlets tomentose, lvs. 2-6 in., ovary 5-lobed, the petals large, lobes rather entire, calyx 1-2 in. long. 2. *S. papilionata*, Planchon, Ternate, Moluccas, in the Archipelago. 3. *S. acuminata*, Wall. Assam, Khasi hills, Nilgiri hills, branchlets naked, lvs. lanceolate or ovate-lanceolate, petioles less than shorter than or as long as petioles, drupe red. 4. *S. nana*, Wall. A small undergrowth in grass lands of the Subhimalayan tract and Bengal, with a woody rootstock, which sends up shoots annually after the jungle fires, with suberose



FIG. 63.—*Strombosia*, Roxb. 5.

suberose leaves and solitary axillary fruit on the slender petioles.

Xylocarpus americana, Linn (*Pala Kagis*, *Pala Zi*, Burong). A glaucous climbing shrub armed with short straight spines on the coast of Terrestrial and the Andaman, inland on dry sunny ground in the Decid. forest in the tropics of both hemispheres. L. blunt, entire, 1½-2 in. long, turning black in drying. Fl. whitish, generally 5-merous, ½ in. long, calyx cup-shaped, 4-5-toothed, petals revolute, on the apex of the deeply bearded stamens 8-10. Drupe ovoid, 3 in. long, orange-red when ripe, pale white, stone hard, 1-seeded.

Xylocarpus laevis, Blume, Sikkim, Khasi hills, Manipur, Clutterbuck, Havel, Malacca, Malay Peninsula and Archipelago is a powerful woody climber with axillary twigs. L. membranous, ovate, with three basal nerves, blade 4-6 centims. 1-2 in. Fl. minute, pentamerous, bisexual, the slender, long, petioled, dichotomous calyx tubular, 4-5-lobed, the lobes enlarged in fruit. Petals short, broad, slightly colored at base, inserted outside the large cupular, fleshy, 5-lobed disk, stamens 5, opposite to petals. Fr. oblong, ½-1 in., yellowish, crested by the scars of the calyx lobes, embryo minute, near the apex of the large fleshy albumen. Two other species closely allied and probably not distinct: 2. *X. papilionata*, Moore, Western Ghats from North Kanara southwards. L. subsericeous, oval, glaucous. 3. *X. rugosa*, Moore, Sikkim, Assam, Khasi hills, Cachar. L. subsericeous, ovate-oblong, lvs. 1-2 in., basal nerves 4-5.

2. STROMBOSIA, BL.: Fl. Brit. Ind. 1, 379.

Evergreen trees. Fl. bisexual, pentamerous, in short axillary cymes or fascicles. Calyx cup-shaped, free or adnate to base of ovary, petals free, hairy within, stamens 5, opposite to petals. Drupe crossed by the remains of calyx, embryo minute, in a fleshy albumen. Species 6, Indo-Malayan region.

1. *S. ceylanica*, Gardner; *Belt. Fl. Sycr.* 4, 137.

Trunk erect, branches drooping; wood soft, shining, pale yellowish-brown. L. coriaceous, glabrous, shining, elliptic-oblong, blade 4-6, petiole ½ in. Fl. pale greenish-white. Fr. ½-1 in.

Evergreen forest of the Western Ghats from the Nilgiris southwards. Fl. C. 2.

Cyclopia of *A. javanica*, Blume. *Yucca* in Malay Peninsula. *Arundinaceae* (see *Cyclopia*, *Yucca*, and *Arundinaceae*, p. 17, for details).

Schoepfia fragrans, Wall. Nepal. In the hills of Nepal is a small tree with white flowers. *L. lanceolata*, leaf 2-3 in. long, elliptic-obovate, very fragrant. *Fl.* long in axillary racemes, pedicels slender, 1/2-3/4 in. long. *Corolla* involute, irregularly lobed, the calyx of *Schoepfia* cannot be distinguished from the involute lobes of *Schoepfia*. *Drupa* supported by the persistent involucre, stone thin, straight, apical minute in the apex of the fleshy allomen. Usually allied and perhaps not far from *Schoepfia* (see *S. & A. acuminata*, Wall. *Khasi hills*, *Fl. Indica*, *Fl. Ind. p. 10*, *pl. 1*, *tab. 1*, *fig. 1* and *2*). *S. & A. Griffithiana*, Valleron, *Himalaya*, is imperfectly known.

5. ANACOLOSA, Blume, Fl. Brit. Ind. 1, 381.

Evergreen trees or shrubs. *Fl.* 5-7-merous, in axillary cymes. Involucres white or yellowish, cup-shaped, indistinctly toothed, not accrescent. Petals free, thick and concave at base, stamens opposite to petals and concealed in the cavity, filaments short, flat. *Drupa* surrounded by the accrescent disk, stone crustaceous, embryo minute at the apex of the fleshy allomen. *Species 5 or 6, Indo-Malayut region.*

1. *A. densiflora*, Boiss. *Fl. Syrie*, t. 488. Vern. *Katta* (India), *Kohulu* (Java), Mal.

A leafy tree, wood white. *L.* oblong-lanceolate, base rounded, 4-5 in., petioles short. *Fl.* in dense axillary clusters, pale yellowish, very fragrant. *Petals* densely hairy on the upper surface.

Anacolosa forests of the Anamalai hills and Travancore, ascending to 2000 ft. *Fl.* Sept.-Nov. The fragrance is perfect mass of very fragrant flowers. *Boiss.* 2. *A. Boccia* Boiss. *Fl. Arab. Ind.* A small spreading tree. *L.* oblong-lanceolate, base acute. *Fl.* in dense axillary cymes. 3. *A. Griffithii*, Mart. *Tamasserial* and *Anamalai*. *L.* ovate-lanceolate, base 2-3, petiole 1-1 1/2 in., *Stamens* few, *Fl.* petals hairy at the apex of the concave portion, otherwise glabrous, anthers hairy. 4. *A. puberula*, Kurz. *Andam.* 5. *A. Kuchera*, *L. ovate-lanceolate*, base 2-3, petiole 1-1 1/2 in. long. *Ped.* 1/2 and contained calyx very pubescent, petals glabrous, excepting a tuft of long hairs at the apex of the cavity, anthers hairy.

1. CANSJERA, Juss.: Fl. Brit. Ind. 1, 582.

Shrublet or small tree. *Fl.* small (axillary), 4-5-merous, in short axillary spikes, bracts small. *Calyx* 5-lobed, campanulate, hairy. *Stamens* 4-5, minute to corolla and opposite to lobes, hypogynous scales alternating with stamens, filaments filiform. *Orary* fleshy, beaked, valve 1, pendulous. *Drupa* supported by the persistent corolla, embryo straight in the axis of the fleshy allomen, cotyledons 2, thickened 3/4 long, plane. *Species 3-4, tropical Asia, China, Australia.*



L. C. Rheedii, Gusselin, *Wright*, t. 1, 1891. Boiss.

Fl. Brit. Ind.—*Cansjera* Rheedii, Gusselin, 1.

Pl. Syst. Method p. 24; Brinkley, Fl. Fl. S. S. 1875. Syn. C. *serotina*, Boiss. Cor. Pl. t. 108.

A large-veined, obovate, armed with scattered stout spines, branched, petioles and inflorescence pubescent. L. ovate-lanceolate, papery or slightly pubescent, 1½-4 in. long. Fl. yellow, perianth hairy outside. Fr. orange-red, 1 in. long.

Orba serota, Boiss. Western Peninsula, generally in swampy lowland. Tenasserim, Abnans, Fl. Sept.-Mar. Fl. H. S. 1875. Malay Peninsula and Archipelago. Nearly allied and probably not specifically distinct: 2. *C. parvifolia*, Kurz, Tenasserim, l. small, pubescent; 3. *C. zeylanica*, Griseb. and 4. *C. holoserica*, Yalcin, Tenasserim.

Lepturus viviparus, Blume, Blume, Bijl. in Journ. A. N. S. B. 1861, vol. 10, p. 110. *L. abnormis*, Macbr. Sibiana, Ann. Kew and Journ. Ind. Tenasserim, Malay Peninsula and Archipelago. A glabrous shrub or small tree, branches pale when dry, L. 4-7 in. Fl. tetramerous, blackish, in axillary spikes 1½ in. long, in fruit overlapped by the large ovate white membranous bracts or bracts. Calyx 9 perianth greenish-lined by the disk. Stamens exerted, glabrous, broad. Fr. 4-5 in. long.

Opfia arantosa, Boiss. Cor. Pl. t. 108; Wright, Bot. in Journ. A. N. S. B. 1861, vol. 10, p. 110. Western Peninsula, Burma, Upper and Lower Malay, Siam, Malay Peninsula and Archipelago, New Guinea, Australia, the East Africa. A weak, scandent shrub, branches finely pubescent. Lengths 2-3 in. Fl. tubular, yellow, in axillary clusters of 2-4 flowers, in short erect axillary spikes or small leafy branches, round white filices bracts overlapping the base. Calyx 9, petals 3 free. Stamens 9, opposite perianth, alternating with short fleshy striated style, short truncate.

ORDER XXXII. ICACINACEÆ. Engler in Engler, G.

Prantl iii. 6, 233.

(*Clactura*, tribes III. *Tractura*, IV. *Phyllocera*, etc. Gen. Pl. 2, 341.)

Shrubs, trees or large climbers. L. generally alternate, stipules 0. Fl. small, rarely polygamous or dioecious, calyx small or wanting, petals 5, segments of perianth free or connate, stamens alternating with petals or perianth segments. Ovary mostly 1-celled, scales pendulous from the apex of the cavity. Drupe 1-seeded.

- | | |
|--|------------------------|
| A. L. alternate; fl. bisexual, rarely polygamous; shrubs or trees. | |
| <i>Corolla campanulate</i> , calicified lobes pendulous. | B. <i>COCCINELLA</i> . |
| Petals free, hairy above, style terminal. | 2. <i>MADIA</i> . |
| Petals free, glabrous, style lateral. | 3. <i>ACANTHA</i> . |
| B. L. alternate; fl. polygamous; shrubs or trees. | |
| Calyx 5-lobed, petals 5, free, more or less overlapping apex reflexed. | |
| Sepals 5, corolla tubular, with 5 spreading | PHYLLOCERA (p. 132). |
| | TRACTURA (p. 132). |
| C. L. alternate; fl. dioecious; climbers. | |
| Calyx 0, perianth 4-lobed. | |
| 1. Small, 2 or 3 in long pedicels, 2 or solitary globose heads. | 1. <i>PHYCACIA</i> . |
| 2. L. ovate, lanceolate or ovate, fl. in long peduncled leaf axils. | 5. <i>MADIA</i> . |
| 3. L. ovate, lanceolate, with shallow distant teeth, 1 in axillary axillary spikes, 2 in small heads on glabrous pedicels. | |
| Calyx 4-5-lobed, petals free, albuminous. | PHYCACIA (p. 132). |
| Sepals 5, petals 5, corolla circular, in a fleshy albuminous | d. <i>SACCHINIA</i> . |
| | VAR. <i>TRACTURA</i> . |
| D. L. opposite; fl. dioecious; calyx cup-shaped, 5-lobed, corolla 5-lobed, hairy outside. | 7. <i>LOREA</i> . |

1. **GOMPHANDRA**, Wall: FL Brit. Ind. 7, 38. (Nepenthes).

Blume, Enum. Gard. Bot. 247.

Tree or shrub. Fl. bisexual or polygamous, 4-5, sometimes 6-merous. Calyx cup-shaped, 4 teeth short. Corolla calyciform, lobes not distinct, inserted into the segment on the inside. Stamens 5, hypogynous, alternating with corolla lobes; filaments flat, and 1/2 as long as the corolla, often petalose or hairy, with 4 cells distinct, protruding from the uniform apex of the filament. Disc surrounded by the receptacle of the disk, endocarp crustaceous. Endosperm minute, albumen fleshy separate. Species 8, all tropical Asia.

1. *G. polymorpha*, Wight Ic. t. 163. — Syn. *G. coriaria*, Wight; Bot. Fl. Brit. Malaccl. 2, 2.

A shrub, glabrous except inflorescence, which is more or less papillose or pubescent. L. thickly coriaceous, most variable in shape, cymes terminal or leaf-opposed, palmate, much longer than petiole. Fl. sometimes 5-merous, polygamous.

We have *G. coriaria* from North Borneo southwards, also finding the indigenous *G. coriaria* (L.) March 3-5, Ceylon. 2. I have called it *G. acillaria*, Wall. Kew. hills just in the Western Peninsula. L. 5-6-merous, cymes axillary, as long as or shorter than petiole. 3. *G. comosa*, King, South Andaman. Fl. 4-merous, connative with upper part of filament densely covered with long white glandular-pointed hairs. 4. *G. pentagona*, Wall. *Indo-orientalis* prostrata, Miq. Kurr. P. Fl. t. 256. Demak, Malay Peninsula. Fl. 5-merous, filaments with white hairs at the base. 5. *G. antamanica*, King. *Indo-orientalis*, Kurr. Andaman and Nicobar Islands. L. 5-6-merous, cymes branched, ternary, pubescent. L. 5-6-merous, filaments quite glabrous. Fl. 4-5-merous.

2. **MAPPIA**, Jacq.: FL Brit. Ind. 1, 388.

Species 1, tropical Asia and America.

1. *M. foetida*, Miq. in Ann. & Mag. Nat. Hist. N. vol. 9 (1852) p. 346, and Contr. bot. to Botany, vol. 4, p. 61, simultaneous publications. Rehd. Fl. Brit. 141. Vera, Kala, Java, Kalyan, Ombra, Miq.; Arab. Tan.

A small tree or large shrub, with strong smell, particularly the flowers. Median ray-lobes prominent on radial position. Young shoots and underside of leaves thickly pubescent. L. ovate, acuminate, base often unequal, mid. lobe 3-8 in. petiole 1-2 in. Fl. yellow in terminal corymbose panicles, generally bisexual. Calyx hairy, 5-lobed. Petals five, hairy above. Stamens 5, hypogynous, alternating with petals inserted into the cup-shaped disk. Ovary hairy, style terminal. Drape oblong obtuse, 1/2 in. long.

Western Borneo from



FIG. 102.—*Mappia foetida*, Miq. Fl. fr.

* A climbing shrub. Lvs. ovate, entire, acute 1-6, petiole 1 inch long. Calyx small, lobes 5. Petals 4-6, inserted by long involucres of 4-7 bracts, a bract in the angle between 2 petals. Stamens alternating with the segments of perianth, filaments short. Stigmas nearly sessile, 2-lobed. Drupes 2 in long, yellowish, obliquely oval, endocarp crustaceous, rugose outside.

Upper Assam, N.W. India, 7, H. 8, 2, M. *dentata*, Hol. American, Linn. *truncata* and *laevigata* to the Linn. *truncata* = *cordata*.

Pyrenacnathus viminalis, Hook. Thicket, foot of hills 3-5m. dry country. A small climber with milky juice, young shoots pubescent. Fl. terminal, subspherical, with shallow lobes beneath, corolla beneath. Leaves elliptic, serrate, 3-5 in. long, 1-2 in. wide, base cordate, venation pinnate, secondary veins numerous, slightly curved. Pet. 5, white, filaments 5, white. Calyx 5, yellowish, lobes 4-6, 5 in. long, filaments axillary, spikes 2 in long, 2 in small heads in filaments axillary, lobes 4-6. Infruct. dense, thin.



FIG. 71 — *Sarcostigma Kleinii*, W. et A. (1.)

SARCOSTIGMA, W. et A.: *Fl. Brit. Ind.* I. 594.

(Species 3 or 4, tropical Asia.)

1. *S. Kleinii*, W. et A.: *Wight Is.* 1: 1851.

A climbing shrub. Lvs. elliptic-oblong, coriaceous, glabrous, venation prominently reticulate, blade 4-10, petioles 1-2 in. long. Fl. minute, dioecious, in

small, lobed calyx, 5-lobed, 5-lobed, calyx small, 4-lobed, petals 5, usually free. Stamens 4, alternating with petals, filaments flat, glabrous. Ovary hairy, stigma sessile, central. Fr. 1-1.5 in., bright, suggested at apex. O. reflexions fleshy, wrapping round the short superior ovule.

Western Ghats, in evergreen forests from the Kanhan westwards. (T. Wall. Cr. only allied to: 2. 2. Walmat, Bailey. (N. 1850; Kurz.) L. downy beneath, glabrous, tomentose. Drupes thick with woody, angled downy pulp, edible.

Natalium nepetium, Hook. Sikkim, Java, and other hills. Java, Khas hills, Chittagong, Pegu Yama. A large climber, with thin waxy tomentose, leucous, pubescent, hairy and pubescent rough with short soft hairs. K. cordate, basal nerves 5-7. Blade 4-6 in., petiole 1/2 in. long. Filamentous, perianth tube in long slender leaf-teats, epidermis hirsute tomentose. Normal petals hairy, linear-lanceolate, long, stamens alternating with stamens, which are opposite to petals. Filaments long, short, anthers sagittate. Drupes 1/2 in., black, outside fleshy, orbicular, in a fleshy albumen.

7. IODES, Bunge, Fl. Riv. Ind. i. 56.

Shrub climbing by means of woody axillary or extra-axillary tendrils. L. opposite. Fl. axillary, small, in short cymes on thick pedicels or in single axillary or extra-axillary nodules. Calyx small, cup-shaped, 5-toothed. Corolla 3-5 lobed, outside densely clothed with long hairs. Stamens alternating with segments of corolla. Stigma sessile, 5-lobed. Drupes supported by the persistent calyx, 4-5, dors. flat leafy, in the superior, in the by albumen. Species at 4. Tropics, Africa and Indo-Malayan region.

1. *Hookeriana*, Bailey & Kurz, P. Fl. i. 244.

Brevifolia, 2nd undernode of leaves hairy-strigose. L. elliptic-oblong, base acute or slightly cordate, 4-5 in., petioles 1/2 in., long, venation conspicuous, reticulate lacinate. Cymes short leafy. Drupes 1-1.5 in., 1-1.5 in.

Awam, Khas hills, Chittagong. Fl. 6-8. (Classy all, but perhaps not so small.)
 2. *L. Thomsoniana*, Bailey, Chittagong, an intense climber, 1-2 in. wide, venation narrowed into a cordate base. 3. *L. ovata*, Bunge, (1. *hookeriana*, Kurz, P. Fl. i. 244. Thomsonian, Malay Peninsula, leaves much shorter, petioles much shorter, much larger than leaves. 4. *Bonellii*, Kurz, Thomsonian, a woody climber, 1-2 in. wide.

ORDER XXXIII. ILICINEÆ. Gen. Pl. ii. 355.

Aquifoliaceæ, Engelm. & Prant. ii. 5. 183.

ILEX, Linn. Fl. Riv. Ind. i. 568.

Shrub or tree, wood white, close-grained. L. alternate, simple, usually entire and in Indian species, with few exceptions, evergreen, stipules minute. At the base of the current year's internodes are frequently imperfect leaf-like leaves which had enveloped the internodes. P. usually deciduous, sometimes bi-axillary cymes. Calyx 4-5 lobed, corolla rotate, petals free or connate at the base, deciduous, imbricate. Stamens 4-5, alternating with petals, adhering to the base of corolla, the imperfect stamens in the 2-3rd whorls hypogynous. Ovary 2-12-celled. Stigmas 2-12 sessile or nearly sessile, free or confluent. Drupes globose, supported by the persistent calyx, stamens 2-15, 1-seeded, embryo minute in a fleshy albumen. Species over 200, a cosmopolitan, the majority tropical.

A. Fl. American, in dense short axillary, frequently branched cymes.

a. L. generally spinose.

1. *L. dipycna*, Wall. Fl. As. Rar. i. 292; Brandis, F. Fl. 76 t. 15.

Collett, *S. Ind. Fl.* Fig. 27. *Himalayan Bot.* Xxxx. *Kandian. Kalmia* in North-West Himalaya.

A shrubby climber, nearly glabrous. L. sessile, elliptic-obovate, generally with large strong spine on both, some quite inflex. Fl. bisexual, white, 4-merous; in axillary cymes; calycose clusters, pedicels very short, about length small. Ovary 2- rarely 3-4-celled. Drupe $\frac{1}{2}$ in diam., stones usually 2.

Herb. Java, from N. India, upward 500-2700 ft. Fl. April-June. 2. I. *Perry*, *Flora*, O. Ind. Bot. *monograph.* Less., *Manjour* (Watt), *Loesener*, *Monograph.* *Ag. Indiarum*, 1870. A. I. *Indica*, Hook. *Fl. Ind.* 3, 24, 248 (1840) n. A small tree from West coast. L. serrate-toothed or obscurely serrate, second, an intramarginal vein and tertiary very prominent beneath, leaflets serrate $\frac{1}{2}$ -1 in. Drupe black, not so smooth, stone 1-2-seed.

(a) L. serrate or ciliate, not spiniferous.

1. *I. odorata*, Hook.; *Brandis*, *F. Fl.* 77.

A small tree. L. elliptic-oblong, minutely serrate, blade 3-6, petiole $\frac{1}{2}$ -1 in. Flowers $\frac{1}{2}$ in diam., unisexual; σ in short panicle cymes, γ in globose sessile clusters. Drupe black, $\frac{1}{2}$ in diam., on slender pedicels as long as drupe.

Outer edge of North-West Himalaya, Naga to Naph, ascending to 4000 ft. Fl. April. 2. I. *Palakpanda*, King *Journ. As. Soc. Bengal* 66 (1867), p. 265, t. 18. *Sikkim* 6-8000 ft., *Manjour* at 8000 ft., *Agassiz* 50 ft., soil here covered by mosses, large marginal venation, usually acute, blunt, puberulous beneath (the forest forest leaf-like). L. minutely serrate, blade 5-7, petiole $\frac{1}{2}$ -1 in. long. Fl. dioecious, in short rounded cymes, σ at ends of short stout branchlets. Drupe red, $\frac{1}{2}$ in diam., on pedicels longer than drupe. C. I. *Hooker*, *King*, *Ind. Bot.* 3, 14, *Tongha*, *Alumia* valley, *Sikkim*, 8000 ft. A small deciduous tree. L. lanceolate, serrate, blade 3-5, petiole $\frac{1}{2}$ in. Fl. polygamous, in dense sessile clusters, reduced when reduced by immature male or female flowers. Drupe $\frac{1}{2}$ in diam., on short pedicels, in small clusters of 2 or 3. Two species found by Watt in *Manjour* with numerous almost entire leaves and rounded leaflets. 7. I. *Carmel*, *Loesener*, *Holog. Ind. Ag. Indiarum* 1, 274, and 6. I. *monopyma*, *Watt* *Flora*, 18, 27.

(b) Fl. σ in panicle cymes, sometimes solitary or fasciculate, γ solitary or fasciculate.

(a) L. entire, or nearly so.

2. *I. malabarica*, *Bell*, *Fl. Sylv.* 1, 143.

A small tree, quite glabrous. L. lanceolate, blade 3-4, petiole $\frac{1}{2}$ -1 in. Fl. σ in diam. σ in shortly pedicel umbels, pedicels slender, γ solitary or fasciculate. Calyx lobes usually 6, broad, ciliate, petals 4-6, ciliate, style stout cylindrical. Drupe $\frac{1}{2}$ in diam., by persistent style, pedicel longer than drupe.

Woods of Malabar from the Kankana southwards, in evergreen forests and on the banks of streams, Nighati, Anam's s. Fl. Feb.-March. 10. I. *Walker*, *Wight* & *Ward*, *Pondichy*, C. Ind. A small much branched tree. L. $\frac{1}{2}$ -1 in, *Loesener* calls the *Palak* and *I. Theobaldi*.

(a) L. toothed or serrate.

3. *I. denticulata*, *Wall.*; *Wight* III. 1, 149; *Bell*, *Sylv.* 1, 142.

A very large tree. L. rigidly coriaceous, serrate, narrowed into a broad truncate petiole, blade 2-3, petiole $\frac{1}{2}$ -1 in. Fl. 4-merous, σ in short, sub-umbel cymes, γ fasciculate. Drupe $\frac{1}{2}$ in diam., stone 4, trifid, woody, pedicels stout, as long as drupe.

Nights and Aracalita, 6-8000 ft. Fl. Jan.-Feb. *Ceylon*, upper mountain zone (1800 ft.) 12. I. *Theobaldi*, *Wall* (*E. Indica*, *Loesener*, *Kura*, *Shast*, *Mishra* *Ind. Indiarum* (Watt), L. ciliate-serrulate, Fl. 5-6-merous. Drupe $\frac{1}{2}$ in diam.

13. I. *Guthrie*, *Hook.* f. (referred by *Loesener* to *I. Indica*, *Hume*, from *Jaya*, *Alumia*, *Khasi* hills, *Malay*, *Peninsula*). A shrub or small tree, branchlets more or less pubescent. L. obscurely serrulate, blade 2-3, petiole $\frac{1}{2}$ in. Drupe $\frac{1}{2}$ in diam., generally solitary, not longer than drupe. 14. I. *umbellata*, *Hook.* f. *Khasi* hills. A small

Secondary or tertiary leaf-veins, pinnatifid, pubescent; stam. comparatively 4-10.
 Drup. globe or 5-in. diam., at 100° F.

Forest-climber; Khasia, Nepal, Java, India. Fl. May. A native tree of the Malay Peninsula, known as called *D. hypoleuca*, Lessert. Two Malayan species reported from Malacca: 24. *D. macrophylla*, Wall. 1, stipule oblong, blade 4-6, petiole 4 in. Fl. in 2-3-pinnate umbels, peduncles often dichotomous. 25. *D. cynosa*, Blume. Lf. 3-5, petiole 1-1.5. Fl. in axillary arranged in simple dichotomous panicles.

Order XXXIV. CELASTRACEÆ. Gen. Pl. 1: 357.

(*Celastraceæ*.)

Lessert. & Engler, n. Prind. ill. 5: p. 189, 222) adopts two orders, *Celastraceæ*, stamens 4-5, rarely 10, allanion as a rule fleshy, and *Hippocistaceæ* (*Hippocistaceæ*, *Salicaceæ*), stamens as a rule 3, allanion wanting.

The order *Celastraceæ* L. in the majority of species opposite, stipules minute, early deciduous, or none. Inflorescence generally cymose. Calyx small, 4-5-lobed, imbricate. Petals 4-5 spreading, not clawed, imbricate. Stamens 3, 4 or 5, rarely 10, inserted on the disk and, if isomerous, alternating with petals. Disk large, surrounding the base of the 3-5-lobed ovary or partially enclosing it. Embryo straight, radicle inferior, in a few cases lateral.

In the genera so far as known, the radiation of the young seedling has a marked staminate, the secondary rays are generally broad, and the vessels large. In *Hippocistaceæ* and related matters are different, and the wood of all Indian species of these two genera, including as well as most, meristematic study. The pitted commissure bands of these plants are frequently interrupted and are often joined by radial bands, so that the structure is so thick numerous masses of xylem appear separated by tangential and radial bands of bast similar to the structure mentioned under *Ruscaceæ*. Several American species of these two genera have been well described and figured in Svensk Aentens vet. Handb. 1864, p. 131, tab. vii.

- L. 1. *Abutilon* or a delicate capsule.
 L. 2. *Abutilon*, seeds not winged.
 Petals five, disk fleshy, capsule 3-5-lobed.
 Ovary solitary, 5-lobed in each cell. 1. EUONYMUS.
 Calyx or the axillary, ovules solitary. 2. GYNERIOPHYLLUM.
 Petals connate at base, capsule 1-lobed. 3. MUCUNA, etc.
 L. 3. *Abutilon*, seeds winged.
 Seeds winged at the lower end, capsule 2-lobed in fruit. 4. HIRSIOPHYLLUM.
 Seeds winged at the upper end, capsule 2-lobed. 5. KOSMOS (p. 161).
 Seeds winged, nearly all round, capsule 2-lobed. 6. LOROPHYLLUM.
 L. 4. *Abutilon*.
 L. 5. *Abutilon*. Fl. in parallel rows, stamens on edge of disk. 7. CELASTRUM.
 L. 6. *Abutilon*. Fl. in dichotomous cymes, stamens under disk. 8. GYNERIOPHYLLUM.
 L. 7. *Abutilon*. 9. KURINA.
 L. 8. *Abutilon*.
 L. 9. *Abutilon*.
 Stamens 3 inserted under the edge of disk. 10. EUONYMUS.
 A tree. Fl. in pendulous dichotomous cymes. 11. PLATYOPHYLLUM (p. 161).
 A shrub. Fl. in small axillary cymes. 12. SIMONDIUM (p. 165).
 A tree. Ovary half inserted in calyx tube.
 Stamens 3 inserted on the disk or apparently on the ovary. 13. SALICIA.

1. EUONYMUS, Linn. Fl. Brit. Ind. 1: 97.

Tree or shrub, the Indian species mostly evergreen, wood white, evergreen, vessels very small, medullary rays extremely fine, J. generally deciduous, some species stipules deciduous. Fl. 1-axial, in axillary cymes. Calyx 4-5-lobed. Stamens alternating with petals, both inserted on a broad fleshy

4-angled disk. Ovary 2-ovuled, immersed in disk. Bracts 2, appressed to each side, style short. Capsule 2-lobed, angled or winged, dehiscent loculicidal, seeds 1-2-seeded, seeds with a fleshy arillus, arillus straight in all directions. Species 10-80, most in the Indo-Malayan region, some in Europe, North and Central America and Australia.

A. Species of the Western Hemisphere.

1. *E. indicus*, Hesse.—Syn. *E. Goughii*, Wight Is. t. 315.

A middle-sized tree. L. elliptic, generally entire, blade 3-4, petiole $\frac{1}{2}$ in. Panicles axillary 1-3-ld., solitary. Fl. 5-merous, petals reddish, filaments oblong. Fr. lobed, longer than broad, angles acute.

Western Ghats, a treegreen forest, Nilgiris. Fl. Dec. Mar. of *E. cretans*, Wall. Wight Is. t. 378; Bell. Pl. sylv. t. 141. Palnis and Nilgiris. A small tree, common in Malabar, 1-7-62. Fr. as long as broad, 1 in. long, angles obtuse. 2. *E. cuneatum*, Hesse, southern part of Western Ghats. A small tree, l. lanceolate, entire, lobed at top. 3. *E. paniculatum*, Wight. Syn. *E. cretans*, Wight Is. t. 315. 4. *E. serratifolia*, Hesse Is. Pl. Oc. t. 171. Nilgiris, Cochin Ghats, 1890. A shrub, l. somewhat serrate. Fr. nearly globose, with 5 rounded lobes. 5. *E. angulatum*, Wight Is. t. 1058. Nilgiris, Cochin. A small tree, l. lanceolate, serrate, panicle long, l. shining above, etc. 6. *E. latifolium*. Fl. $\frac{1}{2}$ in. across, 5-6-merous dull red. Fr. coriaceous, obtusely angled.

B. Himalayan and Eastern species.

a. Fr. echinate.

7. *E. echinatus*, Wall. Bot. III. t. 31. Vern. *Ladoti*, Garho.

A large shrub, each spiny, branchlets with 4 raised lines. Flowers 5-6-merous, blade $1\frac{1}{2}$ -2 $\frac{1}{2}$, petiole $\frac{1}{2}$ - $\frac{1}{3}$ in. Sep. in spreading, 7-8 pair. Fl. 4-merous, $\frac{1}{2}$ in. across. Fr. nearly globose, $\frac{1}{2}$ - $\frac{1}{3}$ in. diam.

Himalaya, Kashmir to Sikkim, 7000-12000 ft. Fl. March, April. 8. *E. ciliatum*, Lawson, Michx. Assam, 8000 ft. l. ovate, blade 3-petiole $\frac{1}{2}$ in. Sep. 5-6 pairs. Fr. depressed-globose, whitish, $\frac{1}{2}$ in. diam.

b. Fr. not echinate. Fl. usually pentamerous.

9. *E. tingens*, Wall.; Brandis F. Fl. 79. Collett, Sikkim Fl. fig. 28. Vern. *Sikim*, Bumsair; *Thogale*, Juma.

A small tree. L. serrate or ciliate, blade $1\frac{1}{2}$ -2 $\frac{1}{2}$, petiole $\frac{1}{2}$ in. Cymes fasciated. Fl. $\frac{1}{2}$ in. across. Fr. $\frac{1}{2}$ in. long, angles acute.

Himalaya, Sikkim to Nepal, 6000-10000 ft. Fl. April-June. 10. *E. javanicum*, Blume, Tembesan, Malu Peninsula. A small tree. L. entire or slightly serrate, blade 3-4, petiole $\frac{1}{2}$ in. Panicles 1-6, fasciated, petals oblong, tubulate. Fr. $\frac{1}{2}$ in. long, angles sharp. 11. *E. glaber*, Hook. Bot. Beechey, Manilla, Upper and Lower Burma. L. lanceolate, blade 4-7, petiole $\frac{1}{2}$ in. Cymes solitary, axillary, 2-3 in. long. Fl. $\frac{1}{2}$ in. across. 12. *E. tomentosum*, Zipp. Pegu and Tenasserim, is probably the same. 13. *E. attenuatum*, Wall. Khasi hills, Cachar. L. entire, blade 3-6, petiole $\frac{1}{2}$ in. Cymes solitary or 2 in one with 1-2 in. Fr. 5-lobed, a little broader than long. 14. *E. retrocurvum*, Gamble, Khamtiang, Bhutan 7500 ft. A large climber, l. ovate serrate, cymes fasciate on arched woody branchlets. Fl. $\frac{1}{2}$ - $\frac{1}{3}$ in. diam. Fr. $\frac{1}{2}$ in. long, angular, valves approximate.

c. Fr. not echinate. Fl. mostly tetramerous.

15. *E. lacerus*, Ham.; Brandis, F. Fl. 78.—Syn. *E. subrotundus*, Walp. *Lichy*, *E. Angor*, Juma.

A small deciduous tree. L. membranous, red in autumn before falling, blade 1-3 $\frac{1}{2}$ by 1-2, petiole $\frac{1}{2}$ - $\frac{1}{3}$ in. Cymes fasciate at the base of the l., or about $2\frac{1}{2}$ in. across. Fr. $\frac{1}{2}$ - $\frac{1}{3}$ in. long, with 4 spreading tapering wings, nearly $\frac{1}{2}$ in. long.

Khasi valley, Trans-Himalaya 8-10000 ft., Himalaya 6-11000 ft., India to Sikkim. Fl. March-June. 16. *E. grandiflorum*, Wall. Pl. As. Bar. t. 254. Khasim, Nepal, Khasi

15. *E. pendulus* (Wall.) Brandis, F. Fl. 73. *Tellu. Hamur. + Maradola, Java.*
A medium-sized tree, young shoots reddish-brown, shining. L. sharply serrate, blade 2-3, petiole 1/2 in. or less, slender. Cymes frequently from the axils of leaves below the leaves, peduncle long, branches strict. Fl. 1 in. Fr. longer than long, 3-4-lobed, angles often winged.

16. *E. pendulus*, Wall. Brandis, F. Fl. 73. *Tellu. Hamur. + Maradola, Java.*

A medium-sized tree, young shoots reddish-brown, shining. L. sharply serrate, blade 2-3, petiole 1/2 in. or less, slender. Cymes frequently from the axils of leaves below the leaves, peduncle long, branches strict. Fl. 1 in. Fr. longer than long, 3-4-lobed, angles often winged.

Locally it replaces *cordata*, with the Himalayas from Haseem to Assam, not known from
-Talpa, 41. 41. 41. 41. 41. *E. tridax*, Wall. Sibth. 7-12046 fl. - A very similar tree. L. normally variable, from narrow-lance to elliptic-lanceolate, serrate, blade 2-7, petiole 1/2 in. or less, long, winged or not, but from rather variable
-Haseem, 41. 41. 41. 41. 41. 41. *E. thalictus*, Wall. Nepal, Assam, Khasi hills, Manipur. - A shrub, branches with raised lines. L. smooth-surfaced, blade 2-5 1/2, petiole 1/2 in. Fr. nearly globose, obtusely 4-angled, 1/2 in. diam.

21. *E. Hamiltonianus*, Wall. Brandis, F. Fl. 4, 16. Vern. *Tellu. Chambe. Papan. Fench. Bato. Panch. Dewil, Java.*

A small decumbent tree, bark often corky. L. membranous, serrate, blade 2-6, petiole 1/2 in. Cymes axillary, or below the leaves, often on arrested branches, peduncles short. Fl. 1/2 in. across, lobaceous, Fr. deeply lobed, angles obtuse.

Coccoloba *Hamphay*, 2802-2808 fl. common in woods. Khasi hills, Manipur. Fl. Manipur. - *Coccoloba* wood used for carving and engraving. 22. *E. variegata*, Wall. Nepal, Papan. - A shrub, branches 1/2 in. diam. L. serrate, blade 2-6, petiole 1/2 in. Cymes 1-2 in. long, Fr. nearly globose, 1/2 in. diam.

2. GLYPTOPETALUM, Trewartha: Fl. Brit. Ind. 1, 612

Differs from *Eucalyptus* by cymes generally supra-axillary, ovules solitary and pendulous from the top of the cell. Species 7, Indo-Malayan region.

1. *G. zeylanicum*, Trewartha: Frères Hardy, Ceylon 1868.

A small tree. L. elliptic or elliptic-lanceolate, serrate, nearly entire, blade 3-6, petiole 1/2 in. Cymes supra-axillary, shorter than leaves. Fl. 1/2 in. ovary ovary central, conspicuous, petals spreading or reflexed, with 2 oval shallow pits on the upper surface. Fr. green, depressed globose, 1-4 lobed.

Anamalai, Tamil Nadu, Travancore. Fl. Fr. Ceylon. 2. *G. grandiflorum*, Brandis. Fl. Brit. Ind. 1, 612. Wainund, 3-3000 ft. A large shrub, l. 4-7 in. Cymes supra-axillary, peduncles slender, 4-6 in. long, 3-branched. Fl. light yellow, 2-1 in. petals without pits. 3. *G. calocarpum*, Prain (Eucalyptus *calocarpum*, Kerr) Travancore, North Anamalai, Nilgiris, Coonoor, Lanka. A shrub or small tree, similar to *G. zeylanicum*, differs by entire leaves, cymes axillary or not, and smaller flowers. 4. *G. Griffithii*, Prain, Mysore. Very similar, supposed to differ by very short cymes, peduncles shorter than petals and pedicels. 5. *G. sclerocarpum*, Kerr (Eucalyptus *sclerocarpum*, Kerr, F. Fl. 1, 256). Kambalahill, Pegu Yams. A tree. L. 6-12 in. entire or faintly serrate. Fr. nearly globose, 1/2 in. diam., rough.

3. MICROTROPIS, Wall. Fl. Brit. Ind. 1, 645

Glabrous evergreen trees or shrubs. L. opposite, coriaceous, stipules 0. Fl. sometimes unisexual, usually pentamerous. Calyx more or less campanulate, dark lining the calyx tube or none, petals mostly connate at the base. Stamens often inserted on the base of petals. Ovary free, 2-3-celled, 2-collateral, ovules 2 in each cell. Capsule coriaceous, 2-valved, 1-celled, 1-seeded, supported by the persistent calyx.

1. *M. discolor*, Wall. *Ann. L. Pl. Linn.*
A shrub or small tree. L. thickly coriaceous, reticulate-venous, blade 3-7 in., narrowed into a short petiole. O. nerved, petals dense axillary or supra-axillary. Fl. 1 in. across, whitish. Fr. round, 2-valved, 1-2 in. long, seed 1 shining scarlet.

Kumau, Sikkim, from the top of the hills according to 1850 fl. sheet with Manipur, Martaban and Tenasserim. Fl. Nov. - March. 2. *M. latifolia*, Wight. Western Ghats from the Konkan southwards, Nilgiris. A small tree. L. very coriaceous, margin thickened, blade 4-5 in., narrowed into a short petiole, veins dense, obscure. Fr. 1 in., oblong. 3. *M. ramifera*, Wight *l. c.* 977. Nilgiris Anamalai, Palnis and other elevations. A middle-sized tree. L. very soft, veins obtuse, broadly elliptical above, margin thickened, blade 2½-4 in., petiole 1 in., very obscure, veins mostly on the petiole and near the base of the leaf. Fr. 1 in. 4. *M. densiflora*, Wight *l. c.* 977. Higher ranges of the Nilgiris and Palnis. L. resembling 2, veins axillary, petiole 1 in., leaf elliptic, 1 in. 5. *M. microcarpa*, Wight *l. c.* 978. Western Ghats from the Konkan southwards. A shrub. L. elliptic, obtuse, blade 1-3, petiole ½ in., axillary, leaf often clustered towards the ends of branches, petiole ½-1 in., petals obscure, ovary 1 in. Fr. 4 in., seed brown. 6. *M. ovalifolia*, Wight *l. c.* 979. Higher ranges of Nilgiris and Palnis. A shrub or small tree. L. similar to 5, veins axillary and below the leaves, petiole ½-1 in. Fl. numerous, petals axillary. Fr. cylindrical, 4 in., somewhat green at first, 5 and 6 are possibly not specifically distinct. 7. *M. ovalis*, Wight, Tenasserim, Malay Peninsula and Archipelago. A small tree. L. elliptic, acute, petiole 1 in., upper surface of a petiole ½-1 in. Ovary extra-axillary, very few petals, leaf elliptic, 1-2 in. long. Fr. oval, apiculate, 1 in. long. *Ballou's Fl. Siam. Manual*, *Quadrat* 1850. *H. Malaccensis*, Wight, a Ceylon tree, is found in the western parts of the Peninsula.

4. HIPPOCRATEA, Linn.; Fl. Brit. Ind. 1, 623.

Climbing shrubs or small trees. L. reticulate, opposite, entire or serrate. Fl. bi- or tri-axillary. Calyx small, 3-parted, petals 5, spreading. Stamens 5, filaments flat, recurved. Ovary 3-lobed, style short, ovules in each cell 2, 2-seeded on the inner angle. Fr. separating into 3 distinct parts, each usually 2-lobed, 2- or more-seeded, rays or seeds compressed, winged, attached to the base of carpel. Cotyledons greenish-yellow, pedicel. Sp. Pl. 76-80, tropics of both hemispheres.

A. Fr. minute, ¼ in. across or less.

1. *H. indica*, Willd.; *Bot. Berol.* Fl. 1, 133.

A glabrous climbing shrub. L. ovate, more or less serrate, blade 2-6 in., petiole 1 in. Fl. greenish yellow, in axillary and umbellate cymes. Fr. 3-lobed, carpels oblong, striated, 1½-2 in. long, ½ in. broad.



Fig. 12.—*Hippocratea indica*, Willd. Fr. d. 1.

Western Peninsula, on the west side, from the Konkan southwards to Burma. Thakur, *Journal*, Malay Peninsula, Fr. Jan-April. 2. *H. arborea*, Roxb. *As. Pl.* 1, 35. *Malabar*, *Journal*, Oudh, Bhojpur, Khasi, &c. A large climber, covering the large trees, often enveloping them with its thick leafy foliage. L. serrulate, 5-6 in. long, 3 by 1½ in. Probably an enlarged form of *H. indica*.

B. Fl. small, $\frac{1}{2}$ in. and more across. Western species.

3. *H. Grahami*, Wight Ic. t. 380.

L. coriaceous, shining, entire or nearly so, blade 3-8, petiole $\frac{1}{2}$ in. Cymes generally much longer than leaf. Fl. $\frac{1}{2}$ - $\frac{3}{4}$ in. across. Fr. $3\frac{1}{2}$ by 1 in., obtuse or emarginate, striated.

Ghats of the Konkan and North Kanara. Fl. H. S.

4. *H. obtusifolia*, Roxb.; Wight Ic. 363.

L. variable in size and shape, 2-5 in. long, more or less crenate, veins finely reticulate. Cymes shorter than leaves, often forming terminal panicles. Fl. $\frac{1}{2}$ - $\frac{3}{4}$ in. Fr. 2 in. long, seeds 4.

Western Peninsula on both sides from the Konkan southwards. Fl. C. and H. S.

5. *H. Arnotiana*, Wight. West coast of Western Peninsula from South Kanara southwards, Ceylon. L. coriaceous, shining, in the upper part faintly serrate, veins distinctly reticulate. Fl. $\frac{1}{2}$ in. across. Fr. $2\frac{1}{2}$ in. long.

C. Fl. small, $\frac{1}{6}$ in. and more. Eastern species.

6. *H. macrantha*, Korthals. Chittagong, Duffa hills, Tenasserim, Malay Peninsula. L. coriaceous, shining, more or less crenate, blade 4-7, petiole $\frac{1}{2}$ in. Fl. $\frac{1}{2}$ inch across, pale yellow or white, cymes short, 1-1 $\frac{1}{2}$ in. long. Ripe capsules 2, 3-4 in. long.

7. *H. Lohri*, Lawson. Maulmein. L. broadly elliptic, blade 3-4, petiole 1-1 $\frac{1}{2}$ in. Cymes shorter than leaf. Fl. $\frac{1}{2}$ in. diam. 8. *H. andamanica*, King. Andamans. L. entire. Cymes often in ample terminal panicles. Fl. $\frac{1}{2}$ in. across. 9. *H. nicobarica*, Kurz. Nicobars. L. more or less serrate.

Eokoona littoralis, Lawson (*Lophopetalum littorale*, Kurz, *Mandling*, Burm.) Pegu and Tenasserim, on low lands inundated during the rains. A large evergreen tree, wood grey, med. rays extremely fine and numerous. L. coriaceous, entire, opposite, 3-5 in. long. Fl. whitish, in axillary and terminal panicles. Capsules 2 $\frac{1}{2}$ -3 in. long, coriaceous, 3-angled, seeds winged at the apex, with the wing 1 $\frac{1}{2}$ -2 in. long, seeds only. Shrub 0.

5. LOPHOPETALUM, Wight; Fl. Brit. Ind. t. 614.

Glabrous trees and shrubs, wood light-coloured, med. rays extremely fine and numerous. L. opposite or alternate, entire, usually coriaceous. Stipules 0. Fl. bisexual, in cymose panicles. Calyx obtusely 5-lobed, disk large, flat, petals either confluent with it at the base, or inserted under its margin, sometimes crested or papillose on their upper surface. Stamens 5, inserted on the surface of the disk. Ovary triquetrous, 3-celled, ovules 7-12 in each cell. Capsule coriaceous, 3-valved, seeds imbricate, winged, nearly all round, radicle lateral, cotyledons flat, albumen probably none. Species about 10, Indo-Malayan region.

1. *L. Wightianum*, Arn.; Wight Ic. t. 162; Bedd. Fl. Sylv. t. 145. Vern. *Balpatte*, Kan.; *Venkotta*, Mal.

A large tree, wood close-grained. L. usually opposite, blade 3-6, petiole $\frac{1}{2}$ - $\frac{3}{4}$ in. Fl. $\frac{1}{2}$ in. across, dull reddish, in ample axillary and terminal panicles, cymes, petals with a corrugated crest. Capsule sharply triangular, 3-4 in. long.

West coast of the Peninsula, ascending on the Ghats to 3000 ft., from the Konkan southwards. Fl. March-April. 2. *L. imbricatum*, Wight. Sikkim, Sikkim Terai (Gambles), Sikkim, Chittagong, Martaban, Tenasserim. A tree, petiole 1-1 in. fl. $\frac{1}{2}$ - $\frac{3}{4}$ in. across, yellow to red, petals with a imbricate crest. 3. *L. floribundum*, Wight, Mergul. A tree, inflorescence sometimes rusty-pubescent. Fl. $\frac{1}{2}$ - $\frac{3}{4}$ in. across, petals not crested.

4. *L. Wallichii*, Kurz, F. Fl. t. 235; Pierre, Fl. Forest. Cochinch. t. 306. Vern. *Katko*, Upper; *Mandling*, Upper and Lower Burma.

A large glabrous deciduous tree, bark smooth, wood grey, moderately hard, concentric bands of wood-parenchyma. L. opposite or nearly so, elliptic or

B. Branches 2-angled.

G. monosperma, Hook. & Grev. *Fl. Borac.* 1: 107. A climbing shrub. Lvs. ovate-oblong, base cuneate, petiole 1-1.5 in. Cymes axillary or terminal, 2-valved. Capsule 1-1.5 in. diam. 2-valved, seeds 1. *G. venulosa*, Wall. & Grev. *Fl. Borac.* 1: 107. A climbing cyme in the axillary position.

7. GYMNOSPORA, W. & A.; Fl. Brit. Ind. 1: 618.

Shrubs or small trees, differing from *Celastrus* by il. in dichotomous cymes and fruit inverted under the disk.

A. Branches 2-angled, often bearing leaves and flowers.

1. *G. montana*, Lawson; Fl. Brit. Ind. 1: 621. —Syn. *Celastrus montana*, Roxb.; Wight, Ic. 1: 381. *G. marginata*, Lamour.; Brandis F. Fl. p. 91. Vern. *Fingon*, Bahch.; *Paikali*, Hind.; *Kalasa*, Ass.; *Mourti*, Mar.; *Imati*, Tel.; *Tandrad*, Kan.

A tall shrub, under favourable circumstances a small tree, trunk heart-shaped. L. grey, coriaceous, exceedingly variable in shape and size, obovate, oblanceolate to linear-spathulate, narrowed into filiform tip. The specimens from Malabar, Rajastana, including the other parts of the Punjab have narrow, those from the Peninsula have broad leaves. Fl. small, pale greenish white, cymes axillary or fasciculate on short branchlets, often forming terminal elongate panicles. Capsule 1/2 in., usually 2-valved, seeds 1, 2, rarely 3, with or without an arillus.



FIG. 76.—*Gynnospora montana*, Lawson. Fl. 1/2 in.

Common in the Punjab, Sind, Rajasthan, the Central Provinces, Bihar and the district districts of the Peninsula. Fl. at various times throughout the year. Afghanistan, Western Asia, tropical Africa. 2. *G. Wallichiana*, Sprengel; Western Peninsula, 200, in wet shade much more than the reticulate tertiary nerves. Fr. 1/2 in. diam. 3. *G. marginata*, Roth (Choisy, T. & G.). Western Peninsula, Ceylon. Fl. on long slender pedicels 3/4 in. diam.

B. Branches usually naked.

2. *G. Royleana*, Wall.—Syn. *Celastrus spinosa*, Royle; Brandis F. Fl. p. 91. *Deordi*, Trans. Ind.; *Paikali*, Kander, Pb.

A shrubby or tree-like shrub 8-12 ft. high. L. obovate, acute, greyish, spines axillary, slender. Cymes mostly axillary, petals reddish with white edges. Fr. 1/2 in. diam.

Paikali, *abhinavayan* (tree) and to R. Krishna, Fl. and Fr. alpestris throughout the year. 3. *G. rufa*, Wall. Sikkim, Malayan tract, Khasia to Bhutan ascending to 6000 ft. White hills. A tree, l. lanceolate, base 2-5 petiole 1-1.5 in. Cymes axillary or below the leaves, branched, peduncles and pedicels filiform. Fl. white. Capsule 1/2 in. diam. 4. *G. Falconeri*, Lawson. North-West India. L. pubescent beneath. Capsule 1/2 in. diam. 5. *G. rugulosa*, Lawson. Mishan. L. slightly serrate, nearly entire, base 4-8 petiole 1/2 in. Capsules slightly rugose. 1/2 in. diam. 6. *G. pallida*, Collett at Humeley, Southern Shan hills 3-4000 ft. A shrub, spines few, l. 2-5 in. Cymes 1-1.5 in. long. Fr. 1/2 in. diam. 7. *G. Meyneana*, W. & A. Palni hills. L. broadly elliptic, base 2-5 petiole 1/2 in. Cymes axillary near the ends of branches, when in fruit 2-3 in. long. Fr. 1/2 in. diam.

C. Unarmed. — Western species.

10. *G. ovata*, Wall. Nilgiri Malabar Palni hills. L. 2-4 in. (occasionally 5 in. branched), axillary and terminal, 1 in. long, fl. 1/2 in. across. Calyx 5-lobed in dist. Specimens collected by Sir Henry G. Oakes on the western Malabar hills have been referred to other species. 11. *G. Rothiana*, W. et A. Nilgiris and North Canara. A small tree. L. ovate, narrowed into petiole 3 in. long. (Synonymy, *var. ovata* mostly based on leaf only. Fl. obovate, 1/2 in. long. According to Dr. Ritchie, this specimen is similar to *G. puberula*, Lawson, Kottaiy Indragiri and in local Malay names slightly different. L. membranous, ovate, 2-3 in. long, narrowed into short petiole. Crossing few till, peduncles and pedicels filiform.

D. Unarmed. Eastern species.

13. *G. acuminata*, Hook. f.

A large shrub or small tree. L. lanceolate, crenate serrate, 3-7 in., narrowed into the short petiole. Venae solitary or fasciated, axillary or on short lateral tubercles, peduncles and pedicels filiform. Capsule 1 in. long, usually 2-valved, 2-seeded, the lower half of seed enclosed in a *Acidula arillus*.

Siaka, 4-7000, Assam, Burma, Siam, India, Upper Burma. Fl. April-June. 14. *G. neglecta*, Lawson, Khasi hills. A shrub. L. elliptic serrate, 1 1/2-2 in. long, 1/2-1 in. in. *G. glaberrima* has long branched, leafy 1-2 in. 15. *G. obtusata*, Lawson, Khasi hills above Shillong. L. oblanceolate serrate in the upper half, 2-4 x 1 1/2 in. narrowed into the short petiole. Venae 3-4 pair very oblique. 16. *G. elliptica*, Lawson. A small L. narrowly lanceolate, serrate, 3-4 x 1 1/2 in. See 14 & 15.

R. KURRIMIA, Wall.; Fl. Brit. Ind. 1: 21.

Malayan trees. L. alternate, coriaceous, entire, congested towards the ends of branches. Calyx 5-lobed, petals 5, spreading or recurved, lobes are parted with petals under the margin of the disk. Ovary 2-seeded, arises 2 from the base of each cell. Capsule dehiscent by 2 valves, 1-2-seeded. Seeds hard or less covered by a fleshy arillus, embryo oblong, albuminous, baby. Species 7-8, Indo-Malayan region.

17. *K. pulcherrima*, Wall. — Syn. *K. robusta*, Karz. Vern. *Geylon*, Burma.

A large evergreen tree, quite glabrous. L. oblong-lanceolate, black, 4-6 petiole 1/2-1 in. See a profluous branch about 12 pair. Fl. in slender axillary, often fasciated racemes, shorter than leaves. Capsules 1/2-1 in. long, seeds generally 2, shining, arillus bright yellow, afterwards orange.

Western India, Assam, Siam, Chingapong, Burma, Siam, Ceylon, India, Tonkin. Fl. April-June. 18. *K. bipartita*, Lawson, Nepagerry hills. A handsome green tree. L. ovate-oblong, shining, elliptic, venae very conspicuous beneath. Capsule usually 2-3 x 1 1/2 in. long, 1-2 in. long, 1-seeded, at length 1/2 in. long. To this species should be referred *Typhlocyba indica*, Bodd. Fl. Brit. 1: 166. Assam hills, Nagpur. It, quoted by Lawson under *K. paniculata*, Wall. a Malay species.

9. ELÆODENDRON, Jacq. Pl.; Fl. Brit. Ind. 2: 223.

Included in *Cordia*, Blaud., by Lessner in Engler u. Prantl III. 2: 214.

Species about 30, tropical Asia, America and Australia. South Africa.

1. *E. glaucum*, Pers. — Syn. *E. Boissierii*, Wight III. t. 71; Bodd. Fl. Sylv. t. 118; Brunsia F. Fl. 82. Vern. *Mariadu*, Fla.; *Jamrasa*, Hindi; *Diche*, praita, Dan; *Chaur*, Methu, Gullu; *Miri*, Kol; *Nimra*, South; *Tamra*, Ann, Mar; *Nerudi*, Tel; *Mubarti*, Ksa; *Arenali*, Tsa.

A deciduous tree, middle-sized in dry localities, very large in moist evergreen forests, wood whitish, close-grained. L. glabrous, generally opposite, coriaceous, elliptic, crenate, stictes small, deciduous. Cyces

rather, the lobes are long, 2-3 in. long, the branches pendulous, the petals, sometimes divaricate, 5. Fl. 4-6 in. diam., disk fleshy, cupled. Stamens inserted under the edge of the disk filaments reflexed, anther cells attached to a loose connective, covering at base. Drupe about 1 in. long, yellow to green when ripe, and with 1 or 2 seeds, 1-2-celled, 10-20 in. diam.

Salacia malabarica, Wight, Flower Valley, ascending to 6000 ft. Rare in Sikkim, Malabar, Bihar, Assam, and elsewhere in India. Fl. Dec. June. 2-3 subrotundum. King, *Arborescent Melastomaceae*. A small tree. L. entire, almost orbicular. Fl. always numerous and in a leaf.

Phacostoma Wigand, Wight, *Fl. Ind. Ind. (Punjab, Ind.)*. Western Ghats, from the Mysore south to Malabar, a shrub or small tree, 2-3 in. high, flowers white, the stem. L. opposite, lanceolate, 1-2 in. long, narrowed at the apex. Fl. small, in small clusters, axillary and below the leaves, only 1-celled, petals 5. Fr. very small, 1-2 in. diam., seeds 1, rarely 2.

Oppositionella robusta, Wight, *Kern. B. Fl. Ind. (Males, Ind. Ind.)*. Malabar, eastern slope of Paga Yama. An evergreen glabrous tree, and yellow, 1-2 in. high, narrow, 2-3 in. long. L. alternate, elliptic-oblong, venose-nerved, blade 1-2 in. long, 1/2 in. wide. Fl. protuberant, yellowish, 1-1/2 in. across, axillary, solitary, or 2-4 in a short, thick pedicel, pedicel thick, 1/4 in. Ovary half adnate to the calyx tube, the filaments irregularly placed in different places, 1-2 in. long. Fr. a small, fleshy berry, 1-1/2 in. diam., with numerous, rarely 1-celled pyrenes.

10. SALACIA, Linn.; Fl. Brit. Ind. 1, 625.

Scrambling or climbing shrubs, glabrous, branches sometimes circinally twisted at the base. L. opposite, striate, 0. Fl. fasciated or cymose. Calyx 5-veined, petals 5. Stamens 3, sometimes 4, inserted on the disk, often between its upper margin and the ovary, disk sometimes with a free lower margin, upper margin free or appressed to the ovary, filaments flat, ultimately recurved, anther cells oblique or transverse, rarely parallel. Ovary conical, more or less immersed in and confluent with the disk, mostly 3-veined, 3-celled, ovules 3-8 on the inner angle of each cell, style unilocular or none.

A. Fl. fasciate on tubercles, ovary free, or not enveloped by the disk more than half-way up.

1. *S. Ravescens*, Kerz. *F. Fl. 1, 200.*

A large climber. L. entire or serrate, acuminate, blade 3-8, petiole 1-1/2 in. Fl. 1/2 in., pedicel slender, 1/2 in., disk with a prominent free upper margin, stamens inserted within it. Fr. 1 1/2-2 in.

Benarasin. Fl. R. 8.

2. *S. Smaliana*, spec. n. Vern. *Ner-ogan*, Bern.

An evergreen climber. L. entire, elliptic or obovate, obtuse, blade 5-8, petiole 1/2 in. Fl. few, yellow, 1-1/2 in., inodorous, pedicels thick, 1/2-1 in., upper margin of disk conspicuous, lower margin undulating, stamens inserted between the trigonous ovary and the upper margin, anther cells distinct, style none.

On the ground and edges of swamps with *Esposita*; Gaugahya forest, Upper Burma. Fl. April. 3. *S. multiflora*, Wight, *Tenasserim*, differs from 2 by some leaves. Fl. numerous, 1/2 in. across, on filiform pedicels 1/2 in., disk orbicular, surrounding the ovary, anther cells vertical, transverse.

B. Fl. fasciate on tubercles, ovary enveloped by the disk more than half-way up, stamens appearing as if inserted on the ovary.

(a) Fl. large.

1. *S. latifolia*, Wall.; King in Journ. As. Soc. Beng. vol. 65 (1897), p. 393.

A slender shrub. L. entire or rarely so, blade 5-8, petiole 1-1/2 in. Fl.

Fl. yellow. Leaves, dark beneath, the top, with the dorsal veins light. Stamens long. Fr. 1 in diam.

Malacca, Noolah, Malay Peninsula. S. & graciliflora, Nool. Fl. Malacca, 1858, p. 112. Fl. yellow, petals 4-5 in. diam. Fr. 1 in diam. Malay Peninsula. S. & graciliflora, Nool. Fl. Malacca, 1858, p. 112. Fr. 1 in diam. Malay Peninsula. S. & graciliflora, Nool. Fl. Malacca, 1858, p. 112.

b. Fl. small.

6. *S. Roxburghii*, Wall.; Kurz, F. Fl. 1: 286.

A leafy shrub. L. entire, elliptic-oblong, serrulate, blade 3-4, petiole 1-2 in. Fl. 1/2 in. or short stiff pedicels, 1/2-1 in. Disk with a ring of ten stamens, very short, anther cells terminal, transverse.

Assam, Khasi hills (Chitlang), L. on bushes, Khasi, Fl. March. 7: 2 variegata, W. & M. Martaban and Tenasserim, Java. L. entire or slightly serrate, blade 1-2 in. narrowed into petiole 1/2-1 in. Fl. numerous, 1/2 in. across, pedicels slender, 1/2 in. S. & macroperum, Wight, In. 1: 362. West side of the Peninsula from the base to the top. A scandent shrub. L. entire, elliptic-oblong, blade 2-5, petiole 1/2-1 in. Fl. 1/2 in. very numerous in very thickets, pedicels 1/2 in. Lower margin of disk with a ring, anthers nearly sessile. Fr. orange, irregularly ob. and 1-2 in. diam.

7. *S. prinoides*, DC.; Kurz, F. Fl. 1: 291. Vern. *Dimal*, *Thallo-pool*, *Sunthil*.

A straggling shrub or small tree, sometimes climbing. L. elliptic-obovate, slightly crenate, blade 2-3 1/2, petiole 1/2 in. Fl. 1/2 in. across, 3-6 in. diameter, bicostate axillary tufts, disk pedicels 1/2 in. diam. Fr. globose, 1/2 in. diam.



Fig. 76.—*Salvia prinoides*, DC. Fl. fr. 4.

Sumatra, Laruen, Sakim, Khasi hills, Siam, Laos, large, less frequently crenate and thickened. L. thinly chartaceous, entire, narrow elliptic, blade 2-5, petiole 1/2 in. Fl. few on short, stiff, erect pedicels, anthers subsessile. Fr. 1 in. diam. S. & virginica, Wall. Mergul. A spreading shrub, l. chartaceous, entire or slightly serrate, blade 1-2, petiole 1/2 in. Fl. few, pedicels 1/2 in. Ovary shaded entirely enclosed by the disk, anthers subsessile on the top, anther cells terminal, transverse. The plant occurs in various forms, all opposite leaves, which is supposed to be a variety from the Malay Peninsula has alternate leaves.

c. Fl. in axillary heads or pedunculate cymes.

8. *S. oblonga*, Wall.; Wight, Bot. Beechey, 1: 47. R. L. 1: 97. Bedd. Fl. Syst. Manual 1: 10, t. 4.

A climbing shrub. L. elliptic-oblong, more or less crenate-serrate, blade 2-5, petiole 1/2-1 in. Fl. yellow, 1/2 in. across, sessile, 3-6, in very shortly peduncled axillary heads. Ovary enveloped beyond the middle by the disk, anther cells parallel. Fr. 1/2-1 1/2 in., bright orange-red.

Western Ghats from the Kankar southwards. Fl. C. S. B. S. 1: 4, trinitosa.

Herbar. Wight, Ind. Arunachal Pradesh, with a single specimen from the same place. Leaves 2-4 cm. long. Ovary half enclosed in the disk which is 1-2 cm. diam. *Fr. 1-2*. *Wight, Ind. Arunachal Pradesh*. Herbar. Wight, Ind. Arunachal Pradesh, with a single specimen from the same place. Leaves 2-4 cm. long. Ovary half enclosed in the disk which is 1-2 cm. diam. *Fr. 1-2*. *Wight, Ind. Arunachal Pradesh*. Herbar. Wight, Ind. Arunachal Pradesh, with a single specimen from the same place. Leaves 2-4 cm. long. Ovary half enclosed in the disk which is 1-2 cm. diam. *Fr. 1-2*. *Wight, Ind. Arunachal Pradesh*.

ORDER XXXV. RHAMNACEÆ. Gen. Pl. 1: 371.

(Rhamnaceæ)

Trees or shrubs, not rarely climbing, often armed with spinose branches & angular spines. L. simple, alternate or opposite. Fl. small, green or yellow, often unisexual. Inflorescence generally cymose. Calyx 1-5-lobed. Lobes triangular, valvate in bud. Petals inserted at the mouth of calyx-tube, or on the edge of the disk. Stamens opposite the petals and often enclosed by them. Disk lining or filling the calyx-tube. Ovary free, or adnate or fused adhering to calyx-tube, 2- or 3-, rarely 4-celled, 1 or 2 ovule in each cell. Seeds 1-3.

Seeds rare of wood, even in the climbing species, normal as far as known.

- | | |
|---|-----------------------------|
| A. Fr. dry, winged, 1- or 2-celled, indehiscent | 1. VENTILAGO |
| B. Fr. a berry, or coriaceous indehiscent, parallel | 2. BERNARDIA |
| C. Fr. a drupe, with a 1- or 2-celled stone 2-3-lobed, curved | 3. ZANTHOXILA |
| D. Berry or drupe with 2-4, usually 3, distinct kernels
Ovary not supported by the persistent but not enlarged calyx tube | 4. BRONIA |
| E. Fr. fleshy, with 2-4, usually 3, distinct kernels
Ovary not supported by the persistent but not enlarged calyx tube | 5. SERRAVALIA |
| F. Fr. baccate, nearly dry, 2-4-celled, 2-4-seeded
Armed: L. spinose, often opposite
Unarmed: L. membranous, alternate, ramifications
of inflorescence fleshy in fruit | 6. SIDA |
| G. Fr. drupe, pericarp generally coriaceous
Fr. superior, base supported by the persistent calyx tube | 7. COCA
SARCOMA (p. 172) |
| H. Fr. drupe, pericarp generally coriaceous
Fr. inferior, covered by the persistent calyx tube | 8. CROTON |
| I. Fr. a large or small, 1- or 2-celled, indehiscent | HERNANDIA (p. 172) |
| J. Fr. a berry or globose, not winged. Fl. umbellate | HERNANDIA (p. 172) |

1. VENTILAGO, Gaertn., Fl. Brit. Ind. 1: 690.

Shrubs or trees, unarmed, generally climbing. L. alternate. Fl. small, pentamerous, bisexual. Inflorescence fascicled axillary or in terminal panicles. Calyx cup-shaped, lobes deciduous, bearded inside, petals enclosing the stamens, hooded or spatulate. Ovary 2-celled, styles 2. Fr. a subglobose indehiscent nut, seated on or partly enclosed by the persistent calyx tube, apertured into a linear coriaceous wing. Seed 1, cotyledons thick, fleshy, radicle tubercular, albumen 0.

1. *V. madraspatana*, Gaertn.: Roxb. Cor. Pl. t. 76; Wight, Ic. t. 163; Wight, F. Fl. Ind. Vera. Koll. Ind. Dist.: *Bansa-santana*, Kol.; *Pipri*, Surgul. Tal.; *Pydi*, Kan.

A powerful climber, tendrils woody, branchlets, petioles and younger leaves

pubescent. *L. chinensis* differs from a slightly different form, *L. chinensis*, which is indistinguishable from the one in the first part, in having the leaflets 2-4 pairs, the petioles greenish white, a strong offensive smell, and the presence of large terminal leafless panicles. Nut 1 indistinct, pubescent.

Occasionally in tract from the Indian coastward. Oahu, Hawaii, Nepal, India, China, Java, and the Philippines. Fuller, *Annals, Botanic, Pt. Nov., March*. I have seen the leaves of *L. chinensis* and of 1867. *Bot. Annot.* with the *L. chinensis*. *Bot. Annot.* *L. chinensis* F. F. 1867, and is to be recognized by the leaflets being pointed at the tip, the petioles glabrous, and the fruit being more or less compressed laterally. *L. chinensis*



FIG. 17.—*Ventilago madroperata*, Gaertn. var. *calyculata*.

chinensis Dels. Ghats of Belgium and North Korea. Branchlets petioles and leaf-stems rusty-tomentose. Lustrous above, hairy glands in the axils of leaves, and in 2-4 pairs, veins freely reticulate, blade 3-4, petiole 1 in. Fl. in dense axillary panicles, not paniculate. *Boissier* (Index 1, Pl. Or. 1, III) quotes as *Ventilago chinensis*, Benth. in Pl. Or. 1, 14, a leafy tree in dense forests of the Malay Peninsula. Two Malayan species with glabrous fruit are reported from Malaya, *L. chinensis* (Lour.) F. F. 1867, and *L. chinensis* (Lour.) F. F. 1867, also in China. *L. chinensis*, edge more or less minutely serrate, and 5-6 or 7 pair, wing 2-3 in. long.

Apteris laevigata, Kunz F. F. 1, 203. Yainway forest on the eastern slope of the Pegu Yoma, probably in a disjunct state of *Ventilago madroperata*.

2. *BERCHEMIA*, Nees; Fl. Brit. Ind. 1: 637.

Woody shrubs or trees, stipules 2-5a long, often intra-axillary. L. alternate, sessile, numerous, parallel-oblique. Fl. small, pistiliferous, calyx 2-lobed, longer or triangular, deciduous. Style simple, often short, stigma capitate. Fr. a 2-celled berry on the persistent calyx. Species, Eastern Asia 8; tropical Africa and North America 1 each.

A. Fl. in terminal or axillary panicles, calyx tube only persistent.

1. *B. floribunda*, Wall.; Brandis F. Fl. 91. Vern. *Korful*, Java; *Chak*, Gorkha; *Chanduk*, Nep.

A large shrub or small tree, erect or climbing. L. ovate, acute or acuminate, blade 2-3, petiole $\frac{1}{2}$ -1 in. Fl. clustered in large terminal panicles, pedicels shorter than calyx. Berry cylindrical, $\frac{1}{2}$ -1 in. long.

Himalaya, Jharkhand, Sikkim, according to 6000 feet, Khasi hills. Fl. June-July (North-West), December (Sikkim). 2. *B. farinosa*, Wall. Sikkim, Upper Burma. Very similar. Fl. in short terminal axillary panicles, pedicels longer than flower.

B. Fl. in small clusters. Fr. supported by entire calyx.

3. *B. lineata*, DC.; Brandis F. Fl. 91. Vern. *Tarbetel*, Push; *Jagari*, Java.

A small shrub, stipules small. L. $\frac{1}{2}$ -1 in. long. Fl. 2-4 together, either axillary or at the ends of branches. Berry blue, $\frac{1}{2}$ in. long.

Tripura, India, and in the Himalaya to Bhutan, according to 9000 ft. Fl. May-July. 4. *B. Meeuwii*, Lessert. Dechan, Western Nepal. Very similar, supposed to differ by longer stipules and less conspicuous secondary nerves, but probably not really different.

3. *ZIZYPHUS*, Juss.; Fl. Brit. Ind. 1: 632.

Shrubs or trees. Medullary rays numerous, very fine. Generally armed with hooked spines, which as a rule are uniserial, one straight, the other curved. L. alternate, more or less distichous, with 3, rarely 4 or 5, basal nerves. Fl. small, pentamerous, mostly bisexual, generally in axillary cymes. Calyx cup-shaped or broad-obovate, lobes hooked inside; petals sometimes wanting, disk lining the calyx tube, edge free, pentagoneous or 5-10-lobed. Ovary immersed in disk, and more or less confluent with it, 2-celled, rarely 3- or 4-celled, styles 2-3, free or partly connate. Drupe as a rule fleshy, stone rugose or tuberculate, 1-3-celled, 1 seed in each cell, embryo in thin albumen, cotyledons thick, ditto in connate radicles short, inferior. Species 40, mostly Indo-Malayan, a few of Africa, America and Australia.

A. Cymes axillary, sessile or shortly pedunculate.

1. *Z. Jujuba*, Lam.; Wright Ic. t. 22; Benth. Fl. Sylv. t. 149; Brandis F. Fl. t. 17. Vern. *Ber Hind.*; *Ber, Mar.*; *Jamunjan*, Ind; *Jalandri*, Tam; *Khaja*, Gaud; *Bojo*, Tel; *Jitachi*, Kan; *Zilva*, Burm.

A middle-sized tree. Branches drooping, armed with angular spines, equal or straight; the other bent, rarely entirely unarmed. Branchlets, petioles, underside of leaves and inflorescence densely clothed with bright hairy or nearly white tomentum. L. opposite, from ovate-oblong to nearly orbicular, apex acute, entire or serrulate, blade 1-2 $\frac{1}{2}$, petiole $\frac{1}{2}$ -1 in. long. Fl. greenish-yellow in short axillary nearly sessile cymes, petals angulate, lobes oblong, connate or hooded, disk fleshy, 10-lobed, styles 2, thick, connate to middle. Drupe varying in size and shape, generally $\frac{1}{2}$ -1 in. long, orange-colored when ripe, stalk half the length of drupe, stone tuberculate, buoy, irregularly furrowed, mostly 2-celled.

Introduced and cultivated throughout India and Burma, used by the natives

A straggling shrub or small tree, rarely 20 ft. or occasionally a small tree, white often 2-3 ft. with stems with grey tomentum, often axillary or sub-nodal dark brown or black, exfoliating with rusty granular scales. Bark white, inner, young, spines and tomentum leaves densely clothed with tomentum or grey tomentum. L. ovate or elliptic, from an oblique base to acute base, blade 2-5, petiole 1/2 in. long, venes 3, rarely 4 or 5, prominent, as well as the net, v. along midrib, and on the outside of the lateral veins. Glands large, pedunculate, axillary and terminal, forming a long terminal generally branching panicle. Petals 5-6. Drupes 4 in. long, with persistent 1-celled 1-seeded.

Sabulna, Mysore trees near the Ganges to Java, ascending to 2000 ft. (Baker, General Bot. West. Peninsula, Burma, Shan Hills to 4000 ft.). Fl. Nov-March, Leyden 14, 2 pedicels, Hain. Atam. Fisher, Shan Hills, Upper Burma, Graham, Graham, L. oblong-elliptic, acuminate, blade 2, petiole 1/2 in. long, transverse (distally) 3-5-parallel veins, granular; a few leaflets on the outside of the outer leaf, venes 3-4 in. long.

4. RHAMNUS, Linn.; Fl. Brit. Ind. 1: 678.

Shrub or tree. L. serrate, alternate, in some species subsopposite, stipules small, mostly deciduous. Fl. often unisexual, calyx 5-6-angled, thickened, with a prominent line, petals sometimes wanting, disk thin, clothing the calyx tube, petals and stamens inserted on its edge. Ovary free, 2-4-celled, partitioned into a 3-lobed style, stigma papillose, obtuse. Drupes on the persistent but not enlarged base of calyx, pyrene 2-4, 1-2-celled. Cotyledons flat, with recurved margins, often green, radicle short. Species 60-70, mostly of the northern temperate zone, some on hills within the tropics.

A. Spinescent. Fl. 4-merous, petals minute.

1. *R. virgatus*, Roxb.; Binaria F. Fl. 91. — *Smi. H. delaviana*, Fl. Ind. Ind. 1: 680; *R. hirsutus*, W. et A. Wight Ic. t. 978; *Chakra*, Nils. p. 100, Ph.; *Chandla*, Thunbur. Jans.

A large shrub or small tree, heart-shaped brown, hard, pores in wood radial, lenticle branchlets often spinous, young shoots pubescent; L. serrate, ovate, almost opposite, glabrous, frequently fasciated or arrested branchlets, lanceolate or ovate-lanceolate, blade 1-4, petiole 1/2 in. long. Fl. greenish, 4-5-merous, pedicels in axillary clusters, petals minute, linear or spatulate. Seed grooved, groove narrow, nearly closed.



Trans-India, Himalaya 2-3000 ft. from the Indian coast, Manipur, Shan Hills, Upper Burma, 3000 ft. Fl. April-June, also 2-3-merous. 2. *R. perispermata*, Binaria, Trans-India, Salt range, North-West Himalaya 2-5000 ft., Nils. Kaniwa, Ph. China, Ind. Ind. A tall shrub with stiff branches, lenticles, L. 1-4, serrate, tomentose beneath. Nils. with a white open grass, the upper thin leaf.

B. Unarmed. Fl. 5-merous, petals 5.

3. *R. Wightii*, W. et A. Wight Ic. t. 109.

A large shrub. L. subsessile, ovate, turning black in drying, mostly alternate, glabrous, and

FIG. 51.—*Rhamnus* Wightii, W. et A. 1.

* *Rhamnus* is near, but, to *Ligustrum*, Benth. and Fl. Brit. Ind.

gularly serrate, the serratures upper, with enlarged lower points, as under and tertiary nerves conspicuous. Blade 3-4, petiole $\frac{1}{2}$ in. Fl. cluster axillary, or clustered on axillary rachis, 2 in axillary fascicles or on short racemes.

Woody shoots from Mahabaleshwar southwards, Nilgiris, Palni hills. Fl. R. S. Colton.

4. *R. triquetra*, Wall. & Brandis F. Fl. 92.

A small tree, branchlets and leaves with dense short tomentum. L. ovate or elliptic-oblong; sec. n. 6-10 pair, prominent, blade 2-5, petiole $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Fl. clustered on axillary racemes attaining 3 in., style 3-4-lobed, the branches coloring nearly to the apex. Seed with a broad open groove.

Nalagarh and North-West Himalaya, Jhelum to Sarda, 3,000 ft. Fl. May-Aug. *R. R. nepalensis*, Wall. Nepal, Nilgiris, to 8,000 ft. (Johal Nep. Bengal Assam, Khasi hills, Upper Burma. A large shrub, glabrous; sec. n. 3-7 pair, blade 3-6, petiole $\frac{1}{2}$ in. Fl. often unisexual but long often branching and both racemes, style 3-4-lobed at the apex, berries red.

C. Unarmed. Fl. 6-nerve, petals none.

6. *R. purpureus*, Edgew.; Brandis F. Fl. 91, t. 18. Vern. *Rangek*, Ph. *Lalich*, Chitt.

A middle-sized tree, young shoots uniformly pubescent, the previous year's branchlets purple. L. alternate, ovate-lanceolate, acuminate, sec. n. 6-10 pair, prominent, blade 3-4, petiole $\frac{1}{2}$ in. Fl. mostly bisexual, in axillary clusters or racemes, style short, 3-lobed nearly to the base. Drupe $\frac{1}{2}$ in. long, pear-shaped, bitter.

Himal. North-West Himalaya, Indus to Sarda river, 1,500-10,000 ft. Fl. May, June. *R. R. procumbens*, Edgew. Simla, Jhelum, Kashmir, 7,000 ft. A small prostrate shrub, 1-2 ft. tall, petioles prominent, subulate as long as petiole. Fl. axillary, axillary, or long slender pedicels.

7. **SAGERETIA**, Brongn.: Fl. Belg. Ind. 1, 641.

Unarmed or spinescent shrub. Branches angular. L. generally opposite, the upper sometimes alternate, stipules small, deciduous. Fl. bisexual, pentamerous, usually in small clusters, supported by bracts, arranged in terminal or lateral panicles. Calyx a shallow cup, segments keeled inside, persistent. Disk thick, fleshy, filling the calyx tube, upper part free. Ovary 3-celled, narrowed into 3 short coherent styles. Drupe with 3 coriaceous indehiscent pyrenes. Cotyledons fulvous, in thin fleshy albumen. Species 10, Central and Eastern Asia, Mexico and Florida.

1. *S. oppositifolia*, Brongn.; Brandis F. Fl. 96. Vern. *Gonda*, Dani, *Mowal*, *Sardhi*, *Uchhapal*.

A large shrub or small tree. Branchlets and underside of young leaves woolly-tomentose, branchlets often spinescent. L. shining above, acuminate, serrate; sec. n. 3-6 pair, arching, blade 2-4, petiole $\frac{1}{2}$ in. Spikes axillary or 1 in terminal racemes. Drupe sweetish, edible, $\frac{1}{2}$ in. long.

Himalaya, Indus to Buntan, 2-6,000 ft., Khasi hills, Khasi Ghats. Hills of the Cold Districts and Northern Orissa. Fl. spring to autumn. 2. *S. hamosa*, Brongn. Nepal, Nilgiris, Palni hills, China. Unarmed, or with stout short deciduous spines. L. glabrous, sec. n. arching, 4-10 pair, blade 1-5, petiole $\frac{1}{2}$ - $\frac{3}{4}$ in.

3. *S. Brandrethiana*, Alchison; Brandis F. Fl. 95. Vern. *Mauyer*, Bal, *Mestanti*, Pachtu; *Gangla*, Ph.

A shrub, at most 10-12 ft. high. Branches stiff, divergent, the younger decussate and frequently spinescent. Often only one of the two opposite buds develops, and at times the branchlets are whorled. Branchlets, inflorescence and underside of leaves clothed with white tomentum. L. entire or slightly

Syntherisma calyculata, Mart. *Travels in the Andamans*. A rampant herb, 1-2 ft. tall, perianth and stamens yellow, lobes 4-5 parted. In female a prominently 5-lobed ovary, the lobes on each side being 2-4 and pedicel 1-1½. Fl. terminal, pentamerous, in flowers a long narrow spatiform perianth becomes pedicel corollate, filament inserted within the ovary. Ovary half inferior, 5-lobed, styles 2 recurved. Fr. 5-lobed, variously shaped, deciduous, vertically 5-lobed, the lower part enclosed in the persistent calyx-tube.

8. **GOUANIA**, Linnæ; Fl. Brit. Ind. l. 641.

Yuccoid shrubs, mostly climbing by means of terminal tendrils. L. alternate, Fl. polygamous in 2-side clusters on axillary or terminal spikes. Ovary inferior, sunk in the disk which fills the calyx tube. Fr. a dehiscent capsule or capsule opened by the persistent calyx-tube, 3-angled or 3-winged, species 3-4 in all tropical countries.

1. *G. leptostachya*, DC.—Syn. *G. thlasifolia*, Boeck. *Obs. Pl.* i. 98. *G. acyridifolia*, Wall. *Vern. Bot. Ind. Nep.*

A large scandent shrub, wood normal, wood rays long and broad. L. broad-ovate, acuminate, base rounded or slightly cordate, base entire, upper part serrate or crenate, blade 3-4, petiole ½-1 in. long. Spikes slender, 6-12 in. long. Fr. 4 in. diam.

Subhimalayan tract and outer hills from the Jimus westward, ascending to 4000 ft. on Sikkim, Khasi hills, Lower Burma, Assam, Fl. Aug. Siam, Tonkin, Cochinchina, Malac. Peninsular and Archipelago. 2. *G. microcarpa*, DC. Western Ghats from the Konkan southwards, often in evergreen forest, Nilgiris, Ceylon, Malay Archipelago, differs by smaller, quite entire leaves, spikes, calyx and young leaves broadly pubescent. Fr. ½ in. diam. 3. *G. grandiflora*, Hook. Malacca and Ternate. Branches, inflorescence and young leaves densely tomentose or tomentose. L. cordate-obovate, entire entire. Wings of fruit rounded. 4. *G. andamanica*, King, Journ. As. Soc. Bengal vol. 6 (1877) 762. Common on middle Andaman islands. Branches woody, pubescent. Fr. rusty-tomentose, triquetrous, not winged.

Reuma lanceolatum, Brandis Fl. 574. Subhimalayan tract, ascending to 4000 ft. Pines in Northern India, Jahan Pichmorchia, Golavary. A slender climbing shrub, 2-3 in. diam. Branchlets ending in simple tendrils. Fl. all lobes. Fr. coriaceous, almost globose, not winged, 3-lobed, tardily dehiscent.

Order XXXVI. **AMPELIDEÆ**. Gen. Pl. i. 386.

(Vitis, Engelm. & Prant) iii. 5. 127.)

Herbs or shrubs, erect or climbing. L. alternate. Fl. regular, inflorescence cymose, generally leaf-opposed. Calyx small, 4-5-lobed or entire, petals 4-5, valvate in bud. Stamens as many as and opposite to petals, inserted outside and often between the lobes of a hypogynous disk. Ovary 2-4-lobed, ovules 2 (rarely 1) in each cell, style simple, stigma often sessile. Fr. a berry, seeds with a stony or crustaceous testa, embryo small, in a copious generally hard albumen.

- Woody or herbaceous climbers, rarely erect, filaments few. Ovary 2-lobed. 1. Vitis.
- Herb. shrubs or large herbs, filaments united into a tube. Ovary 3-lobed. 2. Lera.

1. **VITIS**, Linnæ; Fl. Brit. Ind. l. 645.

Climbing, rarely erect shrubs or herbs. Tendrils generally leaf-opposed, often leaving the inflorescence. Stipules membranous, deciduous. Petals often coloring at the apex, when the entire corolla, lifted up by the stamens,

epiphytic from the sky and falls away. Height 3-4 m. In the mountains by the Beany river, 4-5 ft. tall. Fls. 1-4 axillary. Style about 1/2 in. long.

Placed in DC's Monogr. Fl. Ind. vol. 1, p. 107, under *Impatiens*, but later corrected to belong to the following: 1. *Vitis*, petiole 2-3 in. long; 2. *Impatiens*, petiole 4, mostly 5, in. long; 3. *Clematis*, petiole 4, style long; 4. *Pentstemon*, petiole 5, 2-3 in. long; 5. *Impatiens*, petiole 4, style long.

The wood, as a rule, is not interrupted by medullary rays of that kind. A rare tree, with very broad, widening towards the crown, cones, the wood being extremely soft (sometimes over 60 lbs. diam.) and with smaller cones. The wood is made up of a peculiar structure. On the opposite sides of a central axis numerous alternating axes are formed, each consisting of wood, bark, and leaf-looker outside.

7. *V. simplex*, Fl. Ind. vol. 1, p. 107, under *Impatiens*. Cymes arranged in cymes, often umbellate.

8. *V. adnata*, Wall. Bot. Beechey, Fl. Ind. — Syn. *Clematis* *adnata*, Hook. & Wight, Bot. Beechey, p. 141.

Trailing, young shoots more or less rusty-tomentose. Lf. ovate, partly lobed, often larger than broad, bristly serrate, more or less tomentose beneath, blade 5-11, petiole 1-2 in. long. Cymes more or less adnate, consisting of a round shining cyme, surrounded by a few setaceous awns. Cymes often axillary, opposite to fully developed leaves, fl. greenish yellow. Fr. oblong, 1/2 in. long, seed one. Fruiting pedicels recurved.

Occurs in the Himalayas, extending to the foot of the Khasi hills, and to the foot of the Western Ghats. It is found in the mountains of the Western Ghats, and in the mountains of the Western Ghats, and in the mountains of the Western Ghats. A very large specimen collected at the foot of the Khasi hills, near the foot of the Western Ghats, is now in the Herbarium of the University of Cambridge.

9. *V. linnæi*, Wall. Bot. Beechey, Fl. Ind. — Syn. *Clematis* *linnæi*, Hook. & Wight, Bot. Beechey, p. 141. Occurs in the Himalayas, extending to the foot of the Khasi hills, and to the foot of the Western Ghats. It is found in the mountains of the Western Ghats, and in the mountains of the Western Ghats, and in the mountains of the Western Ghats. A very large specimen collected at the foot of the Khasi hills, near the foot of the Western Ghats, is now in the Herbarium of the University of Cambridge.

10. *V. linnæi*, Wall. Bot. Beechey, Fl. Ind. — Syn. *Clematis* *linnæi*, Hook. & Wight, Bot. Beechey, p. 141.

11. *V. linnæi*, Wall. Bot. Beechey, Fl. Ind. — Syn. *Clematis* *linnæi*, Hook. & Wight, Bot. Beechey, p. 141. Occurs in the Himalayas, extending to the foot of the Khasi hills, and to the foot of the Western Ghats. It is found in the mountains of the Western Ghats, and in the mountains of the Western Ghats, and in the mountains of the Western Ghats. A very large specimen collected at the foot of the Khasi hills, near the foot of the Western Ghats, is now in the Herbarium of the University of Cambridge.

12. *V. linnæi*, Wall. Bot. Beechey, Fl. Ind. — Syn. *Clematis* *linnæi*, Hook. & Wight, Bot. Beechey, p. 141.

13. *V. linnæi*, Wall. Bot. Beechey, Fl. Ind. — Syn. *Clematis* *linnæi*, Hook. & Wight, Bot. Beechey, p. 141.

14. *V. linnæi*, Wall. Bot. Beechey, Fl. Ind. — Syn. *Clematis* *linnæi*, Hook. & Wight, Bot. Beechey, p. 141. Occurs in the Himalayas, extending to the foot of the Khasi hills, and to the foot of the Western Ghats. It is found in the mountains of the Western Ghats, and in the mountains of the Western Ghats, and in the mountains of the Western Ghats. A very large specimen collected at the foot of the Khasi hills, near the foot of the Western Ghats, is now in the Herbarium of the University of Cambridge.

9. *V. repens*, Wall. & Kunt. *Fl. Ind.* 2: 219.

A large climber. Branches often white, mostly. L. glabrous, ovate from a sessile base, serrulate, not lobed, with distinct hairy teeth, blade 2-4, petiole 1-2 in. Cymes large, half the length of leaf, peduncle 1-2 1/2 in., seed usual.

India: Khas hills, Assam, Chittagong, Burma. West side of the Peninsula of India (Khas, Garo, Khasia). Malay Peninsula and Annapurna.

10. *V. quadrangularis*, Wall. & Wight. *Ind. Bot.* 5: 612. Brandis *F. Fl.* 104. Vern. *Harsingur*, Baniar, *Soffera*, Tel.

A perennial climber. Branches dichotomous, succulent, quadrangular, compressed at the nodes, angles winged. L. fleshy, entire, broad-ovate to 8-5 lobed, blade 1-2, petiole 1-1 1/2 in. Berry red, 1-seeded.

North-West India, Western Peninsula. Fl. Ind. Eastern tropical Africa, Assam, Bihar, Arunachal.

11. *V. simplex*. Fl. pentamerous. Cymes arranged in panicles (spikes) in *V. indica*, inflorescence usually on the midrib.

12. *V. vinifera*, Linn.; Brandis *F. Fl.* 98. *The Grape Vine*, *Ind.*, *Ind.*

A large woody climber, tendrils long, bald. L. glabrous above, clothed beneath with grey, hoarse deciduous tomentum, from a cordate base nearly ovate, more or less deeply 5-lobed, edge cut into large unequal acute tooth-like nerves 5, the midrib with 4-5 pair of prominent secondary veins, petiole generally shorter than leaf, but longer than half its length. Fl. green, fragrant, petals falling at the top. Fr. 3-5-seeded.

Indigenous to Armenia, the Caucasus and other parts of Western Asia, probably also to Greece. Apparently wild in the North West Himalaya. Cultivated in Kashmir, Kanton (the vineyard is still destroyed by the disease between 1875 and 1890), the plains of North West India and the Deccan.

13. *V. lanata*, Roxb. *King Journ. A. Soc. Beng.* vol. 65 (1856), p. 141; Jacquem. *Voy. Bot.* t. 3, *Chitcho*, Bhamour; *Javala tara*, Nepal; *Gach-lan*, Sundrib.

A powerful woody climber. Branches, petioles and inflorescence more or less woody. L. from a flat or cordate base, acute, serrulate, dentate, angled, or 5-fidately lobed, more or less clothed beneath with soft, crasy tomentum. Cymes arranged in large compound panicles, one of the lower branches often terminating in a tendril or developed into a second panicle, giving the appearance of a bifurcate inflorescence, petals falling at the apex. Seed 1.

Sundhavan tract, extending to 8000 ft. from Hazara eastward. A very large vine, Manipur, East Bengal, Chittagong, Burma. Fl. April, May. This species differs considerably in regard to the tomentum. A form which is almost glabrous is known from Kanton, the Khas hills, and Bhamour. These glabrous species are very similar to *V. parvifolia*, Roxb., a species of Kashmir, Kanton and Nepal, with tendrilless 1.5-3 in. long 1-2 in. broad. Fl. in short racemiform panicles 1-2 in. long. *V. rugosa*, Wall., Kanton, Burma, with little grapes, has larger leaves 2-12 long. *V. rugosa*, Wall., Kanton, Burma, with little grapes, has larger leaves 2-12 long. In these (11-13) and other species with paniculate inflorescence, the lower leaflets that the lower branch of the panicle bears a second panicle, giving the appearance of a bifurcate inflorescence.

14. *V. latifolia*, Roxb.; Brandis *F. Fl.* 99. *Paullon*, Hind., *Mool Maro*, Assam. Plains of North India; Rajasthan, Bihar, Bengal, Assam, Peninsula. L. densely pubescent beneath, nearly orbiculate from a cordate base, angled or 5-lobed, lobes dentate, tendril long, bald. Cymes on the tendril in pyramidal often bifurcate panicles. 15. *V. bartata*, Wall., Assam, Khas hills, plains of Bengal, Bihar, Peninsula.

Branches, petioles and inflorescence clothed with soft, woolly hair and long thin brown tomentum. L. clothed beneath with hoarse pubescence, cordate, with large petioles basal lobes, 4-10 in. long. Cymes in large pyramidal panicles, leaflets 1-2 in. long. 17. *V. indica*, Linn. *Fl. Ind.* 1: 628. *Nepal*, Mar. West side of the Peninsula from the Konkan southwards. Branches, inflorescence, petioles and

in the leaf of *V. semicordata* (Wall.) Kuhn. with young leaves. L. hard, smooth, glabrous. In the leaf of *V. semicordata*, the veins are mainly in the leaf, and the leaf is mostly in the leaf of a short compound cymose. A pointed leaf of *V. semicordata* is in the leaf of *V. semicordata* (Wall.) Kuhn. The correct name of the Indian species which is now known has still to be determined.

C. L. trifoliate. Cymes umbellate, or arranged in cymes.

18. *V. semicordata*, Wall.; Kuhn in Journ. As. Soc. Beng. 7: 93 (1847), pp. 116, 107. — Syn. *V. himalayana*, Brandis, F. Fl. Ind. Brit. Pl. Simla fig. 31; *V. wightiana*, Wight in Journ. Vern. Botany, Thoug. Ser. Simla; *V. dachan*, Bussahan; *Kandur*, James; *Chachan*, Nep.

A large, woody climber, stem 5-10 in. diam., glabrous, or young shoots slightly pubescent, tendrils distinct, or lines wanting. L. trifoliate, the terminal leaflet ovate or obovate, the two lateral ones ovate-oblong or lanceolate, all sharply serrate with mucronate teeth. Spines, when early deciduous. Fl. yellowish-green, pentamerous, rarely 6-merous, a compound trichotomous cyme, peduncles as long as or shorter than petiole of the opposite leaf, petals ending in a conical base, which encloses the ovary before opening, released after the flower has opened. Ovary slightly 5-lobed, narrowed into a short obtuse style.

Himalaya from Kanchi eastward 3-5000 ft., in Sikkim to 1200 ft. Fl. in hills, Patna hills, Burma. Fl. April-June. In autumn the leaves turn red. Young shoots hairy from pubescence to gland on the nerves beneath. 19. *V. carnea*, Wall. in Journ. F. Fl. Ind. Kanchi, *gaur dakh*, *Ph. dakh*, *Ph. dakh*. Common in the parts of India and Burma. A large climber with herbaceous flattened stems, young shoots hairy pubescent. L. pinnate trifoliate, leaflets ovate or elliptical, the two lateral ones smaller. Fl. in autumn, greenish white, in trichotomous compound cymes, peduncles longer than petiole of opposite leaf, petals separate, long, a thick 5-lobed ovary. Syn. *V. King* identified with *V. carnea*, Kuhn. A large woody climber, in autumn 1876.

D. L. digitately 3-4-foliate, stems more or less flat.

20. *V. planifolia*, Hook. f. Sikkim, lower hills, to 1000 ft., Anam, Khasi and Garo hills. A woody climber, ascending to the top of the tallest trees, sending down from its branches long thin leafless tendrils, stems 1/2 to 1 in. diam., young shoots hairy pubescent, with a rounded base, peduncles 1-1 1/2 in. long. Fl. 4-5-merous, the round 1/2 in. diam., 1-seeded. 21. *V. elongata*, Wall. Sikkim, Terai and hills to 1000 ft., Sibet, Burma, Kanchi, North Kanara (on the coast). A large glabrous climber, stems rather flattened. Fl. 4-5-merous. Fr. oblong, 1-seeded, 1/2 in. long.

E. L. pedately 5-11-foliate. Cymes mostly axillary. Fl. unisexual, bisexual in *V. pedata*.

22. *V. lanceolaria*, Wall.; Brandis, F. Fl. Ind. Wight in Journ. Vern. Botany, Thoug. Ser. Mar.; *V. lanceolaria*, Burma.

A large woody evergreen glabrous climber, stems, branches and petioles often corky-tubercled, tendrils simple, glabrous. L. pedately 5-foliate, those of opposite shoots often 3-foliate, leaflets lanceolate or ovate-lanceolate, distinctly serrate, 3-5 in. long. Fl. unisexual, pale yellow, sometimes 5-merous, stigma 1-lobed. Cymes axillary, dichotomously compound, peduncles short, the female cymes smaller, petals distinct. Fr. 1/2 in. diam.

Kanchi, Nepal, Orissa forests, Sikkim to 1000 ft., Sibet, Manipur, Western Ghats, from North Kanara southwards, Andaman, Lower Burma. Fl. Petal. April. Another closely allied is 23. *V. Hookeri*, Lawson. Sikkim, Assam, Burma, China, India, Ceylon, Java. Leaflets larger and 6-10 in. diam. 24. *V. cuneolata*, B. Don, pedately 5-7-foliate. Himalaya from Simla eastward, 3-5000 ft., Khasi hills. Stems slender, leaflets 1/2 in. 25. *V. ramicaperna*, Lawson, Hook. f. Nep. Sikkim, 5-7000 ft., Khasi hills, Manipur. A large glabrous climber, branches covered with corky tubercles, stems compound trifoliate, simple, long with many leaflets. Fr. oblong, seed broadly triangular-ovoid, tree.

6. *V. pedata*, Willd.; Kurz F. Fl. 227a.

A woody climber, more or less softly pubescent. L. 7-11-foliate, leaflets numerous, 4-8 in. long. Gynae. whorlings axillary, compound-tilt-bulbous. Fl. white or greenish-yellow, bisexual. Fr. $\frac{1}{2}$ in. diam., 3-4-seeded.

Assam, Khasi and Naga hills. Burma. West side of the Peninsula from the Kowloon coast to P. H. S. R. S. A remarkable species with glaucous leaves. *V. rufifolia*, Wall. Assam and Khasi hills.

7. *LEEA*, Linn.; Fl. Brit. Ind. 694.

Large tree or erect shrub, stems and branches generally furrowed. L. uniserrate, or triplicate, rarely simple, leaflets opposite, petioles with broad sheathing base. Fl. pentamerous, in compound corymbose cymes, peduncles leafy-petioled, no bracts, petals more or less covering at the base and adhering to the staminal tube. Stamens 5, filaments short, inserted by the centre of the left staminal tube. Ovary 3-6-celled, one ovule in each cell, style short. Fr. a berry, seeds 3-4. Species 15, tropical Asia, a few in Africa and Australia.

A. Petals red.

1. *L. alata*, Edgew. & Bransley F. Fl. 102. Vern. *Loi galeni*, Nep.

A shrub 2-5 ft. Branches stiff, not succulent. L. pinnate, glabrous, leaflets 2-4 in. long, sessile, oblong, sharply serrate, 6-10 in. rachis often narrowly winged. Fl. in dense rusty corymbs. Fr. red, $\frac{1}{2}$ in. diam.

India, Malabar coast from the Tinnai coastward. Malay-India. Fl. July-Aug.

2. *L. acuminata*, Wall.; Clarke in Trimen's Journal of Botany, vol. 10 (1881), p. 102. Vern. *Loi galeni*, Nep.

A large herbaceous shrub. L. bipinnate, leaflets ovate-lanceolate, acuminate, serrate-serrate, blade 4-6, petioles $\frac{1}{2}$ - $\frac{3}{4}$ in. Corymbs coral-red. Fr. magenta-lilac.

Sikkim, ascending to 3000 ft. Assam, Manipur, Assam. Fl. May-July. 3. *L. wightii* (Clarke) *L. wightii* in Wight Ill. (A List of Res.) Malabar Coast (Dum. L. Wightii) leaflets ovate-lanceolate, serrate, 4-12 in. long, conspicuous beneath.

B. Petals greenish-white.

4. *L. sambucina*, Willd.; Kurz F. Fl. 270.—Syn. *L. Staphylea*, Roxb. Wight Ill. 1. 78. Vern. *Dhoo*, Mar.

A large shrub, glabrous. L. 2-3-pinnate, leaflets elliptic-oblong, coarsely serrate, blade 3-8, petiole $\frac{1}{2}$ - $\frac{3}{4}$ in. Corymbs spreading, 3-6 in. diam. Fr. black or dark blue.

5-6 km. ascending to 4000 ft. Lower Bengal. West side of the Peninsula from the Kowloon coastwards, Andamans, Burma. Fl. May-Aug. Malay Peninsula, Ceylon. In some districts numerous short aerial roots descend from the branches. Closely allied and perhaps not specifically distinct are: 5. *L. gigantea* Griff. Tenasserim, Malay Peninsula. A small tree with a single stem. 6. *L. umbroscifera*, C. D. Clarke, Sikkim, chiefly in valleys, ascending to 3000 ft. A tree attaining 50 ft., trunk as thick as a man's body.

7. *L. aequata*, Linn.; Kurz F. Fl. 281.—Syn. *L. hirta*, Roxb.; Fl. Brit. Ind. 694.

A large shrub, branchlets, petioles and underside of leaves hirsute. L. 2-3-pinnate, leaflets serrate-oblong-lanceolate, 5-10 in. long, on the underside with numerous flat glaucular disks, petioles short. Fr. black, $\frac{1}{2}$ in. diam.

Sikkim, ascending to 2000 ft. Assam, Khasi hills, Garo hills, Chittagong, Lower Burma, Andamans. Evergreen forests near Karwar, Taloo, List 57. Fl. R. S. 5. *L. robusta*, Roxb. Sikkim, to 1000 ft. Singhbora, Chasala district C.P. More like *K. umbroscifera*, Andamans, Lower Bengal. Differs from 7 by the absence of the disks.

Staphylea Emodi, Wall. *Vern. Ind. Ind. (1830)*, *Nepalensis*, *Edgew. Pr. Trees*, India. North-West Himalaya, India to the Satlej river, descends to 2,500 and ascends to 9,000 ft. Partially scattered singly or in small and coniferous forests. A herbaceous small nearly glabrous tree, bark marked with conspicuous raised white longitudinal stripes. L. trifoliate, compound petiole at least as or longer than leaflets. Leaflets ovate, pale beneath, 4-6 in. long, the terminal petiolulate, the lateral sessile. Stipules linear, scapels setaceous, both early deciduous. Fl. bisexual, regular, pentamerous, in terminal short compound erect or drooping panicles, with numerous deciduous bractlets. Petals as long as calyx segments, both white, stamens 6, inserted outside the disk below its edge, anthers exserted. Fr. a membranous inflated capsule, 2-celled, bilobed at the apex. Seeds few, compressed, bright brownish-grey, embryo straight, to the axis of a fleshy albumen, cotyledons thin flat. Closely allied to, and may be regarded as a local form of, the North American *S. trifida*, Linn.

ORDER XXXVIII. ACERACEÆ. Pax in Engl. n.

Prantl iii. 5. 263.

Shrubs or trees. L. opposite, stipules 0. Fl. regular, polygamous, disk generally annular. Stamens inserted outside or upon, rarely inside, the disk, filaments free, as a rule glabrous. Ovary of 2 carpels, 2-celled, 2-lobed. Fruiting carpels winged, albumen 0.

ACER, Tournef.: Fl. Brit. Ind. 1. 612.

Trees, mostly deciduous, buds covered with scales, the outer short, coriaceous, the inner developing when the buds open, oblong, membranous. Fl. male and bisexual usually on different trees. Calyx generally 5-, sometimes 4-12-parted, deciduous. Disk thick, annular or cup-shaped. Stamens 4-12, generally 8, inserted on the disk, inside it or outside, filaments shorter in the bisexual, longer in the male flower. Petals none, or as many as calyx lobes, similar to them in colour and substance. Ovary of 2 carpels, 2 ovules in each, which develop in winged-seeded samaras, the back produced into a large membranous reticulate wing, the lower edge of which is thickened. Albumen 0. Cotyledons irregularly folded, radicle generally long. Species 100, Europe, Asia and North America.

A. L. undivided.

1. *A. oblongum*, Wall.: Brandis F. Fl. 110. Vern. *Pangol*, *Parango*, Jauns.; *Kirmoli*, N. W.

A middle-sized tree. L. lanceolate-oblong, acuminate, entire, pale beneath, blade 3-5, petiole 1-2 in. Fl. pentamerous, in terminal corymbs, ramifications, pedicels and calyx hairy. Nuts unevenly gibbous, wings 1-1½ in. long.

Sivalik tract and outer Himalaya, Bhotan to Bhutan, ascending to 9,000 ft. Assam & China. New leaves of the young shoots of a beautiful brown colour. Fl. Feb.-April.

2. *A. lauratum*, Wall. Pl. A. Bar. t. 191. Outer Himalaya, Garhwal to Sikkim, 5-9,000 ft. Khasi hills. *Patti*, Nep. A large tree, differs from 1. by short petioles ½ in. long. L. not glabrous beneath, reticulate veins conspicuous. Fl. in lax terminal glabrous panicles, pedicels and calyx glabrous, nuts smooth.

3. *A. nigrum*, Blume, Assam hills of Martaban and Tenasserim. A very large tree, glabrous. L. ovate-lanceolate, entire, white beneath. Fl. in racemose glabrous corymbs. Wings of fruit 1-2 in. long.

4. *A. Hookeri*, Muq.; *Lul Kabañi*, Nep. Sikkim, Bhutan, 7-10,000 ft. A middle-sized tree, often grows from seeds deposited in the fork of other trees. L. glabrous, ovate, caudate-acuminate, base frequently cordate, sometimes slightly lobed, closely serrate, basal nerves 5, blade 4-6, petiole 1½-3½ in. Fl. in lax pendulous racemes, pedicels filiform ½ in. Ripe carpels ½ in.

5. *A. sikkimensis*, Muq. Sikkim, Bhutan, 7-9,000 ft. A middle-sized tree. L. glabrous, shining, bright green on both sides, ovate, acuminate, entire or faintly serrate, base frequently cordate, basal nerves 5, blade 4-5, petiole ½-1 in. Fl. nearly sessile in pendulous spikes. Ripe carpels ½ in.

6. *A. stachyophyllum*, Hieron. Sikkim. L. velvety beneath, ovate, caudate-acuminate, serrate. Ripe carpels 1½-2 in. long.

B. L. 3-7-lobed.

7. *A. pentapomicum*, J. L. Stearns & Brandis, F. Fl. III, Veru. Trans. Bot.

A middle-sized or small tree. L. leaf older than long, generally of somewhat 5-lobed, lobes spreading, obtusely dentate. Basal nerves 5, blade 3, petiole 3 in. long. Carpels 1 in., wings erect or diverging.



FIG. 82.—*Acer villosum*, Wall. 1.

Abundant in Khasia, 2500-5000 ft., common locally and at times almost gregarious.
 7. Pans-Mars. 8. *A. isolobum* Brandis, F. Fl. 289. Hill forests of Maratani, 5-7000 ft.
 L. palmately 5-lobed, rounded at the 3-nerve base.

8. *A. villosum*, Wall.; Brandis, F. Fl. III, Veru. *Limnium*, Kunt.
 Khasia, Jaintia.

A large tree, young shoots and inflorescence clothed with long silky hairs. L. glabrous above when full grown, green and often pubescent beneath, cordate, 5-lobed, the two outer lobes very small, irregularly and remotely dentate. Blade 5-7, petiole 4-6 in., basal nerves 5, the three inner pinnately. Fl. below the leaf, in pendulous racemiform panicles, at the axils of short lateral branches. Stamens 8 in the ♂ flower, much longer than calyx. Ripeness, 1 1/2-2 in. long.

Wings elongate, upright, broad. Nuts large, globose, base pubescent. Fructification
forming a structure 4-5 in. across.

South West Himalaya, 20000 ft. to 25000 ft. Kashmir, Kunwar, Fl. J. in May
to June. *A. caudatum*, Wall. Sikkim, Himalaya, Nepal, China. Generally called *Agnimoni*.
Petioles and rachis generally small. Petals bright red, 2-3 in. long, wings
narrowed at the base.

11. *A. exaltatum*, Wall.; Brandis F. Fl. tab. 31. Vern. *Mandar*, *Trikhina*,
Indol, Phooj, *Kutaja*, N. W.

A large deciduous tree, trunk tall, straight, buds glabrous, the inner bud
scales densely silky outside, petioles red. L. pale beneath cordate 5-lobed,
lobes broadly triangular, the two outer lobes smaller serratures large abrupt
toothed nerves numerous secondary nerves on the 3 inner nerves, blade 4-5
petiole 3-4 in. Fl. appearing soon after the leaves in terminal corymbose
panicles. Nuts unevenly gibbous, wings slightly divergent.

South West Himalaya, India to Nepal 4-10000 ft. Fl. April, May



Fig. 82—*Agnimoni*, Thunb.

12. *A. caudatum*, Wall. Pl. As. Bar. t. 132; Collett Simla Fl. in. 1861.
Vern. *Jurkoni*, Mahara; *Kotaji*, Jams, *Kalotaji*, Nep.

A large deciduous tree. L. 5-lobed, lobes longicommittate, the two outer small
to 1/2-1 in., petiole 2-4 in. long. Fl. in lateral and terminal short glabrous
corymbose racemes. Fruiting panicles long, pendulous, carpels 1-1 1/2 in., bright
red, wings divergent or divaricate.

South West Himalaya, Kashmir to Nepal 4000 ft. Fl. March, April, Sikkim
and the Chumbi valley extending to 5000 ft. The Sikkim tree often has divergent
wings. This is *A. parviflorum*, Wall. Pax & Engelm. Bot. Jahrb. vii. 243. 1891.
A. papillo, King, Journ. As. Soc. vol. 10 (1897), Bot. Annals Bot. Garden, Calcutta, IX. 1897.
W. Himal. 11-12,500 ft. A small tree. L. similar to *A. caudatum*, inferior veins
are present, ramifications panicle. Carpels 1 1/2 in. long, wings obliquely and broadly
truncate triangular.

13. *A. pictum*, Thunb.; Brandis F. Fl. 112. Syn. *A. cultusatum*, Wall.
Collett Simla Fl. 59. Vern. Kashmir; *Kotaji*, Buss; *Kotichit*, *Kalotaji*, N. W.

A large glabrous deciduous tree, inner bud scales oblong, bright brown, silky

1. *ÆSCULUS*, Flourens; Fl. Brit. Ind. 1, 675.

Deciduous trees, with large scaly buds and opposite dichotomous leaves, stipules 0. Fl. showy, zygomorphic, in an axillary upright terminal panicle, polygamous. The fertile flower generally near the base of the branches of the panicle, pedicels articulate, bracts deciduous. Calyx campanulate, 5-lobed, the lobes more or less unequal. Petals 5, often only 4 from the abortion of the 5th. Stamens 5-8, long, inserted inside of a lobed disk. Ovary 3-celled, 2 ovules in each cell. Fr. a large leathery capsule, loculicidally 2-3-valved, seeds 1-3, large, testa cartilaginous, shining. Cotyledons thick, fleshy, immiscuous on the short cylindrical radicle, albumen 0. Species 14. Asia and North America.

1. *A. indica*, Colebr.; Brandis F. Fl. t. 10. —Syn. *Picia indica*, Walp. Jacquemont Voy. Bot. 1, 35; *The Indian Hort. Chestnut*, Vern. *Indrajit*, Trans. Indus; *Kakra*, Kashmir; *Bankhor*, *Kharor*, Plin.; *Pe*, Kan.; *Pangar*, *Kandur*, Java.

A large deciduous tree, trunk short, attaining a large girth, wood white, soft, close-grained, med. rays very fine, very numerous. Outer scales of buds coriaceous, resinous, shining, inner membranous, slightly pubescent, oblong, 2 in. long, the leaves immediately above them with a broad membranous petiole, leaflets 5-9, sharply serrate, blade 1-3, petioles 1-1 in. long. Panicle 12-15 in. long, bearing numerous short-pedunculate scorpioid cymes. Calyx 1 in. long, irregularly lobed, often splitting so as to appear 2-lipped. Petals 4, white, red and yellow, 2 narrower than the rest. Stamens 7 or 8, filaments longer than petals. Disk unilateral. Capsule brown when ripe, rough, not echinate, irregularly ovoid. Seeds 1-2 in. diam.

Trees 6000 ft. in Kafiristan, 7-8000 ft. North-West Himalaya, 1000-2000 ft. India to N. evidently in moist and shady valleys. Fl. April-May. Closely allied to *A. pinnata*, Wall. (*Chetivandi*, *Diagon*, Nep.; Sikkim Hooker, Western Districts Khasi Hills, Upper Burma, Tenasserim, Siam, Tonkin). L. thickly coriaceous, leaflets nearly sessile, up to 15 in. long, minutely serrate. Panicle of scorpioid cymes on long peduncles, branches of panicle peduncles and cymes up to 1 1/2 in. long. Calyx 1 and 1/2 small and 1 broad unequal segment. Seeds 1 in. diam.

Pometia pinnata, Forst.; Kurz in Journ. As. Soc. Beng. vol. 6, 41. —Syn. *P. tomentosa*, Kurz F. Fl. 1, 250; *P. ovata*, Bodd. Fl. Sylv. s. 157. Andamans, very common. Ceylon, Malay Peninsula. A middle-sized tree, L. pinnatifid, leaflets 4-9 pairs, the upper 4-12 in. long, the lower pair small, round, resembling stipules, deciduous. Fl. minute, polygamous, in long cylindrical paniculate racemes. Calyx cup-shaped, persistent, teeth 4-5, triangular, petals 4 or 5, small, without scales. Disk complete, glabrous. Stamens 5 or 6, anthers small, filaments hairy, long exerted. Ovary rarely two oblong drupes, 1/4-1/2 in. long.

2. *ALLOPHYLUS*, Loos; Fl. Brit. Ind. 1, 675.

Shrubs or small trees. L. simple or trifoliate, stipules 0. Fl. minute, polygamous, slightly zygomorphic, in apiciform racemes. Sepals 1, in pairs, the outer smaller. Petals 4, with a large hairy scale at the base. Disk one-sided, consisting of 4 rounded glands. Stamens 8, inserted inside the disk. Ovary 2-lobed, 2-celled, 1 ovule in each cell. Fr. indehiscent of 2 distinct carpels. Cotyledons plicate, no endosperm. Species 81-90, in the tropics of all continents.

1. *A. Cobbe*, Blume; Kurz F. Fl. 1, 299 (including *A. serpentis*, DC. and *A. apocynicus*, Kz.). —Syn. *Schoulderia Cobbe*, DC.; Wight Ic. t. 934, 2; *S. villosa*, Wight Ic. t. 401; *S. Rhacellii*, Wight Ic. t. 404; *Grafftypha serrata*, Ruhl. Cop. Pl. t. 61. Vern. *Typani*, Mar.; *Graffuti*, Tel.

A tall, much branched scrambling shrub, or small tree, young shoots densely tomentose. L. trifoliate, petiole 3-4 in., leaflets more or less serrate, softly pubescent on both sides, paler beneath. Fl. short, white or pale-yellow, in

short petioles, the small fascicles on axillary stipules, or small
 often paniculate, generally simple, sepals and petals nearly equal in size. Stamens usually



FIG. 54.—*Alphitonia indica* Ham.

of the same length as the
 filaments, usually
 of the same length as the
 filaments.

Alphitonia indica (Ham.) King
 Western Peninsula, Malacca, Kuala Lumpur, Cherting, 1897, May-July. An irregularly variable plant. Fl. in racemes. Sepals 5, glabrous, broadly elliptic, tertiary veins reticulate, conspicuous. Fl. in simple terminal panicles. *A. royleana* Link. Sikkim, Nepal and outer hills, ascending to 3000 ft. Assam, Cachar, Malacca, Peninsular and Ceylon. Leaves glabrous, alternate serrate, ascending into the axillary blade. 10-15 petioles. Fr. red. (Indiana.)

3. **GUIOA**, Cav. & King
 in Journ. As. Soc. Bengal, 65 (1817) 413.

Erect shrubs or trees. Leaves alternate, pinnate, stipules 0, leaflets lanceolate, entire, ovate, serrate. Fl. paniculate, nearly glabrous in

ind, in simple or branched racemes. Sepals round, thick, concave, pubescent at the edges, imbricate. Petals with 2 pectinate scales. Disk generally incomplete. Stamens 8. Ovary 3-celled, 3-angled, ovules one in each cell, 2-lobed, 3-winged capsule. Cotyledons fleshy and oily, lobed. Species 33, Indo-Malayan region, Australia, Oceania.

G. hirsuta Benth. *Cephaelis hirsuta*, Kurz, Fl. Brit. Ind., 1867. Tree or shrub, small, evergreen tree. Branchlets, leaves and inflorescence pubescent. Fl. in panicles, pair 2-3 in. long. Fr. 1 in. diam. *G. squarrosa*, Benth. *Cephaelis squarrosa*, Kurz, Tenasserim, Malacca, Peninsular. A slender tree. Branchlets shortly hairy, pubescent, leaflets glabrous. Fl. in panicles, pair 2-3 in. diam.

4. **DODONÆA**, Link.; Fl. Brit. Ind., 1867.

Species 46, mostly Australian.

D. viscosa, Link.; Brandis, F. Fl. 113.—Syn. *D. Burmanniana*, DC. Wight, Ill. 1, 52. Vera *Glaucocarpus*, Baluch. *Sonchella*, Meadus, Ph. *Kandara*, C.P. *Haudra*, Bendureh, Kan.

A gregarious shrub or small tree, attaining at times 20 ft., heart-shaped dark green, extremely hard, mol. rays fine. Branchlets angular, young shoots lower or less viscid with bright yellow resin. Lvs. varying from lanceolate to linear-cuneate, coriaceous, glabrous, shining, tapering into a short marginate petiole, midrib prominent, sec. n. numerous. Fl. regularly polygamous, in short terminal panicles. Sepals 5, petals 0. Stamens usually 8, as long as sepals in ♂, shorter than sepals in ♀, filaments much shorter than anthers. Disk inconspicuous. Ovary 3- or 4-celled, 2 ovules in each

all style cylindrical, 2-lobed at top, calyx membranous, sepals with 2-4 br. or wings from base to style, $\frac{1}{2}$ in. long and $\frac{1}{2}$ in. across including the wings, separating superficially into as many valves as cells, each valve winged on its back. Seeds opaque, dark brown or black, with a thickened lamella.

Tree in India, Afghanistan and Baluchistan. Common locally, often entering extensive tracts in the drier regions of North-West and Central India as well as in the Deccan. Also in the southeast. Fl. R. S. Fl. U. S. Ceylon, Malay Peninsula and Archipelago. Tropics of most countries. A most interesting genus, which may possibly not belong to Sapindaceæ.

Rhusa bracteata, Benth., Baluchistan 6000 ft., Afghanistan, Eastern Persia. A small shrubby tree 6-12 ft. high. Ls. hoary, gray, generally fasciculate. Fl. yellow, in axillary fascicles. Sepals 5, elliptic, petals 4, singly on a hairy claw. Disk oblong, 3-4 mm. long, 8 filaments hairy below, capsule membranous, inflated, slightly trigonous-sculptured, of a brilliant yellowish-red colour.

5. HARPULLIA, Roxb., Fl. Brit. Ind. 1: 691.

Species 6, Madagascar, Northern Australia, tropical Asia.

H. cupanioides, Roxb.—Syn. *H. imbricata*, Thunb.; Boiss., Fl. Sylv. 1: 158. Vern. *Harpullia*, Gutt.

A tall tree, l. pinnate. Leaflets opposite or alternate, 3-6 pair, glabrous, 3-8 in. long. Fl. regular, 5-merous, polygamous, $\frac{1}{2}$ in. long, in cymes panicles. Sepals erect, equal, imbricate, minutely pubescent outside, petals clawed, longer than sepals. Stamens 5, glabrous, inserted inside the small puberulous disk. Ovary 2-celled, ovules 2 in each cell, style filiform, stigma not or less exserted. Fr. an inflated 2-lobed capsule, brilliant orange, each lobe opening by 2 valves. Seeds black, usually one in each lobe.

Common in the evergreen forests of the Western Ghats from the Konkan southward to Cochin, Andaman. Fl. U. S. Fl. H. S. A beautiful sight when covered with the brilliant orange fruit. (Boiss.) Ceylon, Malay Peninsula and Archipelago, Yunnan, Trimen, Handboek Ceylon 1: 312, regards the plant of Ceylon and the Western Peninsula *H. fuchicola*, Thunb., as different from the eastern tree.

Parastrobilium xanthophyllum, Miq.; Kurz F. Fl. 1: 286 (*Sapphyretalum xanthophyllum*, H. & A., Hooker's Valley, Upper Burma, Tenasserim (Kurz), Sumatra. A small tree, green tree. L. serrate, lining, in pinnate leaflets opposite, 2-4 pair, entire, 10-14 pair, blade 4-8, petiole 1-2 in. Fl. minute, pink, in rusty-tomentose panicles, generally on the old wood. Petals 5, each forming a turbinate cup, glabrous outside, villous inside. Fr. a dehiscent 2-valved capsule, imbricate.

Lepidopytalum Jackianum, Baill.; Ann. Bot. Gard. Calcutta 1: 23. (*Cupania Jackiana*, H. & A.) Nodular leaved. A small tree. L. pinnate, leaflets chartaceous, shining on both sides, 2-5 pair, alternate or rarely opposite, 5-8-10 pair, arching, ovate, beneath veins finely reticulate. Fl. tetramerous in short axillary racemes. Sepals broad, the petals much shorter than sepals, each with a large scale adnate to its edge. Stamens 8, short, filaments glabrous, anthers hirsute. Capsule 6-angled, compressed, 4-5 in. long, reddish-brown when ripe, dehiscent, 2-valved. Seed 1, black, still in pale pink or white.

6. MISCHOCARPUS, Blume; King Journ. As. Soc. Bengal, vol. 63, 1897, p. 117.

Trees. L. alternate, pinnate, stipules 6 leaflets entire, reticulate veins conspicuous. Fl. pentamerous, in axillary simple or branched racemes. Calyx axillate, cup-shaped. Petals in some species wanting. Disk entire, annular. Stamens 5 or fewer. Capsule pyriform, blunt, 3-celled, 2-4 enveloped in a thin arilla. Species 12. Indo-Malayan and Australasian.

M. fuscescens, Blume.—Syn. *Cupania Helferi*, Hieron., Kurz F. Fl. 1: 285.

A large glabrous tree, only inflorescence puberulous. Leaflets 4-5, shining

leaves ovate, fl. small, subsessile, numerous, pendulous, in very hairy axillary panicles 1-2 in. long. Sepals 2-3, slightly imbricate, glabrous, persistent, pale to yellow as scales, in ♀ small. Disk very hairy. Ovary globose, 2-celled, 1-2 cells in each cell, style short, curved. Three seeds, 1 in each, spindle-shaped, shining, best 1, cotyl. 2, each triangular.

Woods, etc. from Malabar southwards, St. James, Pondicherry, Cochin, etc. (S. India). The genus has been transferred by Baill. from *Albizia* to *Sapindaceae*.

3. LEPISANTHES, III. Fl. Bot. Ind. 1874 including *Hemiglossum*, III 571.

Tree or shrub. L. alternate, pinnate, stipules 0, leaflets entire, rarely cuneate, petiolate, venation pinnate or venate. Fl. polygamous, 4-6-nerved, in racemes or cymes, the uniform panicles, the branches of which are bracteate, composed of nearly equal length, bearing one or numerous flowers, sepals long and narrow, slightly imbricate. Petals usually equal, each with 1 or 2 hairy lobes, arched. Ovary entire 2-celled, or 1-celled solitary in each cell. Fl. 3-celled. Style 1-2, thick, fleshy, obliquely superposed, albumen 0. Species 16, India, Malabar region.

A. Western species.

1. *L. tetraphylla*, Walp. Syn. II. *Hemiglossum tetraphyllum*, Roth. Cor. Pl. 3. 61. *Hemiglossum tetraphyllum*, Walp. Bot. Fl. Sylv. 1: 151. Vern. Kooch, Tel.

A small to medium tree, dark grey. Branchlets, petioles and leaflets more pubescent or tomentose. Leaflets nearly opposite, 2 hair, entire, thick, 1-2 periclype thick, 1 in. long. Fl. white in racemes 2-3 in. long, pedicels included, when on the old wood, or arranged in terminal or axillary panicles, 2 seeds 4, 2 per. generally 5, obovate, claw hairy, basal scales woolly, leaflets dark greenish, uncinated. Stamens 8, collateral, filaments hairy. Fr. 7 in. long, greyish-brown.

Woods and hillsides of the Peninsula, also in the Kankam, Tenasserim, Fl. Ind. Malay. *L. L. deltoidea*, Walp. *Hemiglossum deltoideum*, Roth. Fl. Sylv. 1: 151. *Adiantum deltoideum*, Thunberg. *Thunbergia deltoidea*. A small tree, 2-3 in. high, 1-2 per. Fl. in narrow racemes 2-3 in. long, with numerous short hairs in the axils.

B. Eastern species.

2. *L. cadamiana*, King. *Andropogon*. Leaflets 1-2 per. Fl. 1 in. diam. in racemes, panicles the ultimate branch 1/2 in. long, 1-2 flowers. 4. *L. Surinamensis*, Kunt. Fl. Ind. Malay. southern and eastern slopes, Thunberg's plant. *Andropogon*. Hills between the river and Baling river (DB. February, 1882). An evergreen tree, the trunk much branched with few branches. Leaflets 4-6 per. each 1/2 in. long, 1/2 in. wide and short, 2-3, and reticulate veins prominent beneath. Fl. 1-2, composed of panicles the ultimate branches 1-2 in. long, many-fl. Fr. 1 in. long, oblique, 2-celled, 2-seed.

4. SCHLEICHERA, Willd.; Fl. Bot. Ind. 1881.

5. *S. trifuga*, Willd. (the only species); Bodd. Fl. Sylv. 1: 119; Brandegee Fl. Ind. 25. Vern. *tanam*, Kankam, Kooch, Hindi; *baen*, Tel; *Sapind*, Koo.

A large deciduous tree, heart-shaped red or reddish-brown, very hairy, close-grained, hard, tough and strong, young it shoots silky. L. pinnate, leaflets opposite, sessile, those of the lowest pair 1-3, of the terminal pair 1-4 in. long. Fl. yellow, male and bisexual generally on different trees, fasciated on interrupted. Rows slender racemes. Calyx small, 4-6-cleft, petals 0.

stamens 8, longer than calyx; filaments long, slender, hairy. Disk 2-4 lobed. Ovary 3-5-lobed; style rigid, stigma 4-lobed; carpels 2-4-lobed, but most 2-lobed, each cell. Fr. 1 in. long, usually 8-lobed, and 4 or 5 seeds brown, enclosed in a succulent arillus of yellowish acid taste, &yleders full of oil.

Sabhalakera tract from the hills, extending to S. 66° E. (Vernon, Province of Western Pannuola, Burma, on the Siam plateau to 5000 ft. altitude). Sapindus, single or a few together, mixed with the other trees of the forest. The old leaves are shed January, February. The young foliage comes out towards the end of March or early in April, while the other trees are in leaf and hence the young shoots deep red. It is with the young leaves. (Mab. Journ. Bot.)

Keropernum muricatum, Baill. *Ch. succulantes*, Kunt. *J. Fl. Ind. 25*, p. 19. Trees. A small evergreen tree. Leaves 1 or 2 pair, petioles long, serrated. Fl. small, in slender axillary often fasciculate racemes, sepals 4, imbricate, the outer smaller, petals 4, scales 0. Ovary 2-lobed, style 1, short, fruiting except when 3-lobed.



FIG. 61.—*Sapindus latifolius*, Vahl.

10. **SAPINDUS**, Linn.; Fl. Brit. Ind. 1. 682, excluding *Quercus*, (a) including *Dittelebaum*, l.c. 671.

Trees. L. alternate, paripinnate, occasionally unilobulate, stipules 0. Fl. 2 and 3. Sepals 5, unequal, petals 4 or 5, nearly equal, disk fleshy, circular or one-sided. Stamens usually 8, filaments hairy, anthers versatile. Ovary 3-lobed, 1 ovule in each cell, style 1. Fr. succulent or fleshy, consisting

Fls. distinct, pedicels and stigmas pericarp containing saponine, black berries (bark with scales). Seeds globose, testa black, embryo curved, cotyled. fleshy with oil. Species 11, tropics of Asia and America.

A. Leafy 2-6 pair, pubescent beneath. Ovary hairy.

1. *S. laurifolius*, Vahl; Trimen *Himal. Cl. Journ.* 206. — Syn. *S. triflorus* Lam. Fl. Brit. Ind. 1827. *N. emarginatus* Vahl; Willd. III. 1. 313. Desf. Fl. Syst. 4: 154. *The Nalpand*, Vern. *Raha*, Hind. *Jratula*, *Jatula* Kan. *Kankulu* Tel.

A large tree. Leaves elliptic, generally obtuse and somewhat emarginate at apex acute. Those of the terminal pair largest, 3-7 in.; induriscous and silky hairy pubescent, petiole 4 or 5, oblong or lanceolate, without scales or with two tufts of white hair. Disk concave, edge fleshy hirsute, anthers slender, apiculate. Ovary densely rusty-tomentose. Drupes 2 or 3, beak slightly united.

Common in the Aravalli hills and in the Western Peninsula, on the coast of Malabar and also cultivated in Bengal and in North India. Fl. Oct. - Dec.

B. Leaves numerous, glabrous. Ovary glabrous.

2. *S. Mukorossi*, Gaertn. — Syn. *S. triflorus* Roxb. *Brouss.* 2. Fl. Ind. Vern. *Raha*, *Thak*, North West Himalaya.

A handsome tree, attaining 60 ft. Leaves generally alternate, lanceolate, 4-6 in. long, the terminal pair smaller, so. n. numerous, close together, with shorter intermediate nerves. Fl. $\frac{1}{2}$ in. diam., mostly biserial, in numerous small generally 3-d. cymes arranged in a terminal compound pyramidal thyrse, cymose stems pubescent. Sepals 5, petals mostly 4, purple, nearly glabrous outside, with ciliate edges, with two scales at the top of claw, rounded with long white woolly hairs. Stamens 8, long exserted anthers about elliptic, not apiculate. Disk complete, glabrous. Drupes fleshy, $\frac{1}{2}$ in. long, solitary or in pairs.

North West Himalaya from the Siwalik upward, 2-4000 ft. Assam, India, Ceylon, Java, North West India and Bengal. Fl. May, June. Cultiv. cultivated in Japan. The wood is the pulp of the fruit is an article of trade. Similar in appearance with that of the structure of flowers is *S. & Karik* Blume *Atrop. Bot.* vol. III. p. 106. *Thalassia* Bernh. Hook. f. is abundant evergreen forests in the Mts. near 700 ft. in Upper Burma (Singapore, Burma, Malay Peninsula and Archipelago, attains 50 ft. Fl. May, June. Sepals 5, as well as petals 4, densely silky at base, petals with a dense white, broad scale parallel to and nearly as long as blade. Disk semicircular, glabrous, white. Stamens 8, as long as petals, anthers short, elliptic, not apiculate. Rays mostly usually solitary, 1-12 in. diam., with 2 small under-chapel carpels at the base.

II. APHANIA, Blume: King in Journ. As. Soc. Beng. vol. 65 1867, 425.

Trees or shrubs. L. alternate, pinnate, sometimes unifoliate, leaflets entire, nearly opposite. Fl. 4-5-merous racemose or paniculate. Sepals later, petaloid, white imbricate, petals 4-6, small. Disk complete, slightly lobed. Fr. fleshy, deeply divided into divergent lobes, united only at the base. Species 12, one African, the others in the Indo-Malayan region.

1. *A. Danura*, Ruffe. — Syn. *Sapindus Danura* Voigt (Kurz F. Fl. 1: 296. *Nanaha*, Beng.

Especially a shrub or small tree. L. unifoliate, often crowded so as to appear verticillate, glabrous, shining on both surfaces, entire, 6-12 in. long, petiole thick, very short. Fl. numerous, white and pink, sometimes a few terminal pedunculata pubescent panicles. Sepals unequal, petals with a hairy scale at their base, disk annular. Stamens 6-8. Ovary 2-lobed, style lobed. Ripe carpels fleshy, $\frac{1}{2}$ in. long, generally 1 only.

A. on the hills of Tibet, Darjeel, Chittagong, Andaman. Lower Burma on the

tree or shrub. Leaves green, yellow, or grey above, pale green and beneath. Fl. (bracts) glabrous. Hairs yellow, sometimes reddish. The tree is sometimes hairy, the leaves beneath glabrous. Leaves 2-4 in. long, 1-2 in. wide, the end of a narrow petiole, the petiole itself usually ending in a short, rather stiff stalk at base. Large flowers of *A. indicum*. In the Andamans and Nicobars. A very common and delicious axillary panicle for the natives all round with a short stalk at base.

4. *A. rubra*, Benth.—Syn. *Sapindus attenuatus*, Wallr.; *Nephelium rubrum*, G. Don; Wright, *J.*, 24, 25.

A shrub or small tree. L. sometimes unfoliolate, usually pinnately 3-foliate, cinnaceous, usually 4-5 pair, mostly opposite, glabrous, 4-18 in. long. Fl. dark red, 4-5-merous, nearly glabrous, in large terminal or axillary panicles, petals about as long as sepals. Fr. red, lobed, elliptical, 1 in. long, sikkim, Terai and other hills to 8000 ft. Assam, Sikkim, Ceylon, Java, Borneo, Malacca.

Ternstroemia erycina, Benth. (*Sapindus erycina* Hopen); *Nephelium erycina*, DC. Fl. Ind. Austral. 74. A large erect shrub, common on the western Ghats from the Western Ghats southwards. Leaves chartaceous, pale, 4-5 pair, glabrous. Fl. white, some in terminal panicles, petals difficult to count with a hind view, entire, slightly fringing, areals glabrous, yellow, 1 in. long, 1/2 in. broad.

12. ERIOGLOSSUM, Blume; Fl. Brit. Ind. 2, 623.

Species 2, only in New Guinea.

E. rubiginosum, 10; Blume, *J.* Fl. 107.—Syn. *E. simile*, Blume; *Sapindus rubiginosus*, Roxb., *Cor.* Pl. 3, 62. Vern. *Andhiana*, Upper Burma.

A large shrub or middle-sized tree. Branchlets, young leaves and inflorescences clothed with dense rusty-golden tomentum. L. pinnate, leaves opposite or alternate, 4-8 pair, 6-7 in. long, often tomentose beneath. The greenish-white, in a pyramidal thyrse composed of long racemes, bearing numerous small 3-5-fl. cymes with linear densely silky bracts, which are much longer than the bracts. Sepals 5, petals 4, unilateral, longer than sepals, each with a hind woolly scale at the base. Disk one-lobed. Stamens 8. Carpels glabrous, purplish black, 1/2 in. long, sweet, edible.

Only forest, Sikkim, Terai, Assam, Burma, Okinawa hills, Northern China, North Katsun, Indragiri, B. Andamans, Newburg, Upper and Lower Burma, Fl. Ind. Austral. Malacca, Borneo and Archipelago, Australia.

13. NEPHELIUM, Linn.; Fl. Brit. Ind. 2, 686.

Trees & shrubs. L. pinnate. Fl. regular, ♂ and ♀ in large terminal and axillary panicles. Calyx cup-shaped, almost truncate or deeply 4-8-lobed, petals small, with net scales, often 0. Disk fleshy, complete. Stamens 6-10, filaments usually pubescent. Ovary pubescent, usually verrucose, with 1-lobed, 1-ruled, style erect, 2-3-lobed. Fr. induriscant, consisting of 1-2 globose or oblong carpels, generally echinate or tubercled. Seeds globose, enclosed in a pulpy aril, cotyledons thick, fleshy, usually oblique & compressed. Species 20, Indo-Malayan regions and South China.

1. *N. longana*, Camb.—Syn. *Euphonia longana*, Benth.; Fl. Austral. 76. Vern. B. Camb. Mar.; *Kanlaudoll*, Kan.; *Kytsauk*, lower, *Tanbauk*, upper Burma.

A middle-sized tree, attaining 50 ft. Leaves coriaceous, 2-6 pair, shining above, glaucous and often slightly pubescent beneath, panicles simple, rusty pubescent. Fl. numerous, 1 in. across. Calyx tomentose, 6-merous, 3-4 narrowly imbricate, petals pubescent, spatulate, as long as calyx. Stamens 6-10, in ♂ long exserted, in ♀ as long as calyx, filaments lathy, lower base,

anthers glabrous. Ovary 2-3-lobed, hairy. Carpel usually one, ovoid or globose, nearly smooth, yellowish-red, 1/4 in. diam. Seed entirely enclosed by the succulent sweet edible arillus.

West side of the Peninsula, in evergreen forest, from the Kankai southwards, Khasi hills, Burma. Cultivated in Northern India. Fl. H. S. C. v. h. Malay Peninsula, South China. A variety with leaves tomentose beneath and panicles 15 in. long, has been sent by Smiles from Upper Burma, under the name *Kyaba*, usually the name of *Wibawa piceifolia*. *N. hypoleucum*, Kurz. Eastern slopes of the Pegu Yoma and Martaban hills, with ovoid carpels, probably is only a variety. *N. stipulaceum*, Bedd. Fl. Sylv. t. 106. (*Otonophellium stipulaceum*, Radlk.) Moist forests in Malabar and on the Anamalais. A middle-sized tree. Leaflets 2-4 pair, the lowest pair small, outwardly curved or reniform, close to the base of petiole, resembling stipules. Calyx segments 4-8 large, valvate, petals 0, fruit carpels ovoid, densely covered with dark prickles, 1/2 in. long, seed half covered with the succulent arillus. *N. E. lappaceum*, Merr. *Picris* Fl. For. Cochinch. t. 319. Indigenous in the Malay Peninsula and Archipelago. Cultivated for its fruit (*Ramboutan*). Fl. 1/2 in. diam. Sepals 4-6 sub-valvate, petals 0, fruiting carpels ellipsoid, densely covered with long recurved soft tuberculate broad-based bristles, 1 in. long without the bristles, orange to dark purple when ripe, aril completely enveloping the seed, pale, edible. *N. E. litchi*, Camb. *Wight* in t. 13 *Litchi chinensis*, Sonn.: *Euphorbia*, Burm. Indigenous in China (*Litchi*). Cultivated in tropical and subtropical countries on account of its delicious fruit, entirely glabrous. Leaflets 2-6 pair, glossy, pale beneath, reticulate veins distinct. Fl. minute. Calyx cup-shaped, indistinctly toothed, petals 0, fruiting carpels 2, sharply tuberculate, 1 in. diam., seed completely covered with the succulent arillus.

- The above species are classed under 4 Genera by Radlkofcr:
- 1. *Litchi*. Calyx nearly truncate.
- 2. *Nephelium*. Calyx segments valvate, radicle superior.
- 3. *Euphoria*. Calyx segments imbricate, radicle inferior.
- 4. *Otonophellium*. Calyx segments imbricate, arillus covering half the seed.

ORDER XI. SABIACEÆ. Gen. Pl. i. 413.

Types or shrubs, often climbing. L: alternate, stipules 0. Fl. small, sepals 4-5, petals as many as sepals. Stamens hypogynous, opposite to petals, anther cells distinct, usually adnate to a large connective. Ovary 2-5-celled, styles distinct or connate, ovules 1 or 2 in each cell. Fr. drupaceous. Seed without albumen or with very thin albumen.

- Climbing shrubs, petals equal, all stamens fertile. 1. *SABIA*
- Forest shrubs or trees, petals unequal, 2 stamens fertile, 3 sterile. 2. *MELICOMA*

i SABIA, Colebrooke; Fl. Brit. Ind. ii. 1.

Climbing or sarmentose shrubs, wood normal as far as known, medullary rays broad. L: simple, quite entire, the bud-scales frequently persistent at the base of branchlets. Fl. bisexual, sepals 4-5, equal, petals opposite to sepals, imbricate. Stamens all fertile, inserted on the annular 5-lobed disk, filaments thick. Ovary of two more or less distinct carpels, 2 ovules in each. Fruiting carpels 1 or 2, endocarp hard, rugose, exocarp dry or fleshy. Embryo curved. Species 17, Indo-Malayan region to China and Japan.

A. Peduncles axillary, 1- or few-ld.

- 1. *S. campanulata*, Wall. Himalaya, Kashmir to Sikkim 5-10,000 ft. Manipur. L: membranous, oblong lanceolate, pale beneath, blade 2-4 in., glabrous, narrowed into petiole 1-1/2 in. long, which is often minutely hairy. Peduncles 1-ld., 1-2 in. long; fl. green, brown, or pale purplish-yellow; petals 4-5 in., obtuse, parallel-veined; filaments shorter than petals. Fruiting carpels usually 2, flat, rugose, blue, 1/2 in. diam.
- 2. *S. leptandra*, Hook. f. & Th. Sikkim 4-7,000 ft. Peduncles 1-ld., petals 4 in. Stamens much exceeding petals. *S. S. purpurea*, Hook. f. & Th. Khasi and Naga hills. Peduncles 1-ld., fl. purple, petals 1/2 in., 5-nerved. Fruiting carpels usually 2.

1. *M. malabarica*, David. Annals, hills, 2, 1901 ff. February 2-5 ff. Fr. minute, fruiting carpel solitary, reniform, petiolate.

B. Fl. in axillary or terminal panicles.

2. *M. parviflora*, Wall. Nepal, SIKKIM, BODDICH, Sikkim. Fl. minute in 1-2-panicled cymes, peduncles long, glabrous. Fruiting carpel solitary, generally obcordate 1-1.5 in. long. 3. *M. lanceolata*, Colebrook. Assam, Khasi hills, Maripur. L. lanceolate, blade 5-8, petiole 1-1.5 in., sec. n. almost at right angles to midrib. Panicles axillary, cymes 1-2, dark blue, 1 in. long, woody pulp. 4. *M. hirsutissima*, Wall. Sikkim, Assam, Khasi hills, Chittagong, hills east of Tezpur 1901 ff. (D. B. February, Best, Malay Peninsula. Leaves thickly coriaceous, oblong-lanceolate, blade 4-7, petiole 1-1.5, veins prominently reticulate. Panicles axillary, racemose, glabrous, as long as leaves or longer. Petals obovate 1/2 in. Stamens short, included. 5. *M. paniculata*, Zeyher. Sub-Himalayan tract and outer valleys, from the Jemna eastwards according to (D. B.) ff. Upper Burma (Kymada-lye, Shales, Feb. 1901). Leaves coriaceous, oblong-lanceolate, blade 5-8, petiole 1 in. long, sec. n. and reticulate, veins prominent beneath. Panicles axillary and terminal, racemose, glabrous, yellow, petals oblong 1/2 in. long, stamens included. 6. *M. tomentosa*, Hook. f. Upper Assam or Upper Burma (D. B.). Leaves and petioles clothed with soft spreading hairs. Fruiting carpel solitary, obovate, 1/2 in. long.

2. MELIOSMA, Blume; Fl. Brit. Ind. ii. 3.

Trees or shrubs. L. simple or pinnate. Fl. in large terminal panicles, usually bisexual, supported by bracteoles, which are similar to sepals. Sepals generally 5, somewhat unequal, imbricate, usually glabrous. Petals 5, unequal, the 3 outer concave, orbicular, the 2 inner small, bifid. Stamens 7, two fertile, adnate to the smaller petals, three sterile, opposite to the larger petals, anther cells of the fertile 4 or 5, and globose, attached to a large flat connective. Ovary 2-celled, base surrounded by the cup-shaped membranous toroid disk, ovules 2 in each cell, style 2-3-lobulate. Fr. a drupe, generally oblique and somewhat, as a rule 1-celled, 1-seeded, cotyledons folded, radicle long, twisted. Species over 30, Indo-Malayan region, China, Japan, a smaller number in America.

A. Leaves simple.

1. *M. simplicifolia*, Boxb. Ger. Fl. 1: 254 (Millingtonia). Vern. Chhros, Nep.; Tolo, Ass.; Koko, Mechi; Pih-toung-ging, Burm. (Upper B.) Lalay, Karen.

A middle-sized tree, wood reddish-brown, medullary rays broad, branchlets, petioles and panicles more or less rusty pubescent. L. entire, rarely obtusely toothed while young, oblanceolate blade 6-16, narrowed into petiole 1-2 in. long, sec. n. arching, prominent, tertiary parallel. Fl. yellowish-white, minute, nearly sessile, bracteoles similar to sepals, teeth of inner petals long, subulate, almost filiform.

Sub-Himalayan tract, from Nepal eastwards, in Sikkim 1901 ff. Khasi hills, Chittagong, Tezpur, Upper Burma. Western Peninsula of the Ghat Ghat, from Coimbatore. Fl. December-April. Ceylon.

2. *M. Wightii*, Planchon. — Syn. *M. pungens*, Boxb. Man. 77; *Millingtonia pungens*, Wight Ic. t. 954.

A small tree, branchlets, petioles and panicle rusty tomentose. L. coriaceous, entire, elliptic-lanceolate blade 3-5, petiole 1/2-1 in. Fl. large, sessile, 1/2 in. across, bracteoles numerous, imbricate, teeth of inner petals small.

Western Ghats from the Red Hills to the west, Nilgiris. Fl. May-September. Ceylon, upper mountain zone, common. 3. *M. pungens*, Walpers Rep. 1: 123 (1847). Vern. H. Koko, Koko and Zoko (1899). North-West Himalaya (1800-1800 ff.). Vern. Nep., B. Koko, Koko. Nepal, China, Japan. A small tree, similar to 2 but leaves lanceolate, serrulate, with large distant mucronate serratures, tapering gradually into petiole 1-1.5 in. long. Fl. in the axils of lanceolate deciduous bracts larger than leaves. Ovary supported by 1-2 bracteoles, similar to sepals.

M. dillenianifolia, Blume, *Brasilia* 2, Pl. 115. Collect. Sibola Fl. fig. 33
 Veen. *Sana, Zillies, Karbon, Gai, N. W. Hin.*; *Saupt, Bataraha-g.* Bush

A small deciduous tree, branchlets petioles and inflorescence clothed with ferruginous pubescence. L. membranous, pale beneath, obscurely sharply serrate, with minute hairs on both sides and rusty pubescent on midrib and nerves, blade 6-12, petiole 1-1.5 in. long, sec. n. 13-20 pair, straight, parallel. Fl. white, pedicels nearly as long as flowers in the axils of cauline leaves, to less leaves.

Hinnay, near the Glas eastwards, 1-11, 11, Pl. May-July. *M. sylvatica*, Slecht.

A *Zamia* China, Java, a similar if not identical, the bracts are more persistent. *M. Thomsoni* King MSS. in Hb. Kew. (Sikim) (see 970), a large tree branchlets petioles and underside of leaves densely and softly rusty tomentose, upper side glabrous, young th. tomentose, nerves and midrib. L. cartaceous, teeth short, distinct, blade 4-12, petiole 1-1.5 in. long, panicle longer than leaves, softly tomentose. This doubtless is *M. javanica*, Kurz MSS., described by Sieg. in Journ. As. Soc. Beng. 65 (1867), 116. *M. sylvatica*, Sieb. et. Zucc. in Chinese, and *M. javanica*, Blume, a Javanese Borneo species.

B. Leaves imparipinnate.

M. Arnottiana, Wight III, t. 53 (*Millingtonia*); *Bomb.* Fl. Sylv. 193
Vera, Hull, entony, Tam.; *Kollari, Mal.*

A large tree with a spreading head, branchlets common petiole undersided leaflets and panicle rusty-pubescent. Leaflets 4-7 pair, blade 2-5, petiole 1-1.5 in. long. Fl. crowded, cream-coloured, on very short pedicels, sepals unequal, bracteoles 0.

Western Ghats from Coorg southwards. Nilgiris, Fl. April-June. Ceylon, montane hills, 7. *M. stanaka*, Roth (*Millingtonia*), Sikim, to 1000 ft., Assam, Khasi hills, Cachar. Nearly glabrous, leaflets 5-10 pair, more or less serrate. Fl. white, in loose

in large umbelliform panicles. *M. Wallachi*, Planch. Nepal, Sikim, 3-4, 1991-01, Khasi hills, branchlets common petiole undersided leaflets and panicle rusty-hairy, leaflets 3-4, pale, spinulose-toothed. Fl. minute, greenish-white, on short stout pedicels.

M. Collettiana, King in Journ. As. Soc. Beng. 55 (1867), 116. Mayhew hill, Upper Burma. A middle-sized tree, leaflets 3 pair, rounded and sharply serrate, upper side glabrous except the hairy midrib, underside with scattered hairs. Fl. minute, whitish.

Order XLI. ANACARDIACEÆ. Gen. Pl. i. 413.

Trees or shrubs. L. alternate (opposite in *Bouea, Dolinca*, and occasionally in *Nathageya*), simple, trifoliate or imparipinnate, stipules 0. Fl. regular, unisexual or bisexual, sometimes polygamous. Calyx 3-5-cleft (apathogony in *Gluta*), petals 3-5, free, alternate with sepals, rarely 0. Stamens usually as many as petals and alternating with them, inserted under, rarely on the disk. Ovary superior, inferior in *Holigarna* and *Drinycarpus*, long 2-4-celled, ovules solitary. Fr. a drupe, seed without albumen.

Both male and female in the tree, or a rule in the last (pilsent).

A. Leaves pinnate, trifoliate, in *Gluta* simple

Petals 1-3, stamens 1-10
 Petals 0, stamens 3-5

B. Leaves imparipinnate

I. Ovary 1-celled
 1. Bulbous. Fl. polygamous, stamens 10
 2. Tense, leaflets compound, fl. inferior
 3. Tense, leaflets simple, fl. unisexual
 4. Distichous, stamens 3-10
 5. Rigid, stamens 4

II. Ovary 2-4-celled
 Fl. polygamous, styles 4 or 5, free above
 Fl. unisexual, styles connate

- 1. Rare
- 2. Pinnate

Taxodiaceae (p. 207)
 SARRACENIACEAE (p. 200)

- 3. Ovary
- 4. Pinnate

- 5. Scandent
- 6. Deciduous

C. Leaves simple.

- I. Petals enlarged in fruit.
Fruit stalked
Fruit sessile

7. MELANORRHIZA
8. STYRACIA

- II. Petals not enlarged in fruit, ovary inferior.
Spurs on petioles
Leaves undulate

9. HEDYCARPA
10. DRYINAEUS

- III. Petals not enlarged in fruit, ovary superior.

Leaves opposite, entire

11. BOCCA

Leaves opposite, serrate

DORIXIA (p. 205)

Leaves alternate (see *Nothofagus*).

Stamens twice the number of petals.

Drupe on a fleshy hypocarp.

ANACARDIUM (p. 205)

Drupe on the persistent, not enlarged calyx

12. BECHAMERIA

Stamens as many as petals, one only fertile

13. MANGIFERA

Stamens as many as petals, all fertile.

Fl. bisexual, stamens 4-6

14. GELTA

Fl. polygamous, stamens 4, leaves some-
times opposite

15. NOTHOFAGA

Fl. polygamous or dioecious, stamens 5-6,
drupe on a fleshy hypocarp

16. SERRICARPUS

1. RHUS, Linn.; F. Brit. Ind. iii. 11.

Trees or shrubs, resin ducts filled with a viscous milky, often caustic juice. L. simple, trifoliate or imparipinnate. Fl. small, generally dioecious, white or greenish, in axillary or terminal panicles. Calyx small, 4-6-lobed, persistent, segments imbricate, petals deciduous, equal, imbricate. Disk fleshy, adhering to base of calyx, often 5-lobed, the lobes alternating with stamens and opposite the petals. Ovary 1-celled, styles 3, ovules suspended from a long filiform basal funicle. Fr. a small dry compressed drupe, endocarp coriaceous, crustaceous or bony, the mesocarp often full of resin. Testa thin, membranous, radicle superior, incurved along the edges of the cotyledons (accumbent). Species 120, a few tropical, most in the warmer temperate regions of both hemispheres.

A. Leaves simple*

1. *R. Cotinus*, Linn.; Brandis F. Fl. 118; Collart Sims Fl. fig. 34.—Syn. *R. cochitana*, Wall.; *Cotinus Cogygria*, Scop.; Engler u. Prantl iii. 3, 104. Vern. *Tung, Tunga, Tungla*. North-West Himalaya.

A deciduous shrub or small tree, heartwood dark yellow, mottled. Branchlets, petioles and underside of leaves with short soft pubescence. Ls. strongly aromatic, entire, obtuse, elliptic or obovate, petiole often longer than leaf. Fl. on slender pedicels in a large hairy panicle, fertile flowers few, the pedicels of the numerous sterile flowers elongate after flowering, they are densely covered with long silky hairs and form a spreading panicle of slender feathery branches. Drupe 1-seeded, obliquely obovate, $\frac{1}{2}$ in. long, with prominent veins when ripe.

Eastern slopes of Sulaiman range, North-West Himalaya to the Sarda river, 4-6000 ft. Fl. April-June, the red young leaves in April. South Europe, Western Asia, China.

B. Leaves trifoliate.

2. *R. parviflora*, Roxb.; Brandis F. Fl. 119. Vern. *Tunra, Tungra, Ninas*. Jauns; *Tunga*, Kumaon.

An unarmed often gregarious shrub, sometimes a small tree. Branchlets, petioles, underside of leaves and inflorescence clothed with dense brown tomentum. Leaflets obovate the lower portion entire, the upper irregularly crenate. Terminal leaflet 2-3 in. long narrowed into a short marginate petiole, the lateral sessile, smaller. Panicle large, terminal, the lower branches

the axils of leaves, bracts linear, minute, pedicels shorter than flower. Sepals 5-6, the inner narrower than the others, petals oblong, more than twice the length of sepals, disk distinctly 5-lobed. Drupe globose, brown, shining, 1 in. diam.

North-West Himalaya, Sikkim to Nepal, 2-3000 ft. Pashurachi hills, Centr. Prov., 2500-1800 ft. Chamba hills, Golewari district. Fl. May-June. *R. paniculata*, Wall. Bot. Beecham. Upper Burma, on the Shan hills and in the dry region of the Irrawadi valley, often in Sag forests. A small tree, unarmed, glabrous, leaflets entire or slightly serrated, the terminal 2-5 in. long, the lateral smaller, sec. a prominent 5-nerve.

4. *R. mysorensis*, Heyne. Vern. *Qandi*, *Dammit*, *Rajputana*; *Jambou*, *Pova*.

A small, aromatic, often gregarious shrub or small tree or large shrub, Talbot, List. 61. Branches with spinescent, leaflets deeply dentate, 2-lobed, the terminal 1-1½ in. long, the lateral smaller, all sessile or nearly so. Disk indistinctly 5-lobed.

Shrub, eastern flank of the Sulistan range. Rajasthan. Dry districts of the Punjab and the Deccan. Fl. February-June. Bark used for tanning.

5. Leaves imparipinnate, panicles terminal.

6. *R. acuminata*, Murray; *Brachis* F. Fl. 110. Syn. *R. Bucki-anche*, Roxb.; *Wight* Ic. 2. 311; *R. sinensis*, Kurz F. Fl. L. 319. Vern. *Asari*, *Titel*, *Titri*, *Akkol*, N.W. Him.

A middle-sized or small deciduous tree, resinous, the bark filled with white milk, which is sticky, but does not turn black. Branchlets, petioles, underside of leaves and inflorescence clothed with short, soft, brownish-gray pubescence. L. not aromatic, leaflets

4-6 pair, opposite, dentate, teeth large, triangular, often sharp, lateral leaflets sessile, the terminal on a margined petiole, upper part of margin petiole generally marginate or winged. Panicle large, nearly as long as the upper leaves, branches spreading. Fl. white or pale yellow-green, drupe 1/2 in. diam., oblique.

China: Hsinchuan ranges, 2-3000 ft. Assam, Bhoir and Naga hills. Shan hills, Upper Burma. Marabou. Fl. April-September. The leaves turn red before they fall. Balls of various shapes frequent on the branches. China, Japan.

7. *R. punjabensis*, J. L. Stewart; *Brachis* F. Fl. 120. Vern. *Titri*, *Titri*, N.W. Him.; *Kashita*, Bakh.

A small or middle-sized tree, deciduous, heartwood greenish-yellow, the annual rings marked by a narrow belt of vessels, old bark brownish, with rectangular plates, milk starchy, not sticky, does not turn black. Branchlets, petioles and leaflets clothed with minute soft pubescence. Leaflets 5-7 pair, opposite or nearly opposite, entire or with a few teeth near the apex, common petiole not marginate. Panicles compact, head shorter than leaves, in fruit generally bent down, ramifications rusty tomentose, drupe 1/2 in. diam., clothed with dark red velvet, pulp acid, made into a sharbat.

North-West Himalaya, Kashmir to Kumaon, 2-3000 ft., more frequent towards the former. Fl. May-July. A species very similar and possibly identical with 6 is not uncommon in China.

A species with terminal panicles, possibly new, has been found by E. M. Buchanan at 3000 ft. in the Ruby Missa district, Upper Burma. Leaflets 5-7 pair, oblate, leathery, pale-red beneath. Male 3-5, pedicels 1/2 in., fl. pediculate, in general appears as similar to *R. Griffithii*, Hook. f. Fr. unknown, name not noted.



FIG. 57.—*Rhus myrsinoides*, Heyne.

10. Leaves imparipinnate, panicles axillary.

7. *R. Wallichii*, Hook. f.—Syn. *R. verniciflua*, Brandis F. FL. 129. Veen. *Arbores. Arbol. Arbol.* North-West Himalaya; *Burku*, Bial.

*A deciduous tree, attaining 50 ft., bark smooth, grey; resin canals in bark filled with white milk which turns black and raises blisters on skin. Branches



FIG. 88.—*Rhus Wallichii*, Hook. f.

lvs. petioles, underside of leaflets and panicles densely clothed with yellowish-brown tomentum. L. approximate near the ends of branches, not aromatic, leaflets 3-5 pair, quite entire, 4-7 in. long, the lateral nearly sessile, 20-25 pair, 18-24 pair. Panicles axillary, much shorter than leaves. Fl. nearly sessile, petals much larger than sepals, obovate, greenish-white with dark veins. Drupes $\frac{1}{2}$ in. diam., in compact pyramidal panicles, pilose when young, nearly

glaucous when ripe, + sharp dry, characteristic splitting irregularly, endocarp hard, smooth, in a mass of vegetable wax.

SOUTH WEST HIMALAYA, Kashmir to Nepal 2-7000 ft. Fl. May-June. *R. succedanea* DC. The Vernian tree of China and Japan differs by + scabrate nearly glabrous leaflets. *R. polyphylla* and *R. sinensis* more lax. *R. insignis* Hook. f. Sikkim, China to Khass hills. *R. indica* attains 100 ft., differs by glabrous petioles, pedicels larger, more lax and nearly glabrous, leaflets on thick petioles, drupes smaller.

9. *R. succedanea*, Linn.; Wight Ic. t. 593; Brandis F. Fl. 121. Vern. *Kashmiri*, Kurnwar; *Arkol*, N.W. Him.

A middle-sized or small deciduous tree, entirely glabrous, except petioles and ramifications of panicle, which at times are minutely hairy. Leaflets opposite, 3-6 pair, entire, ovate-lanceolate, long acuminate, blade 8-6, petiole slender, $\frac{1}{2}$ in., sec. n. 8-15 pair, alternating with shorter intermediate narrow. Panicles lax, drooping, ramifications slender. Fl. pedicelled. Drupes $\frac{1}{2}$ in. diam., on pedicels $\frac{1}{10}$ long, glabrous, yellow or light brown, endocarp hard, enclosed in a fibrous mesocarp, vegetable wax mixed with the fibres.

Himalaya, from the Dolan eastwards, 3-6000 ft. Not mentioned in Engelm's collection. F. Tice of the School Circle, but found by me in the Kupin valley in October 1874, Khass hills. Fl. June-September, China, Japan. The milky juice of this species like that of *R. Wallichii*, causes blisters on the skin, and makes black marks on paper. In Japan, wax is obtained from the fruit of this species and of *R. succedanea*. A remarkable variety, possibly a distinct species, with almost continuous leaflets, like *R. indica*, specimens and nearly at right angles to midrib, trailing panicles were seen in Szechuan and on the Khass hills, in *R. succedanea* DC.; *Giant's List* of the *R. Britton*, Hook. f. Sikkim, Mungpo 2000 ft. (C. B. Clarke, October 1884). Upper Assam, Khass hills, common at Shillong. A middle-sized or small tree, glabrous, panicles only pubescent. Leaves large, ovate, petiole 24 in. long and longer, leaflets 15-24 pair, petioles pedunculate, 8-10 in. long.

2. PISTACIA, Linn.; Fl. Brit. Ind. II. 13.

Trees or shrubs. L. pinnate or trifoliate, leaflets entire, stipules none. Fl. small, dioecious, in axillary racemes or panicles, supported by bracteoles, petals 0. σ sepals 1-2, stamens 3-5 on a small disk. ρ sepals 2-5, disk 0, ovary 1-celled. Drupe oblique, endocarp hard, cotyledons filled with fat oil. Species 9, Mediterranean region, China, one in Mexico.

1. *P. integerrima*, Stewart; Brandis F. Fl. t. 22. Vern. *Kashmiri*, *Kakrolog*, *Kakroli*, *Kaurul*, N.W. Him.

A middle-sized deciduous tree, young shoots red, heartwood very hard, durable, close and even-grained, brown, marked with yellow and dark streaks. L. aromatic, impari- or pari-pinnate, finely pubescent while young, leaflets 4-5 pair, usually opposite, lanceolate from an oblique base, blade 3-4 in. long, petiole very short. Drupe broader than long, $\frac{1}{2}$ in. diam.

Hills of Trans-Himalaya territory, Sul range, Pinnak. Outer spurs of North West Himalaya, 1800 to 8000 ft. Fl. March-May. Irregularly shaped galls (*Kabrolog*) of σ , 2-7 in. long, hairs on the leaves. 2. *P. cochinea*, Galt. et Hemsl. Shas hills, Upper Burma, 4500 ft. A small tree. Leaves paripinnate, leaflets 5-6 pair, diameter 1-1 $\frac{1}{2}$ in. long, usually alternate.

3. *P. matica*, Fisch. et Mey.; Engelm. in DC. Monogr. Phan. IV. 287. Linn. in Journ. Linn. Soc. xviii. 308. —Syn. *P. subulata*, Stocks. Vern. *Gurm.*, *Baluch.*; *Kharajok*, *Pashia*; *Hudour*, Hureai district.

A small tree, often gregarious, attains 20-25 ft., and 6-10 ft. in girth, bark dark brown with longitudinal fissures, heartwood small, dark brown, very hard. L. imparipinnate, common petiole minutely hairy, marginate + narrowly winged, leaflets 2-3 pair, ovate-oblong, obtuse.

Beludistan, 4000 ft., at lower elevations associated with *Acacia saligna*, highest 4700, especially on the Jungles. Afghanistan, Kuram valley, Gijit. Fl. March-April.

Albizia Persia, And. Major and Trans. Persia. This and *Albizia* species closely related to *Albizia*. The fruit of *F. Louisa*, Linn. f. P. Kunth, (Catal. Hort. Bot. Berlin). A shrub, often in clumps of stems, or a small tree, bark light grey, smooth and exfoliating. Leaves large, ovate, entire. Afghanistan, Gilgit, Central Persia. Petals not united, lobes 1-2 pair, elliptic or oval or orbicular, serrulate, 1-2 in. long.

Tapura hirsuta, Hook. f. *Psychotria* *spumosa*, Willd., Engler in DC. Mon. Phan. iv. 235; *Tapura villosa*, Conch. Engler in Engler u. Prantl III. 5. 1903 is a large shrubby shrub in Nepal, Sikkim (to 8000 ft.), Assam, Bhutan, Khasi hills, Manipure, China, Brachyloba, involucral tubercles or scales tomentose. Leaves imparipinnate, leaflets 5-7 pair, nearly opposite, entire or margin less serrate. Fl. small, polygamous, axillary in axillary panicles. Drupes black, pericarp fleshy, resinous.

Solenocarpus indica, W. & A.; Bell, Fl. Sylv. t. 216 is a small or middle-sized tree in the evergreen forests of the Western Ghats from North Kanara southwards in the Aravalli hills at 2000 ft. Leaves imparipinnate, leaflets opposite, glabrous, cordate to elliptic, small, bisexual, pure white, panicles numerous, branched at the ends of branches of old tree when in blossom a perfect mass of white. Calyx small, 5-toothed, lobes 5, ovary 5-ovate, entire. Stamens 10, very 1-lobed. Drupes obliquely long, 1 in. long, pericarp full of oil, stone hard.

3. ODINA, Roxb.; Fl. Brit. Ind. ii. 29.

(Species 18, mostly African.)

O. Wodier, Roxb.; Wight, Ic. t. 60, Bell, Fl. Sylv. t. 127; *Roxb.* III. t. 41. — *Syn. Lawsonia grandis*, Engler in Nagel u. Prantl Nachtr. III. *Vern. Khasi, Khasi, Khasi, Punjab; Dabson, Gangan, Hind.; Mohi, Mouri, H. M. (Haw), Bundelkhan; Gad, Ajmere; Gumpun, Tel.; Gollu, Kan.; CAC, Ussu, Tam., Nobe, Barn.*

A large deciduous tree, sapwood white, heartwood warty. L. imparipinnate, leaflets 3-4 pair, opposite, entire. Fl. appearing when the tree is leafless, small, greenish, unisexual, 4-5-merous, on short pedicels in compact fascicles, the female fl. in simple, the male in compound racemes. Racemes numerous from leafscars at the ends of branches, male and female usually on different branches, often on different trees. Calyx 4-5-lobed, persistent, lobes obtuse ciliate, imbricate in bud. Petals oblong, longer than sepals, pink and greenish-yellow. ♂: Stamens 8-10, inserted beneath and on each side the staminal 8-lobed disk, rudimentary ovary 4-5-lobed; ♀: stamens small, sterile, ovary sessile, 1-celled, styles 3-4, short, stout. Drupes reniform-oblong, 1 in. long, stone hard.

Common in deciduous forests throughout India and Burma, in the subhimalayan belt extending to the Indus, and ascending to 4000 ft. in the Patk. hills. In the hills of the forest a mile from January to June, but on the east side of the Peninsula (Sriharipur, Madras, Javadi) in part almost throughout the year. Ugly when leafy, but a handsome tree when in full foliage. Fl. February-April. Fr. from June onwards, often remains long on the tree. Easily grown from cuttings.

4. PARISHIA, Hook. f.; Fl. Brit. Ind. ii. 29.

(Species 3, Indo-Malayan.)

P. insignis, Hook. f., Trans. Linn. Soc. xlii. t. 26; Kurz, P. Fl. i. 318. A tall evergreen tree full of white milk. L. imparipinnate, leaflets 6-8 pair, quite entire, opposite, oblique, 6-8 in. long. Fl. 1 in. diam., yellow, dioecious, tetramerous, in long hairy panicles. ♂: Calyx 4-lobed, lobes valvate, petals 4, stamens 4, inserted below the edge of the disk, rudimentary ovary columnar. ♀: Calyx lobes greatly enlarged in fruit, ovary sessile, 1-celled, style unequally 3-lobed. Drupes globose, pointed, 1 in. diam., supported by the pale-cent enlarged calyx lobes, 3-4 in. long.

Mergal, Andamans. Fl. February-May. — Penang.

4. *SFONDIAS*, Lamour. Fl. Brit. Ind. ii. 42.

Leaves imparipinnate, leaflets nearly opposite. Fl. small, polygamous, in terminal panicles. Calyx small, deciduous, 4-5-lobed. Petals 4-5, spreading. Stamens 8-10, inserted outside beneath the broad crenate disk. Ovary sessile, 4-5-celled. Drupe fleshy, stone 1-3-celled, hard, thick, with a tuberculate green surface. Species 8, tropics of the old and new world.

1. *S. mangifera*, Willd. : Wight, Ill. t. 76; Boid. Fl. Sylv. t. 109; Kurr. Fl. t. 322; Ranjal, Forest Flora Ind. The *Hogplum*. Vern. *Jarra*, Malabar; *Anavat*, H.; *Anbala*, M.; *Anbala*, Oriya; *Anbe*, Assam; *Kan*, *Anbala*, Tam.; *Gro*, Burm.

A glabrous, deciduous tree, large in tropical, small in Northern India, wood gray, soft, light. Bark smooth, whitish or brownish-gray, aromatic. Leaflets 3-5 pair, quite entire, elliptic-oblong, acuminate, 3-6 in. long, sec. a nearly straight, 10-20 pair, joined at the ends by a prominent nerve running along and close to the edge of leaf. Fl. pentamerous, white, nearly sessile, clustered in short ramifications of a sparingly branched panicle, petals $\frac{3}{8}$ in. long. Drupe yellow when ripe, 1½ in. long, is eaten, but has an astringent acid and turpentine taste.

Subindian tree, fruit and water yellow, in 1860 B. from the Chena forest, near Mysore in the Punjab. Deciduous forest of Burma and the Western Himalayas. Fl. February-May. One of the first trees to shed its leaves and one of the last to grow them, which not until the rains have set in. In Ceylon, where it is common in the moist low country, it is here and there for a short time at the end of the dry weather, young foliage in April beautiful deep pink. Tellico, Travels Ceylon 1, 137. Drupe on the coast, greenish and large of the shores are frequently found in the forests where this tree grows. India, Arctostaphylos, Hongkong, 2. *S. acuminata*, Hook. Kew. Hills, North Kanara, Malabar. A subindian fast-growing tree, leaflets 1-2 pair, venately crenulate, long-acuminate, some believed to be smooth.

3. *S. axillaris*, Hook. Ann. Bot. Gard. Cal. ix. t. 25. Vern. *Lebold*, Nep. A tall evergreen tree. Bark brown or reddish, peeling off in long flakes, wood dark pink, red on exposure, soft but durable. Leaflets 6-8 pair, opposite or nearly so, ovate-lanceolate, acuminate, in old trees entire, in young trees serrate, 3-5 in. petioles $\frac{1}{2}$ in. long. Fl. polygamous, pentamerous, the male in axillary panicles, stamens 10, disk annular 10-lobed, the fertile (bisexual) solitary or 2, sometimes 3 or axillary peduncles, $\frac{1}{2}$ in. across, ovary 5-celled, style 5, short, erect. Drupe wood 1-1½ in. long, yellow when ripe, fibrous, stone 5-celled.

Sikkim, Blume 1-430 B. Koshi hills. This is *Celastrus* in Deccan List II, and is probably identical with *Aspartus Fiedli*, Hemsl. Hook. J. Pl. t. 2457, a tree in the Hase Valley of Hongkong.

5. *DRACONTOMELUM*, Blume. Fl. Brit. Ind. ii. 43.

(Species 5, tropical Asia, extending to the Pacific.)

D. mangiferum, Blume; Kurr. Fl. Fl. 322.

A large evergreen tree, the youngest shows lacy-pubescent. L. imparipinnate, common petiole minutely puberulous, leaflets 6-9 pair, opposite or alternate, 5-7 in. long, glabrous above, slightly hairy beneath. Fl. bisexual, pentamerous, campanulate, $\frac{1}{2}$ -1 in. across, greenish-white, in large mostly axillary or short panicles. Stamens 10, inserted at the base of the cup-shaped crenulate disk. Ovary 5-celled. Drupe 1 in. diam., depressed, stone flat, rugulose, 2-3 in. diam.

Malabar. Fl. H. S. Malay Peninsula and Archipelago.

7. *MELANORRHŒA*, Wall. Fl. Brit. Ind. ii. 25.

Fl. subsessile, simple, quite entire. Fl. large, bisexual, in axillary panicles, cupule 5, coherent in the species here described into a pointed deciduous



FIG. 87. — *Melanorrhoea usitata*, Wall. 4.

able of leaves and panicles softly tomentose. L. obovate or oblanceolate, blade 4-12, narrowed into a thick almost winged petiole 1-1 in. long. Fl. white, petals pubescent, stamens many. Drupes red, 1-1 in. diam., stalk thick, 1 in. long, supported by the oblong stellately spreading, enlarged petals, 2-4 in. long.

Burma, Upper and Lower, chiefly in Eng. terms. Fl. January-March. Near to the Mekong river. *M. usitata*, Pierre Fl. For. Cochinch. 1. 267. Cambodia. A certain strain yields a most valuable varnish, grows very rapidly, and can be tapped when two years old. Might be cultivated in Burma. 2. *M. glabra*, Wall. Fl. As. Bar. 1. 268. Yava, Mergul. 3. *glaberrima*. Drupes on slender stalks 1-1½ in. long. Fertile petals linear or spatulate, 2-2½ in. long.

8. SWINTONIA, Griff., Fl. Brit. Ind. ii. 26.

Evergreen trees. Leaves simple, quite entire, petioles long. Fl. bisexual or unisexual, in large terminal and axillary panicles. Calyx small, deeply 5-cleft, lobes rounded. Petals 5-6, persistent and much enlarged in fruit. Stamens 4-5, inserted on the thick fleshy disk. Drupe oval, exocarpaceous, not stalked, subtended by the enlarged petals. Species 7. Indo-Malayan.

1. *S. floribunda*, Griff. Proc. Linn. Soc. i. (1846), 283. — Syn. *S. Griffithii*, Kurz (1870), comprises probably *S. Schumackeri*, Kurz F. Fl. 1. 816. Vern. *Thayt san*, Burm.

A lofty tree, entirely glabrous. L. lanceolate, blade 4-6, petiole very slender, 1-1½ in. long, sec. n. 16-20 pair. Fl. pale yellow or reddish orange. Drupe sessile, supported by the enlarged reflexed linear-lanceolate purple petals, which are 2 in. long.

Chingay hills. Pegu Yoma, rare. Martaban and Tenasserim, common near the

cap. Petal 5-8 imbricate, linear-oblong, parabolic and, as a rule, much enlarged in fruit. Stamens 5 or 6, numerous, inserted on a thick hemispherical columnar disk. Ovary stalked, oblique 1-celled. Fr. a dry drupe, more or less stalked. Species 6, Indo-Malayan.

1. *M. usitata*, Wall. Fl. As. Bar. i. 11, 12. Burdhis in Ind. Forester, i. (1876), 392. Vern. *Thitsi*, Burm.

A large deciduous tree, yields the black Burmese Lacquer or varnish from incisions made into the bark, while the tree is in leaf. Branchlets, petioles, under-

leaves. Lvs. above glaucous, beneath
on the hillside of Tampoon at
2000 ft. Fl. December-March.
L. & Haller, in *POKRY* woods
of the Malay Archipelago. L.
narrowly lanceolate, blade 6-10,
petiole 2 in. long, sec. n. 24-30
pair.

9. HOLIGARNA, Ham.

Fl. Brit. Ind. ii. 36.

Lvs. from L. more or
less coriaceous, petiolate, sim-
ple, quite entire, crowded at
the ends of branches, petioles
mostly with 2 or 4 spur-like
deciduous appendages. Fl.
small, usually sessile, divi-
sions pentamerous, in axillary
or terminal racemes or pan-
icles. Calyx superior, tube
cup-shaped, petals densely
villous. Stamens 5 inserted
on the edge of the disk, which
in the ♂ flower lines the
only ovule, filam. glabrous,
subulate, anthers small,
nearly globose. Ovary in-
ferior 1-celled, styles 3-5,
terminal. Drupe oblong or
ovoid, on stalks elongating
after flowering, resinous,
acid, exocarp perisperm.

A. Western species.

1. *H. Arnottiana*, Hook.

L. (1876).—Syn. *H. longifolia*,

W. et A.; Bedd. Fl. Sylv. t. 167. Varn. *Holligar*, *Hulgari*, *Katuyeri*, Kan.;
Kottuchery, Tam.; *Choru*, Mal.

A large evergreen tree, with black acrid resinous juice, young shoots rusty-
tomentose. L. ovate, obtuse or acute, blade 6-10, narrowed into petiole 1-1 1/2
in. long, sec. n. 10-20 pair. Fl. 1/2 in. long, rusty tomentose within and without,
bacculate, in axillary sparingly branched racemiform panicles, anthers red.
Drupe glabrous, obliquely oblong, stalk 1 in. long.

Evergreen forests of the western coast and the Western Ghats, from the Konkan
southwards. Coorg, Nilgiris. Common in the low country of Travancore, Fl. January-
March. *H. ferruginea*, Marchal (1869), is supposed to differ by racemes shorter, more
robust and less branched, clothed with red tomentum, and larger flowers. Mr. Boardman
reports a new species from the evergreen forests of Travancore, at 2000 ft. and higher,
with smaller leaves not exceeding 6 in., sec. n. 8-10 pair, panicles slender up to 12 in.
long. Fl. smaller, black, hairy outside, white inside they are quite white, clothed with
white hairs, anthers black.

2. *H. Grahami*, Hook. f. *New Cypripes Grahamii*, Wight Ic. t. 256. Evergreen, forests
of the Western Ghats, from the Konkan southwards. *Haplostern*, Khand of North
Mysore (H.B. Aym. 1866). A middle-sized or large tree. L. softly pubescent beneath,
obovate, long acuminate, often abruptly narrowed from the middle, blade 12-16 in.,
petiole thick, 1/2 in. long. Panicles terminal, much branched. Drupe 1/2 in. long, three-
nucleus enclosed in the calyx. 3. *H. Beddomei*, Hook. f. *Avarval hills*. A very large
tree. Young shoots and underneath of leaves densely tomentose with long reflex hairs,
blade 10-22 inches, narrowed into petiole 1-1 1/2 in., spurs tomentose, with red rigid.



FIG. 10.—*Swintonia floribunda*, Griff.

6. Eastern species.

4. *H. longifolia*, Herb. Cam. Fl. 1: 282.

A tall tree, bark smooth, ash-colored. L. glabrous and glaucous beneath, thinly coriaceous, narrowly oblanceolate, blade 12-24, petiole 1-1.5 in. Panicles large and spreading. Fl. dull white, rusty-tomentose. Drup. entirely enclosed by calyx-tube.

Confined to hill tracts, Lower Burma, in Eng and other Forests. Fl. G. S.

The following two species may possibly only be forms of *H. longifolia*, of Eng and Java, As. Soc. Bengal, 65 (1897), 518. 5. *H. Mottetii*, Hook. L.; Kurz F. Fl. C. B. 1: 215. An evergreen tree, Lower Burma, young shoots and inside of young leaves pubescent. L. coriaceous, oblanceolate, shortly acuminate, blade 12-24, petiole 1-1.5 in. long. Panicles axillary, densely rusty-tomentose. Drup. almost entirely covered by the calyx-tube. 6. *H. albivena*, Hook. L. Lower Burma. L. coriaceous, oblanceolate, white and also beneath, blade 6-8, petiole 1-1.5 in., with pubescence.

7. *H. Karstii*, King in Journ. As. Soc. Beng. 85 (1890), 211. *Sepanocarpus albivena*, King; Engler in IV. Mon. Phan. 10 (189), 109. *Ternstroemia Andamanica*, L. coriaceous, white and nearly glabrous beneath, oblanceolate, blade 10-15, petiole 1-1.5 in. long, venation distinct. 12-15 pair, panicle large, compound, terminal.

10. DRIMYCARPUS, Hook. L., Fl. Brit. Ind. 6. 86.

D. racemosus, Hook. L. the only species. Vern. *Bimay-King, Letcha*.

An evergreen tree, entirely glabrous except the inflorescence, wood close-grained, takes a beautiful polish. L. shining, coriaceous, lanceolate, entire, margin thickened and usually strongly wavy, blade 4-12, petiole stout, deeply grooved, 1/2 in. long. Fl. small, greenish-white, pentamerous, in fasciated short racemiform panicles, axillary or below the leaf on the old wood, stamens 5. Ovary inferior, 1-celled, style 1, var. erect. Drupe red, 1 in. diam.

Slender, common in the water hills, 3-6000 ft. British Assam, Khasi hills, Cachar (Shillong), Fl. January-April—China.

11. BOUEA, Meisn., Fl. Brit. Ind. 6. 29.

(Species 3-4, Indo-Malay region.)

B. burmanica, Griseb. (1841) ; Pierre, Fl. For. Cochinch. 1: 396—Syn. *B. yunnanensis*, Meisn. (1842); Kurz F. Fl. C. B. 1: 269. Vern. *Miriom, Crépin, Siam*; *Mirion, Burma*.

An evergreen, middle-sized tree. L. lanceolate, quite entire, blade 4-10, petiole 1/2 in. long. Fl. small, polygamous, in axillary and terminal panicles. Sepals 3-5, deciduous, petals 3-5, imbricate. Stamens 3-5, inserted within the small disk, all fertile. Drupe fleshy, yellow, 1-2 in. long, odour agreeable, pleasant, sweet and acid, endocarp thin, woody, 1-celled.

Sumatra: Andaman, Ternstroemia, cultivated throughout Burma. Fl. January-March. Fl. April-May. Cochinchina, Malacca Peninsula and Archipelago.

Bouea vulgaris, Hamilton, Fl. Brit. Ind. 1: 66, under *Sepanocarpus* is a shrub in Nepal, Sikkim (4-6000 ft.), Mishmi hills. L. coriaceous, membranous, serrate, lanceolate. Fl. small, unisexual, in terminal panicles. ♂: Calyx 5-lobed, 4-lobed, lobes 4, spreading, calyx disk 6, stamens 5, alternately shorter. ♀: A 1-celled ovary on an annular disk, inserted to a truncate base, calyx 6, petals 6, style diffuse, apically 3-lobed. Fr. indurulent, white to a rosy or clove-like tinge, 1-2 in. diam.

Anacardium occidentale, Linn.: Boiss. Fl. Sylv. 1: 161. *The Cashew nut*, Vern. *Kaja, Mar.*; *trabuculo, Kann.*; *Ashe-wara, Tamil*; *Po-rem-wara, Mal.*; *Til-ha, Tami.* *Ungui.* A small tree, middle-sized evergreen tree, indigenous in South America, but cultivated and naturalized in many remote quadrants, often found near the coast. L. glabrous, thickly coriaceous, obovate, entire, blade 5-7, petiole 1-1.5 in., venation 8-12 pair, conspicuous. Fl. polygamous, in large terminal branched panicles, bracteiferous, petals (inner) 4-5 in. long, pale yellow streaked with pink, stamens 10, one longer always fertile than the rest, other sterile. Drupe kidney-shaped, 1 in. long, seated on a fleshy thick base, by which it is 1/2 in. long, orange or crimson, edible, formed of the enlarged base and calyx base.

In pedicels are veins filled with resinous oil, which raises blisters on the skin. Seed kidney-shaped, oily, viscid and rotten.

12. BUCHANFANIA, Roxb.; Fl. Brit. Ind. ii. 22

Trees or shrubs. L. simple, quite entire. Fl. small, bisexual, panicles numerous, terminal and in the axils of the uppermost leaves at the ends of branches. Calyx 3-5-lobed, persistent; petals 4-5, oblong, imbricate in bud. Stamens 8-10, long, inserted outside and under the annular disk, which surrounds the 5-6 free carpels, 1 fertile, the others imperfect. Drupes small, fleshy, splitting into 2 valves at the time of germination. Species 20, Indo-Malayan region extending to Australia and the Pacific.

A. Panicles tomentose or pubescent.

1. *B. latifolia*, Roxb.; Boid. Fl. Sylv. t. 165; Brandis F. Fl. 127. Syn. *B. Lanza*, Sprang.; Cooke, Bombay Flora i. 275. Vern. *Chiroli*, Pb.; *Pigal*, *Pial*, *Paira*, *Char*, *Achar*, Hind.; *Char*, *Chiroli*, *Chiroli*, Mar.; *Mudi*, *Sara*, Tel.; *Narkal*, *Mackala*, Kan.; *Morala*, *Surai*, Tam.; *Mungla*, *perla*, Mal.

A middle-sized tree, attaining 50 ft., bark dark grey, rough, with small quadrangular plates, divided by deep narrow cracks. L. coriaceous, hard, oblong, obtuse, as a rule softly hairy beneath, blade 6-10, petiole 1-2 in. Sec. n. 15-20 pair, prominent. Panicles tomentose, bracts small, caducous, fl. sessile, greenish-white. Drupe black, 1/2 in. diam., edible, stone hard, bony.

Common in the deciduous forests of India and Burma, except the arid region of North-West India. In the sub-Himalayan tract the Sutlej is its north-western limit. Fl. January-March. Nearly leafless for a short time during the dry season. Bark used for tanning. 2. *B. lanceolata*, Wight l. t. 237, Quilon. L. glabrous and shining on both sides, elliptic-lanceolate, blade 4-5, petiole 1/2-1 in., sec. n. 10-20 pair, distinct reticulate veins between them. Panicles shorter than leaves, their branches short, stout. Fr. unknown.

3. *B. platyneura*, Kurz; King in Journ. As. Soc. Bengal, 65 (1897) 492. Andamans and Nicobars very common. A middle-sized or large tree, youngest shoots minutely pubescent. L. coriaceous, glabrous and shining on both surfaces, elliptic-lanceolate, blade 4-6, petiole 1-1 1/2 in. Panicles puberulous, pedicels longer than lower anthers, narrow, not sagittate. 4. *B. glabra*, Wall. Maulmein. L. thickly coriaceous, broadly elliptic, panicles shorter than leaves, rusty-puberulous. Fl. nearly sessile. 5. *B. acuminata*, Turcz. (*B. sessilifolia*, Schauer; King in Journ. As. Soc. Bengal, 65 (1897) 483, the older name but not leading.) Maulmein. A shrub or small tree. L. thinly coriaceous, obtusate, abruptly acuminate, gradually narrowed into petiole 1-1 1/2 in. long, panicle 1-2-lobed, longer than the leaves, minutely pubescent, pedicels shorter than lower. Petals oblong, the apex narrower and recurved, anthers sagittate. 6. *B. lanceifolia*, Roxb.; Kurz F. Fl. t. 299. Chittagong hill tracts, Arakan, Andamans. A large evergreen tree, youngest shoots rusty-tomentose. L. elliptic or oblong-lanceolate, thinly coriaceous, blade 7-9, petiole 1-1 1/2 in. long, sec. n. 15-20 pair, prominent beneath. Panicles slightly pubescent with scattered hairs, nearly sessile, longer than leaves, pedicels shorter than lower. Petals oblong, anthers slightly sagittate.

B. Panicles perfectly glabrous.

7. *B. angustifolia*, Roxb. Cor. Pl. t. 262; Wight l. t. 101. Vern. *Mudi*, *Sara*, Tel.; *Mudapala*, *Kolamācu*, Tam.; *Malamācu*, Mal.

A middle-sized tree, youngest shoots slightly pubescent. L. elliptic or linear-oblong, obtuse, glabrous on both sides, blade 4-7, petiole 1/2-1 1/4 in. Panicles glabrous, as long as or longer than leaves, peduncles and branches slender. Fl. nearly sessile. Fr. oblique, 1/2 in. diam.

On Sandstone in the Chanda district and in Sirpur (Nizam's territory). Western Peninsula, chiefly in the drier districts on hilly ground. Fl. B. S. 7. *B. florida*, Schauer; King in Journ. As. Soc. Bengal, 65 (1897) 493. (*B. ussifolia*, Bl.; Fl. Brit. Ind. ii. 33; *B. ussifolia*, W. B.; Kurz F. Fl. t. 298). Andamans, Tenasserim, Malay Peninsula and Archipelago, Philippines. A small evergreen tree, entirely glabrous. L. thinly coriaceous, obovate, obtuse, narrowed into petiole 1-1 1/2 in. long. Panicles lax, long.

branches, pedicels longer than flower. Calyx 5-lobed, style 1 or 2, lobes alternate, shorter or nearly equal to lobes. To this is referred *M. integrifolia* Wight, no. 181, "Nag-pul hills near Mirzapur," of which I have not seen specimens.

M. malabarica, Kunt. F. Fl. 1. 97 (*Goodenya*, Karst). Marathas, Godavari river on Deccan hills (D.H., February 1882), is not a *Macaranga*, possibly a new genus. Lvs. alternate, pale-green, blade 2, petiole thick 3 in. long. Pinnules alternate, terminal, deeply 12 in. long. Fl. subsessile, σ only larger, minute; sepals 5, triangular, petals 5, calvate. Stamens 10, filaments broad, glabrous, disk 10-lobed.

13. MANGIFERA, Linn.; Fl. Brit. Ind. h. 13.

Evergreen trees. L. petiolate, simple, entire, coriaceous. Fl. small, polygamous in terminal panicles. Calyx 4-5-parted, deciduous; petals equal in number, with thick prominent longitudinal nerves. Stamens 4-5, usually inserted on the fleshy lobes of the disk, one stamen only perfect, much larger than the others. Ovary sessile, 1-lobed, oblique, style 1 attached to the side of the cavity above its base, style lateral simple. Fr. a large fleshy drupe, endocarp pilose, cotyledons fleshy, plano-convex, often unequal and 1-bd. Species about 80, Indo-Malayan region.

A. Pinnule pubescent or tomentose.

1. *M. indica*, Linn.; Bodd. Fl. Sylv. 1. 162; Brandis F. Fl. 195. 736. *Mango tree*. Vern. *Am, amba, amul*, Hind.; *Uli, Kol*; *Ul*, South; *Ambl, Man, Mave, Kan*; *Mangil, Tel*; *Mud, Tam*.

A large tree. L. dark green, coriaceous, oblong-lanceolate, blade 5-12, petiole 1-11 in., sec. n. slightly arching, rugose, alternating with slender intermediate nerves. Panicles large, erect, pubescent. Fl. nearly sessile, petals twice the length of calyx lobes, anther 1, oval, purple, dehiscent. Stamens minute, 2-4. Drupe 2-3 in. long, yellow when ripe.

Indigenous in Burma, Sikkim, the Namer forest Assam, the Khasi hills, in various parts of the higher hills of the Satpura range to Khandesh and along the Western Ghats, cultivated all over India and Burma, extending the northern part of the Peninsula. Fl. February-April. Fr. May-July. In North and Central India the fruit of cultivated trees bearing with a strong turpentine flavor, while the fruit of good grades is excellent. In Burma the trees are not generally grafted, the seeds of a good kind as a rule producing good fruit of the same description. This is believed to be the case in some of the parts of tropical India. 2. *M. zuloagana*, Kunt. F. Fl. 1. 96; *Tree Mango*, native South Burma. Eastern and southern slopes of the Pegu Yomas. L. subacute-ovate, blade 4-8, petiole 1 in. long, sec. n. slender, 10-20 pair, venation between them conspicuously reticulate, intermediate nerves very slender or none. Fl. mostly sessile on a tomentose pedicel, calyx pubescent. Fr. not compressed, 2 in. long, endocarp large, thin-walled.

B. Pinnule glabrous.

3. *M. sylvatica*, Roxb.; Kunt. F. Fl. 1. 304. Vern. *Siana thong*, Burm.

A large tree. L. lanceolate, chartaceous, blade 5-12, petiole 1-3 in. long, sec. n. 10-21 pair, strongly curved. Pinnule glabrous, with slender branchlets, pedicels 1-1 in. long, petals linear, 3-4 times the length of calyx lobes. Drupe mostly as large as the *Mango*, yellow when ripe, much compressed, spine fibrous, large.

New Sikkim, no. 300 (G.), Khasi hills, Andaman. Pegu Yomas. Hills east of Toungoo, 2000 ft., near Dreams, common. Fl. February-May. 4. *M. andamanica*, King in Journ. As. Soc. Beng. 65 (1874), 470. Andaman. L. coriaceous, oblong-lanceolate, blade 2-5 in. narrowed into petiole 1-2 in. long, sec. n. 10-12 pair, reticulate-venation. Fl. tetramerous, pedicels as long as nerves, petals twice the length of calyx-segments. Drupe 1-1½ in. long, pulp thin.

14. GLUTA, Linn.; Fl. Brit. Ind. h. 91.

Evergreen trees, with acid resinous juice. L. coriaceous, simple, quite entire, crowded at the ends of branchlets. Fl. small, bisexual, in axillary or

terminal panicles. Calyx gamopetalous, opening irregularly, deciduous. Petals 4-6, on the elongated torus, contorted in bud. Stamens 4-6, filaments capillary. Ovary 1-celled, style lateral, filiform. Species 6-8, Indo-Malayan, 1 in Madagascar.

1. *G. travancorica*, Bedd. Fl. Sylv. t. 60. Vern. *Sōca Kurawā*, Tinnevely.

A very large tree. L. elliptic or oblanceolate, 4-6 in. long, narrowed into a very short petiole, panicle hairy pubescent, drupe broader than long, with a rough brownish rind, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam.

Eve. *Sanjivani* Tinnevely and *Tinnastore* Ghats. 2. *G. tavyana*, Hook. f. *Thesaurus* (Burma) Tavoy, Mandalay in the east. A small tree, young shoots minutely pubescent, petioles thick, $\frac{1}{4}$ in. long. Fl. $\frac{1}{2}$ in. long, in short axillary panicles calyx pubescent. 3. *G. elegans*, Kurz, var. *Hofferi*, Hook. f. *Sea coast* in South Tenasserim. A small tree, entirely glabrous, petioles denser, 1-2 in. long. Fl. $\frac{1}{2}$ in. long, perfectly glabrous.

15. NOTHOPEGIA, Blume: Fl. Brit. Ind. II. 39.

Small trees. L. alternate or opposite, petioled, entire. Fl. small, white, polygamous, in short axillary racemes. Calyx small, persistent, 4-lobed, petals 4 spreading, imbricate in bud. Stamens 4, inserted on the margin of the narrow 4-lobed disk, filaments free, hairy. Ovary 1-celled, style very short.

1. *N. Colebrookiana*, Blume; Bedd. Fl. Sylv. t. 164. Syn. *Dysox* (?) *Colebrookiana*, Wight Ic. t. 291.

A small tree with milky acrid juice, glabrous excepting inflorescence. L. coriaceous, elliptic-oblong or elliptic-lanceolate, blade 2-8, petiole $\frac{1}{4}$ in., esp. 2-45-20 pair. Drupe red, pyrisiform, $\frac{1}{2}$ - $\frac{1}{3}$ in. diam., edible, a sweet purple juice between skin and stone.

Lowest forest of the Western Ghats, from the Konkan southwards. Fl. Jan-March. Ovary moist region to 3000 ft. 2. *N. travancorica*, Bedd. *Tinnevely* var. A shrub. Branchlets, petioles and midrib clothed beneath with short spreading hairs. L. *sturtianus*, elliptic-lanceolate, var. n. 30-35 pair. 3. *N. aureo-tulva*, Bedd. Tinnevely. A shrub. Branchlets, petioles and midrib densely rufo-villose beneath.

16. SEMECARPUS, Linn.: Fl. Brit. Ind. II. 31.

Trees. L. petiolate, simple, quite entire. Fl. polygamous or dioecious, usually pentamerous, sometimes 6-, rarely 8-merous, in lateral or terminal panicles. Calyx segments declivous, petals imbricate. Stamens 5-6, inserted at the base and outside of a broad annular disk, imperfect in the ♀ flower. Ovary 1-celled, styles 3. Drupe oblique, fleshy, seated on a fleshy hypocarp, formed of the thickened pedicel and calyx-base, pericarp filled with an acrid resinous juice. Embryo thick, cotyledons plano-convex. Species 40, Indo-Malayan region (a large number in Ceylon), extending to Australia.

A. Western species, and species common to both regions.

1. *S. Anacardium*, Linn. f.; Roxb. Cor. Pl. t. 12. Wight Ic. t. 558; Bedd. Fl. Sylv. t. 406. *The Marking Nut tree*. Vern. *Bilawa*, *Bādus*, Hindi; *Rala*, Beng.; *Miba*, *Hāda*, Mar.; *Ger*, Kan.; *Shenabotta*, Tam.

A middle-sized tree, wood soft, no distinct heartwood. Branchlets, petioles, underside of leaves and inflorescence clothed with short, somewhat harsh tomentum. L. coriaceous, clustered near the ends of branches, oblong-obovate, tip rounded, blade 2-24 in., petiole thick, half round, $\frac{1}{2}$ -1 in. long. Fl. $\frac{1}{2}$ -1 in. diam., nearly sessile, fascicled in erect compressed terminal panicles, bracts lanceolate, the lower branches of the panicle in the axils of leaves. Petals

oblong, greenish yellow, waxy hairy. Drupe 1 in. long; almost blackish black, pericarp full of acid resinous juice, hypocarp orange, edible.

Sub-Himalayan tract from the Blacas, Yunnan, ascending in the outer hills to the N. Assam, Khasi hills, Chittagong, Central India and the Western Peninsula. Not in Ceylon and not yet reported from Burma. Leaves February to April. Fl. May-August. 2. *g. pandurata*, Kurz V. Fl. Burmah, the Burma. Common in Pegu and Martaban. 3. *g. sinense* var. *amburacoides*, suddenly narrowed below the middle, and very distinct, etc.



FIG. 191. — *Sarcocarpus Amburacium*, Lindl. f. 4.

possibly only a local form of *Sarcocarpus*. 4. *S. articulata*, Benth. in Pl. Ind. Ind. 187. A large deciduous tree, with black resinous juice, in the evergreen forests of the Travancore and Travancore hills. 5. *S. glabra*, nearly sessile, obovate, with base at least 2-10 l. long. Male flowers, small, 3-4-merous, very numerous, in dense terminal panicles (the tree a perfect mass of yellowish-white blossoms); the female 3-5-merous, more than twice the size of the σ , greenish, on short few-fl. panicles. Drupe which may exceed 4 in. long, on a short broad cup-like hypocarp. 6. *S. travancoricus*, Benth. Fl. Sylv. 1. 222. A large deciduous tree, common in the Travancore and Travancore

smaller than the male, with less persistent calyx. Petals 5, deciduous, shining above, pale beneath, glabrous, oblong-obovate, base 17-21, petiole 2 in. long. Pistils as long as stamens or longer. Al. 3-5, brown. Drupe 1 in. long, obliquely-oblong, hypocarp broad and short.

B. Eastern species.

5. *S. subpanduriformis*, Wall. : Kurz P. Fl. L. 513. — Syn. *S. acuminata*, Kurz: Fl. Brit. Ind. v. 35.

A deciduous tree, entirely glabrous except the minutely hairy inflorescences and younger shoots. L. oblanceolate, acuminate, base 5-12 in., gradually narrowed from the middle into a petiole 1-1/4 in. long, sec. n. 18-22 pair. Panicle terminal, pedicel longer than flower and articulate below it. Fl. 4-5-merous, disk hispid, ovary glabrous, styles 3 elongate. Drupe shining, broader than long, 1/2 in. diam., on a small cup-shaped hypocarp.

Shrubby hill-trusts, Arakan. Engler, Mon. Phan. ix. 265, unites this with *S. glauca* Sw., Spengel, Malay Archipelago, which has elliptic-oblong leaves, nearly sessile flowers, and a hairy ovary. 6. *S. Kurzii*, Engler, King in Journ. As. Soc. Hong. 66 (1897), 310. *S. heterophylla*, Kurz P. Fl. L. 512. Andaman, Nicobar, Batt Malay, Chand. Nagar, Java, Martaban (H.B. January 1899), Eastern, Burma. A small tree, branches stout, clothed with deciduous rusty tomentum. L. ovate-oblong, oblong-oblong, upper surface glabrous, lower pale-brown with short stiff decumbent hairs, base 12-24 in., gradually narrowed into a stout broad-chambered petiole 1/2-1 in. long, sec. n. 20-25 pair. Panicle terminal, longer than leaves. Fl. sessile. Drupe 1 in. long, hypocarp 1/2 in. long, 1 in. diam. 7. *S. Prainii*, King in Journ. As. Soc. Hong. 66 (1897), 311. *S. heterophylla*, Hook. fil. Fl. Brit. Ind. ii. 26. Andaman, Coe Islands, Perak & Malacca. Tree. L. oblong-oblong, base glabrous on both sides, underside pale-brown, base 5-10, petiole 1/2-1 in. Panicle paniculate, terminal, longer than leaves. Fl. sessile. Drupe 1 in. long, broader than long, hypocarp obovate, 1/2 in. long.

ORDER XLII. *Eurhizaceæ*. *Chloroxylon*, Wall. : Pl. As. Rac. t. 289; Golley, Guide Fl. Lab. V. Vera. Mexico, Missouri, Mexico, Japan, Siam, Tonkin valley, Yunnan, Kweichow, Hinnawa, 3-7/99 P., Manipur, Shuk hills, Upper Burma, at 4000 ft. A large shrub with long spreading branches, bark reddish-brown. Branches quadrangular. L. opposite, ovate, basal nerves 3-5. Fl. pentamerous, greenish-yellow, 1/2 in. diam., in clusters, lateral racemes. Stamens 10, long, anthers red, conspicuous. Yellow carpels 5, distinct, 1-4-let, enclosed by the much enlarged purple succulent calyx which are beaked between the carpels on the inner edge.

A remarkable herbaceous shrub in *C. terminalis*, Hance, l. Pl. L. 229. Fls. long the lateral racemes, anthers linear. Inert Sikkim, 9-12/99 fl. Tibet, China.

ORDER XLIII. **MORINGACEÆ**; Gen. Pl. l. 429 (*Moringa* n).

Soft-stemmed deciduous trees. L. alternate, impari- bis- or tripinnate, pinnate and leaflets opposite, leaflets entire, cordate, glands at the base of petioles and points. Fl. large, biserial, irregular, in axillary panicles. Calyx cup-shaped, segments petaloid, deciduous, somewhat unequal. Petals 5, upper smaller. Disk lining the calyx-tube. Stamens inserted on the free edge of disk, 5 perfect, opposite to petals, alternating with 5, sometimes 7, filaments without anthers, anthers dorsifixed, oblong, 1-celled. Ovary supinate, 1-celled, scales numerous, biserial, on 3 parietal placentae. Capsule long, 3-4-angled, beaked. Seeds numerous, albumen 0, embryo straight, cotyledons plumose-coarct.

MORINGA, Lam. : Fl. Brit. Ind. v. 45.

Species 3, one in Arabia and the North African desert.

1. *M. pterygosperma*, Gaertn. : Wight, Ill. t. 77; Bedd. Fl. Syst. t. 80. — Syn. *M. Meibomia*, Lam. : Engler u. Pracht. iii. 2. 243, fig. 146. The Horse-

Waxy, glaucous, a large
 leaflets numerous, smooth,
 cordate, often with apical
 lobes, 1-8, a long 2-4 pair, distal
 of an terminal leaflets, rarely
 lobes elongated. The basal
 lobes of trifoliate leaflets
 very small, subulate, almost
 wanting. Petioles, subulate,
 scarcely longer than the leaflets.
 C. R. pulchella, Planch.
 Java, Sumatra, C. R. humilis,
 Planch. Sumatra. C. R.
 caudata, Planch. Assam,
 Siam, India. Leaflets 2-4
 pair, lanceolate, cordate-
 ovate, 1-2-3 in long,
 lobes and veins crowded,
 petioles subulate, slightly
 longer than leaflets.

B. Leaflets numerous,
 small, 1-2 in long.

C. R. Wallichiana, Planch.
 Malacca, from Malacca
 Malacca, Peninsular and
 Malacca pubescent. Leaflets
 1-3 pair, linear-lanceolate,
 1-2 in long. Petioles
 very short, subulate, capsule
 1-2 in long. C. R.
 sumatrana, Hook. f. Malay
 Malacca, and Malacca, pubescent,
 petioles subulate, leaflets
 1-3 pair, linear-lanceolate,
 1-2 in long. Petioles short, weak,
 spreading, petioles linear-lanceolate,
 1-2 in long. C. R. villosa, Planch.
 Malay, Sumatra, Brunei, &
 Java, and Malacca, pubescent,
 petioles pubescent. Leaflets
 1-3 pair, linear-lanceolate,
 1-2 in long, petioles narrow,
 petioles linear-lanceolate, than the leaflets.
 Capsule 1 in, curved.



FIG. 12. - *Connarus cantaliboides*, W. & A.

Petals nearly three times the length of sepals.

2. CONNARUS, Lamour.; Fl. Brit. Ind., ii. 51.

1. Imparipinnate, leaflets mostly 5. Fl. small, in axillary and terminal panicles. Sepals 5, imbricate, deciduous or persistent, not accrescent, petals linear or ligulate and slightly dilated upwards. Ovaries densely pubescent, usually one only fertile. Ripe carpels stipitate, inflated, albumen 0. Species 40-50, tropics of both hemispheres.

A. Western species. Leaflets quite glabrous beneath, valves of the capsule quite glabrous within.

1. *C. monocarpus*, Lamour. - Syn. *C. pinnatus*, Lamour.; Bedd. Fl. Siam. Man. t. xii. Vern. *Sundak*, Max.

An erect shrub. Leaflets 3-5 in long, elliptic or elliptic-lanceolate, glabrous on both sides, shining, sec. n. 3-5 pair. Panicles rusty-pubescent, sepals glabrous, persistent, petals 1 in long, slightly pubescent outside. Capsule 1 1/2-2 in, not contracted into the stalk, not shining, not ribbed.

Western Ghats from the Hooker & Thwaites 1855. Collected by the latter in the region of C. Ritchie, Hook. F. Glass of B. Hooker & Thwaites, probably also further south. A shrub, possibly also climbing, with long petioled ovate leaflets, rounded at the tips, two-ranked. (C. G. Wright, Hook. F. & Thwaites, specimens in the evergreen forest of South Malabar and Palghat. Leaves below with a 5-7 pair, veins 2 in. capsule compressed, oblong, semi-trilobed, obtuse, striate, striate.)



FIG. 66.—*Comarostaphylos menispermifolia* Linn. f.

B. Eastern species. Leaflets quite glabrous beneath, valves of the capsule pubescent or sericeous within.

4. *C. paniculatus*, Roxb. Fl. Ind. iii. 439. Vern. Neeol, Upper Burma.

An evergreen climbing shrub in Chittagong a large tree, Roxb., glabrous except indumentum. Leaflets 3-7, sericeous, glossy above, 3-5 in. long. Panicle pubescent, spreading. Sepals pubescent, petals $\frac{1}{2}$ - $\frac{1}{3}$ in. long, linear slightly narrowed towards the base, filaments hairy, ovary tomentose. Capsule at first softly tomentose, when mature glabrous and shining, $\frac{1}{4}$ - $\frac{1}{2}$ in. long.

Assam, Khasi hills, Chittagong. Large tree (Halcyon on the Salween (D.R. May, 1870), Annapur (D.R. April, 1880). Fl. Malabar, Java. Evergreen forest, Upper Burma, Hwangka at 2500 ft. (Smith, Dec. 1870). To this I refer specimens collected by Dr. Henry in Yunnan. 5. *C. gibbosa*, Wall. Kora F. Fl. i. 327. Pegu, Transversim and Andamans. Leaflets 4-6 in. long, petals obovate, glabrous, capsule compressed, erect, semi-ovoid when young, glabrous when mature, obliquely striate, compressed, obtuse, $\frac{1}{4}$ in. long. 4 and 5 may possibly turn out to be the same species. 6. *C. nigerrima*, King. In Journ. As. Soc. Bengal, vi. 1898. 7. Nuclear Island, Siam, leaflets broadly ovate, shortly acuminate, $\frac{2}{3}$ - $\frac{1}{2}$ in. long, petals linear, pubescent on both surfaces. Capsule sessile, broad, obtuse, $\frac{1}{4}$ in. long. 8. *C. latifolia*, Wall. Transversim. Capsule cylindrical, obtuse, $\frac{1}{2}$ in. long, suddenly narrowed into a stalk $\frac{1}{2}$ in. long. 9. *C. grandis*, Jack. King. In Journ. Transversim, Malay Peninsula. Leaflets elliptic-ovate, $\frac{1}{2}$ - $\frac{1}{2}$ in. long. Capsule obliquely oval, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, woody.

Ellipanthus species. Leaves pubescent beneath.

Ellipanthus Jack & King, *Bot. J. Malay*, Malay Peninsula, Sumatra, A. Nyberg, *Bot. Beechey*, Java. Branchlets densely pubescent. Leaves 5-7 pairs, petioles and underside of leaves pubescent. Capsule ferruginous, dull, at first rusty pubescent, afterwards glabrous, narrowed into a short stalk, base apically sessile, imbricate, as C. Griseb., Hook. f. *Malay. Imperialis*, Java. Leaves ovate-lanceolate, 2-3 in. long, rusty pubescent beneath.

Ellipanthus ramifera, Griseb., *Botanog. Ellipanthus*, Griseb., Kurz, *P. Fl.* 1: 328 (Cassipourea species, Willd.), Lower Burma and Assam. Branchlets, petioles, underside of leaves and inflorescence more or less with tomentum. Leaves 2-3 pairs, elliptic-lanceolate, leaflets usually opposite, 2-5 pair, nearly sessile, narrowly elliptic, base rounded or cordate, 1-2 in. long. Fl. pubescent or glabrous in those trees (and often branchlets) racemes axillary or from the old wood. Sepals valvate, slightly overlapping at the tip, spreading in fruit. Hips 3-5, 1-3 from last flower, sessile, bright red, compressed, flattened, curved, white in the middle, rusty pubescent, primary sepals joined inside with long filaments.

Ellipanthus tomentosa, Prain in Ann. Bot. Gard. Camb. 4: 23. Kachin hills, Upper Burma. A shrub. Leaves elliptic-lanceolate, leaflets 2-3 pairs, 3-4 in. long. Fl. terminal, in short axillary panicles, sepals 5 in long, valvate, reflexed in fruit. Hips 3-5 from each flower, sessile, oval, 1/2 in. long, glabrous inside and outside.

3. ELLIPANTHUS, Hook. f.; Fl. Brit. Ind. ii. 53.

Trees or shrubs. L. unifoliate, quite entire. Fl. pentamerous, bisexual or polygamous, in short axillary racemes. Sepals valvate, not enlarged in fruit, petals longer than sepals, oblong-lanceolate, densely pubescent. Stamens 10, the five shorter without anthers, filaments short, truncate at base. Ovary 1, pubescent, style short. Capsule stalked, oblique, velvety glabrous in *E. ellipticifolia*, valves glabrous within. Seed arillate, albumen 0. Species 12, Burma, Malay Peninsula and Archipelago.

A. L. pubescent beneath.

1. *E. Thwaitesii*, Hook. f. - Syn. *E. unifoliatum*, Bodd. Fl. Sylvet. 170; *E. ellipticifolia*, var. *neglectus*, O. Kuntze. Vern. *Pulappata*, Mal.

A small tree. Branchlets, petioles and underside of leaves slightly pubescent. L. elliptic-lanceolate, nonnervate, blade 4-6 in. long, petiole 1/2 in. long, veins 4-5 pair, joined by conspicuous reticulate veins and strong intramarginal curves at a distance from margin. Fl. pale-green, in short axillary panicles, sometimes tetramerous. Petals 1/2 in. long. Capsule 1-1 1/2 in. long, pointed, base tapering into a stalk supported by the persistent calyx, densely covered with rusty hairs.

Evergreen forest, Travancore and Tamil-Nadu, Fl. Ind. Mar. 1. Type, Travancore.

2. *E. tomentosus*, Kurz, *P. Fl.* 1: 320.

A small evergreen tree. Branchlets, petioles and underside tawny-tomentose. L. elliptic or elliptic-oblong, glabrous above, more or less pubescent beneath, blade 4-5 in. long, petiole 1/2 in. long, articulate at the insertion of blade. Fl. in small compact axillary panicles. Capsule 1/2 in. long, densely velvety.

Southern slopes of the Parv-Yoma, Tennessee. Fl. Ind. 2.

B. L. glabrous on both sides.

3. *E. calophytus*, Kurz, Assamensis. L. elliptic-lanceolate, blade 4-7 in. long, petioles 1-1 1/2 in. long, glabrous. Petals 1/2 in. long. Capsule obcordate, 1 in. long. 1. E. Balfour, Hook.



FIG. 61.—*Ellipanthus tomentosus*, Kurz, 13.

1. PIPTANTHUS, D. Don: Fl. Brit. Ind. ii. 62.

P. nepalensis, D. Don: Hort. F. Fl. Ind. Vera. Clarend. 1825.

A shrub, attaining 10 ft., with alternate, divaricately trifoliate leaves, crowded at the ends of branchlets; leaflets pinnate, 7-11 in. long, ovate-oblong, petiole less than half the length of leaflets. Stipules ovate, as in appearance opposite to the petiole, deciduous. Flowers large, bright yellow, in short hairy racemes, with broad ovate, tomentose involucral bracts. Pod linear-lanceolate, 2-5 in. long, 3 in. broad, 14-19-seeded, dehiscent.

Himalaya, valley to Bhotan. Khas hills, Manpur. Chin hills Upper Burma. Mostly in shady woods, 7000 to 10000 ft. Fl. May, June. Also Tibet and Szechwan, Western China. A second species, *P. tricuspidata*, Franchet in Yunnan.

2. CROTALARIA, Lamour: Fl. Brit. Ind. ii. 65.

Herbs, rarely shrubs, with simple or digitately 3-foliate, in a few species 5-foliate leaves. Flowers mostly yellow, sometimes blue or purple, in terminal or leaf-axillary racemes, keel beaked. Stamens monadelphous in an open sheath; anthers alternately long and beak-fitted, short and versatile. Style beak-fitted, stigma minute. Pod tergal. Species about 250; tropical and sub-tropical regions of both hemispheres. 77 species in India.

1. *C. Borhia*, Ham.: Brand. F. Fl. 131.

An erect or procumbent shrub; branches numerous, slender, flexible and rush-like when young, stiff and rigid when old. Leaves simple, small and scanty, linear or spatulate. Fl. yellow, far apart on long racemes, forming terminal divaricate rigid panicles. Calyx clothed with long silky hairs, both lanceolate, as long as corolla.

Common in the plains of Assam, the Pura, Western Nagpura, and the Arun. Fl. 5-8. Also in Afghanistan. The young stems are numerous tall herbs, 7-8 ft. high, clothed with large yellow fls. in racemes and on white bark. *Crotalaria frutescens*, Lamour: Fl. 131. Some of Indian hemp is cultivated in most parts of India.

Piptanthus cythoides W. & A.; Kurz, F. Fl. i. 63, is an erect branched shrub, 4-6 ft. high, in the Eastern Himalaya, the Khas and Naga hills, and the hills of Burma, 8000-10000 ft. Leaves trifoliate; flowers yellow, racemes; pods 2-4 in. long, 1-1 1/2 in. broad, enlarged to both ends, on a slender stalk 1/10.

3. CARAGANA, Lamour: Fl. Brit. Ind. ii. 115.

Spinescent shrubs with pinnate leaves. Common petiole produced beyond the end pair and often spinescent. Stipules also frequently spinescent. Claws of petals 1/2 as long, or nearly as long as calyx. Standard broad, with well-fitted wings, keel obtuse, as long as wings and standard. Stamens densely placed, anthers uniform. Style glabrous, stigma terminal minute. Pod linear, calyx convex. 20 species; 7 Indian, the rest in Central Asia and China.

1. *C. brevispina*, Koeler: Brand. F. Fl. 131. Vera. Ar. Janna.

Leaves generally fasciculate, on short tuberculate branchlets in the axils of light spinescent petioles, 1-3 in. long, with or without leaflets. Stipules various, the outer frequently spinescent. Leaflets 5-7 pair, with soft appressed hairs. Corolla petals often not spinescent. Flowers 3-5 in. pedunculate umbels, peduncles 1-3 in. long. Calyx campanulate, teeth shorter than tube. Pod tergal, woolly inside.

North West Himalaya, 8000-10000 ft. India to Gangra, and Khas, valley. Fl. July. Nearly allied to *C. desertiana*, Hook. & Th. Fl. Brit. Ind. Khas valley, Harare, Central. A tall shrub or small tree, with very short calyx with wings of the bark placed on the leafy sheath of the long Afghan leaflets. *C. arborescens*, Lamour: Fl. Brit. Ind. 131. Kurz, F. Fl. i. 63. Kurz valley.

C. Gerardiana, Boyle: Fl. & G. the Lark valley of the lower N.W. Himalaya, also in Kashmir near Quetta, in the Jinnah forests, has all petals yellow, standard

Fl. large, yellow or reddish, low-flowered axillary racemes. Standard broad, biplicate or bicarinate at the base, claw short. Keel long, much incurved, not beaked. Stamens diadelphous, anthers uniform. Ovary stipitate, ovules 2, style much incurved, bearded along the inside. Pod large, membranous inflated, indehiscent or incompletely dehiscent. Species 4-5, South Europe, Western Asia, N.W. Himalaya.

4. COLUTEA, Linn.; Fl. Brit. Ind. ii. 109.

Herbs or shrubs with imparipinnate leaves. Fl. large, yellow or reddish, low-flowered axillary racemes. Standard broad, biplicate or bicarinate at the base, claw short. Keel long, much incurved, not beaked. Stamens diadelphous, anthers uniform. Ovary stipitate, ovules 2, style much incurved, bearded along the inside. Pod large, membranous inflated, indehiscent or incompletely dehiscent. Species 4-5, South Europe, Western Asia, N.W. Himalaya.

1. *C. arborescens*, Linn., var. *imparipinnata*.—Syn. *C. nepetensis*, Steud. Brand. F. Fl. 130; Collat. Sincl. Fl. Ind. 126. Burred, leaflets 4-8 pair, glabrous, oval or obovate. Corolla bright yellow. Pod 2 in. long, hairy when young, splitting at the tip when ripe.

Arid valleys of the inner Himalaya, 5000-11,500 ft., Ladak to Kumaon, Kuram valley, Northern Europe and Western Asia. *C. Colutea armata*, Hamak. and Linn. Journ. Linn. Soc. xviii. tab. 28 is a small-riny shrub of the Baluchistan hills (7,500-8,000 ft.) with grey, fibrous bark, spinescent branchlets, small flowers and pods 1 in. long.

5. INDIGOFERA, Linn.; Fl. Brit. Ind. ii. 102.

Herbs or shrubs, hairs appressed, generally attached by the middle. Leaves simple, trifoliate or imparipinnate, leaflets mostly opposite. Fl. in axillary racemes, calyx oblique. Stamens diadelphous, anthers uniform, apiculate. Ovary sessile, style short, stigma capitate. Pod linear, seeds numerous. Species 200, tropical and subtropical regions.

A. Leaflets mostly opposite, 1-15 pair. Fl. large, over 1/2 in. long.

1. *I. pulchella*, Roxb.; Wight Ic. t. 107.—Syn. *I. arbores*, Hook. & Wight Ind. t. 388. Vern. *Salyho*, Kumaon; *Bar-H*, Mar.; *Tine-mi-yang*, wild forest Indigo, Burma.

A large, handsome shrub, sometimes with a short thick trunk, branches and leaves thinly pubescent, leaflets 8-12 pair, elliptic to obovate, obtuse, often mucronate, 1 1/2 in. long. Fl. pink; bracts caesecious, longer than buds, early deciduous. Calyx carinate, teeth triangular, acuminate. Pod straight, curved, suture thick.

Sahimalayan tract and outer valleys, ascending to 10,000 ft. from Kalka station, Chamba in all forests. Both *Peninsular*, in Burma chiefly in Eng forest. Fl. 10-15 mm. diam.

Wight, F. Fl. t. 361 distinguishes *I. elliptica*, Roxb. Pegu and Yarrabide, as a separate species, leaflets 4-8 pair, pod terete, with pale pedunculate suture, seeds 10-15, with cylindrical.

2. *I. atropurpurea*, Ham.; Wight Ic. t. 109. Vern. *Khath*, Kashmir; *Koth*, Kashmir; *Kola Sulem*, Kumaon.

A large shrub, nearly glabrous, leaflets 3-5 pair, ovate-oblong, 1 1/2 in. long, Fl. dark purple, in pedunculate racemes, as long as leaves or longer, corolla white in bud, the long acuminate bracts longer than the buds. Calyx teeth short, triangular. Pod straight, slightly compressed, marginate, reflexed when ripe.

Upper Himalaya, from Hazara to Nepal, generally between 2,000 and 9,000 ft. Solonchok, Khari, and Neer hills, Upper Burma, Yunnan. Fl. R. S. II. I. Hamilton, Grass and sedgeland, burnt down by the annual fires. Fls. *Eschschol* *resopantia*, buds usually 1 inch, fl. purple 1/2 in. long, distant in long slender racemes.

3. *I. tetepetata*, Benth. Himalaya 2,000-11,000 ft. from Kashmir to Sikkim, central

leaves wanting. Calyx broad campanulate, with short bristly hairs toward base. Linear, dehiscent, seeds numerous, separated by distinct transverse ribs. Species 24 in the tropical and subtropical regions of both hemispheres.

6. *S. aegyptiaca*, Pers. Fl. Brit. Ind. d. 114; Wight Jn. 1. 32. *Veget. Ind. Brit.* Handb.; *Joynti*, Bengal; *Strobil. Mar.*; *Geobotany*, Burma.

A small soft-wooly tree, 8-12 ft. high. Corolla petals 4-6 mm. long, lobes 10-20 mm. linear-oblong, $\frac{1}{2}$ in. long, a lobe 4-12 dented or serrate, nearly as long as broad. Petals yellow or orange and purple. Ped. 6-8 in. linearly-ovate, serulose.

Commonly planted and cultivated. In the Persian Gulf as far as the range extending to 19° N. in the N. W. Himalaya. Cultivated throughout the tropics, wild in tropical Africa. The wood makes good charcoal for gunpowder.

7. *S. grandiflora*, Pers. Fl. Brit. Ind. II. 115. *Veget. Rossia*, Hind. *Boiss. Voy. Arab.* Maroc 1806, Turc.

Attains 20 ft. Corolla petals 9-9 in. long, lobes 10-20 mm. linear-oblong, $\frac{1}{2}$ in. long. Racemes short, fl. 2-4, 3 in. long, cal. of white. Ped. 10-12 in. long, $\frac{1}{2}$ in. broad, compressed, tetragonal.

Confined in tropical India as a species for the light pine for firewood and for fuel, in the ranges of the Deccan chiefly for ornament.

7. MUNDULEA, DC. Fl. Brit. Ind. II. 110.

(12 species, of which 11 in Madagascar.)

M. anberosa, Beeth. Syn. *Euphorbia suberosa*, DC. Wight III. 1. 82, 71.

A small tree, with pale corky bark, branchlets and underside of leaves clothed with short silky hairs. Leaves superimposed, lobes nearly opposite, without stipule, lanceolate, 6-11 palm. Fl. large, 17 in. long, pink or white, in short terminal racemes, on pedicels 2-3 times the broadly campanulate calyx, with unequal. Stamens monadelphous, the 10th free at the base, anthers filaments dilated above. Ped. linear 3-4 in. long, straight, striate, the base of the stamens densely velvety, 2-8 seeded, irregularly 4-angled, flattened seeds.

Woods of Western Peninsula, covered with flowers, May-Aug. Ceylon, Malabar, and the Deccan.

8. MILLETTIA, Wight of Arc. Fl. Brit. Ind. II. 104.

Leaves or all the leaves superimposed, stipule or fasciculate on nodes, which are somewhat prominent, lobes opposite, often stipellate. Fl. white, pink, purple, rarely blue, in racemes or panicles. Calyx truncate or shortly lobed. Stamens in most species glaucous, axillary. Vexillary stamens wholly free, the middle of filament expands with the sheath, anthers trifid. Ped. four-angled or ovate, dehiscent, not winged as a rule. The rest of several species and the fruit of *M. parviflora* used to imbricate bark. 30-64 species in the tropical and subtropical regions of the old world, of which more than one half in the Eastern Peninsula. None in Ceylon. The boundaries between *Millettia* and *Desoria* are uncertain.

In the case of this genus, as well as in the case *E. Deccanica* and *Desoria*, I have observed the species with more or less of the same characters, because these biological features are common to several species. This distinction however, is not an all-gone character, for the leaf-blade of the form *Millettia* are entire, *Desoria* are lobed and other characters remain unaltered, but when light is given over to the intermediate length of the leaf-blade, the leaves and leaflets are clothed with the same type of other characters and form a variety in the open, exposed to the sun, probably as a way of providing for want of supports in some species. Hence the same species in some cases are readily distinguishable as an exact character as a character. For example, in India will grow well in the shade, but in the intervening space by experiment and by observation of the results.

1. Trees all in the eastern region.

1. *M. pendula*, Benth. — Syn. *M. laciniata*, Kurz, F. Fl. i. 372. Vern. *Tsang* (Burm.).

A deciduous tree, heartwood dark purple. Youngest shoots silky, leaflets pair, 3-4 in. long, pale beneath, glabrous when full grown, stipels serrulate persistent. Fl. pure white, on long pedicels, fasciculate in compact terminal racemes, 4-6 in. long. Pod woolly, flat, pointed at the ends, 3-5 in. long, 1-2 in. wide, 1-3 seeded.

Deciduous forests, Upper and Lower Burma, mostly near streams. Fl. H. S.

2. *M. glaucescens*, Kurz, F. Fl. i. 357 (*Derris microptera*, Gamble, List 39). Vern. *Tsang* (Burm.).

A large deciduous tree, nearly glabrous, leaflets 2-5 pair, without stipels, 3-5 in. long, pale beneath, scattered hairs on the underside while young, with a very minute regular but not raised network of reticulate veins between the tertiary nerves. Fl. 1-2 in. long, blue, red or purple, no capillary pedicels in axillary racemes; shorter than leaves. Standard glabrous, very hairy. Pod flat, woolly, 4-5 in. long, 1 in. wide, both sutures thickened and expanded into narrow wings.

Silicles common up to 5000 ft. Young leaves golden brown with long racemes of fine red glands. Lower Burma, common near streams. Fl. H. S. Also Malay Peninsula. R. M. Wrightiana, *Prin. Ind. Arch. Soc. Beng.* vol. 18 (1895), p. 659. Shows little Upper Burma, nearly allied, but with thin pods, no wings at top sutures.

3. *M. atropurpurea*, Benth. — Syn. *Angamia atropurpurea*, Wall. Fl. As. H. S. t. 75. Vern. *Kee Tsang* (Burm.).

A large evergreen tree, glabrous except inflorescence. Leaflets very or less oblique at base, rigidly coriaceous, glossy, 3-4 pair, 3-6 in. long, no stipels. Fl. dark bluish purple, on the stout branches of large pubescent erect terminal panicles, pedicels short hairy, 2 bracteoles at base of calyx. Pod turgid, thickly coriaceous, 2-3 in. long, 2 in. broad.

Evergreen forest, south-eastern part of the Pagan Yoma hills between the Than gyin and Hlaing-hay rivers, and elsewhere in Moulmein and Tenasserim. "The sky covered with dense patches of deep purple." Wall.

The other trees of this genus may be classified as follows:—

a. Leaflets 1-3 pair.

1. *M. multiflora*, Coll. and Hemsl. in Journ. Linn. Soc. xviii. 41. Moulmein, Upper Burma, leaflets coriaceous, elliptic, 1-3 pair, 1 in. long. Fl. 1 in., standard silky outside.

2. *M. tetraptera*, Kurz, F. Fl. i. 356. Dry region of Irwaddi valley, Pagan to Mandalay, leaflets elliptic or obovate, 1-3 pair, 1-3 in. long, silky pubescent. Pod woolly, 1-2 seeded, 3-4 in. long, 2 in. wide, each suture with two narrow wings.

3. *M. palmata*, Kurz, loc. cit. 357. Upper Burma, shrubby forest on the edge of pine-wood hills east of Toungay. Deciduous, leaflets 2-4 pair, thickly chartaceous, long acuminate, pubescent along midrib, no stipels, 6 1/2 in. long, pinkish or yellowish white.

4. *M. ovalifolia*, Kurz, loc. cit. 361. Prome district, leaflets elliptic, 3 pair, 1 in. long, petioles slender.

5. *M. macrostachya*, Coll. and Hemsl. in Journ. Linn. Soc. xviii. 41. Southern Shan hills, 2000-4000 ft., leaflets 1-3 pair, 2-3 in. long, softly tomentose beneath. Fl. pink, 1 in. long, standard silky outside.

b. Leaflets 5-10 pair, stipellate.

6. *M. grandiflora*, Kurz, loc. cit. 355. Vern. *Tsangpagan*, Burma. Pagan, Yanzakha, deciduous, strictly glabrous, attains 60 ft., leaflets 7-10 pair, thinly coriaceous, lanceolate, 1-2 in. long. Fl. blue, standard silky.

7. *M. pulchra*, Benth.; Fl. Ind. Ind. ii. 100. Vern. *Tsangpagan*, Burma. Khasi hills, Manipur, Upper Burma, leaflets semi-obovate, young shoots tomentose, sometimes densely tomentose. *Misconium* Wirt. 288. Manipur, 4. purple, standard glabrous.

B. Woolly climbers.

8. *M. auriculata*, Baker. — Syn. *M. macrophylla*, Kurz, F. Fl. i. 351. Vern. *Gang Hind*; *Mandh*, *Qadh*; *Guncar Gond*; *Wana*, Burma.

Young shoots soft silky-tomentose, leaflets 3-4 pair, 3-6 in. long, ovate.

along shortly serrulate (s. alpestris serrate, secondary nerves 8-10 pair, prominent beneath. Racemes 4-9 in. long, rusty tomentose, axillary, several at the ends of short stout branchlets, fl. whitish. Pod flat, woody, rusty-tomentose, 4-6 in. long, $\frac{1}{2}$ in. broad, sutures thickened.

Sikkim: Darjeeling, from the Sikkim mountain, Belat, Central India south to the Ganges. Common in Sal forests. Fl. April-June. A remarkable local variety, formerly regarded as a specimen of *M. cuneata*, Benth. Kurz, F. Fl. 1. 352. Vern. *Dumrao*, Burm., common in the deciduous forests of Upper and Lower Burma, Tenasserim, reddish-brown, glabrous, more or less glaucous when dry.

13. *M. cinerea*, Benth.; Kurz, F. Fl. 353.

Glabrous except inflorescence; leaflets 1-3 pair, thin, membranous, 3-9 in. long, elliptic or elliptic-obovate, acuminate, beneath glabrous beneath, secondary nerves 6-8 pair, prominent on the underside, with a conspicuous network of raised reticulate veins. Fl. white (tip of bud and wings purple), in terminal panicles, mostly single, not fasciculate, calyx tomentose, supported by 2 setaceous bracteoles, three-tooth triangular, the two upper minute crenate, corolla densely silky outside. Pod thick, turgid flat between seeds, downy-velvety, 2-4 by 1 in., seeds 1-5.

Sikkim, ascending to 4000 ft. Darjeeling, Assam to Chittagong and Burma. Fl. Feb. April. Newly sikkim *M. Darwardi*, Coll. and Hemsl. in *Ann. Soc. Jour. Bot.* 27, described as a tree in one, as a climber in another place, Shan hills, Upper Burma; leaflets 2 pair, 2-3 in. long, fl. in dense terminal panicles.

15. *M. pachycarpa*, Benth.; Kurz, F. Fl. 1. 353. Vern. *Kharlan*, Khasi hills.

A large spreading and scandent shrub, young parts and inflorescence rusty-brown tomentose, leaflets 5-6 pair, 3-7 in. long, pubescent beneath, secondary nerves 8-12 pair. Fl. pale pink, 1 in. long, in axillary racemes 9-10 in. long, standard glabrous. Pod thickly coriaceous, rigid, indented between seeds, 2-3 in. long, $\frac{1}{2}$ in. broad, seeds 1-3.

Sikkim to 4000 ft. Darjeeling, Assam, Khasi hills; pod used to poison fish, Manipur, Upper Burma.

16. *M. racemosa*, Benth.; Fl. Brit. Ind. ii. 100.—Syn. *M. leiogyne*, Kurz, F. Fl. 1. 351.

A large woody climber, deciduous, youngest parts and inflorescence rusty



FIG. 15.—*Millettia euryantha*, Baker.

branches. Leaves 2-3 pairs, 1 in. long, striate, serrate, 7-8 in. long, simple, serrate. Fl. whitish, in compact racemes, which are pendulous at the ends of branches, often appearing before the leaves; bracts much longer than pedicel, standard and ovary glabrous. Pod dark brown, gibbous, linear 4-6 in. long, 3-5 seeded.

Desmodium species of the Wiggins Peninsula, and Burma, 18 Apr. 1917.

Another striking species of this genus, as described as follows:

1. Underneath of full-grown leaves densely clothed with silky, tomentose hairs, in Western species.

11. *M. rubiginosa*, Wight and Arn.: Wight Infr. 261. This species is rather common in the hills, elliptic, 4-6 in. long; secondary nerves 8-10 pair, petioles 1-1.5 in. long, small, 3-4 in. long, standard densely silky on the back. Pod woody, linear, 2-4 in. long, 1 in. broad. 12. *M. splendens*, W. & A. Nigris, A. Smalther. Diandra 2: 4, plate 10, under 10. Underneath secondary nerves 12-15 pair, stipules conspicuously striate, densely silky on the back. Pod woody, striate, 3 in. long, 1/2 in. wide.

3. Underneath of full-grown leaves glabrous; Eastern species.

13. *M. pauricoides*, Prain in Journ. A. Soc. Hong Kong 1907, p. 128. Tenasserim, Shan States, Upper Burma: leaflets 2-3 pair, 1 fl. in long, 1-2 mm. wide, beneath densely tomentose, silky beneath, lower part of petioles to base of long petiole and of this leaflet, secondary nerves 8-10 pair, remaining beneath. Javanese variety, *M. p. long.* 14. *M. long.* 1 in. long, standard densely silky on back, pod striately pubescent. This is the species described by King, F. Fl. 1. Malacca, *M. long.* Wight and Arn. A large woody climber of the Malay peninsula and Java, branches creeping, 10-15 ft. high, 1 in. long. Pod woody, torpid. 15. *M. nitida*, Benth. Nepal in the East. Assam, Sikkim, N. with few scrambling shrubs, leaflets 2-3 pair, elliptic, 1-2 in. long, 1/2 in. long, underneath linear, finely pubescent, secondary nerves 8-10 pair, remaining beneath. Fl. in great racemes. Pod papery, woody, 2-4 in. long. 16. *M. thoma*, collected by Seale, Burma, Infr. 1, p. 10. Burma, 1888. Leaflets 2-3 pair, densely silky beneath. 17. *M. can.* Benth. Yunnan, 1843. Underneath, Wallich, leaflets 3 pair, coriaceous, broadly elliptic, 2-3 in. long, 1 in. broad, secondary nerves 6-8 pair, striate. Pod woody, 1/2 in. long, 1/2 in. wide.

4. Underneath of full-grown leaves glabrous or striate.

18. *M. Padiata*, Wight Infr. 26. Kham Hills, Assam, Upper Burma (Thakwin Burma), Ceylon, glabrous, leaflets 2-3 pair, striate, coriaceous, elliptic-lanceolate, 2-4 in. long, 1/2 in. wide, secondary nerves indistinct. Fl. 4-6 in. long, white, on capillary pedicels. 19. *M. monticola*, W. & A. Nigris, F. Fl. 1. 254, Sikkim 6100-7000 ft. Assam, Nantung, Burma, 2500-3500 ft. In straggled hill and glim forests; leaflets 4-5 pair, membranous, pubescent beneath, veins beneath chiefly serrate, 2-4 in. long, secondary nerves 8-10 pair, not conspicuous, a definite network of reticulate veins between. Fl. in compact, erect or spreading, collateral racemes, generally several at the ends of branchlets. Fl. (Sikkim, Nantung, Korea) pale lilac or purple in Sikkim. Fruit, at the end of the raceme, indurated and winged along both sutures, hence the name, which is *Desmodium monticola*. It is not *D. secunda*, Baker, Fl. Br. Ind. 4: 210.

20. *M. caudata*, Baker, Kham hills, Sikkim, glabrous, leaflets bipinnate, rounded, 2-3 pair, 4-6 in. long. Pod linear, rigidly coriaceous, 2-4 in. long, 1/2 in. broad. 21. *M. curvata*, Baker, Fl. Brit. Ind. 4: 107, found by Wallich at "Kham" in the Kham hills and China.

9. DESMODIUM, Desv., Fl. Brit. Ind. 4: 161.

Shrubs or herbs, leaves unifoliate or pinnately trifoliate, leaflets unimbricated, stipellate. Fl. red or white, stamens diadelphous, or the 10th free, anthers adhering to the sheath higher up. Pods flat, consisting of several (usually) independent joints. 100 species in the tropical and subtropical countries of both hemispheres.

A. Leaves 3-foliate, fl. in umbels or heads.

1. *D. Cephalotes*, Wall., Wight Infr. 373. Syn. *D. congestum*, Wall., Wight Infr. 2: 96.

A large shrub in Burma at times a small tree; branches angular, 2-3 in. diam., grey silky. Leaflets elliptic-lanceolate, 2-4 in. long; secondary nerves

terminal, 6-10 jointed. Pods no. large, shortly pinnulate, yellowish when young, brown when ripened, venose, reticulate, venous, pubescent, slightly curved, jointed, 1-2, pedicels slender, calyx persistent.

— *Sambucalaga* tract from D. to Davao eastward. Common to 1000 feet, pinnulate, venose, reticulate, venous, pubescent, slightly curved, jointed, 1-2, pedicels slender, calyx persistent. Fl. white. *D. olivaceum*, Prain, *loc. cit.* 80. *D. umbellatum*, Prain, *loc. cit.* 80. Upper Burma: pedicels to 6 in. long, densely velvety, venous, 1-2, pedicels slender, calyx persistent. Pods of 2 joints, 1 in. long.

3. *D. umbellatum*, DC.; Kurz, *F. Fl.* 1, 385.

A large shrub, sometimes a small tree, young shoots green-pubescent. Leaves thinly coriaceous, broadly elliptic, glabrous above, pale gray or brownish-pubescent beneath. Fl. white, 6-12 in a pedunculate axillary cyme. Pod of 1-4 pubescent joints, 1½-2 in. long. Calyx deciduous.

Lateral, species of the Eastern Peninsula. From the Western Peninsula reported from near coast and Kelantan. F. B. S. Ceylon, Malay Archipelago. Widely distributed from the Mascarene Islands to Polynesia.

1. *D. Wallichii*, Prain, *loc. cit.* Upper Burma, has pedicels densely pubescent-venous. Pods 1-1½ in. striate.

R. Leaves 3-foliate, 8 in. long, racemes, bracts subulate, linear or lanceolate.

5. *D. tilizifolium*, G. Don; Fl. Brit. Ind. ii, 168.—Syn. *D. oxypleura*, Wall.

A large diffuse shrub, attains 2 in. diam. Wood hard with light brown heartwood, inner bark (heart) tough. Leaves from a rounded or crenate base, ovate-obovate, generally cuspedate, slightly sinuate, secondary nerves 4-6 pairs. Fl. nod. on slender pedicels, 1-1½ in. long, in simple panicles, bipinnate. Slightly drooping. Pod nearly straight, 2-3 in. long, joints 6-10.

— *Sambucalaga* tract from D. to Davao eastward, as far as 7000 feet. Hills of Upper Burma 1000-5000 ft. Fl. R. S. T. *Sambucalaga* tract from D. to Davao eastward, as far as 7000 feet. Hills of Upper Burma 1000-5000 ft. with broad, glabrous, distinctly sinuate leaflets, and long slender drooping pubescent racemes, probably *D. tilizifolium*.

8. *D. sambucense*, DC.; Prain, *loc. cit.* 374.—Syn. *D. floribundum*, G. Don; Fl. Brit. Ind. ii, 167; Gilbert, *Sinis Fl.* 1, 131.

A large shrub, with angular, densely pubescent branches. Leaves with appressed silky hairs, veins prominently reticulate on the underside. Fl. erect, reniculate racemes, buds shorter than the lanceolate, ribbed, deciduous leaves. Pods hairy, 1-1½ in. long.

— *Sambucalaga* tract from D. to Davao eastward, as far as 7000 feet. Hills of Upper Burma 1000-5000 ft. Fl. R. S. T. *Sambucalaga* tract from D. to Davao eastward, as far as 7000 feet. Hills of Upper Burma 1000-5000 ft. with broad, glabrous, distinctly sinuate leaflets, and long slender drooping pubescent racemes, probably *D. sambucense*. *D. sambucense*, Prain, *loc. cit.* 374. A widely spread species. *Sambucalaga* tract from the Ganges eastward, Assam, Khasi hills, Western Peninsula from Bombay northwards, Java, Borneo, Philippines. 10. *D. constrictum*, DC.—Syn. *D. constrictum*, Wall. *Pfl. As. Bor.* 1, 91. Himalaya, Punjab to Assam, to 7000 ft. Hills of Upper Burma 1000-5000 ft. 11. *D. polycarpum*, DC.—Wight *loc. cit.* 1, 161.—Syn. *D. gosses*, Wight *loc. cit.* 1, 167; *D. heterocarpum*, DC.; Kurz, *F. Fl.* 1, 385. Widely spread over India and Burma, and from East Africa to Polynesia.

Q. Leaves 8-foliate, 8 in. small fistules, concealed by a pair of persistent linear bracts.

12. *D. pulchellum*, Benth.—Syn. *Dicranum pulchellum*, DC.; Wight *loc. cit.* 1, 118. Vern. *Tiang tauo*, Burma.

Attains 4-5 ft., terminal leaflet larger than the lateral ones. Fl. in long terminal or lateral bracteate racemes, yellow, several in the axil of a 2-foliate bract, the common petiole terminating in a shorter or longer bristle. Fl. completely concealed by the bracts. Pods small, minutely veined, joints usually 2, often diverging from between the bracts.



FIG. 91.—*Desmodium pulchellum*, Benth. f.

12. *D. gangeticum*, DC. : Wight Ic. t. 271. Subimalayan tract from the Junah eastward, both peninsulas (Ceylon, Java, Sumatra, Borneo, Philippines). A slender under-shrub, leaves ovate-lanceolate, acuminate, glabrous above, more or less pubescent beneath, secondary nerves 8-10 pair, fl. white, in long, slender, terminal and axillary racemes. Pod lobate, 1-1½ in. long.

13. *D. trigastrum*, DC. Varn. *Motia hirsuta* Burw., a small shrub, Dehra Dun, Gadh, Sikkim, Assam, Khasi hills, both Peninsulas and Ceylon, also Indian Archipelago; has 2- or 3-nerved branches, leaves oblong-lanceolate on a broadly-winged, narrow or obovate petiole. Pods sessile, straight, 1-2 in. long, joints square, 1-1½, white or less strigose, with adpressed hairs.

Closely allied are the following species established by Dr. Cambé, Proc. A. Soc. B. *D. carolinense*, DC. Sikkim and coast of Tenasserim and Andaman, attaining 10 ft. and more. Pods glabrous, finely cartilaginous. *D. oleum*, DC. Assam, Khasi hills, Cachar, Chittagong, etc. Pods glabrous, thin. *D. yersii*, *trigastrum*, DC. Subimalayan tract, Assam, Khasi and Nagp hills, Bengal, a low trailing plant, herbaceous, but affinis along the edges, glabrous on the face. Fruits in Journ. Agric. Beng. vol. 6 (1884), 243, classes these forms as subvarieties of *D. trigastrum*.

10. OUGEINIA, Benth. : Fl. Brit. Ind. 5, 169.

O. dalbergioides, Benth. The only species. Bedd. Fl. Sylv. t. 36; Brand. F. Fl. t. 23. — Syn. *Dalbergia ougeioides*, Roxb. ; Wight Ic. t. 391. Varn. *Sranon*, *Stadon*, *Tannur*, Hind. ; *Pinnon*, Oelh. ; *Raha*, Kol. ; *Ticus*, Maf.

A middle-sized deciduous tree, with a short and often irregularly-shaped trunk. Heartwood hard, tough, light brown to reddish brown. Leaves pinnately trifoliate, stipellate. Leaflets coriaceous, unequal, the terminal largest, broad-oval, the two lateral unequal, oblique, edge undulate or slightly serrate. Fls. white or pale pink, on long slender pedicels, in dense fascicles, or on short racemes, forming loose heads on old wood, 1-2 in. across. Stamens diadelphous, anthers uniform. Pod linear-oblong, flat, veined, slightly constricted between the seeds, scarcely dehiscent. Seeds 2-5, flat.

Subimalayan tract, from the Suthel to Sikkim, ascending in the valleys to 1000 ft. Central India south to the Orissary on the east, and North Kanara on the west side of the peninsula. Often gregarious. Fls. from Feb. to May, generally before the old leaves have fallen or the young foliage has come fully out.

To this tribe also belong: *Eschynomene aspera*, Linn. ; Wight Ic. t. 291, fig. 29. Rare in the Western Peninsula, Ceylon. A tall, erect water-plant, attaining 12 ft.

Common in both parts of the island, or widespread in both. Peninsular Ceylon. Its northern limit in the Salt range of Galle and Gallepur. Fl. B.S. AP. Sumatra, Java, Borneo, Philippines, &c.

D. Leaves 1-4-lobate.

13. *D. latifolium*, DC. : Wight Ic. t. 271. — Syn. *D. hirsuticarpum*, DC. Varn. *Kyppera*, Burm.

A large shrub, often with a short woody stem, branched, petioles and underside of leaves softly tomentose. Leaves scabrous above, ovate, 3-5 in. long, slightly repand, secondary nerves 5-8 pair, stipules from a broad base cuspitate. Fl. bright purple, in dense, villous, axillary racemes. Pods 1-2 in. long, clothed with hooked hairs, joints 5-6.

Subimalayan tract, from the Junah eastward, both peninsulas. E. limit of Upper Burma, 271. July-sept. Ceylon. Peninsular India to New Guinea.

which is almost the well-known oak, the soft white wood, generally called the "Banyan" into *Castanopsis*, and *Bala* into *Castanopsis*, as a protection against the oak.

Albizia candelarum, Herbert, *Prain*, in *Journal As. Soc. Beng.*, vol. 6, 1866, p. 177. The name is given to a climbing shrub, sending its roots deep into the ground, with small oblong leaves, and numerous axillary short racemes of small flowers, often bearing leaves and flowers, glabrous ovaries, and large pods. Widely spread from Orissa and Bengal through Western Asia, Afghanistan and Baluchistan, extending over the arid and dry regions of India, in numerous districts found on dry barren ground. Often creeping on a *Mucuna*, *Journal*, *Prain*, 1, p. 676, has silky ovary.

Legumin, *Mitchell*, *Fl. Brit. Ind.*, ii, 142, with trifoliate l. and short 1-seeded pods, many numerous and purple and a few sterile. L. *Prain*, *God. et Horn.*, in *Bot. Soc. Journ.*, xviii, 46, is a shrub 10 ft. high, common on the Shan table-land, 4000-5000 ft., leaves obovate, 1-1 in., fl. purple in dense axillary racemes, larger than leaves, red glabrous.

11. ABRUS, Linn.; Fl. Brit. Ind. ii, 175

(6 species, in the tropics of both hemispheres)

1. *A. precatorius*, Linn.—*Vera Ghacch*, *Kanch*, Hind. Mar.; *Chitath*, *Dev*; *Yee-gue*, Burma.

A climber, with woody stem and slender branches, twining round supports. Leaves pinnate, the common petiole terminating in a slender short bristle. Leaflets opposite, nearly sessile, 10-15 pair, oblong, obtuse, often mucronate. Fl. white or pink, in axillary pedunculate racemes. Pod oblong, lepid, the fruiting peduncles persistent and irregularly thickened. Seeds 3-5, ellipsoid or nearly globose, polished, generally red, with a black eye on the hilum, sometimes black with a white eye, more rarely quite white, shinyhard, and as weighty by perillere. An acrid poison in the seed.

Common in forest tracts of India and Burma, ascending in the outer Himalaya to 6000 ft. Found in Marwar, but not known from the arid region of Sind and the western Punjab. *Fl. Sept.*, Oct. A new species in the Indian Archipelago (*Schlageter*, *Compositae*, within the tropics).

2. *A. pectinatus*, Wall.; also widely distributed, is smaller, but has not slightly curved pods with 6-12 seeds.

12. MUCUNA, Adans.; Fl. Brit. Ind. ii, 185

Woody or herbaceous climbers, leaves pinnately trifoliate. Fl. large, dark purple or greenish white, in peduncled racemes or corymbs, often from the old wood. Calyx campanulate, 2 upper teeth connate, the lower ones longest. Keel and wings longer than standard. Stamens diadelphous, anthers all equally longer basifix and shorter yessette. Pod usually covered with bristles irritating bristles. Species 30, in the tropics of both hemispheres.

The structure of the woody species needs further study. Some South American *Mucuna* have soft spongy wood, irregular, more or less concentric masses of a resin, encircling with bands of pith. The xylem consists of thin-walled procumbent, traversed by longitudinal strands of vessels, sieve tubes and wood fibres.

A. Face of pod covered with oblique plates or lamellae.

1. *M. umbricata*, DC.; *Fl. Brit. Ind.*, ii, 185. Leaves nearly glabrous. Fl. dull purple, or white with purple spots, in short racemes, while in bud covered by large obscure umbilicating bracts. Pod 4-6 in. long, 2-3 in. broad, winged along both sutures; seeds 2-3.

Submontane tract, Kuchin to Assam, Upper and Lower Burma, Andamans—*Fl. Aug.*—*Ind.*

2. *M. monosperma*, DC.; *Wight Ic.*, t. 35.—Syn. *M. angulata*, Wall. *Pl. As. Res.*, t. 23d.

Young shoots clothed with rusty tomentum. Fl. dark purple in a short nodding pubescent corymb. Pod thick, broadly elliptic, 2 in. long, with a

light or double wing all round, and with numerous oblong lamellæ on the face, the whole covered with an appressed declivity, wing armed with red bristly bristles. Seed one, nearly circular.

Western Ghats from the Koonkan southwards, Assam, Khasi hills, Malaya, Java, Sumatra, Andamans. Fl. C. S. Also Malay Archipelago.

4. *M. atropurpurea*, DC. Western Nepal and Szechuan. Branches glabrous, leaves pedunculate, often branching racemes. Pods slightly elong. 2-3 in. long, 1-1 1/2 in. broad, winged and platted, 2-seeded.

B. Face of pod not platted.

1. *M. gigantea*, DC.; Fl. Brit. Ind. ii. 186.

A glabrous climber, stems thin, but sometimes 250 ft. long. Fl. yellow or white, in corymbs, pendulous on slender peduncles. Calyx with yellow declivity bristles. Pod 4-6 in. long, 1-2 in. broad, winged along both surfaces, seeds 2-4.

A tropical tree-fern common in the Sundrian and on the Andamans. A striking feature of the Indian mangrove-swamps. Here and there on the coast of the Western Peninsula, Malay Peninsula and Malay Archipelago to Borneo.

5. *M. macrocarpa*, Wall.; Kurz, F. Fl. i. 379. Vern. *Baldingri*, Siam.

A powerful woody climber, the stems to 15 in. diam. Wood a strongy. Fl. large, 2-3 in. long, greenish purple or greenish white, in long pedunculate racemes, axillary or from the old wood. Pods 1-3 ft. long, slender, up to 1 1/2 in. thick, narrowed between the 8-12 seeds, velvety when young, glabrous afterwards.

Nepal, Sikkim (ascending to 7000 ft.), hills east of Yunnan (then to 10000 ft. 4000-6000 ft.). Chanayuan, Upper Burma, 4000 ft. Fl. H. S. Also Malacca and Yunnan.

3. *Mimosa grisea*, DC.—Syn. *M. alba*, Wall. Wight Is. i. 29. Another name, Fl. C. S. Kurz, Burma, is short-lived (annual?), but climbs over big trees and is common among the tall grasses of the Sundmanas. The dark purple or grey stipules during the rains or in autumn, the pods ripen in the cold season, are 3-8 in. long, 2-angled, and densely clothed with brown irritating hairs. Siam, Assam, Khasi hills, Western Peninsula, Burma, Java, Yunnan. Also Malay Peninsula, Java, and Borneo.

III. ERYTHRINA, Lam.; Fl. Brit. Ind. ii. 188.

Trees or shrubs (a few herbaceous undershrubs), the Indian species nearly all leafless during the hot season, and in flower at that time, branches often prickly. Wood white, soft and light, medullary rays broad, pores vessels large, broad concentric bands of thin-walled wood parenchyma. Leaves paripinnately trifoliate, the lateral leaflets opposite, stipules small, stipules plant-like. Fl. large, generally red, laciniate in peduncled racemes, standard much larger than wings or keel. Stamens connate to the middle, the 10th free or connate with the rest at the base, anthers equal. Pod stipitate, dehiscent. 51 species in the tropical and sub-tropical regions of both hemispheres.

A. Calyx spathaceous, split to the base.

1. *E. indica*, Lam.; Wight Is. i. 38. *The Indian Coral tree*, Vern. *Dasari*, Assam; *Hind. Mar.*; *Pitta, Malar*, Beng.; *Halleero*, Kan.; *Molaga*, Tel.; *Kathi*, Burma.

A moderate-sized tree, of rapid growth. Bark yellowish or greenish grey, long shoots and inflorescence clothed with stellate pubescence. Bark yellow on branches, which fall when a few years old, pericarp unarmed. Leaf-pinnules glabrous, the terminal 1-3 in. long, generally broader than long, late-maturing in dense racemes, with peduncle to 15 in. long. Calyx 1 in. Fl. bright scarlet, with 5 minute teeth. Wings and keel equal, base at the apex of standard. Pod teres, 6-12 in. long, seeds 4-8, each the length.

Common on the coast from the Sunderbans to the Malay Peninsula. Andaman Nicobar. Fl. Feb., March. A bisexual species, which occurs in the Mascarenes, India, etc. It is indigenous inland in localities forest of Than, the Red Sea, and North Korea. Cultivated and well-cultured all over India, in Bengal, and the Peninsula grown to support the betel and pepper vines.

2. *E. stricta*, Roxb.: *Bomb. Fl. Sylv.* t. 175. Vern. *Tung Kathol*, Burm. Trunk and branches armed with sharp conical prickles. Leaflets entire, nearly glabrous. Fl. scarlet, in dense unilateral racemes, 4-5 in. with peduncles very numerous at the ends of short branchlets. Calyx $\frac{1}{2}$ in. keel half the length of standard, wings much smaller. Pod lanceolate glabrous, $\frac{1}{2}$ in. long.

Assam, Mr. W. Chittagong. Burma (Siam). West side of the Peninsula. Fl. Feb.-May.

B. Calyx campanulate or turbinate, limb truncate or split into 2 or more divisions.

3. *E. suberosa*, Roxb.: *Fl. Brit. Ind.* ii. 169.—Syn. *E. sublobata*, Roxb.: *Bomb. Manual* 87. Vern. *Pungat*, Hind. Mar.; *Dhant-dhak*, Hind.

A middle-sized tree, with a corky, deeply cracked bark. Branchlets sparingly armed with sharp stout conical whitish or light brown prickles, sometimes a few scattered prickles on petioles. Branchlets, outside of leaves and inflorescence clothed with long soft bi- or tri-furcate hairs. Leaflets rhomboid, entire or sinuate-lobed. Racemes 4-6 in. long. Calyx turbinate, 2-lipped, keel half the length of standard, wings minute. Pod narrow, 3-4 in. long, 2-4-seed.

Sikkim, from the East to the West, ascending to 2000 ft. Outh Burma, Marazion, Burma. Fl. March, April. A variety with full-grown leaves glabrous, in Khammou, Sikkim, Upper and Lower Burma.

4. *E. ovalifolia*, Roxb.: *Wight Ic.* t. 247. Vern. *Koo Kathol*, Burm.

Trunk and branches armed with dark brown prickles, arising from pyramidal corky tubercles. Leaflets elliptic or elliptic-oblong, obtuse, glabrous, whitish beneath. Racemes lax, 3-10 in. long several at the ends of branchlets. Calyx campanulate, splitting irregularly into 2 or more unequal divisions, lobes deep black-red, standard obovate, emarginate, 1½ in. Keel 1 in., wings 1 in. long. Pod turbinate, 6-8 in. long, finely downy, constricted between the 4-8 seeds.

Siam, Lower Bengal. Plants of Lower Bengal. Fl. Feb., March. Ceylon, Malay Archipelago, Polynesia.

5. *E. arborescens*, Roxb. *Cor. Pl.* t. 219. *Fl. Brit. Ind.* ii. 169.

Few prickles on branches and petioles. Leaflets, when full grown, nearly glabrous, 5-7 in. long and equally broad. Fl. very scarlet, racemes with peduncles up to 15 in. long. Calyx turbinate, silky pubescent, limb truncate or unequally lobed. Standard ovate, acuminate, concave, more than twice the length of keel, wings shorter than keel. Pod lanceolate curved, bristly pubescent, seeds 2-10.

Outer Himalaya, from Khammou eastward, 4000-7000 ft. Khasi hills. Meiboh, Burm. March 1877. D.B. Fl. Aug.-Oct.

A remarkable undershrub is *E. resupinata*, Roxb. *Cor. Pl.* t. 221 in the Saramalee of the salt marshes (not from Outh eastward, as in Parnassia). Trunk perennial outstock, after the flow of the hot ocean, spring short racemes of large bright scarlet fl. calyx 2-lipped, standard bent downwards. After the fl. comes up a short narrow leafy stem.

6. *E. lithosperma*, Miq.: *Kurz. F. Fl.* i. 367. Vern. *Tu-Kathol*, Burm.

A large tree, leafless in H.S., bark white, trunk and branches armed with straight sharp prickles, foliage dark green, young shoot usually pubescent.

Leaves ovate, acuminate, glabrous, 4-5 in. long, stipulate, glands large, oblong. Fl. appear while the tree is in leaf, in dense short racemes on short peduncles. CALYX 2-lipped, wings and keel equal, one-third the length of standard, which is 1½ in. long. Lower portion of pod 5 in. long, flat, seedless, imbricate, upper portion shorter and narrower, dehiscent, with 1-4 large dark purple seeds.



FIG. 71.
Erythrina Indica DC.
III.

Burma, in moist valleys near streams to 2000 ft. Often grown to support the betelvine. Fl. Jan-Feb. Malay Archipelago.

E. Indica, Kurz, in a journal sent by Prain, in Journ. As. Soc. Beng. 97, 72, a mistake based upon the leaves of *E. thapsus* and the fl. of *E. corollata*.

Docia reflexa, H. & A. Kunt, F. Fl. 1871; Ann. Bot. Gard. Cal. 12, 1, 40. Assam, Sikkim, Tenasserim, Andaman, Malay Peninsula and Archipelago, tropical Africa and America, is a strong woody climber with rusty tomentose branches and pinnately trifoliate stipulate leaves. Fl. pale pink, in dense racemes of rusty tomentose peduncles 8-12 in. long, bracts linear, much longer than leaf, subsistent. Pods about equal in length, standard orbicular, emarginate. Vexillary stamens free below, equal with the others in the middle, with a perianth with the stamens in the sheath alternately with perfect and empty anthers. Pod unguiculate, 1-2-seeded, 3-4 in. long.

14. PUERARIA, DC. Fl. Brit. Ind. II, 197.

Trailing shrubs or herbs with large pinnately trifoliate stipulate leaves, which in some species are lobed. Fl. in long, mostly paniculate racemes, blue or purple. Calyx campanulate, teeth unequal. Wings and keel nearly equal to standard. Vexillary stamens entirely free or cohering with the rest. Ovary sessile or nearly so. Pod linear, flat, many-seeded. 12 species, India, Malay Archipelago, Japan, and New Guinea.

1. *P. tuberosa*, DC.; Wight, J. 1, 112. Var. *Socot.* Socot., Hind.; *Gaura* del. Merwara.

A large deciduous pale-rose climber, with woody tubercled stem. Leaves broadly ovate, 3-5 in. long, 3-5 in. broad, the two lateral unequal-sided. Bracts shorter than buds, glabrous, imbricate, in long pointed racemes, appearing when the plant is leafless. Pod flat, clothed with long rusty hairs, 2-3 in. long, 2-6-seeded, much contracted between seeds.

Sahimalayan tract from the Indus to Sikkim, ascending to 1600 ft. Western Provinces. Fl. March, April. The large tuberoses near the base.

2. *P. Wallichii*, DC.; Prain in Journ. As. Soc. Beng. vol. 66 (1896), 419.

A large glabrous climber, leaflets ovate. Bracts longer than buds, hairy, appearing while the plant is in leaf, white, yellow or reddish, in racemes 2-12 in. long, fasciated and paniculate. Pod glabrous, coriaceous, 4-5 in. long.

Sahimalayan tract, Nepal and Sikkim, chiefly in the Sal forest, Khasia, Sikkim, Upper Burma. Fl. Oct., Nov.

Other shrubs and climbers: 3. *P. Thunbergiana*, Benth. Syn. *P. Thunbergii*, DC. Fl. Brit. Ind. II, 196, Sikkim, Khasia, China and Japan. A vigorous climber, leaflets

3-lobed. Fl. large, blue or violet, 1-1½ in., calyx teeth much longer than tube. Pod

2-3 in. long, densely clothed with long silky hairs. 4. *P. Candollei*, Griseb. Chittagong,

1-2 in. long. Calyx glabrous, etc. scarious, imbricate. 5. *P. Collettii*, Prain in

Journ. As. Soc. Beng. vol. 66 (1896), 229, Upper Burma. A shrub, sometimes climbing,

branches and leaves clothed with soft grey velvety. Racemes axillary, longer than

leaf. Pod thin, 2-3

15. SPATHOLOBUS, Hassk. : Fl. Brit. Ind. H. 193.

Woody climbers, with pinnately trifoliate leaves, leaflets stipulate, the two lateral opposite. Fl. small, in axillary terminal panicles. Stamens diadelphous, anthers uniform, obtuse. Pod coriaceous, one seed at the end, lower portion indehiscent. 16 species; 9 Indian, 1 in tropical Africa, the rest in the Malayan region.



FIG. 68.—*Spatholobus Roxburghii*, Benth. Pod, leaf. 4.

1. *S. Roxburghii*, Benth. —Syn. *Bulca parviflora*, Roxb.; Wight Ic. t. 210; Kurz F. Fl. i. 365. Vern. *Maula*, *Mula*, Hind.; *Phalsan*, Mar.; *Athambu*, Mal.; *Pank-nee*, Burm.

A large climber, the stem fluted, often attaining 12-16 in. diam. The layers of bast, which separate the masses of xylem, exude a red gum when cut. Young shoots, inflorescence and underside of leaflets grey velvety. Leaflets 6-8 in. long, longer than broad, secondary nerves prominent beneath, 6-8 pair, arcuate, anastomosing by intra-marginal veins. Fl. fasciated in cylindrical panicles racemes, white, $\frac{1}{2}$ - $\frac{1}{3}$ in. long, calyx teeth triangular acute, nearly 44

long, or only slightly above the mouth of calyx, unguiculate. Pod fully developed tomentose, inflated 3-5 in. long.

Small, slender tree, filling the Jumann in Central and South India. It grows common in deciduous forests, where it does much damage. F.R.C.S. A distinct variety, common, and solitary, is *S. demissiloba*.

2. *S. acuminatus*, Roth.: Fl. Brit. Ind. ii: 191. — Syn. *Butea acuminata*, Vahl.; Kurz, F. Fl. i: 305.

A sturdy climber, stem as thick as a man's arm, leaflets oblong-linear, acuminate, 2-4 in. long, shining above, nearly glabrous beneath. Fl. 1 in. long, in single panicles with slender ramifications, calyx teeth obscure, leaflets lengthened tube. Pod axillary, silky pubescent, inflated, 2-3 in. long.

Lower Burma, Assam, — Fl. B.S. — Also Malaya, Penang, &c.

Great Indian species. 3. *S. purpurea*, Roth.: Prain in Journ. As. Soc. Bengal, vol. 46, pt. 41. Bismarck forests of North Kanara. Leaflets ovate-oblong, shining, both surfaces glabrous-oblong. Fl. dark purple. Pod 4 in. long, pubescent, inflated, both curved, shining. 4. *S. masambica*, Roth.: Khas hills, Sikkim, and Phom, longest shoots and inflorescence strongly woody, with 2-3 in. long, inflated, somewhat shorter in axillaries, series between the secondary nerves which are very prominent. The following species are described by Dr. Prain in Journ. As. Soc. Bengal, vol. 65, pt. 84, 114-116. — 5. *S. squamiger*, Prain, Journ. As. Soc. Bengal, vol. 65, pt. 84, 114-116. — 6. *S. rufosa*, Prain, Malabar and Upper Burma. — 7. *S. latari*, Prain, Chittagong. — 8. *S. nigropunctata*, Prain, Malabar and Pegu. — 9. *S. riparia*, Prain, Thakkyang, near Yaching, Tenasserim. — 10. *S. Pottapari*, Prain in Journ. As. Soc. Bengal, vol. 67, 1900, Khasi hills.

16. BUTEA, Roth.: Fl. Brit. Ind. ii: 191.

Trees, shrubs, or large climbers, with trifoliate leaves. Leaflets stipitate, the 2 lateral opposite. Secondary and tertiary nerves very prominent. Fl. large, bright orange, scarlet or red, fasciated in axillary or terminal cymes. Standard acute, recurved. Upper stamen free, the others obsolete beyond the middle, anthers uniform, obtuse. Pod exaristate, oblong, lower portion flat, indehiscent, upper 1-seeded, dehiscent. 3 Indian species.

1. *B. frondosa*, Roth. Cor. Pl. t: 21; Bodd. Pl. Ind. t: 176. — Syn. *B. macrocarpa* (Lam.) Lambert, in Engler and Prantl, Bot. 3, 301. Vern. *Dhala*, Hind.; *Pada*, Hind. Mar.; *Khoshia*, Gaj.; *Mattuga*, Kan.; *Mahup*, Tel.; *Pink*, Bern.

A moderate-sized deciduous tree, trunk crooked and irregular; a red latex and gum issues from lacerations in the bark. Young shoots hairy, tomentose. Leaflets coriaceous, hard, the terminal from a cuprate base obtuse or truncate, often emarginate, generally as long as broad, 4-6 in. long, the lateral smaller, oblique-ovate. Flowers appear before the leaves, 2 in. long, pedicel 4 in. long, twice the length of calyx. Petals clothed outside with very silky pubescence, keel much curved, acute, 3-6 times the length of calyx.

Common throughout India and Burma, also occasional in the N.W. Himalaya, up to 8000 ft. In December is not common, and confined to the drier districts. The old leaves are shed in February, the tree is covered with bright orange-red fls. in March and April, before the fresh leaves appear.

2. *B. superba*, Roth. Cor. Pl. t: 22. Vern. *Paldak*, Mar.; *Pankine*, Bern.

A gentle climber, stems as thick as a man's leg. Leaflets acuminate-chartaceous. Flowers larger than those of *B. frondosa*, of a gorgeous orange colour, on pedicels three times the length of calyx.

Central and South India, Burma: Fl. March, April.

3. *B. minor*, Ham.: Fl. Brit. Ind. ii: 195.

A large shrub, at times climbing, leaflets 6-10 in. long, glabrous above, silky-tomentose beneath, the terminal largest. Fl. 1 in. long, dull red, petals

and calyx densely silky outside, base obtuse, little curved, three times the length of calyx.

Kanung, Nepal; Sikkim (rare); Assam, about hills. F. C. S.

Grassia lanata, Presl in Wight, Bot. Beech. Coll. 12, 13. Sikkim hills, Upper Himalaya. A slender shrubby, hairy pubescent plant 3-4 ft. long, pedicels, pedicels, and calyx tubular, long stamens; stamens monadelphous, anthers pale. Petals linear 2 in. long.

7. **FLEMINGIA**, Roxb.; Fl. Brit. Ind. ii. 229. (*Moghania*, St. Hil.; Tancher in Engler and Prantl, iii. 3, 375).

Tree shrubs, leaves digitately 3-foliate or simple, gland dotted below. Lowest pair of secondary nerves basal. Stipules lanceolate, prominently veined, deciduous. Calyx tube short, teeth narrow & imbricate, the lowest often the longest. Corolla barely exerted, petals equal in length. Stamens disadelphous, anthers uniform. Pod oblong trigonal, small, 1- or 2-seeded, species 20-3 in tropical Africa, the rest Asiatic. The more common species only are mentioned here.

A. Leaves simple, bracts large, membranous, broadly ovate, lobed, each enclosing a short raceme, frequently with sterile flowers.

1. *F. strobilifera*, R. Br. Wight, Bot. Beech. Coll. 267; Fl. Brit. Ind. iii. 27. Vern. *Kuland*, Oudh; *Silpa*, Pegu; *Uppa*, Burma.

Leaves ovate-lanceolate, 2-4 in. long, secondary nerves 4-10 pair, petiole $\frac{1}{2}$ in. to 1 in.

Tree widely spread and variable species. Prun in Journ. As. Soc. Bengal, 1849 (1858). Fl. differs into 4, with the following characters.

2. *F. acuta*, R. Br. *highly* 2-1 in. long. Vern. *Kuland*, R. Br. Secondary nerves 2-10 pair, nearly equal, bracts 1 in. long, lobed, membranous, subterminal, from Kanung, Sikkim, Assam, Khasi, and Nagaland, Chittagong, Western Peninsula and Burma, Malay Peninsula and Malay Archipelago. F. C. S.

3. *F. lanata*, Wight, Bot. Beech. Coll. 12, 13. Secondary nerves 4-6 pair, the basal pair longest, bracts 2 in., softly hirsute with long hairs. Sub-Himalayan tree from Garhwal eastward, Bihar, Western Peninsula, and Burma. F. C. S.

4. *F. ovata*, Wall. Collect. Simla Fl. fig. 41. Leaves ovate, with subcordate base, long 2 in. long, narrowly hirsute underneath. N.W. Himalaya from Simla to Kanung. Wall. Bot. Beech. Coll. Fl. Aug.-Oct.

5. *F. aspera*, O. B. Clark. Leaves narrowly lanceolate, base emarginate. Guttiferous hills, rocky river beds. Burma.

The last named appears to be a distinct species and *F. reticulata* is a well-marked local form, situated in the climate of the N.W. Himalaya.

6. *F. Chappar*, Ham.; Fl. Brit. Ind. ii. 227. Vern. *Silpa*, Hind. *Beeg*; *Kuland*, Khasi.

Leaves broad-ovate, acuminate, 2-4 in. long and as broad as long, petiole $\frac{1}{2}$ in. long.



FIG. 46.—*Flemingia Chappar*, Ham.

is recorded in forests of *Shorea robusta* (Wall.) B. & A. and *Garcinia* in those of *Albizia* and *Indigofera* in Burma. Fl. O. S.

R. Leaves trifoliate, leaflets ovate-lanceolate, bracts lanceolate, not lobed.

3. *F. stricta*, Roxb. Cor. Pl. : 248; Wight Ic. t. 329. Vern. *Isbar* (Siam).

Attains 6-10 ft. Stems and branches trigonous, petiole 3-6 in. long, angular, 3-ply unless very sometimes narrowly winged (var. *procypus*). Leaflets 6-12 in., secondary nerves 12-20 pair. Racemes cylindrical, 2-4 in. long, often fasciated, supported at their base by numerous large silky hairy bracts, 1-3 in. long, which are densely imbricate, enclosing the racemes while in bud, and are more or less persistent. At the ends of racemes are numerous imbricate lanceolate bracts, much exceeding the buds, which fall after the fl. have opened.

India—Pan. Sikkim, Assam, Burma, Cochin—1 coast. Fl. O. S.

4. *F. congesta*, Roxb.; Wight Ic. t. 330; Vern. *Bauch* (Siam), *Dau*.

Branches slender, pubescent. Petiole 2-4 in. long, angular, sometimes rarely winged, leaflets 3-12 in. long, secondary nerves 4-6 pair, the lowest pair very prominent, with conspicuous tertiary nerves on the outside. Racemes dense, often often fasciculate, bracts lanceolate, 4-4 in. long. Fl. ½ in. long, brown, proscissile; seeds 2, black.

Solimanian tract from the Juma eastward, Khasi hills, Chittagong, Behar, Central India, West Bhamo, Ceylon, Malac., Archipelago, China.

The fruit variable, open or persistent, but divides into several, some of which have been recognized by Kurz.

Racemes enclosed, shorter than petioles: (a) *F. congesta*, Roxb. (c) *F. procypus*, Roxb.; Kurz, F. Fl. t. 374. (e) *F. serrulata*, Graham; Kurz, F. Fl. t. 372.

Racemes elongate, exceeding petioles: (d) *F. Blackiana*, Graham; (f) *F. Blackiana*, Roxb.; Kurz, I. Pl. t. 375. (g) *F. sessilata*, Roxb. Cor. Pl. t. 249; Kurz, loc. cit. Wight Ic. t. 330.

5. *F. exilis*, Roxb.; Wight Ic. t. 331. —Ganges near Hardwar, Khasi Forests (Gall. Vohar, Nager, C.P. North Kanara, Pudukottai, Coim. and not referred to), and various places, pedicel longer than calyx, and 6. *F. sericea*, Kurz, F. Fl. t. 373. Eng. forests of Pegu and Malacca, main hills. Inflorescence densely clothed with long hairs, pedicel shorter than calyx. Two undershrubs, analogous to *Garcinia* *agilis*, *Garcinia pumila*, *Garcinia* *exilis*, *Leghæa* *resplendens*, and others, which, like an undergrowth, form being both flowers and leaves after the first of the hot season.

7. *F. involucreta*, Beal; Fl. Brit. Ind. II. 229.—Syn. *F. capitata*, Zoll.; Kurz, F. Fl. t. 374.

Attains 3-5 ft., branches nearly terete. Petiole ½ in. long, rarely longer, leaflets 2-4 in., secondary nerves 8-12 pair, basal pair not prominent. Fl. blue, in dense woolly hairy round axillary heads (short racemes) supported by persistent lanceolate bracts clothed with long silky hairs, the outer ones lanceolate, up to 1 in. long. Pods enclosed in the calyx, usually 1-seeded.

Solimanian tract from Kumaon to Assam, Central and North India, Burma, China, proscissile or open, green, glabrous and in some places. Fl. C. S.

8. *F. parviflora*, Wall. Kurz, F. Fl. t. 373; Solimanian tract from Kumaon eastward, Behar, Central Prov. Bengal, Upper and Lower Burma. Fl. in lax panicles, leaves dichotomous, 3-7 in. long. 9. *F. humata*, Roxb.; Kurz, F. Fl. t. 372; Solimanian tract from Kumaon eastward, Sikkim, Bengal, Centr. Prov., Western and Eastern, Peninsular Ceylon. Leaves trifoliate, leaflets 4-8 in. long, plant along nerves while young, basal nerves extending far beyond the middle, with numerous prominent tertiary nerves on the outside. Fl. in the axils of minute bracts, in lax axillary panicles.

18. DALBERGIA, Linn. fl.; Fl. Brit. Ind. II. 230.

Trees, shrubs or climbers, with alternate imparipinnate leaves, leaflets alternate, without stipels. Flowers small, paniculate, white lilac or purple, bracts and bracteoles usually small. Calyx 5-dentate, the anterior teeth generally longest. Wings oblong, as long as standard, keel obtuse or shorter than standard. Stamens either diadelphous, the 10th stamen free, or 10-adelphous, with 9 or 10 stamens, or equally diadelphous with two bundles of 5

ovary sessile with long styles, style short, bifid, 5-lobed and terminal. Pod flat, indurated, with *Arachis*-like margin, 2-3-seeded, tropical and subtropical regions of Old and New World.

A. Trees or erect shrubs. Stamens 9 or 10, united in a sheath split above.

1. *D. Sissoo*, Roxb.; *Bodd. Fl. Sylv.* t. 25, Brand. F. Fl. t. 21. *The Sissoo tree*. Vern. *Titi*, PB.; *Sisoo*, *Sak-Sam*, Hind.

A large deciduous tree, bark grey, heartwood brown with darker veins. Leaves 3-5, broadly-elliptic or ovate, serrulate, pubescent when young, glabrous when full grown, 1-3 in. long. Fl. yellowish white, nearly sessile, in short axillary panicles. Stamens 9, ovary pubescent, style much shorter than ovary. Pod linear-lanceolate, 1-3-seeded.

Subindian tree and in the extra valleys from the Indus to Assam, now a big generally to 800 and in places to 6000 ft. Extending far into the plains along the Ganges. Nepal, Java, Sumatra range. Planted and often well grown throughout India. Fl. March-May.

2. *D. latifolia*, Roxb. *Cr. Pl.* t. 113; Wight Ic. t. 115d; *Bodd. Fl. Sylv.* t. 24. *Blackwood*, *Rosewood*. Vern. *Sitaut*, Bengal; *Kiry*, Kol; *Sakhet*, Mar; *Bete*, Kan; *Jitugi*, Tel; *Titi*, Tam.

A large deciduous tree, bark grey, heartwood dark purple with black streaks. Leaves 3-7, broadly elliptic, orbicular or elliptic-obovate, obtuse, sometimes emarginate, 1-3 in. long. Fl. whitish, 1 in. long, on pedicels nearly as long as calyx tube, in short axillary much-branched panicles. Stamens 5, ovary glabrous, styles slender, nearly as long as ovary. Pod oblong-lanceolate, 1-4-seeded.

Subindian tree. From Omb to Sukkio. Central and South India, extend as far as Benbulbin and to Tadga in Mysore. Generally in deciduous forests, here associated with Teak. On the west side of the peninsula, also in evergreen forests. Fl. at Calcutta, in Sukkio and North Kanars in August, in Singbhum Sept.-Oct., elsewhere with the fresh foliage in April. Grows well and throws up one or two *D. tinctoria* (Guss.) Boiss. Fl. *Sylv.* under tab. 24 (*Legum.*), Wawal, Rajput, Anandhaya, Madras, and Timorall. A remarkable tree smaller in size with rather abundant numerous leaflets 3-4 in. long, which require further study. It generally flowers in July, but has also been found to flower in March. *D. conopsea*, Roxb. *Fl. Ind.* III. 224, a large tree on the Andaman (probably on North Island) resembling *Sissoo* in habit, with ovate-margined leaves 6-1 in. long, pure white flowers in axillary panicles generally aggregated at the ends of branches. Herbert, with *D. latifolia* in Fl. Brit. Ind. will probably prove a distinct species. *Plum. Journ.* A. 86. Beng. 70-41 quotes *D. tinctoria* with *D. conopsea*. To this I cannot agree.

3. *D. rimosa*, Roxb.; Wight Ic. t. 115c.

A small bright green tree or large, straggling, sometimes climbing, shrub. Leaflets 5-9, 2-3 in. long, elliptic, acute at both ends, glabrous above, slightly pubescent beneath, secondary nerves numerous (15-20 pair, with shorter parallel intermediate ones). Fl. white, small, in short corymbose panicles, ramified ones slender. Stamens 10. Pod 2-3 in. long, 1-2-seeded.



FIG. 100.—*Dalbergia rimosa*, Roxb.

with serrated veins in middle. *D. glabra* (Lam.) is limited to the Dehra, Almorah hills, and Nilgiris. Fl. Malay Sp. Pl. also Dehra, Nilgiris.

11. *D. thuraca*, Wall. ex. = large scandent or climbing shrub of Burma, similar to *D. glabra*, but leaflets 9-11, oblong, obtuse or emarginate, quite glabrous. Fl. in simple terminal panicles.

12. *D. ovata*, Griseb. Vern. *Madang*, Burma.

A moderate-sized dichotomous tree, quite glabrous, except inf. twigs, which is rusty-tomentose when quite young. Leaflets 5-9, elliptic, acuminate, on a petiole 3-5 in. long. Fl. white, $\frac{1}{2}$ - $\frac{1}{3}$ in. long, calyx supported by an obtuse bractlet. Stamens 2. Panicles large, terminal, common pedicels brown, branches black-denticating. Pods oblong-lanceolate, 1-3-seeded.

Lower and Upper Burma. Fl. G. B. Cochinchina. Kurz, F. Fl. Brit. Ind. says that from this *D. glabra*, by dense pubescent leaflets. This is *D. thuraca*. Prain in Journ. As. Soc. Beng. vol. 70, 12.

13. *D. cultrata*, Griseb. Kurz, F. Fl. I. 542; Vern. *Tindak*, Burma.

Adichotomous tree, attaining 70 ft., with purplish black heartwood, when with lighter and darker streaks. Young shoots appressed silky-pubescent. Leaflets 7-13, obovate-oblong, obtuse, glabrous. Fl. appearing with the fresh leaves, $\frac{1}{2}$ in. long, white or pale pink, white, scented, Upper Burma, on pedicels as long as calyx, in unilateral paniculate racemes. Stamens 11. Pod oblong, 1-4 in. long, with 1-3 seeds.

Common in delicious and evergreen forest of the plains and hills, Lower and Upper Burma. Dry country of the Irrawaddy valley. Fl. H. S., Fl. C. S.

14. *D. Colettii*, Prain in Journ. As. Soc. Beng. vol. 69 (1888) 145. Shrub hills, Upper Burma, with the branches grey-downy, leaflets 9-15, 1-2 in. long, grey-downy at edges, pubescent beneath. Fl. white, $\frac{1}{2}$ in. long, in simple terminal panicles, 1-2-seeded, lanceolate, on a long stalk, tapering to both ends. In Journ. As. Soc. Beng. vol. 70, 25. Prain states this is a large climber.

15. *D. burmanica*, Prain, loc. cit. 145. Rangoon district, Upper Burma, a scandent tree, youngest shoots finely pubescent, leaflets 7-9, glabrous, $\frac{1}{2}$ - $\frac{2}{3}$ in. long, purple, in short sessile brown-pubescent panicles.

B. Climbers. Stamens 8 or 10, united into a sheath split above.

16. *D. rubiginosa*, Roxb. Cor. Pl. t. 115.

A woody climber, running over the largest trees, branches stiff, divaricating, often bent and twisted, branchlets finely pubescent or silky tomentose. Compound petiole rigid, 1-2 $\frac{1}{2}$ in. long, leaflets 5-11, elliptic-oblong, obtuse, sometimes emarginate or emarginate, 1-2 in. long, upper side glabrous or finely pubescent, under side densely tomentose or silky, rarely quite glabrous. Secondary nerves not conspicuous, numerous, parallel. Fl. white, $\frac{1}{2}$ in. long, crowded in short axillary panicles, calyx brown, silky or tomentose. Pod thin, glabrous, 1-2 in. long.

Western Ghats from Kanara to Malabar. Fl. February to May. In this I took *D. rugosa*, Graham, which is pubescent, and *D. Gardneriana*, Benth., which is densely tomentose. The last form is common on the Nilgiris. Prain, loc. cit. 144, regards all three as separate species.

Nearly allied are 2 western species 10. *D. confertiflora*, Benth. S. Ind. Chittagong, Pegu, Assam, etc. Leaflets 11-15, 1-1 $\frac{1}{2}$ in. long, obtuse, glabrous, crowded at the ends of main branches in simple terminal panicles. 11. *D. velutina*, Benth. Khasi hills, Burma, Malay Peninsula. Woody rusty-pubescent, leaflets glabrous at base 13-17, oblong, $\frac{1}{2}$ - $\frac{2}{3}$ in. long.

12. *D. rostrata*, Griseb.; Prain in Journ. As. Soc. Beng. vol. 70, 45. *D. conchocarpa*, Miq. *D. Chuspanii*, Tr. & Pl. Bur. Ind. II. 371. Thenceville, foot of Ghats, Ceylon, Malay Peninsula. Leaflets 1-5, 2-4 in. long, creamy-white, pod 2-7 lines, and 1.

13. *D. Kingiana*, Prain in Journ. As. Soc. Beng. 67, 269, Khasi hills. Leaflets 1-7 ovate-ovoid, shortly acuminate, 2 in. long.

14. *D. tamarindifolia*, Roxb.; Wight Ic. t. 242.

Deciduous, branches often twisted, branchlets and inflorescence pubescent. Leaflets 25-41, obliquely oblong, $\frac{1}{2}$ - $\frac{2}{3}$ in. long. Fl. white, in sessile compact

acutely pointed with corymbosa branches. Pod three, shining, strap-shaped, 1½-3 in. long, 1-seeded.

Southern Malay Archipelago, from Kava eastward, ascending by Sukkur to 3000 ft. along Khasi hills, Arakanens. Burma, Western Gats from Kanton southwards. Fl. March-June. Also in the Malay Peninsula, Sumatra, Java, Borneo. Peels in Journ. A. Soc. Beng., vol. 70, etc. restricts *D. malabarica* to the Eastern region. In the Western Peninsula he recognizes two species, *D. malabarica*, Dalz., leaflets subcoriaceous, very oblique, glabrous above, glaucous beneath; and *D. malabarica*, Prain, leaflets densely tomentose beneath, pod 1½ in. on a slender stalk ½ in. long.

15. *D. malabarica*, Prain in Journ. A. Soc. Beng., vol. 70, 66. (*D. malabarica*)



FIG. 161.—*Dufourea heterolaria*, Linn., leaf, pod, standard.

Prain in Journ. A. Soc. Beng., vol. 70, pt. 1, 440. Khasi hills, Yunnan, Szechuen. Leaflets not oblique, pods 1-seeded, thick and rugose opposite the seed. The pod figured in Wright, loc. cit. 212 is supposed to belong to this species. 16. *D. multiflora*, Heyne. Prain in Journ. A. Soc. Beng., vol. 70, 66. (*D. oppositifolia* Nimmo? Pl. Brit. Ind. 41, 234.) Deciduous forest of the Western Coast, from the Kanton southwards. Stems armed with large curved spines, branches often terleted. Leaflets 11-15 ovate or obovate-oblong, obtuse or emarginate, thinly grey silky. Pod thin, 2-3 in. long, 1-seeded, on a short stalk. 17. *D. circumscissura*, Prain in Journ. A. Soc. Beng., vol. 70, 60. Shergarrie hills. A shrubby bushlets spinous, often curved; leaflets 7-9, glabrous, 1-1½ in. long. Pod elliptic-oblong, thin 4½ x 4 1/2.

18. *D. Katsarocylon*, (Griseb.) and Perr. (*D. Nodosa* Benth.) of Senegambia, a small tree

with black heartwood, similar to *Rourea*. Branches and ribs with 12-15 leaflets 11-25, 10-12, ovate, oblong, or emarginate 1/2-1 in. long. Pod 1-1 1/2 in. long, usually 1-seeded on a long slender stalk.

C. Trees. Stamens 10, in 2 bundles of 5 each.

18. *D. lanceolaria*, Lam.—Syn. *D. frondosa*, Rehb.; Wight, Ic. t. 206. Vern. *Takosi*, Ling.; *Daulhali*, Mar.

A large scandent tree, wood white or yellowish, white, without heartwood. Leaflets 11-17, 1-2 in. long, glabrous, not black when dry, ovate or obovate, dense, secondary nerves more distinct than the reticulate veins joining them. The upper calyx teeth obtuse, the 3 lower acute. Fl. in short unilobed slightly silky racemes, these arranged in large terminal and axillary panicles, with spreading branches. Calyx brownish purple, corolla pale pink, standard broadly-obovate. Pod 1-3-seeded.

Western Peninsula, north as far as Ahmednagar the west, and Islac on the east side. Also in the Nilgiri Table. Ceylon, dry region. Fl. B.S. (August in Ceylon) and the western portion of the peninsula. A beautiful tree, when covered with fl. and young rays.

19. *D. amara*, Rehb.; Fl. Brit. Ind. ii. 263. Vern. *Mutalon*, Assam. Fl. Nov. A tree (S.E. Pen. India in Journ. As. Soc. Beng., vol. 66, p. 179). Differs from the last by dark sticky pubescent leaves and short axillary flower panicles. This species Prain represents *D. lanceolaria* in Assam.



FIG. 12.—*Dalbergia paniculata*, Rehb., loc. cit. standard, 1/2.

the stem is not circular, they are developed well on the larger and resting on the shorter radius. Leaflets 9-13, turn black in drying, 1 in. long, pubescent along midrib, from a rounded base oblong, obtuse, often emarginate, secondary nerves not prominent, venation reticulate. Fl. bluish white, nearly sessile, crowded in short densely brown silky racemes, these arranged in compact terminal panicles. All calyx teeth acute. Disk lining the calyx tube extending to the middle of it, where petals and stamens are inserted. Standard from a narrow cordate base oblong, broader above. Pod narrowed at both ends, 1-2-seeded.

Orch forests, Central India. Western Peninsula and Burma. Fl. Apr. & May, with the fresh leaves.

20. *D. Kurzii*, Prain in Journ. As. Soc. Beng., vol. 66, p. 180.—Syn. *D. stephensonii*, Kurz, F. Pl. i. 544 (not of Wallich). Vern. *Thalpeh*, Burm.

21. *D. paniculata*, Rehb.

Cey. Pl. i. 171. Fl. Brit. Ind.

ii. 263.—Syn. *D. v. g. sericea*

Kurz. Vern. *Indeh*, F. P.

Puleh, F. P., Hind. *Thal-*

santha, Burm. A large de-

ciduous tree, trunk irregu-

larly fluted, bark light grey.

Wood grayish white, no

heartwood, its cells are

most remarkable, entirely

different from that of other

arborescent Dalbergiæ. Nar-

row, more or less concentric

layers of best (phloem) darker

coloured, alternate with

broad strata of wood; planks

cut from trees half to pieces.

These hardened hoofs are

irregularly concentric, some-

times exhibiting a spiral on

a transverse section. When

A large deciduous tree, with stout branchlets perfectly glabrous, heartwood black. Leaflets 13-15, crispaceous, shortly acuminate, often nearly opposite, 2-4 in. long, common petiole 6-12 in. long. Fl. appearing before the leaves, in pedunculate corymbose panicles, which are crowded at the ends of branchlets. Calyx purple, corolla white. Pod brown, distinctly veined, 1- rarely 2-seeded, 4-5 in. long, 1 in. broad.

Lower and Upper Burma, ascending to 4,000 ft. Often a large forest. Fl. Feb.-April.

23. *D. cana*, Griseb. Kurz, F. Fl. t. 444. Lower Burma, slightly more common in the hills, is distinguished by smaller more numerous oblong-lanceolate leaflets and thin, narrow, leaveny velvety pods.

24. *D. glomerifera*, Kurz, F. Fl. Brit. Ind. ii. 295. Hills of the Pegu Yomas. Young shoots toasty tomentose, leaflets 3-5 elliptic or obovate, 2-3 in. long. Fl. crowded in compact, shortly pedunculate head-like panicles, appearing before the leaves.

25. *D. sericea*, G. Don; Prain in Journ. As. Soc. Beng., vol. 70, 51. —Syn. *D. kiriana*, Benth.; Fl. Brit. Ind. A. 215.

A small tree, with soft wood. Branchlets, petioles and inflorescence clothed with silky, grey or ferruginous tomentum. Leaflets 13-19, elliptic, obtuse, adpressed hairs on both sides. Fl. pale lilac, nearly white in compact short axillary panicles. Pods numerous, in short panicles, small, glabrous, linear, 1-2 in. long, 1 in. broad, 1-4-seeded.

Sikkim, always tree, from the Juma to Sibkin. Fl. April, May.

26. *D. Oliveri*, Griseb, Prain in Journ. As. Soc. Beng., vol. 66, 1895, 451. —Syn. *D. paniculata*, Kurz, F. Fl. t. 345 (not of Roxb.). Prain, Lc. vol. 70, 53. Vern. *Tamulan*, *Talank*, Burma.

A large tree, heartwood very tough, hard and heavy, dark red. Leaflets 13-20 glabrous, 1-1½ in. long. Fl. white, appearing with the young leaves, 1 in. long, in large spreading terminal panicles. Calyx pubescent, slightly ciliate, 4 teeth short, obtuse, that opposite the keel long linear. Pod 1-2-seeded, 3-4 by 1-1 in.

Tree, affixed dry forest. Eng forests of Upper Burma. Fl. March, April. Smaller tree, sometimes from the banks of the Miu river, Upper Burma, intermediate between this and *D. albicoma*. Leaflets silky pubescent, fl. white, large in small lateral panicles. Sp. Dec 20 and 25 are closely allied.

Two trees of this section in Upper Burma are — 27. *D. Bensleyi*, Prain, and 28. *D. rivasii*, Prain in Journ. As. Soc. Beng., vol. 68, 1898, 450, 522.

In Manipur a remarkable species of this section has been found: 29. *D. Writii*, Clark, Prain, l. c. 451. Leaflets nearly opposite, 1-5 pair, narrow-lanceolate, very acute, slightly pubescent.

D. Climbers. Stems 10 in 2 bundles of 5 each. Pod thin.

30. *D. volubilis*, Roxb. Cor. Pl. t. 191; Fl. Brit. Ind. ii. 295. Vern. *Dant talung*, Burma.

A large scrambling or climbing shrub with tough wood, the branches often bent and twist into spiral hooks. Glabrous, except inflorescence. Leaflets 9-13 elliptic or obovate, often minutely serrate at apex, 1-2 in. long. Fl. small, crowded, pale blue, in compact, pubescent panicles. Pod 2-3 in. long, ½ in. broad, 1- rarely 2-seeded.

Sikkim, alpine trees, from Khamon eastward. Quidi forests. Central and south India, Andhra, Burma. Fl. Jan.-March.



FIG. 103.
D. Kurzii, Prain.

31. *D. stipulacea*, Roxb.; Wight Ic. pl. 243; Hamble bot. 22. Vern. *Doubhainag*;

Lower, *Thi-mogi*; Upper
Burma.



FIG. 194.—*Dalbergia stipulacea*, Roxb. 1.

A large climbing tree (rarely a shrub or small bushy tree, in the interior of Burma) a fairly strong climber (Trin., *Lc.*, 454), wood hard, close-grained. Leaflets 7-21, oblong, nitous, 1-2 in. long. Fl. dull purple (pale blue, Kurz) 1-1½ in. long, slender pedicels, longer than calyx, in more or less unilateral panicles racemes. Bracts and bracteoles

large, obovate, persistent. Pod oblong, obtuse, 2-4 in. long, ½ in. broad, 1-seeded, thickened and more or less prominently veined opposite the seed.

Sikkim, ascending to 3000 ft. Assam. Manipur, Chittagong, Burma. Fl. Jan. April, August in Sikkim, (Hamble). To this species belongs: 32. *D. thomsonii*, D. & A. Journ. Khas hills. Leaflets 9-11, l. very small.

E. Trees, shrubs or climbers. Pods broadly falcate or reniform, thick, coriaceous or almost fleshy.

33. *D. spinosa*, Roxb.; Fl. Brit. Ind. ii. 238.—Syn. *Drepanocarpus spinosa*, Kurz. Vern. *Y-chin-gat*, Burma.

A rigid vine scrambling shrub, with soft, silvery white, wood, armed with stout divaricating branchlets, ending in pungent spines. Entirely glabrous, leaflets 7-11, often nearly opposite, obovate-oblong, ½ to 1 in. long. Fl. yellowish white. Stamens 10, in a single sheath, sometimes in 2 separate sheaths of 5 each. Pod 1 in. long, reniform, coriaceous, 1-seeded.

Thal forests along the coast from Chittagong to Tenasserim, also on the coast of the Western Peninsula. Fl. May-June.

34. *D. monosperma*, Dalz.—Syn. *D. tocta*, Graham; Cooke, Bombay Fl. v. 1. 367; *Drepanocarpus monosperma*, Kurz, E. Fl. i. 387.

A climbing shrub, branchlets often hooked and twisted, leaflets 5-7, obovate, obtuse, often emarginate, 1-1½ in. long. Fl. white in axillary, mostly unilaterial racemes, which are often arranged in short panicles. Stamens monadelphous, pod falcate, 1-seeded.

Near the sea coast of both peninsulas; on hills as well as in mangrove swamps and other salt marshes. Fl. June. Widely distributed over the Indian Archipelago, China and Australia. Braun in Journ. As. Soc. Hong, vol. 26 (1869), Ed. profr. the seeds

pubescent, silky-pubescent beneath, as well as petioles. Fl. yellow, in simple lax axillary racemes. Pod 2½-3 in. diam., rarely pubescent. Dehiscence, oblique and East Coasts of Upper Burma, Bago and Tenasserim. East of the Salween river frequently associated with Teak (Burma), Nepal, on the Ataman River, 1894 (see H). Fl. April, May. Species 1-stam. closely allied, and are probably of local forms.

4. *P. santalinus*, Linn. *fl.*; *Redd. Fl. Sylv.*, t. 22. *The rose sandal*



FIG. 110.—*Pyrosopis santalinus*, Linn. L. 1.

Fl., t. 110; *Redd. Fl. Sylv.*, t. 21. Vern. *Ujja Sal*, Hind.; *Hid*, Kol.; *Am*, Gujer.; *Gibbi*, Mar.; *Homon*, Kan.; *Podiya*, Tel.; *Fongai*, Tam.

A large deodhar tree, heart-wood brown, with darker streaks. Leaves with soft appressed hairs; white young, dark green, shining. Leaflets 5-7, coriaceous, elliptic, obtuse, emarginate, sometimes shortly acuminate, glabrous when full grown. Secondary nerves 15-20 pair, with intermediate ones joined by prominent reticulate veins. Fl. yellow or white, pedicels much shorter than calyx, in terminal panicles. Calyx, peduncles, and pedicels clothed with dark brown hairs. Stamens monadelphous, the sheath deeply 2-lobed. Pod nearly cylindrical, 1½-2 in. across, often 2-seeded.

Extreme south-east corner of Kuzum. *Orchi forest*. Gorkhpur, Central and South India, Mount Ayoa the northernmost point on the west side. Fl. July (det. sometimes earlier or later). Ceylon. In the bark of this and other species of this genus is a red resin filled with a red astringent oil, gumi, which is obtained by incision in the bark and sold as East Indian Kino. *Varies* in the shape of leaflets. *Prain*, in *Agave* (see *Ind. For.* xvi, 11) distinguishes two varieties: a, with elliptic obtuse slightly emarginate leaflets in the W. Peninsula and Ceylon; b, with acuminate to Central and Southern India, sometimes in the west coast of the Peninsula.

20. **DERRIS**, Lour.; *Fl. Brit. Ind.*, ii, 240. *Dequelia*, Taubert in *Egler und Prantl*, iii, 3, 345.

Mostly climber; leaves biparipinnate, leaflets opposite, without, rarely with minute stipels. Fl. white or purple, fasciculate on tumid nodes, which often are lengthened so as to form small racemes or corymbs arranged in racemiform panicles. Calyx truncate, or teeth minute. Standard generally glabrous, vexillary stamen in some instances long filamentous a rove adnate to the sheath in the middle. Pod hirsuticent, narrowly winged on the upper

tree. Vern. *Lol*, *Chendun*.

A small tree, attaining 50 ft., with extremely hard dark-purple heart-wood. Leaflets 3, rarely 4 or 5, broad elliptic, obtuse, 1½-3 in. long, under-surface pale and clothed with fine appressed hairs. Fl. few, in short axillary or terminal racemes. Pod 1½ in. diam., oblique, gradually narrowed into a short stalk.

Dry hills of the Eastern Decan, from the Godavary to the Palar river. Fl. July.

5. **P. Marsupium**, Roxb. *Coc.*

or on both sides. Species of the tropical and subtropical regions of both hemispheres, one half in the Indo-Chinese peninsula. Differs from *Millettia* by the indehiscent winged pods and, in the case of some species, by the pubescence.

A. Trees.

1. *D. robusta*, Benth.—Syn. *Dalbergia robusta*, Rehb.; Wright, Ic. t. 244. Vern. *Koroi*, Assam; *Thitpo-poa*, Burma.

A middle-sized deciduous tree, leaflets 6-10 pair, chartaceous, elliptic-oblong, 1-1½ in. long, underside pale with minute adpressed hairs. Fl. white, in slender axillary, slightly pubescent racemes, pedicels filiform, three times the length of calyx. Pod linear, manifestly pubescent, 1½-3 by ½-1 in., upper suture winged, seeds 1-5.

Assam, Chittagong hills, Burma. Fl. B.S. A profusion of white blossoms before leaves appear.

2. *D. dallbergioides* Baker. *Dalbergia*. Upper Burma (Mt. Lora's Vern. *Nyasaun*, Burma; *Saun*). In April-May covered with brilliant purple fl. Malay Peninsula. Leaflets 10-15 pair, 1 in. long, pale beneath, with fine adpressed hairs on both sides. Pod subulate, glabrous, 2-4 in. long, 1-4-seeded, a broad sharp wing on the upper suture.

B. Climbing shrubs.

3. *D. scandens*, Benth.—Syn. *Dalbergia scandens*, Rehb. Cor. Pl. t. 192; Wright, Ic. t. 275. Vern. *Gowj*, Hind.; *Miyang-gawj*, Burma.

A very large evergreen climber, stem 100 ft. long; stems 8 in. diam.; leaflets coriaceous, 3-6 pair, elliptic-lanceolate, 1-2 in. long. Fl. pale rose-colored, white in Ceylon on slender pedicels, fasciculate on thickened axes in slender axillary slightly pubescent racemes, much longer than leaves. Pod linear-lanceolate, 1-3 in. long, 1-3 in. wide, with fine silky scattered hairs, upper suture winged, seeds 1-4.

Sulu, Malayan 1841, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 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2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 2681, 2682, 2683, 2684, 2685, 2686, 2687, 2688, 2689, 2690, 2691, 2692, 2693, 2694, 2695, 2696, 2697, 2698, 2699, 2700, 2701, 2702, 2703, 2704, 2705, 2706, 2707, 2708, 2709, 2710, 2711, 2712, 2713, 2714, 2715, 2716, 2717, 2718, 2719, 2720, 2721, 2722, 2723, 2724, 2725, 2726, 2727, 2728, 2729, 2730, 2731, 2732, 2733, 2734, 2735, 2736, 2737, 2738, 2739, 2740, 2741, 2742, 2743, 2744, 2745, 2746, 2747, 2748, 2749, 2750, 2751, 2752, 2753, 2754, 2755, 2756, 2757, 2758, 2759, 2760, 2761, 2762, 2763, 2764, 2765, 2766, 2767, 2768, 2769, 2770, 2771, 2772, 2773, 2774, 2775, 2776, 2777, 2778, 2779, 2780, 2781, 2782, 2783, 2784, 2785, 2786, 2787, 2788, 2789, 2790, 2791, 2792, 2793, 2794, 2795, 2796, 2797, 2798, 2799, 2800, 2801, 2802, 2803, 2804, 2805, 2806, 2807, 2808, 2809, 2810, 2811, 2812, 2813, 2814, 2815, 2816, 2817, 2818, 2819, 2820, 2821, 2822, 2823, 2824, 2825, 2826, 2827, 2828, 2829, 2830, 2831, 2832, 2833, 2834, 2835, 2836, 2837, 2838, 2839, 2840, 2841, 2842, 2843, 2844, 2845, 2846, 2847, 2848, 2849, 2850, 2851, 2852, 2853, 2854, 2855, 2856, 2857, 2858, 2859, 2860, 2861, 2862, 2863, 2864, 2865, 2866, 2867, 2868, 2869, 2870, 2871, 2872, 2873, 2874, 2875, 2876, 2877, 2878, 2879, 2880, 2881, 2882, 2883, 2884, 2885, 2886, 2887, 2888, 2889, 2890, 2891, 2892, 2893, 2894, 2895, 2896, 2897, 2898, 2899, 2900, 2901, 2902, 2903, 2904, 2905, 2906, 2907, 2908, 2909, 2910, 2911, 2912, 2913, 2914, 2915, 2916, 2917, 2918, 2919, 2920, 2921, 2922, 2923, 2924, 2925, 2926, 2927, 2928, 2929, 2930, 2931, 2932, 2933, 2934, 2935, 2936, 2937, 2938, 2939, 2940, 2941, 2942, 2943, 2944, 2945, 2946, 2947, 2948, 2949, 2950, 2951, 2952, 2953, 2954, 2955, 2956, 2957, 2958, 2959, 2960, 2961, 2962, 2963, 2964, 2965, 2966, 2967, 2968, 2969, 2970, 2971, 2972, 2973, 2974, 2975, 2976, 2977, 2978, 2979, 2980, 2981, 2982, 2983, 2984, 2985, 2986, 2987, 2988, 2989, 2990, 2991, 2992, 2993, 2994, 2995, 2996, 2997, 2998, 2999, 3000, 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3665, 3666, 3667, 3668, 3669, 3670, 3671, 3672, 3673, 3674, 3675, 3676, 3677, 3678, 3679, 3680, 3681, 3682, 3683, 3684, 3685, 3686, 3687, 3688, 3689, 3690, 3691, 3692, 3693, 3694, 3695, 3696, 3697, 3698, 3699, 3700, 3701, 3702, 3703, 3704, 3705, 3706, 3707, 3708, 3709, 3710, 3711, 3712, 3713, 3714, 3715, 3716, 3717, 3718, 3719, 3720, 3721, 3722, 3723, 3724, 3725, 3726, 3727, 372

usually pale, but rarely do they bear white. With this view (the name of the tree) is probably intended a tree with spreading branches. In Journ. As. Soc. Beng. vol. 17, 288, Penn. describes *D. latifolia*, Benth. a tall tree in the Sikkim hills, closely allied to *D. Wallichii*, but with longer leaflets and flowers. 17. *D. marginata*, Benth.—Syn. *D. longicaulis*, Hook. & Wight Ic. 697. Nepal, Sikkim, Khasi hills, Pegu. Leaflets 2-5 pair, ovate, obtuse, 2-3 in. long, secondary nerves 5-6 pair, not prominent, joined by distinct primary marginal veins. Nerves of primary leaf prominent raised veins between secondary nerves. Fl. 1 in. on long capillary pedicels in lax drooping panicles, with slender, simple filiform ramifications. Pod straw-colored, inflated, 1- rarely 2-seeded. 18. *D. polystrigata*, Benth. Prain, Journ. Ind. Bot. Soc. 1894. Khasi hills. Leaflets 3 pair, elliptic, acuminate, 2-1 in. long. Fl. 1 in. long on 1-2 in. short racemes in long candelabra-like drooping panicles arranged in large compound umbels, panicles slender, filiform, 1-2 in. long glaucous, veined, 2-seeded. *D. acuta*, Baker, is closely allied to this and perhaps the same. 19. *D. andamanica*, Prain, Journ. Ind. Bot. Soc. 1894. Andaman, Nicobar. Branchlets pale brown silky, leaflets ovate, 3-4 pair, 1-2 in. long. Fl. crowded at apex, very pale, panicles rusty-tomentose, racemiform, several at the ends of branchlets. Pod silky. 20. *D. amena*, Benth.—Syn. *D. Malabarica*, Baker, Tenasserim, Malay Peninsula. Glabrous, leaflets compound 3 pair, 2-4 in. long. Fl. pink or purple, 1 in. long, fasciculate on filiform pedicels larger than veins in spreading racemes forming terminal panicles.

22. **PONGAMIA**, Vent.; Fl. Brit. Ind. ii, 233. *Gadupa*, Lam.
 Taubert in Engler and Prant, iii, 3, 344.

P. glabra, Vent. The only species. Wight Ic. 1, 59; Bot. Fl. Sylh. 1, 177. Veen. Paper. Keng. (Chaly. Kuria), Mar.; Hump. Koo. & Kaurig. Bot. Pango, Lam.: *Thiranda*, Benth.

A moderate-sized tree, bark soft, wood yellowish white, no heartwood. Leaves imparipinnate, glabrous, bright green, leaflets opposite, without stipule, 2-3 pair, ovate, shortly acuminate, 2-5 in. long. Fl. on slender pubescent pedicels, white and purple in axillary racemes, shorter than leaf. Stipules 10, the 10th distinct free at the base, in the middle connate with the rest. Pod marcescent, turned, almost woody, suture or less falcate, 1-seeded, 1½-2 in. long. Seed oil.

Common near banks of streams and watercourses in both Peninsulas. In Tenasserim common up to 2000 ft. Only trees. Here and there in the sub-himalayan tract up to 2500 ft. An old tree of enormous dimensions also in India and back forest of India, Ceylon, the Malay Archipelago, extending to the coast of South China, the Philippines, and several of Australasia. Prain, As. Soc. Journ. Bengal, vol. 69, 1895. The name that I find it only occurs planted. This does not agree with my experience.

23. **ORMOSIA**, Jackson; Fl. Brit. Ind. ii, 352.

Trees rarely climbers, leaves imparipinnate, leaflets opposite, mostly opposite. Calyx campanulate, deeply 5-lobed. Stipules free. Ovary subsessile, style filiform, incurved or circinate at the end, stigma oblique. Pod fleshy or woody, 2-valved. Species 25-30, in the tropics of both hemispheres.

1. *O. robusta*, Wight Ic. 1, 245.—Syn. *Arillaria robusta*, Kurz, F. Fl. 1, 334. Veen. *Kyoo-hangin*, Burm.

An evergreen tree attaining 90-100 ft., bark dark, rough, branchlets ribbed, shortly lacinio-tomentose. Leaflets 4-5 pair, elliptic-oblong, acute, 3-7 in. long. Fl. dull white, in terminal cyme- or twenty-tomentose panicles. Pod nearly glaucous, bright yellow, somewhat fleshy, seeds 1, rarely 2. Seed enveloped in a red fleshy arillus.

Assam, Sikkim, Chittagong, Burma. Fl. O. S. 2. *O. glauca* Wall. Pl. As. Rac. 1, 129. Nepal, Sikkim, ascending to 2500 feet. Fl. white, in peduncled racemes shorter than the leaves. 3. *O. travancorica*. Bot. Fl. S. 1, 15. Western Ghats, Sikkim, Thibet, and Burmah. A lofty tree, leaflets 2-3 in. long on pedicels 1-1½ in. long. Pod thick, woody, 2 in. long. 4. *O. inopata*, Prain in Journ. As. Soc. Bengal, vol. 62, 181, and F. O. Lam. Prain, Ic. 182 are trees on the Kachin hills.

5. Herein goes the large Lamark called the tree *Pongamia*.

3. *SOPHORA*, Linn., Fl. Brit. Ind. II, 218.

Trees or shrubs with imparipinnate leaves, leaflets often alternate. Calyx adfluous, stamens free or filaments connate at base, anthers versatile. Ovary shortly stipitate, ovules 2, stigma terminal, minute. Pod moniliform, striate-hispid or tardily deliquescent. Species 25, tropical and sub-tropical regions.

A. Pod without wings or ridges.

1. *S. tomentosa*, Linn.; Fl. Brit. Ind. II, 249. Vern. *Thiloban-mandi*, Boiss.

An evergreen shrub or small tree, branches, leaves and inflorescence shortly grey-tomentose. Leaflets 11-17, thick, obliquely elliptic, obtuse. Fl. subpaleo-yellow, in terminal racemes, calyx nearly truncate, teeth minute. Pod 4-6 in. long, hairy, 6-10-seeded, the seed-bearing joints often separated by long seedless stalks.

Sea-coast of Borneo, the Andamans, Ceylon. Fl. R. S. A littoral species, common within the tropics.

2. *S. glauca*, Loebner; Wight Ic. t. 370; Spang. Neigh. t. 51.

A handsome shrub, branches, leaves and inflorescence clothed with persistent grey or brown tomentum. Leaflets 21-25, acute, 1-2 in. long. Fl. purple, in dense terminal racemes, calyx longer than pedicels, teeth triangular. Pod veiny, 5-6-seeded, 3-4 in. long.

Common on the Nilgiris above 6,000 ft., and on other hills of the Peninsula. Fl. throughout the year. *S. malabarica*, described by Beddome (Manual, p. 276) from the north Arca and Coimbatore hills, is doubtful. Leaflets 25-34 in. long, obtuse, mucronate or revolute, would agree with *S. interrupta*, while the "villous pod" would refer to *S. glauca*. Wight Ic. t. 370, quoted by Beddome, represents the fl. of *S. glauca* and the pod of *S. interrupta*.

Other shrubs of this section are: *S. Wightii*, Hillebr.—Syn. *S. interrupta*, Wight Ic. t. 1155; Belgaria, Mysore. Leaflets alternate, 11-15, lanceolate, 2-3 in. long, 11-15 longer than leaf, pedicels longer than calyx, axilla white or yellow, seeds red. A Ceylon species, *S. angustata*, Trimen (Handb. Ceylon, II, p. 30) (*S. leptophylla*, Fl. Brit. Ind. II, 256) has smaller fl., but may prove to be the same.

3. *S. acuminata*, Boiss. Nopal, A. sem. Khasi hills, Burma. Leaflets nearly opposite, 12-19, lanceolate, 3-4 in. long, racemes shorter than leaf, pedicels shorter than calyx. *S. Bakeri*, Clarke; Prain in Journ. Ax. Soc. Beng., vol. 36 (1885), 196. Pan-nath, Malabar, pubescent, leaflets 11-16, tomentose beneath, axilla dark red, pod silky. *S. Moorcroftiana*, Boiss., a less much-branched thorny shrub of the inner and North-West Himalaya. Branches and stipules spinose, leaflets pale green, finely grey silky, 1-4 in. long. Two shrubs from Dayer Burma; *S. S. Smith*, Prain; and *S. Prainii*, Prain, loc. p. 469.

B. Pod with 4 wings or with 4 distinct raised lines or ridges.

4. *S. mollis*, Graham.—Syn. *Edicardio mollis*, Royle III, t. 52.

Leaflets 20-30, alternate or opposite, elliptic, 1-1 in. long. Fl. bright yellow in axillary racemes, generally appearing before or with the leaves. Pod glabrous, 3-4 in. long, 3-5-seeded, the joints with 4 crustaceous beak-like wings.

Trans-Indus Sub. range N.-W. Himalaya as far as Kumaon, ascending to 10,000 ft. Fl. March, April.

Other shrubs of this section are: *S. interrupta*, Robt. Ic. Pl. Ind. Or. t. 165. Panmahal, Central Prov., hills of the Deccan. Leaflets 18-25, 1-1 in. long, obtuse or emarginate. Pod nearly glabrous, with 4 membranous wings. 11. *S. Griffithii*, Stocks. Baluchistan, Quetta valley, and Juniper tract of Ziarat, 7,000-10,000 ft. Afghanistan, Persia. Often gregarious, the large bright yellow flowers appearing shortly before or with the leaves; branches, leaves, and inflorescence clothed with soft silvery grey velvet. Leaflets 20-24, 1-1 in. long. Pods silky, the joints with 4 narrow crested ridges.

Calpurnia aurea, Baker.—Syn. *Freytia aurea*, Lam.; Wight III, t. 51 (28) is a large shrub. Nilgiris, hills of Salem and Thiruvelli. Leaves imparipinnate, leaflets opposite, nearly opposite, 6-10 pair, fl. large, yellow. Pod flat, membranous, 11-12-seeded, 1-4 in. long, 5-6-seeded.

SECOND SUBORDER, CÆSALPINIÆ.

Trees, shrubs, climbers, rarely herbs. L. oblonga, pinnately, rarely undulfoliate. Fl. bisexual, often zygomorphic. Calyx of 5 more or less connate sepals, often fused in their lower portion by a disk, which bears petals and stamens. Petals 5 or less, imbricate in bud, the posterior (upper) petal imbricate. Stamens 10 or fewer, rarely numerous, free or more or less connate. Seeds with or without albumen, radicle straight.

All trees of this Sub-Order have a distinct dark-colored heart wood, the chief colour being the rich brown *Boschianus*. Some genera (*Boschianus*, *Cassipoua*, *Tacholobos* and *Hybanthus*) have cavities in the wood filled with gum-resin, the walls are 1 to 2 strata of thin walled sclerenchyma cells. The climbing *Boschianus* has an aerenchyma structure.

A. L. bipinnate.

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| I. Calyx 5-lobed to base or nearly so, segments fringed, stamens 10. | 1. <i>Cassipoua</i> . |
| Pod not winged. | 2. <i>Palmyrinia</i> . |
| Pod winged on both sutures. | 3. <i>Mimosa</i> . |
| Pod winged on one suture only. | 4. <i>Phoradendron</i> . |
| Pod with a large terminal wing, beaked, imbricate. | 5. <i>Papilion</i> . |
| II. Calyx 5-lobed to base, segments narrow, valvate or slightly overlapping. Common petals long; petals cellular, nearly equal; pod flat. | 6. <i>Swartzia</i> (p. 24). |
| Common petals long; petals very unequal; pod turreted. | 7. <i>Parrysonia</i> (p. 24). |
| Common petals short, lobes distinct; pod ringed. | 8. <i>Wendlandia</i> . |
| III. Calyx campanulate. Fl. in dense spikes. A woody climber. Stamens 10. | 9. <i>Artocarpus</i> . |
| A large tree. Stamens 5. | 10. <i>Hemivernia</i> . |

B. L. pinnate, usually pinnately.

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| I. Petals 4. | 11. <i>Sida</i> . |
| Perfect stamens 10. | 12. <i>Dialium</i> (p. 25). |
| Perfect stamens 2-5, long exserted. Leaves opposite. | 13. <i>Albizia</i> . |
| Perfect stamens 2. Leaves alternate. | 14. <i>Parrysonia</i> . |
| II. Petals 5. | 15. <i>Sida</i> (p. 25). |
| Stamens 2-8. L. papery. Pod flat, calyx absent. | 16. <i>Hemivernia</i> . |
| Stamens 7. L. papery. Pod dehiscent, valves woody. | 17. <i>Albizia</i> . |
| Stamens 10. L. coriaceous. Pod dehiscent, valves thick coriaceous, ochreate. | 18. <i>Sida</i> (p. 25). |

III. Petals 5 or 6, nearly equal. Differ stamens 5.

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| IV. Petals 5, unequal. | 19. <i>Albizia</i> (p. 25). |
| Stamens 10. | 20. <i>Tamarindus</i> . |
| Stamens 4-6. | |

V. Petals 6.

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|---------------------------------------|-------------------------|
| Stamens unequal and partly imperfect. | 21. <i>Cassia</i> . |
| Stamens perfect, equal, usually 10. | 22. <i>Crotalaria</i> . |

C. Leaves 2, as a rule sessile.

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| 23. <i>Boschianus</i> . |
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1. CÆSALPINIA, Linn.; Fl. Brit. Ind. II. 254.

Trees, shrubs or woody prickly climbers. Fl. white, yellow or red. Calyx lobes 5, imbricate, the largest outside and often larger. Petals 5, nearly equal. Stamens 10, free; anthers uniform, dehiscent longitudinally. Pod compressed, cartaceous.

A. Pod unarmed with sharp prickles.



FIG. 105.
Cassipouira Bonduella.
Petching, Burm.

1. *C. Bonduella*, F. & M., *Prüfl. in Journ. Anst. Sen. Beng. 46*, 221. Syn. *C. Bonduella* Kunt, *P. 1*, 406. *The Fl. of Ind.* Vern. *Konka, Kollajai, Koll. Karanji*, Hind.; *Noto*, Sundrib.; *Bajud*, South.; *Jagur-pota*, Mar.; *Gathakol*, Tel.; *Garrajo*, Kan.; *Goffi*, Tam.; *Kolca*, Burm.

A large prickly scandent or straggling shrub. L. pubescent, pinnate—8 pair, leaflets opposite, not entire, 6-10 pair. Stipules cut into large segments. Fl. yellow, in axillary many fld. racemes; bracts linear-lanceolate, spreading, longer than leaflets; filaments stout, tomentose. Pod coriaceous, obliquely elliptic, 2-3 by 1½-2 in. Seeds 2-3, lead-colored, shining.

Naturalized throughout India, to 2,500 ft. in Kumaon. Indigenous in the mountains, in Burma and in the Andamans. Fl. R. S. A good hedge plant.—Cultivated in the Malay Archipelago and other tropical countries. 2. *Cassipouira* called *Wightia* by Wight & Arn. & *Bondia*, both naturalized in the Western Peninsula. L. nearly glabrous, erect, pale, bracts erect. 3. *C. Max.* Hance, *Proc. Acad. Sci. Peking*, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 2681, 2682, 2683, 2684, 2685, 2686, 2687, 2688, 2689, 2690, 2691, 2692, 2693, 2694, 2695, 2696, 2697, 2698, 2699, 2700, 2701, 2702, 2703, 2704, 2705, 2706, 2707, 2708, 2709, 2710, 2711, 2712, 2713, 2714, 2715, 2716, 2717, 2718, 2719, 2720, 2721, 2722, 2723, 2724, 2725, 2726, 2727, 2728, 2729, 2730, 2731, 2732, 2733, 2734, 2735, 2736, 2737, 2738, 2739, 2740, 2741, 2742, 2743, 2744, 2745, 2746, 2747, 2748, 2749, 2750, 2751, 2752, 2753, 2754, 2755, 2756, 2757, 2758, 2759, 2760, 2761, 2762, 2763, 2764, 2765, 2766, 2767, 2768, 2769, 2770, 2771, 2772, 2773, 2774, 2775, 2776, 2777, 2778, 2779, 2780, 2781, 2782, 2783, 2784, 2785, 2786, 2787, 2788, 2789, 2790, 2791, 2792, 2793, 2794, 2795, 2796, 2797, 2798, 2799, 2800, 2801, 2802, 2803, 2804, 2805, 2806, 2807, 2808, 2809, 2810, 2811, 2812, 2813, 2814, 2815, 2816, 2817, 2818, 2819, 2820, 2821, 2822, 2823, 2824, 2825, 2826, 2827, 2828, 2829, 2830, 2831, 2832, 2833, 2834, 2835, 2836, 2837, 2838, 2839, 2840, 2841, 2842, 2843, 2844, 2845, 2846, 2847, 2848, 2849, 2850, 2851, 2852, 2853, 2854, 2855, 2856, 2857, 2858, 2859, 2860, 2861, 2862, 2863, 2864, 2865, 2866, 2867, 2868, 2869, 2870, 2871, 2872, 2873, 2874, 2875, 2876, 2877, 2878, 2879, 2880, 2881, 2882, 2883, 2884, 2885, 2886, 2887, 2888, 2889, 2890, 2891, 2892, 2893, 2894, 2895, 2896, 2897, 2898, 2899, 2900, 2901, 2902, 2903, 2904, 2905, 2906, 2907, 2908, 2909, 2910, 2911, 2912, 2913, 2914, 2915, 2916, 2917, 2918, 2919, 2920, 2921, 2922, 2923, 2924, 2925, 2926, 2927, 2928, 2929, 2930, 2931, 2932, 2933, 2934, 2935, 2936, 2937, 2938, 2939, 2940, 2941, 2942, 2943, 2944, 2945, 2946, 2947, 2948, 2949, 2950, 2951, 2952, 2953, 2954, 2955, 2956, 2957, 2958, 2959, 2960, 2961, 2962, 2963, 2964, 2965, 2966, 2967, 2968, 2969, 2970, 2971, 2972, 2973, 2974, 2975, 2976, 2977, 2978, 2979, 2980, 2981, 2982, 2983, 2984, 2985, 2986, 2987, 2988, 2989, 2990, 2991, 2992, 2993, 2994, 2995, 2996, 2997, 2998, 2999, 3000, 3001, 3002, 3003, 3004, 3005, 3006, 3007, 3008, 3009, 3010, 3011, 3012, 3013, 3014, 3015, 3016, 3017, 3018, 3019, 3020, 3021, 3022, 3023, 3024, 3025, 3026, 3027, 3028, 3029, 3030, 3031, 3032, 3033, 3034, 3035, 3036, 3037, 3038, 3039, 3040, 3041, 3042, 3043, 3044, 3045, 3046, 3047, 3048, 3049, 3050, 3051, 3052, 3053, 3054, 3055, 3056, 3057, 3058, 3059, 3060, 3061, 3062, 3063, 3064, 3065, 3066, 3067, 3068, 3069, 3070, 3071, 3072, 3073, 3074, 3075, 3076, 3077, 3078, 3079, 3080, 3081, 3082, 3083, 3084, 3085, 3086, 3087, 3088, 3089, 3090, 3091, 3092, 3093, 3094, 3095, 3096, 3097, 3098, 3099, 3100, 3101, 3102, 3103, 3104, 3105, 3106, 3107, 3108, 3109, 3110, 3111, 3112, 3113, 3114, 3115, 3116, 3117, 3118, 3119, 3120, 3121, 3122, 3123, 3124, 3125, 3126, 3127, 3128, 3129, 3130, 3131, 3132, 3133, 3134, 3135, 3136, 3137, 3138, 3139, 3140, 3141, 3142, 3143, 3144, 3145, 3146, 3147, 3148, 3149, 3150, 3151, 3152, 3153, 3154, 3155, 3156, 3157, 3158, 3159, 3160, 3161, 3162, 3163, 3164, 3165, 3166, 3167, 3168, 3169, 3170, 3171, 3172, 3173, 3174, 3175, 3176, 3177, 3178, 3179, 3180, 3181, 3182, 3183, 3184, 3185, 3186, 3187, 3188, 3189, 3190, 3191, 3192, 3193, 3194, 3195, 3196, 3197, 3198, 3199, 3200, 3201, 3202, 3203, 3204, 3205, 3206, 3207, 3208, 3209, 3210, 3211, 3212, 3213, 3214, 3215, 3216, 3217, 3218, 3219, 3220, 3221, 3222, 3223, 3224, 3225, 3226, 3227, 3228, 3229, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3265, 3266, 3267, 3268, 3269, 3270, 3271, 3272, 3273, 3274, 3275, 3276, 3277, 3278, 3279, 3280, 3281, 3282, 3283, 3284, 3285, 3286, 3287, 3288, 3289, 3290, 3291, 3292, 3293, 3294, 3295, 3296, 3297, 3298, 3299, 3300, 3301, 3302, 3303, 3304, 3305, 3306, 3307, 3308, 3309, 3310, 3311, 3312, 3313, 3314, 3315, 3316, 3317, 3318, 3319, 3320, 3321, 3322, 3323, 3324, 3325, 3326, 3327, 3328, 3329, 3330, 3331, 3332, 3333, 3334, 3335, 3336, 3337, 3338, 3339, 3340, 3341, 3342, 3343, 3344, 3345, 3346, 3347, 3348, 3349, 3350, 3351, 3352, 3353, 3354, 3355, 3356, 3357, 3358, 3359, 3360, 3361, 3362, 3363, 3364, 3365, 3366, 3367, 3368, 3369, 3370, 3371, 3372, 3373, 3374, 3375, 3376, 3377, 3378, 3379, 3380, 3381, 3382, 3383, 3384, 3385, 3386, 3387, 3388, 3389, 3390, 3391, 3392, 3393, 3394, 3395, 3396, 3397, 3398, 3399, 3400, 3401, 3402, 3403, 3404, 3405, 3406, 3407, 3408, 3409, 3410, 3411, 3412, 3413, 3414, 3415, 3416, 3417, 3418, 3419, 3420, 3421, 3422, 3423, 3424, 3425, 3426, 3427, 3428, 3429, 3430, 3431, 3432, 3433, 3434, 3435, 3436, 3437, 3438, 3439, 3440, 3441, 3442, 3443, 3444, 3445, 3446, 3447, 3448, 3449, 3450, 3451, 3452, 3453, 3454, 3455, 3456, 3457, 3458, 3459, 3460, 3461, 3462, 3463, 3464, 3465, 3466, 3467, 3468, 3469, 3470, 3471, 3472, 3473, 3474, 3475, 3476, 3477, 3478, 3479, 3480, 3481, 3482, 3483, 3484, 3485, 3486, 3487, 3488, 3489, 3490, 3491, 3492, 3493, 3494, 3495, 3496, 3497, 3498, 3499, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3508, 3509, 3510, 3511, 3512, 3513, 3514, 3515, 3516, 3517, 3518, 3519, 3520, 3521, 3522, 3523, 3524, 3525, 3526, 3527, 3528, 3529, 3530, 3531, 3532, 3533, 3534, 3535, 3536, 3537, 3538, 3539, 3540, 3541, 3542, 3543, 3544, 3545, 3546, 3547, 3548, 3549, 3550, 3551, 3552, 3553, 3554, 3555, 3556, 3557, 3558, 3559, 3560, 3561, 3562, 3563, 3564, 3565, 3566, 3567, 3568, 3569, 3570, 3571, 3572, 3573, 3574, 3575, 3576, 3577, 3578, 3579, 3580, 3581, 3582, 3583, 3584, 3585, 3586, 3587, 3588, 3589, 3590, 3591, 3592, 3593, 3594, 3595, 3596, 3597, 3598, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621, 3622, 3623, 3624, 3625, 3626, 3627, 3628, 3629, 3630, 3631, 3632, 3633, 3634, 3635, 3636, 3637, 3638, 3639, 3640, 3641, 3642, 3643, 3644, 3645, 3646, 3647, 3648, 3649, 3650, 3651, 3652, 3653, 3654, 3655, 3656, 3657, 3658, 3659, 3660, 3661, 3662, 3663, 3664, 3665, 3666, 3667, 3668, 3669, 3670, 3671, 3672, 3673, 3674, 3675, 3676, 3677, 3678, 3679, 3680, 3681, 3682, 3683, 3684, 3685, 3686, 3687, 3688, 3689, 3690, 3691, 3692, 3693, 3694, 3695, 3696, 3697, 3698, 3699, 3700, 3701, 3702, 3703, 3704, 3705, 3706, 3707, 3708, 3709, 3710, 3711, 3712, 3713, 3714, 3715, 3716, 3717, 3718, 3719, 3720, 3721, 3722, 3723, 3724, 3725, 3726, 3727, 3728, 3729, 3730, 3731, 3732, 3733, 3734, 3735, 3736, 3737, 3738, 3739, 3740, 3741, 3742, 3743, 3744, 3745, 3746, 3747, 3748, 3749, 3750, 3751, 3752, 3753, 3754, 3755, 3756, 3757, 3758, 3759, 3760, 3761, 3762, 3763, 3764, 3765, 3766, 3767, 3768, 3769, 3770, 3771, 3772, 3773, 3774, 3775, 3776, 3777, 3778, 3779, 3780, 3781, 3782, 3783, 3784, 3785, 3786, 3787, 3788, 3789, 3790, 3791, 3792, 3793, 3794, 3795, 3796, 3797, 3798, 3799, 3800, 3801, 3802, 3803, 3804, 3805, 3806, 3807, 3808, 3809, 3810, 3811, 3812, 3813, 3814, 3815, 3816, 3817, 3818, 3819, 3820, 3821, 3822, 3823, 3824, 3825, 3826, 3827, 3828, 382

dark, tubular. Petals 7-14 in. Leaves mostly compound, 1-2 in. long, rarely bipinnate, 2-4 pair. Racemes glabrous, simple or branched, often depressed in a terminal panicle. Pods 2-5 in. long.

Open forests. Nepal. Sikkim, ascending 50,000 ft. Khas hills, Uttarpradesh, Assam, eastern Burma. Plains of Bengal, Bihar. Moist evergreen forests of the Khas and North Khasia. Fl. Nepal, Java, Yunnan, Malay Archipelago.

B. Pods several-seeded. Leaflets and calyx glabrous.

5. *M. enneaphyllum*, W. et A.: Prain in Journ. As. Soc. Bengal, 18 (1888), 472.



FIG. 111.—*Moulouerum enneaphyllum*, W. et A. Fl. 1.

A large climbing shrub, prickles sharp curved. Petiole 6-11 pair. Leaflets sessile, 9-14 pair, membranous oblong, $\frac{1}{2}$ in. long. Pods red white, young green, 1-2 in.

China, Chikung, An-Gung, Yunnan, Fl. R. S.—Java. This probably is *M. glabrum*, Kunt. Fl. 1891. A *M. furfuraceum*, Prain loc. 371, Page. At the same forests (Teanow) it is supposed to differ by less numerous alternate leaflets. A. *M. andamanicum*, DC. in DC. 236. Andaman, common. Petiole 2-5 pair. Leaflets alternate, 2-14 in. long, sometimes obovate and narrowed into a short petiole, 4-5 pair. Petiole large, wrinkled, composed of large unbranched racemes, the flowers in the leaf axils. Calyx herbaceous, petals yellow of a warm blotches and veins. Pod 5-10-14 in.

C. Pods several-seeded. Leaflets and calyx pubescent.

6. *M. hymenocarpum*, W. et A.: Prain loc. 271 (*M. pubescens*, Baker in Fl. Brit. India, 279). Upper Burma as far south as Prome. Andaman, very common. Petiole leaflets alternate or nearly opposite, 2-7 pair, obovate, 1-1 in. long. Calyx herbaceous, pubescent. Pods 10-14 by 1 in.

4. PTEROLOBIUM, B. Brown: Fl. Brit. Ind. 3. 263.

Large woody plecty-climbers. Calyx deeply cleft, lobes imbricated, the lowest longer and more hooded than the others. Stamens 10, free, anthers unilam. Pod indehiscent with a terminal wing and one seed at the base. Species 7, of which 5 in the Indo-Malayan region, 2 in China and one each in Africa and Australia.

1. *P. indicum*, A. Rich.—Syn. *P. lacertum*, Wall.: Wright loc. 1. 185. Vern. *Karinda*, Tel.; *Karinda*, Tam.



FIG. 112.
Pterolobium indicum,
A. Rich. Fl. 1.

Branchlets, common petioles of leaves and panicle finely pubescent, prickles numerous, sharp, curved. Petiole 4-8 pair. Leaflets thin membranous, sessile, 6-8 pair, 1-1 in. long. Fl. white or yellow, $\frac{1}{2}$ in. across, in lax axillary racemes, collected near the ends of branches, petioles slender, longer than (but less than twice as long as) calyx. Pod $\frac{1}{2}$ in. long.

Western Peninsula, extending north in the Godavary river. Reported from Bihar, Bengal in Journ. As. Soc. Bengal, 60 (1888), 476, but not by Koenig's Indian Flora. Fl. R. S. The following, which are closely allied, are regarded by Prain as separate species: 2. *P. macropterum*, Kunt. Fl. 1891. Burma, Atchama. A

long slender with few leaflets. Branches 10 pairs. Leaflets pinnate, 7-10 pair. Fl. white in hot regions, pink in cooler ones. Bark white, the inner of bark red 2-3 in. long. *A. P. decandrum*, Trin.: *Tropisodia* W. Malay Archipelago. Very spreading shrub. Leaflets 6-10 pair, 1-2 in. long. Fl. yellow, in compact terminal panicles as long as or shorter than calyx. Pod 2 in. long.

5. POINCIANA, Linn.: Fl. Bot. Ind. n. 290.

Unbranched tree. Fl. large, in corymbose racemes. Calyx segments 5, unequal, oblong-lanceolate, valvate. Petals clawed, spreading. Stamens 10, 4-6 long, inserted. Pod flat, thin. Seeds numerous.

1. *P. clata*, Linn.: *Reich. Fl. Sylv.* t. 178. Vern. *Nirouli*, Kani; *Sou-Areety*, Tel.; *Poleacrum*, Tam.

Arb. 20-30 ft. Pinnae 2-8 pair. Leaflets linear, 1 in. long, 10-20 pair. Corymbs 1-2 ft. Petals four white, one greenish-yellow, all turning orange when dried. Stamens and style more than twice the length of pedicels. Pod 6-8 in. long, supported by persistent calyx.

Beautifully indigenous in the Western Peninsula, cultivated throughout India, J. L. And. Mart., Arabia, Abyssinia. *A. P. regia*, Boer., a native of Madagascar, is commonly grown in gardens (sometimes as far as the Indies) for account of its splendid scarlet in large erect panicles.

Catalpa racemosa, Boer., also a native of Madagascar, is a great ornament of Indian gardens, with its bright scarlet flowers in long compact corymbose racemes.

Artibeosia aculeata, Linn.: *Prod. Manual* v. 11th. (*Veget. Kibee*, Pl.). A large shrub or small tree, indigenous to tropical America, cultivated in many tropical countries, naturalized in India, where it is grown chiefly as a hedge plant in the West Indies. L. bipinnate, compound petiole short, thick, ending in a stout sharp spine, often with a pair of stipular thorns at its base. Pinnae 2-4 pair, flat, coriaceous, 6-12 in. long. Leaflets pinnate, sometimes none. Fl. yellow, in axillary racemes. Calyx segments nearly equal, distinct almost to the base. Petals equal. Stamens free, filaments pink 4-6 in. Pod linear, 3-6 in. long, contracted between the albuminous seeds.

6. WAGATEA, Dalz.; Fl. Brit. Ind. n. 290.

W. spicata, Dalz. (the only species). *Wight Ic.* t. 186. Vern. *Wagati*, Mar.

A woody climber, with long trailing, prickly branches. Pinnae 8-12 pair. Leaflets glabrous, elliptic-oblong, 1-2 in. long. Fl. nearly sessile, in long dense spikes, bright scarlet on a thick, furrowed brown-velvety pedicel. Calyx scarlet, campanulate, segments 5, the lobes much longer than the others. Petals 5, equal, oblanceolate, inserted with the stamens on the edge of the disk lining the calyx tube. Pod indehiscent, 4-6-seeded, more or less compressed between seeds.

Wag side of the Peninsula, common in dry and moist forests. Fl. O. S. Fl. B. S.

7. ACROCARPUS, W. et A.; Fl. Brit. Ind. n. 292.

Species 2, one in the Malay Archipelago.

A. fraxinifolius, Wight *Ic.* t. 254; *Reich. Fl. Sylv.* t. 41. Vern. *Hawlu*, Nep.; *Hullige*, *Harettige*, Kan.; *Mohrikonni*, Tam.; *Koripulli*, Mal.; *L. lora*, Born.

A lofty decumbent tree, stem tall, often with large buttresses, heart-wood dark red, externally hard, not heavy. Young shoots bright yellow-fuscous. Pinnae 3-4 pair. Leaflets 5-6 pair, elliptic-lanceolate, 3-4 in. long. Fl. dull red or orange, nodding on short pedicels, in dense erect racemes. Calyx

exserted, both β equal. Petals equal, slightly imbricate in bud. Stamens 6 long exserted, anthers uniform, versatile. Pod stalked, flat, thin, with numerous seeds. (On account of the pods being only slightly imbricate, partly valvate, sometimes placed under *Mimosa*.)

Sikkim, according to D.D. B. Wemyss, Dacca, Assam, Ceylon, Pegu, Java, Ceylon, Burma. Western Ghats from South Kanara southwards, according to D.D. B. Nilgiri, Anamalai and Palni hills. Fl. Dec. - Feb., with or before the young foliage, which is eaten. A supposed second species of the Ind. Archip. described as *Mimosa*.

8. HARDWICKIA, Roxb. Fl. Brit. Ind. ii. 270.

Erect unarmed trees. Leaflets few, scarious. Fl. small, biserial, in branched racemes. Sepals petaloid, usually 5 rarely 4. Petals none. Stamens twice the number of sepals, anthers short, versatile. Ovary with 1 or 2 ovules. Pod dry. Seed 1, exalbuminous. Species 8, one in Africa.

1. *H. binata*, Roxb. Cor. Pl. 2, 180; Bodd. Pl. Sylv. i. 29. Vern. *Anjan*, Hindi: *Muc.*; *Jepi*, *Naryepi*, Tai: *Acha*, Tam: *Kamara*, *Kavochi*, Kan.

A large gregarious tree. Branchlets slender, drooping heart-wood dark red, extremely hard. Leaflets 2, oblate, obliquely ovate to truncate with 1-5 arcuate longitudinal nerves. Fl. greenish-yellow. Racemes lax, in single axillary and terminal panicles. Pod flat, coriaceous, oblong-lanceolate, with parallel longitudinal veins, the seed near the end.

Gregarious leafy twigs in patches in the drier districts of the Western Peninsula, south of the Narmada river. Fl. R. 8. Fr. U. 8. Seedlings make a tap root up to 2 ft. long, and probably deeper, to reach a more underground stratum.

2. *H. pinnata*, Roxb. Fl. Ind. ii. 423; Bodd. Pl. Sylv. i. 235. Vern. *Mulayan Sasapira*, Tam: *Koda pala*, Mal.

A large tree, heart-wood, brown. Leaflets 1-6, alternate, coriaceous, ovate to ovate-lanceolate, 2-4 in. long. Sep. 2, numerous. Fl. minute, in dense cylindrical paniched racemes. Pod tergal, indurated, almost woody, 1-1½ in. long, the seed in the upper part.

FIG. III.—Hardwickia binata, Roxb. l. Pl. 1.

Evergreen forests of the Western Ghats from South Kanara to Travancore. Fl. Dec. A balsam exudes when the heart-wood is tapped. Several species of *Cassipourea* and *Albizia* of South America, yield the Guaiacum Balsam in a similar manner. A woody excrescence of the trunk near the base nearest to the heart, when the balsam flows in the streams. One also collects in the ground near the roots of several allied trees, among others of *Albizia Guiberti* in Guiana, which yields the Liquid Gum, and *Trichiliaa Harmsiana*, one of the species which yield the African Gum.

9. SARACA, Linn.; Fl. Brit. Ind. ii. 271.

Erect unarmed trees. Stipules intrapetalous, more or less united. Fl. in panicles with coloured bracts and bracteoles. Calyx-tube long, funnel-shaped, limb 4-lobed, petaloid. Petals none. Stamens 2-8 exserted, oblong, versatile, anthers on long slender filaments. Pod flat, indurated, coriaceous. Seeds exalbuminous. Species 10, India and Malay Archipelago.

A. Bracteoles persistent.

1. *S. indica*, Linn.; Bodd. Fl. Sylv. i. 37. Syn. *Jussia Jussia* Roxb.

and 2-ranked, acute or obtuse, separate between the nodes, which are actually enclosed by a large leaf with a long petiole. Spikes 2-5 in the Malay Archipelago.

1. *H. xylocarpa*, Kurz F. Fl. 1: 419, Poite. Ic. t. 61. Siam, hills 1750. Burm., 2000. A tall tree. Branchlets pubescent. Leaflets 2-3 pair. Ped 1-3 by 2 of n. Seeds 2-4 small, compressed laterally, 11 by 4 in.

2. *H. maritima* Poite. in Bot. Europæica, t. vi. 422. Transcription *Tree* Poite. Burm. A tall tree, in habit like *Persea* sp. Branchlets glabrous. Leaflets 1 pair, 5 by 12 in. Seeds nearly cylindrical, 11 by 4 in.

Stem striate. *Trunks*: Kurz F. Fl. 1: 418. Siam. An evergreen tree, 10-15 m. tall. Leaflets opposite, 5 or 7 pair, ovate, 5-4 in. long. The broad elliptic, strongly venate, rounded leaflets bear the tips of the spines glandular, and on a sticky, rather fragrant resin.

12. HUMBOLDTIA, Vahl; Fl. Brit. Ind. ii. 273 (Botanica, Vahl; Tuckerm. in Engl. u. Prantl iii. 3. 143.

Forest unarmed trees. *L. paripinnata*. Stipules persistent, usually peltate, consisting of 2 separate unequal parts. Fls. in axillary racemes, each fl. surrounded by a pair of persistent colored bractlets. Calyx tube turbinate, 5-lobed, 4 or 5 equal, petaloid. Petals 5 or 6, nearly equal. Stamens 5, exserted, alternating with 5 minute staminodes, anthers versatile. Pod flat, coriaceous, indehiscent. Albumen 0. Species 1 in tropical Africa, 3 in the Western Peninsula and Ceylon.

A. Leaflets 4 pair or more.

1. *H. laurifolia*, Vahl; Wight Ic. t. 1693.

A shrub or small tree, the internodes of the younger branchlets frequently swollen, hollow, the cavities inhabited by small black ants. Leaflets 4-5 pair, rigid, acuminate, 2-4 in. long, upper portion of stipule erect, 1/2 in. long, ovate-lanceolate, lower portion narrow, acute, much smaller, spreading horizontally. Racemes erect, 3-5 in. long. Fl. axillary. Calyx pink. Petals white.

Malacca. Fl. Jun. - October. 2. *H. Vahlana*, Wight Ic. t. 1696-8. Malacca, Singapore, Ceylon. Trunks are 10000 ft. at low elevations near rivers. *Fls.* (Wight, Ic. t. 1696) Malacca, Malys. Leaflets slightly coriaceous, lanceolate, 1-2 in. long. Racemes short, axillary, terminal. 3. *H. succurra*, Vahl; Bot. Ic. Pl. t. 298. Transvaal and Durban, probably in a region bordering Malacca. A small bush or large tree 10-15 ft. tall, leaflets 6-12 in. long, venation pinnate, young racemes broadly winged. Racemes short, axillary, terminal.

B. Leaflets 1-2 pair.

1. *H. Bransia*, Wall. Pl. As. Bur. t. 126; Wight Ic. t. 1694. Western Ghats, from Coorg and South Kanara southwards. Leaflets 2 pair, elliptic-oblong, 1/2 in. long, bases petiole, equaling or exceeding the bases. Petals orange. 2. *H. arizona*, B. & P. Fl. Sylv. t. 163. Transvaal, Ghats. Leaflets 1 pair, 5-7 in. long, rigidly coriaceous. Racemes short, on the old wood or clustered at the ends of short woody branches. Fl. orange.

Arbuscula nodosa, Wall. Pl. As. Bur. t. 126. The tree, Burm. Planted near Patgey, 10000 ft. in Burma, believed to be wild near the Yungai river, below Bassein. Young stems dropping, glabrous, striate. *L.* paripinnate, leaflets 5-8 pair. Fl. crimson, in long-petioled racemes, each fl. supported by 2 large lanceolate colored bractlets. Calyx segments 4, petaloid. Petals 5 large, but unequal, 2 minute. Stamens 10, 4-5 didymous, alternating, shorter. Pod flat, dehiscent, 5-7 in. long, broader at top.

13. TAMARINDUS, Linn.: Fl. Brit. Ind. ii. 273.

T. indica, Linn. (the only species). B. & P. Fl. Sylv. t. 184. Vern. *Santa*, *Judi*, Hind.; *Chitach*, *Chitach*, Mar.; *Koyu*, *Pestali*, *Urya*; *Chita*, *Hitta*, *Gandak*; *Chouta*, Tel.; *Peli*, Tam.; *Magu*, Burm.

A tree, 20-30 ft. tall. Leaves 10-15 pair. Rachis 1/2-1 in. long. Calyx tube 5-6 mm. long, segments 1-3. Petals 3, unequal, variegated with red and yellow, the 2 lower reduced to scales. Perfect stamens 20 filaments joined to the middle, anthers oblong, versatile. Ovary stipitate, the style slender, in calyx tube. Pod dark, filled with dark brown black pulp, traversed by fibres. Seeds brown, shining, without albumen.

Cultured throughout India and Burma. Trees are found as far as the Indian Sea. The fruit is not ripe west of Andhra. Well grown in woods and lowlands but not originally indigenous to India or Burma. Great Ceylon Island, introduced by the sea was planted (Pavon in Journ. As. Soc. Bengal 45 (1868) 211). Cultivated and cultivated in the tropics of both the New and Old World, but to be indigenous in tropical Africa. Never leafless, foliage changes in March and April, 12 May, June, 15 July, March.

14. CASSIA, Lam. Fl. Bot. Ind. ii. 241.

Herbs, erect shrubs or trees. L. paripinnate. Calyx tube very short or 0. Sepals imbricate. Petals axially broad, nearly equal. Pods flat or torulose, with a suture with transverse partition walls. Seeds numerous, alluminous. Species 38, in both hemispheres, mostly tropical, a few extra-tropical.

A. The three lower stamens have long curved filaments and anthers, which open by longitudinal slits, four stamens have short filaments and anthers opening by basal pores; the rest have minute anthers without pollen. Pod cylindrical, indehiscent, hard.

1. *C. Fistula*, Lam.; Brachy F. Fl. 193. *The Indian Lalurana*. Vern. *Kanari, Kanatagal*, Ph.; *Anallita*, Hind.; *Dibaram*, Mal.; *Souren*, Assam; *Bari*, K. C.; *Sonach*, Uchiya; *Kakki, Kakkal, Kan.*; *Rilo*, Tel.; *Kouari*, Tam.; *Npa*, Burm.

A middle-sized, at times a large tree, bark greenish-grey, smooth up to middle age, inward lacin, heart-wood brick-red when fresh cut, darkening on exposure, very hard, youngest shoots silky. Leaflets glabrous when full grown, 3-5 pair, ovate, acute or slightly acuminate, blade 2-5, pet. 1-4 in. long, ven. n. numerous, stipules minute. Fl. large, bright yellow, in lax racemes, peduncles racemes, bracts minute, caducous, pedicels slender, 1-2 in. long, the longer filaments not thickened in the middle. Pod cylindrical 2-3 ft. long, black, seeds in black, sweet pulp.

Cultured in the Indian Sea in most parts of India and Burma. Trees indigenous to the hills near Peshawar. Abundant to 4,000 ft. in the Outer Himalaya. Scarcely ever wholly leafless, the young leaves and fl. appear in April and May. The pulp of the ripe fl. is a strong purgative.

2. *C. nodosa*, Hamilton; Kurz F. Fl. i. 392; Wight l. i. 410. Vern. *Gandhita*, Burm.

A middle-sized or large ever-green tree, the youngest shoots silky. Leaflets 6-12 pair, thinly coriaceous, glabrous and glossy above, opaque beneath, elliptic-oblong, acuminate, blade 3-4, pet. 1 in. long, stipules narrow, foliose, early deciduous. Fl. showy, pink, in ax. stipulate racemes from the scars of fallen leaves, bracts narrow-lanceolate, pubescent, persistent. Petals 1-4 in. long, the three longer filaments with a globose thickening in the middle. Pod cylindrical, 12-18 in. long.

Silky, 12-18 in. tall, tree, Andamans, every few forests of Maratani and Upper P. Assam. Fl. H. S. Malay Peninsula, Cochinchina, Burma.

3. *C. marginata*, Roxb.—Syn. *C. Roxburghii*, DC.; Wight II. i. 83; Bodd. Fl. Sylv. i. 180.

A small or middle-sized tree. Branchlets and young leaves silky. Leaflets 10-15 pair, membranous, glabrous above, below, emarginate and apiculate at

spike stipules the base of leaf long, curly, deciduous. Racemes axillary, 2-7 in
the leaf-axils, bracts large, erect or obsecurate, pubescent, pedicels 1-1 1/2 in. Fl. yellow,
the four longer filaments not thickened in the middle. Pod cylindrical, 8-12
in. long.

Hb. of the Karnataka, Coimbatore, Mysore etc. Deccan Forest, Bangalore, 1917.

9. *C. renigera*, Wall.; Kurz, F. Fl. 1, 391. Vern. *Agulava*, Lower,
Panaka, Upper Burma.

A small or middle-sized deciduous tree, widely tomentose. Leaflets 8-10
pair, oblong-obovate, 1-2 in. long, membranous, warty pubescence on both sides,
stipules large, uniform, curly deciduous, tips shortly caudate. Racemes
short, erect, from the old wood, often leaf-bearing at the base, bracts large,
persistent, erect, long acuminate, pedicels 1 1/2-2 in. Fl. axillary, pink or
yellow. Sepals and petals silky, with long hairs on both sides. Petals
oblong-obovate, 1-1 1/2 in. long, the three longer filaments with a row of long
cylinders the keening in the middle, the larger anthers more or less hairy at the
base. Pod cylindrical, 15-18 in. long.

Lower Malaya, from Prome sprouts. Sta. Hills at 2000 ft. Fl. April, May.

R. seven stamens perfect, anthers nearly equal. Pod flat.

10. *C. stamea*, Lam.—Syn. *C. florida*, Vahl; Bell, Fl. Sib. 4, 175.
Vern. *M'zali*, Burma.

A middle-sized, somewhat a large tree, bark grey, rarely smooth. Leaflets
6-10 pair, chartaceous, elliptic-oblong, tipped with a minute short mucro,
clawed on both sides, 1 1/2-2 in. long, stipules caducous. Racemes often
corymbose, arranged in a large pyramidal terminal panicle, often 2 ft. long,
pedicels 1-1 1/2 in. long, bracts stiff linear, much shorter than pedicels. Fl.
yellow, petals 1/2 in. long. Pod flat, thickened at suture, minutely velvety,
1-1 1/2 in. long.

Primarily indigenous in Burma and in the southern part of the Western Penin-
sula, cultivated throughout India and Burma. Fl. H. S.—Ceylon, low country,
chiefly in the middle region, Siam, Malay Peninsula and Archipelago.

11. *C. moutana*, Heyne. A large shrub. Western Peninsula from Belgavia south
wards. Leaflets 10-15 pair, glabrous, glaucous, elliptic-oblong, mucronate, obtuse,
serrate, pubescent. Fl. yellow, in corymbose racemes forming a large terminal panicle,
pedicels long, suture not thickened, 3-6 in. long.

12. *C. unorientalis*, DC. (Forsk.) Presl.
Lower Burma, Ceylon, Malay Archipelago. A large shrub or small tree. Branches
pubescent. Leaflets 10-15 pair, pubescent on both sides, stipules foliaceous, often
longer than leaf persistent. Fl. yellow, in large terminal panicles, pod 1-1 1/2 by
1/2 in. suture not thickened. According to Holden, Tallet and Prain, Journ. Linn.
Soc. Botany, 477, also in the Western Peninsula. I have not seen specimens and
cannot identify Ceylon or Java, says not in Peninsular India.

13. *C. tomentosa*, Linnaeus, a tropical American shrub, naturalized in the Western
Peninsula and Ceylon. Branchlets, petioles and inflorescence grey velvety. Leaflets
7-9 pair, very tomentose beneath. Stipules small, deciduous. Fl. bright yellow, in
pedicels, very close racemes. 14. *C. gonata*, Zoll., Hook. Kew Journ. 4, 112.
Described as a small tree at the foot of the Goa Ghats, foliis tomentosis, pod flat, 2-3
by 1/2 in.; may possibly be *C. unorientalis*.

15. *C. auriculata*, Linn.; Brandis F. Fl. 165. Vern. *Tarada*, Tirupul,
Mar.; *Tungara*, *Tungara*, Tel.; *Tungali*, Kan.; *Acarra*, Tam.; *B. lobbiana*,
Burm.

A gregarious pubescent shrub. Leaflets 8-12 pair, elliptic-oblong, obtuse,
mucronate, 1-1 1/2 in. long, with a filiform gland at the base of each pair, stipules
large, foliaceous, persistent. Fl. yellow, in terminal corymbose, branched
panicles, the lowest branches in the axils of leaves, the upper supported by
pairs of stipules. Sepals narrow, unequal. Petals clawed, crisped on margin,
1-1 1/2 in. long. Pod 3-4 by 1/2 in., thin, hairy.

Western Peninsula, extending north to Assam and the Indian coast, covering the

tree or the shrubby tree, 2-200 ft. tall, long-branching. Fl. 7-12 May. Tree bark exfoliates by peeling, showing the drying. Lf. & white. Linn. Weigh. Ind. Ann. Naturalis, 1753, 1754, possibly indigenous to the Andaman Is. in the region of both hemispheres. A large shrub or branchlet 10-15 ft. high, leafy. Leaflets 2-12 pair, oblong to ovate, oblong, base obtuse, 2-4 in. long, vein 10 pairs, secondary, beneath stipule light, persistent, serrulate, 1 in. long. Fl. on short pedicels, spontaneous umbels racemes, the buds enveloped in large yellow scarious leafy bracts, bright yellow with darker veins, broad-lance 1/2 in. long. Pale. filament rigid, 6 by 100, 2-3 rounded, longitudinal, winged, each valve.

D. All stamens perfect, anthers nearly equal. Pod flat.

12. *C. glauca*, Lam.; Kurz F. Fl. 1: 374.

A large shrub or small tree, nearly glabrous. Branchlets ribbed. Leaflets 1-10 pair, 1-3 in. long, erect, clavate glaucous at the base of the 2-5 lower pairs. Fl. yellow, in axillary corymbose racemes. Pod thin, dehiscent, glabrous, 4-8 in. long.

Woods in Peninsular Malaya, extending north to Meru, Borneo. Often planted. Fl. throughout the year. Malay Peninsula and Archipelago.

15. CYNOMETRA, Linn. Fl. Brit. Ind. II. 267.

Erect unarmed trees or shrubs. Leaflets opposite, few, more or less ovate-oblong. Fl. small, numerous, fasciculate or in bracteate racemes, different species in bud enclosed by imbricate deciduous scales. Calyx-tube very short, segments 4 or 5, oblong. Petals 5, equal. Stamens 10, rarely indefinitely, anthers versatile. Ovary with 2 locules. Pod terget, indehiscent, with thick calyx. Seed generally 1, exalbuminous, filling the cavity of the pod.

A. Stamens 10.

1. *C. ramiflora*, Linn.; Beauv. Fl. Sylv. 1: 316. Vern. *Saberni Shigun* Siam; *Myin-ka-son*, Borneo.

An evergreen tree. Leaflets 1-2 pair, 1-3 in. long. Fl. white, on slender finely pubescent pedicels, in small sessile corymbes, or short racemes, axillary or above the axils of fallen leaves. Ovary hairy. Pod fleshy, wrinkled, 4 in. long.

Total and most forests from the Sulu Is. to Chittagong and Tenasserim. Cult. in the Caves of Kanchi and Mysore. Fl. U.S. H. 8-10 in. Malay Archipelago.

2. *C. Bedouana*, Presl in Journ. As. Soc. Bengal (1860) 175. Woods of Java, Sumatra, and Malacca. Leaflets chartaceous, 2-5 pair. Fl. in axillary racemes, 2-3 in. long.

3. *C. tricanthos*, Beauv. Fl. Sylv. 1: 316. Thunberg and Tranchese. Small tree, 1-2 in. tall, 1-2 in. diam. Fl. 1-2 in. long.

4. *C. esulifera*, Linn.; Beauv. Fl. Sylv. 1: 316 in part. Cult. in the Caves of Kanchi. Leaflets 1 pair. Fl. pink, anthers, or deep red cross-stitchers, enclosed in leafy bracts. Fl. thick, fleshy, 1/2-1 in. long.

5. *C. polyandra*, Roxb. Cor. Pl. 1: 284. Vern. *Ping Cichar*.

A large tree. Leaf buds enveloped in large imbricate scarious and mucous bracts. Leaflets 3 pair, 3 in. long. Fl. white, tinged with pink, 1 in. across. Petals reflexed, in axillary sessile corymbose racemes, enveloped in bud by hard striate scales, pedicels pubescent, 1-1 in. long. Pod woody, 2-3 in. long.

Kanchi Mts, Cichar. Fl. H. 8-10 Malay Peninsula.

16. BAUHINIA, Linn. Fl. Brit. Ind. II. 273.

Trees or woody climbers. Leaflets 2, united into one entire or 2-lobed palmately veined blade, rarely distinct. Fl. more or less zygomorphic. Calyx

limb divided in mid. into cylindrical or truncate, linearly lobed, 4-6 bracte segments or spathelets, spreading on the upper side, or irregularly lobed. Petals 5, spreading, slightly unequal. Stamens 10, all or some only perfect, anthers versatile. Ovary stipitate, stalk free, 3-angled to the sides, thick. Seeds numerous, compressed, with usually thin oblong. Species 100, tropics of both hemispheres.

The species of the arborescent species has a normal structure, as far as known. That of the shrubby species is irregular, but demands further study. The gift of all glands is believed to be cross-shaped.

A. Fertile stamens 10. Calyx spatheate. Erect trees or shrubs.

1. *B. tomentosa*, Linn. Vern. *Yano Saupage*, Kan.; *Tirucalli*, Tam.

A large shrub. L. 4-5 in. long, pubescent beneath, divided one-third down into two rounded lobes. Fl. in pairs, on short, usually leaf-opposed racemes, bracteoles linear. Calyx 1 in. long, shortly bifid at top, pubescent. Petals sulphur yellow, the uppermost with a dark purple blotch at base, $1\frac{1}{2}$ in. long, not spreading, but forming a bell-shaped corolla. Pod dehiscent, finely pubescent. Seeds 8-12, small.

Western Peninsula more common on the east side. Often cultivated near hillside temples. Fl. Aug.-April. Only a dry region. Tropical Africa.

2. *B. acuminata*, Linn.—Syn. *B. canaliculata*, Aiton. Vern. *Makkar*, Hind.; *Mahabhesa*, Tam. Bern.

A erect shrub. L. 3-4 in. long, longer than broad, divided one-third down into two ovate, obtuse, or triangular acute lobes, tertiary nerves conspicuous beneath. Fl. large, white, in short, generally leaf-opposed racemes. Calyx spatheate, 1-2 in. long, seminate with 5 setaceous teeth. Petals elliptic, 1-1½ in. long. Pod glabrous, at length dehiscent, 4-5 in. long, $\frac{1}{2}$ in. broad.

Collected hill tracts, Andhra, Burma, Upper and Lower, common in low hills. (Probably not indigenous to Western India.) Often grown in gardens. Fl. Sept.-Nov. Malay Peninsula and Archipelago, China. A. & polyvaria, Wall. Kew. P. Fl. 4, 1865. Burma, Upper and Lower. A small shrub. Light brown, 10-15 in. wide, slender, 1-1½ in. Fl. small, in slender leaf-opposed racemes. Petals white, 1-1½ in. long. Specimens from the Pegu Yams, in high Teak forest, with larger leaves, like *B. sin.* Prain, Journ. Ac. Sci. Lond. 1891, 43, is supposed to regard as belonging to a distinct species.

3. *B. racemosa*, Lam. & Bald. Fl. Sylv. 1, 183. Vern. *Pipri*, Jangari; *Jangari*, Hind.; *Makkar*, Dehli; *Jhaja*, Rajasthan; *Apla*, Sincra, Mar. Ar. Tel.; *Atti*, Tam.; *Hpalan*, Burm.

A small deciduous tree. L. 1-3 in. long, broader than long, lobes rounded. Fl. white, small, in long loose pubescent racemes. Petals $\frac{1}{2}$ -1 in. long, linear-lanceolate, unequal, filaments and anthers with long hairs. Pods thick, generally curved, 4-12 in. long, 1 in. broad.

Des. Forests of both Peninsulas, in the sub-malaya tract as far north as the Bay, ascending to 5000 ft. in Kanara. Old described C. S. New? and G. H. S. Ceylon, the region.

B. Fertile stamens 8A. Calyx 5-dentate or limb of 5 segments.

5. *B. malabarica*, Roxb.; Brandis P. Fl. 159. Vern. *Amli*, Indi, Hind.; *Yano*, K. I.; *Vatta Atti*, Tam.; *Ardas Pali*, Mal.; *Buriggia*, Burm.

A middle sized, in most districts a large tree, evergreen, with dark green foliage. L. emarginate, hardly lobed, at times quite entire, 2-3 in. long, broader than long, glaucous beneath. Fl. white, small, often unisexual, ♂ and ♀ on different trees in North Kanara Taluk; pedicels long, short, racemes axillary. Calyx with 5 equal triangular teeth. Petals spatulate, equal. Pod 12-15 in. long, $\frac{1}{2}$ in. broad, marked with raised wavy lines, descending from the middle to the edges of the valves.



FIG. 112.—*Bushinia castaneae* (Hook.)

2000 ft. Central India, Dehra, Western Peninsula, Lower Burma. Fl. Sept. Jan. L. cord. ovate.
 7. *B. incana*, Coll. et Hance in Journ. Bot. Soc. xviii (1891) p. 8. Southern China
 5000 ft. A small tree, erect or b-climbing. Branches ter. petioles and
 veins of l. very numerous. L. shortly 2-lobed broader than long, 1-2 in. across.
 Fl. in small dense racemes, on petiole 1 in. long. Calyx-segments spreading obtuse.
 Petals coriaceous, white. Stamens 10, all perfect. Ovary densely villosa. Pod de-
 hiscent, 2 by 4 in., obliquely acute gradually tapering to the base. F. R. eximiana
 Prain in Journ. As. Soc. Beng., 66 (1898) 461. Maymye and Fort Madaya, Shan State
 Siam, but leaves 2 in. across. Fl. larger on slender pedicels, 1/2 in. long.

8. *B. foveolata*, Dalzell; Prain in Journ. As. Soc. Beng., 66 (1898) 496.
 Syn. *B. Linnii*, Benth.

A tall dioecious tree. L. orbicular, shortly 2-lobed or entire, base deeply
 cordate, blade 5-9 in. diam., pet. 2 in. long, basal nerves 18-19, very pro-
 nounced, minute pits between the closely reticulate veins on the underside. Fl.
 white, axillate, almost sessile, in bran. panicles with divaricating branches.
 Calyx obtuse outside with a dense cast-brown felt of very minute hairs.
 Petals obovate. Stamens 10, all fertile, the shorter filaments epipetalous.
 Pod 10-ribbed staminate. Ovary cylindrical, densely clothed with long hairs.
 stigma broad, fleshy. Pod twisted, red-tomentose, 12 in. long.

Common in moist forests of the Khasia and North Khasia. Fl. Sept.-Oct.

9. *B. diphylla*, Hance; Kurz F. Fl. 1, 389.

A large glabrous climber. Stems 2-30 ft. long, tendrils axillary, circinnate,
 when forked. Leaves quite free, 3 by 2 in. Fl. large, in loose terminal
 racemes, 8-12 in. long. Calyx-tube 2-4 in. long, segments 5, coriaceous, linear-
 lanceolate, 1/2 in. Petals white, lanceolate, erect, as long as calyx-tube.
 Stamens 10, fertile, equal. Pod flat, thin, 10-16 by 3 in., or stalk 2 in. long.

Dry rocks of the Imvashit valley from Poonam upwards. Fl. R. S. Specimens at
 Kew, collected by Sieber in the Khasia.

10. *B. retusa*, Ham.; Brandis F. Fl. 161. Vesp. *Scala*, *Kinilla*, *Kris-
 Poo*, *Bud*; *Laba*, *Kol*; *Thaur*, *Gork*; *Gondi*, *Tel*.

A small tree, bark grey. Branchlets long, slender, pendulous. L. entire or
 slightly emarginate, coriaceous, broader than long, 3-8 in. across. Fl.
 racemes in pedunculate corymbose racemes, forming large terminal panicles,
 the filices long slender. Calyx-tube splitting into 2 or 3 segments. Petals
 broad, hairy outside, blade orbicular, pale yellow, marked with dark-purple
 spots, perfect stamens 3. Pod late dehiscent, 4-6 by 1 in., generally broader
 top, seeds 6-8.

8. *B. purpurea* (Linn.) Brandis F. Fl. 100. Vern. *Koldi*, Ph.; *Bhainasa*, Gaud., *Kvillar*, *Kobbar*, Hind.; *Kanchan*, Tel.; *Saral*, *Kanchinasa*, Kan. A middle-sized tree, heart-wood brown, hard, durable. L. coriaceous, cleft about half-way down, lobes often overlapping along the inner margins. Racemes short, in terminal panicles. Fl. deep pink, sometimes white. *B. frutescens*, Roeb.; pedicels bracteolate. 1-2 in. Calyx-tube obconical, 1/2 in. long, limb twice the length of tube, cleft to the base into two reflexed segments, one emarginate, the other 3-toothed. Petals oblanceolate. Fertile stamens 3, occasionally 4. Pod 6-12 in. long.

Subhimalayan tract, from the Indus eastwards, ascending to 5000 ft. Assam, Khasi hills, Chittagong, Western Peninsula, in deciduous forests. Not indigenous in Burmah or Ceylon. Cultivated largely. Fl. Sept.-Nov.

11. *B. purpurea*, Linn.: Brandis F. Fl. 100. Vern. *Koldi*, Ph.; *Bhainasa*, Gaud., *Kvillar*, *Kobbar*, Hind.; *Kanchan*, Tel.; *Saral*, *Kanchinasa*, Kan. A middle-sized tree, heart-wood brown, hard, durable. L. coriaceous, cleft about half-way down, lobes often overlapping along the inner margins. Racemes short, in terminal panicles. Fl. deep pink, sometimes white. *B. frutescens*, Roeb.; pedicels bracteolate. 1-2 in. Calyx-tube obconical, 1/2 in. long, limb twice the length of tube, cleft to the base into two reflexed segments, one emarginate, the other 3-toothed. Petals oblanceolate. Fertile stamens 3, occasionally 4. Pod 6-12 in. long.

Subhimalayan tract, from the Indus eastwards, ascending to 5000 ft. Assam, Khasi hills, Chittagong, Western Peninsula, in deciduous forests. Not indigenous in Burmah or Ceylon. Cultivated largely. Fl. Sept.-Nov.

12. *B. variegata*, Linn.: Kanjal F. Fl. 130. Vern. *Kochadi*, Hind.; *Kanchan*, Mar.; *Bainatham*, *Mauluri*, Tel.

A deciduous middle-sized tree, with irregular masses of dark-coloured wood near the centre. L. as long as broad, 11-15-nerved, leaflets connate beyond the middle. Fl. large, almost sessile, in short few-fl. racemes, 2 varieties, one with purple flowers (4 petals light purple, the 5th and larger deep purple), the other with white flowers (*B. concolor*, Roeb.), the 5th petal variegated with yellowish-green or dark purple. Calyx-tube cylindrical, as long as the bracteate spathaceous 5-toothed limb. Petals obovate or oblanceolate, 2 in. long. Pod 6-10 in. long. Perfect stamens 3, rarely less.

Subhimalayan tract from the Indus eastwards. Assam, Burma, Western Peninsula, Chittagong largely. Fl. Feb.-May, generally without the tree is leafless. *B. velutina*, Wall. Imperfectly known, Tavoy and D'Arny. Branchlets, petioles, underside of l. and inflorescence clothed with minute generally grey pubescence. Racemes axillary, few-fl., corymbose. Calyx-tube cylindrical, 1 in. long, segments 5 linear, as long as or a little longer than tube. Petals as long as sepals, blade obovate or a long narrow claw. *B. monandra*, Kurz. is not a native of British India (Dunn in Journ. As. Soc. Beng. 10 [1888] 195).

D. Fertile stamens 3, sometimes 4 or 5. Climbers.

(a) Fl. in dense corymbs or corymbose panicles.

14. *B. Vahlia*, Wight et Arn.: Kanjal F. Fl. 138. Vern. *Taur*, Ph.; *Mala*, *Mallhan*, *Mauvain*, *Maulcia*, *Mahul*, Hind.; *Rung*, Kol.; *Mallhan*, *Chaudal*, Mar.; *Sjali*, Oriya; *Thanc*, Goud.; *Mulaps*, Tel.; *Aul paha*, *Hepparige*, Kan.

A gigantic climber, stem irregularly ridged and furrowed, often 100 ft. long and 2 ft. diam. A cross section shows numerous irregularly shaped masses of xylem, consisting mainly of large vessels, arranged in more or less concentric lands and separated by red juicy bark-like tissue, the structure of which is not yet sufficiently known. Branchlets, tendrils, petioles, under side of leaves and inflorescence clothed with dense ferruginous, rarely grey tomentum. L. deeply cordate, variable in size, often up to 18 in. diam, cleft to about one-third of their length, lobes obtuse, basal nerves 11-15; petiole stout. Tendrils axillary, often fl.-bearing, forked, bifurcations circinate. Fl. cream white on long slender pedicels, in terminal corymbose racemes. Calyx-tube shorter than the 2-lobed limb. Petals densely hairy, 1-1 1/2 in. long. Stamens 3. Ovary hairy. Pod flat, woody, clothed with dense brown felt, 9-18 or 2-3 in., bursting open with a loud report.

Subhimalayan tract and water valleys ascending to 5000 ft. from the Ghats eastwards, chiefly in Sal forests. Assam, Bihar, Western Peninsula, chiefly on the west side. Fl. April-June. The most destructive climber to Sal and other trees, being effectually exterminated in many forest tracts. Growth of climbing shoots extremely

small, the flattened, the rays 10, numerous, protracted 20 to 30, and dense. How to divide the stem, the leaves and how the nodes and nodes into lobes. The seeds are small and white. *B. B. rufa*, Griseb. *Il. Peltata* Kurz F. Fl. 1. 421. *B. B. rufa* hills, near the Youngs, 2000 ft. The stem is similar to *B. Peltata*, but the seeds are cylindrical, belong to segments of the limb.

16 *B. arata*, Kurz *Myrsine*, Burm. A gigantic climber. Iwra Yona and Temasserin. Youngest shoots rusty-pubescent, mature leaves glabrous. Fl. in dense terminal, almost globose racemes. Calyx thickly silky, tube imbricate, segments 5, longer than tube. Anthers 2. Ovary densely rusty silky. 17 *B. glaberrima*, Baker, Prain, Temasserin, Malay Peninsula, Borneo. A climber, 60-80 ft long. L. glaucous, bright green, those near the ends of branches rather lower down, light green, fourth their length. Fl. small, silvery grey, in dense corymbose racemes; pedicels, two or at the base of each branch in pairs (scapules), at the base of pedicels solitary, linear-lanceolate. Calyx grey with appressed hairs, tube shorter than the 5 segments of limb. Petals hairy, 4 in long, anthers 2. Ovary hairy. 18 *B. pterisifolia*, Hook. Arca. Soler. similar, but no leaves on pedicels, Fl. larger. Petals 1 in long. 19 *B. Khamra*, Baker. Arca. Kham hills. Youngest shoots bright rusty-pubescent, L. thin, glaucous. Fl. or branch turning red, making terminal corymbose panicles, and like the calyx densely clothed with bright rusty pubescence. Calyx-tube equal to the segments of limb. Petals silky, 1 in long, claw as long as blade, anthers 2. Ovary densely silky.

(b) Fl. in more or less corymbose racemes.

20 *B. phoenicea*, Heyne. — Syn. *B. Benthani*, Bodd. Ic. Pl. Ind. Or. t. 107.

A gigantic climber. L. glabrous above, minutely hairy beneath. Fl. bright crimson. Calyx-tube as long as the 5 linear-lanceolate segments. Petals 1 1/2 in long, claw linear, as long as the ovate-lanceolate blade. Stamens 5. Pod downy, 6 by 1 in.

Common on the Ghats of South Kanara and Warradeo Gorge. Traversed in early green leaves. Fl. Oct-Dec. 21 *B. glauca*, Walp. Temasserin, Malay Peninsula and Archipelago. Branchlets glabrous, leaflets numerous. Fl. in dense and upright and terminal corymbes. Calyx glabrous, tube nearly twice the length of the limb. Petals cream-coloured, 1/2 in long, sparsely pubescent outside, anthers 2. Ovary glabrous. Pod thin, 6-8 by 2 in. 22 *B. tenuifera*, Walp. C. B. Clarke in Journ. Linn. Soc., xvi, t. 8. Kham and Nag hills, Manipur. Similar to 21, but calyx-tube linear, 2-4 times the length of segments. Petals 1/2-1 in long. 23 *B. nervosa*, Walp. Arca. Kham hills. Youngest shoots and inflorescence thinly rusty-pubescent, pedicels numerous. Fl. in large corymbose racemes, linear-lanceolate. Calyx-tube cylindrical, 1/2 in long, segments of limb 5, as long as tube. Petals 1 1/2 in long, densely hairy, claw as long as blade. Pod 4 by 2 in. valves thick, strongly veined. 24 *B. alta*, Prain in Journ. As. Soc. Beng., 56 (1888), Ind. Paga, Temasserin, Nimbura similar to 23, but petals nearly glabrous. Prain identifies this with *B. ferruginea*, Kurz F. Fl. 1. 421 (not Hook.), but Kurz states, petals rusty appressed-silky outside. I have not seen specimens.

25 *B. mollissima*, Walp. *B. glauca*, Kurz (Nat. Veih. Bot. t. 26). Temasserin, Malay Peninsula and Archipelago. Branchlets, pedicels and underside of leaves rusty-pubescent. Fl. in short leaf-opposed racemes. Calyx-tube 1-1 1/2 in long, lobes 5 of equal length. Petals 2-2 1/2 in long. Pod pubescent, 1 by 1 in. 26 *B. Kurra*, Prain *B. rufa*, Kurz F. Fl. 1. 421. Kaymaing chung, Sabern in Engler's, D.B., May, 1896. Yapo at 5000 ft., Galatly (Prain in Journ. As. Soc. Beng., 56 (1888), 26). Fl. rose-coloured, on long slender pedicels in terminal corymbose transverse racemes, 5-6 in linear-lanceolate, 1/2 in long. Calyx-tube short, segments of limb 5 reflexed, 1 in long. Petals 1 in long, slightly pubescent on both sides. Ovary villous. Style thick. 27 *B. Patungeri*, Prain in Journ. As. Soc. Beng., x, 1-67, 266. Kham hills. A large climber nearly allied to *B. nervosa*, Walp.

(c) Fl. in elongate racemes.

28 *B. anguina*, Roxb. Cor. Pl. t. 285. Vern. *Nainill-tara*, Nap.

A large evergreen climber, the branches flat, 4-6 in broad, 1 in thick, jointed in alternate directions, stems more cylindrical, with a raised spiral line. Branchlets and leaves entirely glabrous, youngest shoots rusty-pubescent, tendrils slender, bifid, branches circinate. L. thin, on the branches entire or nearly so, on young plants and on luxuriant shoots cuneate or

1854, the lobes narrow and tapering. Fl. small, white, in long slender racemes, arranged in terminal panicles. Calyx-tube campanulate, very silky, lobes 4, ovate, spreading. Petals 4 in long. Stamens 8. Ovary glabrous. Pod thin, obliquely elliptic, 2 by 1 in., 1-2-seeded.

Wakim, Tern., according to 2100 ft. Kras. hills, Chittagong, Martaban. The Burmese plant near *Boegellou* has smaller pods. Fl. B.S. 32 description of it on p. 11. Fl. B.S. may possibly be this species. See E. in Journ. An. Soc. Bot. (p. 107) No. 10.

Dr. E. Champion, Hook. Thun valley, Wakim, eastern Siam. China, collected by 27, but 1. minutely pubescent beneath. Ovary pubescent. Dr. R. C. Anderson, Wall, Assam, Sibbet, Bettscheli and L. Gahar. Fl. in forked or single rather racemes, 1-2 in. long, pedicels 1-1.5 in., in the axils of small triangular bracts. Calyx-tube as long as the 5-lobed limb. Petals largely silky, 4 in long. Pod linear, 6-8 by 2 in. Seed 2-4.

Third Sub-Order, MIMOSÆ.

Tree, shrubs, climbers, rarely herbs, with abruptly bipinnate, rarely pinnate, leaves and small flowers in heads, spikes, racemes, or small umbels. Fl. regular, occasionally polygamous. Sepals valvate, generally connate, rarely free, usually 5. Petals valvate, as many as sepals, hypogynous, usually connate. Stamens hypogynous, definite or indefinite. Seeds without albumen, embryo straight, radicle short.

Most trees of this Sub-order have a distinct dark-colored heart-wood. Of the allied leg. species, *Estuaria* has a brown spongy structure, while the fruiting-trees have a hard cork-like bark wood.

A. Stamens 10, anthers with depression apical glands.

Theory trees or shrubs; fl. in cylindrical spikes

Pinnae 2 pair; leaflets small, 7-10 pair.

Pinnae 2 pair; leaflets 2-4 in. long; 1 pair.

Pinnae 6-10 pair; leaflets small, 12-15 pair.

Twisted climbers; fl. in cylindrical spikes

Charred trees.

Leaflets evenly short, 6-8 in. long; fl. in racemes.

Leaflets opposite, 4-6 in. long; fl. in globose heads.

B. Stamens 8 or 10, anthers without glands.

Stamens 10, none apical glands

Stamens 8 or 10, free

Pod cylindrical

Pod pinnate

Stamens indefinite, free. Theory trees or shrubs

Pinnae indefinite, monadelphous

Pod thin, straight, entire or thickened

Pod lobes, entire much thickened

Pod ciliate or twisted

1. *Prosopis*

2. *Prosopis*

3. *Prosopis*

4. *Prosopis*

5. *Prosopis*

6. *Prosopis*

7. *Prosopis*

8. *Prosopis*

9. *Prosopis*

10. *Prosopis*

11. *Prosopis*

12. *Prosopis*

13. *Prosopis*

14. *Prosopis*

15. *Prosopis*

16. *Prosopis*

17. *Prosopis*

18. *Prosopis*

1. *PROSOPIS*, Linn.; Fl. Brit. Ind. ii. 287.

Species 25, two in Western Asia and India, two in tropical Africa, the rest in the drier regions of America, from Colorado and Utah to Patagonia.

1. *P. spicigera*, Linn.; Roxb. Cor. Pl. i. 63; Bodd. Fl. Syiv. 4. 16; Gray P. Fl. i. 25. Vern. *Jand*, Punjab; *Kandi*, Sind; *Kheju*, Rajputana; *Prosopis*, Saurat; *Sunder*, Mar.; *Boavi*, Kan.; *Jandi*, Tel.; *Jandi*, Tan.

A middle-sized glabrous thorny tree with a very long tap-root. Bark rough, with deep fissures and cracks. Sap-wood large, irregular, dressed, dark-brown heart-wood in the centre of old trees. Branches and branches armed with scattered broad-based conical prickles. L. bipinnate, pinnae 2, leaflets opposite, pinnae 2, leaflets 7-10 pair. Spikes slender, in short axils.

lamella. Stamens 10, free, exserted, anthers gland-tipped. Pod 2-seeded, indehiscent, pendulous, linear, 5-10 in. long, filled with a very mucous pulp, contracted between seeds.

Found in the Punjab, Rajasthan, the Deccan as far south as Travancore, Malabar and the Nilgiris. Leaves for a short time. Fl. after the leaves have fallen, from Feb. to April. Glycerol-expresses with the base of the stem often surrounded by a mass of small thorny branches and suckers. 2. *P. Stephaniana*, Benth. Pedicular, Malabar, Western Asia, a thorny shrub; pinnae 2-3 pair; pedicels thick, 1-1½ in. long.

2. PIPTADENIA, Benth.; Fl. Brit. Ind. ii. 289.

(Species 14, tropics of both hemispheres, chiefly America.)

P. couthensis, Brandis; Ann. Bot. Gard. Calcutta, ix. t. 13. Vern. *Gadh*, *Gadh*, *Gadh*, *Gadh*.

A middle-sized tree, glabrous, except inflorescence, branches armed with large crescent prickles. L. bipinnate, pinnae opposite, 2 pair, flat glands at the base of each. Leaflets 1 pair, reniform, subcoriaceous, 2-4 in. long. Fl. greenish-yellow, in dense cylindrical spikes, arranged in short panicles. Calyx cup-shaped, nearly truncate; petals 5, lanceolate, three times the length of calyx. Stamens longer than petals, terminal glands of anthers globose. Pod stalked; linear, flat, 9-12 in. long, ½ in. broad. Seeds 15-30.

Hills of the Cochin district and adjacent hills of N. Malabar, India, discovered by R. Thwaites, 1871. Hills above Bann, near eastern Kanara (K. H. 1875). Fl. April.

3. DICHROSTACHYS, DC.; Fl. Brit. Ind. iii. 288.

(Species 7, most in tropical Africa, one in tropical Australia.)

D. cinerea, W. et A. Bodd. Fl. Sylv. t. 183. — Syn. *Miconia cinerea*, Benth. Bot. Beechey, p. 174. Vern. *Kuloi*, Marwar; *Sigankat*, Mar.; *Wala*, Kanar; *Ulaten*, Tel.; *Vadalarasa*, Tam.; *Sithye*, Barm.

A rigid thorny pubescent shrub or small tree, with light grey bark, heart-shaped dark purple spines axillary, straight, strong and sharp, often prolonged into leaf-bearing branches. L. bipinnate, pinnae 6-10 pair, opposite, small stipitate glands at the base of each pair; leaflets 12-15 pair, ½ in. long, elliptic. Fl. in dense cylindrical spikes, the upper flowers of each spike bisexual, yellow, the lower sterile, purple, sometimes white, with long filiform stamens. Pods linear, 2-3 in. long, irregularly twisted, indehiscent or opening irregularly.

Tree stems white in Central India, hills of the Deccan. Stalks and Pods black in the dry region of the middle-forest of the Nilgiris. Fl. according to the locality, at different times, in Rajasthan, the northern Deccan and Barua in the H. S. Malabar. In Java, Vellergades, Senore market in November.

4. ENTADA, Adans.; Fl. Brit. Ind. iii. 283.

(*Pisotha*, Linn.; Engler u. Prantl iii. 3. 122)

(Species 11, tropics of both hemispheres.)

E. scandens, Benth.; Brandis F. Fl. 167. Vern. *Jangra*, Beng.; *Gila*, Assam; *Girraohi*, Mar.; *Gila-ghu*, Barm.

Very large woody climber, stems angled and much twisted. The wood to a certain extent consists of thin-walled parenchyma, in which are embedded a horizontal strands of vessels, sieve-tubes and wood-fibres. L. bipinnate, most petioles ending in long woody blind tendrils; pinnae opposite, 2 pair; leaflets 3-4 pair, 1-3 in. long, glabrous, shining. Fl. pale yellow, crowded in slender spikes, from the axils of the upper leaves, or arranged in a terminal raceme. Calyx shortly 5-toothed; petals 5. Stamens 10, free, exserted.

anthers tipped with globose deciduous glands. Pod woody, of irregular size, 2-4 ft. long, 3-4 in. broad, consisting of 10-30 one-seeded, flat, suture narrowly reticular joints, the valves thick, separating from the thick rim. Seeds flat, nearly orbicular, brown, shining, testa very hard.

Sublimosa can tract from Nepal southwards, ascending to 2100 ft. Sikkim, Meikong, Burma, Assam, N. China, Western Ghats. Fl. March-May. — Ceylon, Malay Peninsula and Archipelago, China. Sea coast of the tropics in both hemispheres.

5. ADENANTHERA, Linn.; Fl. Brit. Ind. ii. 287.

(Species 4, one in Queensland, the others in tropical Asia.)

A. pavonina, Linn.; Wight III. t. 84; Bodd. Fl. Sylv. t. 46. Vern. *Muamli*, Kan.; *And Kundawani*, Yam.; *Footygi*, Burm.

A deciduous, unarmed tree; heart-wood red, hard. L. bipinnate, pinnae opposite, 4-6 pair; leaflets evenly alternate, 12-23 elliptic-oblong obtuse, 1 in. long. Fl. yellow, fragrant, on slender pedicels, in long panicle racemes. Calyx small, campanulate, teeth short; petals 5, connate at the base. Stamens 10, free, anthers tipped with a deciduous gland. Pods linear, curved and twisted when opening, 4-9 in. long. Seeds bright scarlet, shining, lenticular, compressed.

Sublimosa can tract from Oriskapur eastwards. Sikkim, Assam, Burma, Western Ghats from Khandish southwards, not common. Fl. II. 8. — Malay Peninsula and Archipelago, China.

6. XYLIA, Beath.; Fl. Brit. Ind. ii. 286.

X. delabriformis, Beath. The only species. — Syn. *Miconia xyllocarpa*, Rostk. & Schmidt, Fl. t. 100; *Xylia xyllocarpa*, Thunb. in Engler & Prantl III. 8. 122. *The Journal of Burma*, Vern. *Sueia*, Chanda; *Jumbo*, Mar.; *Tongaju*, Tel.; *Jrot*, Tam.; *Pyla*, *Pyakado*, Burm.

A lofty tree, leafless during part of the hot season. Bark grey; heart-wood dark red, very hard. One pair of pinnae at the end of a common petiole 1-3 in. long; leaflets 2-6 pair, oblong acuminate, 3-9 in. long. Fl. pale yellow, in globose long-pedunculate heads. Calyx tubular, wider at mouth, teeth short; petals linear, coherent at the base; anthers with small stipitate deciduous glands. Pod flat, thick, woody, 4-6 in. long, 2-2½ in. wide at the broadest part, 2-valved, opening suddenly. Seeds 6-10, compressed, testa brown, shining.

Common in the mountain districts of the Western Peninsula, on the west side to Orissa and the forest north of the Godavary; the Mabarh forests in the Ghats district being its southern limit in Central India. Often gregarious. Burma, in the deciduous forests, ascending to 3000 ft. Fl. white leafless in March and April; fr. in the evening and winter.

7. PARKIA, R. Brown; Fl. Brit. Ind. ii. 289.

Unarmed trees. L. bipinnate; leaflets very numerous. Fl. in globose or clavate heads, each head supported by a coriaceous bract, the upper fl. in asexual; the lower male or sterile. Stamens 10, filaments connate at base adnate to calyx-tube. Pod flat, coriaceous, tardily dehiscent. Species of the tropics of both hemispheres.

1. *P. Rosburghii*, G. Don. Vern. *Supeta*, Beng.

Attains 60 ft., and 2 ft. diam. Pinnae 20-30 pair; leaflets 40-50 pair, 1 in. long; pod 15-20 in. long, 1½ in. broad, smooth, dark brown.

Awan, Sikkim, Cachar, Chittagong. Fl. Dec. 2. *P. insignis*, Kurz. Vern. *M. linnæi*, Burma, forests east of Toungoo. Pinnae 4 pair; leaflets 20-25 pair, 1 in. long.

3. *P. latophylla*, Kurz. Paga Youm. Pinnae 10 pair; leaflets 15-20 pair, 1 in. long, 12-18 in. long, black, tomentose.

Leucaia glauca, Beath; Fl. Brit. Ind. ii. 290 naturalized, common in India.

usually 4-5-merous; large terminal or axillary heads; plants 1-2 pair; leaflets 10-15 pair; 1 in long. Fl. white, in dense globose heads, biserial, mixed with slender bracteoles broader at the top. Petals 4-5, woody in fruit, bearing numerous seeds which appear stipitate, early deciduous, linear, 3-5 in long; seeds numerous, shining, bicarinate, with two ornaments.

8. MIMOSA, Lam.; Fl. Brit. Ind. ii. 291.

Herbs or shrubs, rarely trees; l. in many species sensitive. Pinnae stipitate. Fl. in dense globose heads. Petals 4 or 5, rarely 3 or 6. Stamens generally twice the number of petals and more than twice their length. Pod linear or oblong, the valves separating (entire or in transverse joints) from the persistent suture. Species 291, mostly American, a few in Asia and Africa.

M. rubicaulis, Lam.—Syn. *M. octandea*, Roxb. Cat. Pl. t. 290. Vern. *Hojara*, Sind; *Agla*, *Mil*, *Alta*, *Al Bah*, Hind.; *Vandra*, Tq.

A straggling prickly shrub, pubescent, branches, petioles and peduncles armed with short curved sharp prickles; stem attaining 5 in. diam. Pinnae 3-12 pair, the lowest often not exactly opposite; leaflets 6-15 pair, obliquely oblong, the midrib lateral. Fl. tetramerous, pink, in fasciculate pedunculate heads. Pod stipitate, glabrous, curved, 3-4 in. long, separating in square joints from the sutural frame, sutures generally without prickles. Seeds 6-10.

Common in most parts of India, except the arid region. In the outer Himalaya ascending to 4000 ft. FL. H. S. Wood used for gunpowder charcoal. *M. hamata*, Willd.; S. Ind. Deccan and west side of the Western Peninsula; pinnae 3-4 pair; leaflets 6-10 pair, midrib near the middle of leaflet. Sutures armed with numerous hooked prickles. Specimens of this, from Beaulay, have been identified with *M. polyacantha*, Benth., an American species. *M. K. patina*, Lam., the Sensitive Plant, naturalized, introduced from America, clothed with long bristly hairs; pinnae 3-4, stipitate; pod 4 in. long, with abundant straw-coloured prickles. Seeds 3-4.



FIG. 314.—*Mimosa rubicaulis*, Lam. ♀

9. ACACIA, Willd.; Fl. Brit. Ind. ii. 292.

(The following characters relate only to the Indian species.)

Trees, shrubs and climbers, armed with stipular, infra-stipular or scattered glob. l. bipinnate, pinnae and leaflets opposite. Fl. yellow or white, in dense heads or cylindrical spikes; numerous scaly bracteoles between the axes. Calyx and corolla 4-5-merous. Stamens free, generally very numerous, adnate or indnate. Species 450, tropical and subtropical regions of a hemisphere, chiefly Australia.

A. Trees or shrubs; stipules spinous; fl. in globose heads.

A. *Parnesiana*, Willd.; Bodd. Fl. Sylv. t. 52.—Syn. *Fachellia Parnesiana*, W. et A.; *Wightia*, t. 200. Vern. *Waddyti Khar*, Hind.

A thorny shrub; spines straight, stipular. Compound petiole $1\frac{1}{2}$ –2 in.; pinnae 4–8 pair; cup-shaped glands below the lowest and often at the base of the uppermost pair; leaflets 10–20 pair. Fl. bright yellow, sweet-scented, in globose fasciculate heads. Pod nearly cylindrical, pointed at the ends, scarcely dehiscent, glabrous, valves with raised parallel lines; seeds embedded in dry spongy tissue.

Indigenous in America, but naturalized throughout India and Burma. Fl. Jan.–March.

2. *A. planifrons*, W. et A.; Trimen Handbook Ceylon i. 35, *The Umbrella Thorn*. Vern. *Godugu Thamma*, Tel.; *Kodaivelam*, *Jali Salei*, Tam.

A middle-sized tree, crown flat, spreading, umbrella-like. Spines of two kinds on the same branch: (a) long (1–2 in.), cylindrical, ivory white, (b) short, slightly curved, brown. L. small, fasciculate, with the fl. on arrested branchlets; pinnae $\frac{1}{2}$ in. long, 3–5 pair; leaflets 6–10 pair, minute, obtuse. Fl. heads yellow in bud, white when open; peduncles slender, $\frac{1}{4}$ – $\frac{1}{2}$ in. long. Pod 2–3 in. long, glabrous, nearly cylindrical, curved nearly into a ring.

Southern Decan: Salem, Madura, Thanjavelli, often gregarious. Fl. March. Prain in Journ. As. Soc. Bengal 66 (1898), 506, mentions a species from Southern India different from 2, possibly *A. Roxburghii*, W. et A. This is not known to me.

3. *A. arabica*, Willd.; Bedd. Fl. Sylv. t. 47.—Syn. *Mimosa arabica*, Lam.; Roxb. Cor. Pl. t. 149. Vern. *Babul*, Hind.; *Kikar*, Pb.; *Bamura*, Jabalp.; *Babar*, Sind; *Jali*, Kan.; *Nellatamma*, Tel.; *Karu Velam*, Tam.

A large tree; bark rough with deep narrow longitudinal fissures; heart-wood pale red, when fresh cut nearly colourless, on exposure turning reddish-brown. Stipular spines straight, $\frac{1}{2}$ –2 in. long. Pinnae 3–6 pair, cup-shaped glands at the base of the lowest and generally also of the uppermost pair; leaflets small, linear, 10–20 pair. Fl. golden-yellow, in globose heads, $\frac{1}{2}$ in. diam.; peduncles slender, fasciculate; a pair of scaly bracts in the middle. Pod solitary, moniliform, much contracted between seeds at both sutures, whitish-tomentose, stalk $\frac{1}{4}$ – $\frac{1}{2}$ in. long.

Indigenous in Sind and the Northern Decan, including Berar and Khandeish. Cultivated and naturalized throughout India, except in the most humid regions on the western coast and in the extreme North-West beyond the Jhelum, where the frost is too severe in winter. Tropical Africa, Arabia. Gregarious. Babul forests are extensive in lower Sind along the Indus, and in the Decan along the Purna, Bhima and Kistna rivers and their tributaries. Fl. R. S. and C. S.; never leafless, the young foliage comes out in Feb. and April. The pods are an excellent cattle-food. Gum exudes largely from wounds in the bark.

A remarkable variety is the *Kousia* or *Kouri Babul* in Berar and Khandeish, called *Fedi Babul* in Poona, Sholapur and Satara. The spines are white, very stout, up to 2½ in. long, the pod is flat, on short stalks, $\frac{1}{2}$ in. broad and very little constricted between the seeds. In these districts the ordinary form with moniliform pods is called *Tolia* or *Godi Babul*, its wood is prized, while that of the *Kousia* is considered only fit for firewood. The bark of the *Kousia* is more deeply cracked and exfoliating and the crown is formed of twisted interlacing branches. In Africa and Arabia also *arabica* varies greatly.

4. *A. cburnea*, Willd.; Trimen Handbook Ceylon ii. 124.—Syn. *Mimosa cburnea*, Roxb. Cor. Pl. t. 199. Vern. *Marmat*, Mar.; *Odai*, Tam.

A large shrub or small tree. Branches armed with straight stipular spines, mostly stout, ivory-white and 1–2 in. long. L. small, clothed with long hair; pinnae 4–8; leaflets 8–12 pair, acute. Fl. yellow, with an unpleasant smell; heads under $\frac{1}{2}$ in. diam., fasciculate; reddish-brown while in bud; glabrous bracts below the middle of the peduncle. Pods linear, slender, 5-veined, generally 2–4 from one fl. head, 2–5 in. long, edges undulate.

Trans-Indus, Baluchistan. Salt range, Subhimalayan tract and outer valley ascending to 3000 ft., east as far as Oudh. Sind. The Decan. Fl. Nov.–March. P. region of Ceylon.

C. Tree or shrub, stipules oft spinous, spines infra-stipular: 12 or 15 spikes.

11. *A. Senegal*, Willd.: Fl. Brit. Ind. ii. 216.—Syn. *A. rupestris*, Brandis & Brandis F. Fl. 181. Vern. Naar, Hind.: *Kumbā*, Rajasthan.



FIG. 116.—*Acacia senegal*, Willd.

A small thorny tree: bark smooth, shining: infra-stipular spines three, stout, conical, very sharp, dark brown, shining, the two lateral straight, the third recurved. Petiole 3-5 pair, common petiole often armed with minute prickles: leaflets 8-12 pair, green, elliptic. Fl. fragrant, white, in lax cylindrical spikes: anthers lemon-yellow. Pod thin, straight, pubescent when young, tardily dehiscent, 2 in. long, $\frac{1}{2}$ in. broad.

Dry hills in Sindh, Arnavalli range. Fl. Aug.-Dec.—Tropical Africa.

12. *A. modesta*, Wall. Pl. As. Har. t. 189.—Syn. *Mimosa dumosa*, Roal. Vern. *Dastar*, Baluch.; *Phooli*, Pl.

A middle-sized gregarious tree, thorny, rarely unarmed. Bark rough, with a multitude of irregular narrow cracks. Heart-wood dark brown with black streaks. Prickles twin, infra-stipular, dark brown, shining, conical. L. pale grey; common petiole 1-2 in. long; pinnae 3 pair; leaflets 3-5 pair, broad ovate, or obovate, oblique. Stipules minute, deciduous. Fl. white or pale yellow, sweet-scented, in lax cylindrical drooping spikes. Pod stalked, flat, indehiscent, 2-3 in. by $\frac{1}{2}$ in.

Baluchistan. Trans-Indus, east flank of the Sulaiman range up to 4000 ft. North of Kohistan tract and outer hills, between Indus and Swat. Salt range and northern part of the Punjab plateau as far as Faisalpur and Delhi. Fl. March-May. The white-d. spikes contrast with the delicate green of the young foliage, but the A. tree and the leaves soon turn an ashy-grey colour.

13. *A. lenticularis*, Ham.; Brandis F. Fl. 189. Vern. *Khour*, Nep.

A small tree, perfectly glabrous. Prickles twin, infra-stipular, and sometimes wanting. Common petiole 3-6 in. long. Pinnae 2-8 pair, 6-12 pair, oblong, obtuse, glaucous, 1 in. long. Spikes 3-5 in. long. Pod 1-1 $\frac{1}{2}$ by 1-1 $\frac{1}{2}$ in., sutures thickened.

Sahyadriyan tract and outer hills, Kumaon to Sikkim. Rajmahal hills in Kumaon or Centr. Prov. This is *A. serragines* in Griseb. List. 2nd ed. 82.

14. *A. ferruginea*, DC.; Bodd. Fl. Sylv. t. 51. Vern. *Khaigra*, Guj. *Khaigra*, Mandeyl; *Phooli* *Khour*, Mar.

A large tree, with rough, dark-colored bark, nearly glabrous. Prickles twin, infra-stipular, slightly curved. Common petiole 3-6 in. long; pinnae 1-6 pair; leaflets 15-20 pair, grey, linear, $\frac{1}{4}$ - $\frac{1}{2}$ in. long. Fl. pale yellow.

petals 2-4 in. long, often armed with scattered prickles. Fines 10-20 pair, leaflets 20-30 pair, linear, imbricate, glabrous or pubescent, under part long-veined beneath in drying. — Fl. pale yellow, in cylindrical spikes; petals three times the length of calyx. — Pods thin, brown, shelling, dehiscent.

Siddhantayan tract, from the Ganges eastwards, ascending to the valleys to 4000 ft., especially conspicuous on hillsides and on the banks of rivers at nearly equinox into the winter. Common on the Arunachal hills in the Western Peninsula, as well as in Burma, Fl. May-July. With this I unite *A. Scaevola*, DC. Fl. Brit. Ind. ii. 205, kept separate by Th. Burkill in and Triebner *Handbook Ceylon* ii. 123. The species varies considerably in regard to the pubescence of calyx, petals and stipules. (Pride in Journ. As. Soc. Bengal, 6. (1866), 508, recognizes 3 varieties.)

14. *Catechu* pepper. Calyx, petals and rachis covered with spreading hairs. Chiefly in the Punjab, Assam and Khasia, in the Ganges and in the Irrawaddy valleys of Pegu and Upper Burma.

15. *Catechusides*. Calyx and petals glabrous, rachis pubescent. Chiefly in the Sikkim, Terai and Assam, also in Upper Burma, in Mysore and on the Nilgiris.

16. *Sandra*. Calyx, pedicel and rachis all glabrous. Chiefly in the Western Peninsula and Upper Burma.

To some extent the pubescence varies, and it is for further inquiry, whether these three forms differ in their mode of growth or in other respects.

16. *A. Suma*, Boehaggen; Brandis F. Fl. 187; Kurz F. Fl. I. 421. — Syn. *A. Catechu*, Boid. Fl. Sylv. t. 41; *Mimosa Suma*, Koch, Fl. Ind. ii. 563; *Vicia Salmata*, Bong.; *Dacrydium Khasia*, Burmann.

A large or middle-sized tree; bark white; branches stiff, sericeous; branchlets and petioles downy, with soft grey pubescence. Prickles in pairs, infra-stipular, oval, downy when young, brown shining afterwards. Ovary with 2-10 in. long, unarmed, with a large cup-shaped gland above the base. Fines 10-20 pair, leaflets 20-30 pair, linear, approximate, imbricate, generally ciliate. Fl. white or pale yellow; spikes lax. Petals not much longer than calyx. Pod 3-5 by $\frac{1}{2}$ in., pubescent when young.

Western Peninsula, both on the west as well as on the east side extending north to the Malabar States in Southern Rajastan. — Lecter Bengal, Sumatra (Kurz gives it from Java). — Burmann in Trans. Linn. Soc. xxx. 319, doubts whether the proportion of calyx and ovary is constant. But it seems to have a different habit and therefore will find no difficulty in distinguishing it.

17. Widely climber; stipules not prominent; spines not infra-stipular but scattered; fl. in globose heads; pods thin, flat, dehiscent.

17. *A. carnea*, Willd.; Brandis F. Fl. 189. — Syn. *A. Jata*, Willd., Fl. Brit. Ind. ii. 27. — Varn. *Aita*, Blud.; *Chilla*, Mac.; *Korinjani*, Tel.

A large climber; stem with prominent ridges twisting like a screw; bark smooth, grey; branchlets and petioles angular, with numerous short conical sharp prickles. Fines 6-16 pair, leaflets 10-30 pair, coriaceous, more or less pubescent, pale or rust-coloured beneath, $\frac{1}{2}$ in. long, obliquely linear or oblong, obtuse or acute, nerves distinct, midrib nearer the middle than the upper edge. Fl. heads pale yellow, in terminal tomentose panicles; bracts minute, caducous. Pods thin, 4-6 in. long, 1 in. broad, tomentose when young, glabrous afterwards.

Siddhantayan tract from the Chera eastwards, ascending to 4000 ft. in Sikkim, Assam, Cachar, Chittagong. Not known from Burma, Behar, Rajastan, Western Peninsula. Fl. April-August. Ceylon, Malys Archipelago.

Pringle in Journ. As. Soc. Bengal 60 (1862) 510 mentions *A. carnea* and *A. Indica* as distinct species, stating "that the crowded leaflets, always hairy beneath, make it very easy to recognize *A. carnea*, even in the herbarium, and that no one dreams of confounding the two as they grow." — Bentham (Mimosa, Trans. Linn. Soc. xxx. 539) following as the work of the late Pres. Thunberg, only recognizes one species, *A. carnea*, Willd. A form collected by me on the Pachigiri hills in April, 1873, with branchlets, petioles, underside of l. and inflorescence densely tomentose is remarkable, but the

specimens from the Khasi, Bhokor, Behar and the Konkan, which are more than usually pubescent, cannot in my opinion be regarded as a separate species.

Scarcely allied are: 18. *A. pruinosa*, Kurz F. Fl. i. 424. Assam, Manipur, Upper Burma. Tree 7000 ft. Branchlets pruinose; leaflets narrow-linear, $\frac{1}{2}$ to $\frac{3}{4}$ in. long, the midrib close to the upper edge, gland on petiole $\frac{1}{2}$ in. above base. 19. *A. pseudo-lata*, Miq. Prain in Journ. As. Soc. Beng. (1886) 24: 311. Andaman, Malac Peninsula and Archip. Branchlets blackish; leaflets linear-oblong, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, midrib close to the upper edge, gland oblong, near base of petiole; $\frac{1}{2}$ in. long. Fl. heads in bud concealed by large ovate acuminate bracts.

20. *A. pennata*, Willd.; Kurz F. Fl. i. 424. Vern. *Aita*, Hind.; *Shewbi*, Mar.

A large climber, climbing over the tallest trees, bark reddish-brown; prickles on branchlets, petioles and inflorescence; branchlets and petioles pubescent. Pinnae 20-40 pair; leaflets $\frac{1}{2}$ - $\frac{3}{4}$ in. long, 30-60 pair, narrow-linear, mucronate, midrib near the upper edge, closely packed, overlapping, making each pinna like the feather of a bird. Fl. heads white or pale yellow, 4-8 together in the axils of leaves or bracts, forming long racemiform panicles, bracts linear, imbricate. Pod shining, very thin.

Subhimalayan tract, from Konkan eastwards ascending in Sikkim to 2000 ft. Behar, Khasi hills, Manipur, Cachar, Chittagong, Burma, Upper and Lower Gangetic forests. Andaman. Western Peninsula. Fl. April-August. Ceylon, Malay Peninsula and Archipelago.

E. Woody climbers; spines scattered; fl. in globose heads; pods thick, fleshy, indehiscent.

21. *A. concinna*, DC.; Fl. Brit. Ind. ii. 296. Vern. *Ban-ritha*, Beng.; *Shakabai*, Mar.; *Chikayi*, Tel.; *Subak*, Burm.

Branchlets, petioles and peduncles tomentose or pubescent, armed with numerous sharp recurved prickles. Pinnae 4-6 pair, leaflets 12-20 pair, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, linear from an unequal-sided base. Stipules large, semicordate. Flowerbuds purple; fl. yellow, heads in dense panicles at the ends of branches.

Subhimalayan tract, from Oudh eastwards. Assam, Behar. Western Peninsula and Burma, chiefly in evergreen forests. Fl. March-July. Malay Peninsula, Java.

Several Australian *Acacia*s are cultivated on the Nilgiris and elsewhere. The most important are: *A. dealbata*, Link. the *Silver Wattle*. A tree spreading rapidly by root-suckers, with bipinnate grey hoary leaves, small linear leaflets and small yellow fl. heads in axillary and terminal panicles. *A. melanoxylon*, R. Brown, the *Australian Blackwood*. A large tree with coriaceous, oblanceolate phyllodia (vertically divided leaf-stalks) instead of leaves except on young trees, which have bipinnate leaves at the end of phyllodia.

II <: ALBIZZIA, Durazzini; Fl. Brit. Ind. ii. 298.

Upruned trees, with bipinnate leaves and large in the Indian species, globose fl. heads. Fl. white, yellow or pink. Calyx and corolla usually pentamerous. Stamens indefinite, long exserted, filaments united high up or at the base only. Pod flat, straight, usually thin, indehiscent or 2-valved.

A. Pinnae 1 or 2 pair; leaflets distinctly pinnul-nerved, 1-6 pair, 2-5 in. long.

1. *A. lucida*, Benth. Vern. *Thanthat*, Burm.

A large glabrous tree, bark grey, heartwood hard, brown with dark streaks. Pinnae 1, rarely 2 pair; leaflets 2 rarely 3 pair, a gland on petiole and at the base of the terminal pair of leaflets, none at the base of pinnae. Leaflets elliptic, acuminate, shining. Heads of 6-10 sessile pubescent flowers, in terminal panicles. Corolla four times the length of calyx; ovary sessile, glabrous. Pod straight, shining, dehiscent, 4-8 by $1\frac{1}{2}$ in.

Schinus molle (L.) DC. from Nepal mountains (Kamulung) (Sikkim) 1894. Assam, Khasi Hills, Chittagong, Burma, Upper and Lower Siam by the banks of rivers or



FIG. 118.—*Albizia lucida*, Benth. 1

on moist ground. Fl. March-May. Leafless a short time during the hot season in early '93.

B. Pinnae 2-3 pair; leaflets 1-2 in. long; fl. sessile or nearly so.

2. *A. Gambleri*, Prain in Ann. Bot. Gard. Calc. ix. 31, tab. 41.

A deciduous tree, attaining 50 ft.; pinnae 2-3 pair. A large gland above the base of the common petiole, and glands at the base of the last pair of leaflets; leaflets 5-7 pair on the upper, 3-4 on the lowest pinna, in all cases decreasing slightly downwards, pale green above, glaucous beneath, sparsely appressed pubescent on both surfaces. Heads many-fl., pedicel; calyx campanulate, pubescent outside, half the length of corolla; corolla 1 in. long; pedicels much shorter than calyx. Pod 6-8 in. long.

Kangra (Prain); Sikkim. Naga Hills. Fl. B. S. Yunnan.

A small tree was found by Sonnerby (April 1901) in Upper Burma on the edge of a forest. Pinnae 2 pair; leaflets oblique, glabrous, upper pair bright green, under side pale; in the upper pinna 6 in the lower 3 pair, those of the terminal pair the largest, in the upper pinna 3-5 in. long; the leaflets of the lower pair only 1-1 in. long, very small glands several in a line on the summit, one below the lowest pair of pinnae and the base of each pair of leaflets, except the lowest. Fl. heads yellow, in large

juvenile pedicels or rays, as well as young branches, are usually silky, except 3-4 in the middle of ray, which is glabrous. (How? Pedicels, young leaves, young twigs, etc., are glabrous like in *P. longiloba*.)

3. *A. procera*, Benth.; Brandis, F. Fl. t. 21. — Syn. *Miconia* light, Roxb. Cor. Pl. t. 121. Vern. *Kochur, Gindir, Nafal Siris, Hind.; Sirt, Urya, Khat, Gwari, Mar.; Chappin, Tel.; Vagat, Tam.; Sit, Burm.*

A large tree, bark light brownish-grey, heartwood hard, brown, shining, with streaks of darker colour. Young shoots white-silky-pubescent. Pinnae 3-5 pair, leaflets 6-10 pair, with scattered appressed hairs, obliquely oblong-ovate, 1-2 in. long, midrib nearer the lower edge, pale beneath. Fl. heads in large terminal and axillary panicles; fl. sessile, 1-1 in. long to extremity of stamens; calyx tubular, glabrous, more than half the length of corolla; corolla four-lobed, lobes bearded at the end with long white hairs. Ovary glabrous, shortly sessile.

Submontane trees from the Jungles eastwards, Western Peninsula, Assam to Burma. Chiefly on river banks and in moist places. Fl. May-August. Rarely seen below the Ganges river in H. S. China, Malay Archipelago. A remarkable variety sent by E. M. Backman from the Tsurumai forest has pinnae 5-4 pair, leaflets 10 pair 1-1 in. long, panicles mostly axillary, ped. not known.

4. *A. odoratissima*, Benth.; Rehd. Fl. Sylv. t. 54. — Syn. *Miconia odorata*, Gussone, Roxb. Cor. Pl. t. 120. Vern. *Karmaru, Ph.; Kalla Siris, Hind.; Bama, Jahaly; Siris, Chinnudo, Mar.; Calchala, Hindi; Chichra, Chanda; Chichaga, Tel.; Blietra, Kan.; Kora Naga, Tam.; Thithaghi, Lower Pathya, Upper Burma.*

A large tree, with dark green foliage. Bark light or dark grey, marked with numerous narrow horizontal wrinkles, nearly encircling the trunk. Heartwood dark brown. Branchlets, petioles and inflorescence pubescent. Pinnae 4-8 pair. Leaflets 10-25 pair, 1-1 in. long, oblong, obtuse, unequal-sided, scabrid, lobate, pub. glabrous or pubescent beneath. Fl. heads pale yellow, fragrant, in compact corymbs arranged in large terminal panicles. Corolla and calyx densely strigose with short hairs, the former campanulate, 5 times longer than calyx. Anthers yellow. Pods 6-8 in. long, 1 in. broad, dehiscent, lomentose when young, nearly glabrous when ripe.

Small woody tract ascending to 1000 ft. Western Peninsula and Burma. Never seen below the Ganges river in spring. Fl. April-June. A tree 100 ft. tall, 10 in. diam. at base. As. Soc. Beng. 86 (1866) 512. Upper Burma, common. A tall tree, about 120 ft. high, from 4 by smaller diam. very numerous, leaflets 10-20 pair, with 10-15 pairs of leaflets.

C. Pinnae 3-11 pair; leaflets 1-3 in. long; fl. pedicellate.

5. *A. Thompsoni*, Brandis, Ind. For. xv. (1869) 281. Vern. *Silary, Chanda.*

A large deciduous tree, attaining 7 ft. in girth; branches spreading. Branchlets, young leaves and inflorescence very tomentose. Pinnae 8-12, leaflets 15-20 pair, pale beneath, very unequal-sided, nearly filicoid, acute or unguiculate, 1-1 in. long. Fl. pale yellow, not scented; anthers pink; pedicels as long as or longer than calyx; corolla twice the length of calyx, both pubescent. Ovary glabrous, stipitate. Heads in dense corymbes, peduncles 1 1/2-2 in. long. Pod glabrous from the beginning, shining, of a rich brown colour, dehiscent, 6-8 in. 1-1 1/2 in.

Mahuli and other forests in the Chanda district, often associated with *Chamaejasme indica* (Gussone). Leafless January and February. Fl. with the young leaves in the end of February or beginning of March.

6. *A. Lebbek*, Benth.; Rehd. Fl. Sylv. t. 63. *Siris, Vern. Siris, Nafal, Hindi; Calchala, Mar.; Boje, Kan.; Diraumant, Tel.; Vagat, Tam.; Kishab, glab.*

... [faded text] ...

... [faded text] ...

11. CALLIANDRA, Benth. Fl. Brit. Ind. III 302

Tree or shrub; bipinnate; leaflets few, large, glabrous (in the Indian species). Stipules usually persistent, often spinose. Fl. often subsessile in globose heads. Stamens 2. Filaments constant in length at base only. The anthers usually separate as the valves bend forward from top to bottom.

C. umbrosa, Benth. — *Calliandra umbrosa*, Wall. Pl. As. Rar. I 121 Vahl, *Kyongt.* Hort.

A small tree; stipules generally spinose. Branches 1 pair, rachis of which 1-2 in. long bearing at the end a pair of more or less oblique leaflets 1-1.5 in. long and a single much smaller leaflet on the outside, see a prominent. Fl. white or pink, sessile in dense globose heads supported by a ring of sessile bracts. Petioles slender, 1-1.5 in. long, generally inserted on the old wood, singly axillary. Fls 0.5-1 in. long, seeds 4-8.

... [faded text] ...

12. PITHECOLOBIUM, Martins, Fl. Belt, Ind. II 362

Tree or shrub; bipinnate. Fl. in globose heads, rarely in small loose spikes or cymes, usually 1-2 in. long. Petals connate half way up or further, sometimes anadelphous, much exserted. Pedicels coriaceous, curved or twisted, usually deciduous along the lower suture. Species 10, tropics of both hemispheres, chiefly America.

Armed, stipules or branchlets spinose.

P. dulce, Benth.; *Pithecolobium dulce*, (L.) Benth. — *Miconia dulce*, Rich. Bot. Voy. 1818; *Jouy dulce*, Willd.; Wright Bot. 1858.

... [faded text] ...

... in small globose heads, ... arranged in long ... Ped ... twisted, 1-5 ...

Indigenous in America, naturalized in the Western Peninsula ... small bushy tree of Caylen, ... small ... part of the Peninsula ... Ped 2-4 by 1/2 in. ... Fl. to extremity of stamens 1-1 1/2 in ... Fl. ... white, ...

Agrically species, probably of this genus, P. ... K. ... has 1 pair of pinnae ...

B. Unarmed; pinnae 1-3; leaflets 2-4 pair; brachlets and rachis of panicle not prominently angled or furrowed.

4. P. glomeriflorum, Kurz F. Fl. 1. 130.

A shrub or small tree; pinnae 1, leaflets 3 pair, elliptic-lanceolate, 1-2 in. long. Fl. sessile, 1-1 1/2 in. to extremity of stamens, in lax axillary and terminal rusty-pubescent panicles.

Shrubby tree ... larger perhaps distinct. Dry forest on the ...

5. P. lobatum, Benth & Kurz F. Fl. 1. 42. Var. ...

An evergreen tree, heartwood brown ... Pinnae 1, leaflets 2-3 pair, shining on both sides, elliptic-lanceolate, 3-8 in. long, glands mainly at the base of leaflets. Fl. white, 1/2 in. long to extremity of stamens, sessile or on short pedicels, panicles axillary or on the old wood. Ped ... lobes thick, ...

... Pinnae 1, leaflets 2-3 pair, shining on both sides, elliptic-lanceolate, 3-8 in. long, glands mainly at the base of leaflets. Fl. white, 1/2 in. long to extremity of stamens, sessile or on short pedicels, panicles axillary or on the old wood. Ped ... lobes thick, ...

P. bigeminum, Martius, Benth. in Trans. Linn. Soc. xxx. 376.

A middle-sized tree; brachlets common panicles and inflorescence ... Pinnae 2-3 pair, leaflets of the lowest pinnae 1-1 1/2 in. long to extremity of stamens, glabrous, dark green ...

... from Nepal ... ascending in ...

*C. Unarmed; pinnae and leaflets numerous; brachlets and rachis of panicle furrowed and angular.

10. *P. angulatum*, Benth. *Rep. V. 17*. P.
 A shrub or small tree 10-15 m. high, flowers white, leaves
 rusty-pubescent. Petioles 2-5 mm. long, of the longest time 2-3, of the
 upper joints 4-8 pairs, the middle ones pinnate, the terminal leaves up
 to 10 cm. long. The whole tree is hairy. Kiang-Ming district, on steep



Fig. 112 - *Pteleoobolus angulatum*, Benth.

petiole as long as, or longer than calyx, on large rusty-pubescent
 leaves. P-1 spirally twisted, 7-8 in. long, distinctly sinuate between seeds,
 very white young.

11. *P. montanum*. Benth. in Trans. Linn. Soc. 23: 185.



Arborescent tree
 leaflets 10-12
 pubescent, widely
 angulate. Long
 10-12 in. long, 2-3
 in. wide, very
 serrate, all
 by of the
 1-1 in. long, pale
 green, both with
 glands orbiculate
 linear at the base of
 each pair of pinnae,
 about 1/2 in. long.
 Fl. heads white, in
 terminal and axillary
 panicles; pedicels as
 long as calyx. Petals
 glabrous, spirally
 twisted, 1/2 in. long,
 semi-bisecting, lobes
 thick, distinct.

Upper Himalayas
 hills, Nepal
 Thibet, 2000 ft.
 D.D. Everest, 1842
 Nepal, 1842
 Griffith, 1842
 February, 1842
 China

12. *P. subcar-
 acum*. Thwaites
 Syn. *P. montanum*
 Benth. in
 Sylv. 1: 185.

A large tree with
 spreading branches,
 branchlets clothed
 with fine grey
 pubescence. Pinnae
 10-12 pair, leaflets
 10-12 pair, leaflets
 1/2 in. long, 1/2 in.
 wide, above, densely pubescent, beneath
 glabrous. Several 1-3 glands

on the petiole below the lowest pair of pinnae and one gland between small
 part of pinnae. Fl. heads many-fl., forming a terminal leafy panicle of
 nearly sessile, 1/2 in. long to extremity of stamens; calyx one-third
 length of corolla. Petals 4 in. long, conspicuously twisted.

Annular hills 15-2000 ft., Terrestrial hills (very abundant) above 1000 ft. in
 S. S. Ceylon. The Ceylon specimens have a smaller number of pinnae (5-6) and
 glands are mostly glabrous beneath.

97

ORDER XLVI. ROSACEÆ. 6th Pl. p. 600.

Leaves shrubby or trees, l. stipulate, alternate, rarely opposite, simple or compound. Fls axillary, regular and bisexual; calyx 5-merous, free or adnate to ovary, 1-5-lobed, pubescent in bud. Disk annular or lining the calyx-tube; petals 5, perianthous, rarely wanting, often orbicular and striate, deciduous or very short or none, imbricate, rarely contorted in bud. Stamens as a rule numerous, inserted with the petals or on the disk, in axel in bud. Carpels usually distinct, one or more, often adnate to calyx-tube, styles free or connate, one in each carpel 1 or 2, rarely more. Fruit often fleshy. Albumen none. Embryo cylindrical plane-convex, cells filled with oil, radicle short.

Appts from medullary rays in woody parts, and here an important part in the wood of *Rosa*, *Crataegus*, *Pyrus*, *Malus*, *Zootherisma* are exceptional, they have a large longitudinal bundle of parenchyma in the wood. In this respect, as well as in the fact of few eye-morphs = 2, this tribe approaches *Leguminosæ*. Wood Glossary *Rosa* as a rule have not bordered pits. As far as known, the wood of the following species has a normal structure.

- III. Calyx-lobes not involved within the calyx-tube.
(See *A. vitis* and *Quercus coccinea*.)
- I. Leaves simple, quite entire. Carpel one. Fl. usually aximorphous (like *Chrysanthemum*).
 - 1. Calyx-tube elongate, stamens (3-5) usually unilateral.
 - 1. *PANICUM*.
 - 2. *PANICUM* (p. 207).
 - 2. Calyx-tube short, stamens 2.
 - 1. *PANICUM*.
 - 2. *PANICUM*.
 - II. Leaves simple or serrate. Carpel 1, rarely 2.
 - 1. Calyx 5-lobed, petals large.
 - 1. Style terminal, ovary large, long.
 - 2. Style basal, ovary perianthous.
 - 2. Calyx 5-10-lobed, petals minute or 0.
 - 3. Carpel 1, ovary large, long.
 - 4. Carpel 1, ovary perianthous.
 - III. Leaves simple or compound. Calyx without bracts.
 - 1. Carpel 1 or 2, rarely 2 or more, in dry seeds linear, testa repandulous, albumen 0 or scanty.
 - 1. *ROSA*.
 - 2. *ROSA* (p. 207).
 - 3. *ROSA*.
 - 2. Carpel 2, rarely 2, in usually fleshy.
 - 1. *ROSA* (p. 211).
 - IV. Leaves mostly compound, calyx bracteolate in bud.
 - 1. One carpel on bud within the calyx-tube.
 - 1. *ROSA*.
 - 2. Calyx 5-merous. *Panicum* = 4-5-lobed ovary, more or less adnate to calyx-tube, with 1 in fruit 5-lobed, and 5-merous.
 - 1. Ovary 5-lobed, 4 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 2. Ovary 5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 3. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 4. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 5. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 6. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 7. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 8. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 9. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 10. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 11. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 12. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 13. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 14. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 15. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 16. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 17. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
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 - 18. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
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 - 19. Ovary 2-5-lobed, 2 or more styles in each cell.
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 - 24. Ovary 2-5-lobed, 2 or more styles in each cell.
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 - 31. Ovary 2-5-lobed, 2 or more styles in each cell.
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 - 32. Ovary 2-5-lobed, 2 or more styles in each cell.
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 - 33. Ovary 2-5-lobed, 2 or more styles in each cell.
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 - 98. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 99. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.
 - 100. Ovary 2-5-lobed, 2 or more styles in each cell.
 - 1. *ROSA*.
 - 2. *ROSA*.

1. PARIARIUM, Desf. Fl. Ind. Ind. 618.

Shrub or tree, fl. and fr. entire, alternate. All glabrous or hairy, beneath slightly spinulose. In panicles or cymes, flowers 2 or 3 on a pedicel at the base of each fl. Calyx 5-lobed, tube 5-merous, generally hairy, lobes unequal, thick, often unequal. Stamens 5-20, mostly unilateral, filaments at a single point at base. Ovary soft 2-celled, hairy, rows of two primary locules of calyx-tube, one erect ovule in each cell. Species 20, tropical and semi-tropical.

A. Western species.

1. *P. indicum*, Beauv. In Fl. Ind. Gr. 1: 100; Fl. Sylr. 4: 491.

A small-sized tree. L. glabrous 5-9 x 2-3 lin., petiole $\frac{1}{2}$ in., venation pinnate. Panicles axillary and terminal. Fl. white, pedicels very short, calyx-tube $\frac{1}{2}$ in. long, a ring of minute teeth inside at the mouth, fertile stamens 12-14, style basal, longer than stamens.

Common in Malabar 2000-3000 ft. 2. *P. travancoricum*, Beauv. In Fl. Ind. Gr. 1: 100. Flowers in panicles in the Travancor hills. Flowers and calyx silky, lvs. with a few spinules along midrib beneath, 2-3 x 1-1 $\frac{1}{2}$ in.

B. Eastern species.

3. *P. andhraicum*, Beauv. Travancor or Andhra, Malabar Peninsula. Tree 100 ft. tall, lvs. glabrous, whitening beneath at the age of maturity on the upper surface. Fls. large, 2-3 in. diam. by pyramidal panicles. Filaments very slender, not twisted, 10-12 in. long, with pubescent hairs. 4. *P. bosianum*, Kuhn. Malabar Peninsula, especially in Travancor. Shrub 20-30 ft. tall, lvs. glabrous, whitening beneath, without glands (but with a few beneath). Fls. in lateral axillary panicles, 5-6 in. diam. at maturity, pedicels of calyx-tube tubular-campulatae, a ring of long 1-branched hairs inside at the mouth of calyx-tube, long with only pedicels found in the panicles. 5. *P. Heister*, Hook. f. in Journ. of Travancor, 1840, p. 103. Tree 20-30 ft. tall, lvs. glabrous, whitening beneath, 2-3 in. diam. at maturity, pedicels of calyx-tube tubular-campulatae, a ring of long 1-branched hairs inside at the mouth of calyx-tube, long with only pedicels found in the panicles.

6. *P. andhraicum*, Beauv. Travancor, Malabar Peninsula. Tree 100 ft. tall, lvs. glabrous, whitening beneath at the age of maturity on the upper surface. Fls. large, 2-3 in. diam. by pyramidal panicles. Filaments very slender, not twisted, 10-12 in. long, with pubescent hairs. 7. *P. andhraicum*, Beauv. Travancor, Malabar Peninsula. Tree 100 ft. tall, lvs. glabrous, whitening beneath at the age of maturity on the upper surface. Fls. large, 2-3 in. diam. by pyramidal panicles. Filaments very slender, not twisted, 10-12 in. long, with pubescent hairs.

2. PRUNUS, Linn. Fl. Syr. Ind. 6: 492.

Shrub or tree with alternate simple glandular-entire l. petioles with 2 glands. Calyx free deciduous, petals 5, stamens 10-40, inserted in the margin of calyx-tube, filaments free. Ovary 1, ovules 2 collateral, pendulous. Fr. fleshy, endocarp or nucleus cut or 2-valved, 1-seeded, smooth or ridged around.

A. Fl. whitish, fasciculate or umbellate, appearing before the leaves with or after the lvs. 2.

1. *P. Amygdalus*, Baillon. Beauv. Fl. Ind. Ind. 618. Syn. *Amygdalus* *officinalis*, Linn. The Almond-tree. Vern. *Baddam*.

A small-sized tree, l. greyish when full grown, oblong-lanceolate, serrate, petioles equal to or longer than the greatest width of leaf, stipules rudimentary. Fl. white, tinged with red, appearing before the leaves from axillary buds of the year's wood, pedicels much shorter than the campanulate calyx. Drupe 1-seeded, pericarp dry, when ripe separating into 2 valves, above compressed with 2 circular subminute holes.

Indigenous in Western Asia, also in the Kurram valley in the Afghans. It is a small tree in gregarious patches. Journ. Linn. Soc. 4: 111. Cultivated in Malabar, especially in the Travancor hills, and in Kadapa and the P. Fl. Ind. March. 2. *Amygdalus* *stolonum*, Beauv. Fl. Ind. Ind. 618. frequent in Malabar.

with the wood for the first time. The bark is very smooth, and the tree is very young. It is very common in the mountains of the Himalayas, and is very common in the mountains of the Himalayas, and is very common in the mountains of the Himalayas.

3. *P. brachyloba*, A. B. DC. *Fl. de l'Himalaya*, Himalaya, P. 11, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

4. *P. persica*, Benth. et Hook. f. *Brandis F. Fl.* 191. — *Syn. Dasypleura persica*, Linn. *The Flora* with variety and *Nectarina* with a small fruit. *Vern. Shurfa*, Baluch. *Kel. Bala*, Sathaj, *den*, Hind.

A middle-sized tree, foliage dark green, l. lanceolate, sharply serrate, petiole shorter than greatest width of leaf, stipules subulate, linear. Fl. white, pink, generally appearing below the leaves, mostly solitary, from last year's wood. Calyx compound, segments widely. Drupe globose or subglobose, pericarp tender and almost stone deeply and irregularly furrowed.

Cultivated probably in China, common, cultivated in Western Asia, India, and China. Also in Baluchistan, in the Himalayas, Sarawak to 10,000 ft., in the eastern Northern India, in Manipur and Upper Burma. Fl. ascending with various flowers January and May, the fruit ripening between May and October.

5. *P. armenisca*, Linn.; Brandis F. Fl. 191. *The Forest*, *Vern. Hing*, *Hama*, *Chilo*, *Chell*, *Sand*, N. W. Himalaya; *Jaldara*, *Zavata*, Hind.

A middle-sized tree, l. broadly ovate, serrate or broad serrate, acuminate, cuneate, petiole half the length of leaf, stipules lanceolate. Fl. pinkish white, solitary or fasciculate, from early buds on the previous year's wood, appearing before or with the leaves, peduncles short. Drupe globose or subglobose, pericarp tender and almost stone with a thickened calcareous margin.

Believed to be indigenous to the Caucasus, but now commonly cultivated in Western and Northern Asia and Europe, in Baluchistan to 5000 ft., in the N. W. Himalaya, in Western Tibet to 12000 ft. and in the plain of the Punjab. Fl. Jan-May in the mountains, and June and Sept.

6. *P. communis*, Boiss.; Brandis F. Fl. 191. *The Flora*, *Prair*, *N. W. Himalaya*, *Vern. Hela*, N. W. Himal.

A shrub or middle-sized tree, stem and young shoots pubescent, l. ovate or ovate-lanceolate, serrate, more or less pubescent beneath along the veins, petioles shorter than greatest breadth of leaf, stipules linear, subulate, below slender, over 4 times the length of calyx, solitary or fasciculate from a small often leaf-bearing base, calyx tube compound, Drupe globose or subglobose, pericarp fleshy.

Indigenous to Europe and Western Asia, where the different kinds have been cultivated from time immemorial. The plant is cultivated in Kashmir and in the Punjab. The form cultivated in Baluchistan, Afghanistan and the N. W. Himalaya, called the *Sathaj*, has been referred to *P. divaricata*, Ledebour, which may be regarded as a distinct species, or as a variety of *P. communis*.

7. *P. Puddam*, Roxb. *Kala*, F. Fl. 1. 434. — *Cereus Puddam*, Wall. Pl. Ind. *Var.* 145. *Vern. Hela*, *Prair*, *Padana*, Hind. *Panal*, *Bama*.

A middle-sized or large tree, high, sending off in horizontal stripes wood-pale branches. Nearly glabrous, l. glabrous ovate long-ovate, sharply serrate, above finely serrate, l. lanceolate, more conspicuous glands on petioles, stipules linear, broadly or palmately divided, the divisions linear, glandular, emarginate. Fl. white, pink or crimson, appearing below the leaves, in umbellate fascicles, solitary or fasciculate near the ends of branchlets, pedicels slender, as long as or longer than the fruit.



FIG. 11.—*Prunus Padus*, Koch.

calyx, white, glabrous, campanulate, lobes obtuse, shorter than half the tube, hairy and slightly hairy. Petals of China, which however has calyx and petals hairy. Not near as beautiful as *P. padus*.

B. Fl. solitary or umbellate, appearing after the leaves.

8. *P. Cerasus*, Linn.; Bravais F. Fl. 1183.—*The Cherry*.

A modicum-sized tree, the bark of this and of several allied species peeling in horizontal strips. Lvs. elliptic or obovate, abruptly acuminate, irregularly serrate-serrate, petioles less than breadth of leaf, 2 glands on petioles or on the lower blade stipules sinuate. Fl. white on long slender pedicels, in fascicles of 2-5 from lateral generally leaf-bearing buds. Calyx tubular, lobes obtuse. Drupes glabrous, with a pitted round stone.

This includes *P. avium*, Linn. the sweet cherry, indigenous to Western Asia, California, N.W. America, &c. These two are regarded as distinct species. *P. avium* indigenous to the mountains of the Himalayas, while *P. avium* has been introduced to the Himalayas.

P. macrocarpa, P. A. Meyer, Baluchistan, Western Asia. A shrub with a dense canopy of leaves, sharply serrate, 1-1.5 long, petioles shorter than blades, the petioles rather thick cylindrical, slightly wider at the base, trunks bushy, small, 1-1.5 long.

P. fruticosa, Hook. f. Baluchistan, Kutch, India, dry regions of India, N.W. Himalayas, a small shrub, 1-2 high, sharply serrate, black 1-2 pairs 1-1.5 in. Fl. solitary, pink, petals very short, calyx tube funnel-shaped. Fr. bright red. *P. fruticosa*, Labillard. Bravais F. Fl. 1183. Vern. Tulu, Palar, Lakshmi, Alghur, &c.

P. spinosa, Linn. A small, very shrubby, bushy tree, 1-2 high, leaves sharply serrate, glabrous above, usually densely clothed beneath with white or greyish hairs. Petioles short, without glands. Fl. red on short pedicels, in lateral buds solitary, in pairs. Calyx tube glabrous, slightly hairy, lobes short, ovate, hairy inside. Fr. 1-1.5 long, reddish-purple, pits sessile.

P. spinosa, Linn. A small tree, 1-2 high, leaves sharply serrate, glabrous except petioles and nerves beneath, which are hairy. Calyx tube cylindrical, 1-1.5 long, hairy, usually sessile, with 2-3 short pedicels, calyx tube cylindrical, 1-1.5 long, hairy, usually sessile, with 2-3 short pedicels, calyx tube cylindrical, 1-1.5 long, hairy, usually sessile, with 2-3 short pedicels.

C. Fl. in axillary or terminal many-flowered racemes, l. deciduous.

11. *P. Padus*, Linn.—Syn. *Cerasus carinata*, Wall. Royle III.

as well as petals 4-5. ... generally minute ...

A. Leaves simple, toothed

1. *R. ...* ... North West Himalaya ...

B. Leaves pinnate

1. *R. ...* ... N. W. Himalaya ...

R.

C. RUBUS, Linn. ; Fl. Brit. Ind. ii. 336

Trailing shrub, a few low undershrubs, as a rule prickly. Leaves alternate, simple or compound, stipules ...

A. Leaves entire, not deeply lobed, usually larger than broad

1. *R. acuminatus*, Sm. ; Gambel's List 55. Branches long, trailing cylindrical, glabrous, prickles very few, ...

Himalaya from Kashmir to ...

R. paniculatus, Smith ; Binard's F. Fl. 196. Vern. *Kala Jucha*, ...

... leaves densely clothed with stiff ...

Fl. large, 5-6 mm diam. long. Sepals long with thick pubescence on inner surface.

18. *R. macilentus*, Cass. : *Brasile F. Fl.* 1827.

A spreading shrub rarely 5-6 m tall, purple stems and petioles, dark stout, short, stiff, yellow and shining, no glandular hairs and bristles. Leaves pale-green, not shining, ovate-lanceolate. R. sometimes 1-2 dm. Petals white, slender or obovate, longer than calyx-segments. Fruit red or yellow, edible.

Himal. & Kashmir : 10000 ft. Fl. Apr.-May.

19. *R. ellipticus*, Smith. — Syn. *R. Gauraphol*, Beck. : *Wight Ic.* 390. *R. Gauraphol*, Hook. : *Brasile F. Fl.* 1827. Vern. *Gauraphol*, Haz. ; *Alho*, Punjab. *H. Gauraphol*, Himal. ; *Sabot*, Samsar, Upper Burma.

A large shrub with long trailing angular branches, which as well as petioles are clothed with a dense soft down and long soft brown bristles without glands; stout hooked prickles on branches, petioles and inflores. Leaflets 2-3 pairs only, not almost coriaceous, broadly elliptic or obovate, obtuse or shortly acuminate, densely clothed beneath with soft grey pubescence, stipules lanceolate. Panicles axillary and terminal, petals white, larger than calyx-segments, fr. yellow, edible.

Upper Himalaya, Hazara to Khasia 5000 ft. Khasi hills, Manipal, British Lower Burma above 2000 ft., Upper Burma down to 700 ft. Western China above 4000 ft. from Mahabeshwar on the Sikkim hills. 15 March May. 1891. Col. J. D. Hooker. 20. *R. maculatus* DC. : *Ann. Bot. Gard. Calcutta* 13, 1846. Densely woody climbing tree taller than 100 ft. on the hills of the Himalaya. Leaves glabrous except leaflets and midrib, nerves smooth or in dense terminal and axillary clusters.

21. *R. fruticosus*, Linn. the European Blackberry. *Agrostolites*, Hook. (Khasi). *Nelumbic*, Solms-Laubach. Europe, North and Western Asia. Leaves on stems beneath often 5-lobed, ovate elliptic, long 1-2 dm. Fl. pinkish or purple, 1-2 dm. diam. Fr. blackish. This is *R. fruticosus*, Wight in *Ann. Bot. Gard. Calcutta* 13, 1846. From Assam, Khasi hills, Manipal. Climbing very tall trees almost entirely glabrous beneath, rough and covered with glandular hairs. Leaflets 2-3 pairs only, ovate, 1-2 dm. diam. Fr. small, in clusters, sometimes calyx spotted nearly to the base, nerves glandular, many outside erect in fr.

22. *R. biflorus*, Buch. : *Brasile F. Fl.* 1827. *Collet*, *Singh Flora Vern. Himalaya*, *Haz.*, *Theog* and *Narkanda*.

Stems and branches covered with a thick white pubescence, branched petioles and peduncles armed with sharp shining prickles, subulate fr. about base, no glandular hairs or bristles. Leaflets often 2 pair, 2-3 pairs, tomentose beneath, elliptic or ovate-elliptic, acute deeply incised-venate, terminal often lobed, stipules lanceolate. Fl. white, 1-2 in diam. on pedicels more than twice the length of calyx, solitary or 2-6 together, yellow, globose 1/2 in diam.

N. W. Himalaya 4-10000 ft. Sikkim, Burma, Fl. Apr.-May.

L. Leaves imparipinnate, leaflets usually 2 pair or more.

23. *R. lasiocarpus*, Smith. : *Wight Ic.* 232. *Brasile F. Fl.* 1827. *Rhodaron*, Haz. ; *Kola Ancha*, Sikkim ; *Kola Himalia*, *Jain's Garip*.

A spreading shrub with long glabrous purple stems often overhanging at the extremities. Branches and petioles armed with stout prickles, no bristles or glandular hairs, branches often pubescent, white-tomentose beneath, 2-5 pair, ovate-lanceolate, with large central terminal leaflet often lobed. Fl. in lax short, grey-tomentose panicles pink, shorter than calyx-lobes. Urripe fr. white tomentose, when eaten.

Khasi hills : Himalaya, 2-8000 to 8000 ft. Khasi hills.

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... ..

27. *R. ...*
... ..
... ..

28. *R. roscifolius*, Smith, *Boiss. P. Fl. Ind. Yech. Yech.*, Kansas.
A prostrate shrub, glabrous or glandular-hairy, prickles on branches and
petioles. Leaves 1-2 pairs, entire on both surfaces, lanceolate, deeply serrate at
tip, 1-2 in. long. Petals 5, in lax panicles; petals white,
occupying the calyx. Fr. cylindrical, of imbricate minute orange-red drupe-
spheres.

Humboldt, *Kunze's Bot. Exped. 4*, 500 p. Khas hills, Mexico. Barro Colorado
Island, Fl. 3, 18-20. On a cultivated with local herbs.

Rosa
... ..
... ..

7. ROSA, Linn.; Fl. Brit. Ind. p. 389.

Leaf or stipule prickly, as a rule prickly. Leaves imbricate, stipules
more or less winged to petiole. Fl. in terminal corymbs or panicles, rarely
solitary. Calyx-tube persistent in fruit, mouth contracted, lacin divided into
5 rarely 4 leafy segments. Ovaries 2, rarely few, free, enclosed in the calyx-
tube, the styles protruding and in some species dilated. Fr. a pulp or dry
stone, black, hairy, and bearing numerous dry 1-celled very hairy carpels. Spines
of thorny nature, of the northern subspecies a few species have the

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... ..

1. *R. involucreta*, Boiss. *Wight Is. 1*, 234; Kurz F. Fl. 1, 49. - *Syn-*
onyma, *Ind. Bot.*, *Boiss. P. Fl. Ind.*

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R. macrophylla Lindl. - Bot. Beech. & B. 1117. Branches 4-12
feet long, often woody, but generally with many
young shoots, often woody, but generally with many

leaves, often woody, but generally with many
leaves, often woody, but generally with many
leaves, often woody, but generally with many
leaves, often woody, but generally with many

R. sericea Lindl. - Bot. Beech. & B. 1117. Branches 4-12
feet long, often woody, but generally with many
young shoots, often woody, but generally with many
leaves, often woody, but generally with many
leaves, often woody, but generally with many

R. muschata Mill. - Branches 4-12 feet long, often
woody, but generally with many young shoots,
often woody, but generally with many young
shoots, often woody, but generally with many

leaves, often woody, but generally with many
young shoots, often woody, but generally with many
young shoots, often woody, but generally with many

R. leucostachya (Lindl.) Hook. & G. - Bot. Beech. & B. 1117.
Branches 4-12 feet long, often woody, but generally
with many young shoots, often woody, but generally
with many young shoots, often woody, but generally

with many young shoots, often woody, but generally
with many young shoots, often woody, but generally
with many young shoots, often woody, but generally
with many young shoots, often woody, but generally

8. **DOCYNIA**, Descurt: Fl. Bor. Ind. ii. 349

Small or middle-sized deciduous trees. L. simple, stipules small. Fl. solitary or in few-fl. umbels. Calyx-tube clavate, petals 5, with long woolly hairs. Stems 5-celled, styles 4, connate and woolly below the middle, ovules 2 in each cell. Species 2.

1. *D. indica*, Des.—Syn. *Pyrus indica*, Wall. Pl. As. Bar. t. 173; Kurz & FL. i. 431.

Young shoots and underside of leaves densely white-woolly, laciniate-lanceolate, indistinctly toothed, blade 2-3, petiole 1-1½ in. long; on young shoots glabrous, larger and leaved often punctate. Fl. white, calyx densely white-woolly. Fr. yellow, seed, 1½-2 in. long, flattened by the persistent sarcocarpic edile.

Siwalik 2-4000 ft. British India hills Manipal. Hill of Upper Burma. Fl. Foe-Moo. — China. 2. *D. Hookeriana*, Des. Khasi hills, 1-2000 ft. long. N. Ceylon. Fr. flattened and edile.



FIG. 124.—*Docynia indica*, Des.

9. **CYDONIA**, Tourne: Fl. Brit. Ind. ii. 368

Deciduous shrubs or trees. L. simple, stipules large, oblique. Fl. solitary or in few-fl. umbels. Ovary 3-celled, styles 3, in the lower part connate and woolly, ovules numerous in each cell. Species 1, Mediterranean region and Asia.

1. *C. vulgaris*, Pers.—Syn. *Pyrus Cydonia*, Linn. Reardis F. Fl. 290. Large shrubs. Hill, Hind.

Leaves alternate, petioles and calyx white. L. ovate, serrate, petioles short, stipules large, glandular-terrate. Fl. white, 2 in. diam. Calyx-tube hairy, lobes longer than tube. Vr. large, lobed with grey woolly hairs and glandular cartilagenous. Seed, many, testa mucilaginous.

Introduced in Western Asia cultivated in N. W. India. Fl. March-April. Fruit, Hind. in Hook. J. Bot. ii. 237, 268. Khasi hills, cultivated in Khasi villages on account of its fruit. China. A shrub with more woody stems 2 in. long. Leaves glabrous when mature, petioles 2-4, narrowed into petiole 1 in. long. Petioles hairy, serrate. Ovary 3-celled and styles connate. Calyx-tube glabrous, lobes 5, lobes short, lobes short, lobes short, lobes short. Fr. 2 or nearly cylindrical, 2 in. long, all the seeds numerous.

10. **ERIOBOTRYA**, Lindl.: Fl. Brit. Ind. ii. 371

Large trees, leaves simple very coriaceous, usually serrate. Fl. white, in terminal mostly densely tomentose panicles, calyx-lobes small. Ovary 2-3-celled, adnate to calyx-tube, ovules 2 in each cell, styles 2. Fr. a dry or succulent berry, generally one-seeded, endocarp

... large ... tree ... Asia.

A. Styles 2 or 3

1. *E. bengalensis* Hook. f. Syn. *E. dybala* Kurz F. Fl. Brit. Ind. 3: 499
Patol, Burma.

A large evergreen tree, l. elliptic-lanceolate, coarsely serrate, quite glabrous,
 shining above, nec. n. 8-12 inch, black 4-8, petiole 1-1 1/2 in. Panicle axillary,
 sessile, fl. smelling of leather? in diam. petals oblique, emarginate,
 yellow, crown of ovary as well as lower part of styles very woolly. Fr.
 ellipsoid 1-2-seeded, 1 in. long.

Khasi hills, Manipur, Chittagong, Mergal, Upper Burma, Eastern F. I. 173
 Malac. Peninsular. 2. *E. casta* Donn, Nepal, Sikkim, 3-7000 ft. Terminal, black
 ... Leaves glabrous shining above, sharply serrate, black 2-3 per 1 in. long.
 3. *E. reticulata* Hook. f. Sikkim, 5000-6000 ft., Bhutan. Leaves glabrous, finely serrate,
 ... or coarsely serrate towards the apex, ... 4. *E. hookeriana* (Donn.)
 ... A ... tree, leaves ovate, sharply serrate, ...
 ... young, glabrous when full grown, ...
 ... large ... Petals ...
 ... yellow, ...
 ... shrub on river banks, ...
 ... small almost glabrous ...

B. Styles 5

1. *E. japonica*, Lindl.; Wight Ic. 1: 224. *The Laurel*.

A small-sized tree, leaves nearly sessile, oblanceolate, acuminate, venately
 ... as well as petiole, densely woolly beneath, ...
 ... Petioles ... with ...
 ... petals broadly ovate. Fr. woolly, intruded at the top ...
 ... seeds 2.

In Japan, in China and Japan, largely cultivated in northern India. Fl. Aug.
 ... 2. *E. elliptica* Lindl. Nepal, Manipur. L. perfectly glabrous when full grown,
 ... serrate coarsely serrate, black 5-11, petiole 1-3 in. long, ...
 ... tertiary nerves parallel.

11. PYRUS, Lam. f. Fl. Brit. Ind. ii. 572

Deciduous trees or shrubs. L. simple or pinnate, stipules ...
 ... in terminal corymbs, bracts subulate or linear,
 ... within and ... ovules 2 in
 ... cells lined with a cartilaginous or bony ...
 ... 1-2-seeded. Species ... temperate and cold regions of
 ...

A. Leaves simple, sometimes lobed. Ovary 2-5-celled, ...
 ... Calyx lobes persistent or deciduous.

1. *P. Malus*, Lam. f. Bravais F. Fl. 3: 56. *The Apple tree*,
 ... Himal.

Young ... and ... of leaves and ... clothed with
 ... L. ovate ... serrate, petiole ...
 ... length of leaf ... Fl. white, tinged with red. Style
 ... 3-5-celled. Fr. on a short pedicel large, globose, intruded
 ... by the persistent calyx lobes.

Khasi hills, Eastern and western Asia, supposed also to be ...
 ... Largely cultivated. Fl. March-May, fr. July Sept.

2. *P. baccata*, Linn.; Bravais F. Fl. 3: 56. *Vern. Patol, Bales*
 ... Himal.; *Botal*, Bash.

Trunk short, bearing a rounded crown of dark green foliage.

acuminate-ovate, petiole usually long, often half the length of leaf. Fr. white, or long slender pedicels in caxally umbelliform corymbs. Calyx tube apiculate, glabrous or slightly pubescent, limb spreading, lobes lanceolate, deciduous, equal to or longer than tube, white cottony inside. Petals with dark veins. Styles 3, usually free, woolly at base. Fr. small, red or scarlet, globose, sometimes pyriform, 1-1 1/2 in. diam., on pedicels 2 in. long.

N. W. Himalaya, Kashmir to Nepal 6-11,000 ft. Blawan and Kama Hills. Burma and Upper Burma. Fl. spring. Fr. autumn. Northern Asia. B. P. Sukhmantha, Hook. f., Sikhim, 10,000 ft. Blawan is believed to differ by a woody calyx, 1-tomentose beneath and pericarpia speckled to its base, probably not specifically distinct.

4. *P. communis*, Linn. Brandis F. Fl. 203. *The Pear tree*. Vern. *Nakipatti*, Hindi.

Usually glabrous, branchlets on young trees often spinose. L. broadly ovate, entire or obtusely serrate, petiole slender, nearly as long as leaf. Fl. white, styles 3, free. Fr. more or less turbinate, not intruded at base, crowned with the persistent calyx.

Indigenous in Eastern and Central Europe and in Western Asia. Largely cultivated in the N. W. Himalaya. Fl. March-April (at times in autumn). Fr. Aug-Oct.

5. *P. ashia*, Hain. & Collett Simla Flora 47.—Syn. *P. cordata*, Wall. Brandis F. Fl. 204. Vern. *Pitangi*, Hazara; *Kind*, Mehal, 119, N. W. Himal.

A small-sized tree, young shoots, peduncles and calyx clothed with whitish tomentum. Branchlets often spinose. Leaves ovate-lanceolate, from a rounded or slightly cordate base, acuminate, serrate, on copper shoots and young trees 1-ribbed or pinnatifid, petioles slender, half the length of leaf or longer. Petals obovate, with dark radiating veins. Fr. nearly globose, often rugose, 1-1 1/2 in. diam., crowded with the base of calyx, rough and scurfy with numerous elevated white round spots.

Afghanistan. Upper India. Himalaya, Hazara to Hunan, 2,000-8,000 ft. Kama Hills, Mehal, Upper Burma. Fl. February occasionally in autumn. Fr. entire till a small size, then it is half-ruptured. Closely allied, if specifically distinct, are *P. Khamon*, Decc. Himalaya, Kashmir to Khamon, leaves corymbose outside of calyx, tube glabrous, calyx 1-ribbed, rounded, woolly at the margin. L. P. Jacquemontiana, Decc. Punjab Himalaya, 1-20 leaves, corymbose lax tomentum, young in growth.

6. *P. lanata*, Desr.—Syn. *P. Aria*, Brandis F. Fl. 204. Vern. *Amol*, C. Valley; *Dala*, Hazara; *Mohi*, Banihara; *Banphallo*, Marghal, P. M. India. Vern. *Amol*.

Large shrub or large tree, young shoots, inflorescences and outside of fr. clothed with white woolly tomentum. Leaves ovate, petioles at length, 8-14 pairs each, terminating in a rib in a small or woolly serrate blade 1/2-1 in. long; full grown leaves glabrous, usually yellowish white beneath, rarely glabrous beneath. Fl. white and 1/2 in. across, in compound terminal corymbs, petals angustate, 1/2-1 in. long, entire, with a few scattered hairs, veined, styles 2-3, free, persistent, densely woolly. Fr. narrowed to the base, red, 1/2-1 in. either side of the persistent calyx-lobes.

Upper India. Himalaya, Hazara to Khamon, Sikhim, Rhododendron Forest, Nepal. Fl. March-May. Fr. Aug-Oct. B. P. vestita, Wall. Himalaya, 10,000 ft. Kama Hills, Yunnan, a large tree, fr. very woolly white-tomentose beneath, calyx tomentose, petals woolly within, styles 3-5, woolly at base, fr. united with slender *P. Aria* in Brandis F. Fl. N. W. & C. India.

Leaves simple, ovary 2-3-celled, styles 2-3, free or united, calyx-lobes hairy, young a raised ring at the top of the fruit.

Upper India. Deccan, Sikhim 6,000 ft. Blawan, Nagu hills, a tree, sometimes epiphytic, that resembles *P. vestita*, 1-densely grey-tomentose beneath when young, shining when full grown, petals glabrous, styles 2, distinct, glabrous.

11. *P. rostrata*, Hook. f. & Thoms. Bot. Beechey, Voy. Alaska 1846, p. 107. ... *P. rostrata*, Hook. f. & Thoms. Bot. Beechey, Voy. Alaska 1846, p. 107. ... *P. rostrata*, Hook. f. & Thoms. Bot. Beechey, Voy. Alaska 1846, p. 107.

13. *P. granulosa*, Bertol. : Kuhn F. Fl. 442.

A small-sized at times a large tree, entirely glabrous, all parts ... *P. granulosa*, Bertol. : Kuhn F. Fl. 442. A small-sized at times a large tree, entirely glabrous, all parts ...

Khasi and Naga hills, near streams. Higher hills of upper and lower Burma ... *P. granulosa*, Bertol. : Kuhn F. Fl. 442. Khasi and Naga hills, near streams. Higher hills of upper and lower Burma ...

14. *P. polyorta*, Hook. f. Khasi hills, perfectly glabrous, also ... *P. polyorta*, Hook. f. Khasi hills, perfectly glabrous, also ...

15. *P. rugulata*, Bertol. Khasi hills, Tenasserim ... *P. rugulata*, Bertol. Khasi hills, Tenasserim ...

16. *P. solitosa*, Wall. Pl. As. Ind. 1: 180. Syn. *P. urtica*, Wall. ... *P. solitosa*, Wall. Pl. As. Ind. 1: 180. Syn. *P. urtica*, Wall. ...

A large shrubby small tree, in Sikkim often epiphytic ... *P. solitosa*, Wall. Pl. As. Ind. 1: 180. A large shrubby small tree, in Sikkim often epiphytic ...

17. *P. microphylla*, Wall. Khasi hills, ... *P. microphylla*, Wall. Khasi hills, ...

18. *P. insignis*, Hook. f. Sikkim, ... *P. insignis*, Hook. f. Sikkim, ...

12. STRANVÆSIA, Lindl. & Fl. Brit. Ind. 6: 3

Species 3, China, Tibet and Himalaya.

1. *S. glaucescens*, Lindl. & Brandl. F. Fl. 210.

A small evergreen tree, leaves coriaceous, lanceolate, serrulate ... *S. glaucescens*, Lindl. & Brandl. F. Fl. 210. A small evergreen tree, leaves coriaceous, lanceolate, serrulate ...

leaves and ovules but the ovules are not in pairs. Fr. white, persistent, 2-3
 lobes in outer segments. Calyx white, lobes 5, segments short, erect, per-
 sistent. Ovary white, single locules of calyx-tube, 3-celled, cells 2-ovuled,
 styles 2, pubescent, minute, hairy etc. Fr. fleshy, including a 3-celled
 capsule, dehiscing loculicidally, the 118 segments remaining attached to the
 inner face of the calyx.

Outer range of the Himalaya in Garoal hills, Kumaon, 3-8000 ft. Nepal, Khasi
 hills, Khasi Mts. Garo hills and Shivalik hills, etc.; Burma, Fl. Apr. June. Yunnan
 leaves not yet described, leaves very dark and only a perfectly glabrous is known from
 Bogota, Cuba, M. A. D. C. and from Yunnan.

III. PHOTINIA, Hook. & Fl. Brit. Ind. ii. 380.

Evergreen shrubby or small tree, leaves coriaceous entire or serrulate, stipules
 subulate, deciduous. Fl. axillary, white. Calyx-lobes short persistent.
 Ovary more or less adnate to calyx-tube, 3, rarely 5-celled, ovules 2-trilobular
 in each cell, apex of ovary free, pubescent or woolly, styles short, free or
 united in the lower part. Fr. 1-2-celled, exocarpy coriaceous or mem-
 branous.

1. *P. Lindleyana*, Wight & Arn. : Wight. In. t. 228. Vern. *Kodai Bikkh*
Kan.

A small tree, as a rule quite glabrous. Leaves elliptic, acute at both ends,
 serrulate, rarely entire, blade 3-6, petiole 1-2 in. long. Fl. 1/2 in. diam., calyx
 tube hemispherical fr. turbinate.

2. *P. insignis* (Lam.) S. B. in the plateau. Fl. March-May.

3. *P. Notoniana*, Wight & Arn. : Wight. In. t. 220. Ill. t. 280. *Budd. Fl.*
Syst. v. 392 - Syn. Erubode in latyrisfolia, Kurz. Fl. Fl. i. 442. Vern. *Bikkh*
Kan.

A large tree, pubescence finely pubescent, otherwise glabrous. Leaves
 elliptic-oblong, rounded, quite entire, blade 4-9, petiole 1-2 in. long. Fl. 1/2 in.
 diam., fr. globose.

Nepal, Pahar and Annapurna hills, Travancore, Khasi and Khasi hills, Burma,
 Khasi hills of Tenasserim 7000 ft., Fl. May, Oct. Hill of Coy. 2500.

4. *P. integrifolia* Blume. Nepal, Shivalik, 7500 ft. Bantua, Khasi hills, Khasi
 hills, Upper Burma, Quing glabrous, lobes sessile, quite entire, blade 2-4,
 serrate, petiole 1-2 in. long. Fl. white, 1/2 in. diam. or globose. The 1/2 in. diam.
 1-2. *P. mollis* Hook. f. Sikkim, Nepal, Bantua hills, petioles and young leafy
 branches white, serrulate, which ditto. Leaves, etc. in 2-10 pair, spreading, slender,
 leaf-veins none, blade 2-4, petiole 1-2 in. Fl. white, ovules serrulate, parts linear,
 styles 2, free, deciduous. Calyx tube campanulate, with triangular, persistent
 lobes 2 or 3 free or 1-2 below. 5. *P. Griffithii* Deane, Fl. Brit. Ind. ii. 381. 1-2 in. diam.
 and 1/2 in. long. Leaves 2-4, petiole 1-2 in. long.

IV. POURTHILÆA, Decc. : Fl. Bot. Ind. ii. 382.

Leaves white, stipules minute. Ovary 2-3-celled, nearly free, base adnate to
 calyx-tube often on one side only. Fr. small, globose, 1-2-celled, endocarp
 thickly coriaceous with irregular finely reticulate grooves.

1. *P. anemifolia* Decc. Khasi hills, Shivalik, Haskings valley, Upper Burma. An
 evergreen shrubby tree, youngest shoots woolly. L. elliptic-lanceolate, sharply serrate, glabrous
 above, beneath prominent beneath, blade 2-5 in., petiole 1/2 in.

2. *P. salicifolia* Decc. A variable sp., one of the 6 forms described by Hooker
 and Decc. 1847. *P. salicifolia* Decc. Khasi hills, Upper Burma, Khasi
 hills, Sikkim, Nepal, Feb. 1847. A deciduous shrubby tree, branches white, woolly,
 beneath, blade 4-8, petiole 1/2 in. long. Fl. cream white in many
 specimens, 1/2 in. long, dark hairy. Styles 2-3, free, glabrous. The specimens from
 the hills have petals.

Ed. cymes at the ends of short leaf-bearing branchlets. Fr. numerous, dark purple-black, or slender pedicels, in large spreading bunches.

Khasia valley, N.W. Himalaya, India: c. 5000-6000 ft., extending into the base of valley, salt range 1800-2000 ft. Fl. May-June. *C. rosea*, Ledeb. *Tib. Geobot.* 4: 5000 ft. Bajaur, Jammu, Paternalia. Chitral valley, Hindustan, slender, drooping, leaves less hairy, fl. pink, smaller than *C. rosea*, calyx hairy glabrous except woody margin, odd to its base than *C. C. frigida*, Wall. Khasia in Blanford 7-8000 ft., *C. obtusolobata* Ledeb. 8-5 in. long, cymes and calyx woody, fr. scarlet.

B. Leaves generally deciduous, cymes with few flowers.

C. acuminata, Ledeb. : Brandis F. Fl. 261. Vern. *Deo vish*, Bogi; *Zam vish*, Kibarkanta.

A shrubby, woody and young l. pubescent with soft silky hairs, stipules subulate, ciliate, l. ovate-lanceolate, 1-2 in. long. Fl. white or pink, $\frac{1}{2}$ in. diam., in small 2-4-fld. cymes at the ends of short leaf-bearing branchlets. Fr. red, turbinate or oblong, $\frac{1}{2}$ in. long.

Himalaya, 1500-4200 ft. c. 5000 ft. underwood in Oak forests. Fl. May-July. *C. vulgaris* Ledeb. Kashmir, west of Hindu valley, Garawal (D. R. 1873). Western Tibet and West. Himalaya, Europe, Western Asia, Siberia, 1-2 in. long, l. broadly-oblong, ovate, with grey tomentose beneath, cymes 2-4-fld. bent down, hairy glabrous, as well as calyx. *C. nannularia*, Fisch. & Meyer, Pamiristan (Siberia, Shergol, Kashan) and Western Tibet, Afghanistan, Western Asia. L. 2-4 in. long, ovate or elliptic, white-silky beneath, cymes 2-4-fld. *C. emendata*, Hort. Khasia hills, l. 1-2 in. long, shortly acuminate, cymes 2-4-fld. *C. thymifolia*, Hort. Kashmir, l. 1-2 in. long, turbinate, scarlet. *C. rotundifolia*, Wall. Garawal, Kashmir, Sik-
... a low rigid dark-bark branching shrub, 1-3 in. tall, subscabrous, glabrous, fr. turbinate, scarlet.



Fig. 12. *Cotoneaster acuminata*, Ledeb. f.

C. Leaves generally evergreen, fl. solitary or in pairs.

C. microphylla, Wall. : Brandis F. Fl. 261.

A rigid, intricately branched, usually prostrate shrub, leaves $\frac{1}{2}$ - $\frac{1}{4}$ in. long, ovate or ovate-lanceolate, glossy above, pubescent beneath, margins recurved, fl. white, generally solitary, or two or three together, $\frac{1}{2}$ in. diam., fr. globose, scarlet.

Himalaya, 4000 ft., Kashmir to Hindustan. Fl. May-June. Closely allied and probably not essentially distinct to *C. thymifolia*, Hort. L. smaller than *C. vulgaris*, fl. rounded or rotund, glossy above, pubescent or tomentose beneath, fl. solitary, $\frac{1}{2}$ in. diam. *C. barmilla*, Wall. : Wright l. c. 952, Nilgiri, Palai hills, a scandent rigid shrub, small tree, forming large dense masses of stiff branches, l. $\frac{1}{2}$ - $\frac{1}{4}$ in. long, ovate or elliptic, densely tomentose beneath, margins recurved, cymes (as well as calyx) pubescent, 2-4-fld., fr. globose, scarlet.

Osteomeles anthyllifolia, Ledeb. : Suva hills upper Burma, 4000 ft. *C. microphylla* in Khasia, Pacific Islands. A shrub, branchlets, petioles and pubescence silky, cymes with in spring from the profusion of small white fl. l. impariflorate, leaflets 10-15 pale, oblong-ovate, quite entire, mucronate, grey-silky beneath, $\frac{1}{2}$ - $\frac{1}{4}$ in. long, woody inflexed, one ovule in each cell. Fr. $\frac{1}{2}$ in. diam. crowned with the triangular broadly, sessile, 5-lobed, enclosing 5 distinct long pyrenes.

and into petiole 3-4 in. Leaves glaucous, soft-limbed, veined, or terminal, rather petioles, petals 5 or 6, thick, valvate. Ovary 1-lobed, styles 2 or 3, 4-5 pericarpal placental. Berries bright dark blue.

Himalaya, Nepal, to Bhutan 4,000 ft. Khasi hills, Siam, hills, Upper Burma, China, Mountains of the Malay Peninsula and Andamans. F. R. S.

3. POLYOSMA, Blume, Fl. Brit. Ind. iii. 408.

Species 8, from the Khasi hills through the Indo-Malayan region to Australia.

P. integrifolia, Blume—Syn. *P. Wallichii*, Benn. & Kurz F. Fl. i. 444.

A middle-sized evergreen tree, the youngest shoots tawny-pubescent, leaves



FIG. 127.—*Polyosma integrifolia*, Blume.

opposite, oblong-ovate, 7-15 line or distantly serrated, blade 4-8, petiole 1-1 in. Fl. greenish-white, tetramerous, in terminal pubescent racemes. Bracts pubescent, cylindrical, 1-2 in. long, petals valvate, disc coloring, stamens 4, anthers linear, basifixed, filaments thick, hairy. Ovary 1-lobed, 1-celled, ovules 2, in two rows attached to the pericarpal placenta, which protrude into the cell. Pericarp oval, 1-celled berry, elongated, narrowed by the persistent calyx-tube, subglobose, at first green, then fleshy albumen.

Khasi hills, Assam, Malacca Peninsula, F. R. S.

4. ITEA, Lindl. Fl. Brit. Ind. ii. 497.

Shrub or tree, alternate, glabrous, destitute stipules. Fl. pentamerous, small, white or pale, in terminal and axillary racemes. Calyx-tube short, adnate to base of ovary, valve valvate. Ovary nearly free, 2-celled, lobes 2, in 2 rows along the middle

of the dissepiment (on the edges of the inflated pericarp). Capsule nearly free, base only adnate to the persistent calyx, septicellally 2-valved, each valve tearing one-half of the styles, the stigmas often coloring.

1. *I. macrophylla*, Wall. Vultures of Siam, ascending to 2,000 ft. Himalaya, Khasi hills. A middle-sized tree, 1-2 in. diam. at base, branches 4-6, petioles 1-2 in., petals reflexed on the pedicel beneath at anthesis. Capsule with 8 or 10 long, calyx-tube turbinate in fr. 2. *I. chinensis*, Hook. & Arn. Khasi and Nepal hills, China, Formosa. A shrub or small tree, 1-2 in. diam. at base, branches 4-6, petioles 1-2 in. long. Petals erect, persistent. Capsule 4 in. long, almost entirely free.

yellow, leaves sessile or long petioled, upper 3-5-veined, lower 2-4-veined, ovate or elliptical, base cuneate, apex acuminate, margins serrate, pubescent or glabrous beneath, racemes axillary, 5-6 in. long, erect, flowers 4-5 in. long, 2-3 in. diam., long as they are wide.

ORDER XLVIII. HAMAMELIDACEÆ. Gen. Pl. v. 604.

(*Hamamelidaceæ*.)

Trees or shrubs, l. alternate, stipules usually deciduous, hairs mostly lanate into or stellate. Fl. in cymose heads or spikes, usually bracteate. Calyx tube none or less; lobes in vary. petals 4-5, occasionally none. Ovary 2-celled, styles 2, usually persistent, ultimately divaricate. Capsule usually longitudinally dehiscent, often also imperfectly dehiscent scutelliformly. Seeds 1 in each cell, or numerous, in which case the lowest only is fertile. Testa oblique, embryo straight, cotyledons flat, albumen usually thin. No species in the Western Peninsula.

In 1861 Griseb. discovered that the Indian Genera of this Order are distinguished by beaked pits on the walls of wood-tissue, resembling the beak-like pits of *Quercus* (Ann. Bot. Soc. Lond. 1861, p. 592), and this is now regarded as an important character of *Hamamelidaceæ*. The wood-tissue has thick walls and a small lumen. The secondary rays are narrow, 1 or 2 cells wide, the rays small, and the wood-pores small and not perforated.

A. Ovary solitary in each cell.

Petalis 0.

Leaves deciduous, serrate, n. lateral in lower

parts of stem.

Leaves persistent, entire, fl. polygamous or unisexual.

Ovary erect.

Ovary half-inclined.

Doubtful.

Leaves deciduous, serrate.

Leaves persistent, entire.

1. *PARROTIA*, DC.

Fl. Ind. v. 604.

Strobil. v. 203.

2. *Hamamelis*.

Linneæus, v. 179.

B. Ovary several in each cell.

Leaves entire, sometimes 3-veined at the apex.

Stipules large, persistent.

Leaves serrate, stipules usually deciduous.

3. *Beccaria*.

4. *Alnus*.



FIG. 128.

Parrotia Jacquemontiana, DC.

1. *PARROTIA*, C. A. Meyer, Fl. Becc. Ind. ii. 129.

(Species 2, one on the south coast of the Caspian Sea.)

P. Jacquemontiana, DC. in Brandis, F. Fl. t. 28. Vern. *Killar* (Chamber, Sib. Kar).

A large gregarious deciduous shrub or small tree, stellate hairs on bractlets, petioles, stipules, calyx and the underside of leaves. L. orbicular or obovate, obtuse, serrate, the lowest pair of sec. n. directed from fl. base, stipules deciduous, oblong, as long as petioles or less. Fl. lateral, greenish-yellow, sessile, about 30 in. in round head, which is supported by a large round membranous bract, white or pale yellow. Calyx campanulate, adnate to base of ovary, limb thick, deeply 5-lobed, or with a few linear lobes, petals 4

stamens usually 13-15. Capsule 3-4 long, woody, and dehiscent, opening through the middle, calyculate. 2-angled, the ribs separating when ripe, each rib with 1 or 2 seeds in a 4-ribbed endocarp, which opens at the top by two teeth to calyx. Embryo oblique in equidistant albumen.

Known in the Himalayas, used for the making of which the seeds of *Hamamelis* and *Hamamelis* 2, 500, 500 ft. Fl. March-May, the leaves turn yellow in autumn. The 1877 are used for medicine and timber work, they are the best material for making the best bridge across the river of the Punjab Himalaya.

Hamamelis indica, Benth. *Khasi hills*. A small tree 1-2 m. tall, 10-15 cm. diam. at base, leaves 2-4 in. long, ovate, apex obtuse, glabrous. Fl. numerous, in small axillary heads 2-3 in. in the same head ovary large half inferior to other half, mostly covered by calyx. Capsule nearly globose, 3-4 in. diam. stipitate, 2-angled.

Hamamelis Griffithiana, Oliv. in *Trans. Indol. Soc.* vol. 1, p. 2. *Khasi hills*. Leaves ovate, 2-4 in. long, apex obtuse, glabrous. Fl. numerous, in small axillary heads 2-3 in. in the same head ovary large half inferior to other half, mostly covered by calyx. Capsule nearly globose, 3-4 in. diam. stipitate, 2-angled.

3. CORYLOPSIS, Griseb. & Zucc. Fl. Brit. Ind. II. 427.

(Species 4-6, all except the following in China and Japan.)

C. himalayana, Griseb. in *Journ. As. Soc. Ind.* 64, 1: 1. Fl. As. 1, 433.

A tree slender small tree, branchlets, petioles and under side of leaves softly stellate tomentose. L. ovate-ovate, apex nearly orbicular, serrate, base more or less cordate, ven. p. oblique, nearly straight, parallel the outer branching on the outside, stipitate base, apex, almost glabrous, deciduous. Fl. terminal, peduncles, yellow, 5-6 in. in length, densely silky, calyx-like spike-shaped fl. in the axils of large ovate leaves. Calyx tube white to ovary, petals 4-5, white, 5-6 in. with a number of small, white, stamens, ovary half inferior, capsule, 3-4 in. diam.



Khasi hills. 2000 ft. *Khasi hills*. *Munipia*. Fl. 1877-1878.

Laropetalum chinense, Oliver. *Ann. Bot. Soc. Lond.* 1880, p. 100. *China*. A tree 10-15 m. tall, 10-15 cm. diam. at base, leaves 2-4 in. long, ovate, apex obtuse, glabrous. Fl. terminal, white, 5-6 in. in length, densely silky, calyx-like spike-shaped fl. in the axils of large ovate leaves. Calyx tube white to ovary, petals 4-5, white, 5-6 in. with a number of small, white, stamens, ovary half inferior, capsule, 3-4 in. diam.

3. BUCKLANDIA, Rob. Brown; Fl. Brit. Ind. II. 429.

B. populnea, R. Br. (the only species); Kurz, F. Fl. I. 446. Vern. *Pijil*, *Da-jeling*. A tall tree, leaves thickly coriaceous, glabrous, rarely pubescent beneath along nerves, broadly ovate, nearly orbicular, apex acuminate, sometimes with a cuspidate apex, basal nerves 5-7, blade 3-9, petiole 1-3 in. long. Stipules

large, enveloping the lobes, which, sometimes, deciduous. The pedicels bear an peduncled heads of 8-20 many or less cinnate by their calyxes. Calyx 5-lobed, adnate to ovary, limb 5-lobed. Petals in the bis and 11, variable in number, linear-spathulate, in the female ♀ preliminary. Stamens 10-14. Filaments long. Ovary 1-4 inferior, styles 4 in each cell, in 2 rows. Capsule sub-glabrous, the lowest seed winged and fertile, the upper seeds sterile.

Stems 2-300 ft. Blotch: Assam, Khasi hills, Manipal, Hills of Muzumbar, 24 small woody (Gambel) but in Malay Peninsula, Sumatra, Java.

1. *ALTINGIA*, Noronha: FL. Belt. Ind. ii. 429.

(Species 2, one in China.)

A. excelsa, Noronha: Kura F. Pl. i. 446. Vers. *Jatili*, Awa.

A very tall aromatic deciduous tree, trunk often 100 ft. to the first branch and larch, brown, aromatic. Almost entirely glabrous, the terminal buds woolly tomentose, silky with minute sharp hairs. Leaves lanceolate serrate, pinnately veined, blade 3-5, petiole slender 1 in. long. Pl. peduncled, in dense heads, 2 heads cylindrical, supported by large silky bracts arranged in short spikes or racemes, each head consisting of a fleshy axis having numerous closely packed short sessile anthers, 2 heads peduncled, solitary, axillary, calyxes confluent, petals 4. Fruit heads rough, glabrous, woody, 1 in. diam., capsules velvety with simple hairs, almost immersed in the confluent calyxes. Seeds numerous, all but one sterile. Fertile seed at the bottom of capsule surrounded by a membranous wing.

Assam, Buitan, Khasi hills, Upper Burma, Tenasserim, grigations along the banks of rivers in Malaya, Fl. B. S. Pa. I. Ma-Mey, Yunnan, Java. This like the closely allied *Liquidambar orientalis*, Mill. of Asia Minor, yields a resin (Storax) contained in canals which accompany the vascular bundles in the leaf ramifications of the leaf-nerves, and which in the stem run along the circumference of the pith, and are particularly in the oldest wood (pyreneous).

ORDER XLIX. RHIZOPHORACEÆ. Gen. Pl. i. 677.

(*Rhizophora*.)

(Schimper in Engelm. & Prantl Bl. 7. 42.)

Trees and shrubs, generally glabrous, leaves opposite, usually entire and entire, scars of petioles in most genera permanent on branchlets. Stipules interspersed deciduous. Fl. regular, generally bisexual. Calyx more or less adnate to ovary, rarely free, limb 4-14-lobed, lobes calvate, axils tube coriaceous and persistent, petals as many as sepals often 2-nd or laminated, stamens usually twice the number of petals. Ovary 2-6 (rarely 1-) celled, styles usually 2-4, each cell, pendulous from the apex. Style one. Fr. coriaceous, usually 1-celled 1-seeded.

The typical species of this, together with trees and shrubs of other orders, form the Mangrove forests, which have a strikingly peculiar character. In the parts in which they grow, these species are firmly anchored by means of woody spreading and much branching roots, and in many cases by aerial roots descending from the branches. Thus they are protected against being uprooted by storms and by waves during high water. The leaves have a very thick cuticle and other arrangements for diminishing transpiration, and they are full of water-storing tissue. The structure resembles that of plants growing in deserts and in very dry localities, and the probable explanation is, that transpiration is checked, in order to prevent a rapid escape of the sea-water salts in the sap which fills their tissues. Mangrove trees and shrubs have other peculiar features, such as knees and other structures growing upwards from the roots, believed to facilitate the access of air to the roots, which are immersed in mud and water; as well as the fact that their seeds often germinate on the tree, making considerable growth before they fall into the mud of the tidal swamp.

Leaves elliptic or ovate, by the narrowed petiole, blade 1-7, petiole 1-1½, ovary 3-5-lobed, from the axils of this year's leaves, peduncles 1-1½, lobes pedicels short thick, calyx segments 5 in. Fr. 1½-2 in. long, dark brown, embryo often attaining 50 in. before falling from the tree.

This species is found in the Western Peninsula, the Sindhian and Burmah. F. H. S. (l. S.) Dark red in colour. See also in the tropical of the Old World and Am. Ind. 2. K. *marginata*, Lam. *Fl. Cochinch. Ind.* Trunc. *Randallia*, (l. S. D. 151.) Generally associated with *L. Loricata*, leaves ovate or elliptic, usually 2-6, petiole 1-1½, blade 1-2, ovary 3-5-lobed.

2. CERIOPS, Arnott, Fl. Brit. Ind. ii. 424.

Simple stem, 1-2 virgates on small trees, sending down aerial roots from the branches. Fl. in compact axillary cymes, calyx deeply divided into 5 segments, petals 5, emarginate, stam. 10 inserted between the base of an annular disk, ovary 3-lobed, 3-celled, 2 ovules in each cell. Fr. as in *Rhizophora*, but the radicle of the germinating embryo ribbed. Species 2.

1. *C. Canaliculata*, Arn. & Wight in Linn. Bot. Manual t. 13. (l. S. 151.) *Sp. Pl. Gen. Syst. Götting. Sindh.* This species is found in the Western Peninsula, Burmah and the Andamans. See coast of tropical Asia, Africa and Australia. It occurs about 5-6 in. tall, branching pedicels short, bark with Robert's short appendages, the segments much longer than anthers. Bark and fruit used in tanning. 2. *C. Kamburghana*, Arn. *Herb. Sindh. Kamburghana*, (l. S. 151.) *Sp. Pl. Gen. Syst. Götting. Sindh.* This species is found in the Western Peninsula, Burmah and the Andamans. It occurs about 5-6 in. tall, branching pedicels short, bark with Robert's short appendages, the segments much longer than anthers.

3. KANDELIA, Wight, Ann. Fl. Brit. Ind. i. 437.



Fig. 110.—*Kandelia Rheedii*, W. & A. l. 1.

K. Rheedii, W. & A. the only species: Wight *Ann. Fl. Brit. Ind.* Manual t. 13. *Vern. Götting. Sindh.*

A simple stem, 1-2 virgates along blade 3-5, narrowed into petiole 1-1½ in. long. Fl. axillary, in dichotomously branched cymes, peduncle 1-2 in. Calyx surmounted at the base of heart-shaped connate into a cupule 5 or 6 linear, 1½ in. long. Petals 5, the lobes divided into narrow, cordiform segments. Stamens 10, anthers small, filaments slender. Ovary half-inferior, prolonged beyond the calyx into a fleshy cone, 3-celled, ovules 6, style slender, stigma 3-lobed. Fr. 1-1½ in. long, set at the base by the reflexed calyx lobes.

This species is found in the Western Peninsula, Burmah, Sindhian and Burmah. F. H. S. (l. S.) Dark red in colour. Götting. Burmah, Penang.

4. BRUGUIERA, Lam., Fl. Brit. Ind. ii. 467.

Trees, base of trunk supported by short aerial roots, leaves from the lower roots abundant. Calyx tube produced considerably beyond the inferior lobes 8-14, petals 2-5 or emarginate, stamens 16-28. Ovary 2-4-celled, 2 ovules in each cell. Fr. fleshy; seed one, germination as in *Rhizophora*. Species 1 or 6 from East Africa to Australia.

A. Fl. large, solitary.

... green, glabrous, ... (Scribn. & G. Don, Proc. Linn. Soc. London, vol. 1, p. 102, 1825). Fl. ... in axillary short-petioled cymes.

... (Nuttall, Journ. Acad. Nat. Sci. Philad., vol. 1, p. 102, 1825). ... (C. W. Wright, Journ. Acad. Nat. Sci. Philad., vol. 1, p. 102, 1825). ... (L. D. Don, Journ. Acad. Nat. Sci. Philad., vol. 1, p. 102, 1825).

Cynodochus axillaris, Hook. & Grev. Journ. Bot. Soc. London, vol. 1, p. 102, 1825. ... (Hook. & Grev. Journ. Bot. Soc. London, vol. 1, p. 102, 1825).

Withera mylaniæ, Nutt. Journ. Acad. Nat. Sci. Philad., vol. 1, p. 102, 1825. ... (Nuttall, Journ. Acad. Nat. Sci. Philad., vol. 1, p. 102, 1825).

Hesperanthea corymbosa, Wall. Bot. Beechey, vol. 1, p. 102, 1825. ... (Wallace, Bot. Beechey, vol. 1, p. 102, 1825).

ORDER I. 10MBRETACE-E Gen. Pl. 1. 685.

(Branchia in Engelm. & Prantl in. 7. 1831)

Types or shrubs, leaves simple, entire, without stipules. Fl. ... usually sessile, ... Calyx tube ... Petals ... Stamens ... Ovary ... Fr. ... Embryo ...

... as well as in the allied *Dolera*, *Alsea*, ... (Engelm. & Prantl in. 7. 1831).

Compositaceæ ... (Engelm. & Prantl in. 7. 1831).

10. Fr. dry, angles 8, regular, wings 1-1.5 equal.

10. *T. dialata* Steudel: Kurz E. Fl. Ind. 1: 166. Varn. 1856, Berlin.
 A large tree, half-stems crowded at the ends of long, lvs perfectly glabrous,
 oblanceolate, blade 1-2, petiole 3-4 in. long. Spinescence, axillary, pale
 tant, as long as leaves, bracts ex-lanceolate, not longer than the heads, upper 1-2
 lobed, the upper 1-2, the lower 1, ovary and calyx densely pubescent.
 Wings broad, serrate and softly pubescent, lobes with the wings 3-4 in. broad.

Yameroon, Andaman. Fl. H. S. 1857. *T. pyramidalis* Kurz: Bot. Beech. and
 Yameroon. Obovate, slender, 10-12 in. long, petals, very slender, styles with
 smaller fruit, which with
 the wings, is 3-4 in. broad,
 the seed portion being broad
 on one side. Morphological
 study in the forest, to be
 studied usually by the forest
 officers.



C. Fr. dry, angles 8, regular, wings 1-1.5 equal.

12. *T. tomentosa*, W.
 at Arca, Wright & Art.
 Bull. Fl. Syd. 1: 17.
 Brachy 8, Fl. 22, 1856.
 Terminalia, Hutch; Kurz
 E. Fl. 188. Terminalia
 W. at Arca, Varn. Syd.
 Arca, Syd. Hutch & Art.
 Hutch, Grammat. 1856.
 Man. Hort. Ind. 1: 17.
 Kurz, Bot. Beech. 1857.
 Nolle, Ind. Tel. Kurz
 Yameroon, Tam; Terminalia
 Bern.

A large tree, trunk
 regularly shaped, bark
 rough, black, deeply
 cracked, heartwood
 dark purplish brown,
 radial with darker streaks,
 often nearly black.
 Branchlets, indumentum
 not young, clothed with
 short, rusty-brown puber-
 cules. Leaves dark, cor-
 iaceous, elliptic or ovate,
 5-10 in. long, 3-4 in. wide,
 blade 3-9, petiole 1-2 in.
 long, nearly opposite, the

FIG. 12. Terminalia macrocarpa, Wright & Art.

very moist often alternate, 1-2 glands near base of midrib, on the side when full
 grown. As a rule soft tomentose, rarely glabrous, ser. n. 10-21 pairs. Fl.
 in axils dull yellow, in erect terminal panicles, the lower branches to the
 axils of leaves. Calyx lobes a shallow cup, hairy within, segments 5-6
 ovate, acute. Fr. 1-2 in. long with a coriaceous bract, wings 1-1 in. broad
 and marked with numerous horizontal lines running from the base of the
 lobes, which are thin and irregularly crenate.

13. *Terminalia* tract from the West Indies, in places ascending to 1000 ft.
 common throughout India (except in the arid region) and Burma. Bract
 dark, dry, oil. Fl. H. S., R. S. (1857) from Felt, April of the ensuing year. Seeds

A large umbel or elliptic or ovate-lanceolate, and rarely often slightly hairy blade 4-8, petiole 1/2 in. long, n. 10-15 pair. Fl. yellow, in slender axillary racemes often forming leafy panicles at the ends of branches, free part of corolla campanulate, petals small, narrow, stamens long exserted. Fr. 1-2 line long, narrowly elliptic, with four thick rounded ridges.

Assam, Khasi hills, Pegu, Tenasserim. Fl. B.S. Ceylon low country, rare. B.C. tetragonocarpum, Kurz, Pegu, imperfectly known.

C. Fr. tetrameron, fr. with 4 papery wings.

10. *C. sagrocarpum*, Herb. Calc. Syn. *C. Wallichii*, Kurz, P. Fl. 1, 465.

A large scandent shrub, young shoots and inflorescence densely clothed with rusty pettate scales, l. broad-elliptic with numerous minute crimson dots on both sides, chiefly beneath, pubescent along the nerves, blade 5-9, petiole about 1/2 in. long. Spikes axillary and in terminal panicles, bracts linear, persistent. Petals white, spatulate, exceeding the triangular calyx-segments. Fr. 1-1 1/2 in. long and equally broad, red or red-brown, surface of seed portion densely covered between the wings with lanceolate-linear scales.

Sikkim, ascending to 5000 ft. Assam, Khasi and Naga hills, Manipal, Chittagong, Upper Burma. Fl. May, June. Closely allied to *C. Wallichii*, DC. Nepal, 8-12,000 ft. common, ascending to 3000 ft. A straggling shrub differs from 9 by smaller and thinner leaves with tufts of yellow hair in the axils of the stem, on the underside, minute fringed bracts and small petals.

11. *C. dasystachyum*, Kurz, P. Fl. 1, 464. Vern. *Semakera* etc., Burm.

A woody climber, deciduous, Smalcs, branchlets, petioles, underside of younger leaves chiefly along nerves, and inflorescence pubescent. l. minute-linear, lanceolate from a narrowly cordate base, n. 8-10 pair, arching, blade 3-6, petiole 1/2-1 in. Fl. in axillary sometimes compound spikes, free portion of calyx funnel-shaped, claw of petals nearly as long as the obovate blade. Fr. shining, 1 1/2 by 1 1/2.

Assam, Khasi hills, Cachar, Chittagong, Burma, Lower and Upper. Fl. B.S. Fr. C. S. Closely allied are 12. *C. chinensis*, Roxb. Assam, Khasi hills, Chittagong, Assam, Eastern slope of the Naga Yomas, Hills and of Dzungou, 2000 ft. Merzua, Malay Peninsula. A large woody climber (evergreen, Kurz), glabrous, shortly coriaceous, frequently in whorls of three, elliptic or obovate with the young shoots and inflorescence spatulate, with minute scales and nodules, l. 1-1 1/2 in. long, nearly as broad as long, wings reverse at both ends. 13. *C. equanum*, Bux. Sikkim, Terai on the banks of streams. Bhutan, Assam, Khasi hills, Chit. & Pegu, Tenasserim, Andamans, Malay Peninsula. A large climber, branchlets, leaves and inflorescence covered with round pettate scales with pale edges, l. thin, coriaceous, from a rounded base, broadly elliptic abruptly acuminate, blade 3-5, petiole 1/2-1 in. long, fr. 1-1 1/2 in. long and equally broad. 14. *C. quadrangulare*, Kurz, Tenasserim, Malak. with circular scales, branchlets sharply quadrangular, l. obovate-lance or broadly ovate, finely serrate, or into the short petiole, n. small.

15. *C. ovalifolium*, Roxb., Triumf. Handb. Ceylon B. 103. Vern. *Dhamroda*, Jaipur.

A large straggling or climbing almost entirely glabrous shrub, branchlets stiff, divaricate, nearly at right angles to stem or branches, l. opposite from stem are large elliptic, acuminate, blade 3-5, petiole 3/4 in. long. Fl. white, in axillary and terminal paniced spike 4, with a few broadly ovate, coloured floral leaves (bracts) at the base of ramifications, fl. outside with minute hairs and thin pettate scales, bracts minute. Fr. 1/2 in. long, nearly glabrous.

In dense forest in the Central Provinces, Berar and the Western Peninsula. Fl. Jan. Mar. 2. Turn dark red before falling, climbs over tall trees and often carpets the ground on the banks of streams, like 14. Ceylon, dry country. 16. *C. nanum*, Benth. Prodr. B. Fl. 221, is a small undershrub with a thick woody prostrate or underround stem, common in grass lands of the Subimalay tract from the Dehra to Sikkim in the Outh forests, Behar and the Central Provinces. Also on the Shan hills of Upper Burma. The leaf and fl.-bearing stems are burnt down to the ground annually by the fires of the hot season. l. obovate, fr. 1/2 in. long, in dense clusters.

alternating, the white, sessile, axillary, bracts, stipules, 10, a line as tall. Calyx very hard, woody, 5-toothed.

Common in India and Burma in Mangrove swamps and other tidal regions. Fl. March. Vitis, *L. pectinata*, W. in *A. L. Fl. Ind. Ind.* Kurz F. Fl. 309. Bengal, in large mangrove swamps, especially in the delta and estuaries, common. Stems creep the length of ponds. Perianth green.

C. ANOGEISSUS, Wall. : Fl. Ind. Ind. II, 159.

L. alternate, II small, biserial, in globose heads, stately, ribs compressed with the ribs prolonged beyond the ovary into a slender tube, which expands at the tip into a campanulate, declivous beak-like limb. Petals 10. Stamens 10, inserted, filaments filiform, exserted. Fr. small, coriaceous, broadly 2-winged, terminating in a beak formed by the persistent calyx-tube. Species 8, one in tropical Africa, the others in India.

A. Persistent calyx-tube shorter than fruit.

1. A. pendula, Edgew. : Brandis F. Fl. 201. Vitis, Dham, Dhakera, Meywar.

A small gregarious tree, branches drooping, leaves turning red before falling. Branchlets and *L.* densely clothed with short soft appressed hairs. *L.* broadly lanceolate or obovate-lance, blade 1-1.5 in. long, 3-4 in. diam., not prominent, 5-7 pair. Fl. heads smaller; in diam., on slender axillary peduncles 1-1.5 in. long. Base 1-2 ribs and in the other species including the wings, nearly obscure, upper portion and short beak hairy, lower portion glabrous.

Common in the Panch Mahals (Gherat) and in Nadi on the Nerbada river. The principal forest tree of Meywar and Meywar. *L.* in flower shed in January.

B. Persistent calyx-tube as long as or longer than fruit.

2. A. laurifolia, Wall. : Beid. Fl. Sylv. 15; Brandis F. Fl. 227. Syn. *Castanopsis unifolia*, DC. - Royle III, 145; Wright loc. cit. *Vitis, Dhamra, Dhamra, Dhamra, Hin-Li, Avam, Gond, Dhamra, Dhamra, Kon, Ghiraman, Telia, Telia, Telia, Telia, Telia.*

A large tree, *L.* broadly elliptic, pubescent when young, glabrous when full grown, blade 1.5-3 in. long, 1-1.5 in. diam., 5-14 pair, tertiary to pinnate, 2-3 pair. Fl. heads 1-1.5 in. diam., on short peduncles, often in axillary racemes, ribs in almost glabrous, nearly orbicular.

Common in the hills of Nepal, ascending to 10,000 ft. Central India, Western Peninsula, ascending to 4,000 ft. on the Nilgiris. Not in Assam, eastern Bengal and Burma. Flower during the greater part of the dry season. In Nov. the foliage begins to fall, and the tree is shed in Feb. and the young come out in May. Fl. May. Occurs in the New-Felt-Ceylon dry country.

3. A. sericea, Brandis, l. c. Forester, vol. xv, 287. Vitis, Kasatia, Dhamra.

A middle sized, on good soil a large tree, young shoots silvery, branchlets and underparts of *L.* clothed with long silky hair. *L.* elliptic, shortly acuminate, blade 1-2 in. long, 1-1.5 in. diam., 4-6 pair. Fl. heads 1 in. diam., on long peduncles. Frequently bearing leafy bracts, and sometimes two or more flower heads. Fr. sometimes broader than long, wings jagged. Calyx-limb sometimes persistent at the end of the long tube.

Common on the Panchmahal hills, Jessour district near the Nerbada river, (Machakota, Monger district). Panch Mahals (Gherat). Fl. Feb. to April. A variety with smaller greyish pubescent *L.* and smaller fl. heads, 1 in. diam., in Mysore.

4. A. acuminata, Wall. : Beid. Fl. Sylv. 1, 10; Brandis F. Fl. 228. Vitis, Panch Telia, Yon, Burma.

tree, with 2-3 in. or shortly prolonged inflorescence. Fls. in dense, globose terminal clusters, crowded with the upper calyx lobes. (Doubtful plant in the Bot. Garden, Calcutta, Aug. 1, 1912) with 5-7-lobed calyx petals, the petals yellow, calyx lobes, & stem yellow-green.

3. *E. Munronii*, Wight Ic. t. 541; B-M. Marinal 199.

A middle-sized very beautiful tree, glabrous, coriaceous, from a solid base. Leaves lanceolate, blade 6-8, petiole about diam. of leaf, $\frac{1}{2}$ in., sec. n. 18-24 pair, slender but prominent beneath, joined by conspicuous intramarginal veins. Fl. white, 1-1 $\frac{1}{2}$ in. across in terminal many-fl. trichotomous compound cymes. Calyx-tube about $\frac{1}{2}$ in. long, tapering into the pedicel which is as long as the calyx-tube.

Western Ghats from South Kanara to Cape Comorin, Nilgiris. Fl. Dec. 1901. Fl. variety with broad leaves found by D. Smith on the lower hills of Travancore. *E. Bopyridata*, Wall. Rhodod. Mal. Gar. (1891) Upper Maral near Cochin. A small middle-sized tree, branches sharply quadrangular, 1 from a woody stem, leaves oblong-lanceolate, solitary or in terminal 6-5-lobed cymes, calyx-tube persistent, 1-1 $\frac{1}{2}$ in. long, free part 1-1 $\frac{1}{2}$ into the ovary shallowly notched, fr. globose 1-2 in. diam.

4. *E. Rama Varma*, Baillon MSS.

A middle-sized or large tree, 1 from a cordate base gradually narrowed into a long acumens, blade 5-7 in. long, petiole stout, very short, midrib imbricate on the upper surface, very prominent beneath, as well as the 15-20 pairs of sec. n. which are joined by straight intramarginal veins. Fl. white, in the axils, solitary or in few-fl. racemes, petioles longer than calyx. Calyx-tube $\frac{1}{2}$ in. long and as wide at the mouth, segments subtriangular, petals cylindrical 1-1 $\frac{1}{2}$ in. diam. Fr. greenish-pink, globose, 1 in. diam.

Travancore, evergreen forest at Ingolettorum 1-1500 ft. Fl. March. Cult. after His Highness the Maharajah of Travancore, who introduced it to the Bot. Garden, Calcutta, in 1874. It is a member of the *trichotoma* group.

B. Leaves more or less elliptic, narrowed towards both ends.

4. *E. Jambos*, Linn. Kaye F. Fl. I. 49. —Syn. *Jambos* = *virgata* DC. Wight Ic. t. 435. *The Rose Apple*, Var. *Golden Jambos*, Hill's Indian Botanic Garden.

A middle-sized tree, 1 thinly coriaceous, oblong- or elliptic-lanceolate, tapering to both ends, blade 4-7, petiole $\frac{1}{2}$ in., sec. n. and intramarginal veins distinct but distinct. Fl. greenish-white, 2-3 in. across, in short terminal cymes composed of 2-4 pair of opposite fl. base of the uppermost petiole often spreading. Calyx-tube obconical, $\frac{1}{2}$ in. long, segments $\frac{1}{2}$ in. long, pedicelation as long as calyx-tube. Fr. globose or pyriform, 1-2 in. long, yellow or pink, edible.

Indigenous to the Malay Archipelago and Upper Burma (Shweli drainage, 1000 ft. in streambeds). Cultivated throughout India and Burma, var. *virgata* in Java, Fl. Feb.-April, but also at other times. *E. Jambos*, Hill's Indian Botanic Garden. Western Ghats from Bangalore to Mysore. L. coriaceous, elliptic-lanceolate, stem-leafy. Blade 4-5, petiole $\frac{1}{2}$ in., sec. n. slender, distinct. Fl. large, white, 5-6 diam. solitary or in 2-4-fl. cymes, calyx-tube $\frac{1}{2}$ in. almost cylindrical, slightly yellowing upwards free portion shallowly campanulate, pedicel often longer than tube, ovary sessile on the middle of tube, petals $\frac{1}{2}$ in. diam., stamens 1 in. long. Fr. globose, long crowned in the calyx segments. Fl. Travancore, India, *Kerala Rex*, Wight Ic. t. 545; Andaman and Nicobar, Sundral. 1871. B. Calcutta. A middle-sized tree, 1 from a solid base, fl. large, white, 5-6 diam., in many-fl. terminal umbels, calyx-tube persistent, 1-1 $\frac{1}{2}$ in. long, cylindrical, free part 1-1 $\frac{1}{2}$ into the ovary shallowly notched, fr. globose, 1-2 in. diam., crowned by thickly incurved calyx lobes.

11. *E. hemisphaerica*, Wight Ic. t. 525; Baill. Fl. Sylhet. 381. Var. *Ecva indica*, Wal.

A large tree, 1 elliptic-lanceolate, blade 3-4, narrowed into petiole $\frac{1}{2}$ in. long, sec. n. faint, distant, 8-10 pair. Fl. white, in simple compound terminal and

usually is only three-lobed, rarely at the ends of main stems, the central lobe usually exceeds the 2 lateral pedicels. Calyx-tube 1/2 in. long, short beyond the point of insertion of base, free portion a very shallow cup. Petals 4-5, sometimes 6, often 7-lobed. Stamens 1/2 in. long. Fr. globose, 1 in. diam. reserved for the persistent calyx-tube.

Woods plants in evergreen forests from the Konkan southwards. Fl. March-April. In E. Kurzii Benth. Kurz F. Fl. Ind. 5: 116 (1891). 5-10 in. 3-4,000 ft., common. In forest moist places. Assam, Cachar & Assamian Hills east of Tezpur. A large broad shrubby tree. Male 4-8, petiole 1/2-1 in. see in detail 1, 8-10 pairs. Fl. in compact trichomes, more terminal and axillary, cymes, yellow, slender, looking as calyptrate. Calyx-tube 1/2 in. long, cylindrical below, slender in the upper part, free portion shallowly cupulate, greenish-brown, broad, continuous with tube. Petals white, free. Fr. globose, 1 in. diam. In E. Wiana W. B. Fl. N. Hart 161 (1856). Java, Java, Bora, Wight F. Fl. Ind. 5: 116. Khasi Hills. Fl. white or rose-colored, elliptic. Male 3-5, petiole 1/2 in. Fl. in trichomes, few-lobed pedunculate, cymes, pedicels and pedicels slender. Calyx-tube provided with ribs, lobes funnel-shaped, the free portion above the start of the lobes, cymes white, continuing on with tube, with a somewhat membranous edge, yellowish. Fr. yellow, oblong 1/2 in. long, crowned with the incurved calyx-tube. In E. ramiflora Wall. Siam, forest, according to 2,000 ft. Khasi Hills. Probably Tezpur, etc. A small tree or shrub. Calyx-lanceolate, acuminate, 1/2-3/4 in. long, free portion 1/2 in. long. Fl. in compact pedunculate, usually terminal cymes, cymes generally as long as calyx-tube. Calyx-tube obconical, 1/2 in. long, petals free, yellowish, 4-5-lobed, cymes 1/2 in. In E. Humeri Benth. Trans. Linn. Soc. Bot. Penins. 4: 116. Similar, it often sessile or shortly pedicellate. Calyx-tube 1 in., lobes very short, much shorter than petals. Stam. 1 in. long.

3. Leaves linear-lanceolate or obovate.

14. E. polypetala, Wight f. c. 119. Vera. Teniga, Bern.

A large shrub or small tree, usually 4-5-petals, linear-lanceolate, male 4-6, petiole short, 1/2 in., see in detail. Fl. white, acedid, 1-2 in. across, solitary or in few-lobed cymes, axillary or from above the scars of fallen leaves, calyx-tube at the base supported by small deciduous bractlets, obconical, 1/2 in. long, free portion shallowly cupulate, lobes 4 or 6, petals 4-10, pedicel as long as calyx-tube.

Khasi Hills, Chitapan, Payer Range, on edge of forest. Fl. March-April. Yalok. In E. occidentalis, Bur-dillo, MSS. A small tree in the evergreen forest. In forest, large tree, thick coriaceous, linear-lanceolate, 2-2 1/2 in. across, in terminal or axillary cymes, pedicels 1/2 in. long, longer than calyx-tube, calyx-tube 1/2 in. long, free portion 1/2 in. long, lobes 4, spreading, petals 4 or 6, in a broad plane, lobes 1/2-1 in. long.

A. Flowers axillary.

15. E. claviflora, Benth. Wight f. c. 119. Kurz F. Fl. L. Ind. 5: 116. In E. septentrionalis, Wight f. c. 119.

A large shrub or small tree, 1, thick, woody, elliptic-lanceolate, shortly acuminate, 1/2-3/4 in. long, petiole 1/2 in. long, see in detail, numerous, with rotund, thin long petiole nerves, 1/2 in. long. Fl. sessile, in compact axillary cymes or shortly pedunculate clusters. Calyx-tube 1/2-3/4 in. long, cylindrical below, gradually widening upwards. Petals 4 or 5, white, free, stamens 1/2 in. long. Fr. globose, 1/2 in. long, crowned by the short inferior calyx-segments.

Fl. in 1850 ft. Khasi Hills, Chitapan, Assam, Lower Burma. Fl. in April. Malay Peninsula. In E. Wightiana, Wight f. c. 119. In E. densiflora, Lam. Wight f. c. 119. Woods plants from the Konkan southwards, Ceylon. Similar, pedicels and cymes in 1/2 in. In E. andamanica, King, Andaman. A small tree, 1-2 in. high, broadly elliptic, male 2-4, petiole 1/2 in. Fl. in fasciculate terminal cymes, terminal and from the sides of the uppermost leaves, calyx-tube 1/2 in. long, petals 4-5-lobed.

In E. malabarica, Lam. The Malay Archipelago, Indonesia, the Malay Archipelago, Java, India. A beautiful tree with deep green glossy foliage. 1, thick, woody, elliptic-lanceolate or obovate, male 6-12, petiole thick, 1/2-1 in., see in 10-12 pairs, 1/2 in. long. Fl. sessile, cymes, 1-4 in. across, in particular, simple or shortly pedunculate, usually 3-lobed, cymes from the old wood. Calyx-tube funnel-shaped, 1

calyx-tube shallowly cup-shaped, free portion shallowly campanulate, as long as the lower solid part. Petals small, free. Fr. nearly globose, $\frac{1}{2}$ in. long, crowned by the calyx-rim.

31. *E. Thunra*, Roxb.; Wight Ic. t. 617; Kurz E. Fl. t. 488.

A middle-sized or large tree, bractelets light grey, l. firmly coriaceous, when dry dark above, copper coloured beneath, elliptic-oblong, blade 4-8, petiole stout, $\frac{1}{2}$ in. long, sec. n. 15-20 pairs. Panicles many-ided, terminal and from the uppermost axils. Fls. small, white, in umbelliform heads of 2 or more fls. Calyx-tube $\frac{1}{2}$ in. long, funnel-shaped, free portion campanulate, as long as the lower solid part, stem segments finally deciduous. Ovary near the apex of the solid part, a petals small, free. Fr. nearly globose, $\frac{1}{2}$ in. long, crowned by the calyx-rim.

Penang and Tenasserim. Fl. H. S. Malay Peninsula. *E. ferruginea*, Wight Ic. t. 534. Negal, petals 5, as referred to this in Fl. H. S. Ind. t. 432. The figure shows the ovary with style and stigma, but in the middle of calyx-tube. *E. rubens*, Roxb. (Distributing Tenasserim) differs slightly, but fl. larger, greenish-white, calyx-tube $\frac{1}{2}$ in. diam. to $\frac{1}{2}$ in. long. Specimens of two different species with the ovary almost lost in the calyx-tube, we from Malacca, the other given in the Bot. Garden Calcutta are preserved under this name in Herb. Kew.

Sec. n. very numerous, slender, closely parallel.

32. *E. cymosa*, Lank.; Wight Ic. t. 550; Kurz E. Fl. t. 480.

A shrub or small tree, l. thinly coriaceous, ovate or elliptic-lanceolate, cordate-acuminate, sec. n. numerous, close, very slender, blade 3-4, petiole $\frac{1}{2}$ in. long. Fl. white, sessile, supported by small bracts in 3-5-ided heads, these arranged in terminal and axillary trichotomous panicles with slender ramifications. Calyx-tube funnel-shaped, $\frac{1}{2}$ in. long, free portion campanulate, as long as the inferior solid part. Petals free, stamens $\frac{1}{2}$ in. long. Fr. nearly globose, $\frac{1}{2}$ in. diam. crowned by the persistent calyx-rim.

Small hills, Ceylon, Andaman and Nicobar, Tenasserim. Fl. Andam. Malay Peninsula, Java, *E. rubens* G. Don. Tenasserim l. slender, sec. n. very numerous, closely parallel, as a distinct species. *E. Gardneri*, Thunb. *E. Australis*, Haller, *E. Benth. Nat. Hist. S. A. t. 284 t. 13*. *Hainneppia* (Hort. Kew.) *Australis*, Evered, *Journal of Travellers*, t. 170 ff. (See also, Malay). A very large tree, l. thinly coriaceous, elliptic-lanceolate, blade 2-4, petiole $\frac{1}{2}$ in. long, fl. sessile in terminal and axillary compound trichotomous panicles. Calyx-tube broadly funnel-shaped, free portion shallowly cup-shaped, petals orbicular, free or slightly cohering, stamens $\frac{1}{2}$ in. long. Fr. apparently globose, in diameter about one of calyx-segments or the small calyx-rim. *E. Buxata*, Haller. *Banksia* Tenasserim Fl. (Haller). Smaller. Fl. often sessile, pedicellate, larger, without bracts, calyx-tube $\frac{1}{2}$ in. long, stamens $\frac{1}{2}$ in. long. *E. taddalinea*, Wight Ic. t. 542. *Asam*, Khasi hills, l. ovate acuminate, blade 3-5, petiole $\frac{1}{2}$ in. long, sec. n. very close, slender, numerous. Fl. sessile in few-ided axillary compound panicles. Calyx-tube funnel-shaped, $\frac{1}{2}$ in. long, $\frac{1}{2}$ in. wide at mouth, segments small, petals free, stamens $\frac{1}{2}$ in.

33. *E. Arnottiana*, Wight Ic. t. 566. Vern. Nigrol, Tam.

A very large tree, usually with a short bole and widely spreading branches, l. rigidly coriaceous, elliptic-lanceolate, blade 2-3, petiole $\frac{1}{2}$ in. long, sec. n. very numerous, closely parallel. Fl. showy, cream coloured, sessile, crowded in dense clusters, forming a compact terminal compound trichotomous cyme, leaf decid. on. Calyx-tube broadly funnel-shaped, $\frac{1}{2}$ in. long, $\frac{1}{2}$ in. wide at mouth, free portion shallow cup-shaped. Petals free or calyptrate, stamens $\frac{1}{2}$ in. long. Berries oblong, dark purple, succulent, fatous, but astringent.

Nigeria, Palau, Amamala, Tenasserim. Fl. Jan-April. Fr. May-July.

C. Fl. middle-sized and small, calyx-tube $\frac{1}{2}$ in. long, narrow, width at mouth less than half its length. (Species 38-41.)

34. *E. ceylanica*, Wight; Bedd. Fl. Sylv. t. 202. — Syn. *E. spicata*, Lank.; *Tricus* (Hort. Ceyl.) t. 171. *Syngonium ceylanicum*, DC.; Wight Ic. t. 73. Vern. Nigrol, Mal.

A. Anthers black or blackish, the tube of the style usually persistent.

1. *E. Leucoxydon* P. Mich. *Forest Trees* (White Grass, South Australia). *Bot. Fl. Austral.* iii. 287.

1. *lanceolata-lanceolata*, rarely ovate-lanceolate. Umbels usually 3-5-fl., pedicels longer than calyx, tube at mouth $\frac{1}{2}$ in. wide. Filaments yellow, rarely pink. Anthers stamens long, sterile, anthers minute, truncate, opening by terminal pore. Ovary 5-6, stigma broad, operculum conical, equal to calyx. Fr. nearly hemispherical, $\frac{1}{2}$ in. diam.

Common Queensland, New South Wales, Victoria, South Australia. Cult. Abbotsford, Orange, Manly, Lockwood. 2. *E. obliqua* (Hort.) Brandis *F. Fl.* 231. *Strongyloides* (Hornem.) (ex. Victoria). Constitutes small trees in Victoria, South Australia, and Queensland, reaching at 4000 ft. (Cath. Nilgiris). A tall tree, attaining 300 ft., lower branches, leaves, etc. as slender but distinct, oblique. Umbels 2-5-fl., calyx tube in a narrow tube about $\frac{1}{2}$ in. wide at mouth, operculum hemispherical, at throat a little. Anthers round, opening by terminal orifices of style. 3. *E. pilularis* (Sw.) Hook. f. & G. (Queensland to Victoria). Cult. Nilgiris. Attains 300 ft., branches regular, leaves, etc. very slender. Umbels 5-20-fl., pedicels regular or sub-parallel, calyx narrowed into a short vestige, $\frac{1}{2}$ in. wide at mouth, anthers roundish. Fr. almost hemispherical, $\frac{1}{2}$ in. diam. 4. *E. macrocarpa* (Schauer) Queensland and New South Wales, very similar, possibly not distinct.

4. *E. marginata*, Smith. *Journ.*, West Australia. "A large tree attaining 150 ft., flowers very durable, lanceolate, usually truncate, etc. as slender, but distinct, mostly 1-2-fl., calyx turbinate, narrowed into pedicel, mouth $\frac{1}{2}$ in. wide, operculum elongated, almost the length of calyx, anthers 4-5-fl. Fr. oval, $\frac{1}{2}$ in. diam., contracted at the mouth.

5. *E. amygdalina*, Labill. *Great Eucalypts* (Wulgara, Queensland). *Bot. Fl. Austral.* iii. 287.

A vigorous tree, attaining 420 ft. L. new, and then opposite, lanceolate-linear-lanceolate, etc. as generally conspicuous. Umbels 4-8-fl. Calyx $\frac{1}{2}$ in. wide at mouth, operculum hemispherical, shorter than calyx, anthers small, round. Fr. nearly hemispherical, $\frac{1}{2}$ in. diam.

New South Wales, Victoria and Tasmania. Cult. Nilgiris, with narrow linear alternate and under the name of *Red Gum* with lanceolate opposite l.

B. Anthers black or ovate, longer than broad, opening by longitudinal slit.

a. Calyx-tube not produced beyond ovary, upper portion of ovary conical free.

6. *E. rostrata*, Schlecht. *Beuth. Fl. Austr.* iii. 291. *Red Gum*.

A large tree, heart wood dark red, exceedingly hard and durable. Leaves lanceolate, petiole etc. as flat. Umbels 4-14-fl. Calyx at mouth $\frac{1}{2}$ in. wide, open into hemispherical with a shorter or longer point. Stamens not affected, upper part of ovary with large resin cavities. Fr. nearly globose, $\frac{1}{2}$ in. diam., white, rarely long exserted.

Along river banks and alluvial valleys in many parts of the Australian continent, also in Tasmania. Cult. Port, Calcutta, Ombak. 7. *E. teretifloris* (Sw.) Queensland, New South Wales, Victoria. Cult. Abbotsford, Lockwood, Kival hills. A tree, not generally exceeding 100 ft. 1. *lanceolata-lanceolata* or ovate-lanceolate, etc. as and intramarginal veins slender but distinct, calyx at mouth $\frac{1}{2}$ in. diam. Operculum much longer than calyx, obscure conical. Ovary and fr. like 6.

b. Calyx-tube produced beyond ovary.

7. Fl. large or middle-sized, $\frac{1}{2}$ in. or more across mouth of calyx.

8. *E. globulus*, Labill.; Brandis *F. Fl.* 231. *Blue Gum*.

A lofty tree, attaining 300 ft., highly aromatic, young shoots and foliage glaucous-grey, l. on older trees linear-lanceolate, falcate, blade 6-9, petiole 1-2 or long. Fl. large, calyx covered with a bluish-white bloom, broadly turbinate, warty and ribbed, mouth $\frac{1}{2}$ -1 in. diam. Operculum shorter than calyx.

1. *T. burmanica*, Griseb., *Norsk F. Fl. II* (1857) *Vern. (Anders.)-pyram.*, 1. nov. *Tenney-Gilg's Atlas*, Burma.

A middle-sized tree, young stems silky pubescent, lvs. 3 in. long, oblanceolate, petiole short-hairy. Calyx $\frac{1}{2}$ in. across, capsule $\frac{1}{2}$ in. diam., protruding far beyond the calyx-tube.

Java, Maricao, Trunckian, ranging to S.W. II. (Linn.) Thunb. Fl. Martav. 1794. 2. *T. warringtonii*, Griseb., *Trunckian*, Malay Archipelago, Java. Lvs. glabrous, petiole short-hairy, the venation glaucous, obscurely serrated; lvs. 3-4 in. long, rounded to 5/8 in. long, petiole hairy. Calyx pubescent, calyx $\frac{1}{2}$ in. across, capsule $\frac{1}{2}$ in. diam., protruding far beyond the calyx-tube.



FIG. 128.—*Tritomania burmanica*, Griseb. 4.

Malesium leucandron, Linn., *Mergal*, Malay Peninsula and Archipelago, Australia. A middle-sized tree, bark pale, feeling like paper, lvs. glabrous, oblanceolate, alternate, not serrated, lanceolate, more or less oblique, 2-3 in. long, tapering into a short petiole, with 5-7 distinct longitudinal nerves. Fl. yellow or white, with a long, capillary style, 2-4 in. long, the rachis generally prolonged and leaf-bearing. Stamens 4-6, the anthers united at their base, these bundles inserted opposite to the petals. Ovary 2-lobed, deeply enclosed in the calyx-tube. Capsule 2-lobed, 2-seeded. The bark is the source of a resinous exudate.

4. **BARRINGTONIA**, Forst.; *Fl. Belt. Ind. II*, 500.

Tree as a rule evergreen, lvs. alternate, not gland-dotted. Fl. in spikes or racemes, bracts usually deciduous. Calyx-tube enclosing the 2- or 4-lobed ovary, not produced beyond it. Petals 4, rarely 5, more or less white at the

low to the staminal tube. Stamens 2, exserted the base into a short tube, all fertile. Ovary pendulous, 2-8 in each cell. The above-mentioned species are 1-3 angular and crossed by the petiole; calyx segments per carp. 2-3, cordate, sessile, hairy. Seed and embryo large; embryo consists of 2 concentric homogeneous masses of cellular tissue separated by a thin layer of diffuse vessels and fibres. Altitude 0. Species 29, regions of Africa, Asia, Australia and Polynesia.

A. Calyx quite closed in bud, splitting irregularly into 2 or 3 segments.

1. *B. racemosa*, Blume (Wight) Ic. t. 152; Kera F. Fl. t. 440; Yucc. Java, Beng. : Newc. Mart. Saunders, Tag.

A middle-sized tree branches with numerous large leaf-veins. L. oblong or oblanceolate, blade 1-12 in. long, narrowed into a very short petiole. Fl. 2-3 in. across, in slender peduncles racemose, 2-4 in. long, filaments often crimson. Fr. 2-3 in. long, ovoid.

Woods and from the Kookan northwards near rivers and backwaters, but also in the mountains. Hainan, Amboina, Newber. Fl. H. 8. (Cera, Java, New Guinea, Celebes of the Malay Peninsula and Polynesia). 2. *B. speciosa*, Flora 7. Wight, t. 1. 2. Amboina, Newber. of the Malay Peninsula and Amboina, Australia and Polynesia. A middle-sized tree, L. sessile, ovate 6-11 in. long, reticulate veins, petiole 1-2 in. across, in erect terminal racemes, pedicels 2-4 angles 2-4 in. long, 1-2 in. long, Fr. 2-4 in. long, depressed 4-angled, 4-angled and more or less lobed. 3. *B. racemosa*, Geoff. Bergal Malay Peninsula. A shrub or small tree, L. slightly ovate, leaf from a rounded or cordate base oblanceolate, blade 3-10 in. long, petiole short, erect. Fl. 1-2 in. long, in short erect racemes, pedicels slender 1 in. long, 1-2 in. long, Fr. 2-4 in. long, 2-4 in. long, Petiole, at the base produced into a wing-like structure.

B. Calyx not closed in bud, segments 4, slightly imbricate.

a) Petiole short, less than 1 in.

1. *B. acutangula*, G. Don, t. 34; Brandis F. Fl. 26; Yucc. Newc. Jager, Hain. : Amboia, Beng. : Yucc. Juggl, Mac. : Amboia, Pol. : Yucc. Bura.

A middle-sized tree, L. sessile or oblanceolate, minutely denticulate, blade 2-8, narrowed into petiole 1-1 in. long. Fl. red, 1 in. across, in long slender peduncles racemose 6-10 in. long. Calyx segments rounded, filaments very slender. Fr. oblong, slightly broadly quadrangular 1 in. long.

Subtropical ever trees from the Ganges valley, Bengal, Central India, the Western Ghats, Hainan, chiefly on banks of streams and in moist places. C. India and Java, Malaya, Amboia, Fl. Dec. - May. - Cera, Java, region. Malay, Amboia, and New Guinea, Australia. 2. *B. rostrata*, Kurr, Transvaal, Katschwe Barta. A middle-sized tree, L. shortly ovate, leaves large, rounded at the ends of branches, oblanceolate, blade 6-10 in. long, narrowed into a very short petiole, petiole 1-2 in. long, Fr. 2-4 in. long, 2-4 in. long, Petiole, at the base produced into a wing-like structure. In terminal peduncles racemose, pedicels short, calyx segments 4 in. long, petals greenish, filaments white. Fr. 2-4 in. long, crossed by the petiole and calyx segments 4-angled, 4-angled. 3. *B. pectinata*, Kurr, Pegu and Martaban, petiole 1 in. long, Fl. white or rose-colored, sessile in very long peduncles with calyx velvety, segments more than 1 in. long. Fr. 2-4 in. long with small narrow wings. 4. *B. hetera*, G. B. Clarke, Transvaal, L. narrowly elliptical, blade 10-15 in. long, petiole 1-2 in. long, peduncles racemose, pedicels slender, 1-2 in. long, Fr. 2-4 in. long, 2-4 in. long, Petiole, at the base produced into a wing-like structure.

(b) Petiole long.

1. *B. microstachya*, Kurr, South Transvaal, Malay Peninsula, Java. A shrub or small tree, L. elliptical-oblong, blade 6-12, petiole 1-3 in. long, sessile, peduncles 10-20 in. long, Fr. 2-4 in. long, 2-4 in. long, Petiole, at the base produced into a wing-like structure. In peduncles racemose, calyx tube 4-angled, 4 in. long, filaments white, petals 4 segments 2 in. long. Fr. ovoid, obtusely angled 1-2 in. long, 1-2 in. long, Petiole, at the base produced into a wing-like structure. 2. *B. pendula*, Kurr, South Transvaal, Amboia, Hainan, L. narrow-ovate, blade 10-15, petiole 1-4 in. long, reticulate veins nearly as prominent as the petiole. Fr. 2-4 in. long, 2-4 in. long, Petiole, at the base produced into a wing-like structure, filaments 1 in. long. Fr. 2-4 in. long, 2-4 in. long.



FIG. 139.—*Barringtonia acutangula*, Gaertn. 4.

5. CAREYA, Roeb.; Fl. Belg. Ind. ii. 510.

Leaves alternate, not gland-dotted. Fl. large, showy, tetramerous. Calyx late adnate to ovary and not produced beyond it. Stamens 4, in 2 equal circles, united at the base into a thick fleshy ring, the stamens of the exterior and interior circle generally without anthers. Ovary 4-celled, ovules narrow, attached to axile placentas. Fr. globose, rim thick, seeds numerous, embedded in a fleshy pulp. Embryo large, structure similar to that of *Barringtonia*, albumen 0. Species 3, one in North Australia and Queensland.

Large or small herbaceous plants. Stems usually 10-nerved with petals in the calyx tube very unequal, 5-lipped, with purple anthers, connective long, produced at the base, and terminating in two lobes, alternating with 5 shorter stamens with yellow anthers, connective not produced. Ovary situated at the base of calyx-tube usually 5-celled, apex clothed with bristles, styles or large axile placentas, which become pulpy in fruit. Seeds minute. Spec. 44 tropical Asia and Australia. Polynesia.

1. *M. malabathricum*, Lam. & Wight III. p. 65, includes *M. roseum* Two. Kurz F. Fl. J. 84. Vern. *Pothé*, *A. C.*, *Mytpe*, *Lower*, *Shanal*, Upper Burma.

An evergreen shrub or small tree, branchlets, petioles and peduncles densely clothed with acute or acuminate, often serrulate scales. Lvs. 3-5-nerved, strigose and often glaucous on the underside, blade 2-6 petiole 1-3 in. long. Fl. purple, 2-3 in. across, calyx densely clothed with pale, linear acuminate entire or serrate scales. Fr. 1 in. diam.

Sublime from the Khasi and Jaintia hills from Nepal eastwards, according to Sikkim, 1850 & Assam, Khasi hills to Assam, Andhra, Burma. Western Polynesia. Fr. throughout the year, heavy March-July. Common inland country to 2000 ft. Seychelles, Malay Peninsula and Archipelago, China, Australia, New Caledonia, Newly allied and 2. *M. decuratum*, Roemer, *M. senegalense*, Sims, *M. senegalense*, Malay Peninsula, Tonkin, China. Branchlets, petioles and peduncles clothed with long spreading bristles, scattered, appressed hairs above, glabrous beneath. Fl. bright purple, 2-4 in. diam., calyx tube clothed with long shining bristly hairs. 3. *M. integratum*, Wall. Assam, Khasi hills, Andhra, Burma. Branchlets, petioles, peduncles and styles clothed with closely appressed serrulate scales. Lvs. strigose on both sides, appressed, subparallel to the midrib, blade 1-2 petioles 1-2 in. Fl. 2-3 in. diam., petals reddish. 4. *M. burmannicum*, Champoux in DC. Monogr. Chin. vol. 26 (*M. Burmannianum*, Kurz, in Sikkim, Pegu, Yunnan. Transverse calyx-tube clothed with ciliate pale colored scales along the base.

2. OXYSPORA, DC. Fl. Brit. Ind. 30, 325.

Large shrubs with spreading and drooping branches. Lvs. long-petioled, ovate, cuneate, 5-7-nerved, sec. 5-nm nerves, at right angles to main nerves. Fl. in long terminal panicles. Calyx-tube cylindrical tuberculate, teeth 5, short, triangular. Stamens 8, the anthers of 2 on long filaments, purple, the others yellow. Ovary inferior, 4-celled. Capsule fusiform, dry, 8-celled. Seeds 8, black. Species 7. India, Malay Peninsula and Archipelago.

1. *O. paniculata*, DC. : Wall. Fl. As. Rat. 1. 88.

Branchlets, petioles and nerves long with with scanty tomentose stellate tomentum and long soft bristles. Panicle ample, calyx, petals and pedicels purple or blue, base of larger anthers deeply 2-lobed.

Other Himalaya from Nepal eastwards 4000 ft. to Sikkim. A. sim. Khasi hills, Pegu, Assam, Manipal—Yunnan. 2. *O. virgata*, Wall. Assam, Khasi hills, Manipal. Branchlets, petioles and nerves beneath with long soft bristles, base of larger anthers deeply 2-lobed, connective 2-curred at base. 3. *O. sericea*, D. Don, Upper Assam, Chittagong. Scandent, glabrous, leaves pale or brown beneath, teeth 4-12, petals 1-11 in. long. Fl. rose-colored, in long narrow drooping panicles, petals shallowly quadrangular at the base. Anthers of 2 longer, slightly 40-curred at base, connective not 2-curred.

Pteranthera caerulea, Jack, including *P. papilionata*, Jack. Transverse, New Guinea and Archipelago. An evergreen large shrub or small tree, lvs. elliptic, glaucous beneath, 3-nerved, basal nerves. Fl. large in axillary compound cymes, calyx shallowly 5-lobed and prolonged beyond its truncate, lobes, lobes, petals 4 thick, white, reflexed, tube of 8 filaments short, perfect anthers 4 or 5, scale blunt, 6 other stamens. Fr. pulpy, tuberculate, truncate, 2-3 in. diam.

3. OSBECKIA, Lam. : Fl. Brit. Ind. 6. 513.

Hairy herbs or shrubs. Fl. large, 4- or 5-merous, in small, mostly bracteate terminal cymes. Calyx-tube campanulate, acute to lower half of ovary and

terminal leafy shoot outside, usually dotted with hairs. ... Stamens 8 or 10, equal, with 10 large, prominent anthers and 10 small ones. Ovary with lobes 4 or 5, crowded, usually 10, the apex usually 2 or 3, ...

O. retrata DC. Subshrub or shrub from Nepal, ... *O. grandis* Hook. ... *O. repens* Hook. ... *O. ...*

Medinilla Walkeri Hook. & Arn. Bot. Beechey, 1: 271. Anomala hills, Ceylon. An epiphytic ...



FIG. 160. *Medinilla rubicunda* Blume.

1. MEDINILLA, Gaertn. Pl. Rar. Ind. 3: 31.

Shrubs, often epiphytic, 1 m. tall. ... *M. rubicunda* Blume. ... *M. ...*

M. rubicunda Blume. ... *M. ...*

1896. Journal of the Botanical Society of London, vol. 16, p. 17. Leaves dark blue above, red or black beneath. 2. *M. Beddardii*, C. B. Clark, *Malesian Flora*, vol. 1, 1841. Evergreen forest of the Western Ghats (India) and elsewhere. A woody shrub 5-6 ft. tall, leaves mostly sessile, 12 in. Fl. light blue, solitary or axillary, pedicel 1, petals 4, pure white, spatulate. 3. *M. malabarica*, Bedd. l. c. 157. *Nilgiris, western slopes, Anamalais, Polynchos*, very dense thicket, prominently 5-6-merous. Peduncles axillary, sometimes very much branched. Fl. peduncles and pedicels 4-6 bell-shaped, 5-merous.

B. *Paniculata* cymes.

1. *M. himalayana*, Hook. f. *Sikkim 2500-3000 ft. Kinabalu hills*. L. nearly sessile, broadly elliptic, cymose cymes, pedicels horizontal in fruit. Fl. 4-6-merous, 5-6-merous. 2. *M. paniculata*, Hook. f. *Der Flanz. Bruchlets* densely paniculately branched, cymes terminal.

Mastus cochinchinensis, Lour. *Asiam, Nallur Forest, March 1819, DC.* China, Szechuan, Cochin China, Burmah. A shrub 30-40 ft. tall, young L. clothed with soft tomentum, white. L. elliptic-lanceolate, blade 6-8 inches long, 2-3 inch broad by distant veins. Fl. small, tetramerous, with an minutely tubercled pedicel, in a small axillary cymose panicle, more often from the axils of fallen leaves, cymes 4-5-merous. Capsule tightly enclosed by the style, broadly 4-lobed. Seeds minute, 2-3-merous, on a central 4-winged placentation, at each end long acuminate.

A. MEMECYLON, Linn., Fl. Brit. Ind. ii, 563.

Evergreen glabrous shrubs or trees. L. coriaceous, pinnately, sec. 11 often obscure, rarely apparently 5-nerve. Fl. blue or white, tetramerous in 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000.

A. Leaves petiolate, acute at both ends, elliptic or elliptic-lanceolate, 1-3-jugate, in 5-7-angled cym.

1. *M. edule*, Herb. Cor. Fl. 1782 (1781) = *M. malabarica* Benth. Fl. Ind. 87 (1768) which may have to take precedence of the well-known name *M. edule*; *M. tinctoria*, Koenig; *Wich.* Ind. 1. 93; *M. rostrata*, Lam. Verm. *N. Am.*, *Agnes. Long.*, *Asiat.*, *Karst.*, *Mex.*, *Flindl.*, *Kan.*, *Alb.*, *Tel.*, *Kanjo.*, *Kanjo.*, *Tan.*



FIG. 111.—*Memecylon edule*, Hook. f. 6.

10. *Leaves*—oblong, rarely ovate, long cordate or ovate-lanceolate.

11. *M. malabaricum*, Cogniaux.—*See M. amplipetala*. Herb. var. *malabaricum*, Fl. Brit. Ind. ii. 553; *M. amplipetala*, Wight Ic. t. 279; *M. malabaricum*, Bedd. Fl. S. Iv. t. 203.

A shrub or small tree, branchlets round, l. coriaceous, sessile or nearly so, oblong-lanceolate from a cordate, often amplexicaul base, 2-6 in. long, sess. or shortly petiolate. Fl. on a slender pedicels, in 10- to many-fl. umbels, pedicels very short, thickened at the base; numerous small bracts at the base of pedicels. Free part of calyx wide-convex, lobes 1-2 in. at mouth, anthers much shorter than connative. Fr. black by im. time.

12. Herb. plants down to the coast, from North Kanara to Travancore, mostly between 2000-3000 ft. Fl. Feb.-June. *M. amplipetala*, Bedd. loc. cit. is a new species from Pondicherry, and it is remarkable when present beneath calyx 1 in. wide at mouth, another which is only a long narrow lobe. 13. *M. decanense*, C. D. Clarke, Western Peninsula, possibly unknown, possibly only a form of 12, l. much more narrower than 12. 14. *M. wightii*, Thwaites, Kanara, Ceylon, differs from 12 by branchlets widely quadrangular and winged.

15. *M. amabile*, Bedd. loc. cit. Fl. Ind. Or. t. Ind. South Kanara plants up 2000 ft. A large shrub or small tree, branchlets widely quadrangular 1.5-2 in. long, sess. or obscurely short-stemmed, petioles slender, in many fl. often compound axillary umbels, pedicels 1 in. long. 16. *M. terminale*, Dalz., Evergreen Forests of North Kanara, a large shrub, very similar to 15 and possibly not specifically distinct. Peduncles often in the axils of the uppermost l. branch appearing terminal. Fr. globose 1 in. diam.

17. *M. maculatum*, Dalz. Arakansas, Tenasserim, Malay Peninsula and Archipelago. A shrub, branchlets often quadrangular below the nodes. L. sessile, coriaceous, lanceolate with longish base 3-4 in. long. Fl. deep blue, in strictly pedunculate axillary bracteate terminal cymes. Fr. elongated, 2-3 in. long, crowned by the deep-impaleated calyx lobes 1 in. long. 18. *M. Kerali*, King in Journ. As. Soc. Beng. 63, 77, Nilgiris Islands. A shrub, l. nearly sessile, thinly coriaceous, 8-10 in. long, sess. or shortly petiolate, 25-30 pair, joined by an intramarginal vein, at a distance from edge. Venae 2-4 in. from the axis of fallen leaves, calyx mouth 1 in. wide, wavy, with 4 broad lobes. Fr. ellipsoid 1 in. long.

ORDER LIII. LYTHRACEÆ. Gen. Pl. i. 773 (*Lythraceae*).

Herbs, shrubs or trees, l. simple entire, generally opposite, stipules 0, or minute. Calyx cup-shaped, persistent, segments often with intermediate teeth, calyate, petals imbricate and crumpled in bud, sometimes wanting; filaments adnate in the bud. Ovary superior, sometimes adnate to the bottom of calyx inferior in *Phytol.* Ovary 2-ovuled. Seeds many, without albumen.

In Engelm. & Pringle, Bot. Mex. t. 16, 22, the genera here described are classed under three separate Orders, *Lythraceae*, *Loasaceae* or *Convolvulaceae*, *Dioscoreaceae*, *Cyclocarpaceae*, and under other genera *Phytol.*, *Dioscoreae*.

A. Ovary sessile or fl. Uniserial, symmetric.

In small trees or shrubs, fr. a dry capsule.

Calyx segments 6, capsule 5-6-valved.

Calyx segments 6, capsule 5-merous.

Calyx segments usually 7, or 6-8, capsule 7-valved.

Calyx segments 4, capsule 4-lobed (rarely 5-lobed).

Woody trees, fr. fleshy, indehiscent.

B. Ovary superior, fl. biserial, zygomorphic.

C. Ovary superior, fl. male and bisexual pedicels.

D. Ovary inferior.

1. *LAGERSTROMIA*.

LAGERIA (p. 320).

2. *DIOSCOREA*.

LAGOSOMA (p. 341).

3. *SCYTHARIA*.

WISSINGIA (p. 311).

4. *CYRTANTHIA*.

PERSEA (p. 344).

1. LAGERSTROMIA, Lindl.; Fl. Brit. Ind. ii. 575.

Trees or shrubs, l. nearly opposite or the uppermost alternate, entire, 1) in axillary or terminal panicles, calyx-tube broadly turbinate or hemispherical.

7. Calyx-tube 5-7-seg., white or bluish, generally persistent, lemma long-exserted above.

The following species are known species here: *L. villosa* (Walp.) Karst. & E. Fl. 1. 324. Vern. *Zanngale*, Lower, *Zanngale*, Upper Burma. *L. villosa* (Walp.) Karst. & E. Fl. 1. 324. Vern. *Zanngale*, Lower, *Zanngale*, Upper Burma. *L. villosa* (Walp.) Karst. & E. Fl. 1. 324. Vern. *Zanngale*, Lower, *Zanngale*, Upper Burma. *L. villosa* (Walp.) Karst. & E. Fl. 1. 324. Vern. *Zanngale*, Lower, *Zanngale*, Upper Burma.

7. Calyx-tube with as many ribs as segments.

7. *L. villosa*, Walp., Karst. E. Fl. 1. 324. Vern. *Zanngale*, Lower, *Zanngale*, Upper Burma.

A small, somewhat size tree, branchlets, petioles and underside of l. with pubescence hairs simple, l. broadly lanceolate, blade 2-3, petiole 1-1.5 in., stipule small but distinct. Fl. white, slightly waxy, in compact head-like with pubescence, panicles at the end of branches, pedicel shorter than calyx-tube. Calyx tubulate with 6 winged ribs, petals minute. Capsule ovoid-oblong, 1/2 in. long, base supported by the shrubby calyx. Seed angular, with the broad triangular wing 1/2 in. long.

Upper and Lower Burma, at the end of the river. Fl. H. S.

Specimens in bud only, collected by the late Sir Henry Collett in Upper Burma. Calyx broadly lanceolate, blade 2, petiole 1/2 in., ribbed on calyx 5-6 almost winged. The following species are *L. villosa*, Karst.

8. Ribs or grooves on calyx-tube twice the number of segments.

8. *L. Flos Regium*, Retz., Roxb. Cat. Fl. 1. 65 (*L. Regium*); Wight in Journ. Bot. Soc. Lond. 1. 23. Syn. *L. speciosa*, Presl.; Koehne in Engl. Jahrb. 1. 28. Vern. *Jarol*, Burm.; *Ahne*, Ass.; *Tawan*, Mar.; *Cholla*, Kan.; *Tawa*, Tanu; *Maidanurath*, Mal.; *Pylunon*, Lower, *Fikaw*, Upper Burma.

A large tree, l. glabrous, blade 8-10, petiole short, 1/2-1 in. long, fl. purplish-lilac, 2-4 in. across, in simple terminal panicles, calyx strongly ribbed, ribbed, broader than the furrows between, segments long-triangular, stamens of equal length. Capsule broadly ovoid, 1/2-1 in. long, the lower third enclosed in the persistent calyx, seed with wing 1/2-1 in. long, pale brown.

Upper Burma, at the end of the river banks. Part of the Western Hill belonging to the State. Leaves during the wet season. In May-June. Calyx broad, lobes 2-3, petiole 1/2 in. long, fl. purple-lilac. *L. macrocarpa*, Karst. *Koepang*, Upper Burma, Near Maximilian. Tern 1/2 in. (H. B. March 1861). *Cholla* in Eng. Journ. A small tree, nearly all white, branch larger, petiole 1/2 in. long, fl. short terminal panicles, fl. purple-lilac, but not fl. bud.

9. *L. hypnacea*, Karst. *Andaman*, *Sumatra*. A large tree, l. glabrous, blade 8-10, petiole short, 1/2-1 in. long, fl. purple-lilac, 2-4 in. across, in simple terminal panicles, calyx strongly ribbed, ribbed, broader than the furrows between, segments long-triangular, stamens of equal length. Capsule broadly ovoid, 1/2-1 in. long, the lower third enclosed in the persistent calyx, seed with wing 1/2-1 in. long, pale brown. *L. hypnacea*, Karst. *Andaman*, *Sumatra*. A large tree, l. glabrous, blade 8-10, petiole short, 1/2-1 in. long, fl. purple-lilac, 2-4 in. across, in simple terminal panicles, calyx strongly ribbed, ribbed, broader than the furrows between, segments long-triangular, stamens of equal length. Capsule broadly ovoid, 1/2-1 in. long, the lower third enclosed in the persistent calyx, seed with wing 1/2-1 in. long, pale brown. *L. hypnacea*, Karst. *Andaman*, *Sumatra*. A large tree, l. glabrous, blade 8-10, petiole short, 1/2-1 in. long, fl. purple-lilac, 2-4 in. across, in simple terminal panicles, calyx strongly ribbed, ribbed, broader than the furrows between, segments long-triangular, stamens of equal length. Capsule broadly ovoid, 1/2-1 in. long, the lower third enclosed in the persistent calyx, seed with wing 1/2-1 in. long, pale brown.

10. *L. tomentosa*, Presl. Vern. *Lendu*, Burm.

A large tree, branchlets, petioles, underside of l., inflorescence and calyx densely clothed with stellate tomentum, l. lanceolate, blade 3-5, petiole 1/2 in. long, ven. and tertiary nerves prominent. Fl. white, 1 in. across, in terminal, rounded panicles, calyx campanulate-tubulate, ribs 10-12, segments short, triangular. Capsule ovoid, 1/2 in. long, lower third enclosed in the persistent calyx.

Upper Burma, Upper Burma. Fl. H. S.

Pimpla acuta, Fawc. Journ. Bot. Soc. Lond. 1. 14. 5. Syn. *Halimolobos Griffithiana*, Wight.

1817, 1820. The first collected by A. J. Baker, exalt. Woodlark, (under the name *Sonneratia*) in Timor, off West of Timor, and the Andamans—1825, 1826. The first seeds of East Africa to A. J. Baker and Polakowsky. A grey silky hairy shrub, 20 feet tall, 10-12 in. diam., 5-6 in. long, 8-14 in. long, readily deciduous, lvs. 2-4 in. long, 1-2 in. wide, beneath with white tomentum, 12-ribbed, segments 12, with 12-15 ribs, with 12-15 ribs, with 12-15 ribs, with 12-15 ribs. Calyx persistent, 12-ribbed, segments 12, with 12-15 ribs, with 12-15 ribs, with 12-15 ribs. Seeds numerous, angular tomentose, testa thick, cotyledons flat, orbicular.

2. DUABANGA, Ham. & Fl. Brit. Ind. II. 578.

Species 2, one in the Indian Archipelago.

D. sonneratioides, Ham. & Kory. Fl. Ind. II. 575. Vern. *Leupattia*, Nepes. *Mooking*, Lower, *Nov*, Upper Burma.

A tall handsome tree, wood greyish brown, branchlets drooping, with the weight of the flowers. Lvs. opposite, distichous, from a coglary base, up to the end, blade 7-10, petiole short, 1-2 in., sec. 1, calyx and marginal nerves prominent. Fl. 2-3 in. across, in terminal cymes, buds large, globose. Calyx cup-shaped, segments 6-8, usually 7, thick triangular. Petals white, crumpled, falling off early with the stamens. Stamens α , in a star-like row, filaments as well as style inflexed in bud. Ovary sessile to the style at the base, 4-8-celled, ovules α , stigma 2-8-celled. Capsule coriaceous, opening loculicidally into 4-8 valves, supported by the thick spreading calyx. Seeds α , umbonate, testa produced at both ends into long pointy tails.

Subhimalayan tract from Nepal eastwards, ascending to 3000 ft. Assam, Khasi hills, Manipur, Chittagong, Andamans and Nicobars. Burma, common westward to Fl. Jan-April—Perak, Dookin, Yagun.

Lavonia alba, Lam. & Wright II. 1. 57. Doid. Manual 14 fig. 1. *The Hope*, Fl. & Vern. *Mandi*, *Mokai*, Hindi: *Mandi*, *Smit*, *Garansi*, Kan.: *Garansi*, Tel.: *Leupattia*, indigenous in Andam and Perak, probably also indigenous in the other parts of the Peninsula and Ceylon (and thence northwards). D. R. Feb. 1887. Cultivated and naturalized throughout India. A glabrous shrub, branchlets often spinose, lvs. opposite 7-14 in. long, fls. crowded-yellow, very fragrant, tetramerous, 1 in. diam., on short slender pedicels, in large terminal parallel cymes. Stamens the 10th & 11th pairs between the petals. Ovary free, 2-4-celled. Capsule globose, base supported by the persistent calyx, pericarp leathery, hardening irregularly. Seeds numerous, angular tomentose, testa thick, cotyledons flat, orbicular. Leaves pulverulent and pubescent, pedicels to stalks appressed, toothed and bearded.

3. SONNERATIA, Lam. D. Fl. Brit. Ind. II. 579.

Little evergreen trees, naturally glabrous. Lvs. opposite, entire. Calyx thickly coriaceous, usually 4- or 6- (rarely 7- or 8-) lobed. Petals none or as many as calyx segments. Stamens α , inserted at the mouth of calyx-tube, inflexed in bud. Ovary usually free, many-celled, placentas thick, axile, ovules 7. Fr. fleshy, indehiscent, supported by the persistent calyx, base adnate to style. Seeds numerous, angular. Species 4-6, tropics of the old world.

A. Petals as many as calyx-segments.

1. *S. acida*, Lam. L. Wright II. 1. 540; Bell. Fl. Silv. Madag. & Fl. Ind. I. Vern. *Oru*, *Orcha*, Sundr.: *Timar*, *Mar.*; *Bluff*, *Thikalis*, Mal.: *Tera*, *Tera*, *Terri*.

A small tree, attaining 30 ft., l. obovate, gradually tapering into a broad spatulate petiole, 2-4 in. long. Fl. 2 in. across, solitary at the ends of branchlets, calyx-tube shallow, not ribbed, segments 4-8, usually 6, teeth longer than tube, petals dark purple, linear, attenuate, 1 1/2 in. long. Fr. 6-pressed-globose, 2-2 1/2 in. diam., entire.

Sundriban. Coast from Chittagong to Terassentan, ascending the rivers as far as the hills. Parts of the Indian, Andam and total waters of the Peninsula. Fl. Feb.

Orchid, Malay Peninsula and Archipelago. This and other species of *Sauricella* as well as a few other Madagascarenses, send up from the widely spreading horizontal row of vertical branches, with soft pith-like wood, which serve to facilitate the interchange of air between the atmosphere and the roots buried in the mud of the tidal channel.

3. *Urtica* none.

2. *S. apetala*, Ham. Vern. *Keora*, Sundra; *Tear*, Mar.; *Kambala*, Burm.

A gregarious tree, attaining 50 ft., wood reddish-brown, hard, branches peninsular, foliage light glaucous-green. L. lanceolate, blade 3-5, petiole $\frac{1}{2}$ in. long. Fl. whitish, 1 in. across, in 4-5 fld. terminal corymbs, calyx not ribbed, segments 4, longer than tube, stigma large peltate, top convex. Capsule depressed-globose, $\frac{3}{4}$ in. diam.

Sunddhuu, banks of tidal rivers. Pegu and Tenasserim, tidal forests. Coast of the Rookan. Fl. April-June. Ceylon. *S. alb.* Smith, Andamans, Mergul, Rookan, Ceylon (rare). Coasts of tropical Africa, Asia and Australia. A shrub or small tree, L. broadly ovate, fl. 1-2 in. across, usually 2 or 3 at the ends of branchlets, calyx-segments 5, rarely 7 or 8, fruiting calyx ribbed, ribs as many as segments. *S. Griffithii*, Kurz. Coasts of Pegu and Tenasserim, ascending the rivers as far as the hills. Similar to *S. acida* but without prunis. Regarded by King in Journ. As. Soc. Bong. vol. 67, 21 as an apetalous form of *S. acida*.

Woodfordia floribunda, Salisb.; Collett Simla Fl. 1863, fig. 57. — Syn. *W. tomentosa*, Bodd. Nash, C. 11, L. J. *W. F. stemon*, Kurz F. Fl. 3, 518; *Grisea tomentosa*, Roxb. Cor. Pl. 3, 31. Vern. *Uda*, *Dawa*, *Dhantia*, *Dhau*, *Dhacola*, Hind.; *Eha*, Kol; *Udali*, Mar.; *Soyi*, *Udali*, Tel.; *Ye Yin*, *Putong*, Upper Burma. Widely spread, from tropical Africa, Arabia to India, ascending to 8000 ft. in the Himalaya, and to both Peninsulas, China and the Indian Archipelago. A large ornamental shrub, more or less pubescent, L. opposite, sometimes with barbs of *R. acida*, from a broad base lanceolate, 2-4 in. long, underneath white with black dots. Fl. numerous, hexamerous, slightly zygomorphic, bright pink-red, in small lateral clusters, generally from the axils of fallen leaves, pedicels dilated above. Calyx tubular curved, coloured, mouth oblique, segments short, alternating with minute teeth, petals 6, short, linear-lanceolate. Stamens 12, inserted near the bottom of calyx, filaments long-exserted, ovary 2-celled. Capsule $\frac{1}{4}$ in. long, enclosed by calyx-tube, splitting irregularly. Fl. used for dyeing alk.

4. CRYPTERONIA, Blume; Fl. Brit. Ind. ii. 573.

Evergreen trees, L. opposite. Fl. polygamous, male and bisexual on different branches, possibly on different trees. Fl. minute, in elongate panicle racemes. Calyx cup-shaped, adnate to base of ovary, segments 5, rarely 4, petals 0. σ : Stamens long-exserted, alternating with calyx-segments, surrounding a rudimentary ovary, anther cells on the edges of a broad connective. δ : Stamens short, ovary 2-celled, style cylindrical. Capsule 2-celled, 2-valved, crowned by the two halves of the persistent style. Seeds numerous, testa produced at each end. Species 5, India and Indian Archipelago.

C. paniculata, Blume; Kurz F. Fl. i. 519; King in Journ. As. Soc. Bong. vol. 67, 5. — Syn. *C. pubescens*, Blume. — *Hemilicia pubescens*, Wall. Pl. As. Bar. t. 221; *C. globosa*, Blume. Vern. *Ananbo*, Burm.

A large tree, bark silvery grey. L. elliptic, acute at both ends, glabrous or thinly pubescent beneath, blade 3-6, pet. $\frac{1}{2}$ in. long. Fl. numerous, greenish-white, calyx-teeth triangular.

Khasi hills, Chittagong. Pegu, Martaban and Tenasserim. Fl. Nov.-Febr. Malay Peninsula.

Punica Granatum, Linn.; Wight Ill. t. 97. *The Honeycreeper*, Vern. *Narysah*, *Dawko*, *Dhara*, *Pini*; *Jaw*, Hind.; *Dahado*, Kan.; *Dawson*, Tel.; Indigoberry in Persia and Afghanistan. Common in Hazara, 4-6,000 ft., apparently wild. Cultivated and naturalized from remote antiquity in India, Syria, Palestine, North Africa, Greece and Italy. A deciduous shrub or small tree, branchlets often spin-



FIG. 103.—*Cryptantha paniculata*, Blume.

top of them. Numerous seeds in each cell, embedded in a cream-colored pulp. Calyx 7-8-lobed, spirally convolute.

... of the ovary... arrested... lobes... into a... Ovary... calyx... 5-7... Petals... calyx... Stamens... below the... attached to the... Carpel... several... of the... here called... under... and... of the... in... Carpel... and... from... containing... of cells... the lower...

ORDER LIV. SAMYDACEÆ. Gen Pl. i. 791.

Trees or shrubs, l. alternate, distichous, stipules small. Fl. hermaphrodite, regular, generally bisexual. Calyx persistent, tube short, segments 5-7, imbricate or valvate in bud. Petals none or alternate with calyx-segments and similar to them in substance. Ovary free or lower portion adnate to calyx-tube, ovules numerous, attached to 2-4 parietal placentas. Capsule 2-4-valved, seeds numerous, attached to the middle of the valves. Embryo in a copious fleshy albumen.

These genera here described are included under *Forsteria* by Wight in Engler's *Prakt. Bot.* p. 51, 52.
 Petals 0, in axillary fascicles. 1. *Casearia*.
 Petals 1-5, vent. & in axils of stipules. 2. *Hemiphragma*.

1. CASEARIA, Jacq.; VI. Brit. Ind. ii. 591.

Trees or shrubs, l. alternate, distichous, stipules small, calyx none. Fl. small, greenish-yellow, regular, usually bisexual. Calyx coriaceous, deeply 5-lobed, lobes imbricate, more or less persistent. Petals 0. Stamens double the number of calyx-lobes, often 8 only with a pentamerous calyx, united into a short tube.

with alternating stamens. Ovary 1-ovuled, styles numerous, affixed to the 3-lobed placenta. Capsule 3-lobed, 3-valved. Seeds numerous, with a fleshy, usually colored aril, embryo straight, cotyledons flat. Species 120, tropical regions of both hemispheres.

Stems are thickened by thin-walled cells in the leaves of some Indian species with a trace of latex or resin.

A. Full grown leaves glabrous.

1. *C. esculenta*, Roxb.—Syn. *C. cuculata*, Thunb., *Bedd. Fl. Sylv.* 1: 208. Vern. *Mor.*, Mar.; *Kolla Kumbha*, Mal.

A tree, L. thick, often coriaceous, quite entire, blade 4-5, pet. 1-1½ in. long. Fl. glabrous, ½ in. long, pedicel glabrous, longer than calyx. Fr. 2- or 3-valved, ellipsoid, ½-¾ in. long.

Western Ghats, from the Konkni southernly nearly to Coimbatore, Northern Circars, Sillaberkot, Tanjore, Fl. R. 8. Malay Peninsula, Ceylon, and other regions, ascending to 5000 ft. *C. ratonensis*, Dalt., Western Ghats, South Kanara to Coorg. A shrub, leaves more petioled and inflexed, young L. red, reddish pubescent.

2. *C. glomerata*, Roxb.—Syn. *C. gracilipes*, Dalt., *Brandis F. Fl.* 243; *Kanhal F. Fl.* 185. Vern. *Chilla*, Hind.; *Giridi*, Uriya; *Gilch*, Gond; *Kachuda*, Mar.

A deciduous shrub or middle-sized tree, branches long, spreading, L. 2-3 or less serrate, blade 4-8, petiole 1-1½

Fig. 118.—*Cassia esculenta*, Roxb. 1-3

in. long, translucent glands resiniferous, elongate and conical. Fl. 2-3 together, ½-1 in. long, with an offensive smell, clustered on scaly tubercles on the axis of leaves or of fallen lvs. calyx pubescent, pedicel generally longer than calyx, glabrous or pubescent. Stamens 8 or 10, alternating with hairy linear scales, half the length of stamens or more. Fr. ½ in. long, 3-valved, glabrous. Aril orange.

Subtropical, from the mountain ranges from the Chittauri, upwards, ascending to 5000 ft. to 5000 ft. Sikkim to 7000 ft. Khasi Hills, Burma, Upper and Lower Singhum, Orissa, Northern Circars, Western Ghats and country between the Ghats and the coast from Surat to South Kanara. Fl. Dec.-June. Culture. *C. gracilipes* is supposed to differ by the pedicel being glabrous above the articulation. Sometimes with hairy petioles and leaves from the western part with glabrous petioles from the eastern part. 3. *C. andamanica*, King in Journ. As. Soc. Bengal, vol. 67, 19. Andamans. A middle-sized tree, rigidly 3-axillary, blade 6-10, petiole 1 in. long, 2-3 in. long, pubescent beneath, ½-¾ in. long, glabrous, as well as pedicel.

B. Petiole and petiole of full grown lvs hairy.

3. *C. tomentosa*, Roxb.; *Brandis F. Fl.* t. 31; *Collect. Simla Flora* p. 197, fig. 165.—Syn. *C. elliptica*, Willd.; *Wight Ic.* t. 184. Vern. *Bloch*, Chilla, Hind.; *Tundar*, Gond; *Giridi*, Uriya; *Chillay*, Gond, Tel.

A small deciduous tree, branches spreading, all parts bitter. Bracteoles and underside of leaves tomentose. L. serrate, elliptic-oblong, narrowed towards the apex, base oblique, blade 3-7, petiole 1-1½ in. long, translucent glands round or broad-elliptic. Fl. tomentose, ½ in. 4 in., densely clustered on scaly axillary tubercles, calyx segments usually 5, stamens usually 8, alternating

ORDER LVI. DATICACEÆ. Gen. Pl. i. 884. (Daticaceæ.)

TETrameLES, H. B. K. Fl. Bot. Ind. 11. 372.

T. nudiflora, H. B. K. (the only species). Benth. Fl. Sylv. i. 215. — *Syris* W. Graham-Smith, Wright, In. 1. 1861. Vern. *Permat*, Kan. *Chait*, Tam. *Chait*, *Pala* *Pala*, Malg. *Thait*, *Tarant*, *Baring*, Upper *thanna*.



A very tall, fast-growing deciduous tree, wood tough, straight, often buttressed at the base, inner smooth, grey, leaf scars prominent on branchlets; petioles and young leaf hairy. The leaves ovate, base cordate, 5-7 main nerves blade 0-7, petioles 1-2 in long stipules. Fl. disc 4-5, tetramerous, petals 4, 2 in each. Involucre of the ends of the 2-3, only a body out into 2-3, usually stands 1, but a 1-2, disc, opposite to calyx segments. 4 in diameter, terminal, persistent, recurved, pedicels very short, ovary inferior, 8-ribbed, 1-2, calyx 4-5, on 4 parietal, disc 4-5. Capsule crowned by the persistent calyx-segments opening at the summit, the calyx terminating in the persistent style. Seeds minute, embryo cylindrical, in scanty albumen.

Tetrameles nudiflora, H. B. K. (the only species). Benth. Fl. Sylv. i. 215. — *Syris* W. Graham-Smith, Wright, In. 1. 1861. Vern. *Permat*, Kan. *Chait*, Tam. *Chait*, *Pala* *Pala*, Malg. *Thait*, *Tarant*, *Baring*, Upper *thanna*. Fl. Bot. Ind. 11. 372. Apr. white leafy, calyx 4-5, lobes 4-5.

Order LVII. — *Cactaceæ*. *Opuntia*. Difficult. H. B. K. Fl. Bot. Ind. 11. 372. *Pachy* *Pachy*. Vern. *Permat*, Kan. *Chait*, Tam. *Chait*, *Pala* *Pala*, Malg. *Thait*, *Tarant*, *Baring*, Upper *thanna*. Fl. Bot. Ind. 11. 372. Apr. white leafy, calyx 4-5, lobes 4-5.

FIG. 118. — *Tetrameles nudiflora*, H. B. K.

and white hairs on the outside, bearing dense woolly hairs with rays of anastomosing tubules and long sharp sides. Fl. disc 4-5, petals 4, 2 in each. Involucre of the ends of the 2-3, only a body out into 2-3, usually stands 1, but a 1-2, disc, opposite to calyx segments. 4 in diameter, terminal, persistent, recurved, pedicels very short, ovary inferior, 8-ribbed, 1-2, calyx 4-5, on 4 parietal, disc 4-5. Capsule crowned by the persistent calyx-segments opening at the summit, the calyx terminating in the persistent style. Seeds minute, embryo cylindrical, in scanty albumen.

the ovary is enclosed in a cup which is sometimes wanting in some cultivated forms. Fr. fleshy, many-seeded, and often in the form of a single raceme, but sometimes branched. The seeds are usually but they are chiefly covered by hairs, which are deciduous and drop the seed.

ORDER LVIII. ARALIACEÆ. Gen. Pl. L. 931.

Trees or shrubs, rarely herbs, are 1 or climbing, sometimes epiphytic. L. alternate, simple or compound. Fl. regular, usually pentamerous, umbellate, rarely racemose or cymose. Calyx 5-lobed, 5-lobed ovary; limb short, usually entire, rarely 5-toothed or lobed, petals mostly triangular, caducous. Stamens as many as petals, rarely numerous, filaments inflexed in bud, anthers didymous, covering disk epiphyous. Ovary 2- or more celled, 1 ovule in each cell. Fr. simple or berry, seeds pendulous, milky; minute in dense fleshy albumen.

A. Lignum = save timber in the track and path, filled with resin or gum. In some species the bundles are found in the pith. The wood is generally light and soft, and many species have a large pith, among others, *Fatsia japonica*, Buchh., the principal component of Japan and Formosa.

- A. Cells of ovary 2, rarely 4 or 6.
 - L. 2-lobed, petals 5 or 6, valvate. 1. HEPTAPLEURUM
 - L. 5-lobed, petals 5 or 6, valvate. 2. PERRARINIA
 - L. 5-lobed, petals 5 or 6, valvate. 3. POLYCARPUM
 - L. simple, ovules numerous, pendulous. 3. HEMERA
 - L. simple, umbels solitary or few. 4. DENDRODIA
- B. Cells of ovary 2-4.
 - Albumen ruminated, petals valvate, edge of leaf mostly entire. 5. OSMIA
 - Albumen uniform, petals slightly imbricate. 6. ANAXIS
- C. Cells of ovary 2, petals valvate.
 - Pedicels continuous, styles distinct.
 - L. digitate. 7. ACANTHOPLEURUM
 - L. bipinnate. 7. HETEROMERIA
 - Pedicels continuous, styles united. 8. BELEGIOPHYTES
 - Pedicels articulate, styles united, digitate. 9. MACRODIA
- D. Ovary 2-celled, 4 styles, placentae and loculi 4-lobed.
 - petals. 10. ARTHRODIA
- E. Cells of ovary 2-12.
 - L. digitate, 4 or 5 lobes. 11. BASSIA
 - L. palmate, 8 or 10 lobes. 12. THALIA
- F. Cells of ovary very numerous, stamens 20. 13. THALIA

Diagnosis belongs more properly to the order in which order it has been placed.

1. HEPTAPLEURUM, Gaertn.: Fl. Belg. Ind. ii. 727.

Included in *Schefflera* by Harms in Engler u. Prantl III. 8. 35.

Unarmed tree or large shrub, often epiphytic. Leaves digitate, leaflets of odd size entire or remotely toothed, of copper above and young trees often lous. Umbels generally in panicle racemes, bracts woolly, pedicels not articulate. Fl. often polygamous, male and bisexual, petals valvate, generally 5 or 6, often adhering in a cup which is raised by the stamens. Ovary with 2 or many cells as there are petals. Fr. often fleshy, generally ridged when dry, enclosing 2-6 perispermaceous or membranous pyrenes in which the seeds lie loose. Albumen often more or less ruminated. Species 55, tropics of the old world.

A. Fr. crowned by the long connate styles, seeds convex, albumen often ruminated.

9. *H. impressum*, A. B. Clark. *Vern. Herb. Brit. Mus.*, 1877.

A large tree, lustrous beneath, entire, those ascending from even distichous veins, upper side shining. The nerves impressed, midvein + distichous secondary veins 4-10 per. lvs. common petiole 5-10 in long. Umbels terminal, in large pyramidal panicles. Fr. obtusely and indistinctly 5-ridged + winged.

Locality: Dacca Hill, Nepal, Sikkim, 8-10000 ft. Himalayas. Fr. May 1877. H. Lawrenceanum, Prace in Jorpat, 10,000 ft. Beng. 1877. 200. Kachin hills, 10,000 ft. Burma, 1877. In the Himalayas, mostly elliptic, glabrous, beneath + shining.

10. *H. hypoleucum*, Kerz. F. F. L. 1839.

A small tree, branchlets lustrous and umbels of 1-3 lobes with narrow deciduous veils. Leaflets 6 or 7, on old trees entire or sharply serrulate, on young trees deeply lobed, nerves not impressed above, ven. prominent beneath. Blade 4-12, pet. 1-5 in long. Umbels solitary or a few on long peduncles, these arranged in racemes or cymes on a short pedicel 10-15 in. long with 1-2 triangular bracts at the base of peduncles, petals clothed with dense stellate wool. Fr. globose 1/2 in. diam., 5-angled, 5-seeded, obtusely 5-ridged, capped by the lobed disk and the short column of connate styles. Allomen runcinate.

Locality: Hills, Manipal. Fr. Nepal, 1877. H. glaucum, C. B. Clark. 1877. H. + glaucum, Kurz, Nepal, Sikkim 5-10000 ft. Himalayas. Hills of Manipal and Khasia hills, Malaya, N. Malaya, 1877. An evergreen tree of large size. Leaves glaucous, elliptic-obovate, smooth-surf., pale beneath, wide 4-7, pet. 1-2 in. long, serrations entire, lobes lanceolate in shape, these serrated, broad and shallowly reflexed, petioles with petals on the inside clothed with dense stellate wool. Fr. 1/2 in. diam. Petals 4-5, white at base and tipped pink. Fr. obtusely 5-angled. H. H. glaucum, C. B. Clark. Assam, Khasia Hills. A small tree similar to *H. glaucum* in habit, but smaller, in the upper part of the Himalayas, 4,000 ft. Manipal, 1877. Fr. Nepal, 1877.

H. H. glaucum, Kerz. F. F. L. 1839. H. H. glaucum, Wight, 1841. Fr. 1841. Common on the hills of Assam, 4,000 ft. Ceylon 4-6000 ft. A large tree, branches + veins dark with dense wool below. Leaflets acuminate, glabrous, entire, mostly 4-5, pet. 1-2 in. long. Fls. a rare non umbellate, except those at the ends of the panicle ramifications, but in elongate racemes, united in large lateral umbels. H. H. rostratum, Kerz. F. F. L. 1839. H. H. rostratum, Wight, 1841. Nepal, 4,000 ft. Khasia hills, 5-6000 ft. Travancore 1000 ft. Similar to *H. glaucum*, but the branches of the panicle lengthen out a few inches before the

H. Fr. crowned by the corky disk, bearing 5-6 rounded styles. Petals 4-5, allomen 5-6 runcinate.

11. *H. venulosum*, Seem. - *Syn. Dactyloctenium venulosum*, W. & A. *Vern. Herb. Brit. Mus.*, Hook. *Myrt. Javan. Javak. Javan. Herb. Herbar. Burm.*

A soft-wooded scrubby shrub, attaching itself to supports by aerial roots from branches. Leaflets 5-7, glabrous, entire, elliptic or elliptic-lanceolate, blade 4-8, pet. 1-2 in. long, stipules connate between branch and petiole. Corolla petiole 0-1 in. long. Fls. yellowish-green or cream-colored, polygamous, generally glabrous, 5-6-merous, umbels in racemes, these on a short pedicel, forming an ample panicle, umbels in early bud enveloped by large woody callosous bracts. Petals sometimes coherent in a cap, which is split by the stamens. Fr. styles short, connate at the base into a fleshy tongue, with fruit 5-ridged.

Subindian, tract and outer ranges, from the Himalayas to the coast, 10,000 ft. Assam, Khasia Hills, Chittagong, Andaman, Malacca, Upper and Lower Malacca, Pen. Malacca, throughout the Peninsula, Philippines, Java, Sumatra, Malay Peninsula and Archipelago. Australia. *H. venulosum*, Kerz. F. F. L. 1839. *H. venulosum*, Wight, 1841. In the Western Peninsula, in the Decan as well as in the West Indies, *H. venulosum* is the same tree. A large shrubby tree, the short branches are clothed with lvs. ovate, lanceolate, 4-7, elliptic, obtuse or acute, with a distinct + deep orbicular blade 2-3, pet. 1-2 in. long, common petiole 1-2 in. long, nerves + veins glabrous. H. H. Wallachianum, C. B. Clark. Ceylon, Nilgiris, 1877. Fr. 1877.

petals 5, lobes 5, valvate imbricate. Ovary 3-celled, styles united at the base into a column, their summits spreading. Fr. ribbed, seeds 3-4, obtuse, minutely.

Algeria, France, Balkans, Russia, China, Japan, Korea, India, Ceylon, Java, Philippines, Moluccas, Madagascar, Europe, North Africa, Western Asia. (1905) The berries of the European tree are usually black.

4. **DENDROPANAX**, D. Don & Planchon, Fl. Hôt. Ind. 15, 733.

Sidaea Ad. Ruffo & Pavon; Harms in Engler u. Prantl, II, 8, 10.

Unarmed, glabrous trees or shrubs. L. simple, entire, mucropous above and young plants palmately 3-5-lobed. Fl. umbellate, pedicels not articulated.



FIG. 147.—*Gamblea elliptica*. G. B. S. (det.)

Petal 5-lobed, 5-valvate imbricate. Ovary 3-celled, styles united at the base into a column, their summits spreading. Fr. ribbed, seeds 3-4, obtuse, minutely. Species 12, mostly American.

1. *D. japonicum*, Sieber, Knapf, etc., China, Japan. A tree with strong smell of Anise. It has young plants and coppices, on steeply pithy hills with long pedicels, on the hills elliptic-lanceolate, pinnately 3-5-lobed, 1-2 in long. (1905) The berries are red, solitary or few in a short terminal panicle. Fr. elliptic, nearly 4 in long.

2. *Artemisia*, King in Journ. Bot. Gard. Calcutta, 2, p. 21. (Synonym.)
 The 2 basal verticillates are not fully lateral, as the third of leaf. Fr. 2-5
 lobed.

GAMBLEA. G. B. Clarke, Fl. Brit. Ind. p. 721.

G. ciliata, G. B. Clarke, above species.

A handsome unarmed tree, digitate, leaflets 3-5, sometimes 7, lobes, slightly ciliate, on the upper side with short harsh hairs on nerves and veins, above 2-7, not 2-5, common petiole 3-8 in. long. Fl. polygamous, pentamerous, umbels in short panicles. Petals 5-6, ovary 3-5-celled, styles ciliate nearly half their length. Seeds not compressed, albumen rudimentary.

Flowers 2-12000 ft. on the edge of the Nepal Great Sikkim in the region of *Bambusa*, on *Salween*. Sikkim, Nagahills, 3000 ft. 17 July.

6. ARALIA. Mun. Fl. Brit. Ind. p. 721.

Leaves digitate, pinnate or bipinnate, a pair of leaflets often at the base of pinnule, lobes membranous, serrulate. Fl. umbellate, petals 5, ovate, not imbricate, slightly imbricate imbric. Ovary 2-5-celled. Drupes more or less naked, with 2-5 areolacous or hard pyrenes. Albumen also rudimentary. Sikkim 25-30 India, Malay, Japan to North America.

1. *A. cachemirica*, Desf.; G. B. Clarke Fl. 317, fig. 10a. Vern. *Achola*, Jaunp.

A large herbaceous, roughly pubescent, unarmed shrubby tree, bipinnate, leaflets serrate, ovate-lanceolate, base generally unequal sided, sides 2-6, petiole 1-1.5 in. long. Fl. white, umbels many-flored in large terminal panicles. Fr. black with 5 pyrenes.

Kumaon valley to Birch forest 3-10000 ft. Himalaya, Kashmir to Sikkim, 5000 ft. to the North West, 4-11000 ft. in Sikkim, extending into the lower arid valley. Fl. June-Oct. 2. *A. malabarica*, Hoff. Manual, t. 15 fig. 2. Western Ghats near Malabar Coastward. A large prickly shrub or small tree, nearly glabrous, with persistent weak prickles and bristles. L. bipinnate, leaflets ciliate acuminate, sharply serrate, panicles branched.

3. *A. armata*, Seem.; Kurz F. Fl. 6/361.

A small evergreen tree, youngest shoots puberulous. L. large triangular, bipinnate, at the base four pinnae from axillary, and a leaflet at the base of each pinna, main and secondary rachis with sharp prickles. Leaflets numerous, 3-6 in. long, with short stiff hairs, chiefly along nerves, the lateral shortly serrulate. Umbels many-flored, in large panicles, cylindrical slender, 5 in. long, as well as branched ramifications regularly bi-pinnate. Fr. with 5 broad ridges.

Sikkim 2-5000 ft. Khas Hills, Tenasserim. Fl. June-Sept. Malay Peninsula, 1. *A. rubra*, Seem. Sikkim, 2-5000 ft. A small graceful evergreen tree, covered with prickles. Leaves 5-6 or 7-pinnate, rachis with sharp prickles, main 4 in. long, large 2 1/2 in. at the base of pinnae. Leaflets 2-5 in. long, slightly or deeply serrate, main and secondary rachis along nerves parallel and umbels branched, petals slender, slightly bi-pinnate.

5. *A. Thomsoni*, Seem.; King in Journ. As. Soc. Beng. vol. 67, 44.

A large prickly, softly tomentose shrub. Leaves large 2-3-pinnate, leaflets entire or minutely serrulate, the lateral nearly sessile. Umbels branched, many-flored, panicles with lanceolate bracts at the ramifications.

Assam, Khas Hills, Fl. B. S. Malay Peninsula, 1. *A. castanea*, Griff. Upper Gangetic valley, Turin Central, 2-10000 Kumaon 3000 Sikkim 2-12000 ft. A large tree or small straggling tree. Leaves naked at the ends of arched branchlets, digitate, leaflets 3-6 in. long, veins 3-5. Pinnules small, very solitary, each bearing a small, round seed. The western specimens are unarmed (*A. scandens*, Edgew. & Thoms. from Sikkim and Jaunpur) are prickly.

Anthopanax scolostemum, Seem. Assam, Khas, Jaintia and Naga Hills—China.

leaves a petiole about 1/2 inch long, blade 2-3 inches long, 1-2 inches wide, 1/2 inch long. Underside of leaf is covered with small, dark, glandular hairs. Petiole and blade are densely covered with small, dark, glandular hairs. Petiole and blade are densely covered with small, dark, glandular hairs.

7. HETEROPANAX, Seem.: Fl. Brit. Ind. II 704.

H. fragrans, Seem. (the only species), Vern. *Pinlo, Diabo, No-W.* (Punjab) *Burm.*

A small glabrous soft-wooded herbaceous tree, attaining 60 ft. in Burma. Leaves bipinnate, 2-4 ft. long, leaflets ovate, elliptic or elliptic-lanceolate, 7-10 inch long. Fl. yellow, fragrant, polygamous, tomentose, in elongate panicles 1-2 feet long. St. sessile or nearly so, in globose heads, the bisexual fl. in umbels usually at the ends of racemes. Pedicels not articulate, petals 5, valvate, nearly 2-lobed, styles 2, distinct, filiform. Fr. laterally compressed, 1 cm. diam., exocarpy, crumose, albumen ruminant.

Heteropanax later (see the *Jussiaea* section). Assam, Khasi hills, Chittagong, Java, Burma, Fl. Brit. Ind. China, Thunb. Jav. II 1, 1858, the *Heteropanax* section.

8. BRASSAIOPSIS, Decc. & Planch.: Fl. Brit. Ind. II 705.

Trees or large shrubs, usually prickly, l. simple, palmate or digitate. Inflorescence and calyx stellately hairy when young, pedicels not articulate, bracts no indication of induraceous persistent. Fl. pentamerous, often polygamous, pedicels not articulate, petals valvate. Gony 2-lobed, styles united. Fruit: 1-seeded, albumen laciniate species ruminant. Species 11. India, Malay, Andam. shrubs.

A. Leaves undivided.

B. simplicifolia, C. B. Clarke, Mianm. Hills. Branchlets prickly hairy, tomentose, serrate, glabrous, pedicels not articulate. L. simple, half inch long, pet. 1/2 inch long. *B. hainanensis*, C. B. Clarke, Sikkim 4000 ft., Burma, Nag hills, Manipul, Yunnan. A small evergreen bush branched and sometimes woody at base, leafy branches young and old tomentose. L. simple, half inch long, pet. 1/2 inch long. *B. alpinus*, C. B. Clarke, Sikkim 10-11000 ft. Branchlets, leaves and inflorescence densely hairy with tomentum. L. simple, serrate, tomentose, pet. 1/2 inch long, pet. 1/2 inch long, pet. 1/2 inch long. C. B. Clarke states that this may possibly be a high level form of *B.*

B. Leaves palmated, divided half-way down at most.

B. palmata, Kurz, F. C. 1867. Sikkim 4000 ft., Chittagong, Andaman, Malay, India. A small evergreen bush leafy branches with rusty tomentum. L. simple, depth 5-7 inch, width 5-10, pet. 5-11 in. long, closely allied to *B. simplicifolia* but specifically distinct. In *Heteropanax* as well as in other *Araceae* the leaves vary considerably, and the flowers here accepted as one in their study to be distinct. *B. elliptica*, C. B. Clarke, May 1861, Sikkim 4000 ft., Chittagong, Andaman. A small upright herbaceous tree, branches often or rarely prickly, l. simple, pet. 1/2 inch long, pet. 1/2 inch long, pet. 1/2 inch long, pet. 1/2 inch long, pet. 1/2 inch long. L. simple, hairy beneath, petiole with small bristles near the end. Umbels 1-2 feet long, panicles below the tail of leaves. *B. hispida*, Seem., Sikkim 4000 ft., Manipul, India, Yunnan. A small prickly tree, l. simple 7-8 ft., a geminate albumen, ruminant, lobes 6-8 inch long, pet. 5-10 inch long, as long as blade. Carpellules are rarely densely stellate-tomentose. *B. Griffithii*, C. B. Clarke, Assam. Imperfectly known, apparently unarmed, l. very large, above glabrous, thickly tomentose, l. also distinctly tomentose, petals 5-lobed when flowering, disk crustal.

C. Leaves digitate.

B. speciosa, Decc. & Planch.: Fl. Brit. Ind. II 705.

A small simple-stemmed tree, prickles on the stem and often also on the

petals. Leaflets alternate, ovate, elliptic-oblong when young, often with scattered stellate hairs, ven. arcuate, prominent beneath, blade 4-8, pet. 1-3, connate, pedicel 12-24 in. long. Umbels many-lobed, peduncles 1-4 in. long, drooping pendulous-racemes. Fr. more or less globose, hardly ribbed, $\frac{1}{2}$ in. diam., crowned by the flat circular disk of the connate styles. Seeds usually 1, sometimes 2, surface irregularly grooved. Alburmen not or very slightly ruminato.

Sikkim, to 5000 ft. Assam, Khasi hills, Garo, Chittlang, Hills east of Bhamo, Upper Burma, at 5500 ft. Fl. & S. Yunnan, D. H. Hooker, C. F. Clark, Sikkim, to 5000 ft. Khasi hills. A prickly tree, young shoots, inflorescence, petals and leaves beset with stellate rusty tomentum, leaflets marginally serrate, blade 4-18, pet. 1-3 in. long. 10. *A. umbellata*, Benth. Khasi hills, 2000 ft. Nepal, Khasi hills. A small tree, 4 or 5 ft. tall, young shoots, young shoots densely beset with tomentum, leaflets serrate, blades alternate, blade 9-5, pet. $\frac{1}{2}$ in. long, sometimes very leaflet only, full grown leaves with points blunt, petioles flat, hairy on both surfaces.

9. **MACROPANAX**, Miq.; Fl. Brit. Ind. II. 738.

Small unarmed trees. L. digitate, leaflets 3-5, glabrous. Panicles large, bracts small, deciduous, fl. umbellated, polygamous, pentamerous, pedicels articulate under the n. Petals calvate, ovary 2-celled, styles united. Fr. ribbed, seed basally compressed. Species 2.

1. *M. oreophilum*, Miq.; Kurz F. Fl. I. 541.

A middle-sized evergreen tree. Leaflets glabrous, lanceolate, denticulate, serrate or crenulate, blade 4-6, pet. 1-3, connate, pedicel 4-10 in. long. Umbels in 1 or 2 compound panicles, the ramifications of which, as well as pedicels, are clothed with rusty, stellate pubescence. Fr. elongate-ovoid, $\frac{1}{2}$ in., disk circular, side 4 in. long.

Khasi hills, outer hills, according to 5000 ft. Nepal, Sikkim, Ekhotari, Assam, Khasi hills, Chittlang, Hills east of Bhamo, Yunnan, Upper Burma (Kura), Fl. Brit. Ind. Yunnan. 2. *M. annulatum*, Benth. Sikkim, outer hills to 5000 ft. China, Nepal, Assam, Khasi hills, Sikkim, Yunnan. A small tree, leaflets entire, panicle glabrous.

Arthropodium diversifolium, Benth. Syn. *A. peruvianum*, Benth. Kurz F. Fl. I. 541. Andaman, Malay Peninsula. A shrub or small tree. Leaves glabrous or nearly so, the lower 3- or 5-lobed, the tuberculately pinnate, the upper ones bipinnate, simple or trifoliate. Inflorescence a simple and umbel, pedicel 1 or 2 pedicels clothed with rusty tomentum. Calyx stellate tomentum, calyx lobes 5-angled. Corolla tubular, small, petals 5-angled, ovary 2-celled, 2-celled, or 1-celled. Seed nearly globose, but raised at base, flattened.

Reynoldsia cuneata, C. B. Clarke. Nigris. L. digitate, leaflets 3 or rarely 5, elliptic-oblong, blade 4-7, pet. 2 in. long. Fl. in a cyme of 2-5 or 6-8 tuberculately lobed, each fl. surrounded by 4 bracts, as long as ovary and united below into a tube. Tubercles 1-2 in. long, in the axils of veins persistent, cuneiform, bracts, in raceme 12-15 in. long, 2 or 3 or 4 thick. Petals 8-10 thick, calyx, stamens and ovary cells as many as petals. Pericarpium, raised later.

10. **TREVESIA**, Vissoni; Fl. Brit. Ind. II. 731.

(Species 4, Malay Archip.)

T. palmata, Vils.; Kurz F. Fl. I. 539. Vern. *Doo*, Burm.

A small evergreen, generally tuberculately tree, armed with short very sharp prickles, young shoots rusty pubescent and very prickly. Leaves orbiculate in general outline, 12-24 in. diam., deeply palmately lobed, acuminate, serrate, sometimes lobed, often cut away in one or several places, so as to leave the midrib of the lobe free, petiole often prickly. Fl. large, umbels pedicel, pedicels not articulate. Young panicles clothed with rusty tomentum, bracts 1 in. long. Calyx-limb free, undulate or repand-toothed, petals 8-12, calvate.

often coherent, but coming off as a cap. Stamens and carpels as many as petals. Fr. fleshy, oval, 1/2 in. diam., crowned by the stout style.

Nepal, Sikhim, Terai, basical streams, ascending to 4000 ft. Khas hills, Garo, Jaintia, Upper and Lower. Fl. Feb.-April; Yunnan, Malay Peninsula.

Tendanius calyptrata, Hook. & Thoms. Khas hills, Burma, western slopes of the Arakan Yoma, Terai of Khas hills. A large glabrous shrub, stem developing into a large clubbed, wood hard. L. digitate, leafless, 7-9 inches long, entire, blade 4-7, pet. 1-2 in. long, ovate, petiole 8-12 in. long, stipules connate within the petiole. Fr. 1/2-3/4 in. diam. in a short panicle with stout branches, pedicels thick, woody-articulate. Fl. large, resembling male's calypters, petals connate, falling off in a few stages 10-15, crowded, ovary-bells numerous, narrow, up to 10, arranged on both sides of a line which usually bifurcates at the ends. Stigma is linear, sessile, as long as ovary-bell. Fr. incumbent, depressed, 1-1 1/2 in. diam.

ORDER LIX. CORNACEÆ. Gard. Pl. 4, 947.

Shrubs or trees, L. petiolate, entire, stipules 0. Fl. regular, calyx tubular, adnate to ovary, limb persistent, the segments small, open or valvate in fruit. Petals 4 or 5 inserted round an epigynous disk, stamens usually as many as petals, ovary inferior, 1-4-celled, one rarely two-lobed, or rarely with cell. Fruit generally drupaceous with a 1-4-celled pericarp or a 1-2-celled stone. Embryo in a lobe, fleshy albumen, cotyledons generally thin, filiform.

A. Flowers bisexual, petals long, linear.

Style 1 or 2, as long as ovary, 1-celled.

Stamens as many as petals.

A. *ALANGIUM*.

A. *MARIT.*

B. Flowers bisexual, petals short.

Ovary 2-celled.

Ovary 1-celled.

B. *CORNUS*.

A. *MAXIMIA*.

C. Flowers unisexual, l. opposite.

ACER (p. 897).

D. Fl. unisexual, l. alternate.

Fl. in dense heads, ovary 1-celled.

Fl. in large pendulous panicles, ov. 2-celled.

Fl. on the under side of leaf, ov. 2-3-celled.

D. *NYSSA*.

TORRECALIA (p. 898).

HECATEA (p. 897).

1. *ALANGIUM*, Lam. : Fl. Brit. Ind. ii, 741.

Shrubs or small trees, l. alternate, entire, penninerved, the lower part of nerves from the base. Fl. white, bisexual, in axillary fascicles or cymes. Calyx-tube tubular, free portion short, truncate or 5-lobed. Petals 5-10, strap-shaped, valvate, afterwards reflexed. Stamens over 20, filaments short, hairy, anthers linear, connate to the connective and dehiscing laterally. Ovary 1-celled, style dilated. Fr. crowned with the persistent calyx-tube. Species 16, Tropical and Subtropical Asia and Africa, Australia, Polynesia.

1. *A. Lamarckii*, Thwaites; Bedd. Fl. Sylv. t. 215. — Syn. *A. decapetalum*, Hook. & Wight III. t. 91; *A. decapetalum* Lamk.; Wight Jr. p. 184. Yarn. *Alang*, *Alangul*, *Kivoh*, *Hind*; *Antol*, *Mar*; *Anicola*, *Kan*; *Uca*, *Udaja*, *Tel*, *Alang*, *Tam*.

A shrub or small tree, bark grey, wood fine-grained, tough and sinuous, branchlets generally spinose. L. membranous, varying exceedingly in shape, from obovate to elliptic and obovate, from obtuse to acuminate, blade 3-4, pet. 1/2-1 in. long, pubescent while young, glabrous or pubescent on the underside when full grown. Fl. fragrant, solitary or fasciculate, pedicels and calyx hairy, petals 1 in. long, 5-10, usually 6, hairy outside. Fr. 1/2 in. long, black when ripe, seed encased in red pulp. Cotyledons large flat, with 3 lines

traces, mucous albumen, which is not ruminated. (If collected separately seeds, when dry, have a central cavity and the cotyledons on drying become cuppled.)

—Siam, Malay archipelago, from the Sularung in Sumatra to Outer Gangetic Plain, in Siam, Central Provinces and the Western Peninsula. Shows quite leafless fall, & covered April-May. Fl. Feb-April. A variety with broadly elliptic acuminate leaf, solitary cymes situated in the Peninsula. Cultures well. Fr. eaten, as extracted from the seeds. Ceylon, Malay Archipelago, South China. 2. *C. Kingium*, Prain & Jenyns, Bot. Beechey, vol. 47, 291. Kachin hills, Upper Burma. Ascendant, somewhat shrubby. Fl. 1-4 in. long, lax pedunculate axillary cymes, much shorter than

2. MARLEA, Rehb.; Fl. Brit. Ind. ii, 742.

Included under *Alangium* by Harms in Engler u. Prantl iii, 6, 2613.

Tree or shrubs, alternate. Fl. bisexual in axillary cymes. Petals 6-10, linear, valvate in bud. Stamens as many as petals, filaments short, adnate to base of petals, anthers linear. Ovary 1- or 2-celled, one ovule in each cell. Style bifid, stigma 4-lobed. Drupe with thin pericarp, pitamen grooved. Species 10. India to Australia and Polynesia.

1. *M. begoniifolia*, Kerst. Cov. Fl. v, 283. Vern. *Kaloh*, *Khangli*, *Hwa Noh*, *Gan-chinon*, Hind.; *Hwah Nop*; *Tang-poo*, Upper Burma.

A small tree, bark smooth, grey, branches horizontal, young shoots pubescent. Leaves pubescent or glabrous, varying from broad ovate semilobate, to ovate, often with an oblique base and angularly lobed, blade 4-10, pet. 1-1 1/2 in. long, basal nerves 3-5. Fl. white, in axillary dichotomous cymes, petals 6-8, 1/2 in. long, slightly hairy on back, ovary 2-celled. Fr. ovoid, 1/2 in. long, pulp scanty, pericarp heavy, 2-celled.

—Siam, Malacca, Java, and other islands, ascending to 6000 ft. Assam, Khasi hills, Patna, Upper Burma. Fl. March-June—China, Japan. *M. hainanensis*, Endl. Kuhn Fl. Fl. 346, petals nearly as long as leaf, probably belongs to this species. 2. *M. alpinum*, Gamble MSS. 3000-4000 ft. usually not angled or lobed, fr. 1/2 in. long, pericarp thin, one-seeded, one cell abortive. 3. *M. hirtata*, H. DC. Assam, Bhutan, China, Tenasserim, smuggy with smooth or spreading hair, 1 ovule, oblong-ovoid, one-seeded, one cell abortive, ovary 1-celled.

3. CORNUS, Lam.; Fl. Brit. Ind. ii, 744.

Shrubs or trees, l. opposite, rarely alternate. Fl. bisexual, branched, white or yellow, in heads or dichotomous cymes. Calyx 5-toothed minute, petals valvate in bud, stamens alternating with petals, anthers oblong. Ovary 2- or 3-celled, one ovule in each cell. Fruit drupeous, pitamen hard, crustaceous to woody, 2- or 3-celled. Cotyledons full, erect in a fleshy albumen.

A. Fl. in compound cymes.

1. *C. macrophylla*, Wall.; Brande F. Fl. v, 81. Vern. *Kandur*, *Kan-bah*, *Kanchitan*, Bush.; *Kuphi*, Jaintia.

A middle-sized tree, l. broad-ovate, acuminate, pale glaucous beneath, blade 4-6, pet. 1-1 1/2 in. long, sec. n. 5-8 pair. Fl. white, in cymes terminal dichotomous cymes on short peduncles, buds 1/2 in. long, calyx ovate. Pedicels, calyx and base of petals clothed with white appressed hairs. Drupe globose, 1/2 in. diam.

Himalaya, Hainan. Nepal, 4-8000 ft. frequent in shady valleys. Fl. April-June. The wood of this and other species of this genus is close and when gamed, similar to that of *C. odorata*, L., largely used for turnery in North America. A species with alternate l. and serrulate calyx, 8000-9000 ft. Bhutan, Manipur (*C. macrophylla*, Hance), like *C. odorata* allied to *C. odorata*, Linn. f. of Western North America. 2. *C. atropa*, Walp.; *Korhol*, Jaintia; *Bowen*, Kunz. Himalaya, under hills 2-7000 ft. Khasi hills, Jaintia. A small tree, l. narrowly oblong, petiole

FIG. 149.—*Cornus blanda*, Wall. f.

A small deciduous tree, branchlets and lvs. rough with short stiff appressed hairs. Lvs. coriaceous, pale beneath, approximate at the ends of branchlets, blade 2-4, narrowed into petiole $\frac{1}{2}$ in. long. Fl. closely packed in terminal heads with a conspicuous involucre of 4 large yellow petaloid bracts. Lvs. uniting into a fleshy strawberry-like head, 1 in. diam., each drupe with a small 1-seeded stone.

Occ.: Himalaya from Kulu to Bastian; Khasi and Naga hills. Fl. April-Oct.

4. *MASTIXIA*, Blume: Fl. Brit. Ind. II, 745.

Trees, resin-canals in the pith. Lvs. alternate or opposite, entire. Fl. small, bisexual, 4-5-merous, 2-bracteolate, in terminal many-fl. panicles. Calyx-tube as well as the valvate petals pubescent, disk large, fleshy. Ovary inferior, 1-celled, ovule 1, pendulous. Drupe with a hard fleshy pericarp and a bony endocarp, which is deeply intruded down one side, dividing the seed into 2 lobes, embryo in raphe, fleshy albumen, radicle long. Species 18, India and Malaya.

1. *M. arborea*, C. B. Clarke: *Bull. Fl. Brit. Ind.*, I, 215-8, 896. *Myrsine arborea*, Wight, *Bot. Beech.*, Ocker. Evergreen forests of the Western Ghats and of the upland ranges 2-7000 ft. from the Konkan southwards. Ceylon. *A. y. r. Myrsine arborea*, Hook. & Thunberg, *Blade* 2-4, petiole $\frac{1}{2}$ in. long. Fl. green, disk yellow. The lower part of the panicle often in the axils of small or large bracts, in elliptical 1 in. long, purple or green. Possibly identical with *M. pentaden*, Blume, of Java. If proved, it is a new species. No possible difference between *M. arborea* and *peruviana* of Thunberg. Brit. India. 2. *M. eucalyptoides*, Prain in Journ. As. Soc. Bengal, vol. 67, 188. *Kashia* Miq., lvs. opposite, blade 4, pet. $\frac{1}{2}$ in. long, fr. almost cylindrical, $\frac{1}{2}$ in. diam. Perhaps the same as a very large tree 20 ft. high, 100 ft. in circ. branch found by Wats. at Kulu, Malabar, 6/1891.

Acacia himalaya, Hook. f. in *Bull. Ind. Mus.*, Manipal, 1890. A large shrubby or small tree, evergreen, some shoots dotted with long silky hairs. Lvs. opposite, imbricate, demarcated by serrate, blade 2-3, pet. 1 in. long. Fl. dioecious, terminal, many-fl. in small axillary or terminal cymes. Bracts white, hairy, pubescent. Calyx-tube hairy, petals lanceolate, valvate, 5-lobed. Ovary 1-celled, with 1 ovule. Fruit 1-celled. Berry about 1/8 in. diam. The same tree is also found at the Japanese M. species Thunberg, mentioned in all his papers, sometimes with variegated leaves.

3. *M. blanda*, Wall. f. *Blume*, *Fl. Brit. Ind.*, II, 745. *Myrsine blanda*, Wight, *Bot. Beech.*, Ocker. *A. y. r. Myrsine blanda*, Hook. & Thunberg, *Blade* 2-4, petiole $\frac{1}{2}$ in. long. Fl. green, disk yellow. The lower part of the panicle often in the axils of small or large bracts, in elliptical 1 in. long, purple or green. Possibly identical with *M. pentaden*, Blume, of Java. If proved, it is a new species. No possible difference between *M. blanda* and *peruviana* of Thunberg. Brit. India.

R. Fl. in globose bracteate heads.

4. *C. capitata*, Wall. f. *Blume*, *Fl. Brit. Ind.*, II, 745. *Myrsine capitata*, Wight, *Bot. Beech.*, Ocker. *A. y. r. Myrsine capitata*, Hook. & Thunberg, *Blade* 2-4, petiole $\frac{1}{2}$ in. long. Fl. green, disk yellow. The lower part of the panicle often in the axils of small or large bracts, in elliptical 1 in. long, purple or green. Possibly identical with *M. pentaden*, Blume, of Java. If proved, it is a new species. No possible difference between *M. capitata* and *peruviana* of Thunberg. Brit. India.

5. NYSSA, Linn.; Fl. Brit. Ind. ii. 747.

Species 5, one in China, 3 in eastern North America.

N. sessiliflora, Hook. fl. — Syn. *Daphniphylopsis capitata*, Karz F. Fl. I. 290. Vern. *Pani kudam*, Ass.

A large evergreen tree, l. membranous, glaucous beneath, numerous raised dots on both surfaces, blade 5-8, pet. 1-1½ in. long. Fl. sessile, usually pentamerous, sometimes 6-7-merous; green, many ♂ and one or a few ♀ fl., with numerous bracts in a dense globose pedunculate head; these in short axillary pubescent panicles, often solitary near the ends of branches. ♂: calyx short cup-shaped, petals imbricate, hairy, stamens usually 10, inserted round a large ottoidal disk. Fr. ovoid, endocar. long, exceedingly hard.

Siakim 5-7000 ft. Assam, Msham Forest G. B. April 1870. Khasi hills, Cachan hills east of Tongso, 4-8000 ft. — Fl. April, May, Perak, Sumatra, Java.

Toricella ulmistolia, DC. Nepal, Sikkim 5-10000 ft. A small deciduous tree, branchlets thick with large pith. L. alternate, when full grown glabrous or slightly pubescent beneath, cordate, sharply serrate, blade 5-7, petiole 3-4 in. long, sheathing. Fl. small, white, dioecious, usually pentamerous, numerous in pendulous panicles. ♂: calyx tube short, petals acuminate, imbricate-ciliate, stamens usually 5, inserted round the disk. ♀: petals 6, ovary inferior 3-celled, stigmas 3-5, sessile, cylindrical. Drupe ovoid purple, seed linear, curved, embryo minute in a fleshy albumen.

Hewingia himalaica, Hook. f. & Thunb. Sikkim 1-9000 ft. Khasi hills, Manipur China. A small shrub, l. alternate, lanceolate, sharply serrate, blade 3-5, pet. 1 in. long. Fl. unisexual, in small few-fl. umbels sessile on the under side of leaf or of large bracts. Calyx truncate, petals and stamens 5, ovary 3-5-celled, styles abortive, united at base. Fr. sessile, 1-fl. on the leaf, ellipsoid, ½ in. long, 2-3-celled with furrows between the carpels. Embryo minute, in copious albumen.



Fig. 149. — *Nyssa sessiliflora*, Hook. fl.

ORDER LIX: CAPRIFOLIACEJffi. Gen. Pl. ii. 1.

Shrubs or small trees, rarely herbs. L. opposite, usually without stipules. Calyx-tube adnate to ovary, limb 3-5-toothed. Corolla gamopetalous, often zygomorphic, lobes 5, imbricate in bud. Stamens usually as many as corolla lobes, inserted in the corolla tube, often unequal, anthers versatile. Ovary 1-8-celled. Fr. a berry or drupe, rarely capsular, 1- or many-seeded. Embryo minute, in copious fleshy albumen.

In most genera the wood fibres have bordered pits. As far as known the wood of the effulging species (*Limneca*) has a normal structure with numerous and in some species large vessels.

- | | |
|--|------------------------|
| 1. Corolla tubular or campanulate, ovary cells 1- or many-celled, style bifid. | |
| Stamens 5, calyx 5-dentate, ovary 2-3-celled | 1. <i>Limneca</i> . |
| Stamens 5, calyx lobes 5, linear, ovary 5-8-celled | 2. <i>Leucocenta</i> . |
| Stamens 4, calyx lobes 5, linear, ovary 3-celled | 3. <i>Abelia</i> . |

leaves hairy beneath with 4-veined veins to 15. The flowers are generally in small racemes or cymes and yellow. *L. holosericea* Wall. is a heterostylous form from N.W. Himalayas. Similar to *L. holosericea* but with 4-veined leaves.

11. *L. scabra* Lam. Kumaon valley, 12000 ft. N.W. Himalayas (1890-1891), and in *faciobrevata* (L.) Wimmer, An. & Gilg. A large shrub, rarely glabrous, dark green, with pubescence. Leaves ovate to elliptic, pet. 4-5 in. long. Fl. prostrate, pedicels 1/2-3/4 in. long, in leaf axils, mostly glabrous, sessile. Style 2-3 in. long. Ovary 3-lobed, the lobes somewhat unequal, with long wiry hairs on lobes. Berries black when ripe. 12. *L. curvula* Lam. 1891 (var. *L. curvula*) (Dobson July 1892). Large and smaller forms. Fl. in leaf axils, the lobes of the calyx somewhat unequal. Leaves ovate to elliptic, pet. 1-2 in. long. Fl. prostrate, pedicels 1/2-3/4 in. long, in leaf axils, mostly glabrous, sessile. Berries black when ripe. 13. *L. microphylla* Willd. Kumaon valley. Lower and N.W. Himalayas (1890-1891). Western Tibet and Western Sikkim. Very prostrate, 1-2 in. long, pet. 1/2-3/4 in. long. Fl. prostrate, pedicels 1/2-3/4 in. long, in leaf axils, mostly glabrous, sessile.

12. Dicotyledonous large shrubs, corolla bilabiate, 1 in. long or less, bracts linear-lanceolate.

14. *L. hypoleuca* (DC.) Balogh, Bot. Jahrb. 1910. Aerial twigs of the lower N.W. Himalayas 8-10000 ft. Bark black, lenticel. Small shrub, prostrate or rarely ascending, glabrous, white or green beneath. Berries 1-1 1/2 in. long. Fl. prostrate, pedicels 1/2-3/4 in. long, in leaf axils, mostly glabrous, sessile. Style 2-3 in. long. Ovary 3-lobed, the lobes somewhat unequal, with long wiry hairs on lobes. Berries black when ripe. 15. *L. gynaecocaria* (Hornem.) Gilg. & Gilg. 1891 (var. *L. gynaecocaria*) (Dobson July 1892). Small shrub, prostrate or rarely ascending, glabrous, white or green beneath. Berries 1-1 1/2 in. long. Fl. prostrate, pedicels 1/2-3/4 in. long, in leaf axils, mostly glabrous, sessile.

16. *L. gynaecocaria* (Hornem.) Gilg. & Gilg. 1891 (var. *L. gynaecocaria*) (Dobson July 1892). Small shrub, prostrate or rarely ascending, glabrous, white or green beneath. Berries 1-1 1/2 in. long. Fl. prostrate, pedicels 1/2-3/4 in. long, in leaf axils, mostly glabrous, sessile. Style 2-3 in. long. Ovary 3-lobed, the lobes somewhat unequal, with long wiry hairs on lobes. Berries black when ripe. 17. *L. gynaecocaria* (Hornem.) Gilg. & Gilg. 1891 (var. *L. gynaecocaria*) (Dobson July 1892). Small shrub, prostrate or rarely ascending, glabrous, white or green beneath. Berries 1-1 1/2 in. long. Fl. prostrate, pedicels 1/2-3/4 in. long, in leaf axils, mostly glabrous, sessile.

13. Erect shrubs, corolla 5-lobed 1-2 in. long, or less, bracts large, ovate, bracteoles small or 0.

18. *L. stipida* Pall. (*L. holosericea* DC. ex DC.) Lower and Himalayan districts 1000-15000 ft. from Balistan to Sikkim and Tibet to Sikkim, China. A shrub, mostly prostrate, but sometimes upright, base woody or caudex. Leaves 1-2 in. long, pet. very short. Fl. in pairs, lobes and pedicels enlarged in calyx. Style 2-3 in. long. Ovary 3-lobed, the lobes somewhat unequal, with long wiry hairs on lobes. Berries black when ripe. 19. *L. repens* Hook. f. & Thoms. Lower and N.W. Himalayas and all the districts of Tibet, Balistan to Kumaon (1-44000 ft.). A low and branched shrub, much like *L. holosericea* but with 4-5 in. long, pet. 1-1 1/2 in. long. Fl. prostrate, pedicels 1/2-3/4 in. long, in leaf axils, mostly glabrous, sessile. Style 2-3 in. long. Ovary 3-lobed, the lobes somewhat unequal, with long wiry hairs on lobes. Berries black when ripe. 20. *L. glabra* Hook. f. & Thoms. Kumaon valley above 12000 ft. Lower and Himalayas 12-15000 ft. Talus, Kumaon. A small shrub growing on slopes of rocks. L. elliptic-oblong 1-2 in. long, fl. lemon yellow, 8 in. long.

E. Kras, mostly large shrubs, 1-3 in. long, corolla 5-lobed, bracts linear, bracteoles usually ovate.

21. *L. hirsuta* Wall. Wight Ic. t. 105. Bot. Manual t. xv. f. 5. Nepal, Khas, Nep. Sikkim. A shrub or small bushy tree, stem terete, bracteoles and pedicels pubescent, l. firm, calyx lanceolate, blade 1-2 in. long, pet. 1/2 in. long, midrib beneath hairy or less hairy. Fl. nearly sessile, corolla hairy in- and outside, 1/2 in. long, lobes 1/2 in. long. Berries usually woody, bracteoles enlarged in fruit, forming an involucre, resembling the 2 or 3 bracteoles.

22. *L. angustifolia* Wall. Verna, Green Code, Flora Jaipur. N.W. Himalayas 8-10000 ft. Sikkim 10-12000 ft. A shrub, attaining 12 ft. bark scabrous in long, lenticel. Leaves ovate, pale and nearly glabrous beneath, blade 1-2 in. long, pet. 1/2 in. long. Pedicels single, axillary, sessile, 1/2 in. long, calyx 1-2 in. long. Ovary 3-lobed, the lobes somewhat unequal, with long wiry hairs on lobes. Berries black when ripe. 23. *L. purpurascens* Hook. f. & Thoms. Kumaon valley, Himalayas 8-10000 ft. Erect shrub to Sikkim.

pendent, lacin. long. at the time the seeds ripen. Ovary 2-celled, fruit capsularous indehiscent, 1-seeded.

N. W. Himalaya, Kashmir or Kuluca
 4000-5000 feet. In fruit time. See
 Trautv. & Pl. May-Aug.

3. VIBORNUM, Linn.

V. Brit. Ind. III, 3.

Similar to trees, woody, gray-barked, leaves simple, when bruised small spots disarticulate. Fl. white or pink, pentamerous, regular, in a compound umbel. Hypanth. at anthesis the outer 4-5 lobes sterile, larger and very scarious. Fr. *Opuntia*, L. The tree is found in Europe, Siberia and North America. Stems & ovary 10-celled, one pendulous scale on each cell. Drupe dry or fleshy, seeds crisp crustaceous, 1-2. L. seed falls & decays by the seed-carp projecting into the cavity. Species about 100, a few in Europe and the Mediterranean region, the majority in the temperate and subtropical regions of Eastern Asia and North America. Of the 40 species here described, 4 are found both in the Western and Eastern regions. Two of these, *V. oxylobum* and *oxylobum*, extend from Cape P. & Alaska to *schottianum* is found in China, while *V. punctatum* is limited to India.

A 5-6 ft. tall, often with shallow grooves. Fl. in compound umbels.
 2. Corolla short, rotate, funnel-shaped, or campanulate, 4-5-lobed, generally membranous.
 3. *V. cotinifolium*, DC. — *Wight II, 5, 1234* — *Coll. et. Sinica Pl. 221, fig. 66*, *V. Brit. Ind. III, 3, Rhododendron*; *Dalman, 6, 7, 8*, *Garnier, K. 1000*. A large deciduous shrub, young shoots and undersides of lvs. hairy, with gray stellate tomentum. Ls. rugose, ovate, elliptic or orbicular, 10-15 cm. long, 5-7 cm. wide, base rounded or slightly cordate, blade 2-5 pct. serrate, $\frac{1}{2}$ in. long. Corolla white, tinged with pink, tube $\frac{1}{2}$ in. long, turbinate, fr. red, $\frac{1}{2}$ in. long, 10-15 mm.

4. *V. stellatum*, Wall. Pl. As. Ind. I, 109. — Syn. *V. involucrellum*, Walt.

5. *V. cotinifolium*, DC. — *Wight II, 5, 1234* — *Coll. et. Sinica Pl. 221, fig. 66*, *V. Brit. Ind. III, 3, Rhododendron*; *Dalman, 6, 7, 8*, *Garnier, K. 1000*.

A large deciduous shrub, young shoots and undersides of lvs. hairy, with gray stellate tomentum. Ls. rugose, ovate, elliptic or orbicular, 10-15 cm. long, 5-7 cm. wide, base rounded or slightly cordate, blade 2-5 pct. serrate, $\frac{1}{2}$ in. long. Corolla white, tinged with pink, tube $\frac{1}{2}$ in. long, turbinate, fr. red, $\frac{1}{2}$ in. long, 10-15 mm.

6. *V. stellatum*, Wall. Pl. As. Ind. I, 109. — Syn. *V. involucrellum*, Walt. *V. Brit. Ind. III, 3, Rhododendron*; *Dalman, 6, 7, 8*, *Garnier, K. 1000*. A shrub, branches 1-2 in. long, bark dark gray. Branchlets, petioles and midribs covered with brown stellate pubescence. Ls. glabrous above, sparingly stellate pubescent beneath, ovate, ovate-lanceolate, long acuminate, with large distinct toothed lobes 4-5 pct. sigmoid, $\frac{1}{2}$ in. long. Fl. small, very numerous, compound umbels large, sessile or shortly pedunculate, calyx hirsute, corolla white, pedicels $\frac{1}{2}$ in. long. Drupe bright red, $\frac{1}{2}$ in. long.

7. *V. stellatum*, Wall. Pl. As. Ind. I, 109. — Syn. *V. involucrellum*, Walt. *V. Brit. Ind. III, 3, Rhododendron*; *Dalman, 6, 7, 8*, *Garnier, K. 1000*.

A shrub, branches 1-2 in. long, bark dark gray. Branchlets, petioles and midribs covered with brown stellate pubescence. Ls. glabrous above, sparingly stellate pubescent beneath, ovate, ovate-lanceolate, long acuminate, with large distinct toothed lobes 4-5 pct. sigmoid, $\frac{1}{2}$ in. long. Fl. small, very numerous, compound umbels large, sessile or shortly pedunculate, calyx hirsute, corolla white, pedicels $\frac{1}{2}$ in. long. Drupe bright red, $\frac{1}{2}$ in. long.

8. *V. stellatum*, Wall. Pl. As. Ind. I, 109. — Syn. *V. involucrellum*, Walt. *V. Brit. Ind. III, 3, Rhododendron*; *Dalman, 6, 7, 8*, *Garnier, K. 1000*. A shrub, branches 1-2 in. long, bark dark gray. Branchlets, petioles and midribs covered with brown stellate pubescence. Ls. glabrous above, sparingly stellate pubescent beneath, ovate, ovate-lanceolate, long acuminate, with large distinct toothed lobes 4-5 pct. sigmoid, $\frac{1}{2}$ in. long. Fl. small, very numerous, compound umbels large, sessile or shortly pedunculate, calyx hirsute, corolla white, pedicels $\frac{1}{2}$ in. long. Drupe bright red, $\frac{1}{2}$ in. long.

9. *V. stellatum*, Wall. Pl. As. Ind. I, 109. — Syn. *V. involucrellum*, Walt. *V. Brit. Ind. III, 3, Rhododendron*; *Dalman, 6, 7, 8*, *Garnier, K. 1000*.



FIG. 101.—*Vibornum*.

young shoots and young leaves, especially in the first few weeks after the
sprout. It is surrounded by minute, sharply serrated, blunt-tipped, 5-7
toothed, 6-8 pair, basally connate, beneath, as well as the upper, sharp, long
veins. Fr. white, appearing with or before the leaves, crowded in terminal cymes
or panicles, sessile or stalked. Drupes 1-1.5 in. long, in an spreading panicle, usually
with point of beak lengthened out. Seeds with imbricated edges. All parts minutely
pubescent, the lateral veins, according to V. odoratissimum, Wall. 1815, in
Upper Burma, Upper Burma, Fl. Malacca, 1815, 1816, 1817, 1818, 1819, 1820,
1821, 1822, 1823, 1824, 1825, 1826, 1827, 1828, 1829, 1830, 1831, 1832, 1833, 1834,
1835, 1836, 1837, 1838, 1839, 1840, 1841, 1842, 1843, 1844, 1845, 1846, 1847,
1848, 1849, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860,
1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873,
1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886,
1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899,
1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912,
1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924,
1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936,
1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948,
1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960,
1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972,
1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984,
1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996,
1997, 1998, 1999, 2000.

9. *Cordia* short, l. coriaceous.

7. *V. punctatum*, Ham; Field, Fl. Sylv. t. 217. Syn. *V. speciosum* Walp. Wight Ic. t. 1021.

A. An evergreen shrub, wholly glabrous, branches stout. L. shining elliptic,
almost entire, acuminate, narrowed into petiole 1 in. long, on the under-
side dotted with minute orbicular multi-lobular, peltate scales. Compound umbels
terminal. Drupe 1 in. long, seed grooved, 2 grooves on the dorsal, 3 on the
ventral side.

Himalayas from Kumaon to Sikkim, according to V. odoratissimum, Walp. 1815, 1816,
1817, 1818, 1819, 1820, 1821, 1822, 1823, 1824, 1825, 1826, 1827, 1828, 1829, 1830,
1831, 1832, 1833, 1834, 1835, 1836, 1837, 1838, 1839, 1840, 1841, 1842, 1843, 1844,
1845, 1846, 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858,
1859, 1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872,
1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885,
1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898,
1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911,
1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924,
1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937,
1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950,
1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963,
1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976,
1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989,
1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000.

8. *Cordia* tubular, lobes short, erect.

8. *V. coriaceum*, Blume. Syn. *V. stipitellatum*, W. & A. Wight Ic. t. 1022.

A shrubby small tree, wood white, hard, close-grained, youngest shoots and
nodes slightly hairy. L. coriaceous, glabrous, usually quite entire, blade 5-6
petiole 1 in. long. Inflorescence pedunculata, calyx glabrous, corolla white,
tubular, glabrous or pubescent, anthers red. Fr. 1 in. long, black, succulent.

Himalayas 4-5000 ft. from the Subtropics, Khasi hills, Lower Burma hills
between Siam and Malacca 5-1000 ft. Upper hills east of Bangkok 5-7000 ft.
Siam, Burma, Fl. Malacca, Aug. Oil extracted from the seeds in Nya and Siam.
China, China, Fl. Malacca, Wight & Arn. Gaudich. Ind. Arch. 1824, 1825,
1826, 1827, 1828, 1829, 1830, 1831, 1832, 1833, 1834, 1835, 1836, 1837, 1838,
1839, 1840, 1841, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851,
1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863, 1864,
1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877,
1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890,
1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903,
1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916,
1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929,
1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942,
1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955,
1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968,
1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980,
1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993,
1994, 1995, 1996, 1997, 1998, 1999, 2000.

R. Seed cavity, endocarpy deeply intruded, transverse section half moon-shaped.

9. Fl. appearing with or after the l., generally in 3-6 d. cymes, arranged in
a terminal thyrse.

10. *V. odoratissimum*, Ker in Botanical Register, t. 193.

A shrub or small tree, l. coriaceous, glabrous, entire or distantly and slightly
dentate, obscure or shortly acuminate, blade 5-7, narrowed into petiole 1 in.
long, see u. distant, 6-8 pair. Fl. white, scented, yellow when fading, crowded
in 3-6 d. cymes, arranged in a paniculate pyramidal, glabrous, cymes.
Calyx not constricted beyond ovary, free part short with 6 triangular teeth.
Corolla glabrous, campanulate. Fr. 1-1.5 in. long, seed narrow, ventral half
moon-shaped, albunch uniform.

Sumat. Khasi hills. Upper Burma near Serpentine Mines. Malacca hills. Fl.
Oct. 1818. Fl. Nya in April and May, in Malacca in Oct. China, Japan.

11) *V. atrocratum*, (L.) B. & C. Himal. hills. Manipur 68000 ft. A. evergreen shrub. Young shoots and leaves glabrous. Blade 2-4, pet. 1-1.5 in. long. Fl. in small terminal corymbs. Drupes 1/2 in. long, hard blue, seed convex, albumen rugulate, red, redness due to *C. diploica*. Name allied to *V. Tross* L. of the Mediterranean region.

12) *V. crubescens*, Wall. Pl. As. Bat. t. 134. Syn. *V. Wightianum* Wall. & Wight in 2. 1824.

A small deciduous tree. Youngest shoots inflorescence and l. on the nerves beneath slightly pubescent. Leaves ovate or elliptic, upper pair serrate. Blade 2-4, pet. 1-1.5 in. long. Fl. white or pale rose-colored, in a pedunculate drooping thyrsus at the ends of short branchlets. The last ramifications having usually 3-fid. cymes, bracts linear. Calyx-teeth 2-3, corolla tubular 1/2 in. long. Drupe red, 1/2 in. long, seed deeply grooved.



FIG. 151.—*Viburnum crubescens*, Wall. Fl. Pl. As. Bat. t. 134.

Himalaya from Kinnaur mountains, in Sikhim mountain in second growth at 10000 ft. N. G. 17. Fl. March-May. Col. China (L. V. Kinnon, Hook. & Th. Khand hills). A shrub or small tree.

13) *V. verticillatum*, glabrous, leaves 2-4, pet. 1-2, the long pet. is oblique 6-8 mill. Fl. white in an erect terminal thyrsus, corolla short, campanulate. Drupe 1/2 in. long, dull red.

(6) Fl. appearing before the l. in compact terminal corymbs, seed deeply concave, endocarp T-shaped.



14) *V. nervosum*, D. Don. Vern. *Göck*; Haz.; *Külös*; Bash.; *Tilul*, *Tevod*, *Arvesar*.

A shrub or small tree. Young shoots and inflorescence softly tomentose. Leaves membranous, elliptic, serrate, hairy on nerves beneath, blade 3-4, pet. 1-1.5 in. long, sep. 2. 8-10 pair, ob-selv. parallel. Fl. white or rose-colored, fragrant, in terminal short dense sessile corymbs, corolla 1/2 in. long, funnel-shaped with a spreading limb. Drupe 1/2 in. long, edible.

Himalaya. Kulu in Sikhim, 7000 ft. Fl. May-July.

FIG. 152.—*Viburnum nervosum*, Don.

- IV. *Androsace*.—Ovary sessile, ovules 2- or 4-celled, or rarely 2-4, reniformly valvate.
- Leaves sessile, opposite.
- Leaves dentate, strigose. 11. *Humboldtia*.
SUTCLIFFE (p. 375).
- V. *Mussaenda*.—Ovary numerous, in a berry or drupe, seeds minute, carinae valvate. Inflorescence terminal out of the calyx-tube usually enlarged.
12. *Mussaenda*.
AGALCANTHUS (p. 376).
MANGROVE (p. 377).
- Inflorescence axillary, 1- or 2-flowered.
Calyx limb truncate.
Calyx-tube long valvate, tertiary nerves prominent.
Inflorescence axillary, 1- or 2-flowered.
Calyx-tube long-hatted, limb, etc. tertiary nerves prominent.
Calyx-tube as long as ovary. 13. *Mussaenda*.
LINDLEY (p. 378).
ANDERSON (p. 377).
- VI. *Garcinia*.—Ovary few or numerous in each cell, one in each cell of Walpers. Fl. a berry, seeds large, corolla-lobes twisted.
- Inflorescence terminal.
- Fl. 5-merous, in terminal ovoidiform compound cymes, anthers exserted. 14. *Wateria*.
BRASOVIAN (p. 378).
- Fl. 4-merous, fruit fl. solitary, male in few-fl. corymbs, anthers included.
- Inflorescence axillary, supra-axillary or leaf-opposed.
Stigma 4-lobed, buds sessile, corolla-lobes 5 or more rarely 4-celled.
15. *Garcinia*.
17. *Garcinia*.
- Stigma 4-lobed, corolla-lobes 5, rarely 4-celled.
Stigma 2-lobed or style bifid, ovules numerous.
- Fl. in axillary or leaf-opposed cymes.
- Fl. 7 in supra-axillary pedunculate buds, 2 often solitary.
- Style bifid, ovules 2-10 in each cell.
- Fl. sessile, in opposite axillary fascicles.
- Fl. sessile, sessile, in axillary branched cymes.
- Style bifid, ovules 2 or 3 in each cell.
- Inflorescence or drupe, berry 2- or 3-celled.
18. *Garcinia*.
SCHEER (p. 384).
- General drupe cylindrical, ribbed.
- VII. *Casearia*.—Ovary sessile, ovules solitary in each cell, middle superior, corolla-lobes valvate.
- Ovary 2-celled, stigma large, usually ribbed. 19. *Casearia*.
VANGHANI (p. 380).
- Ovary 3-celled, stigma 4-5-lobed. 20. *Casearia*.
TIMMER (p. 380).
- Ovary 8-12-celled, style 4-12-branched.
- Corolla-lobes induplicate, ovary 4-6-celled.
- Corolla-lobes or lobes, ovary 1- or 2-celled. 21. *Casearia*.
- VIII. *Luzon*.—Ovary solitary, radicle inferior, corolla-lobes twisted.
- Inflorescence terminal, corolla-tube long, slender.
- L. 1- or 2-branched, bracts at the base of the branched peduncles, pairs or less subtending, style to top the length of corolla-tube. 22. *Luzon*.
23. *Luzon*.
- L. and bracts coriaceous, style less than twice the length of corolla-tube.
- Inflorescence axillary, corolla-tube cylindrical. 24. *Luzon*.
- IX. *Zosteria*.—Ovary solitary, radicle inferior, corolla-lobes valvate.
- Fruit capsular, 1-lobed when bristled.
- Capsum 3-valved at the top.
- Caruncle 5-toothed to the base. 25. *Zosteria*.
26. *Zosteria*.
- Fruit 2-lobed or pyrene, separating when ripe.
- Pyrene flat, orbicular or elliptic.
- Seed cylindrical, smooth. 27. *Zosteria*.
ANDERSON (p. 381).
- X. *Mussaenda*.—Ovary solitary, radicle inferior, corolla-lobes valvate in a drupe or berry.
- Fl. in dense heads, the calyx-tube covering.
- Fl. in dense heads, the calyx-tube truncate. 28. *Mussaenda*.
BRASOVIAN (p. 382).
- Fl. in dense heads, calyx-tube 4-celled.
- Fl. in dense heads, calyx-tube 4-celled.
- Fl. in dense heads, calyx-tube 4-celled.
- Fl. axillary, solitary or in pairs on short pedicels.
- Calyx-tube 4- or 5-celled.
- Fl. in axillary compact cymes or heads, calyx-tube tubular. 29. *Mussaenda*.
GILG (p. 383).

IXI. RUBIACEÆ.

Fl. in axillary and terminal fascicles or umbels

extradichotomous

Palau Islands (p. 200)

Fl. in a terminal thyrsoid, rays a long truncate

Philippines (p. 201)

XI. *Alchornea*.—Ovary solitary, middle inferior, corolla lobes valvate, ovules imbricate. Fl. a drupe or berry.

Ovary 2-celled, fl. in terminal trichotomous cymes.

Corolla-tube short, straight, seeds plano-convex

27. *Pterobotria*.

Corolla-tube slender, curved, seeds concave, cup-shaped.

CHAMALA (p. 205)

Corolla-tube short. A small epiphytic shrub

HINDUSTAN (p. 206)

Corolla bell- or funnel-shaped, cymes often few-fl. cymulose and peduncles slender

28. *Sarcocoma*.

Ovary 4-5-celled, fl. in axillary clusters or short

cymes, 1 distinct, tertiary or parallel

29. *Lasiacra*.

1. **SARCOCEPHALUS**, Ait. l., Fl. Brit. Ind. iii. 22.

Shrubs or trees. Fl. heads single, on bracteate, mostly terminal peduncles, bracteoles 0. Ovaries compound. Fl. 4- or 5-merous without bracteoles, corolla narrow-tubular, lobes imbricate in bud. Stamens inserted in the mouth of the corolla-tube, style long exserted, stigma fusiform, ovary 2-celled, ovules numerous. Fl. glabrous, fleshy lycarpium, seeds not winged. Sp. 13, 14, from tropical Africa to New Guinea.

1. *S. Missionis*, Haviland, in Journ. Linn. Soc. xxxiii. 32—57, *Nectar Missionis*, Wall., Fl. Brit. Ind. iii. 27.

A small tree, l. glabrous, shining, elliptic-lanceolate, blade 3-6 nerved



FIG. 138.—*Sarcocephalus coriatus*, Miq. 1.

into panicle; 1/2 in. long, stout & base concave almost persistent. Peduncle 1-1/2 in., with numerous bracts near base, calyx lobes densely hairy, oblong, almost less than half the length of corolla-tube, corolla-lobes hairy on both sides.

Wood soft of the Peninsula, from the Kamban southwards, contains strong fibers and is well-wooded. Fl. H. 8.

2. *S. cordatus*, Miq. : Bedd. Fl. Sylv. t. 318. - Vern. *Ma-allelana*, Upper Malay Peninsula, Lower Burma.

A large or middle-sized tree, branchlets grey, & broadly ovate, from a broad, often cordate base, often hairy beneath, blade 3-7, petiole 1 in., angles of base 1/2 in. long. Peduncle 7-11 in., heads yellow or orange, calyx lobes clavate, minutely hairy, corolla 1 in. long, quite glabrous, lobes simple.

Malaya, Upper and Lower, Fl. H. 8. Ceylon, Malaya Archipelago, Cebu, China, Formosa. A specimen sent by Dalziel from Hecunpu, Ganda district, Ouh, has the calyx lobes shorter, but differs in linear calyx lobes, more than half the length of corolla-tube, corolla 1 1/2 in. long, and apiculate anthers.

2. CEPHALANTHUS, Linn. : Fl. Brit. Ind. iii. 23.

Species 8. 1 in India, China and North America, 1 in South Africa, the rest mostly in South America.

C. occidentalis, Linn. - Syn. *C. nanoleucoides*, DC. : Kunz F. Fl. G. 48. Vern. *Mamaba pale*, *Sein Sein*, Burma.

A shrubby small tree, glabrous pubescent or tomentose. Leaves opposite or in whorls of 2 or 4, ovate or ovate-lanceolate, blade 3-6, petiole 1-1/2 in. long. Fl. heads white, seated in terminal trichotomous leafy panicles. On a large glabrous hairy, more or less fleshy receptacle, numerous tetramerous fls. closely packed, from perianth of calyx-tube more or less split into obtuse segments, corolla 1-1/2 in. long, tube 2-5 times the length of calyx, lobes usually 5-lobed inside and with small black glands near the sinus of the lobes. Ovaries glabrous or hairy, not prominent, one ovule in each cell. Seeds 2, upper portion enveloped in a spongy white spongy arillex.

Sabinelewa tree, Ouh (in swamps) and Sikkim. Assam (in swamps, grassy fields), East hills, China, Upper Burma. Fl. March-May. Cult. North America, introduced across the whole continent, along the banks of deep streams, in the river banks, rising from about colored rocks and from large, prostrate, vine-like trunks, sometimes attaining stems 10-20 ft. high. - *Flora*, Howley Journ. Linn. Soc. xviii. 209; and *Rayland Journ. Linn. Soc.* xxviii. 261 in regarding the American and Asiatic tree as one species. The American specimens have a long calyx and a long hairy corolla, but do have specimens from Assam.

3. ANTHOCEPHALUS, A. Rich. : Fl. Brit. Ind. iii. 23.

[Species 3, India and Malay Archipelago.]

A. Cadamba, Miq. - Syn. *A. indicus*, A. Rich. : *Rayland in Journ. Linn. Soc.* xxxiii. 22, t. iv. fig. 38-48; *Nandea Cadamba*, Benth. : Bedd. Fl. Sylv. t. 31. *Sirocephalus Cadamba*, Kunz. Vern. *Kadamba*, Hind.; *Aspa*, Ass.; *Kadamba*, Tel.; *Ma-u*, Burma.

A large deciduous tree of rapid growth, wood soft, branches horizontal, lenticular, shining and glabrous above, pubescent beneath, ovate, acuminate, stipules linear, early caducous. Fl. heads single, terminal, yellow, 1-2 in. diam., peduncles 1-1 1/2 in. long, corolla glabrous, lobes erect, calyx lobes oblong persistent. Ovaries not prominent, 4-celled in the upper, 2-celled in the lower portion, bipartite to 0. Fr. a fleshy receptacle, on which are inserted numerous closely packed low-seeded capsules. Seeds not winged.

Terr. tropicalis, India ad S. Africa usque. — Evergreen forest of North Borneo, North in Ulman, Cuddapah and Karikal. Eastern slope of the Paga Yana. Commonly planted. FL. Ind. July. — The first native Malay Archip. — New Guinea.

4. ADINA, Salisb.; Fl. Brit. Ind. iii. 24.

Fl. pentamerous, mixed with numerous biflorous bracteoles. Corolla lobes valvate or slightly imbricate, stigma clavate. Species 9, from Tropical Africa to Japan and the Malay Archipelago.

1. *A. cordifolia*, Hook. f.; Bedd. Manual t. xxix.; Brand. F. Fl. t. 43. — Syn. *Nauclea cordifolia*, Willd.; Roxb. Cor. Pl. t. 73; Bedd. Fl. S. 77. — 38. Vern. *Halmu*, Hind.; *Hoddi*, Mar.; *Hirakutapa*, Tel.; *Hittala*, *Yathiyala*, Kan.; *Huaw*, Burm.

A tall deciduous tree, bark rough, wood yellow when fresh cut, afterwards reddish-brown, even-grained, to heartwood. Ls. ovate-oblong, abruptly acuminate, pubescent beneath. Blade 4-9 in. diam. pet. pubescent, 3-4 in. stipules pubescent, 1-1½ in. long, enclosing the uppermost pair of leaflets. Peduncles 2-4 in. long, single or 2-3 from one leaf-axil. Fl. heads yellow, 1-1½ in. diam., receptacle and bracteoles hairy, calyx and corolla densely pubescent, calyx-tube 5-angled, lobes linear deciduous.

Subindian tree from the Nilgiris eastwards, ascending to 2400 ft. Below Cochin Prov. Common in deciduous forests of both Peninsulas. Common near the coast. Fl. June-Sept., lasted for a short time in the H. S. — Ceylon, Caltura. 2. *A. polycarpa*, Bedd.; Haydon in Journ. Linn. Soc. xxviii. L. N. fig. 25-27. — Khasi Hills, Chittagong. Ternate, Carab. Ill. Siquatra, Java. A small evergreen tree, l. glabrous glossy, lanceolate or elliptic-lanceolate, blade 4-8 in. pet. 1-1½ in. Fl. heads 1-2 in. diam. pedicel sterile in trichotomous terminal panicles, ramification slender. Calyx 4-lobed, lobes obtuse. 3. *A. cingulata*, Haydon in Journ. Khasi Hills, Caltura, but differs by the calyx-limb being entire.

5. NAUCLEA, Lam.; Fl. Brit. Ind. iii. 26.

Peduncles undivided, terminal, single or 3 together. Fl. pentamerous, calyx lobes narrow, deciduous, corolla lobes imbricate in bud, ovates and cordate. Stigma globose or broadly conical, seeds winged, the wing blunt at one end. Species about 37, from India to the Islands of the Pacific.

A. Bracteoles mixed with the fl.

1. *N. purpurea*, Hook. Cor. Pl. t. 34. — Syn. *N. elliptica*, Dalt. A. Atlas Bombay Fl. 118; Bedd. Manual t. xxix.; Ic. Pl. Ind. Or. t. 10. Vern. *Phang*, Mar.

A middle-sized or small tree, l. glabrous, elliptic, blade 4-7 in. pet. 1 in. Stipules deciduous. Peduncles single, 1-2½ in. long, in the middle with 2 opposite bracts. Fl. mixed with numerous hairy bracteoles, calyx lobes purple, subulate, hairy, stigma globose. Fr. crowned with the persistent base of calyx lobes.

Wagay, Ghats from the Nilgiris eastwards. — Rangoon hills, Northern Circars. Fl. Feb.-March. 2. *N. gunnata*, Haydon. Atlas Griseb. in Hook. L. Khasi Hills, Caltura. C. B. & F. Ougana, King MSS. Arakanian. Fl. broadly elliptic, glabrous, petiole flattened and winged in its upper part. Corolla lobes densely hirsute with long hairs, bracteoles elliptic, stigma small.

3. *N. sessilifolia*, Roxb.; Kurz F. Fl. ii. 65. — Syn. *Adina sessilifolia*, Hook. f. Vern. *Tanata*, Burm.

A large decumbent tree, bipinnate, ferns coarse, nearly sessile. Fr. a cordate base, elliptic, 2-9 in. long, sec. n. distant, 6-8 pair. Peduncles short, mostly single, corolla lobes appressed grey-pubescent.

Chalar, Chitlang, Burma. Fl. R. S. — Caltura. — Penang.

B. L. usually opposite, corolla-tube twice the length of tube or longer, usually slender.

4. *W. paniculata*, DC. Vern. *Tayyin*, *Sagya*, Upper Burma.

A small tree, l. usually rough above through the raised roots of indigo hairs, softly pubescent beneath with long hairs, stipules broad or bilobate reniform or oblong-obovate, the upper part usually reflexed. Fl. sessile, white or greenish-white, scentless, in large hairy terminal panicles, calyx supported by one or two linear hairy bracts as long as itself. Calyx hairy, lobes as long as or shorter than tube, corolla funnel-shaped, lobes half the length of tube or less. Anthers exserted.

Assam, N. hills, Malabar, Trincom. Upper Burma (often in lux. groves), Yunnan, Perak. Fl. March-April.

5. *W. tinctoria*, DC. ; Bravais F. Fl. 233. Vern. *Prothera*, Kani; *Tala-tallo*, *Oudlog*, *Tayang Sagya*, Upper Burma.

A small tree, l. smooth and glabrous above, more or less minutely pubescent beneath, stipules erect, stiff, terminating in a subulate point or laterally compressed appendage. Fl. yellowish white, sessile, often supported by numerous short bracts in dense fascicles, forming compact terminal panicles, ramification and calyx more or less hairy, calyx and corolla like 4, calyx often hirsute with long hairs. Varies in regard to hairiness, shape and size of leaves.

Subhimalayan tract and outer hills from Khasia and Ombu eastwards, ascending in Sikkim to 5000 ft. Assam, Khasi hills, Chitragong, Bihar, Burma, Upper and Lower (on hilly ground and in Eng. forest). Fl. Jan. Malab. Yunnan. 6. *W. nitens* Wall. Synonym. L. coriaceous, nearly glabrous, elongate-ovate, obtuse, stipules short, erect, apiculate, calyx hairy, corolla slender, lobes short.

7. *W. glabrata*, DC. ; Kurz F. Fl. ii. 74. Vern. *Thilpyn*, Borneo.

A small evergreen tree, entirely glabrous, l. opposite, sometimes in whorls of 3, elliptic-lanceolate, blade 4-6, narrowed into pet. $\frac{1}{2}$ -1 in. long, stipules small, erect, triangular. Fl. white, calyx glabrous, teeth minute, triangular.

Nepal 4000 ft. *Pter. Hircocymus*, Malabar (near Ganjam 4500 ft. Borneo hills, Gohyari 2000 ft. Gambier. Naga hills and Manipur 3-6000 ft. Chittagong hills, Shan hills, Upper Burma. Hills east of Tenasserim 2-4000 ft., often in evergreen forests, Tenasserim. Fl. Feb.-April. Yunnan, Java, Tonkin, Formosa. 8. *W. coriacea*, DC. Nepal, Sikkim, Terai, and lower hills. Evergreen, quite glabrous, l. coriaceous, leaf. l. very slender, stipules erect, triangular, calyx glabrous, teeth nearly as long as tube. 9. *W. angustina* Wall. Upper Burma. L. glabrous or pubescent on the nerves beneath, stipules appressed, broadly triangular cuspidate, calyx glabrous, teeth full length, longer than tube. 10. *W. glomerata* Kurz. Mergul. L. membranous, glabrous, narrow-lanceolate, narrowed into a very short petiole, stipules large, orbicular, recurved. Fl. large $\frac{1}{2}$ in. long, calyx hirsute, teeth much longer than tube.

C. L. usually in whorls of 3.

11. *W. Notoniana*, Wall. ; Wight Ic. 1033; Bedd. F3, Syl. 1. 234. Vern. *Thocara*, Mal.

A small tree, branchlets, petioles, underside of l. and inflorescence hairy, l. usually in whorls of 3, elliptic-lanceolate, blade 3-6, narrowed into petiole $\frac{1}{2}$ -1 in. long, stipules usually recurved, often 2-fid. Calyx hirsute, teeth as long as tube, corolla-tube hairy within.

West side of the Peninsula, from the Konkan southwards. Fl. Feb. June. Ceylon, moist region. 12. *W. Lawii*, Hook. f. Ramandrug, Bellary. Balabuden hills. Branchlets slender, minutely pubescent, l. glabrous above, minutely pubescent beneath, stipules erect. Fl. generally pedicelled, in lax, softly hairy large pyramidal panicles. Calyx hairy, lobes filiform, longer than tube. 13. *W. angustifolia*, Wight. Courtallum. Entirely glabrous, l. linear-lanceolate, midrib prominent, sec. n. slender, calyx-teeth short, subulate. 14. *W. pendula*, DC. Nepal, Manipur, Yunnan. Branchlets glabrous, l. often opposite, ovate or ovate-lanceolate, nearly sessile, slightly pubescent on the nerves beneath. Calyx glabrous, teeth lanceolate, as long as tube. Corolla $\frac{1}{2}$ in. long.

A large shrubby climber or tree, 2-10 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black.

Anthracoceros tract and outer hills from Nepal or Burma to Sikkim to the P. W. of the Peninsula, Nigra. Upper Burma. Fl. May-Aug. China, Malay Archipelago. *M. macrophylla* Wall. Fl. As. Bur. p. 100. Nepal, Sikkim, India, B. Hills and Naga hills, Yunnan. A large shrubby climber, 10-15 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black. *M. glabra* Vahl. Fl. Ind. p. 100. India, B. Hills and Naga hills, Yunnan, Khasi hills, Cachar, Chittagong, Manipal and Tenasserim hills, Malay Peninsula, China. A climbing climber, 10-15 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black. *M. variegata* Wall. Fl. As. Bur. p. 100. India, B. Hills and Naga hills, Yunnan, Khasi hills, Cachar, Chittagong, Manipal and Tenasserim hills, Malay Peninsula, China. A climbing climber, 10-15 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black.

B. Calyx-teeth persistent.

M. Buchardii Hook. f. Sibiro-Terrene 1000. Assam, Khasi hills, Manipal, Cachar, Chittagong, Bora. A shrub 1-2 m. tall, with pubescent leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black. *M. tomentos* Wight. Khasi hills, Manipal, Cachar, Chittagong, Bora. A shrub 1-2 m. tall, with pubescent leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black. *M. Wallichii* G. Don. India, B. Hills and Naga hills, Yunnan, Khasi hills, Cachar, Chittagong, Manipal and Tenasserim hills, Malay Peninsula, China. A climbing climber, 10-15 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black. *M. strans* Wall. A woody climber, 10-15 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black. *M. virens* Wall. Tenasserim, Ceylon. A shrub 1-2 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black.

Antrodia praevenia Hook. f. Tenasserim, Malay Peninsula. A small tree, 10-15 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black. *M. polyca* W. & A. Tenasserim, Malay Peninsula. A small tree, 10-15 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black.

Myrsoceros nitens Wall. Borneo, Assam, Khasi and Naga hills, Ceylon, Upper Burma, Tonkin. A small shrubby climber, 1-2 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black. *Dryas longistylus* Wight. B. Hills, Assam, Ceylon. A small tree, 10-15 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black.

Dryas longistylus Wight. B. Hills, Assam, Ceylon. A small tree, 10-15 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black. *M. strans* Wall. A woody climber, 10-15 m. tall, with silvery tomentose or tomentose leaves, lobulate or serrate leaves, calyx 5-lobed, pubescent or hirsute, lobes acute or acuminate, berries black.

... *glabrum* Wall. ... *glabrum* ... *glabrum* ...

longifolia (W.) ... *longifolia* ... *longifolia* ...

16. WEBERA, Schrad. & Pl. Dep. Ind. in. Bot. (Teyena) Mart. ... *Webera* ... *Webera* ...

Large shrubs or trees, usually ... *Webera* ... *Webera* ...



FIG. 154. *Webera corymbosa*, Willd.

A. *Stylocoryna*, Cav. ... *Stylocoryna* ... *Stylocoryna* ...

1. *W. corymbosa*, Willd. ... *W. corymbosa* ... *W. corymbosa* ...

A large evergreen shrub or small tree, usually quite glabrous, bark dark ... *Webera* ... *Webera* ...

leaves with opposite, lobes 5 or more, sometimes in leaf. Ovary 1-ovuled, locule 2-ovuled by 2 locules becoming parietal placentae. Fr. fleshy, sometimes slightly conical with a persistent calyx. Lvs. glabrous but with long hairs scattered in the leafy axils, placentae. Spines like for *Vatica*, typical of *Vatica* wood.

A. Um. a. l. H. Burma, usually mostly solitary, evergreen tree 100 ft. tall.

2. *G. lucida*, Roxb. & Wight, *J. Bot. Hort. Mancus.* 1: 10, fig. 6. — *Fl. Ind. Archipelago*, Bot., Burm. P. 1: 11, 12. *Vern. Diccionario*, Mar. 1: 100, 101, 102.

Small tree, elliptic-oblong, 5-10 in. long, narrowed into a short broad petiole, lobes 5 or more, stipules sheathing. Calyx tube 5 lines long, corolla large, tube white, fragrant, tube 1-2 in. long, lobes 5, spreading. Fr. ovate, unguis with the persistent calyx-limb, endocarp thick, woody, inside 2-lobed with the points at placentae.

Flora Lab. 1. Western Peninsula in the interior as well as in the coast, Malacca, Malacca, N. B. in the interior. Burma. Fl. March-June, November in N. B. in the coast. Wood as in the wood. The *Dikanel* wood 200 ft. from a small tree in the forest of Malacca. 2. *G. granatensis* Linn. *W. Ind. P.* 1: 579. *Flora* P. 1: 100, 101. *Fl. Ind. Archipelago*, Bot., Burm. P. 1: 11, 12. *Vern. Diccionario*, Mar. 1: 100, 101, 102. A large tree 100 ft. or more, ovate, with a narrow calyx-limb. Calyx-limb short, tube 2-3 lines or triangular. Fr. 1-1 1/2 in. long, endocarp thin, sometimes nearly 1-lobed.

3. *G. latifolia*, Albuq. & Wight, *J. Bot. Hort. Mancus.* 1: 10, fig. 6. — *Fl. Ind. Archipelago*, Bot., Burm. P. 1: 11, 12. *Vern. Diccionario*, Mar. 1: 100, 101, 102.

A small tree, bark grey, peeling off in flakes, young shoots pubescent, leaves 1 dark green and glossy. L. opposite or in threes, broadly elliptic or obovate, 6-8 in. long, narrowed into a short broad petiole, lobes 5 or more, stipules 15-20 pair, small hairy glands in their axils on the underside. Five portions of calyx campanulate, deeply veined into 5-6 lacinate unequal segments. Corolla white or pale lemon yellow, orange when falling, tube 2-3 in. long, lobes 5, linear on the outside, lobes 1-2, obliquely obovate. Fr. 1 1/2-2 1/2 in. long, hairy when young, grey or speckled greenish-yellow when ripe, endocarp thin, hard, brittle, with 4-5 parietal placentae.

Small tree 100 ft. or more, bark as in the wood. Burma. West in England, Fl. April-May. Camb. under the wood. Calyx-limb long, country. Malacca and whether the tree figured in the wood in *Flora* P. 1: 11, 12, and 13, Malacca, 100 ft. or more, in *Wight's Fl. Ind. Archipelago*, Bot., Burm. P. 1: 11, 12. This species is 100 ft. or more.

4. *G. obtusifolia*, Roxb. *Flora*, Burm. P. 1: 11, 12. *Vern. Diccionario*, Mar. 1: 100, 101, 102. *Flora*, Burm. P. 1: 11, 12. *Vern. Diccionario*, Mar. 1: 100, 101, 102. A small tree 100 ft. or more, bark as in the wood. Calyx-limb long, country. Malacca and whether the tree figured in the wood in *Flora* P. 1: 11, 12, and 13, Malacca, 100 ft. or more, in *Wight's Fl. Ind. Archipelago*, Bot., Burm. P. 1: 11, 12. This species is 100 ft. or more.

5. *G. coronaria*, Ham. *Vern. Diccionario*, Mar. 1: 100, 101, 102.

A small tree, leaves very resinous, l. shining, obovate, 4-10 in. long, narrowed into a short petiole, stipules connate into a somewhat persistent sheath, imbricated, marked by the scars of the and stipules. Calyx tube 1-1 1/2 in. long, often split on one side, corolla white, fragrant, tube 2-3 in. long, lobes 5. Fr. elongate-ellipsoid, 1 in. long.

Chalawong, Burma, Upper and Lower, often in England. Fl. March, April.

B. Usually armed. Fl. small, usually of two kinds, fertile and sterile, the former usually sessile, solitary, the latter shortly pedicellate, fasciculate. The sterile fl. with anthers, style and stigma, but ovary imperfect. In some cases

G. erythroclada, Kurz, Ann. K. Mus. Berlin, Bot. Jahrb. Bot. Gart. Berlin, 1872, p. 100, t. 1, f. 11 and G. B. Clarke in Journ. Linn. Soc., Bot., 1891, p. 100.



FIG. 157. *Garcinia tonkinensis*, Ham.

1. *G. tonkinensis*, Rechb. f. in W. & A. Bot. Beechey, Voy. Pac. Oc. 1825, p. 57, t. 1, f. 57. Varn. *Thanda*, Burckh. in Burckh. & Hufsch. Exped. Arab. Penins., Bot., 1822, p. 100, t. 1, f. 100.

A small deciduous tree, armed with strong axillary or leaf-bearing spines, bark smooth, inner 1.5-2 in. thick, mostly on branches. Lvs. often crowded at the ends of branches, 1-1.5 in. long, broadly narrowed into a short marginate petiole, tomentose or pubescent beneath, glabrous or pubescent above when mature. Fl. white, fragrant, corolla tube 1-1.5 in. long. Fertile solitary sessile, calyx-lobes oblong. Sterile clustered on short pedicels, calyx-teeth minute, sometimes unequal. Fr. grey,

obovoid or globose, 2-3 in. long, endocarp woody, placentas 2-3.

Southern tract of the North West Himalaya, Burma to India, extending to 1000 ft. Rajasthan, Central Prov., Japan, Western Pacific, Persia, chiefly in the lower part of hills at 1000 ft. Fl. H. B. *G. campanulata*, Burckh. & Wight, Journ. Bot., 1822, p. 100, t. 1, f. 100. Small tree, deciduous, armed with long straight sharp spines, often leaf-bearing. Lvs. ovate-oblong, glabrous, lanceolate, blade 2-3 in. long, narrowed into a slender petiole 1-1.5 in. long. Fl. greenish white, corolla tube 1 in. long, upper portion campanulate. Fertile solitary sessile, calyx-teeth oblong or spatulate, filicose. Sterile fasciculate, shortly pedicellate. Fr. 1-1.5 in. long, endocarp woody, placentas 2-3. *G. scabra*, Wight, Journ. Bot., 1822, p. 100, t. 1, f. 100. Small tree, deciduous, armed with long straight sharp spines, often leaf-bearing. Lvs. ovate-oblong, glabrous, lanceolate, blade 2-3 in. long, narrowed into a slender petiole 1-1.5 in. long. Fl. greenish white, corolla tube 1 in. long, upper portion campanulate. Fertile solitary sessile, calyx-teeth oblong or spatulate, filicose. Sterile fasciculate, shortly pedicellate. Fr. 1-1.5 in. long, endocarp woody, placentas 2-3. *G. erythroclada*, Kurz, Ann. K. Mus. Berlin, Bot. Jahrb. Bot. Gart. Berlin, 1872, p. 100, t. 1, f. 11. Small tree, deciduous, armed with long straight sharp spines, often leaf-bearing. Lvs. ovate-oblong, glabrous, lanceolate, blade 2-3 in. long, narrowed into a slender petiole 1-1.5 in. long. Fl. greenish white, corolla tube 1 in. long, upper portion campanulate. Fertile solitary sessile, calyx-teeth oblong or spatulate, filicose. Sterile fasciculate, shortly pedicellate. Fr. 1-1.5 in. long, endocarp woody, placentas 2-3. *G. tonkinensis*, Ham., Journ. Bot., 1822, p. 100, t. 1, f. 100. Small tree, deciduous, armed with long straight sharp spines, often leaf-bearing. Lvs. ovate-oblong, glabrous, lanceolate, blade 2-3 in. long, narrowed into a slender petiole 1-1.5 in. long. Fl. greenish white, corolla tube 1 in. long, upper portion campanulate. Fertile solitary sessile, calyx-teeth oblong or spatulate, filicose. Sterile fasciculate, shortly pedicellate. Fr. 1-1.5 in. long, endocarp woody, placentas 2-3.

17. *RANDIA*, Lam. Fl. Ind. Ind. iii. 101.

Shrubs or trees, stipules short, often connate. Fl. pentamerous, axillary, or whorled, fascicles, or solitary. Calyx tube produced beyond ovary, corolla-tube twisted in bud, anthers subsessile, narrow. Ovary 2-celled, ovules prominent on thick placenta attached to the septum. Berry 2-celled, seeds 2 or more in each cell. Seeds angled, testa thin, albumen horny, cotyledons orbicular. Species about 100, tropical and subtropical regions of both hemispheres.

A. *Andal.* L. glabrous.

1. *R. tetrasperma*, Hook. *Icones*, t. 13, p. 114; *Randia*, Jussieu. *Biblioth. Bot.* t. 1, p. 114. Salt range, Himalaya ascending to 5000 ft. Assam. A small shrub, branches upright, grey, demulcent, branchlets short, often quiescent. L. glabrous, apex of the leaf and ends of branchlets obtuse or subcordate, 1-2 in. long, narrowed into short petiole. Fl. pentamerous, greenish-white, scented, sessile. Corolla-tube yellowish, 1 in. long, lobes oblong, apex subulate. Fr. a globose berry, 1 in. diameter, with the persistent calyx.

Fig. 156. *Randia uliginosa*, DC.

2. *R. uliginosa*, DC. & Wight *Is.* t. 397. — *Ses.* *Gardenia uliginosa*, Retz.; *Becc. Cor.* Pl. 1, 183. Vern. *Phudra*, *Phudra*, *Pear*, Hind.; *Phudra*, *Phudra*, Mar.; *Konda unaga*, Tel.; *Kire*, Kan.; *Hutanaga*, Bam.

A small rigid tree, bark reddish-brown. Branches quadrangular, usually

Young short, terete, decussate, in axils, with several pairs of approximate leaves, and above them 2-4 strong sharp decussate thorns; 4 glabrous and shining above, often pubescent beneath, obovate from a cuneate base, base 3-6, pet. 1 in. long. Fl. solitary, axillary, white, scented, dimorphic, either large and sessile or small and pedicelled. The former have 2 separate stamens, the corolla is 2 in. across, while its tube is longer than the free portion of calyx. The pedicelled fl. have a short corolla-tube and a clavate stigma marked with spiral lines. Calyx-lobes very short, corolla-tube glabrous outside. Fr. yellow, edible, with a hard pulp, those produced by the large fl. are 2 in. long, while those of the others only attain half that size.

Subbimalayan tract from the Junga eastwards, chiefly in Saravali and on low ground, ascending to 2500 ft. Bundelkhand, Central Provinces, Behar, Bihar, Upper and Lower. Western F. Ghats (Sargaria) in places. Fl. April-June. L. reported March, April. *B. longiflora*, Lamk.—Syn. *Walteria longiflora*, *Merrillia*, and *marcescens*, Kurz F. Fl. II. 38, 40. Assam: Khasi hills, Chittagong, West Malabar and Tenasserim, Malay Peninsula, Tonkin. A large evergreen resembling shrub, entirely glabrous, usually armed with stout recurved spines. L. ovate-oblong, shining, elliptic-oblong, blade 2-4, pet. 1 in. long. Fl. white, turning yellow, in compound, sessile or shortly peduncled racemes. Corolla-tube 1-1½ in. much longer than the oblong lobes. Berry ovoid or globose 1-1½ in. long.

B. malabarica, Lamk.—Syn. *Griffithia longiflora*, W. & A., Wight Ic. t. 416, *Peltis Mollis*, Tull. *Tala Mollis*, Tani. Decan. Mysore, Karnatik. Also on the West side of the Peninsula. Often planted in hedges. Cereus. A rigid glabrous shrub, thorns short, sharp, sometimes absent, wintergreen in rich soil. L. very ovate-obovate to oblanceolate, 2-3 in. long, narrowed into short petiole. Fl. white, increased to nearly sessile leaf oppositely, bracts ovate, cuneate, ciliate in pairs. Calyx lobes 2 or 3, leafy, teeth short, triangular, anthers 2 in. across, tube shorter than lobes. Berry 1 in. diam., first orange, finally black. *B. Griffithii*, Hook. f. Nilas and Naga hills. Bernardino 7000 ft. Upper Burma. Spines short, straight, with a few barbed. L. membranous, lanceolate, blade 2-3, pet. 1 in. long. Berry soft black, 4 in. diam., seeds 4 in each cell.

B. Armed, l. pubescent or tomentose.



FIG. 163.—*Rauvolfia dumetorum*, Lamk.

or nearly white, turning yellow when fading, fragrant, in short nodules, solitary or a few together at the ends of short leaf-bearing branchlets, sometimes on the axillary spines. Calyx strigose with stiff hairs, lobes large, broad-ovate, often with minute intermedial lobes. Corolla 1-1½ in. across, tube hairy outside. Fr. yellow, 1-1½ in. long, frequently crowned by the semi-persistent calyx-teeth, fleshy, under a leathery pericarp, seeds embedded in a gelatinous pulp.

Subbimalayan tract and outer hills from the Nilas eastwards ascending to 1750 ft. chiefly in Sal and mixed forests. Rajputan. Central Provinces. Both Peninsular Fl. March-June. Fruit eaten when ripe, unripe used to poison fish. Ceylon, Malacca, Arak, Siam, South China, Eastern tropical Africa. A remarkable form with a distinct species with a densely velvety beneath, hairy above, or a permanent 10-12 pair, le. ribbed and crowned with the semipersistent calyx-teeth. *Saravali* (Sargaria)

6. *R. dumetorum*,

Lamk.; Wight Ic. t. 481.—
Syn. *R. ardens*, *longiflora*
and *horridula*, Wight Ic.
t. 581, 582, 583. *Vern.*
Mairali, *Mairphal*, *Hundi*,
Gheta, *Mudhal*, *Mandi*, *Mang*,
ga, Tel.; *Munari*, Khasi;
Mudu Karran, Tamil.

A large deciduous shrub
or small tree, armed with
stout axillary spines, 1-2 in.
long, bark grey. L. obovate,
1-2 in. long, glabrous or
hairy. Fl. greenish-yellow

19. CANTHIUM, Lam. Fl. Bot. Ind. III. 31.

Plectranthia, Des. II. *Coalbinia*, Schumauer in Engelm. Trans. Acad. Sci. 4, 92.

Stems erect or climbing, stipules connate. Fl. small, in axillary fascicles or 1- or 2-ranked compound cymes; calyx-tube shortly produced beyond ovary; corolla-tube shorter than, as long as, or rarely longer than lobes, throat yellow, lobes truncate in bud, at length reflexed. Ovary 2-celled, stigma large, usually lobed, with one, attached to the upper part of the cell. Drupes with thin pericarp; endocarp 2-celled more or less woody. Seeds oblong, testa membranous, albumen fleshy, embryo nearly as long as seed. Species about 70, natives of the Old World.

A. Armed, fl. 5-merous.

C. didymum, Karst. Hand. F. Sylv. 3, 221.—Syn. *C. umbellatum*, Wight Ic. t. 1634. Vern. *Nalla baina*, *Nalkhuna*, *Nalkarvat*, Tel.; *Miyau*, *Carag*, Upper Burma.

A small, middle-sized evergreen tree with deep-green foliage, branchlets often angular, wood hard, even grained. L. coriaceous, glabrous, ovate, elliptic, blade 4-6, narrowed into a stout petiole $\frac{1}{2}$ in. long. Fl. white, fragrant, in compact axillary many-fl. often umbelliform cymes, sessile on a short stout peduncle. Corolla-tube cylindrical, $1\frac{1}{2}$ in. long, a little longer than the reflexed lobes, anthers slightly, style usually long exserted. Drupes more or less didymous, on long slender pedicels, purple, $1\frac{1}{2}$ in. long.

Western Himal. from Kashmir southwards, chiefly in western forests. Nilgiri-Quilon on the hills of the Salem and adjoining districts. Northern Circars, Orissa, Upper Burma, to Eundaling in umbellate, stigma very little exserted. Mysore, Fl. Ind. May. Ceylon, low country to 4000 ft. numerous large leafed leaf galls frequent on the young branches. Malay Peninsula and Archipelago. India. Very variable in color, size of anthers, not uniform, should be studied. 2. *C. Kingii*, Hook. f. bot. Beechey 1430 f. L. elliptic-ovate, corolla acuminate, fl. in pedunculat-umbels.

3. *C. pergracile*, Burttellon in Journ. Bombay Nat. Hist. Soc. III, Vol. 1, 5. A tall graceful tree in evergreen forest. Travancore at low elevations, lvs. very glossy, serrulate cuneate-acuminate, fl. yellowish-green, in shortly peduncled umbelliform cymes, corolla tube $\frac{1}{2}$ in. long, as long as lobes, fr. 2-4 in. diam., endocarp thick, woody, ribbed. 4. *C. bengharrense*, Wight Ic. C. 1854 fig. Nilgiri and Palni hills. L. alternate or ovate, stem hairy beneath, fl. in small axillary nearly sessile umbels. Eriogonum-colored, obscurely punctate. 5. *C. setosum*, Hook. f. Snowberry hills, l. thickly coriaceous, drying black, fr. 2-11 in. long, compressed, narrowed into pedicel $\frac{1}{2}$ in. long, woody, 2 hard leavy irregularly furrowed nuts.

6. *C. glabrum*, Bl. & *Plectranthia glabra*, Kunz f. Fl. Ind. Ind. Small tree of the Peco Veen. Travancore, Malay Peninsula, Java. A small evergreen tree, l. 2-3 long, ovate-oblong, blade 5-7, pet. $\frac{1}{2}$ in. long. Fl. in shortly peduncled, often lax axillary cymes, calyx-tube equal to lobes, fr. 4-1 in. long, including two small trigonous nuts.

B. unarmed, fl. 4-merous.

7. *C. travancoricum*, Held. Ic. Fl. Ind. Or. 3, 229. *Plectranthia*. Thin veined and Travancore. Glabrous middle-sized tree, l. membranous, glabrous, ovate-acuminate, blade 2 pet. $\frac{1}{2}$ in. long, stipules from a lined base narrowed into a long subulate point. Fl. very small, in lax pedunculat cymes with slender ramifications, corolla $\frac{1}{2}$ in. lobes 3-4 long as tube. 8. *C. grandipes*, Burttellon, Fl. Ind. Ind. *Plectranthia*. Andaman, frequent. A shrubby branchlets finely pubescent, l. membranous, elliptic to oblong-lanceolate, serrate, petioles and nerves finely hairy. Fl. very small, but long slender included pedicels, fr. $\frac{1}{2}$ in. long.

C. Armed, fl. mostly 5-merous.

9. *C. parviflorum*, Lamk.; Roxb. Cor. Plat. 51. Vern. *Kirua*, *Kallia*, *Mac*, *Balaen*, Tel.

3-riquet shrub, branches stiff spreading, spines numerous, axillary or supra-axillary, straight, stout and sharp, wood hard, close-grained. L. glabrous, elliptic, obovate or orbicular 1-2 in. long, stipules small with long cuspidate points. Fl. 4-merous, yellowish, in many-fl. peduncled cymes, calyx teeth minute, corolla-tube broad-constricted, $\frac{1}{2}$ in. long, a little longer than lobes, stigma globose, intercalate. Fr. red or, edible, enclosing two hard stones.

Wardha valley, Nagpur territory and southwards through all the drier districts of the Western Peninsula. Common in the semi-evergreen forest near the Deccan plateau. Fl. of July II. 8, but also at other times. Ceylon, regions 10, C angustifolium, Boiss. & Sieber. *Leucosiphon*, Wight & Arn., Wight, 1838, 851, 852. Described Chittagong, Peninsula chiefly on the west side. A scandent shrub with slender spinescent stems. L. chartaceo, elliptic, ovate, serrulate or ovate, acute, base, blade 1-2 in. pet. 1-1 in. long, veins axillary, straight or raised, calyx-teeth minute, corolla-tube short, lobes, lanceolate, acuminate, former a long point in bud. Style hairy. 11. *C. Kheddi* III. Peninsula, Ceylon, most possibly not a pubescent variety. 12. *C. parvifolium*, Boiss. Khed hills, Chittagong, India, a field, spreading shrub, spines straight, sharp, branches and leaves softly hairy, fr. $\frac{1}{2}$ in. diam. 13. *C. hirsutum*, Blanco, differs from II by short compressed woody spines and wood larger fr.

Vangueria spinesca, Boiss. including *V. pedunculata* Kurz. Siam, Thailand, near Bangkok (Gamble), Java, Khed hills (H. R. May, 1879), Laos, Betong, Burma, Upper and Lower. Deciduous forests of the Peninsula, Java. A small, slender tree with much-branched, woody or scale-lanceolate, glabrous or tomentose, blade 2-4 in. pet. 1-1 in. long, stipules very deciduous. Fl. paniculate, greenish, calyx segments from a triangular base linear, nearly as long as the 5-toothed ovary, corolla-tube as in III, tube yellow, 1-1 in. diam., fleshy, hairy, with 4-5 small hard 1-toothed or 2-3-toothed, Vahl, a native of Madagascar, cultivated in India on a coast of the 4' unmarked, L. elliptic 1-2 in. long.

Thonnia jambosella, Turcz. Boiss. *Pl. Ind. Ind.* 1831-32, p. 169, fig. 100, 101, 102, 103. Andaman, Nicobar, Ceylon, Malabar Peninsula and Andam. A small tree, 4-5, thin, pubescent, pale and silky beneath, blade 2-3 in. pet. 1 in. long, supported by 2 small bractlets, polygamous, sterile in flowers, the cymes solitary or 3 together on long slender peduncles, tomentose, corolla-tube 1/2 pet. outside longer (4 in.) in the sterile β , lobes valvate, ovary 4-5-toothed, one pet. ovule in each cell, style with 4 or more branches. Fr. globose, 1-1 in. diam. 14. *C. hirsutum*, Boiss. including 11-12 compressed pyrenes, seed with scanty albumen, outer

Quercus speciosa, Link. & Bodd. Manual 2, 174. Upland and tidal forest, Andaman. Scarce on the coast of the Western Peninsula often cultivated in gardens, Ceylon rare on the coast. Now common within the tropics. A small tree, much-branched, stout, pubescent, marked with leaf scars. L. crowded at the ends of branches, alternate, pubescent, chiefly beneath, blade 4-10 in. pet. 1-1 in. long, stipules ovate deciduous. Fl. polygamous, 5-6-merous, white, sweet scented, mostly sessile, crowded on the short arms of a pubescent cyme, peduncles 1-2 in., from sheaths of fallen l. Calyx lobes, limb tubular, indistinctly 5-toothed, corolla-tube velvety outside, glabrous, within tube 1-1 in. long, anthers included. Ovary 4-5-toothed, one pendulous ovule in each cell, fr. depressed globose, 1 in. diam., long woody with 5-6 angles and as many cells.

20. OCTOTROPIS, Bodd.; Fl. Brit. Ind. III, 181.

Shrubs, fl. 4- or 5-merous, in pedunculate cymes. Corolla-tube cylindrical, widened upwards, lobes longer than half the tube. Anthers and style or septed, style ribbed, stigma bifid at top. Ovary 2-celled, dissepiment very thin disappearing early, ovules 2 pericarpous from the top of the cell. Species 2.

1. *O. travancorica*, Bodd. Fl. Sylv. t. 85; Manual III/12. Wainudi (1800-1800) in the Sivagherri hills. Tinnevely and Travancore Ghats, or green forest, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. A large shrub or small tree, l. glabrous, ovate-lanceolate, blade 4-6 in. pet. 1 in. long. Fl. white, each supported by 2 appressed bractlets, cymes terminal or long filiform peduncles, corolla-tube 1 in., anthers articulate. Fr. ellipsoid, 1/2 in. long, seeds 1 or 2, albumen hairy. 2. *O. terminalis*, C. B. Clarke, Journ. Linn. Soc., ser. 2, 3, 4, 17. Nambiar forest, Assam. Cymes fasciculate in the axils of the upper part of corolla-tube 1/2 in. long, anthers included (doubtfully referred to this genus).

20. PAVETTA, Linn., Fl. Brit. Ind. ii. 149.

Differ from *Leuca* by membranous leaves, the bracts at the lower cyme branches membranous, more or less sheathing, and the style as a rule twice the length of the corolla-tube, with a slender, entire, rarely notched stigma. Species about 70, tropics of the Old World.

1. *P. indica*, Linn.—Syn. *P. Brunonis*, Wight Ic. t. 1035; *Leuca tomentosa*, Roxb.; Wight Ic. t. 186; Vern. *Anguri*, *Peldu*, N. W. India; *Tappa*, *Paubi*, Tel.; *Jucate*, Kan.; *Pavettai*, Tam; *Hull nabon*, *Hmitlyya*, *Sourangyem*, Burm.

A large shrub, glabrous or tomentose, branchlets obtusely quadrangular, l. elliptic-lanceolate, sometimes lanceolate or obovate, blade 4-9 narrowed into petiole 1-1 in. long. Fl. white, scented, pedicelled in simple trichotomous cyme, usually pubescent cymes, often globose, up to 6 in. diam. terminal, or at the ends of short branchlets. Calyx as a rule pubescent, truncate or with short triangular teeth, corolla-tube $\frac{1}{2}$ - $\frac{3}{4}$ in. long, hairy inside, outside usually glabrous.

Fl. March-July. Three well marked varieties, two of which were described in our old Forest Flora as distinct species, (a) *calyx* proper, branchlets l. cymes and calyx glabrous or nearly so, sinking to 200 ft. Bhamo, Lower Bengal, Andaman, Burma, Upper and Lower, Western Peninsula, Ceylon, Malay Peninsula and Archipelago, China, New Guinea, (b) *calyx*, glabrous, l. small, lanceolate, calyx-teeth acute, Timor and Travancore, (c) *calyx* close, branchlets, leaves and cymes pubescent, see n. distinct. Sikkim, Assam, Khasi hills, Jaintia mountains, Behar, Lower Bengal, Khasi hills, Manipur, Burma, Upper and Lower, Malay Peninsula, Timor.

The following 5 species are mostly allied to *P. indica*: A. Western species, 2. *P. elliptica*, W. et A. *P. suberosa*, Dalz. Western Ghats of the Peninsula, generally in evergreen forest. A slender shrub, l. lanceolate or obovate, glabrous or pubescent beneath, turn black when dry, calyx-teeth triangular, acute, fl. yellow, corolla-tube 1-1½ in. B. *P. Wightii*, Hook. f. Nilgiris. Almost wholly glabrous, l. elliptic-oblongate, cymes at the end of slender axillary branches, naked below, but with a few l. at the base of cyme, calyx-teeth lanceolate, longer than ovary, corolla-tube slender, $\frac{1}{2}$ in. long. C. *P. Brunonis*, Wall. Nilgiris. l. elliptic-hirsute with long, yellow hairs or glabrescent, cymes densely tubulate at the end of short naked branches with a few l. supporting the cyme, bracts large, calyx-teeth lanceolate, often recurved, corolla-tube $\frac{1}{2}$ in. long. D. Eastern, 5. *P. subcapitata*, Hook. f. Assam, Khasi hills. l. lanceolate-heminate, pubescent beneath, cymes sessile, compact, cyme tube, calyx-teeth distant, very short, corolla-tube $\frac{1}{2}$ in. long. 6. *P. nucleifera*, Wall. *Leuca nucleifera*, Kurz. Bhamo, Assam, Khasi hills, Yunnan, Malay Peninsula. Branchlets l. cymes and calyx densely pubescent, cymes at the ends of long axillary naked branches with a pair of l. at the base of cyme, calyx-teeth serrulate.

7. *P. breviflora*, DC. Wight Ic. t. 1033. Travancore, at 1000 ft. in evergreen forest, Nilgiris, on the higher ranges, common. A large glabrous shrub or small tree, l. black when dry, lanceolate, stemolate or elliptic-lanceolate, blade 3-4 gradually narrowed into petiole $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Fl. white, cymes small, sessile or nearly so at the ends of short branchlets, naked below, often with a few l. at the base of the cyme, corolla-tube $\frac{1}{2}$ in. long, style glabrous, less than twice the length of corolla-tube. Somewhat resembles *Hebea laevis*, which has 5-merous fl. and a pubescent style.

21. IXORA, Linn., Fl. Br. Ind. iii. 137.

Shrubs or small trees, as a rule evergreen, wood hard, branchlets usually round, not angled, l. mostly coriaceous. Fl. tetramerous, 5-bracteolate, in terminal trichotomous compound cymes, the l. at the base of cyme often sessile, corolla-tube long, very slender, as a rule glabrous outside, lobes twisted in bud. Ovary 2-celled, style filiform, exserted less than twice the length of corolla-tube, stigma slender, branches 2, rarely persistently connate. Drupe more or less drisymous, pericarp coriaceous or fleshy, endocarp coriaceous, 2-celled. Seeds two, peltate or concave, sometimes by abortion one only.

Tree, shrubby, or epiphytic climber, sometimes scandent. Species about 184, tropics of Asia and Africa, a few in America.

A. Cal-teeth longer than ovary; cyms compact, corymbiform, usually sessile.

1. *I. acuminata*, Burd.; Wight Ic. t. 26. Sikkim, outer hills and valleys; Assam, Shantin. Khasi hills; Cochin. A large shrub, 1-20 m. tall, stem tomentose above. Lvs. 2-7, pet. 1-2 in. long; fls. crowded, axillary or occasionally terminal, white, fragrant, for 4-5 days; cal. corolla tube 1-1.5 in., very slender, mouth 1/2 in. across. Drupe 1-2 in. long, rounded with the slender calyx-tube. 2. *I. nutans*, Wall. Assam, Khasi and Naga hills; Manipal; Yunnan. A shrub 1-4 dm. tall, stem tomentose above. Lvs. 2-5, pet. 1 in. long. Fl. pink. Calyx-tube very slender, 1-1.5 in. long, mouth 1/2 in. across. 3. *I. stramonii*, Wall. Khasi hills; Yunnan, Meng Yung. Many Pedunculata. A small shrub, branches 1 and 2 cm. pubescent. Cyms of short pedunculate flowers 5-10 in. long. Fl. pale rose-colored, corolla tube 1/2 in. long, hairy. 4. *I. marginata*, Hook. f. Mergol. Oblong, 1-2 dm. long, leaf 7-12, serrated into a blunt pet. 1-2 in. long. Fl. rose-colored, corolla tube 1/2-1 in., hairy. 5. *I. polystachia*, Wight Ic. t. 106. West side of the Peulmala, from the Khasi southwards. A large, very ornamental shrub. Lvs. long-ovate, glabrous, blade 8-10 in. long, pet. short. Cyms woolly with some spreading hairs; branches long, bearing only axillary or axillulose calyx-tubes. Corolla glabrous, tube 1-1.5 in. long, mouth 1/2 in. across. Fr. round, 1/2 in. long, sparsely hairy, crowned with the enlarged calyx-teeth linear. 6. *I. Johnsonii*, Hook. f. Cochin. Slender, tall entirely glabrous, 10-20 dm. tall, calyx-teeth linear.

B. Cal-teeth longer than ovary, cyms pedunculate, lower branches spreading.

7. *I. lanceolata*, Colebr.; Wight Ic. t. 97. West side of the Peulmala, from the Khasi southwards, from North Khasi southwards. A small tree, 1-2 dm. tall, glabrous above. Lvs. 4-7, pet. 1/2 in. long. Fl. white, corolla tube 1-2 in., mouth 1/2 in. across, tube hairy. 8. *I. latifolia*, Wall. N. Khasi and P. hills. In the dry hills, the branches slender, elliptic, blade 6-8, pet. 1/2 in. long, hairy with long, spreading hairs. Cyms simple, up to 10 in. long, peduncle up to 1/2 in. long, corolla tube glabrous, 1/2 in. long, lobes linear.

C. Cal-teeth as long as or shorter than ovary, cyms long pedunculate.

9. *I. spectabilis*, Wall. Burma. Arakan to Tenasserim. A small evergreen tree, pale beneath, stem gray-elliptic, blade 6-8, pet. up to 1/2 in. long, the upper part of stem sessile with rounded or cordate base. Cyms pubescent with long spreading branches, peduncles 8-10 in. long with one or two pairs of large sessile foliaceous leaves on the lower half. Fl. white, mouth corolla 1/2 in. long, lobes linear. 10. *I. trivittata*, Wall. Marilay and Tenasserim, slender but 1 dm. tall beneath, stem glabrous with 1-2 pubescent. 11. *I. brandisiana*, Kurz. Tenasserim. Leafy long, lanceolate, finely serrulate, peduncles 4-8 in. long, deflexed, cyms pubescent, compact, 2 in. diam., branches short. 12. *I. elongata*, Heyne. Western Ghats (near the Khasi or Ganges) slender to 2 dm. long corolla tube slender, 1/2 in. long, lobes short, linear. 13. *I. villosa*, Burd. (Wight Ic. t. 110). Sikkim, foot of hills. A semi. tree and Khasi hills. (Cochin) Khasi hills (Cochin) Kurz. A shrub, branches petioles, woody 1-2 dm. long, and cyms pubescent. Lvs. ovate long-ovate, variable in shape, blade 8-10, petiole 1-2 in., stipules 1-1.5 in. long, with long filiform points. Fl. white, fragrant, in ped. heads, cyms with long leafy branches, corolla tube 1 in. long.

D. Cal-teeth as long as or shorter than ovary, cyms on short peduncles, less than 2 in. long, branches spreading.

14. *I. parviflora*, Vahl; Wight Ic. t. 711; Bedd. Fl. Sylv. t. 222. Yunnan, Kura, Luli, Lokundi, Mar.; Kasi, Goring Teh.; Goring, Kan.; Surin, Tan.

A small glabrous tree, cyms sessile or slightly pubescent. Lvs. coriaceous, hard, shining, sessile or shortly petiolate, oblong or obovate-oblong, with a rounded or slightly cordate base, 4-5 in. long, the reticulate veins nearly as prominent as the second nerves. Fl. white or pink, scented, in axils, mostly sessile, compound trichotomous cyms. Corolla glabrous, tube 1/2-1 in., lobes oblong, style pubescent, tip of corolla ellipsoid in bud.

Woods, Peninsular, extending over to the Salween range, common in mountainous parts. District, Ghats, Nagpur, Orissa, Malabar, Malacca, Siam, Ceylon, Java, Sumatra, Borneo, Celebes, Philippines, the Malay Archipelago, the Malay Peninsula, the East Indies, the East African region. Branches of the tree wood make excellent firewood. 15. *I. verticillata*, Hook. Frequently in progress of wood, on the West side, not in Ganjam. Similar to 14, but narrowed into petiole, 4-7 in. long, lower 1/2 than base, base long 1/2 of middle of leaf, in bud, tube 1/4 in.

16. *I. grandifolia*, Zool. and Mart. *I. ovata*, Kurz and *I. macrophylla*, Kurz. Andaman, and Nicobar. Malay Peninsula and Archipelago. A shrub or small tree, 1-2 m. tall, with long elliptic-lanceolate, blade 6-12 in. long, stipules large with 2 long, often half, cusps 1/2-1 in. of pale rose, usually smaller than calyx, lobes 2-linear, tube 1-1 1/2 in. long. 17. *I. brunneovirens*, Kurz. Andaman and Nicobar. A small tree, nearly allied to 16, 1-2 m. tall, 6-7 in. long, sessile or on a very short stem, petiole base rounded or cordate. 18. *I. cuneifolia*, Roxb. Wight Is. 1. 200. Siam, Ceylon, Malabar, Tenasserim. A shrub, young pubescent, petioles and underside of l. minutely pubescent, sometimes almost glabrous. L. elongate-elliptic or elliptic-lanceolate, blade 6-8, pet. 1/2 in. long, vein 10-12 pairs, arching, terminating in distinct intramarginal vein, numerous 1/2-1/3 in. internodal nerves, stipules with short diffuse cusps. Fl. white, sepals or shortly petioled, corolla tube 1/2-1 in. long fr. red.

19. *I. nigricans*, Br. & Wight Is. t. 318. Vern. *Saebia*, Burma.

A small tree, entirely glabrous, turning black in drying. L. chartaceous, lanceolate, oblanceolate or elliptic-lanceolate, blade 5-7, pet. 1/2 in. Cymes strictly pedunculata or nearly sessile, rounded, broader than long, bracts sigillate. Fl. white, petals usually as long as or longer than calyx, with 2 lanceolate lobes. Corolla-tube glabrous within and without, 1/2-1 in. long, lobes linear 1/2-1 in. long, forming a narrow hood, not much broader than tube, filaments nearly as long as anthers. Fr. black 1/2 in. diam.

Woods, Malabar, Cochin, Burma, Upper and Lower, in Ceylon and the Eastern part, Western Peninsula, chiefly on the west side, common in evergreen forest. Fl. Jan-May. Malay Peninsula, Java. 21. *I. crinitissima*, Wall. *I. crinita*, Kurz. Pegu, Tenasserim. Similar to 1, lobes cordate or nearly sessile, base cordate or ovate.

21. *I. laudata*, Roxb. & Wight Is. t. 215. Siam, the IVan and lower hills, Bhamo, Assam, Khasi hills, Upper Burma. Dried sep. A large shrub or small tree, l. chartaceous, glabrous, lanceolate, edge serrulate, blade 5-8, pet. 1/2 in. long. Cymes elongate, shortly pedunculata, spreading pyramidal or top rounded, ramifications slender. Fl. greenish, tube supported by several linear bractlets, calyx teeth long, base usually equal to vary in length. 22. *I. barbata*, Roxb. Andaman and Nicobar. Cultivated at Calcutta and elsewhere. A large shrub, elliptic, blade 6-8, pet. 1-1 1/2 in. long, the upper pair at the base of petiole smaller, sessile, cordate. Cymes sessile, compact, 4-12 in. long, broader than high, calyx-teeth short, triangular, acute, corolla white, tube 1-1 1/2 in. length woolly. 23. *I. odora*, Br. Tenasserim, similar, but corolla-tube shorter.

E. Cal. teeth as long as or shorter than ovary. Cymes compact, ovoidiform, usually sessile.

24. *I. coccinea*, Lam. & Wight Is. t. 153. — Syn. *I. Bandhuca*, Roxb. & Wight Is. t. 143. Vern. *Bangun*, Beng. ; *Laboon*, *Poukai*, Mar.

A large shrub, entirely glabrous. L. coriaceous, sessile or nearly so, elliptic, sometimes obovate-oblong, cymes sessile, dense-ld. Fl. brilliant scarlet, sometimes yellow, corolla-tube 1-1 1/2 in. long, lobes ovate, acute, mouth naked, anthers short, yellow, exerted.

Woods, Peninsular, common near the Western coast, also along the Ghats on the E. side. Andaman, Indragiri &c. In Burma only cultivated. An ornamental in India's gardens. 24 throughout the year. — Ceylon low country to 2000 ft. common.

25. *I. stricta*, Roxb. Tenasserim (Kurz), similar to 24, fr. scarlet to pale and white, corolla-tube 1-1 1/2 in. lobes small rounded. 26. *I. amara*, Wall. Tenasserim, Malay Peninsula and Archipel. l. petioled, roseate. 27. *I. fulgens*, Roxb. & Wight Is. t. 311. *Laetia* Lobbe, Ternate, the Bismarck & Tenasserim, Malay Peninsula and Sumatra, l. shining, petioled, lanceolate, vein 20-25 pairs, fl. orange, then scarlet. 28. *I. cinerea*, Roxb. Andaman, Mergui, Malay Peninsula, l. rigidly cartaceous, lanceolate, blade with 10-12 in. long, d. orange and sharp, only 1/2-1 in. long, very short. 29.

20. *rugosula*, Wall. (*H. scandiflora*, Kurz). Martaban and Tenasserim. Fl. white or pale rose-coloured, corolla-tube $\frac{1}{2}$ in. 21. *spina*, Br. Tenasserim. Fl. pink, corolla-tube 1 in. long.

25. COFFEA, Linn.; Pl. Brit. Ind. III. 153.

Shrubs, stipules free. Fl. usually white, axillary, solitary, in pairs or in dense axillary fascicles. Free portion of calyx short. Corolla-lobes 4-5, twisted in bud. Anthers 4-7, linear, attached in the middle of the back to the short filaments. Ovary surmounted by an annular more or less fleshy disk. Drupe with two coriaceous or cartilaginous pyrenes. Seed plano-convex as a rule with a deep inwardly curved groove on the flat vertical face. Embryo short, near the base of seed, radicle inferior, cotyledons thin, cordate, albumen horny. Species 25, tropics of the Old World.

A. Fl. in axillary many-ld. fascicles, corolla-tube less than $\frac{1}{2}$ in.

*1. *C. arabica*, Linn.; Wight Ic. t. 53; Bedd. Man. t. xvii.; Brandis F. Fl. 274. *Coffea*.

A glabrous evergreen shrub or small tree, l. elliptic-oblong 5-7 in. long, narrowed into short petiole. Calyx-limb truncate, corolla funnel-shaped, tube $\frac{1}{2}$ - $\frac{1}{4}$ in. long, lobes oblong, as long as tube, filaments shorter than anthers. Berry fleshy, purple when ripe.

Indigenous in Abyssinia and the Sudan. Cultivated in Arabia since the 15th, on the mountains of the Peninsula since the 17th century. Fl. March-June. 2. *C. Eberica*, Hiern. *Liberian Coffea*, indigenous in tropical Western Africa, thrives at lower elevations within the tropics and is less exposed to the ravages of the fungus *Hemiteles costaricus* than *C. arabica*, the corolla 6-9-lobed, fr. black 1 in. long. 3. *C. Khasiana*, Hook. f. Khasi and Naga hills, Manipur. A large rambling almost climbing shrub, branchlets pubescent with short hairs, l. elliptic-lanceolate, serrulate-erruncinate, side 5-8 pet. $\frac{1}{2}$ in. long. Fl. yellowish-green on very short pedicels bracteate at the base, which lengthen out as the fr. ripens. Calyx with 4 triangular acute teeth, corolla-tube $\frac{1}{2}$ - $\frac{1}{4}$ in., lobes 4, short, hairs in throat white, anthers yellow. Fr. $\frac{1}{2}$ in. diam., calyx-teeth persistent. 4. *C. Jenkinsii*, Hook. f. Khasi hills. Similar, but glabrous, l. narrower, corolla-tube $\frac{1}{2}$ in., fr. $\frac{1}{2}$ in. long, seeds plano-convex without a central furrow.

B. Fl. solitary or 3-4 together, corolla-tube $\frac{1}{2}$ in. or longer.

5. *C. bengalensis*, Roxb.; Koenig F. Fl. 207. Vern. *Zalat-pyr*, Burma.

A deciduous shrub, youngest shoots slightly pubescent. L. membranous, not shining, 2-5 in., suddenly contracted into the short petiole, stipules subulate from a broad basis. Fl. pure white, fragrant, solitary or in pairs, calyx with 5 broad often indistinct teeth, divided into numerous linear segments, corolla 1-1 $\frac{1}{2}$ in. across, tube $\frac{1}{2}$ -1 in. Fr. $\frac{1}{2}$ in. long, black.

Subhimalayan tract and outer hills from the Juma eastwards. Sikkim, Terai, Assam, Silhet, Chittagong, Tenasserim, Upper Burma. Fl. Feb.-April. 6. *C. fragrans*, Wall. Silhet, Tenasserim, l. lanceolate, fl. usually solitary, calyx with numerous teeth, corolla-tube slender, $\frac{1}{2}$ -1 in. long.

7. *C. Wightiana*, Wall.; Wight Ic. t. 1528. Western Peninsula from Coorg to Travancore. Ceylon, dry region. A small shrub, bark white, branches right almost spinose, divaricate, l. $\frac{1}{2}$ -1 $\frac{1}{2}$ in., nearly sessile, stipules short rigid with a sharp point. Fl. solitary, sessile, calyx with 4 broad deeply lacinate teeth, corolla-tube $\frac{1}{2}$ in., lobes shorter than tube, fr. didymous, much broader than long. 8. *C. travancorensis*, W. et A. Trimen Handb. Ceylon t. 59. Western Peninsula from Coorg to Travancore. Ceylon, moist and intermediate region, ascending to 3,000 ft. A small shrub, branchlets denser, l. lanceolate 2-4 in. long, petiole short, stipules caducous. Fl. solitary or in threes, calyx pubescent, limb truncate, corolla-tube $\frac{1}{2}$ in., glabrous within. Fr. broader than long, $\frac{1}{2}$ in. broad.

Hamiltonia suaveolens, Roxb.; Bedd. Man. t. xvii. fig. 3; Collett Simla Flora, 231 fig. 71 (includes *H. myrtilloides*, W. et A.)—Syn. *Spermatodictyon suaveolens*, Roxb. Cor. 1, p. 226.

Yunnan, China, Burm. Hill, S. W. China, and the Himalayas, the Philippines, and also occurring in Java, Sumatra, and the Malay Peninsula. Burm. Hill, Yunnan, China, Burm. Hill, S. W. China, and the Himalayas, the Philippines, and also occurring in Java, Sumatra, and the Malay Peninsula. Burm. Hill, Yunnan, China, Burm. Hill, S. W. China, and the Himalayas, the Philippines, and also occurring in Java, Sumatra, and the Malay Peninsula. Burm. Hill, Yunnan, China, Burm. Hill, S. W. China, and the Himalayas, the Philippines, and also occurring in Java, Sumatra, and the Malay Peninsula.

20. LEPTODERMIS, Wall.: Fl. Brit. Ind. iii. 198.

Stems leafed when bruised. L. opposite, several pairs often approximate or arrested branched, stipules small, persistent. Fl. usually 5-merous, often unisexual, white or purple, axillary sessile, in compact few-fl. cymes. 2 bracteoles under each fl. ovulate into a scarious, 2-lobed tube. Corolla-tube slender, hairy within, throat glabrous, lobes valvate with inflexed edges. Ovary 5-celled, style filiform, arms 2, linear, ovules erect, basal. Capsule 5-valved to the base, seeds 5, each enveloped in a fleshy strabus ragged covering. Sikkim, Himalaya, China and Japan.

L. lanceolata, Wall.: Outer Himalaya, 8000 ft. Kashmir-Bhutan. A small shrub, l. lanceolate, blade 1-2, pet. 1-1 1/2 in. long. Fl. white, corolla 1/2 in. long, deeply cylindrical, 1-1 1/2 in. *L. virgata*, Hook. f. Sikkim, N. W. Himalaya, Huma, in Kulu, North China. A rigid, much branched shrub, l. linear 1-1 1/2 in. long. *L. graminea*, Khasi hills, Manipur. *L. lanceolata*, 1-1 1/2 in. long, stipules with long pointed points. *L. crassifolia*, Coll. in Burm. Java, Java, No. crest 67. Sikkim, Upper Burma 4-5,000 ft. *L. lanceolata* on grassy slopes. Young stems hairy or tomentose, ovate or orbicular, 1/2 in. long, fl. white, corolla 1/2 in. long.

21. PÆDERIA, Linn.: Fl. Brit. Ind. iii. 193.

Slender twining shrubs, leafed when bruised, stipules deciduous. Fl. 4-5-merous, in axillary and terminal compound trichotomous cymes, calyx-lobes persistent, corolla tubular or funnel-shaped, pubescent, lobes valvate with inflexed crisp-edged edges. Ovary 2-celled, stigmas 2, papillary, twisted, ovules basal, erect. Fr. (in the species here mentioned) flat, a thin shining fragile pericarp, separating from two flat orbicular or elliptic membranous or coriaceous pyrenes. - Species 10 or 10, most in tropical Asia.

P. latida, Linn.: Garooh, Hind. Nepal, Sikkim, from Sikkim to 8000 ft. Assam, Khasi hills, Cachets, (Hingay, Tenasserim, Yunnan, Malay Peninsula and Java). Near glabrous, l. ovate-obovate, base cuneate, 1-1 1/2 in. long. Cymes pedunculate, 2-3 in. long, bracteoles long, in distant pairs, bracts of the cymes or pedicels 1-1 1/2 in. long. Pyrenes black, with a broad pale wing. *P. manginosa*, Wall. Fl. Ac. Bur. 1. 105. Martaban, Tenasserim, often in forest of Tenasserim, Poo of Sikkim hills, Upper Burma, Yunnan. A large twining shrub, stem as thick as a man's arm, branched, petioles, underside of l. and cymes densely tomentose, greenish of l. rough when young with short stiff hairs when mature with the raised ribs of l. pubescent, l. ovate, serrulate, blade 1-2, pet. 1-5 in. Fl. dull purple, glabrous within, corolla 1-1 1/2 in. long.

Atkinsonia rosea, Hemsley, Journ. Linn. Soc. xiv. 1. 34. Khasi valley, at 1,000 ft. Burmesean (var. *Epitha*, Stapf). A gregarious multi-stemmed growing in dense thicket 10-15 ft. high and 5-6 ft. across, stem as dense, arising by the continuous creeping of stem and young l. opposite, petioles, stipules interspersed, persistent. Fl. pink, in crowded head-like inflorescence cymes. Fr. aplymous, separating into 2 cylindrical 1-celled seeds.

20. MORINDA, Lam. — Pl. Brit. Ind. 1, in. 155.

Erect or climbing shrubs or trees, stipules crumpled, sheathing. Fl. white, sessile on a globose receptacle, the calyxes one or less connate, forming dense peduncled heads, which are solitary or arranged in umbels or umbels. Calyx-tube short, truncate. Corolla lobes 4-7, ovate-ovoid, valvate or imbr. Stamens 4-7. Ovary 2-6 by the proloc, rather of the placenta spirally setted, style slender, with 2 stigmatic lobes. Fr. one or more of the succulent coats, enclosing many cartilaginous or bony 1-seeded pyrenes, which sometimes others, drupes rarely free. Species 10, tropics of both hemispheres.

A. Corolla 5-7-merous, tube $\frac{1}{2}$ in. or longer.

1. *M. citrifolia*, Lam.; Fl. Brit. Ind. in. 155. Vars. *M. Ach.* Hind.

A large shrub or small tree, glabrous, l. shining, elliptic, blade 6-10, narrowed into pet. $\frac{1}{2}$ in. long, stipules large, broadly Δ long or semilunar, often 2-3-lobed. Peduncles $\frac{1}{2}$ - $\frac{3}{4}$ in., usually solitary, leaf-opposed, the supporting leaf not developed, in 5-merous, corolla-tube $\frac{1}{2}$ - $\frac{3}{4}$ in. of many drupes coalescent into a fleshy head, pale greenish-white, 1 in. diam.

Indigenous in the Laccadive, Tenasserim, and other hills (Siamese, Lam. 49) and (var. *hirsuta*) on the Andaman, Kuria, as well as along the coast of the Konkan, quite near the sea (Talbot). Cultivated largely in India and Burma on account of the taste which yields sugar. Fl. B. S. R. S. China, Formosa. *M. hirsuta*, Roxb., Wilder. III. 1, 126, is a variety, the calyx-tube with a lanceolate or spatulate foliaceous lobe. In Indian Tinian Fl. II. 123 (available records) *M. citrifolia*, Lam. is the form growing on the sea coast. The writer demands further research.

2. *M. tinctoria*, Roxb. — Syn. *M. citrifolia*, Boiss. Fl. Sylv. t. 1207; *M. tinctoria*, Roxb.; Bracon. Fl. VI. 277; *M. tinctoria*, Kurz; Vern. *M. Ach.* Hind.; *Muldi*, *Toparu*, Tel.; *Niaw*, Burm.

A small or middle-sized tree, usually pubescent or tomentose, bark spongy, deeply cracked, greyish-yellow. L. not shining, elliptic-obovate or lanceolate, blade 4-8, narrowed into petiole $\frac{1}{2}$ in. long. Peduncles solitary, axillary or leaf-opposed, frequently in short trichotomous panicles at the ends of branches. Fl. sessile, 5-merous, corolla usually tomentose outside, tube $\frac{1}{2}$ - $\frac{3}{4}$ in. long, anthers exerted or included. Syncarpium $\frac{1}{2}$ in. diam.

Hill, Central Province, Patnawala, Burma, Upper and Lower, cited in English. Presently cultivated (Hear. D. B. March 1877). Fl. March-June. *M. tinctoria*, Boiss. is the valid name for the form *M. angustata*, Roxb. Cor. Pl. 3, 257. Vern. *Jawa*, *Amam*; *Niaw*, *Toparu*, *Burma*, *Nikkir*, *Tetari* and lower hills, *Assam*, *Khasi* hills, *Upper*, *Forma*, *Pegu* (wild and cultivated by Karam), *Tenasserim*, *Malay*, *Penins.* A large, *Chitrawan* shrub, l. thickly tomentose, lanceolate, blade 4-12, narrowed into petiole $\frac{1}{2}$ in. long, *Indo-China*, *fragrant*, peduncles axillary or leaf-opposed, corolla glabrous, drupes free. 3. *M. persicaria*, Lam. — *Pegu*, *Tenasserim*, *Malay*, *Penins.* A low shrub or undershrub, l. oblanceolate or linear, stipules subulate, peduncles short, leaf-opposed, drupes confluent.

B. Corolla 4-, rarely 5-merous, tube less than $\frac{1}{2}$ in. long.

3. *M. umbellata*, Lam. — West side of the Peninsula in evergreen forests from Cochin southwards. Khasi hills, *Tenasserim*, *Malay*, *Peninsula*, *Ceylon*, moist region in 1890 (l. common). China. A large shrub climbing by long slender branches, internodes long, l. usually glabrous and lanceolate, blade 2-5, pet. slender $\frac{1}{2}$ in. long, in heads in terminal Δ -wise umbels, peduncles 5-10, glabrous or tomentose, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, corolla almost rotate, 4-5-merous. Syncarpium $\frac{1}{2}$ in. diam. irregularly lobed. 4. *M. villosa*, Hook. f. Khasi hills. A climbing shrub, leaves flat, anthers 10 or 12, peduncles tomentose, l. obovate-elliptic, acuminate, 4-5 in. long, seg. n. 10-14 pale prominent beneath. Fl. heads in terminal umbels, drupes confluent.

5. *Bambusa spongia*, Hook. f. *Morinda spongia*, Kurz, *Tenasserim*, *Malay*, *Penins.* and *Archip.* An evergreen climbing shrub quite glabrous, l. thickly coriaceous, lanceolate or elliptic-lanceolate, blade 6-8, pet. $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Fl. violet, sweet-scented, 5-6 in. diam. heads shortly pedicelled, arranged in compact terminal panicles, calyx-tube shortly 4-toothed.

Samolanthus indicus, DC. Prodr. Monocot. III, 1. China, Java, Sumatra, high up in the wooded mountains, trees 15 to 20 feet high, leaves 2 to 4 in. long, veins 3-4 in. straight, slender, tuberculate (possibly standing in the seeds of the minute stipules). Fl. 4-5-merous, white, axillary, solitary or in pairs in slender branched racemes, corolla tube $\frac{1}{2}$ in. long, thin ribbed, throat villosa, lobes triangular-ovate, valvate in bud. Ovary 2-4-celled, sep. 1 in each cell. Possibly a synonym of *Samolanthus* in Malabar (Wight L. Journ. Bot. 14 in. long, veins shorter than l.).

Gynochthodes macrophylla, Ktze. Nov. Avon. South America. Malacca. An evergreen scrubbing shrub, entirely glabrous, petioles elliptic, blade 4-6, narrowed into pet. $\frac{1}{2}$ in. long. Fl. 4-5-merous, unisexual in short axillary compact cymes or heads in the leaf-axils. Corolla tube ovate, throat hairy, lobes valvate, ovary 2-celled. Fr. sep. green, fleshy, $\frac{1}{2}$ in. diam., pericarp 2-4, papery, 1-seeded.

Fritimataria albidiflora, Thunb. Bot. Berol. Pl. Or. t. 93; Martius t. 22, fig. 1. Assam, Khasi hills, Ghattinging, Assam, Tenasserim, Cochinchina, Malay Peninsula and Sumatra. Ceylon, western region. A large evergreen shrub, wholly glabrous, branches decussating, branchlets slender 4-angled. L. coriaceous, shining, elliptic-lanceolate, blade 3-5 pair, 1-1 in. long. Fl. yellowish white, scented, unisexual, 4-5-merous, fasciculate, rarely in pedunculate umbels, pedicels long. Anthers. Corolla-tube cylindrical, $\frac{1}{2}$ -1 in. long, lobes valvate in bud, linear $\frac{1}{2}$ in. long, ovary 2-celled. Drupe purple-diffuse, $\frac{1}{2}$ in. diam., 2-celled, seeds cretaceous.

Colospermum scandens, Hilleb. Andaman, Malay Peninsula and Arctif. A climbing shrub, glabrous, except the puberulum in the axils and calyx. L. coriaceous, dark green, elliptic, acuminate, blade 6-8 pair, $\frac{1}{2}$ -1 in. long. Fl. strongly scented, indolent, umbelliform pedunculate cymes, bearing a terminal thyrsus. Calyx truncate, corolla coriaceous, tube white, $\frac{1}{2}$ in. long, glabrous outside, hairy within, segments yellow, narrow, valvate, adnate to tube. Ovary 4-celled with 1 locule, or 2-celled with 2 locules in each cell.

27. PSYCHOTRIA, Linnæus, Fl. Berl. Ind. III. 161.

Shrubs or small trees, usually glabrous and evergreen, sometimes climbing, rarely herbaceous. Fl. in terminal, rarely axillary, corymbose or paniculate cymes. Corolla-tube straight, short, lobes 5, rarely 4 or 6, valvate in bud. Ovary 2-celled, style blind, ovules basal, erect, one in each cell. Drupe with 2 one-seeded plano-convex pyrenes, endocarp thin. Seeds plano-convex, ventrally flat or grooved, embryo small basal. Species about 500, tropics of both Hemispheres.

A. Pyrenes plano-convex, no dorsal ridges, no ventral groove, albumen strongly ruminated.

a. Western species.

1. *P. Thwaitesii*, Hook. f.; Trin. Handb. Ceylon II. 358.

A large gregarious shrub, l. lanceolate or oblanceolate, blade 4-8, petiole $\frac{1}{2}$ -1 in. long, sec. n. 12-16 pair. Fl. greenish, capitate, mixed with rufous hairs, buds sometimes solitary pedunculate, generally in sessile or pedunculate cymes, the lower branches of which are whorled. Fr. $\frac{1}{2}$ -1 in. long.

West side of the Peninsula, in evergreen forests, from the Kankas southwards. Fl. Mar. to April. Deylon moist region, very common to 5000 ft. 2. *P. congesta*, Wight et Arn. Wight. In. t. 187 (Grewia?), possibly *P. elongata*, Bell. Manual t. xvii. Nilgiris, Palni. Similar, but smaller, sec. n. 8-10 pair, fl. shortly pedicelled crowded cymes often trichotomous, no hairs among the fl., fr. always crowded by the persistent calyx-stalk. 3. *P. macrocarpa*, Hook. f. Tinnevely. (Data, fr. sep. solid $\frac{1}{2}$ in. long.) 4. *P. subintegra*, W. et A. Shervaherry and Dindigul hills. Cymes trichotomous, the lower pair of branches long spreading, rachis arched. 5. *P. truncata*, Wall. West side of the Peninsula in evergreen forests from the Kankas southwards. L. broadly obovate, blade 6-8, narrowed into pet. $\frac{1}{2}$ -1 in. long, sec. n. 14-16 pair, prominent, cymes large. Lower branches of cymes whorled, fr. not crowded by calyx. 6. 2. Zateala, Hook. f. West side of the Peninsula in evergreen forests from North Kanara southwards, often gregarious, branchlets dense green, l. obovate or oblanceolate, 6-10 in. long, petiole short stout, lower cymes branched whorled. Fr. black, succulent, edible, $\frac{1}{2}$ in. diam., crowned with the enlarged calyx, seeds with 1 dorsal ridge. 7. *P. elongata*, Wight et Arn. (Grewia?). Nilgiris and Shervaherry hills. Cymes little to

10. *P. adenophylla*, Wall. (including *P. contorta*, Kurz). An evergreen perfectly glabrous shrub, l. thinly coriaceous, elliptic-lanceolate, blade 4-8, narrowed into petiole $\frac{1}{2}$ in. long, sec. n. crossing, 10-18 pair, stipules connate, sheathing, those sheathing the petiole at the upper end, rest of leaves truncate. Fl. white, in small short-peduncled or almost sessile cymes, arranged in an elongate narrow thyrsus. Fr. purplish-black, 1 in. diam.

Khasi hills, Chittagong, Andaman; Bhamo in low evergreen forest (M. Hall). Pegu, Yunnan and Tenasserim. Fl. H. S. 10. *P. tylophora*, Kurz; Nicobar. Similar but l. elliptic, nearly $\frac{1}{2}$ in. long. 11. *P. pendula*, Hook. f. Andaman. Thyrsus in fr. very long, pedicels fr. $\frac{1}{2}$ in. broad, broader than long, covered by the 5-toothed calyx with fr. 12. *P. platyneura*, Kurz. Andaman. L. elliptic-lanceolate, 4-7 in. long, sec. n. 10-22 pair, cymes trichotomous, branches spreading, fr. slightly obovoid, $\frac{1}{2}$ in. long.

9. *P. adenophylla*, Wall., including *P. contorta*, Kurz.

An evergreen perfectly glabrous shrub, l. thinly coriaceous, elliptic-lanceolate, blade 4-8, narrowed into petiole $\frac{1}{2}$ in. long, sec. n. crossing, 10-18 pair, stipules connate, sheathing, those sheathing the petiole at the upper end, rest of leaves truncate. Fl. white, in small short-peduncled or almost sessile cymes, arranged in an elongate narrow thyrsus. Fr. purplish-black, 1 in. diam.

Khasi hills, Chittagong, Andaman; Bhamo in low evergreen forest (M. Hall). Pegu, Yunnan and Tenasserim. Fl. H. S. 10. *P. tylophora*, Kurz; Nicobar. Similar but l. elliptic, nearly $\frac{1}{2}$ in. long. 11. *P. pendula*, Hook. f. Andaman. Thyrsus in fr. very long, pedicels fr. $\frac{1}{2}$ in. broad, broader than long, covered by the 5-toothed calyx with fr. 12. *P. platyneura*, Kurz. Andaman. L. elliptic-lanceolate, 4-7 in. long, sec. n. 10-22 pair, cymes trichotomous, branches spreading, fr. slightly obovoid, $\frac{1}{2}$ in. long.

B. Pyrenes plano-convex, dorsal ridges none or very slight, frequently a T-shaped ventral groove, albumen uniform.¹ Eastern species.

13. *P. salocarpa*, Kurz, including *P. viridifera*, Kurz. Fl. H. S. 12, not Retz. Nepal, 2000 ft. Assam, Khasi hills, Cachar. 14. *P. tylophora*, Kurz. Pegu and Tenasserim, Perak. A shrub, almost herbaceous, young stems minutely puberulous. L. ovate-lanceolate or elliptic-lanceolate, margins often serrate or unilobate, blade 2-6 in. long, stipules 1-2 in. long, petiole $\frac{1}{2}$ in. diam. Cymes small, axillary and terminal, calyx 5-toothed, elliptic. Fr. $\frac{1}{2}$ in. long, somewhat orange or red, pyrenes with 3 or 4 slight dorsal ridges. 14. *P. Thomsoni*, Hook. f. Khasi hills, similar cymes terminal, trichotomous, elongate peduncled, calyx 5-toothed short-triangular. 15. *P. denticulata*, Wall. Nepal, 2000 ft. Assam, Bhamo, Khasi hills, Manipur, Tenasserim. L. elliptic or obovate, blade 5-8, petiole $\frac{1}{2}$ in. long. Cymes terminal and axillary, pedicels 2-4 in. long, branches axillary or opposite. 16. *P. albertiana*, Hook. f. Assam, Khasi hills, Cachar. L. elongate-elliptic, underside as well as cymes often minutely puberulous, blade 6-12, petiole 1-1 in. long, sec. n. 10-20 pair, prominent, stipules 1 in. diam. Cymes terminal and axillary, pedicels 1-2 in. long, fr. 1-2 in. diam. Cymes terminal and axillary, pyrenes smooth on back, with a deep T-shaped ventral groove, resembles in appearance *P. salca*. 17. *P. montana*, Blume. Fl. H. S. 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. A small glabrous shrub, l. membranous, elliptic-lanceolate, blade 2-5, petiole slender, 1-2 in. long, sec. n. 8-10 pair, slender. Cymes terminal and axillary, branches slender, often v-shaped, pedicels $\frac{1}{2}$ in. long. Fr. red $\frac{1}{2}$ in. long.

C. Pyrenes with sharp ridges on the back, albumen usually uniform.

a. Western species and species of both peninsulas.

18. *P. sarmentosa*, Blume; Wight Ic. t. 1038; Triana Haude, Ceylon II, 359.

A large evergreen glabrous shrub, climbing by adventitious roots, stems sarmentose with long internodes, l. lanceolate or elliptic-lanceolate, blade 2-8, pet. 1-1 in. long, sec. n. faint, stipules sheathing. Cymes trichotomous lax, branches divaricate. Fl. green, calyx hairy, corolla-tube with a dense belt of yellow hairs in mouth, fr. pure white, nearly $\frac{1}{2}$ in. diam., pyrenes with 5 obtuse ribs on the back.

West side of the Peninsula from Coorg southwards, Tenasserim. Fl. Feb-April. Malay Peninsula and Archipelago. Ceylon southern in the low country. Fl. B.

¹ The albumen rimmed off by the intrusion of the testa is nevertheless uniform or homogeneous. I use the term "uniform" in contradistinction to "rimmed," though it is generally understood, though it is not logical.

pubescent, pedicel, fruit, peduncle, leaf, stem, etc. 20. *P. serratata*, Hook. f. *Fl. Borac.* 287. *P. serratata*, Java, Kampoeng. A small shrubby tree green beneath, cymes white, calyx-tube, branches, leaflets, etc. black and somewhat waxy tips, pyrenes 4 in. long, 4-ridged on back. 21. *P. zanzibarica*, Telford Journ. Bomb. Nat. Hist. Soc. 21, 911, t. 20. Falls of Gaurang, North Bantam. A small erect shrub, fr. small, curved, 4 in. long, pyrenes with 2 furrows down the back. 22. *P. striatata*, W. & A. *Nidiv.* fr. 4 in. long, pyrenes with 2 shallow furrows on the back. 23. *P. comata*, Wall. (*P. longica*, W. & A. *Wright* fr. 1, 828). *P. comata*, L. *Christenb.* 1. *P. comata*, shining above, nearly smooth, 4-7 in. long, stipules ovate or lanceolate, simple or bifid. Cymes pedunculate, lower branches whorled, leaflets, etc. entire or serrate, persistent, pyrenes with 2 broad shallow furrows. 24. *P. anamallayana*, Belding, *U. Ch.* 2, 26. *Anamallayana*, 3-4 1/2 ft. on banks of rivers. A large shrub or small tree, l. chartaceous, oblanceolate, blade 6-10 narrowed into petiole 1-2 in. long. Cyme short on a stout peduncle, lower branches whorled, leaflets serrate.

b. Eastern species, pyrenes with 4 dorsal ridges.

25. *P. serrata*, Hook. f. *Nepal.* 513. *P. serrata*, ascending to 6000 ft. Khasi and Naga hills. Sum. An evergreen shrub 4-5 dm. branches, lanceolate, blade 3-7, pet. 1-2, fr. 1-2 in. long, stipules often with 2 or 3 lobes. Cymes trichotomous, 1 in. long, bracts lanceolate. Calyx-teeth longer than tube. Fr. smooth, red and yellow. 26. *P. sulcata*, Wall. *Pegu and Tenasserim.* 1. *P. sulcata*, blade 3-5 narrowed into pet. 2-4 in. long, stipules large, almost persistent. 27. *P. andamanica*, Kurz. *Andaman and Nicobar*, possibly only a form of 25 with longer l. 28. *P. fulva*, Ham. (in *Botan. U. Ind.*, Kurz, *Assam.* Khasi hills, Cachar, *Wright* l. chartaceous, blade 3-12, pet. 4-1 in. long, etc. 15-18 pairs, stipules 1-1 in. bifid. Cymes axillary or terminal, compact, usually pedunculate, fr. 1 1/2 in. long.

c. Eastern species, pyrenes with 1, rarely 3 dorsal ridges.

29. *P. angulata*, Korth. *Tenasserim, Malay Peninsula and Archip.* l. chartaceous, shining above, blade 4-8, pet. 1 in. long. Cymes pedunculate, branches stout, 1-2 dm. 30. *P. symplocifolia*, Kurz. *Khasi and Naga hills.* Hills east of Tenasserim, l. chartaceous, cordate-serrulate, blade 2-5, pet. 1 1/2 in. long. Cymes pedunculate, axillary or terminal, branches slender. 31. *P. heterotana*, Kurz. *Pegu, Tenasserim, Malay Peninsula, Yunnan.* Branchlets, underside of l. hirsute, l. elliptic, blade 3-10, pet. 1-2 in. long. Cymes subsessile axillary or terminal, peduncled, 2 minute greenish-white in lower buds, axils with hirsute persistent bractlets, fr. often hirsute oval, covered by the persistent, only 2 segments.

Chaetia curvifera, Thunberg. *Psychotria curvifera*, W. & A. *Wright* fr. 1, 127. *Sikkim*, 2-4000 ft. *Assam, Khasi hills, Tenasserim, Western Peninsula* to the west coast from the Kankon southwards mostly in evergreen forests. *Malay Peninsula, Celebes*, and region to 6000 ft. A slender shrub 1-2 dm. branches, elliptic-lanceolate or oblanceolate, blade 1-8, pet. 1-3 in. long. Cymes terminal trichotomous, peduncled, 1-2 in. long. Fl. 4-5-merous, dimorphic, anthers exserted, stigmas included or the inner calyx-teeth triangular. Corolla 1-2 in. long, weak white throat yellow, disk reddish, lobes 2. Fr. 4 in. diam. fleshy purple, pyrenes 6-8, shaped, very concave ventrally.

Hydnophytum romocarium, Jack: Kurz *F. F. H. S.* Mangrove swamps of South Andaman. *Malay Peninsula and Archip.* A small evergreen epiphytic perfectly glabrous shrub, with a thick inter-lim trunk, often hollow, in which ants make their nests, branches few, short, l. chartaceous, elliptic or obovate, obtuse, 2-4 in. long, middle or narrowed into a short broad petiole. Fl. white, sessile, solitary with few folioles, ovula-tube 2 in. long, glabrous without, hirsute within, base 2, valvate at base. Ovary 2-celled, stigma 2-lobed. Drupe oblong 2-3 in. long (Kurz) orange-crimson.

28. SAPROSMA, Blume; Fl. Batj. Ind. III. 102.

Shrubs, fetid when bruised, l. opposite & whorled, membranous, stipules deciduous. Fl. usually white, 4-5-merous, axillary or terminal, solitary or cymose, bracts and bractlets minute. Calyx-tube obovate, limb dilated, persistent. Corolla bell- or funnel-shaped, throat villosa, lobes broad, obtuse, valvate with inflexed edges. Ovary 2-celled, stigmas 2, ovules basal, erect. Drupe small with 1 or 2 pyrenes, endocarp crustaceous, embryo nearly as long as seed. Species 8 or 9. India, Tonkin and South China. Malay Archip.

1. *L. ternatum*, H. & A. Assam, Khasi hills, Manipur, Upper Burma, Thailand, Andaman, Yunnan, Tonkin. A small shrubby, small straggling, branched woody plant, l. ternately suboblong-lanceolate, serrulate, blade 2-4 pet. about 1-1.5 in. long, tertiary n. parallel, very few, stipules broadly ovate, leaf-like points, sometimes pubescent. Fl. in terminal cymes, often branched, rays branched long, striate. Calyx with 4-6, triangular. Fr. black when ripe, with a thin shell, crowned by the calyx-limb, size 6. 2. *L. cynocarpus*, H. & A. Ind. Or. 217. Ceylon, Timorella and Traxacora Glata, also 216. In evergreen forest. Similar, but tertiary n. more reticulate, very often pubescent.

3. *L. ceylanicum*, H. & A. Mal. Ind. Fl. Sericea 17, 1891. In Pl. Ind. Or. 216. Ceylon, Nilgiris and Sreevaghery hills glabrous, branchlets flattened and dilated below the nodes, l. oblong above, lanceolate, blade 2-4, pet. 1 in. long, tertiary n. inconspicuous. Fr. pale, sulphur yellow, field, solitary, on slender peduncles 1-1.5 in. long, with 2 small linear bracts below the middle, usually 1 in. long. Fr. 1-1 long, bright blue.

4. *L. fragrans*, H. & A. Syn. Sericea 17, 1891. H. & A. Pl. Ind. Or. 216. Western slopes of the Nilgiris, Timorella hills. Fl. very fragrant, lvs. branchlets and young twigs rather crushed. L. elliptic-lanceolate, blade 2-4 in. long, pet. very short. Fr. in small cymes or clusters. 5. *L. indicum*, H. & A. Ser. 17, 1891. Ceylon, H. & A. Pl. Ind. Or. 216. Western Ghats from Bombay southwards, in evergreen forest, Ceylon, Java. A large shrub, l. small, elliptic-oblong 2-3 in. long. Fl. in short pedicels in leaf-axil terminal clusters. Fr. ellipsoid 1-1.5 in. long, bright blue, with seed case. 6. *L. obovatum*, Kurz. Khasi hills, Martaban and Tenasserim, 2-5000 ft. glabrous, l. lanceolate, blade 2-4, pet. 1 in. long, stipules stiffly linear-lanceolate. Fl. terminal, solitary or few together, in leaf-axils.

20. LASIANTHUS, Jacq. Fl. Brit. Ind. iii. 178.

Shrubs, usually evergreen, often hairy, some species 1, l. distichous, base rarely cuneate-acuminate, tertiary nerves numerous, parallel. Fl. in axillary clusters or short cymes. Calyx-limb persistent. Corolla funnel- or salver-cimped, throat villous, lobes 3-7, ciliate in bud, anthers included. Ovary 4-6-celled, stigmas 3-6, short, obtuse, oviduc erect. Drupe small with 3-6 trigonous, 1-seeded pyrene. Species 80, mostly in India and the Indian Archip., extending to China, Japan and North Australia.

A. Fl. sessile or nearly so, in axillary clusters, bracts conspicuous.

a. Outer bracts longer than fl.

1. *L. stipularis*, H. & A. Tenasserim or Andaman, Singapore, Malay Archip. Cymes enclosed by the large coriaceous stipules. 2. *L. cynocarpus*, H. & A. Naga hills, Chittagong, Andaman, Nilgiris, Malay Peninsula, Borneo. A small evergreen shrub, softly hirsute all over, l. elliptic-lanceolate, blade 6-12, pet. 1-2, outer bracts ovate, 1-3 in. long. Drupe dry, bright blue, pyrene 4-6. 3. *L. Jackianus*, Wight, H. & A. Pl. Ind. Or. 216. Nilgiris, Simlas, softly hirsute all over, l. nearly sessile 4-6 in. long. 4. *L. sikkimensis*, Hook. f. Sikkim 2-3000 ft. Khasi hills. Branches petioles and underside of l. rarely pubescent, l. lanceolate, blade 6-8, pet. 1-1.5 in. long, bracts subulate. 5. *L. Wallichii*, Wight. Assam, Khasi hills, Malabar, Cachar, Andaman, Martaban, Tenasserim, Kurus, Malay Peninsula, China, Formosa. Branches and underside of l. densely hirsute with long hairs, l. nearly sessile, from a rounded or cordate, often unequal base, oblong or oblong-lanceolate, 2-7 in. long, bracts subulate. Drupe blue-black. 6. *L. ventriculatus*, Hook. f. Sikkim. Branches glabrous, l. oblanceolate from an unequal-sided base, long scattered hairs on midrib and nerves beneath, bracts subulate or bifid.

b. Outer bracts shorter than fl.

7. *L. tuberosus*, Hook. f. Khasi and Jaintia hills. l. lanceolate, rough beneath with minute hairs, blade 5-7, narrowed into pet. 1-1.5 in. long, tertiary n. conspicuous. Fl. sessile, clustered, calyx 1 in. long, limb slightly 5-toothed, tubular after flower, bracts orbicular, coriaceous. Drupe 1 in. long, crowned by the calyx-limb. 8. *L. obovatum*, H. & A. In Pl. Ind. Or. 216. Timorella Glata. Branches glabrous, petioles, stipules and nerves beneath strigose, l. elliptic-oblong, blade 2-7, pet. 1 in. long, tertiary n. prominent beneath. Calyx large, limb cleft to the base. 9. *L. obscurus*, H. & A. Tenasserim, Andaman, Sumatra, Java. Branches pubescent and stipules tomentose, l. lanceolate, blade 1-7, pet. 1 in. long, nerves on the underside hairy. Bracts strigose, outer often inner subulate or bifid. Drupe very small.

10. *L. Kurzii*, Hook. f. *J. Bot. Beecheyi*, Kurz. Travels in Annamite Region, studies and notes beneath with each a 15 minute hour. *L. lanceolata*, blade 5-6 pet. 1 in. long. Calyx strongly hairy at the base. 11. *L. sessilis*, Talbot (1881) 112. Evergreen forest. Yellow in Gassoppah, North Kanara. A stout glabrous shrub, white hairs appressed, hairy, petiole and stipules hairy, *L. glabrescens* above, hairy on nerves beneath, dilated. Blade 4-6, pet. 1 in. long. Fl. small, tetramerous, white sessile, bracts hairy, triangular. Calyx tooth triangular, hairy outside. Drupes fleshy, black, pyramis 4, trigonous, tubercles on back.

B. Fl. sessile or nearly so, in axillary clusters, bracts minute or 0.

a. Calyx toothed: Western species.

12. *L. Mannum*, Wight. *Bull. Ind. Pl. Ind. Or.* 1, 25. Travelling and Travancore hills. A large shrub or small tree, almost glabrous, *L. lanceolata*, blade 6-8, pet. about 1 in. long. Calyx tooth much longer than tube. 13. *L. ciliatus*, Wight. Nilgiris. Branchlets petioles and nerves beneath of *L. sessilis* like tomentose, *L. oblongilanceolata*, blade 6-8, pet. about 1-1 in. long, sec. n. 8-9 pair, prominent beneath, as well as tertiary nerves. Fl. hairy, surrounded by stiff bristly hairs, calyx tooth oblong, obtuse, hispid. 14. *L. strigulosus*, Hook. f. Coortallum. Branchlets, petioles and nerves beneath clothed with appressed soft hairs, *L. lanceolata*, blade 4-6, pet. 1-1 in. long. Calyx linear tooth minute, triangular, corolla bilobate. 15. *L. acuminatus*, Wight. Nilgiris. Palm and Sengacherry hills. Nearly glabrous, *L. lanceolata*, blade 4-6, pet. 1 in. long, sec. n. 4-5, oblique, the 2 lower pair reaching beyond the middle of leaf. Calyx hairy, tooth triangular, corolla glabrous outside. 16. *L. parvifolius*, Wight. Coortallum. Quite glabrous, *L. ovata* with distinct, lanceolate or oblong-lanceolate, acute obtuse at apex, blade 15-2 pet. 1 in. long. Calyx tooth small, oblong, corolla glabrous outside. 17. *L. obovatus*, Beld. f. *Pl. Ind. Or.* 1, 10. Travancore Hills 1890 ff. A rigid much branched shrub, *L. glabrescens*, margins obtuse obtuse margins recurved, blade 1 in. long, narrowed into a short petiole. Calyx tooth white or trigonous, corolla tube short, glabrous outside.

A. Calyx toothed, Eastern species.

18. *L. laetius*, Blume. Khasi hills. Upper Travancore (Kurz) Java. Branchlets usually minutely hairy, *L. lanceolata*, blade 6-8, pet. 1 in. long, petioles and nerves beneath minutely hairy. Calyx tooth lanceolate, corolla white, 1 in. long, widely imbricate. 19. *L. Hookeri*, C. B. Clarke. Khasi hills. Minutely striated, rigid bluish-lanceolate, blade 6-8, pet. 1 in. long. Calyx tooth lanceolate. 20. *L. truncatulus*, Hook. f. Khasi and Jaintia hills. Almost glabrous, *L. lanceolata*, blade 6-8, pet. slender, tubercles, 1 in. long. Calyx glabrous, limb cup-shaped, tubercles minute, tooth 4, triangular, acute. 21. *L. tinctorius*, Hook. f. Khasi hills. Branchlets, petioles and midrib hairy, pubescent, *L. membranosa*, narrow lanceolate, blade 7-9, pet. 1-1 in. long. Corolla 1 in. long, slender, puberulous outside. Drupes blue, pyramis 6. 22. *L. equisetum*, Wight. Travancore and Andaman, common. Kurz. Branchlets, petioles stipules and nerves beneath more or less appressed pubescent. Calyx limb contracted above the ovary, dilated above, 4-lobed (sharply toothed, almost truncate, Kurz). 23. *L. pacificus*, W. & A. *Journal of Natural History* vi. 215. Morgan, branchlets petioles stipules and nerves beneath softly pubescent with long spreading hairs, *L. thin*, corolla nearly sessile, 3-4 in. long, calyx with 4 triangular teeth.

a. Calyx limb tubular, truncate or nearly so.

24. *L. truncatus*, Beld. in *Pl. Ind. Or.* 1, 7. Myrcene hill, Ganjam 4,900 ft. Branchlets, petioles and nerves beneath appressed pubescent, *L. narrow lanceolata*, 4-6 in. long, petiole short, tertiary nerves distinct. Fl. solitary or in few-fl. clusters. Calyx limb broadly truncate or nearly so. Corolla 2 in. long, pubescent outside, lobes 6. 25. *L. andamanicus*, Hook. f. Andherst. Andaman. Branchlets, petioles stipules and nerves beneath striate with long hairs, *L. oblong lanceolata*, blade 6-8, pet. 1 in. long, tertiary nerves prominent. Calyx limb directly tubular, truncate. 26. *L. Balfouri*, Travancore or Andaman. Branchlets and petioles glabrous, nerves minutely hairy beneath. *L. oblong lanceolata*, blade 4-6, pet. 1 in. long, sec. nerves 10-12 pair, tertiary absent. Calyx limb shortly tubular, truncate or obscurely lobed.

C. Fl. in peduncled cymes.

a. Western species.

27. *V. verticillata* Wight, Nilgiri (2800) fl. evergreen. Hills of Ghats, very rare. Leaves, a very branching glabrous shrub. *V. verticillata*, elliptic, base 2-4 in. long, pet. short, tertiary nerves prominent. Fl. pale yellow, on short pedicels in loose, almost peduncled cymes, sometimes solitary. Calyx 2-limbate, lobes 4-5, subulate, as long as the corolla-tube, which is glabrous outside, corolla 4 in. long. Drupes 4, crowded by the unguiculate. 28. *V. capitulata* Wight, Nilgiris, nearly allied to 27, almost glabrous or minutely strigose, 2-limbed, lobes longer. Fl. nearly sessile in loose, almost peduncled cymes, corolla hairy inside. 29. *V. distans* Wight, Nilgiris, fl. Ghats, Sheshagberry hills, nearly glabrous, petals and cymes sometimes strigose. Calyx elliptic-lanceolate, lobes 2-4, pet. 4-4 in. long. Fl. 6-8, arranged in a row dischiscent cymes, with the slender peduncle 1-1½ in. long, bracteoid fl. 1½-2 inch long, bracteoid.

b. Eastern species.

30. *V. Hermann* King, Sibhin (3-6000) fl. Khasi hills. Mountain. Branches pubescent, cymes small, nerves beneath minutely strigose. Calyx elliptic-lanceolate, lobes 2-4, pet. 1-1½ in. long. Fl. pale blue or bluish, in short few-fl. cymes, calyx-tube broad, lobes 1-2 in. tube glabrous outside. Drupes bright blue, covered by the covering calyx-teeth. 31. *V. longicauda*, Hook. f. Khasi hills. Glabrous, lanceolate, long caudate acuminate, the linear tips 1-1½ in. long, lobes 4-5, pet. 4 in. long, as in *V. verticillata*, with shorter intermediate ones between. Cymes few-fl., calyx-teeth triangular. 32. *V. micrantha*, Hook. f. Mischul hills. Young shoots, petioles and nerves beneath minutely strigose, 1-limbate from 2 rounded lobes, lobes 4-5, petiole 4 in. long, tertiary to sub-quaternary, 2-limbate.

ORDER LXII. COMPOSITÆ. Gen. Pl. ii. 103.

Herbs, rarely shrubs or trees. L. with few exceptions alternate, striated to suffused, or a head of many small fl. sessile on the receptacle dilated top of the peduncle enclosed in an involucre of whorled or imbricate bracts, the outer fl. opening first. Fl. all tubular, corolla lobes 4-5, valvate in bud, all ligulate, or the marginal ray fl. ligulate (or filiform) and the inner (and) fl. tubular. Fl. all bisexual, or some unisexual, or sterile. Calyx superior, usually a pappus of hairs on the top of the ovary. Stamens 4-5, inserted on the corolla, anthers basifixed, usually connate, connective produced upwards. Ovary 1-celled, ovule solitary. Fr. indehiscent, seed 1, albumen 0.

A. Invol. bracts imbricate.

All fl. tubular.

L. usually dentate, anther base obtuse or minutely sagittate.

1. *VERNONIA*.

L. quite entire, anther-balls tailed.

2. *LAGYROMIS*.

Marginal fl. ligulate.

Erect herbs or shrubs, anther-balls tailed.

3. *ISOLA*.

Straggling or climbing. Anther base obtuse.

MICROGLOSSA (p. 201).

Marginal fl. filiform.

Pappus of denticulate hairs.

L. punctate.

Invol. bracts narrow, linear.

4. *BLOMEL*.

Invol. bracts broad, rigid.

5. *PLEUCHA*.

L. with 5-9 longitudinal nerves.

HELICHRYSIS (p. 202).

Pappus 0.

ANTHEMIS (p. 202).

B. Only one row of large bracts, sometimes a minute outer row.

6. *SEYDIA*.

1. *VERNONIA*, Schreb.; Fl. Brit. Ind. iii. 229.

Herbs, shrubs sometimes climbing, rarely trees. L. alternate. Heads hemispherical, involucre of many imbricate bracts, the inner longest. Corolla all equal, tubular or funnel-shaped, usually outside with minute stipitate glands. Lobes 5, narrow, one-third or one-half the length of tube, anther base obtuse.

or minutely serrate. Achene ribbed, 7 angled, pappus of numerous lanulate hairs, often gilt with an outer row of short hairs or flat bristles. Species 15, mostly tropical, more than one half in America.

A. Western species and species of both regions.

a. Trees.

1. *V. arborea*, Ham. — Syn. *Menaris Wigollana*, DC.; Wight Ic. t. 1085; Bahl. Fl. Sylv. t. 226.

A middle-sized tree, branchlets and inflorescence pubescent, l. coriaceous, elliptic, glabrous above, glabrous or pubescent beneath, blade 5-8, pet. $\frac{1}{2}$ -1 in. long. Fl. heads 1-6-did., invol. bracts oblong, obtuse, the outer much shorter than the inner. Pappus white, hairs all equal and in one row, $\frac{1}{2}$ in. long.

Western Ghats and adjoining mountain ranges, from the Bababudilla hills southwards. Assam, Khasi hills, Assamensis. Burma, Fl. Febr.-May; Ceylon, near Negombo to 500 ft. Malay Peninsula and Arak. 2. *V. travancorica*, Hook. f. — Syn. *V. boissieriana*, Benth. Fl. Sylv. t. 223. Travancore and Travancore Ghats, standards near the dense masses of *Coelocarya*. A middle-sized tree, branchlets, inflorescence and sometimes underside of l. minutely pubescent, l. obovate, obtuse, sinuately-dentate, blade 2-5, narrowed into pet. $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Invol. bracts silky, pappus snow-white, 2-did.

3. Shrubs or undershrubs.

4. *V. divergens*, Benth. — Syn. *V. alpe-cypensis*, DC.; Wight Ic. t. 1076; *Dioscoreum divergens*, DC.; Wight Ic. t. 1061. Assam, Manipur, Burma, Upper and Lower Karenjak, Bantelkhand, Centr. Prov., Western Peninsula. L. elliptic-lanceolate, serrate, blade 2-5, narrowed into pet. $\frac{1}{2}$ in. long, heads 8-12-did., outer invol. bracts short ovate. Pappus dirty white or pale reddish-brown. Var. *Lowii*, C. B. Clarke. Khasi hills, Khasi (Khasi), Garo, Mar., invol. bracts densely white, woolly, often with an obscure green point, fl. lilac. 5. *V. pentiniformis*, DC.; Wight Ic. t. 1077, Nilgiris and Pains hills, l. rigid, more or less rough, chiefly beneath, elliptic-lanceolate, serrate, blade 3-6, pet. $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Heads 10-25-did., outer invol. bracts small ovate, pappus reddish. 6. *V. indica*, Clarke. West side of the Peninsula from the Nilgiris southwards. Branchlets and underside of l. densely white-tomentose, l. ovate, broadly elliptic, pet. very short, invol. scales densely tomentose, the outer short.

7. *V. Barburghii*, Less. Sukhumsayan tract, Juma to Sarda, Bihar, China, Nagayon, Khasi, (doubtful), Upper Burma. Branchlets and l. rough, with stiff minute hairs, l. rigid, cuspidate-serrate, elliptic-lanceolate, nearly sessile, 3-5 in. long, to 180-200, large, invol. bracts apiculate or pungent, pappus dirty white.

8. *V. chinensis*, Schult. Bip. Baluchistan, Hind. Pakistan, Ajmere and Merwatta (Tawal). A low shrub, obtund with greyish-white pubescence, l. spatulate, 1-1 1/2 in. long, heads $\frac{1}{2}$ in. diam. on slender peduncles, pappus white.

B. Eastern species, corolla-tube cylindrical.

a. Erect, heads large, fl. numerous, more than 10 in one head.

9. *V. volkammeriana*, DC. — Syn. *V. decaisnea*, DC.; Kurz F. Fl. II. 78. Sikkim, Sater hills, to 4000 ft. Bhutan, Assam. Khasi hills, Manipur. Myit Kyit's, Upper Burma. L. oblanceolate, entire or coarsely serrate, glabrous above, more or less pubescent beneath, 7-12 in. long, narrowed into a very short petiole, fl. lilac, invol. bracts obtuse, more or less hairy, pappus dirty white. Specimens from the following localities differ by a white pappus, and densely silky invol. scales, the achene ribbed and more or less clothed with long thin hairs. Dey hill forest, east of Bhame 500 ft. (Mount Hill); Schwab's district in declivity forests with Teak (Sagya, Swales); Katha district (J. W. Oliver).

10. *V. salicifolia*, Hook. f. Sikkim, lower hills, Assam. A middle-sized tree, l. rigidly pubescent, glabrous and shining above, obovate or oblanceolate, blade 10-25, narrowed into short amplexicaul petiole $\frac{1}{2}$ in. long, sec. and reticulate tertiary nerves prominent beneath, invol. bracts almost glabrous, broad-ovate or elliptic, obtuse, often marked at tip, pappus red.

11. *V. salicifolia*, Benth. Pagan, Hills east of Tawang, Yunnan, China. Similar to *V. arborea*, differs by the l. hirsute on the upper, silky tomentose on the under side. L. with a rounded or cordate base, sinuately-dentate, fl. heads smaller.

b. Erect, heads small, in pan. (less than 10 in. diam.)

14. *V. Apnala*, Coll. et Herbar. Shan hills, Upper Burma, 9,500 ft. A small tree or shrub, in heads of 10-20-30-40 of infl. sessile, protheca willow-like. Heads sessile, numerous, in simple terminal panicles 12 in. diam. with 12-16 fls. in bud, the inner disk involucre white, white 1-2 in. long, outer white glabrous, numerous, imbricate, all silky to touch, 8-9-10 in each head, tubular glabrous, slightly pinnatifid. (C. V. Parish, Hook. L. Botanic Garden and Herbar. boundaries of Yunnan, near 4,000 ft. (D. B. Macdonald, 1884).) (Amaran. district (Paris).) *Homalium* (Lamour.) of 1 and inflorescence velvety, l. glabrous, distantly serrate. Heads sessile, numerous, pinnatifid, in simple terminal panicles, inner involucre white, 1-2 in. long, outer numerous imbricate, sessile, much shorter, all densely silky, curve by 2-3 in. Pappus white.

c. Climbing.

15. *V. scandens*, DC. 2-3 km. outer hills, Assam, Khasi hills, Manipur, Dept. Khasi hills, Bhabhri, and inflorescence slightly pinnatifid, tubular, sessile, 1-2-4, narrowed into slender pedicel 1/2 in. long. Heads 5-10 fls. pedicel 1/2 in. long, terminal leafy panicle, papery, 1/2 in. long. 16. *V. Munda*, DC. Lower Burma, Yunnan, similar to 15, but l. larger and adpressed pubescent. 17. *V. sinensis*, DC. Pegu, Yunnan, China. Branchlets petioles, underside of l. and inflorescence with grey pubescence, l. variable, from sessile to linear-lanceolate, 1-2-3 in. long, 1/2 in. long. Heads 1/2 in. diam., few at the ends of the rigid striate branches or a few terminal panicles.

C. Erect species, corolla funnel-shaped widened from a slender cylinder and base.

16. *V. cylindrocephala*, G. R. Clarke in Journ. Linn. Soc. bot. 36. Nag and Manipur hills, 4,500-5,800 ft. Yunnan 4,500-5,500 ft. A large shrub or small tree, l. three-branched, much on 1-1/2-2-3 in. with minute stiff hairs, of secondary blade 5-7, narrowed into pet. 1-2 in. long. Heads purple, cylindrical when in bud, striated in bud, terminal panicles 2-4 in. long, l. sessile, obtuse, nearly glabrous, imbricate, the outer shorter, the 4-5 inner 1/2-1 in. long. Achene obscurely ribbed, papery, red. A small tree with lvs. white papery found by Maktagan Hill (620 ft. dry hill forest) at Bhamo at 4,000 ft. in other respects is exactly like *V. cylindrocephala*. 17. *V. peguensis*, Clarke, Pegu Yunnan, similar to 16, but involucre sharply cuspitate with a recurrent nerve, the striate subulate, heads with 12 fls.

3. LEUCOMERIS, DC. Fl. Brit. Ind. iii. 361.

Shrubs or small trees, l. quite entire. Heads white, 4-8 fls. in terminal corymbs. Invol. bracts imbricate, coriaceous, petioles bracteolate. Fl. all ♀, fertile, tubular, segments 5, narrow, revolute. Anther-lance sagittate, tails ciliate. Species 2.

1. *L. spectabilis* DC. in Walp. Bot. Ac. Haug. III. Outer North-West Himalayas, Jammu to Nepal, 3-6,000 ft. A large shrub or small tree, bark white corky, branches stout, green. L. glabrous, white-florescent beneath, oblong-lanceolate, blade 1-1 1/2, narrow, inwardly into petiole 1-1 1/2 in. long. Heads 1 in. long, involucre glabrous. 2. *L. densa*, Kurz, Manipur. Pegu in the Eng. forest of the Prone district. Shan hills according to 4,000 ft. Yunnan. A small deciduous tree, l. nearly glabrous when mature, pet. 1-2 in. long. Heads 1/2 in. diam., crowded at the ends of the leafless branchlets, involucre woolly at the base.

4. INULA, Linn.; Fl. Brit. Ind. iii. 291.

Herbs, rarely shrubs. Heterogamous, radiate, invol. bracts 2-3-4, inner rigid and narrow. Ray fl. ligulate ♀ fertile, in one or several rows, ligule 3-toothed, disk fl. ♀ fertile, tubular, yellow, limb elongate with 5 short teeth. Anther-lance sagittate, tails long usually branched. Species 5. Europe, Asia and Africa.

1. *I. Capra*, DC. Outer hills from Nepal, backwards 3-6,000 ft. with grassy and in mountainous. Khasi hills, Manipur, Burma. Altitude 10 ft., branches l. beneath and l.

Stems usually silky or woolly, 1 sessile or nearly so, oblong, sometimes branched, heads numerous in terminal panicles 1 in. diam., invol. bracts all linear, rigid, hairy beneath, the very small, few or wanting, adaxial silky, rays 8-12, white, hairs rather soft on the outside. 1. *L. eupatorioides*, DC. sub-Himalayan tract, Sikkim, Bhutan, above the 200 fms. Khasi hills. Branches all underneath of 1 pubescent, 1 rigid, lanceolate, blade 4-7, pet. about 1 in. ligules narrow. 2. *L. cuspidata*, C. B. Clarke, Collett, Simla Plant. Esq. fig. 78. North-West Himalaya 4-7000 ft. Nearly glabrous, 1 elliptic-lanceolate, blade 3-5, pet. 1 in. long. Ligulate fl. numerous, ligule short, broad.

Microglossa calvata, DC. Khasi and Naga hills. Burma, Upper and Lower, up to 8000 ft. Malay Peninsula and Archipel. China. A large evergreen, straggling or climbing shrub, branches grassed, branched or not, slightly pubescent, 1 ovate-lanceolate, obscurely cuneate, blade 2-4, pet. slender 1 in. long. Heads yellow, clustered on the axils or in a rounded corymb, invol. base of linear-lanceolate, pubescent, ligule of marginal fl. minute, anther-bases obtuse, adaxial white, 3-angular, pappus red much longer than the awns.

4. BLUMEA, DC.; Fl. Brit. Ind. iii, 299.

Annual or perennial, a few shrubs, glandular-pubescent or woolly. Invol. bracts indistinct, many-seriate, the outer smaller. Marginal fl. 5, numerous, 1-flowered, minutely dentate at the apex. Disk fl. bisexual, corolla tubular, limb 4-5 short teeth, anther-base sagittate, tails small, slender. Species 69, 1. Africa, Australia.

1. *B. chinensis*, DC. Nepal, Sikkim 2-4000 ft. Bhutan, Khasi hills, Manipur, Upper Burma, dry hill (above 5000 ft. east of Bhamo) China. A shrub resembling or exceeding *platensis*, only pubescent beneath. 2. *B. malabarica*, sharing lanceolate, slightly serrate. Heads rather less clustered on the distant branches of a long terminal panicle, rays 10-12, broadly elliptic with long thin subcylindrical hairs.

3. *B. talamitara*, DC.; Sims P. Fl. Ind. (Glossa latifolia, Linn.) *Fl. Martiana*, Burm. Sikkim, ascending to 4000 ft. Assam, Khasi hills, Chittagong, Burma, Upper and Lower, China, Formosa, Malay Peninsula and Archipelago. A large deciduous very aromatic shrub with herbaceous branches, sometimes a small tree, woody top, very rarely an arborescent *Tanagra*, branches 1 and underneath densely clothed with silky tomentum, 1 lanceolate or elliptic-lanceolate, blade 4-10, petiole 1-1.5 in. long, with several lanceolate lobes near the apex. Heads yellow, 1-4 in. diam., densely clustered on the branches of a large terminal leafy panicle, pappus red. This complex, which is an articulated tree in China. 4. *B. arcuata*, DC. Sub-Himalayan tract and outer hills from Kanton onwards. Khasi hills, Tenasserim, China, Altitude 6-10 ft. Glabrous or with thin tomentum, sometimes glandular hairs 1 narrow-lanceolate, narrowed into a short petiole, rarely bearing lateral lobes.

5. PLUCHEA, Cass.; Fl. Brit. Ind. iii, 271.

Shrubs tomentose or glutinous, 1 alternate. Heads campanulate, heterogamous, disciform, outer fl. 2 fertile filiform, disk fl. few, sterile tubular, limb 5-6, invol. bracts imbricate, dry, rigid, the outer smaller. Anther-base sagittate. Achenes 4- or 5-angled, pappus hairs 1-seriate, slender, rigid. Species 39, warmer regions of both hemispheres.

A. 1. broad, obovate or elliptic.

1. *P. indica*, Lam.; Wight Ill. t. 131. Beach and tidal forests on the coast from Bengal to the Malay Peninsula, Andaman. Also inland by stream beds Upper Burma, Malay Archipel. China. Nearly glabrous, 1 shortly glaucous more or less scabrous, 1-2 in. narrowed into a short slender petiole, 2. *P. tomentosa*, DC. Siml. a high plain from Dehra Dun to Lower Bengal, Western Peninsula, Attalus 10 ft. squarish, and 1 pubescent or tomentose, 1 sessile elliptic or broadly obovate, dense white tomentum, base cuneate, pappus reddish.

B. 1. narrow, lanceolate or oblong-lance.

3. *P. Wallichiana*, DC. Siml. Balabation, Gujarat, Punjab. Glandular-pubescent and scabrous, 1 disc 1-2 in. long, lanceolate or oblong, sessile, faintly cordate, 1-2. *P. lanceolata*, Cass. Siml. Punjab. Ranges of plain as far as Cawnpore. Afghanistan.

North Africa. L. cuneata, small shrubby climber with or without spines, with thick and a little woody stem, is not found in the mountainous districts of the East. *S. arguta* Desf., *Dalrymplea*, *Sida*, *Pursh*, *Humboldtia*, *Senecio*, *L. maculata*, which grows in the East, the involucre consists of 2 in. long, varying much in breadth from about 1/2 to nearly obsolete to linear, when broad deeply cut. Heads pedunculate, solitary or few together, involucre rigid, subulate-lanceolate.

Helioscymum toddleoides, DC. Hills on the West side of the Peninsula from Kaniara southwards. A shrub, often 5 ft. often prostrate, underside of l. and rays densely tomentose. L. sessile, lanceolate, quite entire, 4-6 in. long, 1/2-3/4 longitudinal nerves. Heads yellow, in globose clusters, forming terminal corymbs, inner involucre bracts broad, scarious, outer hairy. Marginal fl. 2, diliform, disk fl. 7 tubular.

Artemisia vulgaris, Lam. Southwestern tract and Himalaya extending to 10,000 ft. often prostrate in clearings, Khasi Hills. Hills of the Western Himalaya, Sikhim, Java. Temperate Europe and Asia. A shrub, very aromatic, pubescent or tomentose beneath, lower part of stem, lobed or pinnatifid, with pubescence or tomentose beneath, lower part irregularly serrate, uppermost linear-lanceolate entire. Heads 1/2 in. long, in woolly or less dense (but radiated) racemes, involucre bracts more or less woolly, the outer scarious, the outer smaller herbaceous. Ray fl. 2 slender, 2-3-toothed, disk fl. tubular, all fertile. Pappus 0.

6. SENECIO, Linn.; Fl. Brit. Ind. iii. 338.

Mostly herbaceous, a few small trees, shrubs and woody climbers, l. alternate, in the herbaceous species often radical. Heads yellow, rarely white, involucre bracts one-seriate or with an outer row of small bracts. Ray fl. 2 ligulate, sometimes wanting, disk fl. bisexual, tubular, anther-base obtuse or minutely tailed. Species 1,000-1,200 chiefly in temperate climates and mountains of the tropics.

A. Fl. few, 12 or less in one head, all tubular.

1. *S. cranioides*, DC.—Syn. *S. Walp. Arn.* Wight In. t. 1181. Sikhim, 5-8,000 ft. Assam, Khasi hills. Nilgiris, Ceylon, Java. A woody climber, l. ovate to ovate cordate base, dentate or serrate, sometimes slightly lobed, often grey, tomentose beneath, blade 4-7, pet. 1-2 in. long, basal nerves 5-7. Fl. heads bracteoid, rays 2 terminal and auxiliary bracteoid corymbs, involucre bracts 8. 2. *S. corymbosum*, Wight In. t. 1180. Nilgiris, Ceylon. Similar, l. scarious smaller almost orbicular, lower tomentose beneath.

B. Fl. few 5-10 in one head, ligulate fl. 2-5.

3. *S. triangulatum*, Ham. Nepal, Sikhim, 4-10,000 ft. Mishmi etc. Nagas hills, Manipur. Dry hill forest east of Bhamo (Montagne Hill), Yunnan (Henry). A woody climber, glabrous, except corymbs which are often puberulous, l. elliptic, obtuse-lanceolate, gradually acuminate, blade 4-5, pet. 1 in. long. Fl. white. Hills yellow (Henry), involucre bracts 5-8, l. in long. Fl. 2-3 ligulate and 2 tubular in each involucre, ligules very short 2-toothed, lobes of tubular fl. revolute. Pappus dirty white. From the same locality, 4,500 ft. Mount Hill (41) has small specimens of a small tree, very similar but peduncles and ramifications of corymbs capillary, fl. smaller, involucre bracts 1 in. long, pappus pure white. 4. *S. vagans*, Wall. Nepal, has capillary peduncles but larger fl. heads, ligulate fl. conspicuous.

5. *S. ruberrima*, DC. Khasiwar, Simla, Garhwal and Kumaon, 6-8,000 ft. L. ovate to ovate-lanceolate, sharply toothed, lower surface white tomentose, except the red-brown nerves. Heads 5-10 fl., involucre bracts 5-8, much shorter than fl.

C. Fl. numerous. Climbers.

6. *S. scandens*, Desf.—Syn. *S. Dightiana*, DC.; Wight In. t. 1185; *S. intermedia*, Wight In. t. 1185. Kumaon, Sikhim, 6-10,000 ft. Mishmi and Khasi hills, Manipur, Hills of Upper Burma, Yunnan, Tonkin, Nilgiris, Palnis, Ceylon, Cambodia, branches zig-zag, grooved or ribbed, nearly glabrous, l. lanceolate or linear, blade 3-4, pet. 1-1.5 in. long, often with tomentose ribs and nerves at base. Heads yellow, on the divergent branches of lax terminal corymbs, involucre bracts 10-15. 7. *S. canaliculata*, DC.; Wight In. t. 1184. Nilgiris, Climbing branches angular. Similar prostrate branches and l. beneath densely white-tomentose, petioles always striated. 8. *S. palmata*, Ham. Nepal, Sikhim 5-6,000 ft., branches underside of l. and rays

1. AGAPETES, D. Don; Fl. Brit. Ind. 56. 13.

Evergreen shrubs, usually epiphytic. Leaves sessile in most species, entire. Fl. in corymbs or fascicles, rarely in racemes or solitary. Calyx-tube glabrous, adnate to ovary, limb deeply 5-lobed. Anthers elliptic, produced upwards in 2 long beaks opening by apical pores or slits, often spurred behind. Stamens very numerous, anther coat usually very lax. Species 10, eastern Himalaya, hills of the Eastern Peninsula and the Indian Archipelago. 1793.

A. Corolla long, tubular, lobes short, bracts short, 1 long.

(a) Calyx not supported by an epicalyx.

α. L. sessile or nearly so, not gradually narrowed into pedicel.

1. *A. setigera*, D. Don (*Focoidium verticillatum* Wight Ic. t. 119), Kurr. Fl. Brit. Ind. var. 1. *F. acuminatum* Wight Ic. t. 1186. Nepal, Khasi hills, Cachar, Great hills 6000 ft. (Collett). Hills range between Yunnán and Salween 2000 ft. (D. B. March 1880). L. glabrous, generally crowded with short internodes, so as to appear whorled; lanceolate or elliptic-lanceolate, 2-5 in. long, narrowed suddenly into the very short petiole. Fl. scarlet or crimson, in pedunculate corymbs, arising from the axils of L. or above the scars of fallen L.; peduncles, pedicels and calyx-tube pubescent with long hairs, bracts minute. Corolla 2-4 in., slightly curved, outside truncate with long hairs, bracts minute. Fl. 1/2 in. diam. calyx-teeth long and pubescent or hirsute, anther beaks not spurred. Fl. 1/2 in. diam. calyx-teeth long and pubescent or hirsute. Anthers 2-4 in. long, slightly sessile with a rounded base, 2 angles of 1/2 in. long, long petiolulate glabrous corymbs, base to limb 1/2 in. long, bracts glabrous distinctly curved, 1/2 in. long.

2. *A. lanthaniflora*, D. Don (*Focoidium verticillatum elegans* Kurz), Yung Yung, highest ridges. Headwaters of Yunnán 1000 ft. (D. B. March 1880). Tendrils. L. often loosely whorled, almost sessile lanceolate or oblanceolate, 2-5 in. long. Fl. axillary, solitary, fasciculate in short corymbs, corolla 2-4 in. long, anthers spurred and pedicellate; calyx long or less lined with long hairs. 3. *A. minima*, Hook. f. Khasi hills. Peak range. L. elliptic-lanceolate, petioles short bracts. 4. *A. grandiflora*, Hook. f. Mishm and Nag hills. Dikhhimur district, Assam. L. mostly sessile, oblong-lanceolate. Fl. on the old wood, fasciculate, calyx-teeth triangular, 4 in. corolla 2-4 in. lobes lanceolate 1/2 in. long, anthers spurred on beak.

5. *A. Hillii*, n. sp. Hills east of Bhamo 1000 ft. Above Hill Oct 1871. 6. *A. Hillii*, n. sp. In tall trees, stem swollen. L. sessile oblong-lanceolate 4-6 in. long, in pedunculate corymbs, pedicels 1-2 in. long, thickened at apex and consequently arched over the calyx. Calyx divided nearly to the base, lobes linear 1/2 in. long. Corolla tubular, widened upwards, 2 in. long, purple with darker V-shaped markings. Filaments flat, hairy, not glandular; anthers not spurred.

β. L. petiolate, or narrowed towards base. Anthers 2-4 spurred.

7. *A. walliana*, Hook. f. (*Focoidium villosum*, Hook. f. Bot. Beech. Fl. t. 154), 1841. 1500 ft. Thungayin 5000 ft. Tendrils. Stems often greatly thickened at the base, 1 scattered, lanceolate, acuminate, base 2-4 narrowed into petiole 1/2 in. long, not conspicuous. Fl. dark red, in short glabrous corymbs, calyx-teeth triangular, 4-6 in. long, corolla 1 in., widened upwards, lobes long-acuminate, 1-2 in. long, anthers not spurred on beak. 8. *A. Parishi*, Clarke. Tendrils. Nearly sessile, long 2, see n. slender, intramarginal with numerous, calyx-teeth triangular. 9. *A. acuminata*, Clarke. Mishm hills. L. linear-lanceolate, petiole very short, bracts 1/2 in. long, lobes short, triangular.

10. *A. macrantha*, Hook. f. (*Focoidium verticillatum*, Kurz, var. *macrantha* Hook. Khasi and Chittagong hills, Tendrils. Fl. in corymbs, corolla pale purple, with darker veins; bracts 11-2 by 1 in. 11. *A. macrophylla*, Clarke. Khasi hills. L. bracts lanceolate, blade 9-11, pet. about 1 in. long, see n. prominent. Fl. in pedunculate corymbs, calyx-teeth narrow-lanceolate, 1 in., corolla 1 1/2 in. long.

γ. L. petiolate, anthers spurred.

12. *A. variegata*, D. Don (*Focoidium albidiflorum*, Wight Ic. t. 1187), 1841. Khasi hills, Cachar, Chittagong and Marulan hills. L. lanceolate, 1 1/2-2 in. long, narrowed into a thick pet. 1 in. long. Fl. on the old wood, dense, pedunculate, slender glabrous-petiole, much longer than calyx, calyx-teeth triangular, spreading.

Corolla campanulate, lobes 5, V-shaped, imbricate, usually 1-1 1/2 in. long with a very narrow, truncate, persistent tomentum. The seeds of the set of *Agrostes* require further study. 13. *A. angulata*, Hook. f. *Flacraea alba* (Swartz), Kurz, *Palat. 1011*. Branches strongly ascending, shrubby to 12, but calyx tube shortly fringed. 14. *A. campanulata*, Clarke (*Flacraea* or *Spodoptera*, Kurz). Nallang, Marabou 1300 ft. Calyx tube narrowed, lobes very short petioles. Corolla campanulate, deep scarlet, lobes 5, 1/2-3/4 in. long.

(i) Calyx supported by an epicalyx (enlarged pedicel or connate bracteoles).

15. *A. auriculata*, Hook. f. *Flacraea auriculata*, Kurz, Sikkim 3-3000 ft. Brutan, Khasi hills. L. ovate calyx white, lobes 5-8 in. long, oblong-lanceolate from a very small base (interangular nerves distinct). Corolla from the old wood or from the white of the wood, persistent, pedicels imbricate and apex-based at the apex, corolla 1/2-3/4 in. long, bright red, calyx white, 1 in. long, broadly lanceolate, truncate. Very similar, but possibly a new species, is a shrub growing on granite boulders on the hills east of Bhamo at 6500 ft. (M. L. Hill). Corolla white, lobes 5, calyx white supported by a double epicalyx, the outer spreading, the inner appressed to calyx-tube with a free margin.

16. *A. glabra*, Clarke. Brutan, Khasi hills, 5-8 similar to 15, but corolla red, corolla tube broadly truncate, corolla green, lobes white, often with reddish. V-shaped transverse hairs. 17. *A. Sikkimi*, Clarke. Brutan, Khasi hills, 5-7, narrowed into short pet. 1 in. very tubular, corolla 1 in. long.

(ii) Corolla lobes short, bracts short, l. under 2 in.

18. *A. obovata*, Hook. f. Khasi hills, common. A small dense shrub branches 6-7, lobes 1-2, less than 1 in. margins revolved. Fl. solitary on long slender pedicels, calyx broadly triangular acuminate, corolla 1 in. long, widely corolla in bud. 19. *A. Manni*, Hook. f. *Char. China*, 1861, xii, 361. Khasi hills. Similar, but pedicels shorter, lobes as long as the corolla 1 in. long, reddish-brown, in. dusky glabrous, 1/2 in. diameter. *A. manipurensis*, Watt 1888. Manipur 6500 ft., l. cordate, 1/2 in. l. 1/2 in. diam., corolla 1/2 in. long.

20. *A. turbinata*, Nutt. Double hills. L. lanceolate or oblanceolate, 1-1 1/2 in. green, pedicels solitary, hairy, 1/2 in., corolla bright red, 1/2 in. long. 21. *A. nitroscindes*, Hook. f. Malini hills. Brutan, Khasi hills, l. elliptic, serrate 1-2 in., pedicels slender solitary, 1/2 in. long, bifurcating and bearing 2 fl., corolla 1 in. long.

(C) Corolla campanulate, divided to 1/2 its length or further down, bracts small.

22. *A. nana*, Hook. f. Naga hills. A small epiphyte with thick inter-fl. stems, l. lanceolate, narrowed into a very short petiole, epicalyx deeply 10-12, warty, linear, corolla villary or from the old wood, corolla 1-1 1/2 in. lobes nearly to the base. 23. *A. densa*, Clarke, Sikkim 3500 ft. Brutan, Patkoi range. L. white beneath, reddish, all or lanceolate, 1-2 in. long, narrowed into short petiole, corolla 1-1 1/2 in. long, divided nearly to the base. 24. *A. pumila*, Hook. f. Khasi hills, Malini hills, l. cordate elliptic, lobes 5, lobes rounded, base 1/2, petiole 1/2 in. Fl. fasciated on glaucous hairy pedicels, 1 in., corolla 1/2 in. long.

25. *A. lobata*, Clarke. Jaintia and Naga hills. Thangyin, 5100 ft. L. lanceolate, lobes 5, lobes 1-2 in., petioles very short. Corolla pedicel, l. glabrous, lobes 5, lobes 1/2 in. long, white to white tip, narrow tubular, 1-1 lobes 1/2 in. long.

(D) Bracts longer than half the pedicel, glandular hairs on inflorescence, anthers spurred.

26. *A. bracteata*, Hook. f. *Flacraea*, 1861, 10, 100 ft. A small shrub in rocks, l. ovate, corolla 5-angled, lobes 5-8, petiole 1 in. Fl. bractlets lanceolate, narrow, lobes nearly as long as pedicel. Corolla campanulate, lobes 5 in. lobes narrow, recurved, nearly as long as tube. 27. *A. Postquamii*, Prain, Ann. Gard. Calc. ix, 10, 100 ft. Khasi hills, 1300 ft. An epiphytic shrub, branchlets hairy, l. ovate, rounded, 1-1 1/2 in. long, petiole short. Calyx 5-lobed, lobes campanulate, notched, teeth triangular, 1/2-1/3 in. long, lobes 1/2 in. long, lobes short, blunt.

2. PENTAPTERYGIUM, Ktze: Fl. Brit. Ind. iii, 449. *

Epiphytic, evergreen shrubs, differing from *Agrostes* by the 5-angled or winged calyx-tube and the 5-winged or distinctly-ribbed berry. Species 5.

A. L. small, pedicels solitary or in pairs, anthers not spurred.

1. *V. sepiaria*, Klotschky; Wight in J. Hort. Soc. Lond. 1830; Hook. f. in Hort. Fl. Ind. 3: 133 (1841) f. Benth. Base of stem large, tuberculate, granular puberulent, lentic, densely hairy, L. glabrous, bifurcates, margins recurved, corolla 1/2 in. long, lobes 1/2, fringed with V-shaped marks.

B. L. large 2-3 in., pedicels fascicled or corymbose, beaks of anthers spurred.

2. *V. rugosa*, Hook. f. Klotschky, India; Benth. L. verticillate rugose, secundarily prostrate, corolla 1/2 in. white or rose. B. P. Lister, King, Bhotan, 7000 ft. L. toment. entire, rugose, corolla 1/2 in. rose. L. *V. navaum*, Hook. f. Benth. L. rugose, slightly serrate, corolla 1/2 in. yellow. B. P. Hooker, Clarke, Sikkim, 5-8000 ft. Bhotan. L. verticillate, corolla 1/2 in. yellow.

Diospyros maritima, King et Prain, Ann. Gard. Calcutta, 2: 26, t. 26, f. 26, 1884. *Ex. hii. hii.* Hb. Bot. Bern. An epiphytic shrub 7-10 dm. tall, blade 1-5 cm. long, long. Fl. in axils, corolla small, pedicels upright below the calyx, calyx cup partially enclosing calyx tube, truncate 5-lobed. Calyx limb inflexed, lobes campanulate, minutely, 2-3 in. long, corolla 1/2 in. long, lobes short, fringed with the persistent calyx limb. The authors of this genus (ourn. A. S. Benth. et al.) apparently describe that species, *Diospyros* and *Diospyros* might be united, in that case the present species should belong to the section of *Diospyros* represented by *Diospyros* p. 133.

3. VACCINIUM, Linn., Fl. Brit. Ind. 3: 451

Shrubs or small trees, base of stem epiphytic, L. pubescent. Fl. axillary, small, generally in racemes, rarely solitary. Racemes in bud often enclosed by the imbricating bracts. Corolla campanulate cylindrical or ovoid, lobes short, anthers oblong, often spurred at the top, divided into 2 cylindrical tubes opening by terminal sills. Seeds ellipsoid, testa firm, shining, minutely lenticulate. Species 100, Northern Hemisphere and mountains in the Tropics.

A. L. large, racemes solitary.

a. L. by-eculate, serrate, mostly falsely whorled.

1. *V. serratum*, Wight in J. Hort. Soc. Lond. 1830; Wight, in J. Hort. Soc. Lond. 1830; Sikkim & Bhotan. Klotschky, India. A shrub often epiphytic, stem often thick, base of stem often approximate near the ends of branches, densely whorled, leaves 3-4 in. long, gradually narrowed toward very short petiole. Fl. greenish white, racemes several at the ends of branches, bracts small, simple. Corolla 1/2 in. long, glabrous outside, hairy inside, filaments hairy, anthers not spurred. Berry globose, white or yellowish, 1/2 in. diam. 2. *V. vancouverianum*, Wight in J. Hort. Soc. Lond. 1830; Bhotan, Klotschky, India. Base of stem sometimes thick, L. serrate with a distinct base, gradually narrowed into a very short petiole, ven. n. prominent. Racemes several near the ends of branches, pedicels with acuminate persistent elliptic bracts at their base. Filaments glabrous, anthers not spurred.

b. L. elliptic, minutely serrulate, scattered.

3. *V. guaiatherifolium*, Hook. f. Benth. Aitain, B. H. Berry blackish, 1/2 in. diam. 4. *V. glauco-album*, Hook. f. Sikkim 6-7000 ft. Bhotan, Benth. 1/2 in. diam. persistent until the fruiting.

c. L. entire.

5. *V. Dunalianum*, Wight in J. Hort. Soc. Lond. 1830; Sikkim 5-8000 ft. Bhotan, Klotschky, Manipal, Yunnan. A shrub often epiphytic. L. alternate almost distichous, lanceolate, long cuspidate-acuminate, blade 2-5, petiole 1/2 in. long. Racemes in bud enclosed by the broad imbricating, pale, strongly declivous bracts at the base of pedicels. Fl. pink, corolla ovoid-ovoid, 1/2 in. long, anthers spurred. 6. *V. arbutoides*, Hook. f. Benth. Mines, Upper Burma. Hills east of Toungay, Thaukyin, Thaukyin. L. serrate, largely whorled at the ends of branches, elliptic-lanceolate, venous imbricate, at the ends of the uppermost L. 7. *V. arbutoides*, Chase. Patheo range, L. scattered, ovate, cuspidate, blade 1-5, petiole 1/2 in., ven. n. oblique, several pairs from base to base, racemes hairy.

8. *V. Echinense*, sp. nova. Benth. in, Karaua, Hills east of Bhamo, A. S. Benth.

10. *V. laurifolium*, (Macleay) Hill, V. & P. 110. A large tree, 1. Infructuous wood, 1-2 in. diam. Bark reddish-brown, 1/2-1 in. long, solidly adhered to the short young twigs, not so persistent. Racemes on the gl. wood below the l. glabrous, 1-2 in. long, involucrate with persistent, very effluviscous, edge imbricate, white membrane covering the bracts, dense at the base of peduncle numerous, slender. Fl. 1-2 in. diam. red, on slender pedicels calyx lobes triangular-lanceolate half the length of corolla. Corolla imbricate, 1/2 in. long, glabrous outside, minutely hairy inside, lobes very unequal, anthers spurred, filaments clothed with long soft spreading hairs.

B. 1. Large, racemes more or less terminal.

a. Western Species.

11. *V. Leachianum*, Wight Ic. t. 1188; Bodd. Fl. Sylc. t. 227.—Syn. *V. Leachianum*, Wight III. t. 139. Vera *Kitaru*, Tam.; *Anducan*, Bodd.

A small or middle-sized tree, youngest shoots and inflorescence minutely pubescent, l. ovate or nearly ovate, 1 1/2-3 in. long, short. Bracts enclosing calyx with triangular, edges ciliate, corolla pink, 1/2-3/4 in. long, filaments hairy, anthers spurred.

Highly abundant. Amboi and Paldi hills. Fl. January-June. Fr. edible.—Common common about 1000 ft. 10. *V. aligerense*, Wight Ic. t. 1189. Western Ghats and adjoining hill ranges from Welinao southwards. A shrub or small tree, 1-2 in. high, l. ovate, bracts large, less caducous than in *V. d.* white, calyx and corolla pubescent, white.

b. Eastern species.

12. *V. Donlanum*, Wight Ic. t. 1191.—Syn. *V. affinis*, Wight Ic. t. 1193.

A shrub or small tree, youngest shoots and inflorescence glabrous, l. lanceolate, entire or minutely serrate, blade 2-3, pet. 1-1 1/2 in. Fl. pink or white, bracts lanceolate, early deciduous. Calyx-teeth often irregularly denticulate, corolla glabrous outside, filaments with long thin hairs, anthers spurred at apex.

Khasi hills, Manipal. Sikkim hills, Upper Burma. Hills between Sring and Salween, Lower Burma. Fl. March-May. Similar to some forms of *V. Leachianum*, 12. *V. leucanthum*, Miq. (F. ex. B. H. H. Sikkim hills—Hills east of Tezpur, 5000 ft. Many Penins. Borneo. A shrub or small tree, l. elliptic, entire, racemes and calyx usually sericeous often pubescent, spur. 1 anther very short. 13. *V. malacense*, Wight Ic. t. 1191. (Tham. in 5000 ft. Malay Peninsula and Amboi. l. elliptic-lanceolate, minutely crenate-serrate, racemes and corolla pubescent, anthers spurred, short. It is not impossible that the forms specimens of 12 and 13 may eventually all be referred to *V. Donlanum*.

c. l. small, 2 in. and under.

14. *V. arifolium*, Wight Ic. 1192. Khasi hills, Uthia. A shrub, ascending 6 ft. Infructuous shoots and racemes pubescent, l. elliptic-lanceolate, serrulate, 1-2 in. long, persistent. Racemes often pendulous, calyx shorter than fl. bracts large, leaf-like, as well as the linear bractlets, persistent, calyx minutely hairy, corolla avoid white, 1/2-3/4 in. long, spur on the back of anthers prominent. 15. *V. Summalia*, Hook. f. & Thoms. Sikkim 5-10,000 ft. Bhiton, Epiphytic, branches long, pendulous, densely clothed with long bristles. l. 1-1 1/2 in., broadly elliptic, obtuse, margins revolved, 2-3 line.

16. *V. repens*, Hook. f. Sikkim 7-8,000 ft. Bhiton, Naga hills. A large shrubby or epiphytic, branches pendulous, pubescent, l. obovate 1-1 1/2 in. long, obtuse. Racemes 1-2 in. long, branched, bracts pure white, membranous, 1-1 1/2 in. long, enclosing the buds, persistent until the fl. open, corolla pink with 5 red stripes, filaments with long



FIG. 119.—*V. laurifolium* Donlanum, Wight, 3.

hairs, more at the ends of anthers large. 17. *V. striatum*, Clarke. Single flowers, 8-10 ft. A small procumbent herb, l. elliptic or obovate, acute, serrate, calyx-teeth very short, obtuse. 18. *V. punellum*, Kurz. Hills east of Toungay 4000 ft. A small epiphytic branch and stems hairy, l. elliptic 1-4 in. Calyx hairy-teeth lanceolate, as long as tube.

Cerulobrya acuminata, Hook. f. Khasi hills, Bhutan. A small shrubby woody herb, l. serrate, blade 1-2 in. long. Fl. in corymbs on the old wood above the leaves, corolla, calyx, pedicels and peduncles coral red, bracts minute. Corolla glabrous-campulate, 1/2 in. long, anthers oblong, prolonged into short tubes, opening by terminal slit.

4. GAULTHERIA, Linn.; Fl. Brit. Ind. iii. 450.

Shrubs, mostly small procumbent, a few large, erect, l. persistent, serrulate, Fl. pentamerous, supported by 2 bracteoles, sometimes dimorphic, usually in bracteate racemes. Calyx enlarged, succulent and coloured in fruit, enclosing the capsule. Corolla ovoid, teeth small, recurved. Filamentous pilose, anther-cells opening by short terminal slits, with 1 or 2 horns at the back. Capsule 1-belled, loculicidally 5-valved from the apex. Species 99-100, mostly in mountainous, chilly American.

1. *G. fragrans*, Wall.; Wight Is. i. 116 (G. *Lachnocaulis*, DC.) Wight Is. i. 141 and Is. i. 116; *G. pauciflora*, DC. Nepal, Sikkim 6-8000 ft., Bhutan, Khasi hills, Hills east of Toungay 6-7000 ft., Nigritia, low gregarious. Palm, Travancore hills, Ceylon, ever mountain zone, Yunnan, Mts. of Java and Sumatra. A large shrub, leaf thin, shining. L. faintly aromatic when bruised, coriaceous, elliptic or oblanceolate, sometimes lanceolate, blade 1 1/2-3, pet. 1-1 1/2 in., sec. n. 3-7 pair, the inner one not pale from the base reaching 1/2 and half the length of leaf. Racemes axillary shorter than l. Fl. white, pedicels short, didymophyllous with short stamens and short anthers not horned. Fr. 2 in. diam., hairy, enclosed by the bright enlarged calyx, edible. Closely allied and perhaps only an extreme form is *G. Hookeri*, Clarke. Sikkim 8-11000 ft., Himalayas Nepal, l. smaller, bracts large elliptic 1 in. long, pink and white. 2. *G. Griffithiana*, Wight Is. i. 116. Nepal, Sikkim 6-9000 ft., Bhutan, Khasi hills, Manipur. A stout shrub l. coriaceous, elliptic-oblong, serrulate, blade 4-6, pet. 1 in. long, sec. n. 3-4 pair, obliquely arching, concurrent with an intravaginal vein. Fl. green, anthers brick red, pedicels 1/2 in. long, corolla campanulate, open, red black. From the l. of a small creeping North American species (*Gaultheria procumbens*, var. *viridula* or known as Oil of Wintergreen) is distilled.

5. DIPLYCOSIA, Blume; Fl. Brit. Ind. iii. 458.

Small shrubs differing from *Gaultheria* by anther-cells without horns at the back and calyx partly adnate to ovary in some species. Species 23, Malay Peninsula, and Archip., more than half in Borneo.

1. *D. discolor*, Clarke. Bhutan. Hills east of Toungay. Bracteoles pale, l. serrate, corolla glabrous, elliptic, 1-2 in. long, sec. n. 2-3 pair, the lowest from near the base, the upper reaching to the apex, vascularly glandular-dotted, racemes pubescent, 1 in. long. 2. *D. semi-infera*, Clarke. Bhutan 7-9000 ft. Similar, l. elliptic-lanceolate, 2-3 in. long, sec. n. 3-4 pair, ovary half-inferior.

Ceanothus fastigiata, D. Don (*Androsida fastigiata*, Wall. Pl. As. Har. v. 381; Bryon. III. t. 63). Higher Himalayan ranges 10-14,000 ft., Kashmir-Bhutan. A small heather-like shrub covering large areas, l. small, rigid, elliptic, densely and minutely but furiously pubescent. Fl. pentamerous, axillary, sometimes 2-4 together, on slender woody pedicels up to 1/2 in. long, calyx of 5 free-sepals thickened at the base, edge scarious, corolla white, widely campanulate, anthers truncate, each cell lobed as in *C. saginoides*, Sikkim 10-13000 ft., Tibet, China, stems more slender and pedicels longer.

Eukenthus himalaicus, Hook. l. & Thoms. Sikkim and Bhutan 8-11000 ft., China. A small tree l. membranous, approximate at the ends of branches, elliptic-lanceolate, pubescent beneath, blade 1-2, pet. slender, 1 in. Fl. in corymbs on slender pedicels often fasciculate, pedicels 1-1 1/2 in. long. Corolla broad campanulate, at mouth 1 in. across, anthers oblong, each cell with a long hairy awn at the back. Capsules globose, loculicidally 5-valved. Perfect seed few, angular, testa very lax, membranous.

6. *PIERIS*, D. Don; Fl. Cat. Ind. Or. 366.(Included under *Ligustrum*, Nutt., by Drake in Engler u. Prantl iv. 1. 41.)

Trees or shrubs. Fl. pentamerous in bracteate racemes, pedicels bracteolate. Ovary 5-celled, capsule loculicidally 5-valved, seeds α linear-oblong, not winged or fringed, testa loose. Species 12, from the Himalaya to Japan, Mexico and N. E. America.

1. *P. ovalifolia*, D. Don; Coll. India Fl. 283, Fig. 89.—Syn. *Androsida ovalifolia* Wall.; Wight Ic. t. 1193; Brandis P. Fl. 280. Vern. *Mha*, Pkt; *Ceta*, *Yeta*, *Ledra*, *g*, *Bha*, *g*, *Agur*, Hind.

A small deciduous tree, l. ovate- or elliptic-oblong, entire, acute or shortly acuminate, often pubescent when young, base rounded, blade 3-8, pet. $\frac{1}{2}$ - $\frac{1}{4}$ in. long. Basal axillary veins or less pubescent, 4-10 in. long, fl. white, sometimes pink or bluish, calyx-tube triangular, corolla $\frac{1}{2}$ - $\frac{3}{4}$ in. long, filaments hairy, with 2 hairs near the apex.

Ever Himalaya, in the North West 4-8000 ft. often associated with *Quercus leucocarpa* and *Abies delavayi*. In Sikim, associated with *Sa* in the Teer valley at 2-3000 and with the *Madrodrum* of Kanchi at 10000 ft. (Gamble); Khasi hills. The Sikhim and Khasi hills specimens have a longer corolla. Burma; Kachin Hills, highest ever in the waters of Yunnan 5-7000 ft.—China, Japan. Fl. April-June. 2. *P. villosa*, Hook. f. Himalaya higher ranges 10-13000 ft. Garwal to Sikhim probably to Jammu at 7500 ft. Gamble Ind. Time. 16. 1871. A small tree, similar to 1, but l. smaller, villous beneath, calyx-tube linear-obovate, corolla broadly campanulate, no hairs at the top of filaments. 3. *P. harniana*, D. Don *Androsida harniana*, Wall. & Wight l. c. 1870. Himalaya 5-10000 ft. from Nepal eastwards. Khasi hills, Manipur. A small evergreen, glabrous tree, l. coriaceous, lanceolate, serrate, blade 2-3, pet. $\frac{1}{2}$ in. Racemes in large terminal panicles, corolla white, filaments with 2 hairs at the end.

4. *Leucostoe griffithiana*, Clarke. Himalaya 1250 ft. Branchlets beneath, l. long semi-obovate, entire or slightly serrate upwards, blade 4-6, pet. $\frac{1}{2}$ in. long. Racemes axillary, 2-3 in. long. Capsule depressed-gibbose $\frac{1}{2}$ in. diam. Seeds flat nearly orbicular, with a dense fringe of short blunt umbellular hairs.

7. *RHODODENDRON*, Linn. t. Fl. Brit. Ind. iii. 402.

Small trees or shrubs, often epiphytic, the species here described evergreen, the deciduous species commonly known as *Alcornoque*. L. entire, usually coriaceous and crowded at the ends of branches. Fl. showy, as a rule large, mostly in terminal cymes or umbelliform cymules, bracts at the base or pedicels numerous, large, coriaceous, deciduous, enclosing the buds. Calyx 5-lobed, entire or obsolete. Corolla widely funnel-shaped, campanulate or cylindrical, lobes 5-10, anthers oblong, opening by terminal pores. Ovary 5-celled, 5-lobed, α . Capsule septically 5-20-valved from the apex, the valves breaking away from the placentae. Seeds α , testa often produced at the ends, one end frequently ciliate. Species 200, chiefly in Eastern Asia, a smaller number in temperate North America, a few in Europe and Western Asia, 1 in tropical Australia.

1. Capsule cylindrical, valves woody or coriaceous, the placentae remaining attached to the central axis.

2. Underside of l. without glandular scales, calyx-lobes short or obsolete, not enlarged in fr.

(a.) Corolla-lobes 5, stamens 10.

(b.) Corolla purple, rose or white, underside of l. hairy.

3. *R. arboreum*, Sm.; Wall. Pl. As. Rar. t. 121; Wight Ill. t. 140 and Ic. t. 1211; Bedd. Fl. Sylv. t. 228. Syn. *R. nilagiricum*, Zuccer; *R. Camp-*

17. *R. bursale*, DC., without glandular scales, calyx deeply lobed or enlarged in fr.

(a) Branches not woolly.

18. *R. caribaeum*, Wall. Hook. f. Rhod. Sikkim 3. Himalaya from Khasia to Nagas 5-12000 ft., Naga hills 5000 ft. A small or middle-sized tree, l. glabrous, woolly on both sides, acute petioles, branchlets and inflorescences with long woolly hairs. Heads 3-5, corolla deep red, very large, cupate & the large lobes 10-12. *R. Thomsonii* Hook. f. Rhod. Sikkim 6-12. *R. Goodenii* var. Hook. f. & G. 2. For. Nepal and Sikkim 11-12000 ft. A large shrub attaining 15 ft., l. heavily stippled, some of the veins very often obsolete, glaucous beneath, blade 3-4, pet. 4-5. Calyx funnel-shaped, usually lobed, enlarged in fr. Joints enclosing the glandular scales & the long corolla. Corolla deep crimson. 16. *R. Hookeri*, Nutt. Bhutan, Sikkim and possibly only a variety of 15. L. oblong underneath with minute raised glandular scales. Calyx funnel-shaped, usually lobed. 17. *R. Griffithianum*, Wight & Gardner. Jackfield. Hook. f. Rhod. Sikkim 1. 11. Sikkim and Bhutan 7-10000 ft. A shrub of tree & middle-sized tree, l. glaucous above, base rugulose, blade 4 ft. x 1-1.5 in. Fl. large white with a pink tinge; calyx same-colored, lobes nearly entire in fr. often unequally enlarged. Corolla little long, very woody.

(b) Branches woolly. Usually epiphytic.

19. *R. Edgeworthii*, Hook. f. Rhod. Sikkim 4. 12. Sikkim 7-10000 ft. Bhutan. Branchlets petioles underside of l., pedicels, calyx and corolla, white & very densely clothed with wool. L. usually scabrously-hispid, l. glabrous but strongly rugose with the finely impressed nerves and veins. Fl. white, sweet scented, calyx divided nearly to the base, lobes obtuse, somewhat oblong, 1/2 in. long, corolla 2-3/4 in. across. 20. *R. parvifolium*, Hook. f. Rhod. Sikkim 4. 13. Branches pedicels 2-4 ft. long, l. mostly spreading above at the ends of branches & very woolly beneath, blade 1 1/2, pet. 1/2 in. long. Calyx lobes obtuse, 1/2 in. long, rose-colored, corolla white, 1 in. across, glandular scales.

(c) Underside of l. with round appressed glandular scales.

(a) Calyx-lobes short or obsolete, not enlarged in fr.

21. *R. manabitarum*, Hook. f. Rhod. Sikkim 1. 9. Gumbie (adj. Tibet), wt. 10-40 ft. Nepal, Hook. f. Rhod. Sikkim 7. Sikkim 10-12000 ft. and higher. Branches & large parts of glabrous and shining above, densely clothed beneath with glandular scales, l. 1 1/2-2 1/4, pet. 1/4 in. long, villous-exserted, etc. a. visible on the upper side. Heads 10-15 ft. pedicels 1-1/2 in. long, calyx-lobes obtuse, usually short, sometimes the upper lobe corolla orange or brick red long narrow-manipulate, almost tubular, tube acute, acute equal (Hooker's figure of *R. caribaeum* is possibly representative of a species with these 2 heads and the prominent calyx-lobes). Fl. or almost obsolete. If not, these are described above as different from *R. Heyl.* 22. *R. tetrum*, Hook. f. Rhod. Sikkim 1. 10. Sikkim, Manipal 7-11000 ft. Assam 2 ft. l. woolly white beneath. Fl. few, sometimes solitary, corolla glaucous, lower-lobes 1/2-3/4 in. long, 1/2 in. diam.

23. *R. Sepul*, Nutt. Bhutan 8-10000 ft. L. lanceolate, short axillary spurs, corolla tube cylindrical, tube brick red. 24. *R. virgatum*, Hook. f. Rhod. Sikkim 1. 2. Sikkim 7-10000 ft. Bhutan. A shrub attaining 4 ft. with slender branches and scattered shining-lanceolate l. Fl. axillary, solitary or in pairs, pedicels slender at the base to indicate a cymose branch, or hook's corolla purple, 1 in. across, almost

25. *R. formosum*, Wall. Pl. As. Rav. 1. 267. *Prabun pua*, Kuhn.

A shrub, l. lanceolate, usually broader above the middle, acute, glabrous above, glandular scales beneath numerous, but epidermis distinctly visible between them. Corymbs 2-5-fld., corolla white, widely funnel-shaped, 2 in. across at mouth.

Bhutan, Khasi hills, often near streams, Kachin hills 7500 ft. and Ruby Mine district Upper Burma. Hills east of Taunggye 4-7000 ft. Mocha, 10-5000. Yunnan 4-5000 ft. Very variable, two varieties may be noted: *R. salicoides*, Khasi hills with broad-lanceolate l. *R. Javanicum*, Wight 1858, Naga and Manipal hills 5000 ft. with elliptic l., the glandular scales approximating beneath, corolla with pink veins and dots. 26. *R. Veitchianum*, Hook. Tenasserim hills 4-7000 ft. Some forms, especially, is supposed to differ by a larger corolla with a crisped-crenulate margin.

ORDER LXVI. PLUMBAGINACEÆ. Gen. Pl. ii. 623 (Plumbaginac.)

Mostly herbs, a few shrubs. fl. regular bisexual, bracts usually scarious on the edge, sheathing the fl. Calyx tubular, 5-ribbed, mouth frequently scarious. Petals 5, free or connate at base, stamens 5, epipetalous. Ovary 1-celled; style 1; pediculous from a basal funicle.

Characters of the two genera here described have an entire anomalous structure. Each has a transverse section showing concentric bands of thin (pith-like) alternating with a wider strata of wood, similar to *Dalbergia paniculata*, *Quercus laevis*, and to transverse shrubs. A transverse section of *Argemone* shows numerous distinct vascular bundles consisting of thick-walled wood fibres and a radial line of vessels.

Argemone retundifolia, Hook. f. *Fl. Kurr.* F. Pl. ii. 106. Mangrove swamp and edge of forest of Bengal and Burma. Andamanis, Malay Peninsula. A simple stemmed, glabrous evergreen shrub, with a thick woody trunk, branchlets marked by the scars of the amplexicaul petioles. Lvs. alternate, thickly coriaceous, nearly orbicular, 1 1/2-2 1/2 inches long, petiole sheathing, longer than blade. Fls. in panicles terminal. Calyx tubular 5-ribbed, the ribs ending in short teeth, petals white, linear, the upper portion 5-ribbed, the ribs ending in short teeth, petals white, linear, the upper portion 5-ribbed, the lower united with the filament into a persistent tube. Capsule linear 1/2 in. long, pentagonal, dehiscing usually along the angles. *A. scandens*, R. Br. is a widely spread littoral species of tropical Asia and Australia.

Tegelia indica, Gilson, Wight I. 3. 1875. Sand, Bagmatana, dry districts of the Southern Ivesans, Australia with few branches. Lvs. alternate, entire, amplexicaul or petiolate. Fls. in spikes arranged in terminal panicles. Calyx deeply 5-lobed, broad, strongly imbricate, wings between the ribs, style filiform with 5 stigmatic branches. Capsule included in the calyx, circumscissile at the base.

ORDER LXVII. MYRSINACEÆ. Gen. Pl. ii. 639 (Myrsinac.)

(See, *Myrsinaceæ*, in Engler's *Pflanzenreich*, 1897.)

Shrubs or small trees. Lvs. alternate, undivided, generally gland-dotted, stipules 0. Fl. bisexual or polygamous, usually 5-merous, calyx persistent, often enlarged in fr. Corolla tube short or none, segments (petals) can be united or imbricate. Stamens opposite the corolla-lobes, and frequently adnate to them, anthers usually dehiscing by lateral longitudinal slits. Ovary 1-celled, narrowed into the style, ovules inserted on a free central placenta. Embryo transverse, in *Aspidosiphon*.

Resin cavities and canals ducts are found in the leaves and bark. The resin ducts in *Gambel's* Indian Timbers vol. ii. 138-140 of *Myrsine africana*, *Aspidosiphon* and *Aspidosiphon* makes it probable that these species have resin cavities or special cells filled with resin in the cellular tissue analogous to the wood cells in the case of *Dipterocarpaceæ* (see p. 107, 96).

- I. Ovary inferior or half-inferior, ovary 1-celled. I. MYRSIN.
- II. Ovary inferior, 1-celled.
 - A. Filaments 0 or shorter than anthers.
 - Fl. in dense axillary clusters, corolla-segments imbricate or valvate in bud. I. MYRSIN.
 - Fl. in simple or compound, often panicled racemes, corolla-segments imbricate or confluent in bud. B. EMBELL.
 - Fl. usually umbellate, corolla-segments (related to the right hand edge) overlapping. I. ALGIDA.
 - Anthers free, calyx glabrous. PENTASTEMATA (p. 12)
 - Anthers free, calyx hairy. HEMICLADIA (p. 12)
 - Anthers connate. ANTHYANTHA (p. 12)
 - Corolla tubular, segments acute. HEMICLADIA (p. 12)
 - Corolla tubular, segments emarginate. ANTHYANTHA (p. 12)

- Fl. white, calyx lobes 5, the segments 5-lobed, the 5th lobe with 2-3 lobes.
- B. Filaments as long as anthers, of a 2-lobed berry.
- C. Filaments long, exerted. Fil. very slender.
- Septim. A. DC. is placed under *Sepalaria*.
- A. DC. 1825. *Artocarpus*.
Artocarpus 121.
 G. Don 1825.
 Rept. A. DC. is placed under *Sepalaria*.

1. MÆSA, Forst.: Fl. Brit. Ind. 1797.

Evergreen shrubs or small trees, leaf-blade opaque in a few species, or a rule with a system of anastomosing resin ducts, transparent when the dry cell-walls, often enlarged near the edge, in some cases without such a system of resin ducts, but with minute transparent dots. Fl. white, pentamerous, often unisexual, in simple or compound racemes; bracts small, two bractlets under each fl. Inflorescence often monostrous, the fl. replaced by densely imbricating bractlets. Calyx-tube adnate to ovary, corolla rotate or campanulate, segments inserted on the axils, at or above the base, filaments usually short. Ovary inferior or half superior, ovules numerous. Berry many-seeded, crowned by the persistent calyx-tubes. Species 10 (Clarke), 102 (Max), tropics of the Old World, Australia and Polynesia.

A. Corolla almost rotate, lobes as long as or longer than tube.

(a) Leaves glaucous, distinctly toothed.

C. *M. indica*, Wall.; Wight *Icon.* 1836. Vern. *Nandiyadhera*, Kuntze; *Mā*, Mar.; *Kirihū*, Travancore.

A large shrub or small tree, often gregarious, branches long, straggling. L. elliptic, elliptic-oblong or elliptic-lanceolate, base 3-7 (or) 1-2 in. long. Rami axillary, shorter than l., often compound, generally glabrous. Calyx-segments ciliate along the edges (Northern India) or naked (Peninsula, Java, & less extent, corolla almost rotate, 1/2 in. across at mouth. Berry small, pinkish-white, edible.

Occurs throughout, ascending to 6000 ft. from the jungle eastwards. A. Mar. Khasi hills, Manipal, Chittagong, Burma, Upper and Lower, Western Peninsula, chiefly on the West side, but also in the Northern Ghats and on the hills of the Deccan and the Khasi hills. Fl. almost throughout the year, chiefly Dec-May. Vern. *Mā*, Malay, Archaic. Now classes the Indian forms of this variable plant under 7 species, as follows:

- Calyx-segments ciliate, veined.
- Inflorences short, resin ducts in leaves conspicuous. a. *M. indica*, Wall.
- Inflorences short, resin ducts not visible. b. *M. montana*, A. DC.
- Inflorences 1 times length of pedicel. c. *M. Mariana*, Max.
- Calyx-segments ciliate, not veined. d. *M. elaeagnifolia*, Max.
- Calyx-segments not ciliate.
- Stamens inserted, at the base of corolla. e. *M. chinensis*, Max.
- Stamens inserted higher up, calyx-segments veined.
- Resin ducts in leaves distinct. f. *M. Parviflora*, A. DC.
- Resin ducts not visible. g. *M. maxima*, Max.

Besides these Max describes *M. longicaulis* and *M. sanguinolenta*, which also are nearly allied to *M. indica*, Wall. Before these can be accepted as distinct species they must be further studied in the forest.

2. *M. Gata*, Don. Nepal, Sikkim 2-3000 ft. Bhutan, Khasi hills. A gregarious shrub. L. thick membranous, laminae the veins very slender, closely reticulate, blade 2-3 per. 4 in. long. Racemes glabrous, lax, generally branched, about half the length of the pedicels as long as fl. calyx segments not ciliate, distinctly veined as well as corolla, stamens in 2 fl. exerted. 3. *M. paniculata*, A. DC. Khasi hills. Terminal fl. ovate, acuminate, base rounded, blade 4-8 per. 1-1 long. Racemes panicled, longer than leaf, often bearing a large terminal panicle, calyx-segments not ciliate.

(b) Leaves glabrous, entire or minutely denticulate.

1. *M. ramentosa*, A. DC. Bhutan, Khasi hills, Chittagong, Andaman, Manipal, Burma, Upper and Lower, southern in the second growth in Assam, Java, Sumatra, Xunnan, Malay Peninsula, and Archaic. A shrub or small tree, gregarious.

longer, long acuminate, 1 third coriaceous, oval-lanceolate, quite entire, with 15-20 pairs of long, soft, n. hairs, 6-8 pairs. Racemes glabrous, compound, as they are long as 1 corolla-lobe or shorter. A. *M. andamanica*, Kurz, F. Fl. Ind. 1857, South Andaman, rare, very similar to 4, but labourably distinguishable.

9. *M. rugosa*, Clarke, Sikkim 3-7376 (n. Hb. Kew). A small shrub, l. coriaceous, lanceolate, marginate-serrulate, 3-toothed and minutely denticulate, serr. on 12-18 pairs prominent beneath, as well as the tertiary and shorter intermediate nerves. Blade 5-6, pet. 1-1 1/2 in. Racemes compound, 1-2 in. long, berries yellowish-white. Near this are probably *M. grandiflora*, Mez, Assam, and *M. papuana*, Mez, K. O. Ind., Naga hills.

8. Leaves hairy.

7. *M. densa*, Wall, *Med. Indica*, Boid, Manual 4, xviii fig. 4. Evergreen forest of the Western Ghats, Nilgiris to Malabar. Branchlets and l. rusty-tomentose, l. ovate-lanceolate, blade 1-7, pet. 1-1 1/2 in. long. Racemes compound, less than half the length of l. Near it is probably *M. pubescens*, Mez, Bombay. 8. *M. argentea*, Wall, Garhwal, Kumaon, Nepal, Sikkim 3-7375 (n. Hb. Kew). A large shrub, branchlets softly pubescent, l. ovate-lanceolate, long, 1-2 in. long, pet. 1-1 1/2 in. long. Racemes 1-2 in. long, l. large, ovate, branches woody, elliptic or obovate, evenly serrate, base of l. cordate. Male 6-8, pet. 1-1 1/2 in. long, sep. n. 10-14 pairs, prominent beneath, dissecting the edge of l. Racemes compound, pubescent 6-10 in. long, sometimes bearing a terminal panicle.

10. To this group belongs a shrub or small tree sent by Montagne Hill from the hills east of Burma, l. minutely pellucid-punctate, branchlets, nerves on the under side of l. with long slender hairs, veins covered with a profusion of white fl. 1-3 in. long, with long branches above the base often fasciculate in the axils and forming a terminal panicle. Petioles as long as fl. calyx-segments ciliate, net-veined, smooth with prominent brown veins.

11. Corolla campanulate, lobes shorter than tube.

11. *M. permans*, Kurz.—Syn. *M. andamanica*, Kurz, F. Fl. Ind. 1857; *M. pallida*, Clarke, *M. acida*, A. DC. 1844 Java species. Hills of Upper and Lower Burma, ascending to 4000 ft. Yunnan. A slender shrub, branchlets, petioles and under side of l. hairy, l. elliptic, acuminate, dentate, blade 5-7, pet. 1-1 1/2 in. long. Inflorescence compact, densely branched, shorter than petiole, leaves minute.

12. *M. Kurdi*, Mez.—Syn. *M. mucosa*, Kurz, F. Fl. Ind. 1857 (New species, A. DC. is a species of the Malay Archip.). Upper Burma. Branchlets and l. glabrous, nerves fine, l. long, ovate-lanceolate, elliptic or obovate, acuminate, dentate, blade 5-10, pet. 1-4 in. Racemes usually branched, compound, twice the length of petiole or longer, bracts lanceolate, usually hirsute, compound, twice the length of petiole or longer, bracts lanceolate, usually hirsute, as long as fl. or nearly so. Specimens collected by Smith in the Shwabe-hung, 1000 ft. Nettle etc. Burma, have l. entire-glaucous and racemes slightly hairy.

9. MYRSINE, Linn.; Fl. Brit. Ind. 511.

Evergreen trees or shrubs, Lauraceae. Fl. polygamous or dioecious, subsessile or on short pedicels in dense clusters, usually axillary. Calyx small, persistent, 4-5 lobed, corolla white, 4-5-partite, segments in bud imbricate or 10-15-veined, both with nervous dots. Ovary free, globose, stigmas 2-5, erect or spreading, sessile or on a short style. Fr. red or purple, seed 1. Species 81 (Clarke), 100 (Mez) chiefly tropical. Mez (*Myrsinaceae* 342) includes under *Myrsine* the species with sessile stigmas.

1. *M. capitellata*, Wall.; Wight Ic. 1211; Boid, Fl. Sylr. t. 231.

A small tree, l. entire, pellucid-punctate, lanceolate or elliptic-lanceolate, blade 3-7, narrowed into a marginate petiole 1 in. long. Fl. 5-merous, sessile or shortly pedicellate, in dense fascicles on short woody protuberances in the axils of fallen l., stigmas sessile, erect, more or less combined. Berry 1-1 1/2 diam., purple. Calyx-segments ciliate, corolla-lobes spreading or reflexed. Anthers nearly sessile in the ♂, on short filaments in the ♀.

Water H. Malaya ascending to 4000 ft. from Nepal eastwards. Assam, Khasi hills, Burma, Upper and Lower. West side of the Pyramida, chiefly in evergreen forest, from North Kanara southwards. Common in the Nilgiri hills. Fl. 6-8. Java, Ceylon, Malaya, etc. Malay Peninsula and Archip. China, Japan. An exceedingly

variable trees. MacDougal in his *Rept. on the Forests of the Burma* with a list of specimens mostly in the class of trees with pedicellate flowers, but some of the species are also cited by him as tall trees. Western Peninsula: *E. Hirtelliana*, *Chittala* and *Depressa* (Burma: *E. acuta* and *Wrightiana*).

2. *E. serrata*, Wall. *Opus Himalaya* from the Ben-Gangwan 2-1025. In *Bell. Ganges*, Gardl. 1. Khasi hills, Manipur. Hills east of Patna 2-1224. Upper Burma. Yunnan. A shrub or small sometimes a much-branched tree, with glabrous, l. thickly scabrous, elliptic-obovate, entire or l. in the upper half with sharp spinulose serratures. Blade 3-5, petiole 1 to long. Fl. white, with a slight pink tinge. Fr. red, $\frac{1}{2}$ - $\frac{1}{4}$ in. diam. on pedicels $\frac{1}{2}$ in. long.

3. *E. africana*, Lindl. & Collett, *Ann. Fl. Bot. Soc. Lond.* 1844, fig. 34. Afghanistan. Baluchistan. Trans Indus. Salt range. Outer N. W. Himalaya from Nepal westwards 2-1025. In Annes, Mountains of East and South Africa. Western Asia. China. Yunnan. Khasi Hills. *Gaul.* Kashmir. Chitaval, Bakh. *Ravenna*, Java. A small shrub, branches hairy. L. $\frac{1}{2}$ -1 in. long, minutely cuspidate-serrate, 2-3-nerve. In axillary clusters of 1-6, stigma large capitate, imbricate. Racemes usually solitary, red or black, $\frac{1}{2}$ in. diam., often densely covered with cylindrical capitate protuberances. *EM. africana*, Martens.

3. EMBELIA, Burm. f. *Fl. Brit. Ind.* III. 512.

Shrubs or small trees, as a rule evergreen, most species climbing. L. usually entire. Fl. small, polygamous, often dioecious, in simple or compound, often paniced racemes. Calyx free, persistent, petals free or slightly coherent at base, filaments more or less adnate to petals, style cylindric, stigma capitate, scales few. Calyx, petals, anthers and ovary usually with glandular dots. Seed one, albumen more or less ruminated. *Species 90-93, tropics of the Old World.*

A. Petals imbricate in bud, fl. 3-merous.

(a) Inflorescence terminal.

1. *E. Ribes*, Burm.—Syn. *E. glandulifera*, Wight *Is.* 1. 1297. Vern. *Watanang*, Mar.; *Shalla*, Ass.

A large climbing shrub, l. glabrous, coriaceous, elliptic-oblong, serrulate. Blade 3-4 in., narrowed into a more or less marginal or glandular petiole $\frac{1}{2}$ in. long; sec. n. slender, numerous, glands sometimes along midrib. Fl. greenish-yellow, more or less pubescent, on pedicels as long as fl., longer than bracts, in large terminal cyme or less pubescent panicles. Berry black, succulent, wrinkled when dry, $\frac{1}{2}$ in. diam.

—Saxils, forest hills ascending to 4000 ft. Assam. Manipur 2-5000 ft. Chittagaon & Burma. Upper and Lower, 3000 to 6500 ft. Hills of the Western Peninsula, in evergreen forest. Fl. Naxos, Java. Ceylon, moist regions to 4000 ft. Malay Peninsula and Archip. Tonkin. China. 2. *E. acuminata*, Kurz, Burma, Upper and Lower, rare. A very woody shrub, l. ovate, entire, glabrous. Fl. sessile, elongated similar to *E. Ribes*.

3. *E. adnata*, Bedd. (Palghat hills). A very large climber, branches stout, angles woody, young foliage red, l. coriaceous, blade 4-6, pet. about 1 in. long, terminal panicle large, ramification stout. 4. *E. microcalyx*, Kurz, Nicobar. Scandent, branches lvs. and underside of l. and petioles brown when l. elliptic, obtuse at both ends.

(b) Inflorescence axillary.

5. *E. robusta*, Roxb. & Bedd. *Manual* 1. xix. fig. 2.—Syn. *E. Tilioides* Cattan, A. DC.; Wight *Is.* 1. 1299. Vern. *Gula*, Dán.; *Nwanata*, Uru; *Ekmucure*, Burm.; *Bairrang*, *Bebrang*, *Bhingi*, Hind.; *Watanang*, Assam, Mar.

A large shrub or small tree with long spreading and scrubby branches, leucoblasts, petioles and underside of l. more or less rusty-pubescent, sometimes glabrous. L. membranous, entire or slightly denticulate, elliptic, blade 2-3, petiole slender, $\frac{1}{2}$ - $\frac{1}{4}$ in. long, sec. n. slender but conspicuous beneath. Racemes 1-3 in. long, sometimes 2 or 3 from one leaf axil. Fr. red, woody dry, longitudinally ribbed, $\frac{1}{2}$ - $\frac{1}{4}$ in. diam.

(a) Leaves glabrous.

1. *A. humilis*, Vahl, Wight *Jour.* 1812—Syn. *A. caldasana* Benth. *Bot. Beechey* Pl. 7; *A. polyphylla* Wight, *Jour.* 145; *A. attenuata* Ait., *Bot. F.* Pl. II, 119; *A. acrostichum*, Wall., *Vern. Jaitis*, *K. schum.* II ed. Koenig, Burm.

A large shrub or small tree, attaining 20 ft. L. glabrous, entire, above and below, 4-8 in. long, narrowed into a short petiole. Fl. light pink in bud, white later, mostly axillary corymbs, pedicels 1-1 1/2 in. long, sepals slightly connate at base or almost distinct, more or less ciliate, sepals and petals with rounded black dots, often confluent into longitudinal lines, anther cells naked or less transversely rugose.

Soiliana, from trees from the Janna mountains according to Benth. *Jour.* Khasi Hills, Manipur. On rare Lower Bengal, Orissa, Mithoon, Orissa, Northern Mysore. In open and West side of the Peninsula, chiefly on the banks of streams, Burma, Upper and Lower, on the sea coast and inland.—Fl. at all seasons, usually March-June. Coyle, on the South-Western Coast, Malay Peninsula, China, Mal Myriophorum 181 and 188, fig. 20 separates *A. suberosa* by fruit, but cillioses seeds and restricts *A. humilis* to the littoral plant. He also recognizes *A. suberosa* as a separate species. 2. *A. Wallichii*, A. DC. *J. bot. Sikkim*, Wall., Mar. 1, 1829, Benguet, Pinus, Upper Burma, with L. indistinctly denticulate in the upper part, probably not specifically distinct from 1. 3. *A. polycephala*, Wall., Manipur, Upper Burma, common (Aitchison). L. obtusely serrate, blade 3-10, narrowed into petiole 1/2-1 in. long, midrib prominent beneath, veins numerous, lower part distinct. Fl. large, dark rose, in elongate branched racemes, pedicels 2-4 in., petals 1/2 in. long. Closely allied and possibly not distinct to *A. arphylla*, Wall., Yunnan, Malay Peninsula, from which Moore separates *A. attenuata*, Wall., and *A. adocia*, A. DC.

4. *A. parviflora*, Talbot, *Jour.* 1821 and 1824, with distinctly ciliate and pointed petioles and small white fl., evergreen scrub jungle near the coast of North Borneo. There exists another *A. parviflora*, Moore, as a Java species.

5. *A. rynchophylla*, Hook. Khasi hills. A small shrub, branched and petioles pubescent, L. approx. long-ovate, blade 2-5, pet. 1-1 1/2 in. long, etc. as with 1, but L. has distinct beneath, as well as the reticulate veins. Fl. large, white in form of axillary corymbs, pedicels 1 in., petals 1/2 in. long. 7. *A. Khasiana* Clarke, from which Moore separates *A. Theinensis*, Moore, Khasi hills, Manipur, Chittagong. A small shrub, branched and petioles pubescent hairy, L. glabrous, linear lanceolate or oblanceolate, 4-6 in. long, narrowed into a very short petiole. Fl. in 2-3-5d. pedicels white axillary umbels, pedicels 1 in., petals equally long, petals 1/2 in. long, berry red, calyx 1/2 in. long.

8. *A. rivularis*, Murray. Mixed plain woods; Total and banks of streams in the lower hills according to Moore. Fl. in lateral racemes, pedicels white, 1-2 in. pedicels 2-3, bracts as many as pedicels, petioles 1/2 in. long, fl. large, sepals waxy, rounded, pink, petals 1-1 1/2 in. long, both with copious black round elongated dots, sepals enlarged in fr. and bent over the berry.

(b) Leaves hairy beneath.

9. *A. Balfouriana*, Krae. Manipur, Yunnan. Branches L. and inflorescence densely rusty pubescent, L. elliptic-lanceolate, blade 4-6, pet. 1/2 in., pedicels axillary, 1/2-1 in. long, bearing short and often numerous. Other shrubs with L. hairy beneath, 10. *A. reflexa*, Wall. 11. *A. grandifolia*, A. DC. Cochin and Manipur. 12. *A. Khasiana* Clarke.—Moore's 12 separates specimens of *A. reflexa* with mostly glabrous L. as *A. Indochinensis*, A. DC.

B. Sepals narrow, open in bud. Style in bud longer than petals, usually exserted. Inflorescence usually (rare *A. rhomboides*) of compound corymbs or racemes, axillary or forming terminal panicles.

(a) Sepals and petals not purplish.

10. *A. Soribunda*, Wall. in Roxb. Pl. Ind. ed. Carey & Wall. p. 272. Brandis F. Pl. 287; *Mex Myriophorum*, p. 107.—Syn. *A. sciffolia*, Wall. Pl. Brit. Ind. III, 522.

A large shrub or small tree, L. lanceolate, entire, upper side glabrous, under side with cross-lining minute thin rounded scales, blade 3-6, pet. 1 in. long.

Fl. pink in a large terminal panicle, its ramifications as well as the short pedicels minutely papillose. Calyx open in bud, segments ovate, anthers scarcely mucronate, style filiform $\frac{1}{2}$ in. long.

Outer Himalaya from Garhwal eastward ascending to 5000 ft., often along streams. Assam, Khasi hills, Manipur, Chittagong. Fl. April-May. 14. *A. Icara*, Ham. (*A. pruriata*, Kurz). Assam, North-East Bengal, Burma. Similar to 13, but leaflets serrulate, calyx segments linear-lanceolate and anthers with a long terminal awn.

15. *A. depressa*, Clarke. Sikkim 4500 ft., Khasi hills, Singphoma, Upper Burma, L. lanceolate or elliptic-lanceolate, blade 3-4 in. long. Fl. small, in axillary long pedunculate compound umbels, shorter than l. 16. *A. rhomboides*, Wight. In. t. 1243. Arunachal hills. Travancore and Thiruvalluvar 2-4000 ft. A small tree, L. elongate-rhomboid acuminate, 2-8 in. long, gradually narrowed into short petiole, petioles axillary 1-3 lin., shorter than l.

b) Sepals and petals distinctly punctate.

17. *A. pauciflora*, Heyne. Wight. In. t. 1244. A large shrub or small tree, common on the Nilgiris and other hills on the West side of the Peninsula. L. lanceolate, blade 2-5 in. long, pet. 1 in. Racemes short axillary 1-3-did., petals acuminate, berries red. 18. *A. pedunculosa*, Wall. Assam, Khasi hills, L. lanceolate 4-8 in. long, narrowed into a short petiole. Fl. rose red, in many-did. axillary pedunculate compound corymbs, often forming a large drooping panicle at the ends of branches, buds very acute, pedicels slender, $\frac{1}{2}$ in., petals $\frac{1}{2}$ in. long.

19. *A. quinqueangula*, A. DC. Bengal. L. similar to 18. Fl. in a large terminal panicle, petals $\frac{1}{2}$ in. long, drupes obviously 5-ribbed. 20. *A. Griffithii*, Clarke. Khasi hills. Similar to 18, but l. larger, elliptic-oblongate, 8-12 in. long, sec. n. numerous, parallel, slender but distinct, sepals oblong, drupes vertically striated.

c) Fl. small, in axillary and terminal panicles, petals less than $\frac{1}{2}$ in. long.

21. *A. colorata*, Roxb. (*A. naxos*, Wall. Kurz F. Fl. II. 107). Assam, Khasi hills, Cachar, Chittagong, Martaban and Tenasserim. A small tree, branchlets and under side of l. covered with minute often shining scales. L. lanceolate-oblong, blade 8-12 in. long, pet. $\frac{1}{2}$ in. long, sec. n. numerous slender, almost at right angles to midrib. Fl. small, in axillary panicles, usually forming large terminal panicles, peduncles often flattened, d. unit, petals $\frac{1}{2}$ in., style much longer than petals. 22. *A. andamanica*, Kurz. Andaman. Mergut. A small shrub, perfectly glabrous, branches slender. L. thin, lanceolate, blade 3-7, pet. $\frac{1}{2}$ in. long. Fl. minute in axillary lax panicles, pedicels slender, divaricating, $\frac{1}{2}$ in. long, petals $\frac{1}{2}$ in., with copious black, more or less elongate dots, style a little longer than petals.

23. *A. amplicaulis*, Bodd. Jc. Pl. Ind. Or. t. 150; Manual t. xviii. Wainai, Travancore. L. thin, sessile, with an unequal-sided (almost amplicaulis) base, 5-6 in. long, with a belt of numerous raised dots along the margin. Fl. small, in lax terminal panicle, petals $\frac{1}{2}$ in. long.

D. Fl. in terminal panicles, supported by a false whorl of leaves.

24. *A. paniculata*, Roxb. Assam, Khasi hills, Dacca, Imphal, Chittagong hills. A large shrub, L. oblanceolate, glabrous, 6-20 in. long, narrowed into a short stout petiole, midrib and sec. n. prominent beneath. Fl. middle-sized, rose-coloured, in ample pyramidal terminal panicles 8-12 in. long, supported at base by a false whorl of large l., rachis and ramifications angular, glabrous, petals $\frac{1}{2}$ in., style longer than petals, pedicels in fl. $\frac{1}{2}$ in. long, sepals and petals not punctate. 25. *A. mistonii*, Wall. (*A. costalisensis*, Wight. In. t. 1215). Hills on the West side of the Peninsula from Coimbatore southwards. Ceylon, moist region, common. Similar to 24. Pedicels in fl. $\frac{1}{2}$ in. long, sepals and petals black punctate, petals $\frac{1}{2}$ in. long, style as long as petals.

26. *A. rigida*, Kurz. Tenasserim, on the coast. Siam. L. elongate-elliptic, 5-7 in. long, narrowed into a very short petiole, sec. n. arching, prominent beneath, panicle contracted, 4-5 in. long, sepals and petals punctate, anthers with a long point. 27. *A. Karstii*, Clarke (*A. polycephala*, var. *acuminata*, Kurz F. Fl. II. 110). Pegu Yoma, eastern slopes. Hills east of Toungoo (D. B. Fehr, 1888). A large shrub, l. coriaceous, glabrous, lanceolate, blade 5-9, narrowed into pet. $\frac{1}{2}$ in., sec. n. arching running out below the margin, into distinct intra-marginal veins. Fl. in pedunculate umbelliform corymbs, 3-d at the ends of branches, supported by a false whorl of large l.

II. Leaves crenate or serrate.

A. Branchlets and petioles glabrous.

28. *A. macrocarpa*, Wall. *Pl. Asiat. Novæ*, Sikkim 2: 496 (t.). Branchlets small, single-stemmed shrub, forming a dense thicket. Leaves alternate-lanceolate, crenate, 5-6 in. long, narrowed into a very short petiole, a row of large raised dots on the margin. Fls. axillary, peduncled, in axillary, pedunculata umbels, near the ends of long, thin, soft-stemmed & terminal panicles, sepals oblong, calyx tubular, 1 in. long, petals 2-4 in. long. Berries bright red, 1-4 in. diam., dotted. 29. *A. crenata*, Hook. (including *A. confusa*, Clarke & Robinson, A. DC., *Man. Myrsin. 114*) Khasi hills, China, Japan, Malay Archip. Similar to 28, but the dots with large raised dots all over, without a row of marginal ones, fl. smaller, petals 2-4 in. long, sepals smaller. 30. *A. bhotanica*, Clarke (*Andropogon bhotanicum*, Mez) fl. small, umbels in short lateral panicles.

31. *A. virens*, Kurz F. Fl. B. 575. Assam, Khasi and Naga hills, Manipur, Cachar, Upper Burma, Yunnan. A single-stemmed shrub with horizontal branches, lustrous, elliptic-oblong blade crenate, 5-7 in. long, narrowed into petiole, 2 in. long. Umbels arranged in a terminal glabrous corymb, sepals elliptic-oblong, petals 1 in. long, both permanently black-dotted. Berries 1-1½ in. diam., yellow, spotted. 32. *A. laetevirens*, Mez. Khasi hills, palmate-triangular, as well as petals with black oblong dots. 33. *A. Brandisiana*, Kurz. Thailand and Upper Salween forests. L. cuneiform, slightly serrate elliptic, obtuse or acute, blade 6-7, pet. 1-1½ in. long, sec. n. obtuse, strongly veined by prominent reticulate veins. Fl. large in axillary umbels on peduncles 2-3 in. long, sepals 1, petals 1 in. long, not dotted.

B. Branchlets and petioles hairy.

34. *A. villosa*, Hook. f. (*Myrsin*, Wall., *Man. Myrsin. 111*). Martaban and Tenasserim. A small shrub, hexmethyl, petioles, young l. and inflorescence rusty villous, l. membranous slightly crenate, elliptic-lanceolate, blade 5-7, pet. 1 in. long. Fl. in pedunculata axillary beset with umbels with three lanceolate, 1 in. long, petals hardly as long as wide. 35. *A. scandifolia*, Mez (*A. villosa*, var. *obovata*). Shavgherry hills. Western Peninsula. L. spatulate, fl. in broad axillary panicles, rusty pubescent, like the oblong-lobed angulata.

36. *A. odontophylla*, Wall. Khasi hills, Palihai range, Cachar, Malay Peninsula. A small shrub, branchlets, petioles, midrib and sec. n. beneath rusty pubescent or villous. L. membranous, finely and sharply serrate, elongate-elliptic, blade 6-8, pet. 1-2½ in. long. Fls. simple or compound, few-lobed racemes, pedicels slender, 2-3 in. long with minute hairs, petals 1 in. long. Berry scarlet, 1 in. diam.

37. *Trichandra eugentifolia*, Hook. f. (*Sedirea eugentifolia*, Mez). Khasi hills, common. A shrub with scrambling horizontal branches, l. nearly glabrous, cordate-ovate, crenate, blade 6-10, pet. 1 in. long, veins very prominent beneath. Fl. 1 in. long, in short axillary branches, numerous, calyx and pedicel hairy, corolla campanulate, lobes shorter than tube, styles few in one horizontal line on the central placenta, berries bright red. Three other species in Assam and on the Khasi hills: 2. F. Griffithii, Clarke, 3. *erecta*, Clarke and 4. *Sedirea solanifolia*, Mez.

Hymenandra Wallichii, A. DC. (*Ardisia Hymenandra*, Wall. Pl. As. Bur. 1: 175). Upper Assam, Khasi hills, Cachar. A low stout, usually simple-stemmed shrub, l. glaucous, serrate, crenate, nearly sessile, 6-10 in. long, from a narrow base gradually widening upwards, sec. n. spinous, parallel, joined by distinct intra-marginal veins. Fl. pink, in rusty old umbels, several at the ends of short branches, supported by 2-4 floral l., umbels 2-3 in. diameter, l. pedicels 1½ in. long. Sepals and petals punctate, sep. short, pet. lanceolate, 1-1½ in. long, the right edge overlapping the rest. Anthers connate into a tube by broad membranous edges, which terminate in a long thin membranous appendix.

Amblyanthus glandulosus, A. DC. Khasi hills. A small glabrous shrub, l. glabrous, membranous, narrow-lanceolate, slightly dentate, teeth often glandular-reticulate, raised dots on the underside, often a belt of such dots along the edge, blue 5-7, narrowed into slender pet. 1-1½ in. long. Fl. minute, a cluster of small pedunculata umbels supported by 2-4 l. at the ends of long otherwise naked branchlets, peduncles slender 1-2 in. long, pedicels short. Buds obtuse, calyx and corolla punctate, corolla ½ in. long, segments obovate, emarginate, anthers connate by their edges into a tube, styles 3-4 in one line on the globose placenta. *Man. Myrsin. 110* adds 2 species, *A. pomifera*, Mez, Khasi hills and *A. scandiflora*, Mez, Assam.

5. ANTISTROPHE, A. DC.; Fl. Brit. Ind. iii. 531

Fl. bisexual, in sessile lateral umbels, pedicels slender. Calyx-lobes lanceolate, persistent. Corolla-lobes twisted in bud, the left edge overlapping. Anthers rostrate-connate. Ovaries 3-4, in one line around the globose placenta. Species 2.

1. *A. argentea*, Wall. Khasi Hills, Maler Pyngwala. A single stemmed shrub, with horizontal branches and very dark foliage. Lvs. ovate, glabrous, lanceolate, base 5-7, pet. slender 4-5, petals 4 in. long. Buds 5-6, sometimes sepals, petals and ovary glandular-tubed. 2. *A. serratifolia*, Hook. f. (*A. serrata* Hook. f. Bot. Beechey, Bot. Voy. III, 110). Young stems and l. beneath along the nerves rusty tomentose, l. sharply serrate, veins 4 in. long.

Andryanthopsis membranacea, Moench (*Andria membranacea*, Wall.). Khasi Hills, Chokri. A small almost herbaceous shrub, l. thinly veined, glabrous, lanceolate, venose, underside with numerous black glandular dots. Fl. small, in pedunculate axillary cymes, corolla-tube minute, enlarged at lobes (free, flattened, filament at base of anthers, very obtuse).

1. **AEGICERAS**, Gaertn., Fr. wit. Ind. III, 532.

A. majus, Gaertn. (probably the only species); Wight II, t. 149; Bedd. Man. t. 115. — Syn. *A. caroliniana*, Blume. Vern. Kutai, *Kantoh, Kallaha, Baga, Kanyala*, Mar.; *Betula*, Borneo.

A large evergreen glabrous shrub or small tree, gregarious, copious with dark grey, l. scattered, coriaceous, obovate, base 2-4, narrowed into pet. 1/2 in. long. Umbels many-fl. at the ends of branches usually naked below, with a few l. below the umbel, pedicels slender. Fl. white, fragrant, sepals and corolla-lobes twisted in bud, the right hand edge overlapping, corolla 1/2-1 in. long, lobes reflexed. Anther-cells transversely septate. Ovary numerous, in several tiers on the globose placenta. Fr. cylindrical, curved, acuminate, 1-2 in. long, seed one, same shape as fr., almost none. The seed germinates within the pericarp on the tree, sending down a long radicle.



FIG. 101.—*Aegiceras majus* Gaertn.

See coast and banks of tidal rivers, Sulu, Western Peninsula on both sides, Sulu-lan, Andaman, Borneo. Fl. Dec-May. See coast of tropical Asia, Australia and the South Pacific Islands. Most Murray, 47 describes a second species (*A. Scoblei*, Roon) or says it is from islands in the Pacific.

ORDER LXVIII. **SAPOTACEÆ**. Gen. Pl. ii. 650.

Tree, sometimes shrubs, scandent, usually alternate and coriaceous, stipules early caducous or none. Fl. bisexual, as a rule in axillary clusters, bracts and bracteoles minute or 0. Calyx persistent, segments 4-8, almost distinct, corolla-tube short, lobes 4-24. Stamens inserted on the tube, as many as corolla-lobes and opposite them, or 2-3 times as many; filaments usually shorter than anthers. Ovary free, 1-12-celled, style filiform or cylindrical, stigma paniculate, ovules solitary in each cell. Fr. a 1-8-seeded berry, seeds with a castaneous shining testa, oily, exalbuminous with large fleshy cotyledons or albuminous with fat cotyledons.

... which are ...

- A. Ovary 4-5-celled
 - I. Calyx segments 5, 6, 7, 8, and 9 ...
 - 1. *Sideroxylon*
 - 2. *Calceolaria*
 - II. ...
 - 3. *... ..*
 - 4. *... ..*
 - III. ...
 - 5. *... ..*
 - 6. *... ..*
- B. Ovary 1-2-celled ...
- C. Ovary ...

2. SIDEROXYLON, Lamour., Fl. Ind. Ind. 41, 1891.

... ..

A. II large, ...

- 1. *Sideroxylon*, ...
- 2. *... ..*

... ..

- 3. *... ..*
- 4. *... ..*

B. longepetala, Hook. & Arn. Bot. Beechey, 1846, p. 104. Fl. small, corolla less than 1/2 in. long, petals as long as or longer than anthers.

B. longepetala, King & Prins. Ann. Gall. Cal. 2: 411. Fl. small, corolla less than 1/2 in. long, petals as long as or longer than anthers.



FIG. 202. *Bidens ciliata* Johnston. B. & A.

King, F. B. L. 390. Andaman, Narthayan, Atayan Islands. A considerable tree, 10-20 ft. in height, in a primary forest. Fl. branches on anthers 1-4 in. long, petals as long as or longer than anthers.

B. ferruginea, Hook. & Arn. Bot. Beechey, 1846, p. 104. Fl. small, corolla less than 1/2 in. long, petals as long as or longer than anthers. Young stems, young leaves and pedicels rusty tomentose. Lvs. ovate, long petiole, from a woody base elliptic or obovate, 1-2 in. long, 1/2 in. wide. Petiole 1/2 in. long. *B. grandifolia*, Wall. Klatzke, Myrtol, hills between Badung and Sabang rivers. A large tree, 10-20 ft. in height, at the extremity of the tract, with large, elliptic, obovate leaves, 1-2 in. long, 1/2 in. wide. Fl. greenish, small, many together, the wood being the same as that of *B. ferruginea*.

B. O. umbellata, C. B. Clarke, Sukho, 1846, p. 104. A large tree, 10-20 ft. in height, in a primary forest. Fl. small, corolla less than 1/2 in. long, petals as long as or longer than anthers.

CHRYSOPHYLLUM, Linn., Fl. Linc. 1: 104, in 536.

Species 10, chiefly in tropical America.

C. Roxburghii, W. Dour. Beauv. Fl. Ind. 1: 234. The *Sida Apple*, Varr. *Indica*, Lamour. Mac. & Balf. Koenig, Bot. Bergey, Trav. Judo, 214.

A middle-sized, at times a large, evergreen tree, tree-like and often with dense, clothed with fine rusty hairs. Lvs. ovate, shining above, obscurely serrulate. Petiole 1/2 in. long, narrow and into a short petiole, very 2-pinnate, resembling *Colopodium*. Fl. small, greenish-white, in dense axillary cymes, 1/2 in. long, glabrous or rusty-pubescent, calyx 5-6 lobed, lobes broadly campanulate, 1/2 in. long, rounded, distinct, 2-5-lobed, villous. Berry rusty-tomentose when young, yellow when ripe, oblate, 6-8-ribbed, obscurely when fresh, sharply when dry. Seeds 2-4 compressed, testa coriaceous.

India, Khasi, 1846, Beauv. Western China, from 1846, Khasi, northward to Malay, Java, Ceylon, and Java, Khasi, India, and Java.

A. lutea *septica*, Linn., *Fl. Ind. Occid.*, 1758, p. 24. A very rare tree, occurring only in India on account of the smallness of the island. Fr. hairy tomentose, of the size of a walnut, shining black-lustrous, seeds 2, 2-angled, flattened, pale, embryo minute, cotyledons 2, separating the lanceolate 2-angled testa, containing the oil, in a few drops, equalled. Fr. 2-angled, more strongly rimmed, lobes, white with few hairs.

3. ISONANDRA, Wight: Fl. Brit. Ind. iii. 308.

L. alternate, coriaceous, glaucous. Fl. small, shortly pedicelled in small clusters, in more or less dense clusters, axillary or over the scars of fallen leaves, usually, rarely equal, corolla-tube short. Stamens 5, all perfect, mostly included. Ovary villous, 4-celled, style linear. Fr. ellipsoid, 1-seeded, embryo large, cotyledons flat, in fleshy albumen. Species 1, seen in the Sandwich Islands.

1. *I. lanceolata*, Wight Ic. t. 369 (1844); Trimen, *Handb. Ceylon* iii. 77. — Syn. *I. Wightiana*, A. DC. *Prodr.* tiii. 187 (1844); *I. culta*, Wight Ic. t. 369; *I. Canthioides*, Wight Ic. t. 1220; *I. Percettiioides*, Wight Ic. t. 1219.

A small or middle-sized tree, young shoots rusty-pubescent, L. very variable, from lanceolate to broadly and obtusely elliptic, blade 2-4, pet. 1/2 in. long, veinlet 6-10 pair, arching, prominent beneath, tertiary n. slender, numerous, transverse, finely reticulate. Calyx rusty-silky, corolla 1/2 in. long, lobes obtuse, often emarginate, stamens included, anthers often hairy, style exserted. Fr. 1/2 in. long, scarlet, seed hard, palish.

Western Ghats, above 1000 ft. from Coorg southwards, common on the Nilgiris, 20 March Aug. Dehra doon region. Five species of Fl. Brit. India are here placed together. Gombi, Indian Timbers Ed. II. 416, describes two species from the Nilgiris, but they are not well distinguished, which however in the forest he has made incorrectly to merge. The subject demands further study. 2. *I. Boissii* in B. Clarke, *Compos. Stocks*, not found by Talbot, *Fl. Ed. II.* 291. L. obovate-oblong, ovary n. hairy reticulate, n. transverse. Fl. sessile on short thick lateral spines.

3. *I. dipetala*, C. B. Clarke (*Dioscorea dipetala*, Wight Ic. t. 1226), an entirely unknown, imperfectly known species, probably from the Western Ghats. L. ovate-oblong, glaucous, spotted, petals 5, stamens 10-15 1-sectate.

4. PALAQUIUM, Blume: Trimen, *Handb. Ceylon* iii. 81.

Dichopsis, Thwaites: Fl. Brit. Ind. iii. 543.

Trees, fl. dentate, cal. segments in 2 series, the outer 3-5-lobed, the inner 5-lobed. Corolla-tube as a rule contorted in bud, stam. 12-15, in 2 or 3 rows on the one side, anthers extrorse or lateral, connective produced beyond anthers, antheriferous band. Ovary villous, 6-celled, style simple. Fr. fleshy, seed 1, cotyled. 2 large, oily, albumen 0.

A. Western species.

1. *P. ellipticum*, Benth. *Dichopsis*. — Syn. *Bauhin elliptica*, Dorr, *Botl. Fl. Sylv.* t. 43. Var. *trichantha*, Karst: *Kat. Illupei*, Tern.

A very tall tree, wood reddish-brown, durable, young shoots, pedicels and calyx minutely rusty-pubescent. L. approximate near the ends of branches elliptic or obovate-elliptic, blade 3-7, gradually narrowed into petiole 1/2 in. long. Fl. in axillary fascicles of 2-8, pedicels 1-1 1/2 in., calyx 1/2, corolla 1-1 1/2 in. long, filaments hairy. Fr. slices of pulpy, 1/2 in. long.

Western Ghats from North Kanara southwards, common in Waddar. Fl. in 2-3 whorls (inferior kind of *Dutta Partha*). 2. *P. Bourdillonii*, sp. nov. Tree very much green. Forests up to 4000 ft. A small tree, L. rigidly coriaceous, pale glaucous, lanceolate or obovate-elliptic, blade 5-7, narrowed into petiole 1/2 in. long, veinlet 6-10 pair, arching beneath, aided by intra-marginal veins, tertiary n. finely reticulate. Fl. in axillary fascicles, pedicels 1/2 in., sepals 1/2 in. long, lobes obtuse, the outer rusty-pubescent. Corolla glaucous outside, tube 1/2 in. long, lobes 1/2 in. long, lobes filaments rusty-hairy, connective obtuse.

B. Eastern species.

FIG. 104. *Drosera rotundifolia*, Bodd. 1.

glabrous, shining, ovate, blade 2-4, pet. $\frac{1}{2}$ in. Fl. σ in small rusty tomentose cymes with large long-ciliate bracts, cal. cylindrical, nearly truncate, corolla tubular, tomentose outside; γ solitary, calyx enlarged, truncate, l. oval-cylindrical, 1 by $\frac{1}{2}$ in., supported by the cup-shaped slightly enlarged calyx, albumen uniform.

Evergreen forests of the Western Ghats from the Konkan southwards. Fl. Jan.-March. Ceylon. Heartwood regularly streaked with black bands, wood of the latter the wood, the produce of *D. rotunda*. There a large tree of the high country of Ceylon.

D. rotunda in pedunculate panicles.

1. *D. paniculata*, Dalz.; Bodd. Ic. t. 105.

A middle-sized, at times a full tree, glabrous, except inflorescence. L. chartaceous or coriaceous, elliptic-oblong, blade 4-7, pet. broad $\frac{1}{2}$ in. long, closely reticulate raised veins between the sec. nerves, conspicuous on both surfaces. Fl. large, pentamerous, calyx of both sexes large with reflexed sides, corolla hairy. σ in long drooping bracteate pubescent panicle cymes; bracts large foliaceous, peduncle $1\frac{1}{2}$ in. long, stamens 20, glabrous in pairs, γ solitary, sometimes in pairs, on bracteate pedicels $\frac{1}{2}$ in. long. Fr. hairy white young, ovoid $1\frac{1}{2}$ in. long, supported by the enlarged leucaceous calyx.

Evergreen forests along the Western Ghats from the Konkan southwards. Common in Travancore. Fl. Dec.-March. Wood streaked with black.

2) Corolla of σ fl. hairy, l. hairy.

3. *D. pruriens*, Dalz.; Bodd. Ic. t. 105. Western Ghats from North Kanara southwards in evergreen forests, very common throughout the Wainad, Ceylon. A small or middle-sized tree, branchlets villous with long yellowish hairs, l. chartaceous, elliptic-oblong, 2-4 in. long when full grown, softly scabrous beneath, chiefly along midrib and sec. n., pet. short. Fl. 4- or 5-merous, calyx hairy on both sides, corolla



FIG. 495. — *Diospyros paniculata*, Walt.

1-1 1/2 in. long, densely silky outside, segments longer than tube. ♂ in the axils of the upper lvs., 2 together, stamens 14, glabrous, filaments on a fleshy torus, which surmounts the hairy ovary rudiment. Anthers unequal in length, the 5th longer ones (often variably connate) forming an inner circle. ♀ solitary, pedicels up to 1 in. long, ovary hairy. Fr. ovoid, 1-1 1/2 in. long, densely clothed with stiffening hairs; calyx scarcely enlarged.

6. *D. stricta*, Roxb. Sibth. Tipperah. A tall tree, trunk straight to the top, branchlets and petioles softly tomentose. Leaves more or less hairy, membranous, ovate-lanceolate, long-acuminate, blade 5-7, pet. 1/2 in. Fl. 4-merous, white, 2-3 small, in axillary hirsute branched cymes; calyx and corolla hirsute; stamens 14-16, glabrous, single, filaments as long as anthers. Fr. glabrous, ovoid, 1 1/2 in., on a stout stalk 1/2 in. long, supported by the small hairy 4-lobed calyx; albumen uniform.

(c) Corolla of ♂ fl. with lines of hairs along midrib of lobes, otherwise glabrous.

7. *D. Chloroxylon*, Roxb. Cor. Pl. t. 49. — Syn. *D. capitulata*, Wight Ic. 1. 1924 ♂, 1888 (bis) ♀. Vern. *Nensi*, *Niui*, *Mar*; *Ullingi*, *Ullenda*, *Vallada*, *Tel*.

A shrub or small tree, axillary spines and spinescent branches frequent, branchlets densely rusty-tomentose. L. thinly coriaceous, upper side pubescent, under side rusty-tomentose, elliptic or obovate, blade 1-2, pet. 1-1 1/2 in. long. Fl. very small, white, 4-merous, sessile or nearly so, calyx cleft nearly to the base, strigose outside with stiff hairs, ♂ in small axillary clusters of 6-10 fl., corolla 1/2-3/4 in. long, glabrous outside, except 4 longitudinal lines of stiff hairs, segments erect, stamens 16, in 2 rows, slightly connate at the base in pairs.

rather watery, $\frac{1}{2}$ to 1 in diam. Bark, cor. 10-20 grey, smooth, ex. grey-black. Fls. yellow, glabrous.

Species: *Diospyros*, *Stemodia* (Nees) and *Simonsia* (Nees) and *Indriopsis* (H. B. K.) *D. microphylla*, Boiss. *D. L.* 133. *Stemodia* (Nees) from North Kanara Southwards, *Stemodia* (Nees) from Malabar Palnadia and Kanyakumari. A large tree, containing 100-150 stems straight, but branched at base, branched above with large pithy lateral pith, sometimes, in wet woods 1-2 in. long with long soft hairs along midrib and very densely all over when young. Fl. small, mostly male, $\frac{1}{2}$ in diam. 8 or 10-12 solitary, flowers green, hairy along midrib and sides of segments, lobes or lobes, stem, etc. always 1% in pairs, filaments longer than the broad anthers. Corolla large, upper lobes of ovary pubescent. Fr. small, globose, $\frac{1}{2}$ to 1 in. diam. abundant.

D. Corolla of $\frac{1}{2}$ in. glabrous or slightly pubescent, striated in pairs, 1 glabrous present.

8 *D. montana*, Roxb. Cor. Pl. t. 18, Wight Ic. t. 125, — Syn. *D. cordifolia*, Roxb. Cor. Pl. t. 30; Wight III. t. 148. *Var. Hindustan* H. B. K.; *Tumbler*, Mar.; *India* *Mohli*, *Halla*, *Tavak*, *Tal.* *Lakshmi*, *Tam.* *Indrat*, *Chol.* *Burm.*

A large shrub or small tree, branchlets sometimes spinose. Branchlets and young leafy pubescent. L. litter Kanihal, thin, chartaceous, ovate-oblong, base rounded or cordate, blade 2-4, pet. slender, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, $\frac{1}{4}$ to $\frac{1}{2}$ pair slender. Fl. white, as a rule 4-nerous, $\frac{1}{2}$ in. velvety, shortly pedunculate or nearly sessile, usually 2-8-10; cyanes, with small bracts and bracteoles, pedicels shorter than calyx, buds conical, calyx deeply 4-5d, segments obtuse, recurv. on both sides. Corolla $\frac{1}{2}$ in. long, campanulate, outside glabrous or pubescent, lobes short, spreading. Anthers 16, slightly hairy, in 8 pairs, sessile, drooping on short pedicels, calyx-segments ovate $\frac{1}{2}$ in. long, corolla nearly glabrous outside, ovary glabrous. Fr. bitter, not edible, $\frac{1}{2}$ -1 in. diam. yellow when ripe, supported by the enlarged lobaceous calyx-lobes, albumen exiliform.



FIG. 105. *Diospyros Cochinchinensis*, Roxb. t. 1

Sp. Pl. 1000; tract from the East Indies. *R. putana* and the Southern *P. putana* N. & C. in the East Indies of India. Fl. Mar. 5-May. Many Archip. Tropical Australia. *V. putana* (Nees) in shape and habitus. A common form with cordate base, usually more pubescent, is by some botanists regarded as a distinct species (*D. cordifolia*). Another var. allied to *putana*, probably new, was found by Collett at Meiktila, Upper Burma. It rigidly chartaceous, with 8-12 pair, reticulate veins conspicuous on both surfaces, $\frac{1}{2}$ to $\frac{3}{4}$ in. long, in compact cyanes, corolla-lobes campanulate $\frac{1}{2}$ in. long. A second allied species with orange-colored petals a large shrubby small tree (Mou. Burm.) was by Schauer from Upper Burma, the $\frac{1}{2}$ cyanes, flowers producing a profusion of small hairy $\frac{1}{2}$ in. the piece of $\frac{1}{2}$.

10 *D. sylvatica*, Roxb. Cor. Pl. t. 47; Boiss. Ic. Pl. Ind. Gr. t. 121. Vern. *Dalla Gata*, Tel.; *Kaka saruli*, Kan.

A middle-sized, at times a large tree, branchlets nearly glabrous. L. chartaceous or thinly coriaceous, glabrous or slightly pubescent, elliptic, acuminate, blade 2-4, narrowed into petiole $\frac{1}{2}$ in. long (in coppice shoots much larger, $\frac{1}{2}$ to 1 in. long, but distinct). $\frac{1}{2}$ buds nearly globose, cyanes pedunculate, many-10, corolla white, nearly glabrous, arccolate, $\frac{1}{2}$ solitary, calyx similar to but larger than in $\frac{1}{2}$. Fr. globose, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., supported by the enlarged spreading lobaceous, often striate calyx-lobes, albumen ruminant.

Woods. Flowers, including both male and female, yellow. Fls. yellow, greenish white country. Fls. 3-5, with pale yellow, sometimes 1 pale yellow, sometimes 2 pale yellow, blades 4-6, pet. 1 long long, narrow, white, but somewhat tinged with blue. Fls. supported by the spreading pedicels, all segments all round the pedicel, has been collected in India (Himalayas) but the species mentioned under *D. sonchifolia* on p. 221 of his F. Fls. (and in the *Fl. Ind.* by the same author) (Gardner 1847).

(c) Corolla of ♂ fl. bilobous.

(1) *L. membranacea*.

12. *D. Lotus*, Lam.; Benth. F. Fl. t. 30. Vern. *lotka* Pers.

A middle-sized deciduous tree, branchlets and petioles of young fl. with scattered hairs. *L. membranacea*. Elliptic-oblong, acuminate, blade 3-5, pet. slender, 1 in. long, etc. n. *Lotus*, 6-8 pair, tertiary not raised on the secondary. *L. L.* closely and slightly, rather less. Fl. solitary or 2. ♂ fl. in small glabrous calyx similar in ♂ and ♀, lobed half-way down, slightly pubescent. Corolla glabrous outside, stem, etc. 10, anthers lanceolate, cuspidate, connective broad on both faces. ♀ solitary, slender hairy. Ovary globose, only hairy at apex. Fr. sweet, edible, globose or ovoid, 1-1/2 in. diam., dark purple when ripe, with a bluish bloom, supported by the enlarged flat calyx.

Woods. Asia, including in India, Himalayas, Khasi hills, the North West Himalayas, the Alps, etc. Cultivated on account of its fruit in the French and in the Mediterranean Regions. In the East, India, etc. W. Ind. I. 115. *Lotka* Pers. *Lotka* Khasi hills. Upper Himalayas, China and Japan, where numerous varieties are collected. Similar to 12. *Lotka* and *L. L.* are present in some cases. *L. L.* is probably a hybrid, deeply lobed, broadly silky, corolla lobes not raised on the secondary. *L. L.* is also a hybrid, stems 10-15 filaments and connective hairy. Fr. red or purple when ripe. The variety in Asia in China is much larger and fr. more water.

(2) *L. chalybeata* or *ochroleuca*.

13. *D. erebintha*, Wall. *Indica* Bern. *Indica* Ternstroem. A large tree with red with darker streaks. Reproductive and ♀ glabrous. *L. L.* is large, more or less, length when dry, elliptic-lance rounded, blade 3-15, petiole with 1 or 2 long, etc. in 12 pair, distinct, ascending under the edge. Fl. 4-5, solitary, very small, 6-8, globose, 1 in. diam. 13. *D. erebintha*, Wight *D. erebintha*, Benth. in Journ. Botany Soc. Ind. Soc. Ind. Khasi hills. *Chalybeata* Ternstroem *ochroleuca* Pers. 200 fl. *Chalybeata* Wight 1855, 1856. A small tree, branchlets with scattered, 1-2 hairs, etc. *Chalybeata*, blade 2-4, petiole glabrous except the hairy petiole and midrib, etc. *Chalybeata*, 17, white, 4 or 5-seeded, calyx divided nearly to the base, segments glabrous or sparsely hairy outside, glabrous inside, etc. *Chalybeata*, 18, 19, hairy, etc. corolla narrowly tubular, 1-1/2 in. long, segments 12-20, glabrous, etc. *Chalybeata*, 20, shorter than filaments, these separate in pairs, and may or may not be united at base into short tubes. Fr. short, brownish, etc. corolla ovoid, 1-1/2 in. long, etc. globose, 4-5-seeded. Fr. globose, 1-1/2 in. diam., calyx segments appressed, not enlarged in fr., slightly hairy outside. 16. *D. Topocia*, Har., Bodd. in t. 1225. *Syn. D. opocia*, Benth.; Wight in t. 416. Khasi hills, China, Chingay, Tinian hills (Bodd.). Corolla, red, etc. An evergreen middle-sized tree, branchlets glabrous, 1, etc. glabrous, elliptic-lanceolate, blade 1-8, pet. 1-1/2 in. closely reticulate raised veins conspicuous on both surfaces. Fl. white, tetramerous, long globose, glabrous, minutely tuberculate, the calyx completely closed in bud and expanding irregularly. ♀ in lax pedunculate cymes; corolla glabrous, corolla lobes ovoid-ovulate, teeth short, segments 8-10 in pairs, anthers linear, glabrous. ♀ sometimes 11 petals, ovary hairy. Fr. 1-1/2 in. diam., seeds 4, albumen cartilag.

B. Calyx of ♂ and ♀ dissimilar.

(a) Corolla of ♂ fl. 5-lobed, stamens single.

15. *D. melanoxylon*, Reab. Cor. Fl. t. 45.—*Syn. D. Wintinaea*, Wall., Bodd. Fl. Sylv. t. 67; *D. Abida*, Wall.; Wight in t. 1223; *D. ex-alpina*, Bodd. Fl. Sylv. t. 66 (probably). *The Ebony of Northern India*. Vern. *Trudu Abida* (the wood), Hind.; *Tuaru*, Gend.; *Timburu*, Mar.; *Timburu*, Tel.

A middle-sized deciduous tree attaining 50 ft. and 6 ft. in girth, bark dark

in the forest of Sumatra No. 11716. In *D. ovalifolia*, Wright, et al. Hill of the 17th century, should not be West's *D. ovata*. A plant, a middle-aged tree, heartwood streaked with black, trunk glabrous glaucous. Leaves ascending glaucous, glabrous elliptic, blade 1-5, pet. 1 in. sec. n. prominent beneath. Fl. cream-coloured, 2- or 5-merous, sessile in clusters of 2-8 in the axils of fallen l. 4 sometimes solitary, calyx pubescent, edges of segments obtuse, glands widely scattered. 2 cal. sep-shaped segments obtuse, glaucous inside, stamens 14-25, free, glabrous, anthers linear, tube 2-4 mm. longer than filaments. 2 cal. lobes to the base, densely pubescent within, very loosely webbed. Fr. glabrous, 2 in. diam., segments cylindrical, seeds 2, thick, reflexed, deeply imbricated on both sides, seed cavity 1/2 albumen uniform.

50. *D. Kurzii*, Hieron: *Andaman*. *Vulgate* or *Zebra wood*.

A large evergreen tree, bark grey, smooth, thin, heartwood streaked black and grey, branchlets, petioles and midrib beneath minutely pubescent. L. chartaceous, drying black, elliptic-oblong, serrulate, blade 2-3, pet. slender, 2-merous, sec. n. slender, numerous, close together. Fl. 2 only known, 4-5-merous in 2-8-fld. short-pedunged cymes, calyx nearly glabrous, corolla 4-5-lobed, velvety outside. Fr. 1/2 in. diam., albumen uniform.

Andamans, frequent. Similar. Core islands. Fl. May, June. 31. *D. Estheri*, Gilg & Clark. Tenasserim or Andamans, Cambodia. Branchlets pubescent, l. nearly glabrous, chartaceous, oblong, blade 4-6, pet. 1-1/2 in. long. Fl. 2 only known, sessile, 2- or 4 together in short-pedunged prothierous cymes, calyx divided to the base into 5 spreading lobes, velvety at back, cor. hairy outside 1/2 in. long.

III. Female fl. in many fld. compound cymes usually on the old wood.

51. *D. Brandiana*, Kurz. Evergreen forest on the hills between Yauvalin and Sapa river 2000 ft. also in the Tenasserim Range, Upper Burma. A middle-aged evergreen tree, l. thinly chartaceous, slightly pubescent beneath. Fl. white, long and 4- or 5-merous, in pedunculate cymes from axillary wood protuberances on the trunk or branches, pedicels longer than calyx. Calyx dark to the base, segments lanceolate cordate 1-1/2 in. long, strongly tubular, pubescent outside, tube about as long as tube. 51. *D. eximifera*, Roxb. *Composita* (Glabr.) Boiss. Wright 12, 1, and 2. Khasi hills, Tipperah. A large tree, l. thinly chartaceous, glabrous, shining, blade 4-8, pet. 1/2 in. sec. n. striking slender, but 4-fld. Fl. cream-coloured 5- or 6-merous, in dense compound cymes on the old branches, pedicels long-stalked, not longer than calyx. 2 calyx campanulate, thick cartaceous, like pedicels clothed with dark grey-coloured tomentum, teeth triangular, shorter than tube. Cor. 5 thick fleshy lobes, upper part 1-1/2 in. long, tomentose outside, corolla densely hairy. Fr. as large as an orange, on the thick tubular calyx, seeds 10-12 in a yellow elliptic pair. 52. *D. Burdickii*, sp. nova. Tenasserim evergreen forest below 1000 ft., common. A large tree, no black heartwood, youngest shoots arborescent with delicate hairs, woody when in the middle. L. glabrous, coriaceous, 1/2 in. long, short-acuminate, blade 2-4, pet. 1 in. long, nerves almost invisible. Fl. 5-merous, 2 shortly pedunged in short-pedunged axillary cymes, calyx distinct beyond the middle, segments long-tubular, obtuse-angled, imbricated, the edges, on the wood especially, very long, tube inside, glabrous inside, tube broad-expansate, 1-1/2 in. long, lobes spreading, 1/2 the length of tube, velvety on both surfaces. 2 on pedicels much longer than calyx in compound cymes on the old wood, calyx and corolla similar to 2, but slightly larger. Fr. 1/2 in. diam., supported by the hard woody pentagonal calyx 1/2-3/4 in. across, cells 8-10. This is the species mentioned in *Baldwin's Manual* 146 (near the Anamalai and Tenasserim Ghats).

53. *D. Burdickii*, Horn. Tenasserim (Kum) Malay Peninsula, Java. L. thickly coriaceous, glabrous, shining above, elongate-elliptic, blade 8-10, pet. 1/2 in. midrib vein and midrib very prominent beneath, impressed on the upper surface. Fl. both 5 and 7 in compound cymes, the 5 cymes large, up to 1 in. long. 54. *D. densiflora*, Wall. Lower Burma, rare (Kurz), similar, l. smaller, nerves elevated on the upper surface.

IV. Not sufficiently known to be classified.

A. branchlets and l. glabrous.

55. *D. varicosa*, Hieron. Mergui, Malay Peninsula. A shrub or small tree, branchlets glabrous, l. chartaceous, glabrous, upper-surface beneath when dry, elongate-elliptic acuminate, blade 2-4, pet. 1/2 in. Male fl. white, 4- or 5-merous calyx and corolla pubescent outside, bract a large foliaceous, calyx-tube ovate, acuminate, corolla slender, 1 in. long. 56. *D. exaltoides*, Kurz. Eastern slopes of Pegu Yoma. A middle-aged evergreen tree, leaflets hairy, branchlets glabrous, l. thickly cartaceous, glabrous, elongate-elliptic, blade 6-10, pet. 1/2 in. sec. n. joined by distinct inter-

with a series of nearly erect, C-shaped bracts, the lower ones being partly reflexed by the heavy calyx lobes. A. & Gussone, *Wald* 1: 124. *Tropaeum* Hill. A much branched shrub, bracts glabrous, glandular, sessile, 1-1½ in. long. Fl. solitary axillary or A. & Gussone, *Bull. Acad. Sci. Turin* 1840: 11. A small tree, shrubby glabrous, 1-2 in. long, fl. white, supracylindrical, 2 pairs of bracts on the smaller pedicels 1 in. long, solitary or 2 in one pedicel. Fr. spheroidal 1-1½ in. diam.

R. Fl. in axillary fascicles on short spikes or rays and over ½ in. long.

(a) L. octagona.

A. & Gussone, *Wald* 1: 124. *Nigella*. *Labiata*, *Nep.* 2014: 11. *Wald* 1: 124. A small tree, l. glabrous, serrate, sessile, blade 3-4, pet. 1-1½ in. Fl. in compound branched spikes, erect, persistent. Stamens 20-25, twice the length of anther. Pet. 1 in. long, covered by the broad ovary calyx-lobe. A. & Gussone, *Wald* 1: 124. *Tropaeum* Hill. A small tree, l. glabrous, serrate, sessile, blade 4-6, pet. 2-3 in. Fl. in axillary fascicles, solitary or 2 in one pedicel. Fr. spheroidal 1 in. long, solitary or 2 in one pedicel. Fr. spheroidal 1-1½ in. diam.

A. & Gussone, *Wald* 1: 124. *Nigella*. A densely branched shrub, l. glabrous, slightly serrate, sessile, blade 1-2, pet. 1-1½ in. Fl. in axillary fascicles, solitary or 2 in one pedicel. Fr. spheroidal 1 in. long, solitary or 2 in one pedicel. Fr. spheroidal 1-1½ in. diam.

(b) L. montanae or nearly so.

A. & Gussone, *Wald* 1: 124. *Nigella*. A small tree, l. glabrous, serrate, sessile, blade 3-4, pet. 1-1½ in. Fl. in axillary fascicles, solitary or 2 in one pedicel. Fr. spheroidal 1 in. long, solitary or 2 in one pedicel. Fr. spheroidal 1-1½ in. diam.

C. Racemes or spikes multicausal, over ½ in. long.

(a) Fl. white or yellow, A. octagona.

(b) Fr. oval or cylindrical, less than 1 in. long.

(c) Fr. glabrous, L. more than 3 in. long.

10. *S. racemosa*, *Blak.*: *Vern. Lath.*, *Hilb.*: *Labiata*, *Burm.*

A small evergreen tree, bark thick, spongy. L. glabrous, serrate, elliptic-lanceolate, obscurely crenate, blade 4-6, pet. 1-1½ in. Fl. yellow, fragrant, in simple hairy axillary more or less lax racemes, pedicels as long as calyx-tube, stamens about 100. Fr. cylindrical, nearly ½ in. long.

S. racemosa var. *blakii* (Blak.) Hutch. & Dalziel, *Fl. Ceylon* 1: 100. A small tree, bark thick, spongy. L. glabrous, serrate, elliptic-lanceolate, obscurely crenate, blade 4-6, pet. 1-1½ in. Fl. yellow, fragrant, in simple hairy axillary more or less lax racemes, pedicels as long as calyx-tube, stamens about 100. Fr. cylindrical, nearly ½ in. long.

S. racemosa, *Blak.*: *Vern. Lath.*, *Hilb.*: *Labiata*, *Burm.*

connate in 5 bundles, ovary 2-celled. Fr. glabrous, smooth or nearly glabrous, $\frac{1}{2}$ in. long, calyx-tube small, much narrower than fr., embryo curved.

Himalaya, Kashmir to Assam 3-8000 ft. Khasi and Naga hills. Hill forests of Szechuan and Salween Upper Burma. Fl. March-June. Yellow dye from fr. and bark China, Japan.

88. *S. spicata*, Roxb.; Wight Ill. t. 150; Kurz F. Fl. ii. 145; Brandis F. Fl. 300. Vern. *Looh*, Hind.; *Dhaha*, Mar.

A middle-sized tree, l. coriaceous, glabrous, acuminata, serrulate, buds 4-7, pedicel $\frac{1}{2}$ in. Fl. cream-coloured, sessile, in paniculate axillary pubescent or glabrous spikes, each fl. supported by 3 ovate bracts, ovary 3-celled, glabrous, as well as calyx-segments. Drupe sessile, nearly globose, ribbed, $\frac{1}{2}$ in. diam.

Assam, Khasi hills, Cachar, Chittagong, all tracts, Tenasserim, Western Ghats, Nilgiris, Shavany hills. Fl. Sept.-Dec. Malay Peninsula, China, Japan. A remarkable form (Thunberg in D. B. 1807) with entire, thickly coriaceous l. see fl. indistinct, probably a new species. Brandis, in his separate *S. attenuata*, Wall., Assam and Khasi hills, by smaller l. and more strictly globose fr. and *S. Oudotiana*, Vong and Atampala by more pubescent inflorescences, larger bracts and a straight embryo. D. B. ferruginous, Roxb. (including *S. polytricha*, Wall. and *jacquese*, Kurz). Gatal, Kanton, Sikkim (4-6000 ft.), China. A small tree, branchlets rusty-villous, l. hairy on the nerves beneath, buds 6-8, pet. $\frac{1}{2}$ in., sep. n. 10-12 pair, prominent on the underside, fl. sessile in large compound axillary rusty-villous panicles, bracts longer than the short calyx-tube. Fr. globose, ribbed, $\frac{1}{2}$ in. diam., crowned by the enlarged calyx-segments.

(b) Fr. cylindrical, ellipsoid or conical.

89. *S. thasactis*, Lam. Kumaon, Nepal, Sikkim, 3-10000 ft. Assam, Khasi hills. A middle-sized tree, l. glabrous, buds 3-6, pet. $\frac{1}{2}$ in., midrib raised, not impressed on the upper side. Fl. white, sessile in short dense compound spikes, $\frac{1}{2}$ in. long, stamens 10-20, a little longer than corolla, disk densely clothed with long white hairs. Fr. ellipsoid-cylindrical, $\frac{1}{2}$ in. long, umbels straight, calyx in fr. inconspicuous. Specimens with larger l. buds 8, pet. $\frac{1}{2}$ in. Hills east of Tongpoo 2000 ft. D. B. Feb. 1867. 90. *S. Kurziana*, W. & A. Comp. Singular young seeds rusty-tomentose. l. hairy beneath, midrib impressed, spikes compound, 2-3 in. long. 91. *S. Warburgii*, Wight l. c. 64. Nilgiris, stamens 25, twice the corolla otherwise like 10 just seen. 92. *S. oxyphylla*, Wall. (*S. pedicellate*, Kurz) Assam, Khasi hills. Forest east of Tongpoo. A large evergreen tree, l. elliptic-lanceolate, buds 4-6, pet. $\frac{1}{2}$ in., sep. n. slender, 17 pair, veined by intranervial veins. Fl. strictly pedicellate, in racemes, dimorphous branching from near the base, fr. terminal, $\frac{1}{2}$ in. long.

II. Calyx-tube produced beyond ovary, petals connate into a tube, on which are inserted the stamens. L. glabrous.

93. *S. sessile*, Hook. Travancore evergreen forest 4-5000 ft. A middle-sized tree, branchlets l. $\frac{1}{2}$ in. Fl. sessile, solitary, corolla $\frac{1}{2}$ in. long, fr. cylindrical $\frac{1}{2}$ in. long. 94. *S. pendula*, Wight l. c. 1237. Annual at the Pahn hills (Ceylon upper mountains). 95. *S. Thomsonii* (*S. parviflora*, Wight). A shrub or small tree, l. coriaceous, elliptic, 1-2 in. long, pet. beneath. Fl. pendulous, fr. from the axils of fallen l. on 1-500, pedicels with numerous minute persistent bracts, corolla $\frac{1}{2}$ in. long.

2. STYRAX, Lam. - F. Ind. III. 588.

Hairs often setose, fl. white. Calyx campanulate, free or slightly adnate to base of ovary, truncate or 5-toothed. Corolla-tube short. Stamens 10 inserted in the corolla-tube, filaments short, anthers linear. Ovary incompletely 2-celled, the dissepiments reaching to the middle. Fr. dry, supported by the persistent calyx-tube, breaking up irregularly. Seed 1, rarely 2, embryo straight, cotyledons flat. Species 9, America, China, Japan, India.

1. *S. serrulatum*, Roxb. - Kurz F. Fl. ii. 142. Vern. *Shigriti*, Assam.

A shrub or small tree, l. serrulate, young shoots and under side of leaves tomentose pubescent, inflorescence, calyx and outside of petals densely white stellately tomentose. Fl. mostly in short racemes, corolla $\frac{1}{2}$ in. long. Calyx near truncates with minute teeth.

about 1000. Male cones 1-2 dm. long. Female cones 1-2 dm. long. Bark 1-2 mm. thick. Wood 1-2 dm. long. Leaves 1-2 dm. long. Flowers 1-2 dm. long. Fruits 1-2 dm. long. Seeds 1-2 dm. long. The wood is 1-2 dm. long. The bark is 1-2 mm. thick. The leaves are 1-2 dm. long. The flowers are 1-2 dm. long. The fruits are 1-2 dm. long. The seeds are 1-2 dm. long. The wood is 1-2 dm. long. The bark is 1-2 mm. thick. The leaves are 1-2 dm. long. The flowers are 1-2 dm. long. The fruits are 1-2 dm. long. The seeds are 1-2 dm. long.

A. polyperum (Vahl) K. in 1810, bears like small glabrous inflorescence of *Parlatia* (L.) B. & C. wood, possibly does not belong to this genus.

Order LXXI. OLEACEÆ. Gen. Pl. ii, 672.

Unbranched shrubs or trees, sometimes climbing. Leaves opposite, alternate, or a few species of *As. sinensis*, stipules or inflorescence mostly racemose, rarely spicate, or trichotomous panicles. Fl. regular, axillary, bisexual, rarely dioecious. Calyx small, truncate, or 4-lobed, lobes sometimes 4-5. Petals 4, lobes usually 4, sometimes 4-12, in some cases petals distinct or fused. Stamens 2, filaments usually short, anthers five, 2-ribbed, awles 1-2 in each cell, attached to the inner angle.

The climbing species of *As. sinensis* has a woody stem of a small diameter, but the wood is 1-2 dm. long, and in some cases colored, but intrinsically the wood.

- 1. Usually green or glaucous, lvs. pubescent, serrated.
- 2. Bark grey, becoming white age, with 2-3 lvs. 1-2 dm. long.
- 3. Bark grey, becoming white age, with 2-3 lvs. 1-2 dm. long.
- 4. Bark grey, becoming white age, with 2-3 lvs. 1-2 dm. long.
- 5. Bark grey, becoming white age, with 2-3 lvs. 1-2 dm. long.
- 6. Bark grey, becoming white age, with 2-3 lvs. 1-2 dm. long.
- 7. Bark grey, becoming white age, with 2-3 lvs. 1-2 dm. long.
- 8. Bark grey, becoming white age, with 2-3 lvs. 1-2 dm. long.
- 9. Bark grey, becoming white age, with 2-3 lvs. 1-2 dm. long.
- 10. Bark grey, becoming white age, with 2-3 lvs. 1-2 dm. long.

1. NYCTANTHES, Linn. & H. Brit. Ind. iii, 673.

1. *N. Arborvitæ*. Linn. (the only species) H. Brit. Ind. iii, 673. Vern. *Ilav*, *Silvan*, *Sulac*, *Havilapana* Kunt. Hind. *Alorasi*, *Mot*, *Huning*, *Paripota*, *Ras*, *Kivati*, *Toli*, *Sady da*, *Jurn*.

A large deciduous shrub or small tree, branches quadrangular, rough all over, with an uneven epidermis and stiff white hairs. Lvs. ovate, acuminate, entire, or with a few large distant teeth. Fl. sessile, in pedunculate branched fascicles of 4-5 arranged in short trichotomous cymes. Calyx campanulate, indistinctly dentate, 5-lobed, lobes 5-8, white, crenate or emarginate, persistent in bud. Anthers sessile in the orange-colored anther tube. Capsule chartaceous, flat, splitting into two 1-seeded cells, cotyledons flat, radicle inferior, straight.

Nyctanthus yanthus, from the Chinese with variety *Qua*, *Ferula*, *Singha*, *Centra*

found in the same collection as *Fraxinus* (L.) in 1840, in the same place of origin. D. B. S. from the Dnieper, 1840, but slightly larger leaves and by longer more slender petioles. Described as *F. hirsuta*, Wiegand in *Kortze*, *Botch.* 1: 179. *F. sargyana*, M. J. Sch. *Hort. Bot. Afghanistan*, *Verh. Bot. Gart. Berlin* 1: 4 (1847), contrary to the common view, referred to both taxa.

3. *F. xanthoxyloides*, Wall. Syn. *F. macrostachya*, Brandegee, *Bot. Beech.* 1: 304. Vern. *Sargy*, Pany, *Bushes*, Haz. *Tadsh*, Kuzavara.

A shrub or small tree. L. approximate at the ends of branchlets, very variable in size, leaflets 3-5 pair, 1-2 in. long, sessile or nearly so, rounded to the margins. Fl. in compact sessile lateral many-fl. racemes, supported by a number of undeveloped woody l. calyx cup-shaped, 4-6-lobed. Stamens linear-spathulate, 1-1.5 in. long, basal part thick, ribbed and narrowed at the tip, supported by the persistent but not enlarged calyx.

Afghanistan, Helmand, Tash, India territory, N. W. Himalaya, 1840, D. B. S. in the same collection. *Open grasslands*, 18. March, April.

8. SCHREBERA, Boiss. *Fl. Ind. Ind.* III: 611.

Species 1, of which 3 in Africa.

S. swietenoides, Boiss. *Exc. P.* 1: 201; Wight III: 162; *Bull. Fl. Sylv.* 1: 248. Vern. *Bolha*, *Shut*, *Hull*, *Mokodaj*, *Tel.*, *Kulquata*, *Kan*, *Mogallaga*, *Tam.*; *Tithus*, *luc.*, *Bann*.



Fig. 10. *Schrebera swietenoides*, Boiss. 1.

A middle-sized deciduous tree, branches grey. L. unarticulate, leaflets opposite 3-4 pair ovate, base often cuneate, veins blade 3-5 pair. The branchlets thickened at nodes and between pairs, thickened at the insertion

J. indica V. Fl. yellowish-brown. Bark and stem light brown, smooth. Leaves glaucous on the upper surface, glaucous or reddish on the lower surface. Inflorescence terminal, cymose, many-flowered. Corolla 1-2 cm. long, lobes 5-7 on the upper side with 10-15 brown glandular raised dots. Capsule 5-6 cm. long, pear-shaped, 2-3 cm. long, 2-valved, seeds 8, 8-10 mm. long, surface glaucous. Radicle short, superior, ovoid, cotyledons fleshy, longitudinally divided.

Subfamily of trees from Himalayas and Java. Central India, Rajasthan, Western Ghats, Burma, Borneo and Java. Fl. Aug-April.

4. SYRINGA, Lamour. Fl. Brit. Ind. III, 124.

Leaves opposite, usually deciduous. Fl. numerous in a terminal cyme or cymes. Calyx campanulate, 4-5-lobed, more or less persistent. Corolla lobes 4, calyx often included. Fr. a cylindrical fruit or berry, cylindrical capsule, 2-valved, the valves separating. Seeds papulous, one pair from the apex, each cell with a mucous covering all round. Embryo straight in a fleshy albumen radicle superior. Species 10, Europe, Western Asia, Himalaya, China and Japan.

7. *S. Emodii* Wall., Royle III, t. 66. Vera, Szechuan, Szechuan, China, Przewalski, Japan.

A large shrub, youngest shoots and inflorescence pubescent. Leaves pale beneath, blade 5-7 pet. 1 in. long. Fls. white or purplish, strongly scented, crowded in short compact cymes. Capsule cylindrical, 1 in. long, often curved.

T. indica (1891) p. N. W. Himalaya, Japan, India, Burma, in the temperate zone as well as in the inner zone and tropics. Fl. Mar-July. 2-3 petals. Leaves, entire when in Burma, Afghanistan and West India, serrated in Kashmir and at Jammu. Woodless, entire or punctate, capsule 1-1.5 long. 2-3-ovulate. S. Eastern Europe. 1 broadly ovate or cordate, long leafy.

5. OSMANTHUS, Lamour. Fl. Brit. Ind. III, 496.

Evergreen shrubs or trees, glaucous, l. coriaceous, fl. tetramerous, usually polygamous, in axillary leafy bracts. Corolla lobes obtuse, imbricated 12-16 lobed. Drupe usually unseeded, albumen fleshy or bony, embryo cylindrical, radicle superior. Species 10-15, Eastern Himalaya, China, Japan, New Caledonia, the Sandwich Islands, Eastern North America.

1. *O. fragrans*, Lamour. Fl. Brit. Ind. III, 496. Himalaya from the Himalayas 5-7,000 ft. in Garo hills and Khasi hills, mostly near the mountains, throughout China, Japan. A shrubby tree 1-2 m. tall, leaves glaucous, entire or serrated, 10-15 cm. long and 4-6 cm. wide, stipules 1-2 cm. long, pressed in the axils. Inflorescence terminal, 2-3 in. long, light red or pink, 1-2 m. long, 1-2 m. wide, 1-2 m. long, 1-2 m. wide. Drupe 1-2 cm. long, 1-2 cm. wide, 1-2 cm. long, 1-2 cm. wide. A small tree 1-2 m. tall, leaves glaucous, entire or serrated, 10-15 cm. long and 4-6 cm. wide, stipules 1-2 cm. long, pressed in the axils. Inflorescence terminal, 2-3 in. long, light red or pink, 1-2 m. long, 1-2 m. wide, 1-2 m. long, 1-2 m. wide.

6. OLEA, Lamour. Fl. Brit. Ind. III, 611.

Tree or shrub. Leaves entire or toothed. Fl. small, often subspherical, tetramerous, in axillary or terminal panicles. Calyx short, truncate or dentate. Corolla lobes short, lobes spreading, valvate to half-stamens exerted, style short, stigma 2-lobed or bifid. Fruit a fleshy drupe, endocarp usually hard. Seed usually one, albumen fleshy, oil. Embryo straight, ovoid, cotyledons radicle superior. Species 20-30, South Africa, India, Australia and Polynesia.

A. All with corolla.

1. *O. cuspidata*, Wall., Royle III, t. 65. Vera, Zaiton, Przewalski, Korea, India, S.W. India, 10, Malabar.

A middle-sized to a large tree, often nearly black, often beautifully marked, extremely hard. L. lanceolate, cuspidate, entire, the upper surface glossy green, the under side, as well as branchlets and petioles clothed with a dense ferruginous or red, sometimes grey film of minute orbicular or reniform lobed scales, midrib prominent, sec. n. obscure, blade 2-4, pet. 1-2 in. long. Fl. whitish, bisexual, in axillary panicles, about half the length of L. Corolla rotate, lobes ovate, acute. Drupe oval, 1-2 in. long, black when ripe, supported by the remains of calyx, pulp scanty, oily, stone thick, hard, bony.

Palenchotha. A'chulstan. Sulaiman range, Trans India. North West Himalayas ascending to 6,000 ft., also in the deep inner valleys. Fl. April-June. Common near the wood. Closely allied to *Olea integrata*, Linn. Also *Escarpus* G. Don, which the suggested tree has quite short branchlets, leaves green above, white beneath, a more dense pubescence and larger fruit.

2. *O. glandulifera*, Wall.; Wight Is., t. 1298; Bodd. Fl. cycl. t. 208. Vern. *Gair*, *Gaili*, Jamsar, Gachwal.

A small or middle-sized wholly glabrous tree, trunk short, with a broad



Fig. 159. *Olea glandulifera*, Wall. 1

umbrous crown, wood reddish, close-grained, hard. L. elliptic or ovate, long acuminate, sec. n. 6-8 pair, in their axils on the dorsalside small oval cavities, blade 4-5, petiole 1-1½ in. long. Fl. white, bisexual, in terminal and lateral compound pyramidal trichotomous panicles, corolla rotate. Fr. oval, ½ in. long, endocarp crustaceous.

Outer Himalayan ranges, Kachhar in Nepal 1200-6000 ft., scattered in mixed woods, often associated with *Azadirachta*. Batabuduh Hills, Coorg. Nilgiris, Anamalai, Fl. March-May. 3. *O. dentata*, Wall. Mishme and Khazi hills. Hills of Lushai and Upper Burma. Branchlets and panicles more or less pubescent, L. coriaceous, entire or entire, lanceolate, blade 6-7, pet. 2 in. long. Fl. dioecious in panicles as long as or longer than L. calyx hairy, corolla 1 in. long. 4. A large climber (Clarke 1207 Manipur 6500 ft., Nov. 1893). Fr. coriaceous, lanceolate, caudate-acuminate, blade 5-6

... ..

L. Marshalliana, Wall. -

B. D.

L.

LINOCIERA

Tree or shrub, rarely climbing,

L.

L. intermedia, Wight

... ..

... ..

B. Pet.

L.

JASMINUM, Herb.: Fl. Ind. Ind. 591.

Species of *Jasminum* are climbing, prostrate, shrubby, or subshrub-like plants, mostly with opposite, alternate, or whorled leaves, frequently serrate, and the flowers, usually small, tubular, and often fragrant. Calyx 5-toothed, 4-5-lobed, or 5-lobed, white, or yellow, lobes 4-7, anthers in 2 rows, about middle. Style cylindrical, frequently 2-lobed, with 2-lobed ovary, having a long, slender style. Stamens 2, linear, anthers 2 in each cell. Rays of 2-lobed ovary distinct, 4-angled, sometimes deeply lobed. Abundant in warm regions of America and near South Europe.

J. officinale, simple, calyx pubescent.
Calyx 5-toothed, in 4-5 rows the length of tube or longer.

J. Sambac, Willd.: Wight, Ind. 1: 204. Vahl, Bot. Bergen, China, Herb. Marten, Kunz, Nels, Burma.

A shrub or tree, or low climbing, beautiful, and of the perfume of the flower. Leaves alternate, elliptical, glabrous, or finely hairy, with serrate margins, sometimes serrate. Calyx 5-toothed, hairy, 4-5 lobed, or 5-lobed, lobes 4-7, anthers in 2 rows, about middle. Style cylindrical, frequently 2-lobed, with 2-lobed ovary, having a long, slender style. Stamens 2, linear, anthers 2 in each cell. Rays of 2-lobed ovary distinct, 4-angled, sometimes deeply lobed. Abundant in warm regions of America and near South Europe.

J. pubescens, Willd.: Sp. Pl. Indica, Willd.: Wight, Ind. 1: 204. Burser, Fl. Ind. 1: 212. *J. hortense*, Wight, Ind. 1: 204. Vahl, Bot. Bergen, China, Herb. Marten, Kunz, Nels, Burma.

A shrub or tree, or low climbing, beautiful, and of the perfume of the flower. Leaves alternate, elliptical, glabrous, or finely hairy, with serrate margins, sometimes serrate. Calyx 5-toothed, hairy, 4-5 lobed, or 5-lobed, lobes 4-7, anthers in 2 rows, about middle. Style cylindrical, frequently 2-lobed, with 2-lobed ovary, having a long, slender style. Stamens 2, linear, anthers 2 in each cell. Rays of 2-lobed ovary distinct, 4-angled, sometimes deeply lobed. Abundant in warm regions of America and near South Europe.

J. pubescens, Willd.: Sp. Pl. Indica, Willd.: Wight, Ind. 1: 204. Burser, Fl. Ind. 1: 212. *J. hortense*, Wight, Ind. 1: 204. Vahl, Bot. Bergen, China, Herb. Marten, Kunz, Nels, Burma.

A shrub or tree, or low climbing, beautiful, and of the perfume of the flower. Leaves alternate, elliptical, glabrous, or finely hairy, with serrate margins, sometimes serrate. Calyx 5-toothed, hairy, 4-5 lobed, or 5-lobed, lobes 4-7, anthers in 2 rows, about middle. Style cylindrical, frequently 2-lobed, with 2-lobed ovary, having a long, slender style. Stamens 2, linear, anthers 2 in each cell. Rays of 2-lobed ovary distinct, 4-angled, sometimes deeply lobed. Abundant in warm regions of America and near South Europe.

J. elliptica, Wall. Pl. Art. Bot. 1: 175. Described from the fruit and seeds, collected by J. G. Smith, in the mountains of the island of Java, near the city of Batavia, in the year 1795.

J. elliptica, Wall. Pl. Art. Bot. 1: 175.

J. elliptica, Wall. Pl. Art. Bot. 1: 175. Described from the fruit and seeds, collected by J. G. Smith, in the mountains of the island of Java, near the city of Batavia, in the year 1795. The fruit is elliptical, and the seeds are small, and the tree is a small tree, with a trunk that is 10 feet high, and the leaves are elliptical, and the flowers are small, and the fruit is elliptical, and the seeds are small.

J. elliptica, Wall. Pl. Art. Bot. 1: 175.

J. elliptica, Wall. Pl. Art. Bot. 1: 175.

A large, upright, bushy, woody tree, with a trunk that is 10 feet high, and the leaves are elliptical, and the flowers are small, and the fruit is elliptical, and the seeds are small.

At Sumatra, Java, and the island of Java, near the city of Batavia, in the year 1795. The fruit is elliptical, and the seeds are small, and the tree is a small tree, with a trunk that is 10 feet high, and the leaves are elliptical, and the flowers are small, and the fruit is elliptical, and the seeds are small.

J. grandiflora, Wall. Pl. Art. Bot. 1: 175. Described from the fruit and seeds, collected by J. G. Smith, in the mountains of the island of Java, near the city of Batavia, in the year 1795. The fruit is elliptical, and the seeds are small, and the tree is a small tree, with a trunk that is 10 feet high, and the leaves are elliptical, and the flowers are small, and the fruit is elliptical, and the seeds are small.

J. grandiflora, Wall. Pl. Art. Bot. 1: 175.

J. grandiflora, Wall. Pl. Art. Bot. 1: 175. Described from the fruit and seeds, collected by J. G. Smith, in the mountains of the island of Java, near the city of Batavia, in the year 1795. The fruit is elliptical, and the seeds are small, and the tree is a small tree, with a trunk that is 10 feet high, and the leaves are elliptical, and the flowers are small, and the fruit is elliptical, and the seeds are small.

J. grandiflora, Wall. Pl. Art. Bot. 1: 175.

J. grandiflora, Wall. Pl. Art. Bot. 1: 175.

An erect, 10 ft. shrubby glabrous shrub, occasionally a small tree, branched at the top. L. elliptical, opposite, leaflets opposite, 1-2 in. long, fl. yellow, fragrant, in short terminal racemes, pedicels long, the only, only a little longer than tube, corolla lobes 5, broad, ovate, the longest shorter than tube. Fruit didymous, berries 2-3.

Sumatra, Java, and the island of Java, near the city of Batavia, in the year 1795. The fruit is elliptical, and the seeds are small, and the tree is a small tree, with a trunk that is 10 feet high, and the leaves are elliptical, and the flowers are small, and the fruit is elliptical, and the seeds are small.

Maximiliana, Wall. Pl. Art. Bot. 1: 175. Described from the fruit and seeds, collected by J. G. Smith, in the mountains of the island of Java, near the city of Batavia, in the year 1795. The fruit is elliptical, and the seeds are small, and the tree is a small tree, with a trunk that is 10 feet high, and the leaves are elliptical, and the flowers are small, and the fruit is elliptical, and the seeds are small.

In flowering and fruiting stages the plants are prostrate or decumbent. The leaves are opposite, ovate to elliptic, with serrated margins. The flowers are small, tubular, and the fruit is a capsule. The plant is native to the mountains of the Sierra de Guadalupe, near the town of San Mateo, Pinar del Rio, and is also found in the mountains of the Sierra de Escambray, near the town of Sagua. The plant is used as a medicinal herb, and is said to be effective against various ailments.

Order LXXIII. APOCYNACEÆ. Gen. Pl. p. 681

Tree, shrub, or climbing, rarely perennial herbs, with frequently milky latex. Leaves opposite, ovate to elliptic, with serrated margins, veins small, glandular, intravascular, punctate. Flowers tubular, usually pentamerous. Calyx five-lobed, usually nearly or quite to the base into 5 segments, usually generally imbricate in bud. Corolla hypogynous, campanulate, lobes 5, spreading, usually contorted, rarely reflexed, throat often hairy or clothed with a dense mat of hairs. Stamens 5, alternating with or inserted in the lobes, filaments usually short. Ovary of 2 carpels, 2-cell or with style or 1-celled, with parietal placentae. Style often with a row of hairs, usually with a very allanated, suberose stratum.

The smaller families of the order are: *Asclepiadaceae*, *Apocynaceae*, *Convolvulaceae*, *Loganiaceae*, *Moraceae*, *Passifloraceae*, *Previaceae*, *Rubiaceae*, *Sapotaceae*, *Simarubaceae*, *Sonchaceae*, *Urticaceae*, *Violaceae*, and *Zygocarpaceae*. The order is characterized by the presence of a milky latex, which is contained in specialized cells in the pith and bark, and in the vascular tissue in the bark. The wood of several species yields a milky latex. In many cases the plants in the wood are highly arranged in layers or sheets of radial lines. Many of the plants in the order are used as medicinal plants, and some are highly valued for their medicinal properties. The order is one of the largest and most diverse in the plant kingdom.

- I. Anthers 2, parallel, at 12 o'clock. Carpel 2, ovary 2-lobed, ovary 2-lobed, ovary 2-lobed.
 - A. Ovary 2-lobed, glabrous in the throat.
 - 1. *Asclepias*
 - 2. *Asclepias*
 - 3. *Asclepias*
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C. macrophylla, Wall. (Linn. Bot. Beecham, Fl. Ind. Brit. Ind. 3: 1824, t. 1, f. 10).
C. macrophylla, A. DC. (Wieg. Fl. Ind. 3: 1824, t. 1, f. 10). Small stem, 1-2
 feet high, with a few pubescent, and white tinged with pink, flowers
 in leaf.

B. Spines derived.

C. macrophylla, Wall. (Linn. Bot. Beecham, Fl. Ind. Brit. Ind. 3: 1824, t. 1, f. 10).
 In Tisserand's large work, *Plantes Indes*, fig. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

2. MELODINUS, Forst. Fl. Brit. Ind. 3: 1824.

Stems erect or climbing shrubs. Corolla salver-shaped, usually 5-lobed
 with more or less lobed scales, but lobes and scales overlapping. Anther
 included, on very short filament, cells base of the base. Ovary 2-lobed,
 styles 2, cordate & placental. Fr. globose, perispermic, seeds 4, often
 included in pulp, cotyledons thin flat, in fleshy albumen.

M. magnus, Hook. & Wieg. Fl. Ind. 3: 1824, t. 1, f. 10. Small tree, 10-15
 feet high, with a few pubescent, and white tinged with pink, flowers
 in leaf. Fr. globose, perispermic, seeds 4, often included in pulp, cotyledons
 thin flat, in fleshy albumen.

M. magnus, Hook. & Wieg. Fl. Ind. 3: 1824, t. 1, f. 10. Small tree, 10-15
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M. magnus, Hook. & Wieg. Fl. Ind. 3: 1824, t. 1, f. 10. Small tree, 10-15
 feet high, with a few pubescent, and white tinged with pink, flowers
 in leaf. Fr. globose, perispermic, seeds 4, often included in pulp, cotyledons
 thin flat, in fleshy albumen.

M. magnus, Hook. & Wieg. Fl. Ind. 3: 1824, t. 1, f. 10. Small tree, 10-15
 feet high, with a few pubescent, and white tinged with pink, flowers
 in leaf. Fr. globose, perispermic, seeds 4, often included in pulp, cotyledons
 thin flat, in fleshy albumen.

3. RAUWOLFIA, Desf. Fl. Brit. Ind. 3: 1824.

Glabrous shrubs, usually 3-4-nately whorled. Pedicels in the axils of
 the upper stl. Calyx 5-lobed. Corolla salver-shaped, tube hairy & thin, lobes
 for the anthers, the cells of which are rounded at the base. Disk large, 5-lobed,
 shaped or annular, with 5 lobes. Carpels 2, distinct, or annular, rounded
 collateral in each carpel. Fr. of 2 rounded or diam. 1-4-seeded drupe, with

11. *Conchocladia* (Wight) Hook. & Thoms. *Conchocladia* Wight, *Bot. Beechey*, p. 107, t. 1, f. 10. *Conchocladia* Wight, *Bot. Beechey*, p. 107, t. 1, f. 10. *Conchocladia* Wight, *Bot. Beechey*, p. 107, t. 1, f. 10.

12. *Conchocladia* (Wight) Hook. & Thoms.

Conchocladia (Wight) Hook. & Thoms. *Conchocladia* Wight, *Bot. Beechey*, p. 107, t. 1, f. 10. *Conchocladia* Wight, *Bot. Beechey*, p. 107, t. 1, f. 10. *Conchocladia* Wight, *Bot. Beechey*, p. 107, t. 1, f. 10.

Conchocladia (Wight) Hook. & Thoms. *Conchocladia* Wight, *Bot. Beechey*, p. 107, t. 1, f. 10. *Conchocladia* Wight, *Bot. Beechey*, p. 107, t. 1, f. 10. *Conchocladia* Wight, *Bot. Beechey*, p. 107, t. 1, f. 10.

12. CHONEMORPHA, G. Don: Fl. Brit. Ind. III, 694

12. *Chonemorpha* (G. Don) Hook. & Thoms. *Chonemorpha* G. Don, *Fl. Brit. Ind.*, III, 694. *Chonemorpha* (G. Don) Hook. & Thoms. *Chonemorpha* G. Don, *Fl. Brit. Ind.*, III, 694.

Chonemorpha (G. Don) Hook. & Thoms. *Chonemorpha* G. Don, *Fl. Brit. Ind.*, III, 694. *Chonemorpha* (G. Don) Hook. & Thoms. *Chonemorpha* G. Don, *Fl. Brit. Ind.*, III, 694.

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13. TRACHELOSPERMUM, Linnæus: Fl. Plin. Ind. III, 697

13. *Trachelospermum* (Linnæus) Hook. & Thoms. *Trachelospermum* Linnæus, *Fl. Plin. Ind.*, III, 697. *Trachelospermum* (Linnæus) Hook. & Thoms. *Trachelospermum* Linnæus, *Fl. Plin. Ind.*, III, 697.

...
 ...
 ...

A. *Andria* ...

1. *T. fragrans* Hook. f. ...
 ...
 ...

T. grandiflora Hook. f. ...

B. *Andria* ...

1. *T. ...* ...
 ...
 ...

14. AGANOSMA, G. Don; Fl. Brit. Ind. III, 613.

Stems with green clusters. Sepals usually ...
 Corolla silver-shaped, lower portion of tube ...
 ...
 ...

A. Sepals ...

1. *A. marginata*, G. Don; Wigt. In a ...
 ...
 ...

B. Sepals ...

1. *A. ...* ...
 ...
 ...

2. *A. ...* ...
 ...
 ...

15. ICHNOCARPUS, R. Br.; Fl. Brit. Ind. III.

Herbaceous ...
 ...
 ...

1. *I. ...* ...

... (faint text describing botanical specimens or their characteristics)

... (faint text, possibly a description of a specific plant part)

... (faint text, possibly a description of a specific plant part)

ORDER LXXIV. ASCLEPIADACEÆ. Gen. 12 to 726
(Asclepiadæ)

... (faint text describing the characteristics of the Asclepiadaceæ order)

- 1. This order is nearly free from ...
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... by

1. C. Buchanan, Botanic Society, Wight,

... ..

... ..

PERIPLOCA, Linn. : Fl. Bot. Ind. ex. H.

... ..

1. P. aphylla, Desai, Brandis, Fl. Ind. Nep.

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TOXOCARPUS, WOOD & ALLEN, 1917

Genus under examination in America, Pacific, 2, 304

Fl. small in axillary disposition. Corolla lobes... (faded text)

A. The filaments of the base of the ovary... (faded text)

B. The filaments of the base of the ovary... (faded text)

C. The filaments of the base of the ovary... (faded text)

D. The filaments of the base of the ovary... (faded text)

GYMNEMA, R. B. & F. H. & D. S.

Fl. small in axillary or interaxillary position... (faded text)

A. The filaments of the base of the ovary... (faded text)

B. The filaments of the base of the ovary... (faded text)

C. The filaments of the base of the ovary... (faded text)

Corolla glaucous, tube globose, lobes trifidous within, corolla-tube a little much longer than staminal-column.

Style longer than staminal-column, apex round.

6. *M. lucida*, Edgew. Vern. *Dolla* Hind. Kumaon, mostly valleys, small flowers. A large, upright, slender, branched, pet. 2-3, l. beneath and inflorescence mostly pubescent. L. thinly coriaceous, elliptical ovate, lobes beneath blackish, pet. 1-1½ in. Fl. purple, ventral, equal, densely striate, less than half the length of corolla. Corolla tube long, lobes hairy within shorter than tube. Follicles 5 in. long, stout, peltate, thickly cartilaginous. 7. *M. cristata*, Hook. & Th. Hind. hills. Glabrous except the slightly pubescent cyathes, the greenish calyx, equal, elliptical, lobes of corolla.

(b) Corolla much less than ½ in. long.

8. *M. tinctoria*, R. Br. Wight Br. J. 259. Sibth. 2, 109. R. Assam, Khasi hills, Prome hills, Nepal, Tonkin, China, Java, Patna and Arabia. A tall slender, nearly glabrous, l. membranous, turning dark blue when dry, as if from a loss of the essential base. Blade 1-8, pet. 1-3 in. Fl. small in a dense corymbose umbel, the corolla one third the length of corolla-tube which is ½ in. long, clothed with white silky hairs, lobes short & shallow. Staminal-column minute, compressed, with the style a long as or a little longer than entire. Follicles slightly pubescent. The species kind of *Indigo*. 9. *M. stricaria*, Hook. & Th. Peltate, lobes of corolla yellow with long spreading hairs. 10. *M. leucocarpa*, King & Poep in Journ. As. Soc. Bengal, vol. 179. Khasi hills, Upper Burma. A large slender, nearly glabrous, l. ovate lanceolate, blade 3-6, pet. 1-1½ in. long, follicles only one of a pair developed. 11. 2 in. long, quite glabrous.

B. Cyathes scales very short, like spurs or teeth at the base of anthers.

11. *M. Galesata*, Wight & Sutherlandian tract of Nepal and Sikkim, ascending to 2000 ft. Branchlets, petioles, l. beneath and cyathes pubescent, l. membranous, ovate, blade 2-6, pet. 1-1½ in. long. Cyathes large, much branched. Corolla small, obtuse, less than ½ the length of corolla hairy on both sides. Corolla 1-1½ in. long, striate outside, glabrous within, lobes shorter than tube. Staminal tube cylindrical, pentagonal, 5 teeth at the base, prolonged upwards as narrow ridges alternating with the webbed teeth, terminating at the tip in a sharp tooth. Follicles 5-6, by 2 in. long, small in cyathes clusters arranged in slender racemes on a flexuous rachis 1-1½ in. long, the upper clusters in oval, ½ in. in diam. In these lobes are open, corolla 1 in. long, green and yellow, the lobes erect, follicles cartilaginous, 2 in. long, base turgid.

12. *M. barbata*, Collett & Hems. in Journ. Linn. Soc. xviii. 87. Malacca, Upper Burma. A trailing shrub, softly pubescent, l. rhomboid, blade 2-3, pet. 1-1 in. long. Cyathes axillary on short peduncles. 10-12 fls., setae in axils obtusular, margin of lobes of corolla purple, globose, 4 in. diam., glaucous outside, hairy within, dense tuft of hair between the lobes. Staminal column pentagonal.

Congocoma nepalense, Dene. Himalaya 2-1000 ft. near Kumaon to Sikkim, Assam, Khasi hills, Chittagong. Pet. 2-3, l. beneath and inflorescence striate, rough, l. with serrations in the raised l. membranous, pet. 1-1½ in. long, lobes of corolla 1-1½ in. long. Petioles axillary, l. long, branching into a long divaricate umbel, bearing many-flowered umbels. Corolla yellow, prominent at base, lobes 1-1½ in. long. Follicles about 1½ in. long.

6. CALOTROPIS, R. Br., Fl. Brit. Ind. v. 17.

Large shrubs, wood very soft or branches herbaceous, l. large. Fl. large in umbelliferous, pinnulate cyathes, equal, glandular within, corolla broad campanulate, lobes calvate. Corona of 5 or 6 compressed fleshy appendages, acute to sub-radiating from the staminal column, the lower end free and incurved. Anthers with a broad membranous tip, inserted on the stigma; pollen-masses 10, in pairs, stipitate, stigma large, flat, pentagonal. Follicles broad, short, oblique, seeds flat ovate with a long silky coma.

A. L. sessile or nearly so.

1. *C. gigantea*, R. Br. Wight Br. J. 259. Vern. *Hi. Bastar*, Hind. *Kolla*, Hind. Mar. *Jelanda*, Java, *Nalla Jellanda*, Tel. *Yorika*, Mal. Common in the forests of Northern India and in the Peninsula. Single flowers when green, l. large, dark red (Kurr). Bayon. Malay Peninsula and Arabia. Young shoots 2-3 in. long, underside of l. clothed with soft white appressed woolly tomentum. L. 1-8 in. long, alternate, alternate-oblong, serrated, narrowed into a cordate, often unplexural base.

spines. Corolla tube 1 in. long, usually 2-3 lobes, 2-3 lobes, villous, a 14-16 long, ...

B. Fl. large.

1. *C. Corvillii*, Hook. & Grev. Bot. Beechey. A large shrubby ...

Coleosiphon elegans, Benth. Manupar. Hooker's ...

3. FAGRÆA, Thunb.: Fl. Beit. in l. v. 84.

Trees or shrubs, glabrous, evergreen, ...

A. Fl. large, more than 1 in. long.

1. *F. obovata*, Wall. Kurr. Fl. p. 26. — *Sen. F. malaberi* ...

A shrub or small tree, often epiphytic on Teak, Terminalia ...

West side of the Peninsula, from the coast to 6000 ft. Nilgiris. ...

Order LXXVI. BORAGINACEÆ. Gen. Pl. II, 882
(Hemipetal.)

As a rule herbs: trees and shrubs in a few genera only. Leaves alternate, rarely opposite, usually undivided, stipules 0. Fl. bisexual, as a rule regular, mostly pentamerous, is unilateral spikes or racemes; the nodes called back when young, and often dichotomous. Calyx free, persistent, lobes valvate, in bud 5-6 bracts have 5-6 sepals, gamopetalous, numerous inserted in the tube, alternating with 5-6 stamens. Ovary free, of 2 carpels entire or 4-5 rarely 2-lobed, style simple or 2-4-fid, terminal or inserted between the lobes. Endosperm straight, radially short, superior, albumen none or scanty.

Microscopic characters.—Stem or leaflets have a row of climbing cells on the outer, thick and granular base often large and rounded, are similar in position to those of the outer. Corolla and allied organs have a row of thick and branched, sometimes glandular cells. In many cases the rough surface of the leaf, formed by cells of the epidermis containing crystals, sometimes mostly consisting of Calcium Carbonate. Crystals of this nature are found in the hairy places of many and not rarely species of the order, in groups of epidermic cells, which appear as white dots, mostly on the upper surface of leaves.

Style 1, or forked, drupe with an oblong style and to the middle of lower part, 4-5 with 2-3
Style bifurcated stigma 2-lobed, or 4-5-lobed
Style short, undivided, gemmae none

- 1. Cordia.
- 2. Laportia.
- Ruscus, p. 154.
- 3. Miconia.

1. CORDIA, Linn. Fl. Brit. Ind. iv. 130.

Trees or shrubs, usually deciduous, gum issues from wounds in the bark. Medullary rays broad, 3-5 cells wide prominent on a radial section, rays large, up to 0.2 mm. diam.; transverse often broad bands of wood perpendicular at right angles to med. rays. Leaves alternate. Fl. polygamous usually 2- and 3 in dichotomous cymes panicle or racemes. Calyx 5-6-lobed, gamopetalous or tubular, enclosing the fl. until they open, teeth short, 4-5 often irregular. Corolla funnel-shaped, lobes 4-8. Stamens 4-8, filaments 2-6 hairy at the base, anthers shortly exserted. Ovary glabrous 3-lobed, 1 ovule in each cell, style terminal, twice forked. Fr. a drupe partly enclosed in the enlarged and hardened calyx, endocarp hard, often perforated at the apex, seed usually one, albumen or vitellaceous plaited lengthwise. Species over 300, tropical countries of both hemispheres, chiefly America. Species 1, 2, 3, 10, 11 deserve attention on account of their beautiful timber.

1. Fl. small or middle-sized, white, corolla-tube as long as or shorter than calyx.

A. L. alternate, basal nerves 4-6.

B. Crystalline cells not conspicuous on upper surface of leaves.

2. C. Myxa, Linn.; Wight Ill. t. 108; Deffl. Fl. Sylc. t. 245. — Syn. C. collina, Willd. Vern. *Laccora*, *Bhairava*, *Basalla*, Hind.; *Baba*, Beng.; *Saba*, *Bhakar*, Mar.; *Ikki*, *Nakkari*, Tel.; *Challe*, Kan. *Tala*, Goa; *Havashan*, Mal; *Thant*, Burm.

A middle-sized tree, branchlets glabrous, wood soft, light grey, no heartwood. L. entire or slightly dentate, glabrous, but more or less rough when full grown, variable in shape, from elliptic-ovate to broad ovate, often with a rounded or cordate base, basal n. 3, rarely 5, blade 3-6, pet. 1-2 in. long. Fl. small, in large lax terminal and axillary panicles almost always cymes, peduncles 1-2 in., buds nearly globose. Drupe 1-1.5 in. long, white, ripe

yellowish-brown, pink or nearly black, shining, but generally duller, especially above, very hard, in a sweetish viscid almost transparent pulp.

Sublimation tract and other ranges according to 4000 ft. Punjab Solan range, Rajasthan, Central India and Centr. Prov. Western Peninsula, Assam hills, Burma. Largely cultivated in gardens and avenues. Fl. March-May. Fr. and seeds eaten, the strips fr. as a vegetable and pickled.—Ceylon, India to the N. of India. Malay Peninsula and Philip. China, Formosa, Cutch, and possibly India, grows in Western Assam. 2. A species mentioned by Kurz *F. Fl.* 3. 239 *Himalaya, Burma, Pegu*. A small tree, l. ovate, acuminate, a few large teeth in the upper part, blade 5-10, pet. 1-2 in. long, short hairs on the underside, ably about not very, rather rough with distinct cystolith cells, fl. pinkish. 3. A greatly pedicled ascending leaf of the Burmese variety.

4. C. Wallonia, H. Poir. *Reed. Pl. Socy.* 1. 246; *Erubis F.* 74. 237. *Talbot List of B. Ind.* probably *C. officinalis* of Wright *Bot.* 1. 1878. Syn. *C. officinalis*, Willd. var. *Wallonia*, C. B. Clarke, *Bot. Fl. Brit. Ind.* 1. 155. *Sesbania, Pinca* (W. Western Peninsula in Indian forest). A widely-spread tree, 10-12 ft. high, l. ovate, acuminate, beneath with a dense hairy, otherwise similar to 1. or 2. 5. *C. indica*, possibly a subspecies, variety, J. C. Lowiana, sp. nov. *Merrillia* (C. B. Clarke) *Bot. Ind.* 1878; A. E. Lowrie Oct. 1881; *Durand* No. 4754, Jan. 1882. A slender small tree, 10-12 ft. high, beautifully mottled on a radial section, foliage bright green. Whole glabrous, excepting the minutely hairy inflorescence, leaflets elliptic, acuminate, acute at both ends, base even or base unequal sided, deeply 3-5-veined in the upper half, blade 2-8, pet. 3 in. long, sep. 4-6 pair, the lowest pair in a pair the base. Fl. nearly throughout the year, in small compact pedunculate cymes from the axils of the uppermost l. calyx tube in fl. more cylindrical than of *W. Ind.* Very similar to *C. coccinea*, DeRoi, cultivated in Egypt.

6. Cystolith cells conspicuous as raised, generally white lines on upper surface of l.

a. Calyx not distinctly ribbed.

7. *C. monosa*, H. Poir. *Bot. Pl.* 1. 38. Syn. *C. pinnatifida*, Koch. Western Peninsula, from the Cape, 1700, southwards. L. ovate or elliptic with a cuneate base, slightly pubescent beneath, rough above with numerous raised ribs, blade 1-4, pet. 1 in. Calyx small, calyx obscure, 4 in. long. 7 and 8, fl. on separate branches. 8. *C. grandis*, H. Poir. *Assam, Chittagong, Burma (Kau)*. L. ovate, underside generally glabrous with sparse hairs along nerves, upper side rough with numerous white raised ribs, blade 4-8, pet. 1-4 in. Fl. in compact cymes arranged in large compound panicles.

9. *C. fragrantissima*, Kurz. *Ko'sat, Tanay, Patani, Burma; Ko'ok, Kar, Pegu and Marikaya, Bangla forest* (A. E. Jan. 1882). Hill east of Tanay (P. Fl. May 1883). Heartwood brown, beautifully mottled in structure resembling *C. Madag.*, but fragrant. L. ovate, serrate when young with furcated, up to 1/2 in. cuneate rough with numerous white ribs, underside glabrous with a soft downy hair beneath, a number of obsolete hairs, blade 5-10, pet. 1-2 in. long. Fl. axils, l. in axillary racemes, arranged in dichotomous panicles. 2. A small tree, 10-12 ft. high, C. B. Clarke, 898, 8320, *Chittagong, Gumbura*, (C. B. Clarke, 1870). *Western Peninsula, Malacca, Chica, Henry, 214*, similar to 7, but l. broadly elliptic, h. pedicellate and sessile, not markedly unilateral.

B. Calyx distinctly ribbed and furrowed

10. *C. Macleodii* Hook. f. & Thoms.; *Bombis F. Fl.* 41. *Vera, Dhawan, Dhawan, Jhansi, Hind.; Dhawan, Mar.; Gudia, Ajmere; Poldu, Bhattara, Tel.*

A middle-sized tree, blade of wood parenchyma narrow, heartwood reddish-brown, beautifully mottled. Branchlets underside of l. indurated, and calyx clothed with dense grey or tawny tomentum of collate hairs. L. sometimes embossed, coriaceous, firm and hard when full grown, rough with raised groups of cystolith cells, blade 5-7, pet. 2-3 in. long, the base as well as secondary and transverse tertiary nerves prominent on the underside of natural,

11. I have adopted this as a distinguishing character of species 5-11 with some hesitation, as it is not impossible that the appearance of the cystolith cells on the upper surface of leaves may vary. The species of this difficult but important genus require further study in the forest.

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LETTISOMIA (Linn.) F. H. Linn. p. 227

Shell large, irregularly oval, with a prominent, rounded, anterior angle.

- 1. *L. aggregata* (Linn.) F. H. Linn. p. 227. - Shell large, irregularly oval, with a prominent, rounded, anterior angle. - Found in the strata of the Silurian period, in the strata of the Silurian period, in the strata of the Silurian period.
- 2. *L. striata* (Linn.) F. H. Linn. p. 227. - Shell large, irregularly oval, with a prominent, rounded, anterior angle. - Found in the strata of the Silurian period, in the strata of the Silurian period, in the strata of the Silurian period.
- 3. *L. striatula* (Linn.) F. H. Linn. p. 227. - Shell large, irregularly oval, with a prominent, rounded, anterior angle. - Found in the strata of the Silurian period, in the strata of the Silurian period, in the strata of the Silurian period.

Brachiozooids small, with a long, slender, and curved pedicel.

- 1. *L. striata* (Linn.) F. H. Linn. p. 227. - Brachiozooids small, with a long, slender, and curved pedicel. - Found in the strata of the Silurian period, in the strata of the Silurian period, in the strata of the Silurian period.
- 2. *L. striatula* (Linn.) F. H. Linn. p. 227. - Brachiozooids small, with a long, slender, and curved pedicel. - Found in the strata of the Silurian period, in the strata of the Silurian period, in the strata of the Silurian period.
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- 2. *L. striatula* (Linn.) F. H. Linn. p. 227. - Brachiozooids small, with a long, slender, and curved pedicel. - Found in the strata of the Silurian period, in the strata of the Silurian period, in the strata of the Silurian period.
- 3. *L. striatula* (Linn.) F. H. Linn. p. 227. - Brachiozooids small, with a long, slender, and curved pedicel. - Found in the strata of the Silurian period, in the strata of the Silurian period, in the strata of the Silurian period.

6. PORANA (Linn.) F. H. Linn. p. 227

Young shells of the large, pedicel, ovate, broadly ovate, with a rounded, anterior angle, in the strata of the Silurian period, in the strata of the Silurian period, in the strata of the Silurian period.

PLANT SOLANACEAE

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WITHANIA, Pongor, Fl. Ind. Ind. 23.

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LYCIUM, ... Fl. Ind. Ind. 24.

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TECOMA. I. - PLANT MONOGRAPH

By J. H. RAVENEL

1. *T. pedunculata*, (L.) Benth. *Proc. Linn. Soc. New York*, 1845, p. 100. *Bot. Beechey*, 1847, p. 100. *Bot. Beechey*, 1847, p. 100. *Bot. Beechey*, 1847, p. 100.

A shrub, 2-3 m. tall, with a woody stem, and a dense covering of pubescence. The leaves are ovate, with serrated margins, and are borne on petioles 2-3 mm. long. The flowers are small, and are borne in a terminal panicle. The fruit is a globose capsule, with a persistent calyx.

Flowers white. The fruit is green, and is covered with a dense covering of pubescence. The fruit is eaten by the Indians, and is said to be very nourishing.



Fig. 1. *Tecoma pedunculata*, (L.) Benth.

2. *T. stans*, (L.) Benth. *Proc. Linn. Soc. New York*, 1845, p. 100. *Bot. Beechey*, 1847, p. 100. *Bot. Beechey*, 1847, p. 100. *Bot. Beechey*, 1847, p. 100.

A shrub, 2-3 m. tall, with a woody stem, and a dense covering of pubescence. The leaves are ovate, with serrated margins, and are borne on petioles 2-3 mm. long. The flowers are small, and are borne in a terminal panicle. The fruit is a globose capsule, with a persistent calyx.

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ORDE LXXVI. ACANTHACEÆ. Gen. Pl. R. 1008.

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BARLERIA, Lindl. & Murray, Ind. Pro. 85.

Herb or subshrub, a few shrubs. Fl. large, usually singly or in short spikes, axillary, in 2 opposite pairs, those of the upper pair larger, usually 2. One of the lower pair usually of 2, one ascending to the tip. Corolla lobes 2, nearly equal, tube elongate. Stamens 2, anthers 2 on each cell. Stachys and 10 species of the Old World, a few in America. Of the 22 species described from British India the following only can be mentioned.

A. *Barleria*
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B. *Barleria*
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C. *Barleria*
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D. *Barleria*
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E. *Barleria*
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F. *Barleria*
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DEDALACANTHUS, T. And. Fl. Brit. Ind. Pro. 417.

(*Cranthium* L., Linnæus in Rayler & Panton, p. 6. 1734.)

Perennial herb or large herbaceous shrub.
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hairs moderate, twisted in bud. Stamens 2, anthers very spurred. Style 1
long, hairy. Species 17, Ind. Malayana, etc.

A. Lower half of corolla-tube cylindrical, upper half ventricose.

1. *pendula* T. And. Sikkim, eastern Nepal, Himalayas, ascending to above the
Upper Burma. L. entire or nearly so, glabrous, 2-3 in. long, corolla tube 2-3
long. Corolla 1 1/2 in., purple or lavender.

B. Corolla-tube slender, narrowly cylindrical.

2. *stramonium* T. And. Sikkim, eastern Nepal, Himalayas, ascending to above the
Upper Burma. L. underwood to 4 or 5 ft. Anthers 2-3 in. long. Corolla 1 1/2 in. long,
tubular, white, but in bud to dense brownish purple. Style 1 1/2 in. long, hairy
to middle, pale, almost white, hairy, very slender, light blue. A. 2 perianth
lobes, 1/2 in. long, 1/2 in. wide, lobes 1/2 in. long, 1/2 in. wide. Corolla 1 1/2 in. long,
tubular, white, but in bud to dense brownish purple. Style 1 1/2 in. long, hairy
to middle, pale, almost white, hairy, very slender, light blue. A. 2 perianth
lobes, 1/2 in. long, 1/2 in. wide, lobes 1/2 in. long, 1/2 in. wide.

3. *tetragona* T. And. Upper Ind. Low. Burma. L. underwood to 4 or 5 ft. Anthers
2-3 in. long. Corolla 1 1/2 in. long, tubular, white, but in bud to dense brownish
purple. Style 1 1/2 in. long, hairy to middle, pale, almost white, hairy, very
slender, light blue. A. 2 perianth lobes, 1/2 in. long, 1/2 in. wide, lobes 1/2 in.
long, 1/2 in. wide.

Petalium *heterostachya* T. And. Sikkim, eastern Nepal, Himalayas, ascending to above the
Upper Burma. L. underwood to 4 or 5 ft. Anthers 2-3 in. long. Corolla 1 1/2 in. long,
tubular, white, but in bud to dense brownish purple. Style 1 1/2 in. long, hairy
to middle, pale, almost white, hairy, very slender, light blue. A. 2 perianth
lobes, 1/2 in. long, 1/2 in. wide, lobes 1/2 in. long, 1/2 in. wide.

STROBILANTHES. Blume: Fl. Brit. Ind. iv. 428

Herb. or shrubs, often prostrate. The l. of the same pair often unequal,
axillary cells linear, broader at one end, conspicuous on the upper surface.
Fl. mostly capitate or in strobiliferous spikes. Calyx persistent, more or less
2-3 in. long. Anthers nearly equal, connected in bud. Anthers numerous, 2-3 in.
long, linear, slight of one long, lanceolate branch, the other minute. Spikes
1-2 in. long, hairy. Many species of this and allied genera are eminently
terrestrial, covering open hill sides or forming a dense underwood under the
forest, covering the ground so completely as to impede regeneration by self-seeds.

Some of these prostrate species flower annually, but the majority flower
periodically at intervals of 2 years or longer. After ripening their seeds, the
stems die, giving a chance for the seeds of the forest trees to come up.

A. Stamens 2. Fl. in dense heads, calyx-segments equal.

1. *Kanchana* T. And. Pithoragarh, eastern Nepal, White Mts. Himalayas, ascending to above the
Upper Burma. L. underwood to 4 or 5 ft. Anthers 2-3 in. long. Corolla 1 1/2 in. long,
tubular, white, but in bud to dense brownish purple. Style 1 1/2 in. long, hairy
to middle, pale, almost white, hairy, very slender, light blue. A. 2 perianth
lobes, 1/2 in. long, 1/2 in. wide, lobes 1/2 in. long, 1/2 in. wide.

B. Stamens 4. Fl. in heavy or short spikes, calyx-segments nearly equal.

1. *heterostachya* T. And. Sikkim, eastern Nepal, Himalayas, ascending to above the
Upper Burma. L. underwood to 4 or 5 ft. Anthers 2-3 in. long. Corolla 1 1/2 in. long,
tubular, white, but in bud to dense brownish purple. Style 1 1/2 in. long, hairy
to middle, pale, almost white, hairy, very slender, light blue. A. 2 perianth
lobes, 1/2 in. long, 1/2 in. wide, lobes 1/2 in. long, 1/2 in. wide.

Chamaecrista (Kuntze) B. & P. Bunches of flowers, of 2-3 long, yellow, tubular, 5-lobed, in, with red or purple. The long upright stem, 2-3 ft. high, is branched, but with few lateral branches. Leaves, trifoliate, the leaflets 1-2 in. long, the upper ones 1-2 in. long. The 2 uppermost leaves of the stem are 1-2 in. long, the lower ones 1-2 in. long, and are 1-2 in. long.

Chamaecrista (Kuntze) B. & P. Bunches of flowers, of 2-3 long, yellow, tubular, 5-lobed, in, with red or purple. The long upright stem, 2-3 ft. high, is branched, but with few lateral branches. Leaves, trifoliate, the leaflets 1-2 in. long, the upper ones 1-2 in. long, the lower ones 1-2 in. long, and are 1-2 in. long.

Chamaecrista (Kuntze) B. & P. Bunches of flowers, of 2-3 long, yellow, tubular, 5-lobed, in, with red or purple. The long upright stem, 2-3 ft. high, is branched, but with few lateral branches. Leaves, trifoliate, the leaflets 1-2 in. long, the upper ones 1-2 in. long, the lower ones 1-2 in. long, and are 1-2 in. long.

PHLOGACANTHUS, N. & P. Bot. Ind. in Ind.

The leaves of plants, 1-2 long, yellow, tubular, 5-lobed, in, with red or purple. The long upright stem, 2-3 ft. high, is branched, but with few lateral branches. Leaves, trifoliate, the leaflets 1-2 in. long, the upper ones 1-2 in. long, the lower ones 1-2 in. long, and are 1-2 in. long.

A. Fl. in a dense cylindrical terminal raceme.

P. thymifolius N. & P. Bunches of flowers, of 2-3 long, yellow, tubular, 5-lobed, in, with red or purple. The long upright stem, 2-3 ft. high, is branched, but with few lateral branches. Leaves, trifoliate, the leaflets 1-2 in. long, the upper ones 1-2 in. long, the lower ones 1-2 in. long, and are 1-2 in. long.

P. thymifolius N. & P. Bunches of flowers, of 2-3 long, yellow, tubular, 5-lobed, in, with red or purple. The long upright stem, 2-3 ft. high, is branched, but with few lateral branches. Leaves, trifoliate, the leaflets 1-2 in. long, the upper ones 1-2 in. long, the lower ones 1-2 in. long, and are 1-2 in. long.

R. Fl. in numerous axillary and terminal cymes.

P. thymifolius N. & P. Bunches of flowers, of 2-3 long, yellow, tubular, 5-lobed, in, with red or purple. The long upright stem, 2-3 ft. high, is branched, but with few lateral branches. Leaves, trifoliate, the leaflets 1-2 in. long, the upper ones 1-2 in. long, the lower ones 1-2 in. long, and are 1-2 in. long.

Chamaecrista (Kuntze) B. & P. Bunches of flowers, of 2-3 long, yellow, tubular, 5-lobed, in, with red or purple. The long upright stem, 2-3 ft. high, is branched, but with few lateral branches. Leaves, trifoliate, the leaflets 1-2 in. long, the upper ones 1-2 in. long, the lower ones 1-2 in. long, and are 1-2 in. long.

Chamaecrista (Kuntze) B. & P. Bunches of flowers, of 2-3 long, yellow, tubular, 5-lobed, in, with red or purple. The long upright stem, 2-3 ft. high, is branched, but with few lateral branches. Leaves, trifoliate, the leaflets 1-2 in. long, the upper ones 1-2 in. long, the lower ones 1-2 in. long, and are 1-2 in. long.

Chamaecrista (Kuntze) B. & P. Bunches of flowers, of 2-3 long, yellow, tubular, 5-lobed, in, with red or purple. The long upright stem, 2-3 ft. high, is branched, but with few lateral branches. Leaves, trifoliate, the leaflets 1-2 in. long, the upper ones 1-2 in. long, the lower ones 1-2 in. long, and are 1-2 in. long.

3. *C. ...* occurs about 1800 in the warm regions of the Old World.

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5. GRELINA Less., Fl. Brit. Ind. 3: 241.

Tree or shrub, leaves usually entire. Flowers large, corolla tube slender above, ...

A. Erected trees.

G. arborea, Lamour., Bot. Voy. Pl. 1: 246. Wight Ic. t. 1479. Benth ...

A large, dense tree, bark pale, wood grayish-white, light and strong ...

... (faded text) ...

B. Branchlets frequently branched.

G. ... (faded text) ...

6. PREMNA Less., Fl. Bot. Ind. 3: 241.

Tree or shrub, leaves mostly opposite or subopposite, ...

A. Shrub, tree or climber.

Premna ... (faded text) ...

tree, attaining 40 ft., branches, petioles, underside of l. and inflorescence densely rugo-pubescent, with short soft stellate hairs. L. ovate or elongate elliptic, acuminate, glabrous above, blade 6-12, pet. 1-2, in long, sec. 4-5-12 pair. Fl. lilac or pale purple, with an unpleasant smell, cymes large, spreading, peduncle 1-2 in. long, calyx stellately pubescent.

Kinnon, Oudh forests. Nepal. Singbhum in valleys, not common. Sikkim, foot of the hills and ascending to 2000 ft. (common in clearings). West of Dary. Khas hills, Maripur. Burma, Upper and Lower to 4,500 ft., common on degraded Young's Hill. April-May. 2. *C. vestita*, Wall. Nepal. Sikkim 1-6,000 ft. Khas hills, glabrous l. mainly on the lower part, densely matted with long silky hairs, peduncles 2 or long, calyx in fl. heavily glandular. *C. lanata*, Lam. - Syn. *C. Wallichiana*, Walp. Bull. Manual 1: 21 fig. 6; Wright Bot. 173; fig. 5, l. 6, 1160. Vern. Khas, Khasia, Maru, Yitfal, parts Tamu; *Thapsacanthus*, Mal. West side of the Pegu from Bantay country, common on grass lands by the Tamu hills. Ceylon. A large shrub or small tree, branches, petioles underside gl. and inflorescence densely tomentose. L. ovate or ovate-lanceolate, base often rounded, blade 8-15, pet. 1-2 in. peduncle 1-1 1/2 in. long, bracts and corolla pale purple or red, calyx stellately pubescent.

B. Petiole long, l. broadly cordate, lobed.

1. *C. lobata*, Clarke. Sikkim 10-11,000 ft. L. 12-15 in diam., peduncles 5-7 in long.

C. Petiole short, under 1 in., l. sharply serrate.

3. *C. macrophylla*, Vahl. *Isner*, Hb. Sub-Himalayan tract, from Hanchi westwards, ascending to 8,000 ft. Nepal. Abundant in the plains of Bengal, Singbhum, Lower and Upper Burma. A tall shrub, branches, petioles underside of leaves and inflorescence clothed with heavy or grey stellate tomentum. L. from an acute base elliptic-lanceolate, blade 6-10, pet. 1-1 1/2 in. long, sec. 4, 12-19 pair. Cymes from branches, glabrous, 1-2 in diam., peduncles 1-1 1/2 in long, fl. numerous, pink, very white.

4. *C. rubella*, Lamour. Sikkim 2-8,000 ft. Khas hills, Maru, Yitfal, parts Tamu and Sikkim. L. oblong or oblong-ovate 3 by 1 1/2 in. base cordate, pet. very white, peduncle straight 1-1 1/2 in.

7. *C. longifolia*, Lamour. Assam (Nabbar Forest, D. H. March 1859). Khas hills, Chitlanging. Nicobar, Tenasserim (Amaru, D. H. Aug. 1858). Malu, Penang, and Aruap, North Australia. L. thinly membranous, lanceolate, blade 3-7, long, pet. into 1st, 2-4 in long; upper side glabrous, under side thin or little pubescent, calyx white, stellate-tomentose, 14, white. 8. *C. pilocalyx*, Clarke. Khas hills, Maru, Yitfal, parts Tamu. A small tree, branches stellate-tomentose, l. thinly membranous, elliptic-lanceolate, blade 4-8, pet. 1 in. long, calyx glandular, not hairy, fr. glab.

Glossocarya malha, Wall. Tenasserim. A climbing shrub, branches and peduncles densely pubescent, fl. in simple terminal corymbiform compound cymes grey villous, calyx capsule cylindrical, 4-angled, 1/2 in long, clothed with long patent hairs, usually twice the length of the campanulate 5-toothed calyx.

8. CARYOPTERIS, Rango: Fl. Brit. Ind. iv. 587.

Shrubs, l. opposite, more or less toothed, on both surfaces with minute yellow clustering glands (glaucous trichomes, consisting of several cells filled with essential oil). Calyx 4-5-lobed, sometimes 6- or 7-lobed, slightly enlarged in fruit, corolla tube short, glabrous, limb spreading, lobes 5, indistinct in bud, 3-5-lobed, the 5th interior largest. Stamens exserted, anther-cells 4 or 5, 1 at base. Ovary imperfectly 4-lobed, 4-angled, style filiform, shortly 2-lobed. Capsule dividing into 4 valves with incurved margins, holding the 4 two-seeded slightly winged pyrenes. Species 10, India, Mongolia, China, Japan.

A. Corolla 1/2 in. long.

1. *C. Wallichiana*, S. Baker; Collett Shale Fl. 281, fig. 121. Vern. *Chitrophi*, Khasia hills, India. Sub-Himalayan tract and other ranges, ascending to 7,000 ft. Bengal Salt range; Oudh forests. A shrub with 4-lobed glabrous branches, cymes large, dense, pale red. L. lanceolate, serrate, blade 2-4, pet. 1 in. long. Fl. pale red, 5-lobed, purple, in compact branched cymes, bearing cylindrical axillary and terminal fls. 1/2 in. long. Calyx segments lanceolate with a distinct web-like fruit.

B. Corolla 1/2 in. long and less.

2. *C. grata*, Benth. Oudh Hills, Jangarod, Nepal, to 6,000 ft. *C. flaccida*, and pubescent, cymes lax, axillary, segments of fruiting calyx strikingly enlarged. 3. *C.*

ram. pub. Glab. Ochroma, Malacca, 1819. K. Sum. Bantam, Java. 1819. ...

1. CONGEEA, Rox. Fl. Brit. Ind. iv. 602

Stems 1-2 m. high, quite entire. Fl. sessile, in cymose panicles ...

A. Calyx lobed & the way down, usually clothed with long soft hairs.

1. C. ... Roxburgh, Fl. Ind. 1819. ...

B. Calyx ...

2. C. ... Roxburgh, Fl. Ind. 1819. ...

10. SPHENODESME, Jack: Fl. Brit. Ind. iv. 602

Stems ... Fl. sessile in ...

Signa ...

A. ... Roxburgh, Fl. Ind. 1819. ...

B. ... Roxburgh, Fl. Ind. 1819. ...

B. ...

(11) Involucral bracts longer than calyx, heads in simple terminal panicles.

A. ... Roxburgh, Fl. Ind. 1819. ...

whisking, in 1 to 1.5 long, calyx glabrous, mouth involucre from with 5 to 7 long, sessile, tooth alternating with the others. *S. Griffithiana*, Wight & Hook. Bot. Beechey's Voy. 1847, p. 404, t. 1, f. 8. (Andaman) — Syn. *S. apiculata* perianth long. Kurz, Tenasserim, 1845, p. 104, t. 1, f. 8. Calyx divided with long lobes, a reflexed tooth in each sinus of the lobes.

6. Involucral bracts shorter than calyx, heads sessile or nearly so in axillary sometimes branched spikes.

8. *S. erythroides*, Kurz. — Syn. *Synplactis gracilis*, Kurz. Vedd. Nodend. Burm. Lower Burma, common on the banks of streams and in damp places. A large evergreen shrub or small tree, often climbing, 1-peltate or tomentose beneath, heads in dense terminal

11. SYMPHOREMA, Roxb.; Fl. Brit. Ind. iv. 369.

Large woody climbers, hairs stellate. Fl. sessile, in racemose pedunculate 7-8d. heads, involucre of 6 bracts, much enlarged in fr. The 7-th bract is a dichotomous cyme with 3 central and 4 lateral, the one pair of bracts supports the primary, while 2 pairs support the two secondary inflorescences. Calyx tubular, tooth 4-8, short, corolla small, white, tube cylindrical, lobes 4-10, narrow, oblong, equal. Stamens 4, anthers 4-lobed, anthers exerted, ovate with parallel. Ovary imperfectly 4-celled, ovules 8 in each cell, suspended from the top of a central placenta, style bifid, shortly bifid. Fruit 4-lobed, includes in the calyx, 1-seeded. Species 3, one in the Philippines,

1. *S. involucratum*, Herb. Brit. Pl. t. 156; Wight, Ic. t. 362; Nicolson, Leaves, Sp. Upper Burma. E. Ind. Wavara, Pagan, Burma. Upper and Lower Burma. In petiole and underside of leaf pubescent. Lvs. ovate, usually toothed, blade 2-3, pet. 1-2 in. Cyme 4-10, sinuses of involucre in fr. slightly pubescent, thinly tomentose, primary mostly 4-lobed; 2. *S. polyandrum*, Wight, Ic. t. 369, III. t. 178, fig. 7; Richard, forest, Chanda district, Singbhum, Decan. Stems with long from July to 1829, lvs. ovate, tomentose, blade 4-8, pet. 1-2 in.; corolla 1 in. long; bracts of involucre densely grey-tomentose.

12. AVICENNIA, Lam.; Fl. Brit. Ind. iv. 64.

Species 3 on the sea coast within the tropics of both hemispheres.

A. officinalis, Linn.; Bedd. Man. t. 22, fig. 2 — Syn. *A. tomentosa*, Willd. Pl. As. Bor. t. 271, bot. Jacq.; Wight, Ic. t. 1481; Kurz, F. Pl. 6, 270; Vedd. Theor. Mar.; Ippol., Kan.; Bauh., Bonc. Bih., Sundriber; Thunb. Ind. and Thunb. p. Burm. The true *A. tomentosa*, Jacq., is limited to South America and has white fl. Schimper, Indo-Mal. Strandflora 16.

A large evergreen shrub or tree, in the Sundriber attaining 60 ft. and a great girth. Branchlets, petioles, underside of leaves and involucre clothed with a dense white or silvery tomentum of very minute hairs. Fl. yellow, sessile, in bracteate heads or sterete cymes, which are arranged in trichotomous corymba. Calyx divided to the base into 5 imbricate equal corolla-tube short, limb 4-5-lobed. Stamens 4, in the throat of the tube, anther-cells parallel. Ovary hairy, imperfectly 4-celled, ovules 4, suspended from a central 4-winged placenta. Capsule compressed, dehiscing into two thick valves. Seed one, chyliferous large, folded lengthwise, hypogynous (radicle) villous.

Often gregarious, in tidal forests or on tidal sandy flats along the coasts of the Peninsula, the Sundriber, the Andamans and Burma. Fl. R. S. — 1870, East Africa, the Malay Archipelago, New Guinea, Australia, Polynesia, New Zealand. The long aerial roots, which run horizontally through the mud, send up numerous erect filiform suckers, the ends of which stand above the surface of the water. They facilitate the ascent of air to the roots, but sometimes they produce leaves and grow up into bushes. The seed often germinates before it falls. The hairs of the hypogynous are stiff and recurved, they aid the seedling to fix itself in the mud.

Avicennia coccinea Presl: On a transverse section the wood shows alternating layers of concentric ring of xylem and phloem (wood and bark), which often shatter off. A. L. Washington reports (Ind. Forester xlv. 59) that coppice shoots 25 and 30 months old

Order LXXXIV. NYCTAGINACEÆ. Gen. Pl. iii. 1.

(Nyctaginæ)

Mostly herbs, a few genera of shrubs and trees. Fl. usually opposite, stipuliferous, axillary, or perianth, sometimes in the axils of certain persistent bracts. Stems opposite, alternate, or in pairs, sometimes arising from the axils. Leaves long, narrow, ovate, rounded, or like grass blades. Fr. dry, 2-merous, usually inferior, all seeds in 1 or many.

The most species of the Order. Very common in the tropics and subtropics, but also in temperate regions. The leaves are usually alternate and are arranged in opposite pairs, sometimes in pairs, sometimes in whorls, sometimes in pairs, sometimes in whorls. In some cases the leaves are arranged in whorls, sometimes in pairs, sometimes in whorls. In some cases the leaves are arranged in whorls, sometimes in pairs, sometimes in whorls.

Some will be recognized with. Commonly found in gardens, and also in the woods. Some will be recognized with. Commonly found in gardens, and also in the woods. Some will be recognized with. Commonly found in gardens, and also in the woods.

PISONIA, Lamour. Fl. Ind. Ind. 310

Tree, 2-3 stories high, usually upright, but opposite. Fl. in long, narrow racemes, with 10-20 flowers. Perianth 5-lobed, sometimes 10-lobed. Fr. large or long, 2-angled, completely pericarpic, enclosing the seeds and albumen. Species 24, 25 pairs of both hemispheres.

A. Asia

P. indica, Lamour. Fl. Ind. Ind. 310. West. Ind. Ind. 310. P. indica, Lamour. Fl. Ind. Ind. 310. West. Ind. Ind. 310. P. indica, Lamour. Fl. Ind. Ind. 310. West. Ind. Ind. 310.

P. Indica

P. indica, Lamour. Fl. Ind. Ind. 310. West. Ind. Ind. 310. P. indica, Lamour. Fl. Ind. Ind. 310. West. Ind. Ind. 310. P. indica, Lamour. Fl. Ind. Ind. 310. West. Ind. Ind. 310.

Order LXXXV. AMARANTACEÆ. Gen. Pl. iii. 20.

Mostly herbs, all opposite and alternate, stipuliferous. Fl. supported by leaves, usually in terminal or axillary, branched spikes. Perianth 5-lobed.

leaves alternate, venation pinnate, leaflets 1-3, ovate, apex acute, base cuneate, margin serrate. Inflorescence terminal, panicle, flowers small, corolla 5-lobed, lobes ovate, acute, base cuneate, margin serrate, surrounding a small ovary.

Leaves alternate, venation pinnate
 Leaves alternate, venation pinnate
 Leaves opposite

1. Leaves
 2. Leaves
 3. Leaves

1. DEERINGIA, R. & S. Fl. Brit. Ind. v. 11.

Sp. nos 5-9, from Malabar to Queensland.

D. calosoides Rob. Brown. Wight in c. 72. Vireo, 6-8, Malabar, Ceylon, India, Java.

A large scrambling shrub, flowers white, calyx 5-lobed, lobes ovate, acute, base cuneate, margin serrate, surrounding a small ovary. Petals 5, lobes ovate, acute, base cuneate, margin serrate, surrounding a small ovary.

Said to have been introduced from the South of India to Queensland, Australia, by the Rev. J. J. Moore, in 1842.

D. arborescens Hook. f. Bot. Beechey, N. W. Himalaya 4769. A large tree, flowers white, calyx 5-lobed, lobes ovate, acute, base cuneate, margin serrate, surrounding a small ovary. Petals 5, lobes ovate, acute, base cuneate, margin serrate, surrounding a small ovary.

D. frutescens Hook. f. Bot. Beechey, N. W. Himalaya 4770. A large tree, flowers white, calyx 5-lobed, lobes ovate, acute, base cuneate, margin serrate, surrounding a small ovary. Petals 5, lobes ovate, acute, base cuneate, margin serrate, surrounding a small ovary.

Order LXXXVI. CHENOPODIACEÆ. Gen. Pl. III, 41.

Mostly herbs, 1-stemmed, usually alternate, flowers 0-5, usually in regular, panicle or 2-5 whorls, opposite the leaves. Siliques 2-5, 2-5, each with 1 or 2 seeds, usually parietal.

Nearly all plants of this order are Helianthus, being more the most abundant in the lowlands. Helianthus is the most abundant in the lowlands, and is the most abundant in the lowlands. Helianthus is the most abundant in the lowlands, and is the most abundant in the lowlands.

- 1. Leaves
- 2. Leaves
- 3. Leaves

SALSOLA, Hance, Fl. Brit. Ind. v. 17.

Small herbs or shrubs, branches not articulate, leaves alternate, linear, small, usually sessile, solitary or fasciculate, entire, base cuneate, margin serrate, surrounding a small ovary. Petals 5, lobes ovate, acute, base cuneate, margin serrate, surrounding a small ovary.

with some circumscissile ones, perhaps as a rule 5 lobed, but some are 4 lobed. Anther usually sessile 1-20, but a small one or quite one of 20, and one or two are free, still short or a few with 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Many specimens, a very interesting one from an unpublished specimen, possibly from the island of Java, but not known. The fruit, but not the whole tree, is very common in the island of Java, but not in the island of Sumatra. The fruit is a small, green, fleshy, globose fruit, 1-2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

MYRISTICA, Lam: Fl. Brit. Ind. 1: 102.

George King, description of Myristica of British India, Ann. Bot. Gard. Camb. 11: 3 (1891).

M. magnifica, Lam. in part: Warburg 171. Fl. prolatens, campanulate, calyx 10-20, linear, adnate to a column, which is often stipitate and frequently prolonged beyond the anthers, stigma sessile. The style appressed to the perianth. Arillus lacinate to the base. Sepals 8-10, linear, free to tropical Australia.

A. of *M. sumatrana*, on a thick woody tuberous.

M. magnifica, Lam. in part: King Ann. Bot. Gard. Camb. 11: 3 (1891). Warburg 171. Fl. prolatens, campanulate, calyx 10-20, linear, adnate to a column, which is often stipitate and frequently prolonged beyond the anthers, stigma sessile. The style appressed to the perianth. Arillus lacinate to the base. Sepals 8-10, linear, free to tropical Australia.

B. of *M. in perianth* grass, peduncles slender.

M. magnifica, Lam. in part: King Ann. Bot. Gard. Camb. 11: 3 (1891). Warburg 171. Fl. prolatens, campanulate, calyx 10-20, linear, adnate to a column, which is often stipitate and frequently prolonged beyond the anthers, stigma sessile. The style appressed to the perianth. Arillus lacinate to the base. Sepals 8-10, linear, free to tropical Australia.

H. angustata Wall. King Ann. 10, p. 102. Fl. white, 1/2 inch diam. 12-15 stamens, slender, sessile, filaments large, and anthers brownish. Ail. frequently subscissate. Specimens from the New Zealand.

A. Anthers singly 2-valved, anthers, entire, sessile, filaments 1/2 inch long.

H. angustata (Wall.) Hook. & Grev.

A. *H. angustata* Wall. Fl. A. Hart. 1844, p. 102. Fl. white, 1/2 inch diam. 12-15 stamens, slender, sessile, filaments large, and anthers brownish. Ail. frequently subscissate. Specimens from the New Zealand.

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CRYPTOCARYA. Roy. Bot. Soc. Lond. 1842, p. 117.

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FIG. 117. *Cryptocarya Wightiana*, Thunberg.

Young stems, deep hairy. Tapal-van, Malay Peninsula and Archipelago. Branchlets possibly indurated. L. and inflorescence minutely brown-tomentose. L. thinly coriaceous elliptic-oblong, blade 4-11, pet. 1 in. long, n. 10-12. 2-8 heads $\frac{1}{2}$ in. diam. on short slender peduncles. Axillary sessile cymes, 2-8 heads nearly sessile. Fr. and 1-4 in. long. 19. *L. ramronensis*, Metten. (Ternate). Similar to 10. Lower branches, petioles and blade of leaf indurated brown-tomentose. L. coriaceous elliptic-oblong, blade 6-10, pet. 2-4 in. long, n. 10-12. 2-8 heads elliptic-parallel, prominent 2-3 in. diam. before opening. 20. *L. grandis*, Wall. (Ternate). No. 19. Young stems, petioles and blade of leaf indurated brown-tomentose. Branchlets shortly nerved with the veins of leaflets. L. rigidly coriaceous, petioles shortly pubescent, densely and softly brown-tomentose. Blade elliptic-oblong, blade 9-11, pet. 2-4 in. long, n. 10-12, pair, very prominent beneath as well as the primary secondary 2-8 heads 2 in. diam. before opening, in short peduncles, 1-2 in. long. Specimens from Barak-pur, etc. Specimens of leaf only, sent by me in the Monday Express from Mar-Labon (Himal.). Nerves a large, yellow, and yellow. L. still in my notes to be distinguished by Kurz as *Indocalamus grandis*, Wall. and *L.* are quite different.

21. *L. rubrous* beneath or nearly so, sometimes opposite.

22. *L. laciniata*, Hook. Nilgiris, foot of hills. Eastern Assam. Khasi hills, Calcutta. Chittagong. Ternate. A shrub or small tree, branches petioles and blade 1-2 in. long, L. thickly chartaceous, glaucous beneath, usually opposite or nearly so, elliptic-lanceolate, blade 4-6, pet. $\frac{1}{2}$ in. long, n. 10-12, pair. Fr. globose, 2-3 in. diam. before opening. The bracts petioles and blade alternate. 23. *L. mitchellii*, Hook. L. Malabar hills, Assam. A large glaucous tree, L. thinly coriaceous, blade 4-10, pet. $\frac{1}{2}$ in. long, n. 10-12, pair. 24. *L. asamica*, Hook. L. Assam. L. thinly coriaceous, blade 4-8, pet. $\frac{1}{2}$ in. long, n. 10-12, pair. 25. *L. wallii*, Hook. L. Nilgiris. Eastern Assam. Ternate. A glaucous tree, L. coriaceous, blade elliptic, blade 4-6, pet. $\frac{1}{2}$ in. long, n. 10-12, pair, striking impressed veins on both surfaces, raised, minutely and regularly reticulate. Filament glaucous, nearly globose, $\frac{1}{2}$ in. long, seated on the persistent but not enlarged 2-4 in. peduncle. 26. *L. venulosa*, Miq. Ternate hills. An evergreen, straggling shrub, quite glaucous, L. thinly coriaceous, glaucous beneath, elliptic-oblong, obtusely cordate, minutely serrate, blade 4-6, pet. $\frac{1}{2}$ in. long.

27. Perianth-segments usually 6, tube much enlarged in fr.

(a) Fr. heads solitary or fascicled.

(b) L. more or less pubescent or tomentose beneath.

28. *L. Khasiana*, Miq. South-eastern tract from Nilgiris eastwards, ascending to 2,000 ft. Upper Burma. Ruby Mountains, 1890. Ternate. Branchlets beneath L. indurated finely pubescent, L. usually glaucous beneath, varying in shape, blade 3-12, pet. $\frac{1}{2}$ in. long, n. 10-12, pair, nearly straight, prominent beneath. Heads before opening 2 in. diam. fascicled on stout peduncles. Fr. 1 in. diam. seated on the enlarged 6-8 in. turbinate peduncle-tube. 29. *L. martianica*, Kurz (Ternate). Malabar, hills south of Tapir, 1890 ft. Sabra, 2,000 ft. U. B. 1890. A shrub or small tree, branchlets, pet. underside of L. and inflorescence finely pubescent. L. coriaceous elliptic-oblong, blade 3-8, pet. $\frac{1}{2}$ in. long, n. 10-12, pair, primary and secondary 2-8 in. diam. before opening. 2-8 in. diam. before opening. Fr. heads 1 in. diam. before opening. Perianth 2 in. long, base enclosed in the enlarged perianth tube. 30. *L. vanderplottii*, Wats. Ternate. Eastern New Guinea. Forest. A moderate-sized tree, branchlets, petioles and blade of leaf indurated, very L. coriaceous, elliptic-oblong, blade 3-8, pet. $\frac{1}{2}$ in. long. Fr. heads 1 in. diam. before opening in compact axillary cymes, glaucous beneath. Fr. globose, 2 in. diam. seated on the broad cup-bared 2-4 in. diam. tube. 31. *L. elongata*, Wall. Outer Khasi hills ranges from the Juma hills, water system in Malabar (2,000 ft.), ran further west, Assam. Khasi hills. A moderate-sized or small tree, branchlets and L. thickly rusty-tomentose as well as petioles, underside of L. and inflorescence. L. elliptic-oblong, blade 4-11, pet. $\frac{1}{2}$ in. long, very finely parallel. 2 heads before opening, 2 in. diam. before opening, peduncles 1-2 in. Fr. elongate-ellipsoid, 2 in. long, usually 2 or 6 from one head, seated on the spreading more or less lobed tomentose pedicelled perianth. 32. *L. watsiana*, Kurz. Ternate. Eastern New Guinea. Petioles and underside of L. thickly tomentose, L. coriaceous, obovate-elliptic, blade 3-7, pet. $\frac{1}{2}$ in. Fr. 1 in. long, the lower half included in the thickly tomentose cup-shaped perianth.

33. *L. octocorn*, Heyne. Cornwallis. Travancore, common in secondary forest, ascending to 2,000 ft. A small tree, branchlets, petioles and underside of L. and fr. very densely pubescent, L. coriaceous, blade 3-7, pet. $\frac{1}{2}$ in. long. 2-8 heads subsessile.

... before opening, as also in a short exserted pedicel ...

26. *L. glaberrima* Hook. - ...
 27. *L. subsericea* Hook. - ...
 28. *L. indica* Wall. - ...
 29. *L. Thunbergii* Moench. - ...
 30. *L. chartacea* Wall. - ...
 31. *L. Mansueti* Hook. f. - ...
 32. *L. myriophylla* Wall. - ...

... heads in axillary racemes ...
 ... Eastern species ...

33. *L. indica* Hook. f. - ...
 34. *L. ...* - ...
 35. *L. ...* - ...
 36. *L. ...* - ...
 37. *L. ...* - ...
 38. *L. ...* - ...
 39. *L. ...* - ...
 40. *L. ...* - ...

... heads in axillary racemes ...
 ... Eastern species ...

Species with entire and pinnatifid, 10-20 in. long, serrulate fls. or leaves, the former one to 4 in. from a petiole 10 in. high, in Persia and West India. The genus *Strobil.* (India, Upper Burma, Java, etc.) is similar. *Strobil.* is distinguished from *H. indica*, *H. indica* or *V. indica*, of Java, but is quite different.

Gentiana rosea, A. Nouring, Ann. N. York Acad. Sci., vol. 1, p. 107, 1897, and Bot. South Wales, vol. 1, p. 107, 1897, the Nilgiris and elsewhere. A genus occurring in the rocky mountains. The plants are from 4 to 12 in. high, leaves pinnatifid, the fls. 1-2 in. diam. opposite, sometimes 1-2 in. diam. The corolla is white, the lobes 3-4 in. long, furnished on short pedicels with black, pedicels 1-2 in. long. Pedicels opposite, directed to the side. Fr. an oblique oval, with 1-2 in. diam. diameter, on 1 side, seeds 1 or 2.

ORDER XCIV. THYMELÆACEÆ. Gen. Pl. iii. 156.

Shrubs or trees, rarely herbs, leaf tough. L. alternate or opposite, simple, ovate entire. Fl. usually bisexual, perianth tubular or campanulate, lobes 4 or 5, alternate in 2's. A few genera have whorls alternating with the lobes, regarded as petals by some Botanists, while the lower portion of the perianth is regarded as a hollow receptacle or torus, on the edge of which are inserted small and, in some cases, petals. Gills or scales 4, Prunif. p. 16, 20, and Engelm's Jahrbuch, vol. 1894, p. 491, 1895. Stamens inserted on the inside of the perianth usually twice as many as lobes, those of the outer upper whorl opposite to the lobes. Disk annular, cupular or of distinct scales, sometimes wanting. Ovary superior, usually 1-2 or 3-angled, 1 in each cell, pendulous from the disk. Fr. usually indehiscent, seeds 1 or 2, rarely superior.

Fls. thus are abundant in the back, and increase along the branches. A few species are often developed by stamens which had already formed by the time the ovary fell.

A. Lobe of Perianth 4, distinct 5.

- | | |
|---|--------------------------------|
| 1. <i>alternata</i> , stigma nearly sessile. | 2. <i>diversa</i> . |
| 3. <i>alternata</i> , style long, stigma large. | 3. <i>Eschscholzi</i> (n. 54). |
| 4. In a rare extreme, style short, stigma large yellow. | 4. <i>Wittmanni</i> . |

B. Lobe of Perianth 5.

- | | |
|---|------------------------------|
| 1. Usually opposite, 4 to 5, stigma sessile or sessile. | 1. <i>Littorata</i> (n. 54). |
| 2. Opposite or nearly so, 4 to 5, compound stigma. | 2. <i>Littorata</i> . |
| 3. Alternate, 5, sessile. | 3. <i>Asiatica</i> . |

1. DAPHNE, Linn., Fl. Bot. Ind. v. 193.

Shrubs, usually evergreen, l. alternate, mostly coriaceous. Fl. generally in terminal heads, perianth coloured, persistent & hoary, equal, spreading. Anthers 8 on short filaments. Stigma capitate, subsessile. Fr. coriaceous or fleshy, mostly enclosed until near maturity in the tubular perianth (receptacle). Tests thick, coriaceous. Native SW. Europe, N. Africa, temperate Asia, Himalaya.

A. Fl. heads sessile, bracts of a partly deciduous.

1. *D. genkwa*, Sieber. — Fr. *D. genkwa*, G. & B. III. v. 31, t. 2; Pr. Fl. Ind. III. 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 2681, 2682, 2683, 2684, 2685, 2686, 2687, 2688, 2689, 2690, 2691, 2692, 2693, 2694, 2695, 2696, 2697, 2698, 2699, 2700, 2701, 2702, 2703, 2704, 2705, 2706, 2707, 2708, 2709, 2710, 2711, 2712, 2713, 2714, 2715, 2716, 2717, 2718, 2719, 2720, 2721, 2722, 2723, 2724, 2725, 2726, 2727, 2728, 2729, 2730, 2731, 2732, 2733, 2734, 2735, 2736, 2737, 2738, 2739, 2740, 2741, 2742, 2743, 2744, 2745, 2746, 2747, 2748, 2749, 2750, 2751, 2752, 2753, 2754, 2755, 2756, 2757, 2758, 2759, 2760, 2761, 2762, 2763, 2764, 2765, 2766, 2767, 2768, 2769, 2770, 2771, 2772, 2773, 2774, 2775, 2776, 2777, 2778, 2779, 2780, 2781, 2782, 2783, 2784, 2785, 2786, 2787, 2788, 2789, 2790, 2791, 2792, 2793, 2794, 2795, 2796, 2797, 2798, 2799, 2800, 2801, 2802, 2803, 2804, 2805, 2806, 2807, 2808, 2809, 2810, 2811, 2812, 2813, 2814, 2815, 2816, 2817, 2818, 2819, 2820, 2821, 2822, 2823, 2824, 2825, 2826, 2827, 2828, 2829, 2830, 2831, 2832, 2833, 2834, 2835, 2836, 2837, 2838, 2839, 2840, 2841, 2842, 2843, 2844, 2845, 2846, 2847, 2848, 2849, 2850, 2851, 2852, 2853, 2854, 2855, 2856, 2857, 2858, 2859, 2860, 2861, 2862, 2863, 2864, 2865, 2866, 2867, 2868, 2869, 2870, 2871, 2872, 2873, 2874, 2875, 2876, 2877, 2878, 2879, 2880, 2881, 2882, 2883, 2884, 2885, 2886, 2887, 2888, 2889, 2890, 2891, 2892, 2893, 2894, 2895, 2896, 2897, 2898, 2899, 2900, 2901, 2902, 2903, 2904, 2905, 2906, 2907, 2908, 2909, 2910, 2911, 2912, 2913, 2914, 2915, 2916, 2917, 2918, 2919, 2920, 2921, 2922, 2923, 2924, 2925, 2926, 2927, 2928, 2929, 2930, 2931, 2932, 2933, 2934, 2935, 2936, 2937, 2938, 2939, 2940, 2941, 2942, 2943, 2944, 2945, 2946, 2947, 2948, 2949, 2950, 2951, 2952, 2953, 2954, 2955, 2956, 2957, 2958, 2959, 2960, 2961, 2962, 2963, 2964, 2965, 2966, 2967, 2968, 2969, 2970, 2971, 2972, 2973, 2974, 2975, 2976, 2977, 2978, 2979, 2980, 2981, 2982, 2983, 2984, 2985, 2986, 2987, 2988, 2989, 2990, 2991, 2992, 2993, 2994, 2995, 2996, 2997, 2998, 2999, 3000, 3001, 3002, 3003, 3004, 3005, 3006, 3007, 3008, 3009, 3010, 3011, 3012, 3013, 3014, 3015, 3016, 3017, 3018, 3019, 3020, 3021, 3022, 3023, 3024, 3025, 3026, 3027, 3028, 3029, 3030, 3031, 3032, 3033, 3034, 3035, 3036, 3037, 3038, 3039, 3040, 3041, 3042, 3043, 3044, 3045, 3046, 3047, 3048, 3049, 3050, 3051, 3052, 3053, 3054, 3055, 3056, 3057, 3058, 3059, 3060, 3061, 3062, 3063, 3064, 3065, 3066, 3067, 3068, 3069, 3070, 3071, 3072, 3073, 3074, 3075, 3076, 3077, 3078, 3079, 3080, 3081, 3082, 3083, 3084, 3085, 3086, 3087, 3088, 3089, 3090, 3091, 3092, 3093, 3094, 3095, 3096, 3097, 3098, 3099, 3100, 3101, 3102, 3103, 3104, 3105, 3106, 3107, 3108, 3109, 3110, 3111, 3112, 3113, 3114, 3115, 3116, 3117, 3118, 3119, 3120, 3121, 3122, 3123, 3124, 3125, 3126, 3127, 3128, 3129, 3130, 3131, 3132, 3133, 3134, 3135, 3136, 3137, 3138, 3139, 3140, 3141, 3142, 3143, 3144, 3145, 3146, 3147, 3148, 3149, 3150, 3151, 3152, 3153, 3154, 3155, 3156, 3157, 3158, 3159, 3160, 3161, 3162, 3163, 3164, 3165, 3166, 3167, 3168, 3169, 3170, 3171, 3172, 3173, 3174, 3175, 3176, 3177, 3178, 3179, 3180, 3181, 3182, 3183, 3184, 3185, 3186, 3187, 3188, 3189, 3190, 3191, 3192, 3193, 3194, 3195, 3196, 3197, 3198, 3199, 3200, 3201, 3202, 3203, 3204, 3205, 3206, 3207, 3208, 3209, 3210, 3211, 3212, 3213, 3214, 3215, 3216, 3217, 3218, 3219, 3220, 3221, 3222, 3223, 3224, 3225, 3226, 3227, 3228, 3229, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3265, 3266, 3267, 3268, 3269, 3270, 3271, 3272, 3273, 3274, 3275, 3276, 3277, 3278, 3279, 3280, 3281, 3282, 3283, 3284, 3285, 3286, 3287, 3288, 3289, 3290, 3291, 3292, 3293, 3294, 3295, 3296, 3297, 3298, 3299, 3300, 3301, 3302, 3303, 3304, 3305, 3306, 3307, 3308, 3309, 3310, 3311, 3312, 3313, 3314, 3315, 3316, 3317, 3318, 3319, 3320, 3321, 3322, 3323, 3324, 3325, 3326, 3327, 3328, 3329, 3330, 3331, 3332, 3333, 3334, 3335, 3336, 3337, 3338, 3339, 3340, 3341, 3342, 3343, 3344, 3345, 3346, 3347, 3348, 3349, 3350, 3351, 3352, 3353, 3354, 3355, 3356, 3357, 3358, 3359, 3360, 3361, 3362, 3363, 3364, 3365, 3366, 3367, 3368, 3369, 3370, 3371, 3372, 3373, 3374, 3375, 3376, 3377, 3378, 3379, 3380, 3381, 3382, 3383, 3384, 3385, 3386, 3387, 3388, 3389, 3390, 3391, 3392, 3393, 3394, 3395, 3396, 3397, 3398, 3399, 3400, 3401, 3402, 3403, 3404, 3405, 3406, 3407, 3408, 3409, 3410, 3411, 3412, 3413, 3414, 3415, 3416, 3417, 3418, 3419, 3420, 3421, 3422, 3423, 3424, 3425, 3426, 3427, 3428, 3429, 3430, 3431, 3432, 3433, 3434, 3435, 3436, 3437, 3438, 3439, 3440, 3441, 3442, 3443, 3444, 3445, 3446, 3447, 3448, 3449, 3450, 3451, 3452, 3453, 3454, 3455, 3456, 3457, 3458, 3459, 3460, 3461, 3462, 3463, 3464, 3465, 3466, 3467, 3468, 3469, 3470, 3471, 3472, 3473, 3474, 3475, 3476, 3477, 3478, 3479, 3480, 3481, 3482, 3483, 3484, 3485, 3486, 3487, 3488, 3489, 3490, 3491, 3492, 3493, 3494, 3495, 3496, 3497, 3498, 3499, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3508, 3509, 3510, 3511, 3512, 3513, 3514, 3515, 3516, 3517, 3518, 3519, 3520, 3521, 3522, 3523, 3524, 3525, 3526, 3527, 3528, 3529, 3530, 3531, 3532, 3533, 3534, 3535, 3536, 3537, 3538, 3539, 3540, 3541, 3542, 3543, 3544, 3545, 3546, 3547, 3548, 3549, 3550, 3551, 3552, 3553, 3554, 3555, 3556, 3557, 3558, 3559, 3560, 3561, 3562, 3563, 3564, 3565, 3566, 3567, 3568, 3569, 3570, 3571, 3572, 3573, 3574, 3575, 3576, 3577, 3578, 3579, 3580, 3581, 3582, 3583, 3584, 3585, 3586, 3587, 3588, 3589, 3590, 3591, 3592, 3593, 3594, 3595, 3596, 3597, 3598, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621,

... and ... petals ...

... petals ...

- 1. Leaves ...
- 2. Yawns ...
- 3. ...
- 4. ...

L. LORANTHUS. Lam. p. FL. Bor. Ind. v. 333.

L. opposite, in some sp. both alternate & opp. ...

... names used in the ...

- 1. No bracteoles, or few or several bracts.
- A. Entirely glabrous, or with few hairs only.
 - 1. L. ...
 - 2. L. ...
- B. Petals more or less connate ...
- 10. Racemes or spikes many-fl., glabrous.
 - 1. L. ...
 - 2. L. ...
 - 3. L. ...

... (faded text) ...

(II) Each filament of 1 long and 2 bristled. *L. plurima*, species ...

(III) In short ...

L.

L.

L.

L.

L.

L.

L.

L.

L.

L.

VISCUM, Linn. Fl. Brit. Ind. v. 233

... (faded text) ...

... (faded text) ...

... (faded text) ...

14. *C. pubescens*, small tree, 10-15 ft. tall, 1-2 in. diam. at base. Bark grey, smooth. Flowers yellow. Sepals 3-4, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick. A middle-sized or large tree, branches and petioles pubescent, leaves 1-2 in. long, 1/2-3/4 in. wide. Flowers yellow. Sepals 3-4, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick. A middle-sized or large tree, branches and petioles pubescent, leaves 1-2 in. long, 1/2-3/4 in. wide. Flowers yellow. Sepals 3-4, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick.

15. *C. pubescens*, species, imperfectly known.

16. *C. pubescens*, small tree, 10-15 ft. tall, 1-2 in. diam. at base. Bark grey, smooth. Flowers yellow. Sepals 3-4, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick. A middle-sized or large tree, branches and petioles pubescent, leaves 1-2 in. long, 1/2-3/4 in. wide. Flowers yellow. Sepals 3-4, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick.

13. CYCLOSTEMON, Blume, Fl. Brit. Ind. v, Bur.

Shrub or tree, l. alternate usually coriaceous. Fl. dioecious, spatulate calyx on the old wood, sepals 3-6, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick. A middle-sized or large tree, branches and petioles pubescent, leaves 1-2 in. long, 1/2-3/4 in. wide. Flowers yellow. Sepals 3-4, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick.

1. *C. pubescens*. Stamens numerous, stigmas 2, large, sessile.

A. Fl. axillary.

2. *C. pubescens*, small tree, 10-15 ft. tall, 1-2 in. diam. at base. Bark grey, smooth. Flowers yellow. Sepals 3-4, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick. A middle-sized or large tree, branches and petioles pubescent, leaves 1-2 in. long, 1/2-3/4 in. wide. Flowers yellow. Sepals 3-4, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick.

3. *C. pubescens*, small tree, 10-15 ft. tall, 1-2 in. diam. at base. Bark grey, smooth. Flowers yellow. Sepals 3-4, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick. A middle-sized or large tree, branches and petioles pubescent, leaves 1-2 in. long, 1/2-3/4 in. wide. Flowers yellow. Sepals 3-4, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick.

B. Fl. all on the old wood.

4. *C. pubescens*, small tree, 10-15 ft. tall, 1-2 in. diam. at base. Bark grey, smooth. Flowers yellow. Sepals 3-4, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick. A middle-sized or large tree, branches and petioles pubescent, leaves 1-2 in. long, 1/2-3/4 in. wide. Flowers yellow. Sepals 3-4, broad, imbricate, often supported by a number of small imbricate bracts. Petals 5, broad, 1/2-3/4 in. long. Stamens 10-15, 1/2-3/4 in. long. Ovary 1, 1/2-3/4 in. long. Fruit globose, 1-2 in. diam. at maturity. Bark 1-2 in. thick.

17. *S. villosum* Wight & A. DC. - *S. villosum* Kurz F. Fl. B. Mal. Penins. 1857. A shrubby tree 2-4 ft. tall. L. ovate-oblong, glabrous, 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long. Capsule 2-4 in. diam., 2-3 lobed, lobes 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long. Capsule 2-4 in. diam., 2-3 lobed, lobes 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long.

S. ? S. pedicellat. branchiata pubescent.

18. *S. rotundum* Wight & A. DC. - *S. rotundum* Kurz F. Fl. B. Mal. Penins. 1857. A shrubby tree 2-4 ft. tall. L. ovate-oblong, glabrous, 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long. Capsule 2-4 in. diam., 2-3 lobed, lobes 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long.

19. *S. rotundum* Kurz. - *S. rotundum* Kurz F. Fl. B. Mal. Penins. 1857. A shrubby tree 2-4 ft. tall. L. ovate-oblong, glabrous, 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long. Capsule 2-4 in. diam., 2-3 lobed, lobes 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long.

S. ? S. seeds by nearly so, branchiata glabrous.

20. *S. rotundum* Kurz. - *S. rotundum* Kurz F. Fl. B. Mal. Penins. 1857. A shrubby tree 2-4 ft. tall. L. ovate-oblong, glabrous, 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long. Capsule 2-4 in. diam., 2-3 lobed, lobes 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long.

21. *S. malabaricum* Hook. - *S. malabaricum* Kurz F. Fl. B. Mal. Penins. 1857. A shrubby tree 2-4 ft. tall. L. ovate-oblong, glabrous, 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long. Capsule 2-4 in. diam., 2-3 lobed, lobes 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long.

S. ? S. seeds by nearly so, branchiata pubescent.

22. *S. rotundum* Kurz. - *S. rotundum* Kurz F. Fl. B. Mal. Penins. 1857. A shrubby tree 2-4 ft. tall. L. ovate-oblong, glabrous, 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long. Capsule 2-4 in. diam., 2-3 lobed, lobes 1-2 in. long, 1/2-1 in. wide, apex acuminate, base cuneate, venation pinnate, secondary veins 10-12, parallel, obscurely raised, midrib distinct. Petiole 1/2-1 in. long.

S. ? S. seeds by nearly so, branchiata pubescent.

10. *C. substrata* Kurz. Inwardly hairy. A small tree, young shoots with...
11. *C. substrata* Kurz. Inwardly hairy. A small tree, young shoots with...
12. *C. substrata* Kurz. Inwardly hairy. A small tree, young shoots with...

7. L. penninervial.

(1) Inflorescence 1-verticillate.

13. *C. wallichii* Wall. Arg. Peris. Tenasserim. A middle-sized tree...
14. *C. wallichii* Wall. Arg. Peris. Tenasserim. A middle-sized tree...

(2) Inflorescence glabrous.

15. *C. substrata* Kurz. Inwardly hairy. A small tree, young shoots with...
16. *C. substrata* Kurz. Inwardly hairy. A small tree, young shoots with...
17. *C. substrata* Kurz. Inwardly hairy. A small tree, young shoots with...

B. Ovary glabrous, sepals much enlarged in fr.

18. *C. laxiana* Nimmo. Babulodan Hills, Mysore. A small tree, young shoots with...
19. *C. laxiana* Nimmo. Babulodan Hills, Mysore. A small tree, young shoots with...

21. GALEARIA, Zollinger & Moritz. Fl. Brit. Ind. v. 477.

20. *G. rotlieriformis*, Griff. (the only species); Wight Ic. t. 1880. Bold. Fl. Brit. Ind. v. 477. A small tree, young shoots with...
21. *G. rotlieriformis*, Griff. (the only species); Wight Ic. t. 1880. Bold. Fl. Brit. Ind. v. 477. A small tree, young shoots with...

22. GIVOTIA, Griff. Fl. Brit. Ind. v. 396.

22. *G. rotlieriformis*, Griff. (the only species); Wight Ic. t. 1880. Bold. Fl. Brit. Ind. v. 396. A small tree, young shoots with...
23. *G. rotlieriformis*, Griff. (the only species); Wight Ic. t. 1880. Bold. Fl. Brit. Ind. v. 396. A small tree, young shoots with...

Stems 1-3 in. in diam. ... Disk circular, very flattened, hairy, ... each cell. Fruit a subglobose drupe, 1-1.5 in. diam. Seeds 2, cotyledons 2, ...



Fig. 124. *Myrtaceae*, *Myrtaceae*, Griff. 1.

The forests of the Western Ghats and on the hills of the ... Mysore and ...

Myrtaceae *Myrtaceae*, Hook. & Th. Bot. Beechey, 1844. Branches ...

Myrtaceae *Myrtaceae*, Pennington, Bonpland, Malay Peninsula and Archipelago, China ...

23. TRIGONOSTEMON, Blume, Fl. Brit. Ind. v. 393.

Evergreen shrubs or small trees, l. alternate, pinninerved. Fl. monocious, ...

...insects, blossomed at the ends of branches, ...

Sumbavia macrophylla, Muell. Arg. ...

Manihot Glazovii, Muell. Arg. *Coccoloba* ...

Hevea brasiliensis, Muell. Arg. ...

28. GEI.ONIUM, Roxb.; FL Brit. Ind. v. 458

Evergreen, glabrous ...

G. lanceolatum, Willd.; Wight ...

Conocarpus castaneocarpus, Thwaites ...

ACALYPHA, Lour., Fl. Brit. Ind., v. 141.

Herbs, or low shrubs or trees. L. alternate, petioled, serrate. Usually sessile, usually minute, or axillary spikes, calyx splitting into 4 valvate segments usually 2, or a longer protractile anther-cell divaricate, 2 at the base of the stamens or in separate protractile lobes, sometimes solitary. Sepals minute, 4-5, ovary 3-celled, styles filiform, generally long, branched or bifurcate, often bright-colored. Capsule of 3 small crustaceous cocci. Species 22, tropical and subtropical.

1. *A. trichomanes*, (L.) Poir. Western Peninsula. Pegu and Martaban (Kurz).—Tree. A shrub, young with a finely hairy, 1-urate, pubescent, with numerous minute, spreading glands, blade 1-3, pet. 1-1 1/2 in. Nodes hairy, 1/2-1 in. long, the upper portion crowded by densely crowded minute glands, while the lower portion bears isolated glands. In the axils of small foliose bracts and radially ribbed leaves, small 4-lycelate, solitary, erect, densely hairy, styles with numerous lateral branches. Capsule 3-celled, 2-3 in. diam. 2. *A. acmophylla*, Benth. in Journ. Linn. Soc. xxvi, 498. Upper Burma—Hawaii. Similar to 1, young shoots and young l. clothed with long tangled hairs. L. glandular, long, acuminate, blade 2-4, pet. slender, 1-2 in., spikes usually 1, 1-2 in. long. 3. *A. solitary*. 4. *A. alata*, Kuhn. Western Peninsula. Branches and petioles with pubescence. L. tomentose while young, more or less hairy when full grown, glandular, ovate, blade 1-2, pet. 1-2 in., styles 3, 2-3 in. long. 5. *A. terminalis*, Kuhn. In axils of short spikes, bracts 1-3, styles pink, glaucous with capillary branching, petiole ligulate. 6. *A. Dalzellii*, Hook. f. Bombay. Glandular, glandular, l. finely deep laciniate, ovate-lanceolate, obtusely crenate, blade 2-3, pet. capillary, 1-2 in. long. 7. *A. l. l.* in pairs or long filiform peduncles in the axils of one large reniformly lobed leaf, 1-2 in. diam. Ovary glabrous. 8. *A. nigra*, Burm. New Guinea. Cultivated in India and the Malay Archip. A shrub, l. lanceolate, 3-ranked, petioles scarious, 12-18 in. long, styles deeply pentatifid, segments linear-ovate.

9. *ALCHORNEA*, Swartz, Fl. Brit. Ind., v. 420.

Trees or shrubs, l. alternate, il. dioecious or monoecious, small, apetalous. In clusters on slender or panicled terminal spikes or racemes, bracts minute, disk 0, 2-3 valvate glabrous, splitting into 2-4 valvate segments. 2? sepals 3-5, imbricate. Capsule of 2-3 two-valved crustaceous cocci. Species about 30, tropical.

1. *A. mollis*, Moell. Arg. Outer valleys of Nepal and Sikkim, ascending to 2000 ft. Leaves Northern Circars. A small tree, branchlets petioles underside of l. and in some finely tomentose. L. broad ovate, dentate, serrulate, base emarginate or slightly cordate, blade 1-3 in. long and nearly as broad, pet. 3-5 in. basal n. 2. Capsule 1-2 diam., faintly 2-lobed, smooth, densely pubescent, styles short spreading. 2. *A. elliptica*, Moell. Arg. Sikkim foot of hills, ascending to 1000 ft. Assam. Khaw hills, south of Assam (Kurz). Similar to 1 but l. hairy along nerves only, serrate. Capsule 2-3 diam., ovate-oblong, tubercled, finely pubescent, 1 in. long, crowded by the long filiform styles. 3. *A. rugosa*, Moell. Arg. Tenasserim—Malay Peninsula. L. serrulate, l. elliptic-lanceolate or obovate, 1-1 1/2-4-5, pet. 1 in. long, sepals glabrous and smooth, 1 1/2 in. diam.

Decaspermia elliptica, Moell. Arg.—Syn. *Hymenocallis pinnata*, Kurz. Pegu, Martaban and Tenasserim in rocky forests and on the ground in the Saravali forests (Kurz).—A small tree or shrub, branchless and petioled with rusty pubescent, 3-lobed-laciniate, abruptly acuminate, repand-crenate, blade 1-6, pet. 1-1 in. long, smooth, densely covered with valvate articular scales, 1/2 in. minute in distal nerves or long slender axillary racemes. 2 solitary on short peduncles in racemes 1/2 in. long, ovary trilocular.

10. *MALLOTUS*, Lour., Fl. Brit. Ind., v. 427.

Shrubs or trees, l. mostly evergreen and alternate, in some species opposite, usually long. Fl. monoecious or dioecious, apetalous, disk usually 0. 2? sepals glabrous or broad, valvately 3-5-partite, stamens 8-10, crowded on a central protractile anther-cell adnate to and often widely separated by the long connative. Pistilode 0 or minute. 2? Calyx usually valvately 3-4-lobed. Ovary 2-4-celled, styles spreading or recurved. Capsule 2-3-celled, dehiscent loculicidally, 2-3-valved. Species 70-80, chiefly Indo-Malayan.

- 1. Disk (upper) present orbicular or apiculate. Seeds without fleshy coat.
- a. A1. Capsule echinate or tubercled.
 - 1. L. orbicular or broadly ovate, usually alternate.
 - a. L. petiolate.

9. *M. arbus*, Muell. Arg. - Syn. *M. arbus* - See Kurz E. Fl. II. 229; *Isobrya petiolata* Wight in 1873. - Fern. *Morobos*, Borneo; *Kabuy*, Kurat; *Malacca*, *Tan.* *P. Blau*, *Perak*, *Mal.* *Penang*, *Java*, *Birma*. - Western Ghats from the Konkan mountains to the Nilgiri ranges and valleys of the Sikkim Himalaya, ascending to 2000 ft. in some places. - Small growth forest. Assam, East Bengal, Chittagong, Upper Burma. - 2-4 ft. tall. Leaves in 1's, 2's, or 3's. Branchlets, petioles, underside of l. and inflorescence densely clothed with grey or tawny stellate tomentum. L. usually alternate. Foliolate, acuminate, entire or sinuate-toothed, base narrowly petiolate, rounded or truncate, base 1-3. Fl. dioecious, in axillary and terminal panicles. 1. Base of disk 1 to 2 in. diam., anther cells parallel. 2. Anther 2-3 in. long, very densely clothed with soft hairs, style 1-2, densely papillose. Capsule black, tubercled. 10. *M. barbata*, Muell. Arg. - *Tenasserim*, *Malay Peninsula*, *Konkan* (deglutit). Branchlets, petioles, underside of l. and inflorescence densely white tomentose. L. alternate, petiolate, orbicular, shortly 3-lobed, base 1-1.4 in. diam., pet. 2-6 in. long. Fl. in narrow panicles 2-3 in. long. Capsule 1-2 in. diam., densely clothed with masses of stellate hairs. 11. *M. Roxburghiana*, Muell. Arg. - *Sikkim*, *Assam*, *Tan.* *P. Blau*, *Perak*, *Mal.* *Penang*, *Java*, *Birma*. - *Malay Peninsula*, *Konkan* (deglutit). Branchlets, petioles, underside of l. and inflorescence densely white tomentose. L. alternate, petiolate, orbicular, shortly 3-lobed, base 1-1.4 in. diam., pet. 2-6 in. long. Fl. in narrow panicles 2-3 in. long. Capsule 1-2 in. diam., densely clothed with masses of stellate hairs. 12. *M. Roxburghiana*, Muell. Arg. - *Sikkim*, *Assam*, *Tan.* *P. Blau*, *Perak*, *Mal.* *Penang*, *Java*, *Birma*. - *Malay Peninsula*, *Konkan* (deglutit). Branchlets, petioles, underside of l. and inflorescence densely white tomentose. L. alternate, petiolate, orbicular, shortly 3-lobed, base 1-1.4 in. diam., pet. 2-6 in. long. Fl. in narrow panicles 2-3 in. long. Capsule 1-2 in. diam., densely clothed with masses of stellate hairs.

A. L. not or very narrowly petiolate.

1. *M. nepalensis*, Muell. Arg. - *Himalaya* from *Nepal* to *Sikkim*, *Assam*, *Tan.* *P. Blau*, *Perak*, *Mal.* *Penang*, *Java*, *Birma*. - *Malay Peninsula*, *Konkan* (deglutit). Branchlets, petioles, underside of l. and inflorescence densely tomentose. L. sometimes opposite, quite entire, ovate or orbicular, base 1-2 in. diam., pet. 2-6 in. long. Exserted, shortly 3-lobed, base 1-1.4 in. diam., pet. 2-6 in. long. Fl. in narrow panicles 2-3 in. long. Capsule 1-2 in. diam., densely clothed with long soft tomentose hairs. 2. *M. cochinchinensis*, Lamour. - *Syn.* *M. pseudobata*, Muell. Arg. - *Burma*, *Java*, *Birma*, *Malay Peninsula*, *Konkan* (deglutit). Branchlets, petioles, underside of l. and inflorescence densely white tomentose. L. alternate, rhomboid or orbicular, entire or shortly 3-lobed, base 1-1.4 in. diam., pet. 2-6 in. long. Fl. in simple panicles 2-3 in. long. Capsule 1-2 in. diam., densely clothed with soft tomentose hairs. 3. *M. ritchii*, Muell. Arg. - *Tan.* *P. Blau*, *Perak*, *Mal.* *Penang*, *Java*, *Birma*. - *Malay Peninsula*, *Konkan* (deglutit). Branchlets, petioles, underside of l. and inflorescence densely white tomentose. L. alternate, rhomboid or orbicular, entire or shortly 3-lobed, base 1-1.4 in. diam., pet. 2-6 in. long. Fl. in simple panicles 2-3 in. long. Capsule 1-2 in. diam., densely clothed with long soft tomentose hairs.

B. L. elliptic, oblong or obovate (excepting *M. Roxburghiana*).

1. Calyx spatheous. 7. *M. acuminata*, Muell. Arg. - *Assam*, *Tan.* *P. Blau*, *Perak*, *Mal.* *Penang*, *Java*, *Birma*. - *Malay Peninsula*, *Konkan* (deglutit). Branchlets, petioles, underside of l. and inflorescence densely tomentose. L. alternate, elliptic, base 1-2 in. diam., pet. 2-6 in. long. Fl. in simple panicles 2-3 in. long. Capsule 1-2 in. diam., densely clothed with long soft tomentose hairs. 8. *M. Roxburghiana*, Muell. Arg. - *Tan.* *P. Blau*, *Perak*, *Mal.* *Penang*, *Java*, *Birma*. - *Malay Peninsula*, *Konkan* (deglutit). Branchlets, petioles, underside of l. and inflorescence densely white tomentose. L. alternate, elliptic, base 1-2 in. diam., pet. 2-6 in. long. Fl. in simple panicles 2-3 in. long. Capsule 1-2 in. diam., densely clothed with long soft tomentose hairs. 9. *M. Roxburghiana*, Muell. Arg. - *Tan.* *P. Blau*, *Perak*, *Mal.* *Penang*, *Java*, *Birma*. - *Malay Peninsula*, *Konkan* (deglutit). Branchlets, petioles, underside of l. and inflorescence densely white tomentose. L. alternate, elliptic, base 1-2 in. diam., pet. 2-6 in. long. Fl. in simple panicles 2-3 in. long. Capsule 1-2 in. diam., densely clothed with long soft tomentose hairs.

B. Calyx 3-5-partite. L. usually opposite.

(1) Western species. Minute shining orbicular scales on the underside of l. 10. *M. Lawii*, Muell. Arg. - *Western Ghats* from the *Konkan* mountains to the *Nilgiri* ranges and valleys of the *Sikkim Himalaya*, ascending to 2000 ft. in some places. - Small growth forest. Assam, East Bengal, Chittagong, Upper Burma. - 2-4 ft. tall. Leaves in 1's, 2's, or 3's. Branchlets, petioles, underside of l. and inflorescence densely clothed with grey or tawny stellate tomentum. L. usually alternate. Foliolate, acuminate, entire or sinuate-toothed, base 1-3. Fl. dioecious, in axillary and terminal panicles. 1. Base of disk 1 to 2 in. diam., anther cells parallel. 2. Anther 2-3 in. long, very densely clothed with soft hairs, style 1-2, densely papillose. Capsule black, tubercled.

Gambon, Antimony, Burma, P'lofi, Beng. P'lovi, Mani, Stralera, Kiam, Mal. P'lovi, K'lovi, Upper, Yehow, 1/2, 1/2, Burma.

A woody shrub, for large trees, young shoots thin, pubescent and sometimes full grown, beneath clothed with tomentum or soft wool. L. ovate from a rounded or notched base, acuminate, blade 1-4, pet. 1-3 in. long. Female fl. on long peduncles, solitary or 2-3 together, styles yellow, 1/2-1 in. long. Fr. globose 1-1 1/2 in. diam., pericarp thick, almost woody.

Shrub, 10-15 m. tall, from the Juma mountains, ascending to 3000 ft. Assam, K'lovi, Upper, Bengal, Bihar, Singhbhum, Central India, both Peninsular. Ecology in open places and on river banks, sometimes abundantly from road sinks. Fl. white. Ag. - C. J. Mal. Peninsular and Archipelago. Closely allied and perhaps identical by Austin & T. polycarpa, Benth. in G. B. 19: 10, 918 (T. and G. Benth. in G. B. 19: 10, 918; Wright, 1951). Western Peninsular, 2 in. diam. short shoots, fr. 1/2 in. diam., primary cross 1/2 in. diam.

39. CELODISCUS, Baill.; Fl. Brit. Ind. v. 425.

Shrubs or small trees with stellate hairs, l. opposite, dentate or sinuately lobed, base n. 3-7. Fl. digynous, small, in axillary bracteate spikes or racemes, ♂ clustered in the bracts, ♀ solitary, disk 0. ♂: sepals 3, valvate, stamens 20-22 surrounding a naked central receptacle, filaments free, pistillode 0. Capsule of ♀ two-valved wood, tomentose or clothed with soft prickles and separating from a central axis. Species 5 or 6, Indo-Malayan region.

C. lappaceus, Kurz. Upper Burma, Yunnan. Branchlets, pedicels, underside of l. and under surface of leaf densely clothed with soft stellate tomentum, 5-6 rays, often broad, appressed, rough with raised dots and distant stellate hairs. Blade 4-6, pet. 1-2 1/2 in. long, stipules orbiculate. Racemes short, bracts linear. Capsules enclosed 1 in. diam., densely covered with long soft hairy bristles. *C. longipes*, Kurz. King and Dry Forests of F. M. and Malacca. A small dentate undershrub the aerial stem and young shoots with thick woolly tomentum, mature l. nearly glabrous, orbiculate 2-5 in. diam., pet. 1-2 1/2 in. long. Yuccoides number 5-7 in. long, arising mostly from the base of the rootstock, capsule auriculate, pedicel 2-4 in. long. Two deciduous small shrubs or undershrubs, of which 7 fl. only are known. *C. himalaicus*, Kurz. Yuccoides, pet. 1-2 in. long and *C. glaberrimus*, Kurz. Yuccoides and Malacca, near summit, pet. 1-2 in. long.

40. MACARANGA, Thunberg; Fl. Brit. Ind. v. 445.

Trees or shrubs of rapid growth but not long lived, wood soft spongy, l. alternate, often large and peltate, underside with numerous orbicular scales. Fl. axillary, usually digynous, in axillary panicles, rarely racemose, bracts often large, ♂ fl. numerous, clustered, minute, sepals 2-4, valvate, stamens 1-10, central anther, calyx 4-peltate, 3-4-celled, the connective shorter than the anther-cells, pistillode 0. ♀: Calyx 2-4-lobed or notched, ovary 1-3-celled, styles entire, 1 ovule to each cell. Capsule mostly didymous, often rhizoid, of one coccos only. Embryo small, cotyledons flat, in fleshy albumen. Species 80-90. Tropics of the Old World.

M. grandis fl. in much branched panicles, styles short, recurved.

A. Branches of ♀ panicles not enclosing the fl. clusters.

(1) *M. peltata*.

(2) *M. denticulata*, Muell. Arg.; Kurz P. Fl. n. 387. Vern. *Burno*, Beng. *Tung, petron, Lower; Petron, Upper* Burma.

A mobile shrub or large evergreen tree. Young shoots and l. rusty-tan above with long slender thin-walled hairs, branchlets and petioles glabrescent, glaucous. L. broadly ovate, acuminate, denticulate while young, blade 6-12, pet. 1-2 in. long, underside pale, densely covered with minute orbicular scales, often pubescent, base n. numerous, midrib with 10-12 pair sec. n. prominent beneath, stipules small, fugacious. ♂ fl.: clusters pubescent, approximate,

lowest continuation on the ramifications of panicle, bracts minute. Sepals 2-3, stamens 6-8. ♀ panicles short, fl. or about thick pedicels, bracts minute. Sepals 3-4, ovary 2-celled, styl. 4 short. Capsule didymous, $\frac{1}{2}$ in. diam., blackish-glabrous with minute orbicular glands.

Subshrub or tree from Sikkim eastwards, ascending occasionally to 5,000 ft., mixed forest and on grass lands. Assam, Khasi hills, Chittagong, Burma, Upper India, Wight Ic. t. 185 and 1949 f. 2; Bedd. Fl. Sylv. t. 287a. Vern. *Bijay*, Dehra Dun, outer hills, Singhbhum, in damp valleys, rare. Assam, Khasi hills, Andamans, Nicobar, tree, often gregarious, branchlets stout, glaucous, young shoots and young l. hairy, a very minutely hairy or softly tomentose beneath, with numerous orbicular subulate scales, blade 5-12 in. diam., pet. 3-8 in. long, basal n. numerous, sec. n. from midrib in the axils of a thick fleshy bract, which terminates in a quadrangular or elliptical shining glandular blade, sepals 2-3, stamens 6-10. ♀ panicle hairy, bracts small, sepals usually 4, ovary mostly 1-celled, densely covered with round resinous yellow glands, capsule as a rule globose, $\frac{1}{2}$ in. diam.

(b) L. not peltate.

3. *M. pustulata*, King. Vern. *Kallata*, Nepal. Himalaya from Kumaon eastwards, 3-6,000 ft., chiefly on old clearings. A small often gregarious tree, youngest shoots rusty tomentose. L. entire, broadly ovate, base truncate, blade 4-7 in. long and often broader than long, pet. as long as blade, underside pale with numerous minute orbicular glands. ♀ panicles glandular. Capsule didymous, $\frac{1}{2}$ in. diam., densely tomentose, each cocoon with a large glabrous glandular patch on the back. 4. A sp. nearly allied to 3, collected at Bernardinoy, Upper Burma 5-6,000 ft., by J. W. Oliver. ♀ only, has branchlets, underside of l. and inflorescence softly tomentose, l. ovate, slightly lobed, base truncate or broadly cuneate, blade 4-8, pet. 2-4 in. long, fl. in dense clusters on long interrupted racemes, pedicels short, sepals 5, $\frac{1}{2}$ in. long hairy on both sides, stamens ∞ , glabrous. 5. *M. gmelinaefolia*, King. Karsong 4-5,000 ft. Similar to 3, base of l. broadly cuneate, ♀ panicles with minute decumbent stellate hairs. 6. *M. Gamblet*, Hook. f. Dulkohar forest, Darjeeling terai. A small tree, l. lanceolate, blade 2-5, pet. $\frac{1}{2}$ -1 in., orbicular glands on underside of l. few, scattered, ♀ panicles pubescent.

B. Bracts of ♀ fl. large, concealing the fl. clusters.

(a) L. peltate, entire.

7. *M. Roxburghii*, Wight Ic. t. 1849 fig. 4. — Syn. *M. tomentosa*, Wight Ic. t. 1949 fig. 4; Bedd. Fl. Sylv. t. 287; *M. peltata*, Muell. Arg. ; Prain Bengal Plants 161. Vern. *Chand*, Mar.; *Uppilgi*, Kan.; *Patta*, Tam. Western Ghats from the Konkan southwards, common in evergreen forest. Hills of Orissa and the Circars. — Ceylon, up to region, very common. A small or middle-sized tree, branchlets stout, youngest shoots glabrate-tomentose, l. deltoid or orbicular, broadly peltate, entire or minutely toothed, basal n. numerous, blade 5-10, pet. 3-8 in. long. Panicles rusty tomentose, bracts tomentose, large, dentate, veined, bracteoles concave. ♀ clusters enveloped by bracts and bracteoles, sepals 3, stamens 2-3. ♀ ovary 1-celled, style lateral. Capsule $\frac{1}{2}$ -1 in. diam., covered with hairs and glands. 8. *M. Tanarius*, Muell. Arg. — Syn. *M. andersonii*, Wight Ic. t. 310. Andamans, Nicobars, Malay Peninsula and Archipelago, China. Branchlets stout, young shoots and young l. softly pubescent, bracts 1-4 in. long, tomentose, acute, toothed or pectinate, capsules 2-6-lobed $\frac{1}{2}$ -1 in. diam., densely covered with orbicular scales, with 6-12 subulate soft bristles $\frac{1}{2}$ in. long.

(b) L. not peltate.

9. *M. minutiflora*, Muell. Arg. Tenasserim. Branchlets underside of l. and inflorescence softly tomentose, l. ovate, emarginate-acuminate, denticulate, blade 4-5, pet. 1-3 in. long, basal n. 2. Male panicles sessile, falcate, shorter than pedicels, bracts villous-ovate, pectinately toothed, $\frac{1}{2}$ -1 in. long, stamens 2.

11. ♂ fl. in few-fld. racemes, styles long and slender, l. not peltate.

10. *M. Brandisii*, King. Mulevit, Tenasserim, 2-5,000 ft. Quite glabrous, l. lanceolate, penninerved, blade 4-5, pet. 1-1 in. long. Capsules didymous, with a few soft bracts, in long-pedunculate 1-3-fld. racemes, in the axils of large ovate-lanceolate leafy bracts.

Cleistanthus javanicum, Blume; Bedd. Fl. Sylv. t. 272. Vern. *Vallare*, Tam. Western Ghats from the Konkan southwards in evergreen forests. Outer hills of the eastern Himalaya from Sikkim eastwards. Chittagong, Manipur, Burma, Upper and Lower, Ceylon.

Corolla lobes 5, from rather low within the perianth. No leaf-stipules visible.

A. Fruit a winged samara.

1. Petiole, or peduncle, hair

2. Petiole, or peduncle, glabrous

B. Fruit a drupe.

3. Sepals imbricate.

4. Sepals free, usually chartaceous.

5. Sepals connate, or connate, & reflexed.

6. Sepals imbricate, valvate.

1. *Ulmus*.

2. *Pterocarya*.

3. *Ulmus*.

4. *Ulmus*.

5. *Taxus*.

1. ULMUS, Linn.; Fl. Brit. Ind., v. 480.

Trees, mostly deciduous, in some caducous; fls. in most Indian sp. before the leaves, usually bisexual, in lateral racemes or fascicles, supported by deciduous coriaceous bracts, pedicel articulate, the lower portion (peduncle) hairy, the upper (pedicel proper), usually glabrous. Perianth campanulate, generally persistent, 4-10-lobed, segments imbricate in bud, stamens adnate to perianth tube. Ovary 1-2-celled, styles 2, papillose on the inner face. Achenes solitary or 2, as a rule produce seeds. Fr. indehiscent or flat samaras surrounded by a broad membranous wing. Species 16, temperate regions of the Northern Hemisphere.

A. Pedicels longer than perianth.

(a) Articulation near the base of pedicel, the lower hairy portion shorter than the upper glabrous one.

1. *U. Wallichiana*, Planchon; Brandis F. Fl. Ind. 51. Vern. *Kom* Huz.; *Murchi*, *Naray*, *Talchi*, *Eastal*, N.-W. Himal.

A tall tree, often attaining a large diameter, bark rough, grey, & exfoliating in diamond-shaped scales, branchlets and underside of lvs. usually softly pubescent, lvs. elliptic or obovate, long-acuminate, upper side rough, blade 4-8, pet. 1-1½ in., straight, parallel, 15-20 pair, each terminating in a large serrature, the outer edge of which is serrulate, veins minutely reticulate. Fls. numerous, densely fasciated on short racemes, forming globose heads in the axils of the lvs. Pedicels 1, peduncle supported at the base by coriaceous pubescent bracts. Perianth ½ in. long, narrowed into a glabrous pedicel as long as itself, which is articulated with a hairy peduncle ¼ in. long, lobes 5 obtuse, ciliate along the edge, ovary slightly hairy. Samara thinly membranous, elliptic, ½ in. long, seed in the centre of the samara.

North-West Himalaya, India to Nepal, 2,500-10,000 ft. Fl. March, April. Bark grey when erect. Often planted and lopped for cattle fodder every other year.

(b) Articulation of pedicel near the perianth, the lower hairy portion much longer than the upper glabrous one.

2. *U. lasiocoma*, Hook.; Wall. Pl. As. Bur. v. 200. Vern. *Tigla*, *Lawan*, *Talchi* and *Lawan*, Upper Burma, Sikkim, foot of hills ascending to 8,000 ft. Thibet, Assam, Khasi, Jaintia, Chittagong, Bama, Upper and Lower. A large tree, bark white and reticulate, usually hairy, lvs. ovate, lanceolate, serrate, blade 1-1½, pet. slender, 1 in. long, very serrulate, nearly as prominent as set. b. Perianth 5-lobed, lobes 1 in. long, very oblique. Generally leafless during part of the fl. when flowers are in fl.

B. Fl. nearly sessile, pedicel in fl. shorter than, rarely as long as, calyx.

3. *U. villosa*, Brandis in Ind. For. xv. 219. Vern. *Mausan*, *Hastara*, *Bora*, *Kula*, *Sutlej* and the *Pabar* valley; *Mahlaug*, *Kunawar*.

A large tree, branches drooping, branchlets and lvs. glabrous. lvs. ovate-oblong, blade 1½-4 in., pet. slender, 1-1½ in. long, set. n. 14-18 pair, each terminating in a large serrature, the outer edge of which is serrulate, the meshes of the reticulate veins larger than in 1. Fl. 10-15, in dense sessile fascicles. Perianth ½ in. long, sessile and articulate on a short hairy peduncle.

A middle-sized deciduous tree, bark smooth, bluish grey, striate with horizontal wrinkles, branchlets, petioles and young leaves tomentose. Leaves alternate, lanceolate, acuminate, base very obtuse, sharply serrate, serrations coarse, blade 3-5, pet. $\frac{1}{2}$ in. long, the lateral basal n. extending $\frac{1}{2}$ beyond the middle but not to the tip of the leaf. Fl. with or before the l. Drupes 1-2 in. long. Two distinct varieties, a fr. large purplish-black nearly 1 in. long (A. N. Scharf), a fr. yellow or red $\frac{1}{2}$ in. long (T. B. Poir., N. Scharf).

Himalayan, Solomon range, Salt range, North-West Himalaya, from sea level to 5,500 ft. Often planted also in the plains of the Punjab. Fl. March-May. Pollinated by middle bees.—Western Asia, Mediterranean region, Caucasus, India, and elsewhere. *C. cinnamomea*, Hook.—Syn. *C. serotina*, Planch.; Wight Ic. p. 1070. *C. trisecta*, Burck. Bot. Fl. Syria, t. 312; *C. Hamiltonii*, Planch. O. Ind. Nep. Striking from foot of hills to 5,000 ft. below. Central Prov., Mysore, Orissa, Southern Circars and hills of the Eastern Decan. Western Ghats, Central and Khasi hills, Chittagong, Manipur, Burma, Upper (Tibet) and Lower. Usually called *C. cinnamomea* in the lower half, sepals usually 4. *C. acuta*, Wall., usually pubescent 4-5 in. in Upper Burma.

3. Fertile fl. in axillary dichotomous panicles.

C. cinnamomea, Lindl. Sikkim, lower hills to 2000 ft., Chittagong, Pegu, Marazion, Kankai, Ceylon, moist region, common, the wood when fresh very scaly, lacy. Branchlets usually rusty-pubescent, l. long-acuminate, serrate and often indistinctly crenate, test. n. and veins obscure, sepals usually 5.

B. Leaves almost entire, base equal-sided. σ and fertile fl. in axillary dichotomous panicles.

C. Wightii Planch.; Wight Ic. t. 195.—Syn. *Selenicarya Wightii* Miq. Hills of the Northern Circars, the Decan and Mysore, Nilgiris, Tinnevely, Anaimalai, Kanni.—Ceylon. *Thala-Kala-Mudali*, Tel.; *Hulava*, Nilg. A small or middle-sized evergreen tree, l. rigidly coriaceous, entire or very sparsely crenate-serrate, blade 2-6, pet. $\frac{1}{2}$ in. long, young foliage pink, panicles usually twice the length of petiole, fr. scarlet, $\frac{1}{2}$ in. long.

4. GIRONNIERA, Gaud.; Fl. Brit. Ind. v. 485.

Evergreen trees or shrubs, l. coriaceous, penninerved, entire or serrulate at the tip, sec. n. impressed on the upper and very prominent on the underside. Fl. dioecious. σ : Sepals 5, broad, obtuse, imbricate, striate, σ , erect in bud, patillode woolly. γ : Sepals narrow, acute, ovary sessile, style central, arms 2, filiform, ovule pendulous. Drupes usually 2-keeled, endocarp hard, embryo contorted. Species 8-10, Indo-Malayan region, China.

G. subaequalis, Planch.—Syn. *G. acroica*, Planch., var. *subaequalis*, Kurz F. Fl. B. 470. Andaman, Tenasserim.—Ceylon, Malay Peninsula and Archip. China. A middle-sized tree, lanceolate, stipules, petioles, underside of l. and young strigose with long hairs, l. elliptic, acuminate, rough beneath, blade 3-8, pet. $\frac{1}{2}$ in. long, young branches and veins strongly reticulate. σ cymes 1-2 in. long. γ fl. solitary or a few together. Drupe ellipsoid, $\frac{1}{2}$ in. long, compressed, minutely keeled. *G. reticulata*, Thunberg, Fl. Sylva t. 818.—Syn. *G. cuspidata*, Kurz F. Fl. B. 470. Striking other hills to 2000 ft. Khasi and Naga hills, Upper Burma. Eastern slopes of the Pegu Yoma (Khasi). Evergreen forests of the Western Ghats from Nizam's schistwards, Range of South Mysore (D. B. 1886).—Ceylon, Java. A tall tree, stem tomentose. Youngest shoots minutely strigose, otherwise glabrous. L. elliptic, acuminate-lanceolate, serrulate, veins minutely and elegantly reticulate. Drupe glabrous, $\frac{1}{2}$ in. long. *G. turida*, Kurz, Andaman. A middle-sized tree quite glabrous, l. elliptic, serrate, surface rigidly coriaceous, entire, sec. n. arching, test. n. and veins obscure.

5. TREMA, Lour.; Fl. Brit. Ind. v. 488.

Shrubs or trees, l. serrate, basal nerves 2-7, stipules lateral, transdeciduous. Fl. unisexual and bisexual, in small axillary cymes, sepals 4-5 imbricate-valvate. σ : Stamens 4-5, erect in bud, patillode small glabrous. Drupe supported by the persistent sepals, endocarp hard. Albumen fleshy, embryo curved, cotyledons narrow. Species 28-30 tropical and subtropical.

1. Small tree, 20-30 ft. tall, 2-3 in. diam. at base. Barks grey, smooth, fissured in the bark. Flowers small, greenish-yellow. (1) *Malhotra* (1941)
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- (100) *Malhotra* (1941)

1. FICUS, Linn.: Fl. Brit. Ind. v. 494

Trees or shrubs, often epiphytic, sending out aerial roots, many species creep and climbing by means of adventitious roots on stems, on the ground and over rocks, at times subsequently developing an erect stem with a spreading crown. Juice milky. Narrow undulating concentric bands of latex tubes in the wood. L. usually alternate, stipules deciduous in most species, leaving scarious scars. Fl. minute together with numerous thin bracts, enclosing the inner surface of a hollow globose or pear-shaped receptacle for which sometimes lengthens out into a stalk, supported by 3 or 4 basal bracts, the mouth of the receptacle closed by numerous scales in several rows, the inner scales turned down, and those of the outer row being erect or spreading. Fl. 5 kinds: 1 with 1-3 anthers, 2 without, 3 with a rudimentary pistil, 4 with 1-2 stamens, 5 with a short style, 6 consisting of a pedicellate perianth without stamens or pistil. Perianth of 2-4 sepals, or gamopetalous, 2-4 partite. In the species of one section (*Crotonifera*) 7 and 8 are in the same receptacle, in the other species 7 and 8 are in one receptacle, 9 and 10 in another set of receptacles. In some species 1-6 are mixed with the others, as a rule they are only found near the mouth of the receptacle, in some species few, in others numerous covering half the inner surface. The galls do not usually develop in axils, but are raised by Hymenoptera insects (*Blastophaga*) which lay their eggs in them. The perfect insect on leaving the receptacle, takes away the pollen of the 3 fl. and thus fertilizes the 4 fl. in another receptacle. The 5 receptacles generally require several months to ripen, the fruit as a rule becomes fleshy and across numerous minute achenes. Embryo curved, in a scanty albumen.

The following key to the species of this large genus may be found useful.

1. Axillary or lateral, those in which the leaf is solitary or in pairs, rarely in the axils, I. *Whorliferæ* III. *oppositæ* IV. *verticillatæ* V. *axillares* VI. *axillares*
- A. L. lanceolate or oblong, width as a rule less than one-third the length.
- (a) L. entire or nearly so: *57. ciliolata*, *58. lepidota*, *61. erecta*, *62. glandulifera*, *66. clavata*, *68. reticulata*, *70. crumena*, *71. ovata*, *72. ovata*, *73. ovata*.
- (b) L. serrate or lobed: *74. quercifolia*, *75. chrysocarpa*.
- B. L. ovate or obovate, width as a rule more than one-third the length.
- (a) L. entire or nearly so: *57. ciliolata*, *58. lepidota*, *61. erecta*, *62. glandulifera*, *66. clavata*, *68. reticulata*, *70. crumena*, *71. ovata*, *72. ovata*, *73. ovata*.
- (b) L. denticulate, serrate or lobed: *4. longicaulis*, *12. asperifera*, *35. atrovirens*, *53. palmata*, *54. palmata*, *57. ovata*.
- C. L. very obtuse, frons laminate to broadly ovate: *7. heterophylla*, *55. Alata*.
- D. L. ovate, deeply lobed: *54. Malabarica*.
- E. L. very unequal-sided: *11. obscura*.
- F. L. as a rule cordate-acuminate, tertiary nerves very prominent: *1. glabra*, *3. scopulifolia*, *28. elongata*, *34. rostrata*, *57. auriculata*, *70. acuminata*.
- (1) *Acropetiales* (axillary pairs, no. *lysellata*). Large tree, epiphytic when young, often stem-climbing: I. *attenuata*; II. *vestigiata*, pp. 4-56.
- (2) *Strobiliferæ* in dense clusters on tubercles or on leafless racemes or panicle-like branches, from the trunk or larger branches: L. sometimes opposite: I. *Chalchicomula*, 48-54; V. I. *Neesii*, pp. 72-73.

SECT. I. *Tetrastromphala*. ♂ fl. monoandrous, containing a rudimentary pistil, in the same receptacles with gall fl. ♀ fl. in separate receptacles.

1. *F. gibbosa*, Blume; Kuhn, Ann. Bot. Gard. Calcutta, 1: 2.—Syn. *F. heterophylla*, Roxb.; Wight, Ic. t. 650; *F. Anapala*, Roxb.; Wight, Ic. t. 652; *F. Guleriata*, Roxb.; Wight, Ic. t. 651; *F. parvifolia*, Kuntze; Bonpl. F. Fl. Ind.; *F. var. var.*, Vahl; Kunz, F. Fl. ii, 451. Var. *Chalchicomula*, G. Don; *Chalchicomula*, Jalapour; *Chalchicomula*, Satpura range; *Dallin*, *Dallin*, *Mari*, *Mari*, *Ipoh*, *Nyctea*, *Thaly*, *Burm.*

A small tree, often a large tree, often epiphytic or climbing, enclosing the trunk of trees in a perfect network of branches, or creeping along walls and on the sides of wells. L. thinly coriaceous, smooth above, rough beneath, elliptic-ovate or lance-acuminate, often very unequal-sided, angular and with a few large teeth. Blade 3-5, pet. 1 in., sec. n. 4-6 pair, joined by arching intra-vascular veins, the lowest pair from the base usually running near the edge, lateral veins and tertiary a. distinct. Receptacles minutely hairy, 1-1 1/2 in. diam., peduncle up to 1/2 in. long, bracts at base of peduncle. Ovary in fourth fl. axile. Fr. yellow when ripe. A variable species, two varieties: a. *prostrata*, l. elongate-acuminate, nerves pellucid. b. *peruviana*, l. 10-40 rib on each, nerves opaque.

1. *F. ovalata*, Blume; Kuhn, Ann. Bot. Gard. Calcutta, 1: 6. Chittagong, Assam, Burma, Bahr., Guada Nagar, Centr. Prov., Western Peninsula, Fr. Ind. Mus., Java, the country common. Malay Peninsula and Archip. *Blume*, *F. ovalata*, Blume; Kuhn, Ann. Bot. Gard. Calcutta, 1: 6. Chittagong, Java, Sumat., eastern Archip., Malabar—Malay Peninsula, Archip., China. A large dioecious shrub, the young tree climbing young trees, minutely pubescent. L. membranous, glaucous, entire, marginate, ovate, elliptic-lanceolate or subcordate. Blade 4-10, pet. 1-1 1/2 in. long, sec. n. 4-6 pair, venation obscure. Fl. ♂ containing a rudimentary pistil or pistil, in axils of the branches, receptacles on different plants, perianth green, yellowish, with shining base. Fr. orange-yellow with white dots. *F. scopulifolia*, Wall. (Beng. Ann. t. 9. Assam, Hual hills, Chittagong, Burma—Malay Peninsula, Java, Sumat., eastern Archip., Malabar, Java, the tree with an upright narrow tall, blade 2-4, 1-2 1/2 in., stipules minute. Receptacles shortly pedunculate, scarious when ripe, yellow when ripe. Very similar to *F. rostrata*, Lamk., which is also larger in pet. and fl. without a pistil.

SECT. II. *Vestigiata*. ♂ fl. as a rule monoandrous, in the same receptacles with ♀ and gall fl., stigma elongate, usually acute and feathery. Large trees, the majority of species evergreen, as a rule epiphytic when young, frequently producing aerial roots, which either descend straight into the ground, developing into secondary stems, or form a network, enclosing the trunk of the tree.

which the lig. has a prominent, often ascending, rib, above or below, or both, the rib circular. Excessively the support is often killed by the host, especially in the case of the *Ficus*. L. mostly alternate, entire or imbricate, glabrous or finely, never rough, stipules broad, as a rule minutely hairy, stipular scars minute. Br. pairs mostly sessile, in pairs, axillary, below the scars of the old ones, supported by 2 broad bracts.

3. *Sec.* n. prominent, distant, not more than 10 pair.

4. Petioles short, less than one-third the length of blade.

5. Mature L. glabrous.

1. *F. bengalensis*, Lam.: King, Ann. L. t. 15.—Syn. *F. Indica*, Roxb.; *Veronica bengalensis*, Gray; Wright, l. c. 1909; *Banyan*, Sans. Patr. Vern. Bot. Burd. Baryat, Hindi; *Wool. Mar.*: Murray, *Tal. Mal. Camb.*, *Archi. Kan.*: *Fiji myrsine*, Lam.

A large tree, branches spreading, leaning down to the ground numerous aerial roots, which afterwards become trunks. Young shoots pubescent, L. glabrous when mature, approximate near the ends of branches, ovate, usually obtuse, base cordate or pointed, basal n. 3-5; the midrib with 4-9 pair of setae; blade 4-8, pet. 1-2 in. Fr. globose, pubescent, 1/2-1 in. diam., sessile, somewhat woody tips, supported by 2-4 broad obtuse bracts.

Indigenous in the entire Indian tract and the Western Peninsula. Commonly planted by Hindus throughout India as far north as Peshawar and in the Outer Himalaya as high as 4000 ft. Aerial roots which have a crown 10-500 ft. in diam., supported by numerous often more than 100 roots. Fr. Apr.-July. 5. *F. altissima*, Burser; King, Ann. L. t. 19, 21.—Syn. *F. leucifera* Roxb. Wright, l. c. 554. *Qum*, Himalaya, from Nepal southwards, ascending to 5000 ft. *Asana*, Khasi hills, Chittagong, Andamans, Lower Burma—Siam, Malay Peninsula and Archip. China. A tall tree, aerial roots few, young shoots and outside of stipules minutely hairy, when older quite glabrous. L. elliptic, sometimes ovate, base rounded, but not 4-5 pair, usually 1-2 in. long, 1-2 in. long. Fr. sessile, oval, 1/2-1 in. long, rarely flattened, woody tips.

6. *F. Balfourii* King, Ann. Bot. 31.—Syn. *F. Eleani* Gray, Burser in Journal Bombay Natural History Society xiii, 158. *Tinocallium Balfourii* in evergreen forests 1-2000 ft. A large tree, wholly glabrous, trunk irregularly shaped, branches wide spreading. L. shining, dark green when old, pale when young, base cordate, usually serrulate, blade 5-12, pet. 1-1 1/2 in., setae 12-16 pair, the lowest pair basal, stipules golden yellow, often several in long. Anthers sessile. Fr. oval or subglobose, 1 in. long, with several pairs of broad distinct vertical ridges, green with yellow spots when ripe, basal bracts 2 small, petioles up to 1 in. long. 7. *F. travancorica*, King, Ann. L. t. 21. North Travancore hills, 2000 ft. A large tree, fr. 1 in. diam., base truncate, blade 5-9, pet. 1-1 1/2 in. Fr. globose 1 in. diam., petioles shorter than fr.

8. *F. glauca*, Blume; King, Ann. L. t. 25.—Syn. *F. senilis* Wall. Travancore hills. A large slender, 1-2000 ft. long, shortly cuspidate, blade 5-7, pet. 1 1/2 in., setae 7-10 pair, the lowest basal, stipules up to 2 1/2 in. long. Fr. globose, truncate, 1-1 1/2 in. diam., petioles short.

9. *F. glaberrima*, Blume; King, Ann. L. t. 18.—Syn. *F. Theobaldi* Miq. *Ver. Khasi*, *Diale*, Hindi.—In the high tract, ascending to 2000 ft. from the Juncus, southwards Khasi hills, Chittagong—Meyay forest, Travancore (D.B. March 1867). *Asana*, *Malay Archip.* A large tree, at times a large epiphytic shrub (D.B. Roy, *Indo-Gangetic Malay forest*). As a rule quite glabrous, minute hairs sometimes on young shoots, L. and petioles. L. oblong-lanceolate, acuminate base, usually ovate, blade 5-7, pet. 1-1 1/2 in. long, setae 8-10 pairs at an angle of 80° to the midrib, the lowest pair basal, remaining near base, size of L. Fr. 1 in. diam., orange-brown, 5-6 pair, basal bracts deciduous, petioles slender, as long as fr. 10. *F. Rochetii*, Miq.; King, Ann. L. t. 42. Sikkim, lower hills—Khasi hills, Chittagong. L. broad-ovate, blade 6-12, pet. 2 1/2 in., setae 8-10 pair, the lowest pair from the base, stipules up to 1 in. long, caducous. Fr. sessile, 1/2 in. diam., the lower third in an entire cordate-lyrate cup, consisting of the minute basal bracts.

11. *F. parvica*, Roth; King, Ann. L. t. 86. *Vern. Job*, *Mal.*: *Siam*, *Mal.*: *Burma*, *Assam*, *Cachar*, *Chittagong*, *Lower Burma*, *China*, *Nagpur*, *Malay Archip.*, *Galavari*. Evergreen forests of the Western coast, ascending to 1000 ft. from North Kanara southwards.—Malay Peninsula and Archip. China. A very large unbranched tree, in a dry climate smaller, trunk 6 in. dia., an elevated young

Young branches, weak supported by high branching buttresses. L. shining glaucous above and shortly acuminate, blade 5-10, pet. 1-2 in. stipules pink, up to 1 in. long. Receptacles enclosed, white, young, by located in hollow which fall off, leaving a sun or shaped base under the fr. Fr. smaller greenish yellow when ripe, ovate-oblong, 1/2 in. long.

Outer Himalaya from Nepal eastwards ascending to 5000 ft. Assam. Upper Burma south to 21° N. Fr. H. S. The tree as a rule germinates on the branches of tall forest trees, grows very slowly at first, but soon begins to shed its buttresses, and when these have taken root begins to make rapid progress. Early in the tree stands on its own legs, and attains a height of 100-200 ft. with a diameter of 10-20 in. Cultivated on a large scale for the yield of India Rubber since 1874 in Java and since 1874 in Assam. *Syn. F. Benaviana*, Lindl. *Art. Bot. Beechey*, Xuzi; Kunz. *Ann. L. t. 12*.—*Syn. F. vulgare*, Koch. *Co. Pl. t. 125*. *Wright*, *Jour. Voy. Asia*, *Nepal*, *China*, *Ind. Archip.*, *Assam*, *Vol. Mal.*, *Nyasa*, *Malacca*, *Burma*. Part of the Eastern Himalaya, Assam, Ceylon, Andaman, Java, Malacca, Sumatra, in China, Nepal, Northern China, Transvaal, 1000-2000 ft. summit of Mount Omei—Malay Archip. China. A large tree with a spreading crown and drooping branches, perfectly glabrous. L. thickly coriaceous, shining, elliptic-obovate, acuminate, blade 3-5, pet. 1/2 in. Fr. sessile, yellow or red when ripe. 1/2 in. diam. (in the young plants), basal bracts small. *Syn. F. Benaviana* (under fr. small pet. 1/2 in. diam. Assam) (Kunz. *Malay Archip.* *Benaviana* cultivated, *Andaman*, *Java*). The size of the tree is however varied greatly. *Syn. F. Trinani*, King. *Burma*, *Bihar*, *Bellary*, *Ceylon*. A very large tree, entirely glabrous, l. membranous, elliptic, blade 3-4, pet. 1 in. Fr. sessile, 1/2 in. diam., orange yellow or red, not dotted. 1/2 in. diam., basal bracts small, ovate-pointed.

Sect. III. *Synecia*. σ fl. monandrous in the same receptacle with gill fl. γ and δ outer fl. in separate receptacles. Neuter fl. consist of 3 linear sepals and long pedicel without any trace of either anther or pistil.

27. *F. calcarata*, Miq.; King. *Ann. L. t. 11*.—*Syn. F. pumila*, Kunz. *Transvaal* (Kunz.). Malay Peninsula Archip. Climbing stem often 100 ft. long, bearing to the base of stem by innumerable slender branching rootlets. L. glabrous, rigidly coriaceous, entire, blade 3-4, narrowed into pet. 1/2 in. sec. n. 3-10, pet. 1/2 in. diam. the underside of the l. the surface takes between the two lateral veins. Fr. on the stem sessile, solitary, pale yellow or orange when ripe. 1-1 1/2 in. diam., 1/2 in. long.

Sect. IV. *Sycolisium*. σ fl. monandrous with gill fl. in one set of receptacles, γ in another set. L. in most species small and rough.

A. Erect shrubs or trees.

(a) L. entire or nearly so, caudate-acuminate.

28. *F. clavata*, Wall.; King. *Ann. L. t. 11*.—*Syn. F. trichocarpa*, Miq. *Ver. Kiamoy*, Jans. *Kiamoy pale*, Burma.

At erect shrub or small tree, sometimes attaining a large size, branchlets rough. L. rigidly membranous, lanceolate, sometimes oblanceolate or ovate, upper part dentate, caudate-acuminate, tail tapering 1/2-1 in. blade 4-8, pet. 1/2 in. sec. n. 5-10 pair, the lowest pair from the base of l. running as lateral marginal nerves to the apex, tert. n. and reticulate veins prominent beneath, stipules 1/2 in. lanceolate, caducous. Receptacles solitary and axillary, of two kinds, globose, 1/2 in. diam. and obovoid, up to 1/2 in. long smooth or warty, the γ receptacles smaller than those with σ and gill fl. peduncles 1/2 in. basal bracts small, fr. yellow.

Himalaya, lower hills ascending to 5000 ft. from the Sikkim eastwards. Nepal. Western parts of Bhadrach (Duthie). Khasi hills. Manipur. Upper Burma. Fr. April-June. Malacca, China. *Syn. F. sikkimensis*, Miq. *Sikkim* 2-1900 ft. Erect hills. A small tree, sometimes epiphytic, l. membranous, nearly glabrous, entire, lanceolate or oblanceolate, tail 1/2 in. blade 3-7, pet. 1/2 in. Recept. solitary or clustered, nearly sessile, 1/2 in. diam.

(b) L. denticulate, crenate, serrate or deeply lobed, not caudate-acuminate.

29. *F. brevicaarpa*, Miq.; King. *Ann. L. t. 11*. *Andaman*.—*Javica*. Java. A shrub, branchlets scarcely hispid. L. elongate-elliptic or obovate, slightly denticulate, blade 5-10, pet. 1/2 in. Receptacles globose, 1/2 in. diam., peduncles solitary, axillary or from the base of leaf. *Syn. F. obscura*, Blume; King. *Ann. L. t. 11*. *Sikkim*. From the base of hills. *Syn. F. obscura*, Blume; King. *Ann. L. t. 11*. *Sikkim*. From the hills and valleys ascending to 5000 ft. Khasi hills. Burma King.—Malay

1797 and 1800; Fr. edible, ripe Nov. 2-Sept. 4 Bark. *F. quadrata* Willd.; King Ann. 1833. Sikkim, Sikkim, ascending 5000 ft. Kashmir. Caucasus. *A. glaberrima* (L.) Jacq. var. *entire*, long serrulate, blade 9-10, pet. 2 in. stipules as long as pet. base sessile. In India, in the axils of such leaves solitary or in short racemes long prostrate leaves as *F. Ribes* Reinw. & King, Ann. 1. t. 114. *Salmia* (L.) Kurz. Malay Peninsula, M. Archip. New Guinea. Number to 52, sheets 1890. The minute hairs, l. 1/2-1 in. Perianth 1/2 in. diam. This and some allied species are described by Salmia-Laubach in Bot. Zeit. 1887, 1891. *F. Ratilosa*, Reinw. & King, Ann. 1. t. 129, 183. *Khasi* (Roxb.) Chittagong, Java, Borneo (Roxb.) Malacca, Penang, and Arquip. *F. arvensis* (Roxb.) & King, Ann. 1. t. 129, 183. *F. arvensis* probably also includes *F. Major* L. King, Ann. Malay Peninsula. A shrub or small tree, branches stout, often hollow, nodes of young shoots to 1/2 in. diam. hairs, l. somewhat minute, 1/2-1 in. diam. stipules opposite, glabrous, generally undivided, sessile or slightly corrugate, along venation blade 1-2, pet. 1-2 in. long, stipules sessile. Receptacles 1-1 in. diam. axillary, or on the old wood, often 1/2-1 in. diam., pedicels 1/2-1 in. long.

St. VI. *Evagee*. 3 fl. as a rule, *Andromeda*, *leptocoma* 1, *hista* 1-3, *acuticulis* and *laeta* 2 or 3. *Cochia* generally 3, sometimes in the same receptacle with gill fl. ?

fl. in 6-stam. receptacle. l. alternate, receptacles axillary.

A. Foot shrubs or trees.

α. Branchlets and underside of l. densely hairy; l. dentate, serrate or lobed.

F. palmata, Persk.; Collett Simla Fl. 460. Sp. 14; King, Ann. 1. t. 183. Syn. *F. grandis* Roxb.; *F. Lyata* Roxb.; Wight, Ind. 1. 949. Vern. *Bela*, *Khauri*, Hind.; *Pachira*, Har.; *Phala*, Jains.; *Aeseri*, Merv. Baluchistan. Eastern slopes of the Sulaiman range, Salt range and plains of the Punjab. Mt. Abu, Merwatta, North-West Himalaya from the foot to 5000, on the Sutlej to 9000 ft., eastwards as far as Nepal. Cultivated in North India. A small or middle-sized tree, bark smooth, grey, branches solid with a large pith, branchlets, petioles, young shoots and underside of leaf-branches, l. rough above, broad-ovate, dentate, at times deeply lobed, base truncate or cordate, sometimes abruptly narrowed to the petiole, blade 3-5, pet. 1-2 in. long, 3-5 long nerves, ax. to 10, midrib 8-9 pair. Perianth ciliate with long hairs. Receptacles axillary, more or less ear-shaped, 1-1 in. diam., usually pubescent, yellow, edible when ripe, basal bracts deciduous, at the base of the stalk, which often lengthens out to 1 in. in the fr. ripens, peduncle 1-1 in. *F. fulva*, Reinw. & King, Ann. 1. t. 187. *Andaman* and *Nepal*—Malay Peninsula, and Archip. l. ovate, denticulate, often deeply lobed. Receptacles sessile, 1 in. diam., densely hairy, perianth glabrous. *F. carica*, Linn.; *Honey tree*, Trans. Linn. Soc. III (1838) t. 46; *Salmia-Laubach* in Bot. Zeit. 1882, 1892. The *Fig tree*, Vern. *Asfir*, Hind. Indigenous in Baluchistan, Afghanistan, Western Asia and the eastern Mediterranean region. Cultivated in N. W. India and the Deccan. A shrub or small deciduous tree, branchlets and under-



FIG. 188.—*Ficus carica*. Ham. 1.

of the leaflets or branchlets. The leaflets are 2-3 times longer than broad, blade 1-2 in. long, 1-2 in. wide, elliptic-oblong. The leaf is dense or thickly pubescent above, especially beneath, with glandular hairs, while above is a shorter, more widely spreading pubescence, becoming hairy in the leaves in the lower parts of the tree. The dist. veins in the shape of receptacles and lines so great, that the leaflets were regarded as distinct genera or species. The 2 trees being used together. The receptacles of both were lengthened out into a stalk, at the base of which are 2-3 bracts or bracts. In the Malayan region twigs with receptacles of the *Caprirea* are tied to the tree, in order to facilitate fertilization. A few are occasionally made into the receptacles of the *Caprirea*.

55. *F. hirta*, Vahl: King, Ann. L. 1. 168, 169; Wight, bot. 674.—Syn. *F. hirta*, Ait. Mill.; *F. hirta*, Hook.; Wight, bot. 679; *F. hirta*, Ham. Subul. Javanica, and other hills, from Nepal eastwards, ascending to 3000 ft. Assam, Khasi hills, Malay Peninsula, Upper and Lower, often in deserted Tangayans—Malay Peninsula and Archipelago. A shrub or small tree, branchlets pubescent, under side of l. and receptacles hairy with soft tawny or rusty lanuginous or long silky hairs. L. serrate, variable in shape and size, from broad ovate to oblong-lanceolate, entire or deeply 3-5-lobed, upper side harsh with scattered hairs. Blade 6-10, pet. 1-2 in. long, basal n. 3-7. Receptacles 2-3 in. diam. with long stiff hairs in axillary pairs, small or nearly so; 2 in. diam. diamorphic, those with 2 fl. globose, those with 3 and 4 fl. oval almost round, the fertile receptacle red when ripe. The species is distinct, 2 and 3 receptacles as a rule, also different bushes (Graf in Solms-Laubach in Bot. Zeit. 1866, 416). 56. *F. hirta*, Ait. Mill.; King, Ann. L. 1. 168. Malayan (Khasi)—Malay Peninsula and Archipelago. Branchlets and underside of l. more or less tawny, or brown tomentose, lanceolate or oblong-lanceolate, serrate, round 1/2 in. diam., densely glandular hairy.

(6) Branchlets and underside of l. minutely or sparsely hairy; l. entire or nearly so.

57. *F. lepidota*, Wall.: King, Ann. L. 1. 207.—Syn. *F. lepidota*, var. in Hort. P. Fl. B. 461. Western Duars, Assam, Khasi hills, Cocham, Chittagong, Papua, New Guinea, northern spurs, Tenasserim—Penak. An erect shrub or small tree, young shoots silky with long hairs, branchlets pubescent, stout, marked with scars of petioles, with large, le. membranous, glaucous above, pale and velvety hairy beneath, entire, elongate-elliptic, blade 4-8, pet. 1-2 in. long, sep. n. 6-8 pair prominent beneath, the lowest pair basal. Receptacles axillary, 2-4 in. diam. peduncle 1-2 in. basal bracts 3-4. Under *Spidiosa* in P. Fl. B. 461, var. 2. 58. *F. erecta*, Thunb.: King, Ann. L. 1. 173. Sikkim, Khasi, Malayan, Japan. A small tree, buds minutely hairy, otherwise quite glabrous. Lobes obovate or lanceolate, usually entire, blade 3-8, pet. 1-2 in. long. Receptacles 1/2 in. diam. in axillary pairs, peduncles up to 1 in. long. 59. *F. subretorta*, Miq.: King, Ann. L. 1. 201. Sikkim, Malayan valley. Assam, Khasi hills, Cocham. A shrub, branchlets entire pubescent, l. pale and sparsely hairy beneath, entire lanceolate, oblong-lanceolate or oblong, blade 4-8, pet. 1-2 in. long. Receptacles axillary, solitary or in pairs, sparsely hairy, 1/2 in. diam. 60. *F. glauca*, Wall.: King, Ann. L. 1. 181. Tenasserim (Palawan)—Malay Peninsula and Archipelago. Branchlets and pet. rusty pubescent. L. mostly glabrous, entire, underside pale, and minutely hairy along margin and on elliptic, acuminate, blade 2-4, pet. 1-2 in. long. Receptacles oval 1/2 in. diam., yellow when ripe, peduncle 1/2 in. long. 61. *F. verruculata*, Hook. & Arn.: King, Ann. L. 1. 201. 202.—Syn. *F. verruculata*, Miq.: *F. verruculata*, Miq.: In rocky stream beds, Khasi hills, Assam, Upper and Lower Malaya, China. Annual shrub, young shoots pubescent, minutely hairy beneath, lanceolate, or linear-lanceolate, blade 1-4, pet. 1 in. Receptacles peduncled, 1/2 in. diam. and into a short stalk, solitary, axillary, 1/2 in. peduncle up to 1 in. long. In Malayan localities *F. lanceolata*, Ham. with larger and glabrous fr. and *F. verruculata*, Miq. with opposite l.

(c) Branchlets and underside of l. glabrous; l. entire.

62. *F. nemoralis*, Wall.: King, Ann. L. 1. 201.—Syn. *F. nemoralis*, Wall.; *F. nemoralis*, Miq.; *F. hirtella*, Miq. Vern. *Dalila*, Hindi; *Dalila*, Nep. Himalaya, 3000 ft. from Rawan eastwards, often planted near villages for cattle fodder. Assam, Khasi hills. A small glabrous tree, not epiphytic, 1-2 m. tall, entire, ovate or almost elliptic to lanceolate, long acuminate, base acute, blade 1-4, pet. 1-2 in. long. Receptacles varying in shape from clavate to globose, small or on short peduncles 1/2-1 in. diam., glabrous, when ripe reddish, edible; 4 fl. in all receptacles, few in those with 2, numerous in those with 3 and 4. 63. *F. chartacea*, Wall.—Syn. *F. lepidota*, var. *chartacea*, Kurz, E. Fl. II. 451. Tenasserim—Malay Peninsula. A shrub, young shoots minutely strigose, l. glabrous, entire, pet. slender, receptacles globose, 1 in. diam., yellow when ripe.

(d) Epiphytic or creeping.

64. *F. breviloba*, Wall.: King, Ann. L. 1. 196-198.—Syn. *F. puberula*, Wall.

- C. Fr. sessile, tip of peduncle set. Stipules not apparent.
3. *A. Lakucha*, Roxb.; Wight *et* al. 681; Ann. Cal. v. 13.—Syn. *A. mollis*, Wall. Vern. *Dhon-Dhon*, *Lakuch*, Hindi *Dhona*, Beng.; *Dhon*, Ass.; *Vakro-maw*, Tel.; *Mount Hill*, *Leung*, *Mount Wang*, Upper Burma. A middle-sized, at times a large deciduous tree, young shoots, petioles and beneath densely clothed with soft grey, tomentose or rusty tomentum. Lvs. monocious, entire, elliptic & ovate, blade 6-14, pet. 1 in. Fl. sessile, axillary, globose, 3 nearly sessile, perianth of 2-4 sepals, 2 pedunculate. Fr. white or yellow when ripe, 2-4 in. diam, irregularly lobed, seeds oblong.
- Subhimalayan tract and outer hills, Assam, Khasi and Jaintia mountains, to 1000 ft. Khasi hills, Burma, Upper and Lower, Malay Peninsula, Evergreen forests, the Western Ghats from the Konkan southwards. Fl. H. S.—Ceylon, 1. 2. *Samudra*, Wall. Ann. Cal. v. 11. Andaman. *Tanora*, Malay Peninsula, similar, entirely glabrous, oblong ovoidate, fr. globose or oval, 1-1½ in. diam.

4. MORUS, Linn.: Fl. Brit. Ind. v. 491.

Trees or shrubs, l. with 3-5 basal nerves, stipules deciduous. Plant monocious or dioecious, ♂ in deciduous spikes, sepals 4 unilobed, stamens 4, indurated in bud, pistillode minute. ♀ in spikes or heads, sepals 4, sacrovent and unilobed in fruit. Styles 2, more or less connate. Fr. a compound berry, consisting of the succulent perianths, each enclosing a one-seeded carpel, persistently afterwards gelatinous. Embryo curved in a fleshy albumen. Species 4-8, tropical and temperate.

a. A. Spikes short, under 2 inches.

(a) Perianth of ♀ fl. of 4 sepals, the 2 inner flat, the outer 2 very broad, keeled.

1. *M. alba*, Linn.; Brandis F. Fl. 1. 47. *Mulberry*. Vern. *Tat*, *Tut*, Hindi.

A middle-sized deciduous tree, young shoots, petioles and underside of l. along n. slightly pubescent. L. ovate, dentate, frequently lobed, base often cordate, blade 2-5, sometimes larger, pet. 1-1½ in. long, basal nerves 3-5. Fl. monocious, the sexes often on distinct branches; 3 sepals elliptic, 2 spikes ovoid, pedunculate, styles free. Fruit white or red, sweet.

East and westward in Baluchistan, Afghanistan and the north-west part of the Trans-India territory. Also in the Punjab plains, Kashmir and the North-West Himalaya. Fl. March, April. Fr. April-June. Cultiv. in Europe, Western and Central Asia and in China. The following species are closely allied if specifically distinct: 2. *M. nigra*, Linn. Cultivated in Baluchistan (Sheet 100). L. broader than the 2-seeded sepals and styles densely hairy, fr. purple. 3. *M. strapparva*, Roxb. Fl. Ind. 3. 160. China, cultivated in India, fr. cylindrical, 2 in. long, dark purple.

4. *M. indica*, Linn.; Wight *et* al. 674. Vern. *Tat*, *Ph.*; *Sok* *bat*, Hindi; *Tat*, Beng.; *Aso*, Burm.

A deciduous tree, for silk worms grown as a shrub, l. ovate, serrate-serrate, coarsely and unevenly serrate, blade 2-5, pet. 3-4 in.; 5 nerves; lvs. on short slender peduncles, ♀ spikes short ovoid, styles connate-high up very hairy. Fr. dark purple.

Widely in the subhimalayan tract in dry forest from the Sikkim mountains westward to Kooche. Fl. Feb. March. Extensively cultivated to feed the silkworm in Bengal and Burma. In the Punjab plains the Mulberry grows up mostly in 10 or 15 ft. trees. In December 1870 I first noticed an underwood of Mulberry in these plains above an island of the Jhelum river. Since then the Mulberry has grown up in all places mentioned in the Punjab plains. Gangetic Ind. Timbers, v. 1. 111. This is 11 to 12 inches. Specimens collected by me in Charga Marga, with a diameter of 12 to 15 inches.

(b) Sepals thin, hyaline, equal, oblong, 3 or 4.

5. *M. serrata*, Roxb. Vern. *Karūn*, *Krūn*, *Chūn*, *Kūn*, N-West Hindi.

A large scandent tree, up 100 ft. diam. with corky, young shoots and branches at 1. velvety tomentose. Lvs from 2 cordate base acute, shortly acuminate, serrately toothed, often doubly lobed, blade 1-3, pet. 1-2 in. long, stipules broadly lanceolate. ♂ spikes very hairy, 1-2 in. ♀ 1-4 in. leafy cylindrical, papillose, finely ciliate, styles very hairy, connate below. Fl. purple.

Himalayas, Ladakh, Kashmir, Ladakh, 11, Aug. May, Pr. Assam, Assam, Fossilized, Japan, Korea, India, and Malacca, but not yet introduced.

B. Spikes 2-4 in. long.

A. K. Indragiri, West. Vern. Kula, Nep. Thuyet, Born. Outer Himalayas, New Guinea, Malacca, Assam, Khasi Hills, Upper Burma, Malacca, etc. Cultivated at Labuan, Sabah, Borneo, young shoots, stipules and bud-scales with long white hairs. Lvs ovate lanceolate, base cordate, blade 8-12, pet. 1-1.5 in. Spikes 2-4 in. long, 2-4 in. long, very hairy, glabrous, styles 2-4 in. long, 2 outer to 2-3 in. long, papillose, finely ciliate, styles very hairy, glabrous, papillose from the base, fr. long, 2-4 in. long, papillose, finely ciliate.

BROUSSONETIA, Vent. Fl. Brit. Ind. v. 499.

Species 2-3, Indo-Malayan range, China, Japan, Pacific Islands.

B. papyrifera, Vent. The Paper Mulberry. Vern. Molang, Born.

A scandent or arborescent tree, leaves dentate, often lobed, margins rough,



Fig. 185—*Broussonetia papyrifera, Vent.* 4

underneath softly tomentose, basal nerves 3, blade 4-8, pet. 1-2 in. long. Fl. axillary, ♂ in cylindrical catkins, perianth 4-6, segments valvate, stamens 4, long, inferior in bud. ♀ in globose pedunculate heads, mixed with persistent bracts, perianth tubular, 2-4-toothed, persistent, including the stipitate

style pale, bifid. Albumen staining brownish, long feebly stalked. Cystolems oblong, albumen scanty.

Valley of the M'echang, A. S. in former boundaries of the Salween region of the National Academy (Dr. H. Sch. 1880 and March 1889). Paper and the other parts (Pala'ok) used like dates in schools. Are made of the inner bark in Java and Burma. In Java paper, and in the South Sea Islands Tapa cloth is made of it. The tree is cultivated at Delhi, Ind. It is hard in Kuron and is a chief vegetable material of a tree which thrives in temperate and tropical climates. Cypripes and other shrubby epiphytic root-suckers.

6. CUDRANIA, Trévis: Fl. Brit. Ind. v. 318.

Straggling or climbing shrubs, armed with stout axillary spines, l. alternate, quite entire, pinnatifid. Fl. in naked globose heads, dense very much, with few scales inserted on a globose receptacle. Sepals free, not numose, stamens included, anthers oblong, filaments short, stamens straight, style terminal, often appearing simple, through the abortion of one of its branches. Fr. a compound irregularly shaped many-sided berry formed of the enlarged fleshy ovary and perianth, each perianth enclosing a one-seeded nut. Species 7. From India to China, Japan, New Caledonia and Australia.

1. *C. javanica*, Trévis: Syn. *Cudrania*, Kerz F. Fl. B. 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 2681, 2682, 2683, 2684, 2685, 2686, 2687, 2688, 2689, 2690, 2691, 2692, 2693, 2694, 2695, 2696, 2697, 2698, 2699, 2700, 2701, 2702, 2703, 2704, 2705, 2706, 2707, 2708, 2709, 2710, 2711, 2712, 2713, 2714, 2715, 2716, 2717, 2718, 2719, 2720, 2721, 2722, 2723, 2724, 2725, 2726, 2727, 2728, 2729, 2730, 2731, 2732, 2733, 2734, 2735, 2736, 2737, 2738, 2739, 2740, 2741, 2742, 2743, 2744, 2745, 2746, 2747, 2748, 2749, 2750, 2751, 2752, 2753, 2754, 2755, 2756, 2757, 2758, 2759, 2760, 2761, 2762, 2763, 2764, 2765, 2766, 2767, 2768, 2769, 2770, 2771, 2772, 2773, 2774, 2775, 2776, 2777, 2778, 2779, 2780, 2781, 2782, 2783, 2784, 2785, 2786, 2787, 2788, 2789, 2790, 2791, 2792, 2793, 2794, 2795, 2796, 2797, 2798, 2799, 2800, 2801, 2802, 2803, 2804, 2805, 2806, 2807, 2808, 2809, 2810, 2811, 2812, 2813, 2814, 2815, 2816, 2817, 2818, 2819, 2820, 2821, 2822, 2823, 2824, 2825, 2826, 2827, 2828, 2829, 2830, 2831, 2832, 2833, 2834, 2835, 2836, 2837, 2838, 2839, 2840, 2841, 2842, 2843, 2844, 2845, 2846, 2847, 2848, 2849, 2850, 2851, 2852, 2853, 2854, 2855, 2856, 2857, 2858, 2859, 2860, 2861, 2862, 2863, 2864, 2865, 2866, 2867, 2868, 2869, 2870, 2871, 2872, 2873, 2874, 2875, 2876, 2877, 2878, 2879, 2880, 2881, 2882, 2883, 2884, 2885, 2886, 2887, 2888, 2889, 2890, 2891, 2892, 2893, 2894, 2895, 2896, 2897, 2898, 2899, 2900, 2901, 2902, 2903, 2904, 2905, 2906, 2907, 2908, 2909, 2910, 2911, 2912, 2913, 2914, 2915, 2916, 2917, 2918, 2919, 2920, 2921, 2922, 2923, 2924, 2925, 2926, 2927, 2928, 2929, 2930, 2931, 2932, 2933, 2934, 2935, 2936, 2937, 2938, 2939, 2940, 2941, 2942, 2943, 2944, 2945, 2946, 2947, 2948, 2949, 2950, 2951, 2952, 2953, 2954, 2955, 2956, 2957, 2958, 2959, 2960, 2961, 2962, 2963, 2964, 2965, 2966, 2967, 2968, 2969, 2970, 2971, 2972, 2973, 2974, 2975, 2976, 2977, 2978, 2979, 2980, 2981, 2982, 2983, 2984, 2985, 2986, 2987, 2988, 2989, 2990, 2991, 2992, 2993, 2994, 2995, 2996, 2997, 2998, 2999, 3000, 3001, 3002, 3003, 3004, 3005, 3006, 3007, 3008, 3009, 3010, 3011, 3012, 3013, 3014, 3015, 3016, 3017, 3018, 3019, 3020, 3021, 3022, 3023, 3024, 3025, 3026, 3027, 3028, 3029, 3030, 3031, 3032, 3033, 3034, 3035, 3036, 3037, 3038, 3039, 3040, 3041, 3042, 3043, 3044, 3045, 3046, 3047, 3048, 3049, 3050, 3051, 3052, 3053, 3054, 3055, 3056, 3057, 3058, 3059, 3060, 3061, 3062, 3063, 3064, 3065, 3066, 3067, 3068, 3069, 3070, 3071, 3072, 3073, 3074, 3075, 3076, 3077, 3078, 3079, 3080, 3081, 3082, 3083, 3084, 3085, 3086, 3087, 3088, 3089, 3090, 3091, 3092, 3093, 3094, 3095, 3096, 3097, 3098, 3099, 3100, 3101, 3102, 3103, 3104, 3105, 3106, 3107, 3108, 3109, 3110, 3111, 3112, 3113, 3114, 3115, 3116, 3117, 3118, 3119, 3120, 3121, 3122, 3123, 3124, 3125, 3126, 3127, 3128, 3129, 3130, 3131, 3132, 3133, 3134, 3135, 3136, 3137, 3138, 3139, 3140, 3141, 3142, 3143, 3144, 3145, 3146, 3147, 3148, 3149, 3150, 3151, 3152, 3153, 3154, 3155, 3156, 3157, 3158, 3159, 3160, 3161, 3162, 3163, 3164, 3165, 3166, 3167, 3168, 3169, 3170, 3171, 3172, 3173, 3174, 3175, 3176, 3177, 3178, 3179, 3180, 3181, 3182, 3183, 3184, 3185, 3186, 3187, 3188, 3189, 3190, 3191, 3192, 3193, 3194, 3195, 3196, 3197, 3198, 3199, 3200, 3201, 3202, 3203, 3204, 3205, 3206, 3207, 3208, 3209, 3210, 3211, 3212, 3213, 3214, 3215, 3216, 3217, 3218, 3219, 3220, 3221, 3222, 3223, 3224, 3225, 3226, 3227, 3228, 3229, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3242, 3243, 3244, 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252, 3253, 3254, 3255, 3256, 3257, 3258, 3259, 3260, 3261, 3262, 3263, 3264, 3265, 3266, 3267, 3268, 3269, 3270, 3271, 3272, 3273, 3274, 3275, 3276, 3277, 3278, 3279, 3280, 3281, 3282, 3283, 3284, 3285, 3286, 3287, 3288, 3289, 3290, 3291, 3292, 3293, 3294, 3295, 3296, 3297, 3298, 3299, 3300, 3301, 3302, 3303, 3304, 3305, 3306, 3307, 3308, 3309, 3310, 3311, 3312, 3313, 3314, 3315, 3316, 3317, 3318, 3319, 3320, 3321, 3322, 3323, 3324, 3325, 3326, 3327, 3328, 3329, 3330, 3331, 3332, 3333, 3334, 3335, 3336, 3337, 3338, 3339, 3340, 3341, 3342, 3343, 3344, 3345, 3346, 3347, 3348, 3349, 3350, 3351, 3352, 3353, 3354, 3355, 3356, 3357, 3358, 3359, 3360, 3361, 3362, 3363, 3364, 3365, 3366, 3367, 3368, 3369, 3370, 3371, 3372, 3373, 3374, 3375, 3376, 3377, 3378, 3379, 3380, 3381, 3382, 3383, 3384, 3385, 3386, 3387, 3388, 3389, 3390, 3391, 3392, 3393, 3394, 3395, 3396, 3397, 3398, 3399, 3400, 3401, 3402, 3403, 3404, 3405, 3406, 3407, 3408, 3409, 3410, 3411, 3412, 3413, 3414, 3415, 3416, 3417, 3418, 3419, 3420, 3421, 3422, 3423, 3424, 3425, 3426, 3427, 3428, 3429, 3430, 3431, 3432, 3433, 3434, 3435, 3436, 3437, 3438, 3439, 3440, 3441, 3442, 3443, 3444, 3445, 3446, 3447, 3448, 3449, 3450, 3451, 3452, 3453, 3454, 3455, 3456, 3457, 3458, 3459, 3460, 3461, 3462, 3463, 3464, 3465, 3466, 3467, 3468, 3469, 3470, 3471, 3472, 3473, 3474, 3475, 3476, 3477, 3478, 3479, 3480, 3481, 3482, 3483, 3484, 3485, 3486, 3487, 3488, 3489, 3490, 3491, 3492, 3493, 3494, 3495, 3496, 3497, 3498, 3499, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3508, 3509, 3510, 3511, 3512, 3513, 3514, 3515, 3516, 3517, 3518, 3519, 3520, 3521, 3522, 3523, 3524, 3525, 3526, 3527, 3528, 3529, 3530, 3531, 3532, 3533, 3534, 3535, 3536, 3537, 3538, 3539, 3540, 3541, 3542, 3543, 3544, 3545, 3546, 3547, 3548, 3549, 3550, 3551, 3552, 3553, 3554, 3555, 3556, 3557, 3558, 3559, 3560, 3561, 3562, 3563, 3564, 3565, 3566, 3567, 3568, 3569, 3570, 3571, 3572, 3573, 3574, 3575, 3576, 3577, 3578, 3579, 3580, 3581, 3582, 3583, 3584, 3585, 3586, 3587, 3588, 3589, 3590, 3591, 3592, 3593, 3594, 3595, 3596, 3597, 3598, 3599, 3600, 3601, 3602, 3603, 3604, 3605, 3606, 3607, 3608, 3609, 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3618, 3619, 3620, 3621, 3622, 3623, 3624, 3625, 3626, 3627, 3628, 3629, 3630, 3631, 3632, 3633, 3634, 3635, 3636, 3637, 3638, 3639, 3640, 3641, 3642, 3643, 3644, 3645, 3646, 3647, 3648, 3649, 3650, 3651, 3652, 3653, 3654, 3655, 3656, 3657, 3658, 3659, 3660, 3661, 3662, 3663, 3664, 3665, 3666, 3667, 3668, 3669, 3670, 3671, 3672, 3673, 3674, 3675, 3676, 3677, 3678, 3679, 3680, 3681, 3682, 3683, 3684, 3685, 3686, 3687, 3688, 3689, 3690, 3691, 3692, 3693, 3694, 3695, 3696, 3697, 3698, 3699, 3700, 3701, 3702, 3703, 3704, 3705, 3706, 3707, 3708, 3709, 3710, 3711, 3712, 3713, 3714, 3715, 3716, 3717, 3718, 3719, 3720, 3721, 3722, 3723, 3724, 3725, 3726, 3727, 3728, 3729, 3730, 3731, 3732, 3733, 3734, 3735, 3736, 3737, 3738, 3739, 3740, 3741, 3742, 3743, 3744, 3745, 3746, 3747, 3748, 3749, 3750, 3751, 3752, 3753, 3754, 3755, 3756, 3757, 3758, 3759, 3760, 3761, 3762, 3763, 3764, 3765, 3766, 3767, 3768, 3769, 3770, 3771, 3772, 3773, 3774, 3775, 3776, 3777, 3778, 3779, 3780, 3781, 3782, 3783, 3784, 3785, 3786, 3787, 3788, 3789, 3790, 3791, 3792, 3793, 3794, 3795, 3796, 3797, 3798, 3799, 3800, 3

flowers, very fragrant. Many flowers and branches. A small variety of clear white flowers, also abundant with yellowish tinge, and a variety of yellowish, mostly simple. Leaves alternate, lanceolate or elliptic-lanceolate, long-petiole, serrulate, 4-10 in. long, with about 10-15 divisions, 7-10 clustered nearly sessile, petiole with glands, 2-3 millim. long, with a few hairs, each enclosed in a thin, yellowish, papery, glandular, and very thin sheath, each enclosed in a thin, yellowish, papery, glandular, and very thin sheath.

Taxotrophis asyriaca, Thwaites: Bot. Misc. (Linn.) 2, p. 10, 1821. Syn. *Erythraea asyriaca*, Trew. & Wight in L. 1822 (the lower half of the figure). *Stellaria asyriaca*, Kurz: Western Districts, a place forming thicket at the top of the hills. Upper Burma-Ceylon. A large right shrub, woody, an armed stem; axillary leaves alternate, pubescent, membranous, serrate. Fl. glabrous, in obliquely subglobular cymes, subtended by sepals, crowned by the lateral 2-petaled style.

GENUS CL. URTICACEÆ. Engler in Engl. u. Prantl in l. 98.

(*Urticaceae*, tribe VII. *Urticeae*. Gen. Pl. 16, 318.)

Mostly herbs, in a few genera shrubs and trees, sap watery. L. as a rule dentate, alternate stipulate, with 8 basal nerves. Fl. unisexual, sessile, as a rule in compact heads or clusters, stamens 4-5, opposite to sepals or perianth segments, filaments inflexed in bud; ♀ perianth campanulate, ovary tubular, free, with 2 locules, often succulent in fr., rarely 0. Ovary erect, or half pend.

Stems often strongly developed in the herb. often very hard. Cylindrical, often mucous in the epidermis. No indurated tubes. Stinging hairs very common.

I. Hanceolata, petals and calyx weakly armed with stinging hairs. *Laportea* (p. 515).

II. No stinging hairs.

A. ♀ perianth tubular, axillary or campanulate.

Fruiting head solitary.

Stigma filiform, persistent.

Stigma filiform, deciduous.

Fruiting heads axillary.

Style long-exserted, curved.

Stigma sessile, dilated pedunculate.

Perianth obliquely campanulate.

Perianth erect, mostly tubular.

I. white or grey beneath, outer part parallel, persistent.

L. green beneath, primary not prominent.

B. ♀ perianth 0.

Laportea crenulata, Gaud. & Bond. Fl. Selc. 2, 361, 1824. *Tortiva crenulata*, Engler & Wight in L. 1822. Vern. *Charpette*, Beauv. *Urtica*, Tuck. *Asyriaca*, Murray & Thwaites. *Urtica*, Subhimalayan tract from Nepal eastwards. *Urtica*, Sikkim, *Urtica*, Malabar, Lower Burma, Hump hills, Northern China, Western China, according to 5000 ft. on the Ganges—4000 ft. A shrubby small tree, 10-15 ft. high, with a few long hairs, glabrous, clothed with hairs of the kind described here, and with a few long hairs, elsewhere glabrous, and raised especially in the upper part of the stem. Fl. tubular, green, deciduous, in axillary panicle cymes, often 1-2 in. diam., 2-3 perianth deeply 4-5. Anthers oblique, 1 in. diam., seated on a very short perianth and crowned by the style. The stinging of this *Urtica* is very bad and the effects last for many days.

I. BŒHMERIA, Jacq.; Fl. Brit. Ind. v. 575.

Shrubs or small trees, a few herbs, l. opposite and alternate, 3-nerved, glabrous, stipules usually free. Fl. in unisexual sessile clusters. ♀ perianth half-partite, valvate, pistillets clavate or globose. ♀ perianth tubular, 4-lobed, including the ovary; stigma filiform, long-exserted, persistent.

A. Fl. clusters axillary or from the axils of fallen l.

1. *R. malabarica* Winkl.—Syn. *R. malabarica* Radlk. *Bot. Zeit.* 23: 27 (1847).—Shrub, about 10 ft. high. Bark smooth, reddish-brown, ascending to 5000 ft. (near the base of the Chittur range, Mysore). Western China from the Koulan mountains—Czechoslovakia. A shrub or small tree, 1-2 m. high; glabrous above, usually pubescent beneath. Petiole, leaflets, &c. pub. 1-4 in. long. Clusters 2-4 in. diam. 2. *R. sinensis* Winkl.—Syn. *R. diffusa* Winkl. Subhimalayan tract and outer hills from Nepal and northwards, ascending to 10000 ft. Khas hills, Darjiling, Branchlets, 1 on both sides and 2 opposite usually absent with long hairs & sometimes opposite. 2-3 in. long often all naked branchlets with a leaf off 1 at the end. Two specimens from Kurmooch in the Himalayas; 3. *R. Bellari* Blume. Transvaal. 4. *R. Dufrenoyi* Winkl. Malabar.

B. Fl. clusters in usually long and simple spikes.

A. L. alternate.

1. *R. rugosa* Winkl. Vern. *Gusti*, *Gambh.*, *Hind.*; *Dev.* Nep. Subhimalayan tract and outer hills, ascending to 4000 ft. from the Sutlej mountains. A small or middle-sized tree, 1-2 m. high, sometimes upper side dark green, glabrous but rough, underside reddish pale, often white, obtusely but distinctly crenulate, elliptic-lanceolate, length 2-5, petiole 1-1½ in., stipules ovate, basal n. prominent, extending to the tip of leaf, but not adequately serrate and joined by intramarginal veins. Spikes simple, clusters supported by coriaceous bracts. Wood reddish-brown, coarse-grained, somewhat yellowed in some parts. 2. *R. Kumaonensis* Hook. & Arn.—Syn. *Urtica* *malabarica*, Royle; Wight *lc.* 1838. *The Blue plant*, *China* *tree*. Indigenous and cultivated in China and Japan. Cultivated in Assam and elsewhere. A shrub with herbaceous branches, sometimes with long hairs, broad-ovate, serrulate-dentate, venation opposite, rough, underside usually white, densely covered with appressed hairs. Fl. greenish, monocious, in solitary axillary umbels, bracts stem leaves, which generally are in pairs, 2 per leaf in the lower part, the upper side often much covered, hairy. A variety with the leaves green on both surfaces ("Blue") is distinguished as *R. javanica* Gand.

B. L. and P. opposite, petioles in one pair unequal.

1. *R. macrophylla* Des. Vern. *Bare* *tree*, *Darya* *tree*, *Kash.* Nep. Subhimalayan tract and outer valleys, ascending to 4000 ft. from the Jumna mountains. Staghorn-like. Yunnan. Branches upright or small tree, branchlets, petioles, and underside of leaves covered with short stiff hairs. 2. *R. integrata* gradually tapering into a narrow point, ovate-lanceolate, serrulate, petioles and branchlets about 1/2-1 in. long. Fl. monocious, smaller depending on long as or longer than 1, clusters 1-1 in. diam. 3. *R. Kumaonensis* Hook. & Arn. Petiole glabrous, exceeding the pale-outer spike. 4. *R. elliptica* *malabarica*, Winkl. *Gusta* 2-7, petiole 1-1½ in. long. Spikes slender, longer than 1. 5. *R. Ramfischii* Winkl. Vern. *Saha*, *Harm.* Subhimalayan tract and outer hills, ascending to 10000 ft. from Nepal mountains. Assam. Khas hills, Pegu and Malabar. The same, except the pubescent petioles & membranous serrate, lanceolate, leaflets 1-7, petiole 1-1½ in. long. Spikes slender. 10. *R. polytricha* Winkl. Outer Himalaya, 10000 ft. from Assam eastwards. Assam. Khas hills. Sikkim hills, Malabar hills. 11. *R. B. Marsh* *tree*, Yunnan. Glabrous, branches stout, broadly ovate, deeply dentate, broad-ovate, leaflets 3-10, petiole 1-2 in., spikes branched, shorter than 1.

11. *R. gairdneri* Des. Syn. *R. verticillata* Polak. Vern. *Saha*, *Darya* *tree*. A large, bushy shrub, 10-15 ft. high, ascending to 7500 ft. Assam. Khas hills. Chittur range, Burma. Chittur Nagpur, Orissa. Central Pyrenees, Western Pyrenees. In the Himalayan region common. Malay Archipelago, China, Japan, Africa. A large shrub or small tree, alternate, broadly ovate, elliptic or orbicular, serrulate, coarse-punctate, underneath rough, spikes often scurringly branched. An exceedingly variable plant, of which the principal varieties are recognized in Fl. Brit. Ind. 2. 617. Petiole, branchlets, &c. pub. 1-2 m. long. *R. scandens* Gand. with short stout erect fruiting spikes is not a new species.

Pennisetum *venosum* Winkl.—Syn. *P. hirsutum* Wight *lc.* 2: 19 (1841). Vern. *Chipsi*, *Nep.* Outer Himalaya, from Kashmir eastwards, ascending to 5000 ft. Assam. Khas hills. Chittur range, Upper Burma, Malay Peninsula. A large shrub with long slender branches situated in dry localities, branchlets and petioles 1-2 m. long, striate, usually white on the underside. L. ovate-lanceolate, serrulate, dentate, leaflets 1-5, petiole 1-1½ in. long, usually 2, the lateral extending to 1/2 the length of 1 or further, and 2 usually 1-2, the upper side of branchlets and leaflets in small axillary clusters. 3. *Pennisetum* *tuberosum*, petiole, branchlets, &c. pub. 1, stigma bifid, 1-2 m. long.

Pipturus *platanus* Winkl.—Syn. *Morus* *posidonia*, Royle; Wight *lc.* 1: 576. *Nyctaria*, *Malay Peninsula* and *Ar.* New Guinea. A small tree, branchlets, petioles and underside of leaves often silvery pubescent, 1-2 m. long, often serrate, crenate, leaflets 1-5, petiole 1-1½ in. long. Fl. dioecious, in loose heads on simple or branched

- A. Stamens 1-12 on pedicels, or 2 or less distinctly arranged in a 2-4 rank with a terminal or 2-4 lateral, and several without cells of hairs. Anthers without pedicels.
- Another-cells distinct, 1, or 2, or 3, or 4, or 5, or 6, or 7, or 8, or 9, or 10, or 11, or 12, or 13, or 14, or 15, or 16, or 17, or 18, or 19, or 20, or 21, or 22, or 23, or 24, or 25, or 26, or 27, or 28, or 29, or 30, or 31, or 32, or 33, or 34, or 35, or 36, or 37, or 38, or 39, or 40, or 41, or 42, or 43, or 44, or 45, or 46, or 47, or 48, or 49, or 50, or 51, or 52, or 53, or 54, or 55, or 56, or 57, or 58, or 59, or 60, or 61, or 62, or 63, or 64, or 65, or 66, or 67, or 68, or 69, or 70, or 71, or 72, or 73, or 74, or 75, or 76, or 77, or 78, or 79, or 80, or 81, or 82, or 83, or 84, or 85, or 86, or 87, or 88, or 89, or 90, or 91, or 92, or 93, or 94, or 95, or 96, or 97, or 98, or 99, or 100, or 101, or 102, or 103, or 104, or 105, or 106, or 107, or 108, or 109, or 110, or 111, or 112, or 113, or 114, or 115, or 116, or 117, or 118, or 119, or 120, or 121, or 122, or 123, or 124, or 125, or 126, or 127, or 128, or 129, or 130, or 131, or 132, or 133, or 134, or 135, or 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636, or 637, or 638, or 639, or 640, or 641, or 642, or 643, or 644, or 645, or 646, or 647, or 648, or 649, or 650, or 651, or 652, or 653, or 654, or 655, or 656, or 657, or 658, or 659, or 660, or 661, or 662, or 663, or 664, or 665, or 666, or 667, or 668, or 669, or 670, or 671, or 672, or 673, or 674, or 675, or 676, or 677, or 678, or 679, or 680, or 681, or 682, or 683, or 684, or 685, or 686, or 687, or 688, or 689, or 690, or 691, or 692, or 693, or 694, or 695, or 696, or 697, or 698, or 699, or 700, or 701, or 702, or 703, or 704, or 705, or 706, or 707, or 708, or 709, or 710, or 711, or 712, or 713, or 714, or 715, or 716, or 717, or 718, or 719, or 720, or 721, or 722, or 723, or 724, or 725, or 726, or 727, or 728, or 729, or 730, or 731, or 732, or 733, or 734, or 735, or 736, or 737, or 738, or 739, or 740, or 741, or 742, or 743, or 744, or 745, or 746, or 747, or 748, or 749, or 750, or 751, or 752, or 753, or 754, or 755, or 756, or 757, or 758, or 759, or 760, or 761, or 762, or 763, or 764, or 765, or 766, or 767, or 768, or 769, or 770, or 771, or 772, or 773, or 774, or 775, or 776, or 777, or 778, or 779, or 780, or 781, or 782, or 783, or 784, or 785, or 786, or 787, or 788, or 789, or 790, or 791, or 792, or 793, or 794, or 795, or 796, or 797, or 798, or 799, or 800, or 801, or 802, or 803, or 804, or 805, or 806, or 807, or 808, or 809, or 810, or 811, or 812, or 813, or 814, or 815, or 816, or 817, or 818, or 819, or 820, or 821, or 822, or 823, or 824, or 825, or 826, or 827, or 828, or 829, or 830, or 831, or 832, or 833, or 834, or 835, or 836, or 837, or 838, or 839, or 840, or 841, or 842, or 843, or 844, or 845, or 846, or 847, or 848, or 849, or 850, or 851, or 852, or 853, or 854, or 855, or 856, or 857, or 858, or 859, or 860, or 861, or 862, or 863, or 864, or 865, or 866, or 867, or 868, or 869, or 870, or 871, or 872, or 873, or 874, or 875, or 876, or 877, or 878, or 879, or 880, or 881, or 882, or 883, or 884, or 885, or 886, or 887, or 888, or 889, or 890, or 891, or 892, or 893, or 894, or 895, or 896, or 897, or 898, or 899, or 900, or 901, or 902, or 903, or 904, or 905, or 906, or 907, or 908, or 909, or 910, or 911, or 912, or 913, or 914, or 915, or 916, or 917, or 918, or 919, or 920, or 921, or 922, or 923, or 924, or 925, or 926, or 927, or 928, or 929, or 930, or 931, or 932, or 933, or 934, or 935, or 936, or 937, or 938, or 939, or 940, or 941, or 942, or 943, or 944, or 945, or 946, or 947, or 948, or 949, or 950, or 951, or 952, or 953, or 954, or 955, or 956, or 957, or 958, or 959, or 960, or 961, or 962, or 963, or 964, or 965, or 966, or 967, or 968, or 969, or 970, or 971, or 972, or 973, or 974, or 975, or 976, or 977, or 978, or 979, or 980, or 981, or 982, or 983, or 984, or 985, or 986, or 987, or 988, or 989, or 990, or 991, or 992, or 993, or 994, or 995, or 996, or 997, or 998, or 999, or 1000.
- B. Ova 2-4, apical, 11 on each branch without pedicels, another-cells with a 2-4 rank of cells. A thin perianth adnate to ovary.
- F. small to drooping spikes, in the axil of large woody, or reticulate bracts.
- G. a large nut enclosed in a thick, and indurated, sometimes spinous involucre.

1. BETULA, Turcz.; Fl. Brit. Ind. v. 599

Pith oblong, offsp lobed, med. rays all narrow, of 1-4 rows. Stamens 4-8, inserted on the stalk or on the inside of the bract and more or less distinctly arranged into diandrous fl., each with 2 or 4 perianth leaves, one of which is much larger than the others. Anthers on very short filaments, the 2 cells distinct to the base. σ fl. in dense cylindrical spikes, 3 ovaries in the axil of a woody bract, which usually is 3-lobed. Nuts winged. Species 33. Northern hemisphere.



FIG. 131.—Betula utilis, DC. 1

L. B. utilis, DC. —Syn. B. Bhulputra, Wall.; B. Jirpucha, DC. Sp. Pl. Jacquemont Voy. Bot. t. 188. Vern. —Bhoj, Bhojputra, S. West Himal.; Shik, par. Kanawat; Jhaja par. Nep.

A moderate-sized tree, attaining at times 90 ft., a shrub near its upper limit; bark smooth, with white horizontal lenticels, the outer bark consisting of numerous thin papery layers, alternating in broad horizontal cells, youngest above pubescent. L. ovate, acuminate, and equally serrate, slightly hairy

along midrib and nerves, blade 2-3, pet. 1 in. long. Bracts of σ fl. ovate, glabrous, another-cells with a few hairs at the tip. σ spikes solitary, drooping out, 3-lobed down to the base. Nuts with a narrow wing; bracts in involucre, deeply 3-lobed, broader than the wings of the nut.

Karwan valley, 10-11,000 ft. Himalaya, 10-14,000 ft. in the Punjab as low as 7,000 ft. also in the lower hill regions. Often prostrate at the upper limit of the tree-region, sometimes with *B. schindleri* or *B. nana*, and with an underwood of *B. schindleri* or *B. nana*. —Mountains of China and Japan. The outer bark is used to paper for writing and packing, for umbrella covers and for the roofing of houses. σ fl. solitary. DC. —Syn. B. schindleri, Wall. Fl. As. Bar. v. 108; Brit. Ind. v. 599. σ fl. solitary. DC. —Syn. B. schindleri, Wall. Vern. —Siam, Bakh. Kall. 1870. J. Hook. Voy. Serer. Garhy. Nepal. Himalaya from the Sikkim mountains, 5-10,000 ft. Khas hills, Nepal. Hills of Upper and Lower Burma above 5,000 ft. At these elevations in patches. China. A moderate-sized tree, wood grey, the outer bark both of σ fl. and σ fl. pubescent, the woody and barky parts short, densely tomentose. L. ovate, acuminate, serrate, both margins, often serrate. Bracts of σ fl. ovate, pubescent,

1. CORYLUS, Linn. Fl. Brit. Ind. v. 28.

Pith pure or less circular, buds with imbricate scales, lepidotelets and papillae often with elongular hairs, 4 serrate, basal 2-5. ♂ catkins hairy, drooping, headed or 2-5 on a common 1-1 1/2 inch, stamens 4 with buds on the inside of a broad bract, supported by 2 bracts, which are rather more than half adnate to the bract, Elements either with 2 contiguous but distinct anther-cells, or more or less irregularly bifurcating, each anther bearing an anther-cell, tufts of hairs at the apex of anther-cells. ♀ spikes small, lateral, sessile, ovoid, leaf-like, consisting of numerous imbricate bracts, the fl. in pairs in the axils of a few of the uppermost bracts. Perianth 4 whorls to the ovary, minutely toothed, soon obliterated. Each fl. surrounded by 2 or more minute scales (involucres) which enlarge in fr. and form a leafy densely felted sheath, the lobes sometimes spinose-ent. Nut hard, woody or leavy. The thick fleshy cotyledons remain underground in the fr. when germinating. Species 2, Northern hemisphere.

1. *C. Calymna*, Linn.—Syn. *C. Javanica* (G. Don) in Journ. Voy. Bot. v. 111. *C. Javanica* Wall. Vern. *Thong* (Tamsat), Pangl, *Khavil*, *Shavil*, *Bandula* (Linn.), *Khavil*, *Khavil*, North-West Himalaya 5-10,000 ft. in places precipitous and mountainous covered with *Thurifera*. On the South as far as Pangl on the right and Puri on the left bank—South-East Burma and Acha Myer, China. A modern wood rose the scales of the nut often detaching themselves at the base and collecting upwards, but without nearly hemispherical. L. pubescent with a mature, obscure, shortly acuminate base, serrate, irregularly serrate, and often slightly lobed, blade 5-6, pet. 1-1 1/2 in. ♂ leafy ovate, acute, bearing along the midrib 8 one-celled rather or short acute or less equidistant stamens. Fr. usually is cloven, involucre sometimes clothed in linear-lanceolate lobes with glandular hairs, much longer than nuts, supported by large lacinate bracts. 2. *C. nucifera* Wall. Pl. As. Bar. t. 57. Nepal. Sikkim 8-10,000 ft.—China (near Chikong). A small tree, bark silky, elongated, fl. ovate-lanceolate, serratures crenulate, unequal, blade 4-5, pet. 1/2 in long, hairy. ♀ scales bearing at their base 2 minute stamens, each with 2 distinct contiguous anther-cells. Fr. in clusters of 2-4, lacinate, thick, almost fleshy, lobes pinnatifid, the segments bifurcating in slender scales 1/2 in. long.

ORDER OVIL. FAGACEÆ. Prantl in Engler u. Prantl III. 1. 47.

(*Capillifera*, tribe III. *Quercineae*, Gen. Pl. III. 431.)

Monocious trees, rarely shrubs, l. alternate, simple, but often deeply lobed, pinnatifid, stipules deciduous. ♂ fl. in drooping catkins or in erect spikes, anther-cells not separate. ♀ fl. in spikes, each fl. or group of 2-3 fl. enclosed in an involucre of numerous bracts, coalescing in fr. Perianth minute in the ovary, limb minutely toothed. Ovary more or less completely 2-3-celled, scales 2 in each cell, pendulous. Nuts induplicate, one or several supported by or enclosed in the enlarged coriaceous, crustaceous or woody involucre, the cellments of the abortive scales at the base or at the apex of the seed. Pericarp coriaceous or woody, cotyledons thick fleshy, albumen 0.

Ovary 2-celled.

One ♀ fl. in each involucre, nuts supported by a cup or enclosed in an involucre not clothed with leafy scales.

Usually 2-3 ♀ fl. in each involucre, nuts enclosed in the enlarged involucre, which usually is spinous.

Ovary 6-8-celled.

Usually 2-3 ♀ fl. in each involucre, nuts enclosed in the enlarged 2-4-valved spinous involucre.

1. *Quercus*

2. *Castanea*

3. *Castanea* (in fr.)

1. QUERCUS, Linn. Fl. Brit. Ind. v. 100.

(*Ilex* and *Quercus*, Prantl in Engler u. Prantl III. 1. 50.)

Trees, rarely shrubs, pith in most species pentagonal, the angles often projecting. Med. rays of two classes based or very broad and narrow.

Several species of Sect. *Purshia*: *lappacea*, *acuminata*, *pachyphylla* and *foucaurensis* have uniform very fine rays, numerous and equidistant. Wavy soft, more or less concentric bands of wood-parenchyma (often very narrow) in most species. Wood-fibres with bordered pits. ♂ fl. in drooping catkins or erect spikes, perianth of 3-8 segments, more or less connate at the base, stamens as many as or twice the number of segments, a rudimentary ovary in some species. ♀ fl. on erect axillary, often very short spikes, each fl., or in a few species a pair of fl., in an involucre of numerous bracts or scales, which in fr. coalesce and form a cup or a bag entirely enclosing the nut and are often connate into concentric belts. Ovary 3-celled, styles 3, stigmatose on the inner surface or at the apex only, often red. Cotyledons thick fleshy, remain underground when germinating, starch as a rule the reserve substance. Species about 300, Europe, Mediterranean region, Asia, North America. *Thitcha*, Burm. and in Upper Burma *Zayat* and *Mellein* are used indiscriminately for several species.

Sect. I. *Lepidobalanus*. Spikes unisexual, ♂ simple, lax, mostly pendulous, deciduous, usually fasciated. Fruiting spikes short, often with 1 or 2 acorns only, rachis softly hairy, not ribbed. Cup hemispherical, bracts imbricate, tips free. L. usually serrate or lobed.

A. Mature l. hairy or tomentose beneath.

1. *Q. semecarpifolia*, Smith; Wall. Pl. As. Bar. t. 174; Brandis F. Fl. t. 64; King in Ann. Gard. Calc. ii. t. 15a; Collett Sunda Fl. 474, fig. 152. Vern. *Banyar*, Hax.; *Kharshu*, Hind.; *Mara*, *Kree*, Chamba; *Khor*, Bashi.

A large gregarious tree, sometimes leafless for a few weeks in spring, bark dark grey, cut by shallow cracks into small more or less 4-sided scales, shoots and young l. softly rusty-tomentose. L. rigidly coriaceous, glabrous and dark green above, generally hairy on the underside, entire or (on young trees always) dentate with long spine-point teeth, elliptic or elliptic-oblong, blade 2-5 in., pet. very short, sec. n. generally bifurcating and branching. ♂ catkins fasciated, 2-6 in. long, perianth-segments obtuse, ciliate. ♀ spikes short, few-fl., styles 3-5 linear, recurved. Fr. usually solitary, on the previous year's wood, glabrous, 1 in. diam., black when ripe, base enclosed by the thin concave cup.

Kurur valley 9-11,000 ft. Himalaya, 8-10,000 ft. occasionally descending to 6,500 and ascending to 12,000 ft. East Manipur on the Burma frontier 8-10,000 ft.—China. New l. and fl. April-June. The fr. ripens Aug-Sept. of the next year, 15 months after flowering. Seeds profusely every second year, but a few trees here and there bear acorns every year. Trees that bear acorns do not shed l. that year, whereas those which produce ♂ fl. are generally leafless by the middle of May (Ranjal 388). 2. *Q. Rex*, Linn.—King Ann. ii. t. 17.—Syn. *Q. Dalson*, Griff. Vern. *Ba'at*, Afg.; *Bek*, Kun. Kurur valley 6,500-8,000 ft. common. Hills north of the Peshawar valley at 3,500 ft. Central, 6-8,000 ft. Arbi valleys of the Inner Himalaya, on the upper Jhelam, Chenab, Ravi and Sutlej, 3-8,500 ft. In the Sulej valley the lower limit. Chergaon and Parwi, the upper; Teling and Purina—Mediterranean region. Afghanistan. A middle-sized evergreen tree, often only a shrub, branchlets, petioles and underside of l. densely grey-pubescent with stellate hairs. L. coriaceous, elliptic or elliptic-oblong, entire or with large spine-point teeth, blade 2-5 in. long, pet. short, sec. n. not prominent. Anthers hairy. Acorns 2-3 on a peduncle 1-2 in. long, nuts at first nearly enclosed in the cup, scales hairy, closely appressed. Gamble p. 572, mentions a tree from the Chumbi valley which, he thinks, may possibly be this species.

3. *Q. Griffithii*, Hook. f. & Thoms.; King Ann. ii. t. 18. *Thitcha*, *Lowat*, *Mellein*, Upper Burma.

A large deciduous gregarious tree, bark silvery grey, branchlets and young l. pale, often rusty-tomentose. L. coriaceous, underside usually pubescent, ovate or oblanceolate, blade 6-9, pet. $\frac{1}{2}$ -1 in., stout; sec. n. 14-18 pair, prominent, nearly straight, terminating in large triangular serratures. Fr. solitary or in short spikes, cup hemispherical, $\frac{1}{2}$ in. diam., scales closely appressed, nut $\frac{1}{2}$ -1 in. long, nearly cylindrical.

Bhutan, Khas and Nag hills, Manipur. Hills of Upper Burma, east of the Irrawaddi. Hills between the Sitang and the Salween, south as far as Lanang, common.

on the upper Yumalle at about 5,000 ft. Fl. Oct.-March. Wood similar to that of *Quercus aculeata*. Remarkable galls on the branches, consisting of densely packed subulate scales, up to $\frac{1}{4}$ in. long. Var. *oblonga*, Khasi and Naga hills, has nearly entire l. *Q. officinalis*, Blume, of Japan and several other sp. of Japan and China will probably eventually be united with this sp.

4. *Q. incana*, Roxb.: King Ann. ii. t. 20; Collett Simla Fl. 475, fig. 154. Vern. *Rhin*, Haz.; *Shiddar*, Kashm.; *Bau*, *Bauj*, Hind.

A middle-sized or large evergreen gregarious tree, foliage grey, branchlets, petioles and underside of l. white-tomentose. L. coriaceous, elliptic-lanceolate, serrate, teeth sharp, untruncate, base acute, blade 3-6, pet. $\frac{1}{2}$ in., stipules linear, scarious, $\frac{1}{2}$ in. long, early caducous. Catkins hairy, bracts obtuse, scarious, perianth of 4-5 short unequal segments, anthers glabrous. Fr. mostly solitary, ripe nuts ovoid-conical, 1 in. long, half enclosed in the rough woody cup.

Outer North-West Himalaya, eastwards as far as Nepal, 4-8,000 ft., occasionally lower (Mothronwala swamp, in the Dun 1,800 ft.). Generally associated with *Rhododendron arboreum* and *Androsace*. The Doddar, often self-sown, readily comes up under its shade. Leaves renewed in March and April, the young foliage coming out with a lilac shade. Leaves renewed in March and April, the young foliage coming out with a lilac and purple tinge. Fl. about the same time, but occasionally irregularities occur; thus at Simla the *Bau* flowered abundantly in July 1902. Fr. in autumn, 15-17 months after fl. Coppices freely. Wood splits and warps, but makes excellent fuel, bark rich in tannin. 5. *Q. lanuginosa*, Don; King Ann. ii. t. 19. Kumaon, 4-8,000 ft., gregarious in patches, often associated with *Q. incana*. Nepal.

Blutan. Vern. *Bauj*, *Bianj*, *Bai Bauj*, Kumaon; *Baujo*, Nep. A large evergreen tree, branchlets and underside of l. densely clothed with rufous or tawny wool. L. coriaceous, upper surface rugose, midrib often hairy, serratures distant, blade 4-8, pet. $\frac{1}{2}$ -1 in. long. Fr. solitary or in short spikes, cup $\frac{1}{2}$ in. across, scales thin, appressed, not woolly with a short cylindrical umbo.

B. Leaves glabrous when mature.

6. *Q. serrata*, Thunb.; King Ann. ii. t. 16. A middle-sized straight-stemmed deciduous tree, annual rings conspicuous by numerous very large pores in the spring wood, concentric bands of wood - parenchyma obscure. Youngest shoots and young l. clothed with soft hairs, l. thinly coriaceous, glabrous when mature, shining, lanceolate or elliptic-lanceolate, blade 5-7, pet. 1-1 $\frac{1}{2}$



FIG. 192.—*Quercus serrata*, Thunb. 4.

in. long, slender, sec. n. straight 10-20 pair, each nerve terminating in a sharp serrature, up to $\frac{1}{4}$ in. long. Fr. on the previous year's wood, nearly sessile, cup $1\frac{1}{2}$ in. diam., scales spreading, hoary, up to $\frac{1}{4}$ in. long, nut shining, globose to cylindrical, $\frac{1}{2}$ -1 in. diam.

Himalaya, from Kumaon eastwards, 8-9,000 ft. Khasi hills, Manipur, Shan hills, Upper Burma. Fl. March-May.—China, Japan, Korea. One of the species of Oak on which the Yamaoaki silkworm in Japan is raised. 7. *Q. dilatata*, Lindley; Boyle III. t. 84 fig. 2; King Ann. ii. t. 15; Collett Simla Fl. 474 fig. 153. Vern. *Bacassi*, Haz.; *Mars*, Punj, Hind.; *T'konj*, Garhw. Kurum valley, 7-8,500 ft. N.W. Himalaya, 6-9,000 ft. In the zone below that of *Q. semiserrata*, often associated with the Himalayan Spruce and Silver fir. In Kumaon as far as Jani.—Afghanistan. A large tree, nearly evergreen, bark dark, peeling off in longitudinal scales. Compound med. rays, similar to *Corylus*. Youngest shoots nearly glabrous. L. glabrous, shining, coriaceous, entire or with sharp spinose teeth, blade 2-3, pet. $\frac{1}{4}$ in. σ catkins fascicled, ρ spikes short. Fr. mostly solitary, nearly sessile, the lower half enclosed in the cup $\frac{1}{2}$ in. across, scales closely appressed. Fl. April, May, fr. O. S., 10-18 months after fl. 8. *Q. calathiformis*, Skan in Journ. Linn. Soc. xxvi. 598. Vern. *Nols*, Burm. Ruby Mines district, Upper Burma, 4-5,000 ft.—Yunnan 4-6,000 ft. A shrub or small tree, branchlets ridged and furrowed with a few minute stellate hairs. L. thinly coriaceous, obtusely serrate or crenate, elongate-elliptic, blade 4-8, pet. $\frac{1}{4}$ in., upperside shining, underside pale, sec. n. slightly arching, 15-20 pair. σ spikes from the axils of the uppermost l. often branching, 2-3 in. long, rachis ribbed, glabrous, with a few very minute stellate hairs, 6-8 fl. in compact oblong clusters in the axils of small bracts. Stamens glabrous, surrounding a hairy pistillode. Acorns sessile, solitary on spikes 4-6 in. long, cup pubescent hemispheric, $\frac{1}{2}$ in. across, nut ovoid-cylindric $\frac{1}{4}$ in. long. Differs from the other species of *Lepidobalanus* by the rachis of the σ spikes being ribbed, nearly glabrous, not softly hairy, and by the rudimentary ovary.

9. Sect. ii. *Cyclobalanopsis*. Male spikes as in 1. Cup hemispheric or campanulate, bracts connate into concentric belts (lamellae). L. more or less serrate.

A. Mature nut exerted, less than half enclosed in the cup.

9. *Q. semiserrata*, Roxb.; Wight Ic. t. 211; King Ann. ii. t. 22. *Thitcha*, Lower; *Zayat*, Upper Burma.

A middle-sized evergreen tree, youngest shoots and l. clothed with soft deciduous tomentum. L. coriaceous, glabrous when mature, elliptic-lanceolate, upper portion serrate, lower entire, blade 5-10, pet. 1 in. long, sec. n. straight, faintly anastomosing close under the edge. Fr. on short thick stalks, solitary or in pairs, cup $1\frac{1}{2}$ in. across, belts 5-8, thick, velvety, enclosing one-third of the nut, which is cylindrical-ovoid, $1\frac{1}{2}$ in. long.

Assam, Garo and Khasi hills, Cachar, Manipur, Burma, Upper and Lower, often in Eng forest. Fl. H. S. Var. *Masali*, Assam. Khasi hills. L. with a long canescent base, cup with the edge densely velvety and turned over.

10. *Q. glauca*, Thunb. (1781); King Ann. ii. t. 23; Collett Simla Fl. 475 fig. 155.—Syn. *Q. annulata*, Smith (1819); Brandis F. Fl. t. 65. Vern. *Baria*, Haz.; *Banni*, Hind.; *Phandt*, Knm.; *Phalat*, Nep.

A large evergreen tree, leaf-buds usually 4-sided, youngest shoots silky. L. thinly coriaceous, on the underside glaucous and often minutely pubescent with appressed hairs, upperside and petiole glabrous, blade 3-6 in., upper half sharply serrate, base entire, sec. n. 12-18 pair, straight, excurrent into the serratures, tert. n. slender, parallel, pet. slender, 1- $\frac{1}{4}$ in. long. Bracts of σ catkins long, early deciduous. Fr. sessile, on axillary, short, often only 1-fruited spikes, cups hemispheric, belts thin, thinly silky, crenate, often divided into broad truncate teeth, nut ovoid, apiculate, shining, $\frac{1}{2}$ - $\frac{3}{4}$ in. long.

Valleys of the outer Himalaya, ascending to 6,000 ft. Coppice woods of this and of *Q. laevis*, with standards of *Azadirachta indica* in the Kangra valley, Khasi hills, Fl. March-June. Fr. 15-17 months after fl.—China. Closely allied: 11. *Q. lineata*, Bl. (1825); King Ann. ii. t. 26, 27. Eastern Himalaya from Nepal eastwards 6-9,000 ft., common near Darjeeling, Khasi and Naga hills, Arakan, Hills of Upper Burma—Mal. Archip. China. L. often tomentose beneath, sec. n. 15-20 pair. Nut hemispheric, often broader than long. The full Indian varieties of *Q. lineata* are described by King in Ann. ii. 83: *Argolas*, *Lobii*, *Griffithii*, *Thomsoniani*, *Hildebrandii*.

B. Half the mature nut enclosed in the cup.
 12. *Q. Brandisiana*, Kurz; King Ann. II. t. 25 A. Shan hills, Upper Burma. Hills east of Toungoo, in hill Eng forest. Innat range 2-5,000 ft., Tenasserim. A



FIG. 193.—*Quercus semiserrata*, Roxb. 4.

in hills-sized evergreen tree, young shoots thinly pubescent, l. rigidly coriaceous, glabrous when mature, from elliptic to obovate, undulate, or with a few shallow serratures, blade 4-7, pet. 1-1½ in. long, sec. n. straight, 10-12 pair, midrib, sec. n. and often tert. n. prominent on the under and impressed on the upper side. Fr. on spikes 2-3 in. long, cup softly velvety within and without, shallow, ½-¾ in. across, nut nearly globose, apiculate. 13. *Q. velutina*, Lindl. Chittagong hill tracts. Pegu, frequent in Eng forest. A large tree, young shoots rusty-tomentose, l. serrulate near apex, nearly glabrous, thin, lanceolate, blade 5-8, pet. ½ in., sec. n. slender curved, 10-14 pair. Cup densely tomentose, 1½ in. across, lamellae crenate, nut depressed, velvety. 14. *Q. xanthactata*, Drake in Journal de Botanique 1868, 149, t. III, fig. 1. Wundab district, Upper Burma, 1,500 ft. (Dawson, Burm. l.—Tonkin. A large tree, branchlets, petioles and axillary buds tawny-tomentose. L. coriaceous, minutely serrate near the apex, elliptic, blade 4-6, pet. slender 1 in. long, upper side glabrous, underside glaucous with scattered thin hairs, sec. n. 10-12 pair. Cup densely fulvous-velvety, 1-1½ in. across. 15. *Q. Heteriana*, A. DC.—King Ann. II. t. 25 B. Manipur. Ruby Mines and other hills of Upper Burma east of the Irawadi, also hills east of Toungoo and on headwaters of Yunnalin 3-5,000 ft. A large tree, stunted in exposed situations, branchlets and under side of leaves densely tawny-tomentose, l. coriaceous, glabrous above, except midrib, sec. n. 10-14 pair, impressed above, prominent beneath. Fr. on spikes 2 in. long, peduncle stout, cup almost flat, the edge incurved, 1 in. across, lamellae 8, very regular, denticulate, not velvety, depressed, hemispheric. This might perhaps be included under A.

C. More than half the nut enclosed in the cup.

16. *Q. lamellosa*, Smilh; Wall. Pl. As. Rar. t. 149; Hook. l. III. Himal. Pl. t. 20; King Ann. II. t. 20. Vern. *Shalshi*, *Budgrat*, Nep.; *Bak*, Lepcha.

A very large evergreen tree, wood very hard and heavy. Buds silky, young shoots with tawny deciduous pubescence. L. elongate-elliptic, acute at both ends, sharply serrate to near the base, upper side glabrous, underside glaucous, with deciduous pubescence while young, blade 8-18, pet. 1-2 in. long, sec. n. 18-25 pair, straight, impressed on the upper, very prominent on the underside. Fr. sessile on short spikes, peduncles thick, cup very large, up to 3 in. across, woody, with 10 thin broad loose lamellæ, enclosing the greater part of the nut.

Nepal: Sikkim, 6-9,000 ft. Bhutan - Manipur, 7-9,000 ft. Fl. April-May.

17. *Q. mazzillotta*, Wall.; King Ann. II. t. 28. Manipur. Hills of Upper Burma.

18. *Q. otocarpa*, Kerth.; King Ann. II. t. 21 A. Tenasserim (F). Malay Peninsula. A tall tree, l. glabrous, elliptic-lanceolate, the upper fourth serrate, blade 5-7, pet. slender 1-2 in., sec. n. 19 pair, arching. Cup deep, covering 1/4 of the nut, lamellæ pubescent, appressed, more or less crenate, nut ovoid, 1 1/2 in. long.

19. *Q. spicata*, Smith; Wall. Pl. As. Rar. t. 46.—Syn. *Q. squamata*, Roxb.; Wight Ic. t. 213. Vern. *Arasulia*, Nep.; *Bara chakma*, Beng.

A large or middle-sized evergreen tree, glabrous excepting the hairy ♂ spikes.

L. shining, variable in shape. ♂ spikes hairy, stout, 2-8 in. long, usually in dense terminal panicles, fl. closely packed in oblong woolly clusters in the axils of acuminate bracts. Fr. more or less confluent in clusters of 3-6, on stout divergent spikes, 3-9 in. long, cup 1/2-1 in. across, embracing one-third part of the shining nut, scales more or less confluent, tips usually free. Nut adnate to the cup with the circular base only.

Eastern Himalaya, from Nepal eastwards, 2-5,000 ft. Assam. Khasi and Naga hills, Manipur. Fl. at different times, Sept. to May. Fr. ripens in autumn of the following year.—China. Malay Peninsula, Sumatra, Java, Bangka.

Two principal forms may be distinguished: (a) *spicata* proper. King Ann. II. t. 41 l. coriaceous, from elliptic to obovate, lower part usually narrowed towards the rounded or cordate base, blade 5-12, pet. 0-1 in., sec. n. prominent, nut globose, often depressed. (b) *Colletia* (*Chittagong*). Ann. II. t. 42. l. thinly coriaceous, lanceolate or elliptic-lanceolate, narrowed to both ends, blade 3-8, pet. 1/2-1 in., sec. n. mostly slender, nut ovoid. Regarding the distribution of these 2 forms in Chittagong and Burma, the following may be mentioned: (a) *spicata*: Upper Burma, hills east of the Irawadi, 2-5,000 ft. Yechon, Burma; Martaban and Tenasserim, sometimes in Eng. forest. (b) *Colletia*: Chittagong. Upper Burma, hills west of the Irawadi, 1-2,000 ft. (*Zapat*, *Zapat pnyang*, Burma). Hills east of the Irawadi, 3-7,500 ft. (*Tait-é*, Burma; *Wodau-pun*, Kachin). Tenasserim. These two forms merit careful study in the forest, chiefly in regard to their biological characters. They may prove to be distinct species, analogous to the European *Quercus acutiflora* and *pedunculata*.

20. *Q. Lindleyana*, Wall.; King Ann. II. t. 55. Hills of Upper Burma, east of the Irawadi river. A middle-sized tree, branchlets, petioles, underside of l., upper side of midrib, and sometimes the entire upper surface, softly grey- or tawny-tomentose, l. thickly coriaceous, obovate, edge undulate, blade 6-8, pet. stout 1/2 in., sec. n. 19-15 pair, as also tertiary n. impressed on the upper surface. Male spikes softly tomentose, axillary and in large terminal panicles. Fr. connate in clusters of 3-6, on spikes 8-12 in. long, peduncle stout and woody, cup enclosing one-fourth of the nut, which is cylindrical-conic, indistinctly angular.

21. *Q. lappacea*, Boxb.; Wight Ic. t. 220; King Ann. II. t. 33. Assam, Khasi hills, Tenasserim, near the great falls of the Salween, in evergreen forest (R. B. April 1859).—Malay Peninsula. A middle-sized tree, branchlets rusty-tomentose. L. hairy along midrib and nerves, elongate-elliptic, acuminate, sec. n. 12-18 pair, anastomosing under the margin, blade 5-9, pet. 1/2 in.

22. *Q. lappacea*, Boxb.; Wight Ic. t. 220; King Ann. II. t. 33. Assam, Khasi hills, Tenasserim, near the great falls of the Salween, in evergreen forest (R. B. April 1859).—Malay Peninsula. A middle-sized tree, branchlets rusty-tomentose. L. hairy along midrib and nerves, elongate-elliptic, acuminate, sec. n. 12-18 pair, anastomosing under the margin, blade 5-9, pet. 1/2 in.

23. *Q. Lindleyana*, Wall.; King Ann. II. t. 55. Hills of Upper Burma, east of the Irawadi river. A middle-sized tree, branchlets, petioles, underside of l., upper side of midrib, and sometimes the entire upper surface, softly grey- or tawny-tomentose, l. thickly coriaceous, obovate, edge undulate, blade 6-8, pet. stout 1/2 in., sec. n. 19-15 pair, as also tertiary n. impressed on the upper surface. Male spikes softly tomentose, axillary and in large terminal panicles. Fr. connate in clusters of 3-6, on spikes 8-12 in. long, peduncle stout and woody, cup enclosing one-fourth of the nut, which is cylindrical-conic, indistinctly angular.

2 spikes softly tomentose as long as l. filaments long. Fr. 2-8 on spikes 3-5 in. long. cup enclosing the base of the nut, bracts hairy, long-acuminate, appressed and spreading, nut ovoid-conic, velvety. 22. *Q. acuminata*, Roxb. Chittagong Hill tracts. Donat



FIG. 191. *Quercus spicata*, Smith. 4

Java, Tenasserim (D. B. April 1850). Similar to 21, but entirely glabrous, l. on both sides shining, cup hemispheric, velvety, bracts confluent, tips free. Nut broad-ovoid with a flat base.

23. *Q. polytachya*, Wall.: King Ann. ii. t. 41. Manipur. Hills of Upper Burma, 1500-2000 ft. Martaban hills near Lematee. A middle-sized tree, l. glabrous, glaucous beneath, elongate elliptic, narrowed to both ends, blade 4-7, pet. 1-1 in. 2 spikes in large terminal panicles. Fr. 2-3 together, often with small abortive acorns, in shortly stalked clusters, cups shallow, 1/4 in. across, nuts ovoid, shining. 24. *Q. Amherstiana*, Wall.: King Ann. ii. t. 32a. Pegu Yoma, near streams or in evergreen forest. Bihoko range, near Halgy (2000 ft.), Martaban (D. B. 1859). Amherst. A large evergreen tree, entirely glabrous, l. thinly coriaceous, lanceolate or oblong-lanceolate, acuminate, blade 6-12, narrowed into pet. 1-1 in., ven. n. slender. Spikes 6-9 in. long, fr. solitary or in groups, cup embracing lower half of nut, wings thick, reflexed, bracts indistinct, nut ellipsoid with rounded ends, 1 1/2 in. long. 25. *Q. Falconeri*, Kurz: King Ann. ii. t. 24. Tenasserim. Similar to 21, l. shining, coriaceous, oblong-lanceolate, blade 12-15, pet. stout, 1/4 in., ven. n. arching, impressed above, prominent

beneath anastomosing near the edge. Cup shallow, edge thin, undulating, much wider than nut, bracts distinct. Nut nearly globose, $\frac{1}{2}$ in. diam.

B. More than half the mature nut enclosed in the cup.

26. *Q. pachyphylla*, Kurz; King Ann. ii. t. 38. Vern. *Sungre Katia*, Nop.

A large tree, l. elliptic-lanceolate, long-secuminate, glabrous above, underside pale, with minute stellate hairs, midrib and nerves glabrous, blade 5-8, pet. $\frac{1}{2}$ in., sec. n. 8-10 pair, impressed above, arching and anastomosing under the margin. Spikes sometimes androgynous. Cups $1\frac{1}{2}$ -2 in. across, always con-



FIG. 195.—*Quercus pachyphylla*, Kurz. $\frac{1}{2}$

fluent, forming large irregularly shaped masses, nuts glabrous shining, nearly globose, almost entirely included. Var. *fruticosa*, Manipur, a shrub or small tree, l. smaller, upper portion of nuts free.

Sikkim, 5-10,000 ft. common on the Singalila range. Manipur 8,000-9,500 ft. 27. *Q. magnifica*, sp. nova. Kachin hills east of Ithano. Southern Shan States 5,200 ft. in evergreen forest (*Molima pos-anna*, Shan. Montague Hill, Oct. 1906). A large tree, l. entire, glabrous, rigidly coriaceous, elongate-elliptic, blade 6-9, pet. 1 in. long, upperside shining, underside dull, sec. n. 10-12 pale, prominent. Pr. on stout woody spikes 3-7 in. long, clustered, but cups hardly confluent, cups enclosing $\frac{1}{2}$ of the nut, leaving a circular mouth open, walls woody, $\frac{1}{2}$ in. thick, bracts thick, hard, triangular, acuminate. Nut globose, lower half rough, upper half polished, pericarp woody, in the upper half $\frac{1}{2}$ in. in the lower half $\frac{1}{2}$ in. thick. Cotyledons thick fleshy, plano-convex. Several other species have an unusually thick pericarp: *Q. Rex* and *Ferdiana*, Hemsl., of China, and *Q. cornea*, Lour., of China and Tonkin. These 3 species have lobed cotyledons, like the Walnut. The acorns mentioned under *Q. Javanica*, Benth., in Fl. Brit. Ind. v. 618 also have a very thick-walled nut. They however belong to sect. v. The nut is entirely included in an ovoid involucre 2 in. long, tips of bracts large, pyramidal. *Q. polchra*, King Ann. ii. t. 81. Bercea, differs from 27 by the flat, not shining top of the nut; *Q. epicata*, Smith, by smaller confluent cups, and the nut adhering to the cup with its circular base only, pericarp $\frac{1}{2}$ in. thick; *Q. pachyphylla*, Kurz, has acorns as large but they are confluent, the base only of the nut is rough, while the greater part is polished, the pericarp in this portion being $\frac{1}{2}$ in. thick.

28. *Q. venestrata*, Roxb.; Wight Ic. t. 219; King Ann. II. t. 39. Vern. *Pala Katsa*, Nep. Sikkin, 5-8,000 ft. Khasi hills, Manipur. Upper Burma, east of the Irawadi, ascending to 5,000 ft. Martaban and Tenasserim, not known from Pegu. A middle-sized or large tree, young shoots often with deciduous hairs. L. coriaceous, lanceolate, blade 6-8, narrowed into pet. $\frac{1}{2}$ - $\frac{1}{4}$ in. long, upper side glabrous, underside often clothed with a dense felt of very minute stellate hairs, sec. n. 10-16 pair. σ spikes gray-pubescent, in dense terminal panicles, bracts long acuminate, deciduous. ν spikes long, generally branching. Fr. crowded, but not confluent, cup $\frac{1}{2}$ in. diam., crustaceous, usually thin, enclosing $\frac{1}{2}$ or more of the mature nut, scales connate, apex free, triangular, acuminate, nut globose, polished, pericarp $\frac{1}{4}$ in. thick. This somewhat variable species merits careful study in the forests. One form with lvs to 12 in. long at 4,000 ft. in the southern Shan States (*Moile*, Shan, Mont. Hill, Oct. 1903). Another with l. thinly coriaceous, 5-8 in. long, grey beneath, tert. n. conspicuous, cup almost closed, very thin, as well as pericarp, in the hills east of Bhamo 8,000 ft. (*Let sleep pass*, Kachin, Mont. Hill, Feb. 1902), also in the Buby Mines district; 29. *Q. dealbata*, Hook. & Thoms.; King Ann. II. t. 46. Bhutan. Khasi hills (*Kawing*), Manipur. A shrub or small tree, similar to 28, branchlets and underside of l. minutely tomentose, l. smaller, sec. n. 8-12 pair, cup and nut hoary.

Sect. iv. *Cyclobalanus*. Male spikes stiff, erect. Bracts of cup connate into concentric ridges or belts. L. entire.

30. *Q. Thomsoni*, Miquel; King Ann. II. t. 69a. — Syn. *Q. turbinata*, Roxb.; Wight Ic. t. 221. Khasi hills, Chittagong (Roxb.) Hills east of Bhamo, 9,000 ft. in evergreen forest (*Wesol pass*, Kachin). Hmangin, west of the Irawadi 1,500-2,000 ft. (*Zogel*, *Wesol*, Burm.) Bithoko range near Hatgyi 3,000 ft. A large tree, l. thinly coriaceous, upper side glabrous, underside grey or silvery with very fine stellate hairs, lanceolate, blade 5-8, narrowed into pet. $\frac{1}{2}$ - $\frac{1}{4}$ in. long. Fr. tightly packed in clusters of 3-12, cup thin, shallow, $\frac{1}{2}$ -1 in. across, nuts depressed, grey, velvety. 31. *Q. eumorpha*, Kurz; King Ann. II. t. 51b. Martaban and Tenasserim hills; Nattaung, 6-7,000 ft., in stunted hill forest. Mooleyit 6,500 ft. A small evergreen glabrous tree, l. elliptic-lanceolate, margin undulate, blade 3-4, pet. $\frac{1}{2}$ - $\frac{1}{4}$ in., sec. n. slender. Cup velvety, $\frac{1}{2}$ in. across, concentric belts more or less distinct. σ fl. unknown.

Sect. v. *Chlamylobalanus* and vi. *Lithocarpus*. Male spikes erect, stiff. Involucre ovoid or globose, enclosing the whole nut, marked on the outside with concentric belts or densely clothed with acuminate scales, tip sometimes free. L. quite entire.

A. Involucre with concentric belts and a few scales or tubercles.

32. *Q. lanceifolia*, Roxb.; Wight Ic. t. 212; King Ann. II. t. 74. Vern. *Pala Katsa*, Nep. Subhimalayan tract from Sikkin eastwards, ascends to 5,000 ft. Assam. Khasi hills, Chittagong, Shan hills 5,000 ft. A small evergreen tree, fine male rays numerous and equidistant, broad rays very few. Branchlets and l. glabrous, l. pale beneath, lanceolate, blade 5-8, pet. $\frac{1}{2}$ - $\frac{1}{4}$ in. Female spikes hairy, involucres mostly solitary. Acorns 5-10, distant on spikes 4-7 in. long, on short thick stalks, involucre thin, enveloping the whole nut, marked outside with 4-6 wavy rings (tuberculate in var. *semicristata*). Nut silky, obliquely-ovoid. 33. *Q. truncata*, King Ann. II. t. 80. Naga hills, Manipur. Upper Burma, hills east of the Irawadi river 4-8,000 ft. (*Moicheng*, Shan.) A middle-sized (at times a large) tree, branchlets ribbed, glabrous. L. glabrous, thinly coriaceous, pale beneath, lanceolate or elliptic-lanceolate, blade 6-12, narrowed into pet. $\frac{1}{2}$ - $\frac{1}{4}$ in. long, sec. n. 10-12 pair, arching. Acorns on spikes up to 6 in. long, in sessile clusters of three, cups confluent. Cups hoary or pubescent, urceolate, almost turbinate, marked in the lower portion with uneven more or less concentric belts, and on the flat truncate top with triangular scales. Nuts entirely included or tips free, ovoid or obovoid, $\frac{1}{2}$ -1 in. long, the lower three-fourths adhering to involucre, rough, the upper fourth depressed, hoary, not polished, pericarp thin, scotyledons plano-convex. Some acorns from Upper Burma, possibly a new species, have the involucre clothed with flat appressed scales, more or less arranged in concentric belts. 34. *Q. oha*, Kurz in Journ. As. Soc. Bengal 44, 107 tab. H. fig. 9. Assam (acorns only known). Fruit spikes stout, 1 in. long, acorns distinct with 1 or 2 abortive ones adnate to the base, cup very thick-walled, woody, campanulate, but narrowed at the mouth, scales broad, appressed, abruptly acuminate, arranged in regular vertical rows. Nut depressed globose, polished, the apex only free. In Fl. Brit. Ind. v. 619 this is supposed to be near *Q. truncata*. Kurz thought it to be near *Q. spicata*.

B. Involucre densely covered with acuminate scales $\frac{1}{2}$ - $\frac{1}{4}$ in. long.

35. *Q. xylocarpa*, King Ann. II. t. 79. Naga hills, Manipur 6-7,000 ft. A large evergreen tree, youngest shoots thinly hairy. L. pale beneath, lanceolate finely

acuminate blade 4-6, pet. $\frac{1}{2}$ in., sec. n. 10-12 pair, arching, prominent beneath. Acorns confluent in axillary clusters of three, involucre 1-1 $\frac{1}{2}$ in. diam., completely enclosing the nut, scales tapering from a pyramidal base into a long acuminate, walls woody; $\frac{1}{2}$ in. thick, adhering tightly to the nut. Nut depressed-globose, diam. $\frac{1}{2}$ in.; the upper fourth polished, the lower three-fourths rough, pericarp $\frac{1}{2}$ in. thick, intruded into the cavity, cotyledons probably lobed. *Q. zeylanica*, Kurz in Journ. As. Soc. Bengal 41, 196, tab. 14, figs. 5-8, Arakan hills east of Akyab, 5-6,000 ft., is probably this species, but the scales are blunt and the apex of the nut is stated to be free. 36. Acorns only, similar to 35, from the hills east of Bhamo 7,500 ft. (*Sala pax*, Kschin, Mont. Hill, Feb. 1902), nut almost hemispherical, polished, except the flat circular base, pericarp thin. 37. *Q. Wrayi*, King Ann. II. 1. 191. Meign. (Manson).—Perak, Branchlets, petioles, underside of l. and nerves on the upper side tomentose. L. lanceolate, blade 6-8, pet. $\frac{1}{2}$ in., sec. n. slender, 15-20 pair, near the edge curving and anastomosing. Caps sessile, on spikes 4 in. long, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., scales soft, densely tomentose, up to $\frac{1}{2}$ in. long.

2. **CASTANOPSIS**, Spach; Fl. Brit. Ind. v. 619 (included in *Castanea* by Prantl in Engler u. Prantl iii. 1. 54).

Evergreen trees, path usually quadrangular, med. rays of most species uniform, very fine and equidistant. δ catkins erect, mostly in terminal panicles. σ fl. 1-3 in one involucre, nuts wholly enclosed in the involucre, which is covered with spines or tubercles or marked with more or less concentric tubercled lines. Species 28, one in Pacific North America, the rest in Eastern Asia. *Kyauza*, Burm. and *Thit-e* in Upper Burma, are used indiscriminately for several species.

- I. Involucre ovoid or globose, dehiscent, spinous.
- A. Leaves sharply serrate.



FIG. 196.—*Castanopsis indica*, A. DC. 4

1. *C. indica*, A. DC.; King Ann. II. t. 83.—Syn. *Castanea indica*, Roxb.; Wight Ic. t. 417. Vern. *Dalac katō*, Nep.; *Tūt-t*, Burma.

A middle-sized or large tree, bark silvery-grey. Vessels in irregular radial bands of wood parenchyma. Narrow tangential lines of wood parenchyma. Branchlets, petioles, underside of l. and inflorescence rusty-tomentose. l. coriaceous, elliptic-oblong, sharply serrate, blade 5-8, pet. $\frac{1}{2}$ - $\frac{3}{4}$ in., sec. n. 15-20 pair, prominent beneath. ♀ involucre mostly solitary. Fruiting spikes 4-6 in. long, often branching, involucre thin-walled, 1-1 $\frac{1}{2}$ in. diam., spines crowded, concealing the surface of the involucre, slender, simple, straight, hairy, unequal, the longest $\frac{1}{2}$ in.

Valleys and outer Himalayan ranges, from Nepal eastwards, 1-4,000 ft. Assam-Khasi hills, Cachar, Chittagong. Hills of Upper Burma east of the Irawadi river, 2-4,000 ft. Fl. Nov.-Dec., Sikkim, Feb., March, Burma. Coppice wood, the wood splits easily, used for shingles.—Tonkin. 2. *C. Clarkii*, King Ann. II. t. 83 bis. Khasi hills, Bhutan 5,000 ft. Hills of Upper Burma east of Irawadi. A large tree, nearly allied to 1, l. pale beneath, thinly pubescent, chiefly along nerves, pet. $\frac{1}{2}$ -1 in. long. Spikes slender pubescent, ♀ solitary, axillary. Ripe involucre $\frac{1}{2}$ -1 in. diam., spines slender, in tufts, leaving the velvety surface of the involucre exposed. Specimens from the Ruby Mines district, 4,000 ft., have petioles $\frac{1}{2}$ in. long and fr. $\frac{1}{2}$ in. diam.

B. Leaves usually entire.

(a) Surface of involucre more or less concealed by the crowded spines.

a. Branchlets, petioles and underside of l. pubescent or tomentose.

3. *C. Hystrix*, A. DC.; King Ann. II. t. 84.—Syn. *C. coccifera*, Hook. t. & Th. Vern. *Bora Katō*, Nep.; *Hingoes*, Ass. Sikkim, 6-8,000 ft. Bhutan, Assam, Khasi Hills, Ruby Mines hills, Upper Burma. Upper Yunnan 3,500 ft., Martaban.—Malay Peninsula, Yunnan. A tall tree, young shoots and inflorescence pubescent. l. lanceolate, underside clothed with minute ferruginous tomentum, blade 3-6, pet. $\frac{1}{2}$ - $\frac{3}{4}$ in. Spines of involucre stellately branched. Seed edible. 4. *C. diversifolia*, King Ann. II. t. 85a.—*Castanea diversifolia*, Kurz. Vern. *Kaung*, Burma. Hills east of Tonngoo 3-4,000 ft., common. Branchlets tawny-tomentose, l. rigidly coriaceous, entire, broadly ovate or elliptic, greatly varying in shape and size on the same branch, blade 5-9, pet. thick $\frac{1}{2}$ - $\frac{3}{4}$ in., petioles, midrib and sec. n. thinly pubescent. Sec. n. 10-12 pair, as well as the stinging, $\frac{1}{2}$ in. long. 5. *C. javanica*, A. DC.; King Ann. II. t. 85.—Syn. *Castanea javanica*, Blume.—Malay Peninsula, Tonkin and Archip. Branchlets, petioles and underside of l. from rusty-pubescent to tomentose. According to Kurz frequent in Pegu, Martaban and Tenasserim, but Kurz describes it as glabrous, the leaves beneath with minute indistinct tomentum. This has to be cleared up by studying the tree in the forest.

B. Branchlets, petioles and l. glabrous or nearly so.

6. *C. argentea*, A. DC.; King Ann. II. t. 82.—Syn. *Castanea argentea*, Blume; *Castanea martinicensis*, Wall. Pl. As. t. 107. Hills east of Bhamo, 7,000 ft., Upper Burma, wood used for building (*Kyica*, Kachin, Mont. Hill, Feb. 1907). Hills of Pegu, Martaban and Tenasserim.—Malay Peninsula and Archip. A large tree, bark smooth, light grey, branchlets and l. glabrous. l. thinly coriaceous, pale beneath, oblong-lanceolate, serrulate, blade 6-10, pet. $\frac{1}{2}$ in. Spikes pubescent, ♀ fl. solitary. Spines of involucre pubescent, $\frac{1}{2}$ in. long, in dense tufts on short woody stalks. 7. *C. castanocarpa*, Spach; King Ann. II. t. 81.—Syn. *Castanea Buchbergii*, Litell; *Quercus castanocarpa*, Roxb. Pl. Corou. t. 206. Chittagong. A large evergreen tree, young shoots minutely silky. l. thin, glabrous, oblong-lanceolate, acuminate, blade 6-12, pet. $\frac{1}{2}$ in., sec. n. 8-10 pair. Female involucre solitary on axillary spikes, 6-8 in. long. Fr. ovoid, pubescent, $\frac{1}{2}$ in., spines $\frac{1}{2}$ in. long tufted by their base into tufts.

(b) Spines in tufts or belts, not completely concealing the surface of involucre.

8. *C. argyrophylla*, King Ann. II. t. 83b.—Syn. *Castanea tribuloides*, var. *ferox*, Kurz P. Fl. II. 481. Vern. *Tūt-t*, *Tūt-tat*, Burma; *Makōe*, Shan. Upper Burma, Ruby Mines hills 5-6,000 ft. Shan hills, 4-5,000 ft. Arakan, Pegu, Martaban and Tenasserim. A middle-sized tree, branchlets minutely pubescent. l. thinly coriaceous, glabrous, pale beneath, blade 5-9, pet. $\frac{1}{2}$ - $\frac{3}{4}$ in., sec. n. 10-12 pair. Fr. nearly globose, 1-1 $\frac{1}{2}$ in. diam., with stout short simple spines in tufts or on short ridges, nut adnate high up to the inside of the involucre, tomentose where free.

9. *C. tribuloides*, A. DC.; King Ann. II. tt. 94, 95, 96.—Syn. *Castanea tribuloides*, Wall.; *Quercus ferox*, Roxb.; Wight Ic. t. 218. Vern. *Tumari*,

Katonj, Khamti: *Musey Kutra*, Nep.: *Kyanza*, Lower, *Thitè ni*, *Thitiggin*, Upper Burma.

A middle-sized (rarely large) evergreen tree, young shoots pubescent. L. coriaceous or thinly coriaceous, entire, sometimes serrate near the apex, lanceolate, long acuminate, blade 4-8, pet. $\frac{1}{2}$ in., upper side glabrous, under side pale or reddish, sometimes pubescent. Involucres distant, solitary or in pairs, styles long, linear. Fr. $\frac{1}{2}$ -1 in. diam., on spikes up to 10 in. long. Involucres not confluent, tomentose, spines up to $\frac{1}{2}$ in. long, usually on short ridges, often stellate or branched, as a rule leaving portions of the involucre uncovered, nuts 1-3, glabrous when mature, cotyledons ruminated.

Outer Himalaya from the Ganges eastwards, ascending to 8000 ft. Assam, Khasi hills, Manipur, Cachar, Chittagong. Hills of Upper Burma and Martaban.—Furzees. Fl. March-May, sometimes later. More or less gregarious (Garibol). King l. c. 102 recognizes the following varieties: (a) *typica*. L. entire, pubescent striatose, spines numerous, long, slender, covering the walls of involucre, nuts usually solitary. (b) *ferax*. Involucres larger than in (a), spines stouter but fewer. (c) *longispina*. L. large, spines stout curving, often $\frac{1}{2}$ in. long. (d) *reticulocarpa*. Pubescence ferruginous, involucre smaller than in (a), less covered by the spines, which are fewer and shorter, nut one. (e) *Wittii*. Manipur, also Khasi hills and Sikkim. Involucres small, almost woody, densely clothed with short often rufous spines, nuts 2-3.



FIG. 107.

Castanopsis tribuloides, A. DC. 4.

10. *C. armata*, Spach: King Ann. II. t. 93.—Syn. *Quercus armata*, Roxb. Cor. Pl. t. 29; Wright l. c. 770; *Castanea tribuloides*, var. *armata*, Kurz F. Fl. II. 481. Vern. Nohor, Beng.: *Kanta Singar*, Assam; *Singhar*, Tipperah; *Kanta-lal butana*, Chittagong. Assam, Khasi hills, Tipperah, Chittagong, Maymyo, Upper Burma, 4000 ft. A large tree, branchlets thinly pubescent, l. entire, lanceolate, blade 6-9, pet. $\frac{1}{2}$ -1 in., sec. p. striking, 6-9 pair. Involucres solitary. Fr. 1-1 $\frac{1}{2}$ in. diam., grey pubescent, spines pubescent, conical, very sharp, in stellate stalked clusters, arranged in imperfectly concentric ridges. Nuts single, pubescent.

11. Involucre irregularly ovoid, usually indehiscent, tuberculate or with short conical spines.

11. *C. rhamnifolia*, A. DC.: King Ann. II. t. 100a.—Syn. *Castanea rhamnifolia*, Kurz Southern Pegu Yoma, Paunglin, one of the most common trees in the evergreen forest (Kasson, D. B. Jan. 1892). Mergui (Wet thitta, Mauser, March 1892).—Malay Peninsula and Archip. A tall tree, bark greenish-grey, youngest shoots minutely puberulous, branchlets and l. glabrous, l. thinly coriaceous, ovate or elliptic-lanceolate, acuminate, blade 5-6, pet. $\frac{1}{2}$ -1 in. Spikes pubescent, in terminal panicles, ∇ involucre frequently at the base of spike. Fr. obliquely ovoid or obovoid, $\frac{1}{2}$ -1 in. long, grey-velvety, the side towards the rachis flat, uneven, the rest densely covered with short conical or pyramidal spines with sharp tips, nut one. 12. *C. Sumatrana*, A. DC.: King Ann. II. t. 67.—Syn. *Castanea incana*, Lindl. Hills east of Toungoo (Kurz)—Malay Peninsula and Archip. L. glabrous, thinly coriaceous, lanceolate, blade 4-7, pet. $\frac{1}{2}$ -1 in., spikes pubescent. Fr. irregularly ovoid, 1-1 $\frac{1}{2}$ in. long, with 3 or 4 irregularly concentric tuberculate lines.

Castanea sativa, Miller (1766).—Syn. *C. vulgaris*, Lamarck (1788); *C. vesca*, Gaertner (1798). Sweet Chestnut, Mediterranean region, China, Japan. Cultivated with

some success in the Dôn and elsewhere. A long-lived deciduous tree, growth rapid while young, coppices readily, mesh rays uniform, very fine. L. sharply serrate, spikes erect, axillary, the lower 4, the upper androgynous, the ♀ fl. at base. 3 fl. 3 or more in the axil of one bract, stamens numerous. ♀ fl. usually 3 in one involucre, ovary 6-celled, styles 6. Ripe involucre 1-2 in. diam., densely spinous, dehiscing into 2-4 valves. A variety in China with l. densely tomentose beneath. Chestnuts are imported from China into Upper Burma.

ORDER CVIII. SAUCACEÆ. Gen. Pl. iii. 411
(*Salicineæ*).

Deciduous, fast growing, as a rule not very long-lived trees or shrubs, with scaly barks. L. alternate, simple, stipulate. Fl. dioecious in catkins, which are similar in both sexes, each bract bearing one fl. in its axil. Perianth 0, a more or less developed disk at the base of stamens and ovary. ♂: stamens 2 or more, filaments usually free, no rudimentary ovary in normal fl. ♀: ovary 1-celled, ovules ∞ on 2-4 parietal placentas, style short, 2-4-fid. Capsule usually 2-valved, the valves spreading or rolling back. Seeds ∞ , minute, embryo straight, radicle minute, inferior, albumen 0.

Wood soft, medullary rays narrow, vessels small, uniformly distributed, wood-parenchyma not much developed, wood fibres wide, walls not thick, pits simple. Petioles short, disk of 1 or 2 separate glands, stamens 2-12, in most species 2, long-exserted.

Petioles long, disk flat or cup-shaped, stamens 4-10.

1. SALIX.

2. POPULUS.

1. SALIX. Linn.; Fl. Brit. Ind. v. 626.

Leaves lanceolate, ovate or elliptic, petioles short, as a rule less than one-fourth the length of leaf. Bracts of catkins entire, disk of 1 or 2, rarely more, glands or scales. Stamens 2-12, in most species 2, filaments long, filiform. Valves of capsule generally rolled back, placentas near the base of valves. Species about 160, nearly all in the Northern Hemisphere.

Sect. I. *Piciandra*. Stamens 3-12, filaments free, villous at the base.
1. *S. tetrasperma*, Roxb. Cor. Pl. t. 97; Wight Ic. t. 1954; Bedd. Fl. Sylv. t. 322; Brandis F. Fl. t. 58. Vern. *Bias*, Haz.; *Bed. Bains*, Hind.; *Nilwa*, *Biru*, Gaud.; *Bai*, Ass.; *Bilawa*, *Waboj*, Mar.; *Niranji*, Kan.; *Fanti*, Mal.; *Mocaka*, Lower, Yess, Upper Burma. Subhimalayan tract and outer ranges, ascending to 6,000 ft. Common and in places gregarious on river banks and in moist places throughout India, in the Himalaya ascending to 6,000, in the Nilgiris to 7,000 ft. On the Aravalli hills, but not known from the arid region of Sind and the southern Punjab. Burma, Upper and Lower, China, Malay Bains, and Archip. Not in Ceylon. A middle-sized tree, sometimes a shrub, wood reddish, bark rough with deep vertical furrows, the lower 2-3 ft. of stem, if subject to inundation, often covered with numerous small rootlets. Young shoots and young l. silky, branchlets and underside of l. sometimes pubescent. L. glaucous beneath, lanceolate, rarely ovate-lanceolate, as a rule minutely and regularly serrate, leaf blade 2-6, pet. $\frac{1}{2}$ -1 in. long. Fl. after the l., catkins ♂ 2-4, ♀ 3-5 in. long, bracts pale. Stamens 3-12, capsules glabrous or puberulous, often in groups of 3-4, pedicel as long as capsule, or nearly so, style short, stigmas 2 spreading, generally entire, seeds 3-6. In Burma often leafless during the rains. Remarkable varieties: (a) *agria*, Kumaon, Nepal. Branchlets, petioles, underside of l. and rachis of catkins pubescent, l. nearly entire. (b) *calophylla*, Pegu, Tenasserim. Glabrous, l. broadly lanceolate, pet. long. 2. *S. ichnostachya*, Lindl.; Wight Ic. t. 1863. North Kanara and the Konkan, along river banks. Mysore, Shevaroy hills. L. lanceolate, pet. $\frac{1}{2}$ -1 in. Capsule broadly ovoid, densely woolly, nearly sessile. 3. *S. acmophylla*, Boiss. Vern. *Bol*, *Bola*, Hind., Punj.; *Jalsada*, Dän. Baluchistan, wild and cultivated, Kuram valley, Kashmir. Subhimalayan tract east to the Ganges. Northern Punjab, often cultivated.—Western Asia. A middle-sized tree, young shoots and l. silky. L. linear-lanceolate, as a rule entire, blade 1-5, pet. $\frac{1}{2}$ in. Fl. after the l., catkins on leafy peduncles. ♂ compact 1-2 in. ♀ lax 1 in. long, bracts pale. Stamens 4-6, capsule glabrous, ovoid-conical, pedicellate, style short.

Sect. II. *Diandra*. Stamens 2, filaments free (see 4. *degenii*).

A. Trees or large shrubs.

(a) Fl. with or after the L, catkins as a rule on leafy peduncles.

1. *S. elegans*, Wall.; Collett Simla Fl. 479, fig. 156. Vern. *Bashal*, *Kalichon*, *Sutlej*. North-West Himalaya 6-11,000 ft., very common, extending to the inner arid valleys.—Turkistan. China. A gregarious shrub, young shoots very minutely pubescent, branchlets glabrous. L. glabrous, often drying black, elongate-elliptic or obovate, entire or minutely serrate, blade 1-2½, pet. ½-1 in. long. ♂ catkins slender, 1-1½ in. long, bracts ovate, at times emarginate, filaments hairy in the lower portion, sometimes more or less cohering, glands 2. ♀ fl. frequently occupying the upper portion of ♂ catkins. ♀ catkins 2-4 in. long, leafy peduncles longer than half the catkin, capsule glabrous, styl. short. 2. *S. alba*, Linn. Cultivated in the North-West Himalaya, indigenous in Europe, Western and Northern Asia. A large tree with grey foliage. L. white beneath with appressed silky hairs, narrow-lanceolate, denticulate, stipules lanceolate, deciduous. Capsule pubescent, subsessile, style short bifid, each branch bearing a 2-lobed stigma. 6. *S. fragilis*, Linn. Cultivated at Aikhel in the Kuram valley, in Gilgit, Ladak and Lahaul, indigenous in Europe and Western Asia. A fast growing middle-sized tree, foliage green, branches divergent, easily breaking off at the junction. L. glabrous or nearly so, lanceolate or oblanceolate, crenate or serrate. Catkins 1½-2½ in. long. Capsules glabrous, narrowed into a short bifid style. Specimens coll. by Less, Pashu 5293, Quetta 5,000 ft., named *S. triandrea*, var. ♀ in Journ. Linn. Soc. xxviii, 319, being to this species. 7. *S. babingtonia*, Linn.; Brandis F. Fl. 1, 52. Weeping Willow, *Maisan*, *Pung*. Cultivated in Baluchistan, Northern India, the Punjab and (less commonly) in the plains further east, also in the Himalaya. Indigenous in Northern China, also reported from Northern Persia and Kurdistan. The female tree was introduced into Europe about the 16th century, and has since that time been propagated by cuttings. In Northern India the ♂ is more common than the ♀ tree. A large tree, usually with drooping branches, branchlets glabrous, shining, buds thin, acute. L. glabrous, linear-lanceolate, 3-6 in. long, finely serrulate, stipules falcate, serrate. ♂ catkins short, cylindrical, ½-1 in. long. Capsules sessile, conical, glabrous or slightly hairy at the base, stigmas 2, sessile.

8. *S. hastata*, Linn. North-West Himalaya, chiefly in the inner dry and arid valleys, 8-15,000 ft. Also less and there on the outer ranges, Kashmir, Hattu, Siakim, high up the Lachen river, 11,500 ft.—Alps and mountains of Central Europe, also in Scandinavia, Northern and Western Asia. A small shrub, branchlets glabrous, dark coloured, l. elliptic or elliptic-oblong, glabrous or pubescent and sec. n. hairy beneath, blade 2-4, pet. ½-1 in., stipules broadly ovate or semicordate. Fl. with the L, catkins ♂ 1-1½, ♀ 2-6 in. long. Capsules stipitate, glabrous, style filiform.

9. *S. Daltoniana*, And. Lachen and other inner valleys of Sikkim, 9-14,000 ft. Bhutan. A small tree, shrubby at high elevations, branchlets black, glabrous. L. lanceolate, 1-3 in. long, underside silky and coppery. Catkins slender, ♂ 1, ♀ 1-6 in. long, filaments hairy below. Capsule sessile, ½ in. long. 10. *S. longifera*, And. Inner Sikkim Himalaya, 9-10,000 ft. A small tree, branchlets and petioles thinly silky, l. glabrous when mature, lanceolate, entire, blade 1-2, pet. ½ in. ♀ catkins very slender, nearly glabrous, 2-5 in. long, on leafy peduncles, bracts minute. 11. *S. eriostachya*, Wall. Nepal. L. oblanceolate, entire, sparsely silky on both sides. ♀ catkins pubescent, 1½-2 in. long, bracts hairy, broadly ovate. Capsules sessile, style 2-cleft, stigmas long filiform, quite entire. The Bhutan specimens doubtfully referred to this in Fl. Brit. Ind. v. 636 f. before the L.

(b) Fl. before the L, catkins sessile or nearly so.

12. *S. Wallichiana*, And.; Brandis F. Fl. t. 61.—Syn. *S. virens*, Wall. Vern. *Blaisdre*, *Jains*. Kuram valley 10-12,000 ft., common. Himalaya, common 7-8,000 ft., descending to 2,000 and ascending to 9,000 ft.—Afghanistan. China. A large shrub or small tree, young shoots grey-silky, branchlets, petioles and underside of l. silvery pubescent. L. lanceolate, quite entire, blade 2-3, pet. 1-1½ in. Catkins densely silky, on very short peduncles, supported by a few rudimentary l. ♂ 1, ♀ 2-4 in., ♂ bracts black. Capsules downy, slender, ½ in. long, shortly stalked, stigmas subsessile. Regarding projections of the wood into the bark see Garbale Ind. Timbers ed. II, 687. 13. *S. daphnoides*, Vill.; Brandis F. Fl. t. 62. Vern. *Bashal*, *Sita*, *Bash*; *Bashrol*, *Jains*. North-West Himalaya, 2,500-15,000 ft., common in the inner arid tract.—Alps and mountains of Central Europe, descending into the plains along river valleys. Russia, Siberia, China. A tall shrub or small tree, wood reddish, branches usually covered with glaucous bloom, youngest shoots silky, branchlets glabrous or hairy. L. lanceolate or linear-lanceolate, glabrous, glaucous beneath, serrate. Fl. before the L, catkins densely silky, ♂ 1-1½, ♀ 3-4 in., bracts black at apex, fringed with long silky hairs. Capsules glabrous or minutely silky, subsessile, style long, slender. 14. *S. insignis*, And. Kashmir, 6,800 ft. *Pung*; 12,000 ft. (Less, Aug. 1859. Pitt 11,000 ft. (T. Thomson, Sept. 1847). A large shrub, branchlets tomentose, stipules semi-cordate, ♀

bracts black, obtuse, capsules hairy. 15. *S. Caprea*, Linn.: Brandis F. Fl. t. 67. *Salix*. Cultivated in the Punjab (*Bed musak*). Wild in Europe, Northern and Western Asia. A shrub or small tree. L. crenate, broadly elliptic or obovate, glabrous and more or less rugose above, gray-tomentose beneath, stipules large, reniform. Catkins densely silky, nearly sessile, ♂ sweet-scented, erect, 1-1½ in. long, bracts tipped with black. Capsules downy, stigmas subsessile.

16. *S. viminalis*, Linn. Kashmir, Chamba, Labaul, 5-9,000 ft. Baspa valley, Kunawar 9,000 ft. (D. B. Sept. 1864).—Europe (one of the principal kinds in Osler beds). Northern Asia. China. A shrub, branchlets and underside of l. densely matted with gray silky hairs. L. linear-lanceolate, margin revolute, blade 4-5 in., narrowed into a short pet., stipules lanceolate. ♂ catkins 1, ♀ 2-4 in. long, bracts brown or black at the apex, fringed with long silky hairs. Capsule gray tomentose, narrowed into a long slender style. 17. *S. obscura*, And. Lachen, Sikkim 9-14,500 ft.—China. A diffuse shrub, young shoots silky, l. lanceolate, 2½ in. long, glabrous or slightly silky beneath, midrib pubescent above. ♀ catkins sessile, bracts minute.

18. *S. eriophylla*, And. Khasi hills, probably also Sikkim.—China. A spreading shrub, branchlets and underside of l. with dense silvery tomentum. L. lanceolate, 2-4 in. long, sec. n. conspicuous. Catkins supported by a few small l., ♂ slender 1 in., ♀ 1½-2 in., capsule ½ in. long, sessile, woolly.

19. *S. Sikkimensis*, And. Inner Sikkim, 9-14,000 ft. A tree, shrubby at high elevations, common in stream-beds.—China. Branchlets stout, angled, shining. L. lanceolate, underside densely silky and coppery. ♂ catkins supported by a few small deciduous l., stout, 1-2 in. long. Capsules sessile, densely silky, nearly hidden by the villous bracts. 20. *S. yllia*, And. Inner arid valleys of the North-West Himalaya, 10-15,000 ft. A stout much-branched shrub, branches glaucous. L. rigid, glabrous on underside silky, pale beneath, elliptic or elliptic-oblong, 1-1½ in., veins finely reticulate, catkins ½ in. long.

B. Small, usually prostrate shrubs, the the ground. L. small, usually coriaceous; the l., terminating leafy branches.

g stem often half buried in ngly nerved. Catkins after

(a) L. narrow, width less than one-third the length.

21. *S. ...* All. Himalaya, Kashmir to Sikkim, 10-15,000 ft.—Yunnan. L. glabrous denticulate, elliptic-lanceolate 1-1½ in. ♂ catkins 1-1½ in. long, rachis, bracts and filaments glabrous. 22. *S. furcata*, And. in DC. Prodr. 16, p. 291 (*S. frutescens*, And. in Journ. Linn. Soc. iv. 53 is older, but is described: foliis integris, capsulis dense cinereo-villosis). Bashahr, Garhwal, Kumaon 10-12,000 ft. Young shoots, rachis of catkins and filaments with long thin hairs, l. glabrous, glaucous beneath, serrate, elliptic-lanceolate or oblanceolate, 1-1½ in. long. Catkins: ♂ 1-1 in. long, bracts purple, glands of disk 3-4, red. ♀ 1 in., two long styles, ending in clavate stigmas, early deciduous. Capsules glabrous. 23. *S. Serpyllum*, And. Sikkim 10-14,000 ft. Branchlets hairy, l. glabrous, oblanceolate, 1-1½ in. long. Bracts of catkins black, obtuse, with long white hairs. 24. *S. Thomsoniana*, And. Inner Sikkim, 8-10,000 ft. A dwarf shrub, l. 1-1 in., lanceolate, white-silky beneath, sec. n. oblique, prominent. ♂ catkins villous, 2-3 in. long.

(b) L. comparatively broad, width one-third the length of blade or more.

25. *S. sabellaris*, And. Himalaya, chiefly in the inner arid valleys, 11-15,000 ft., but also in the outer ranges, Hazara, Kashmir. Branchlets angled, glabrous, l. glabrous, crenulate, elongate-elliptic or obovate, blade 1-1½, pet. 1-1½ in. 26. *S. calyculata*, Hook. f. Lachen valley, Sikkim, 12-15,000 ft. Young shoots and young l. silky, with long hairs, l. obovate, blade 1-1½, pet. 1 in. 27. *S. oreophylla*, Hook. f. Sikkim, 14-16,000 ft.—China. L. 1½-1 long, deeply serrulate at the apex, catkins minute, hidden among the foliage.

Sect. iii. *Synandra*. Stamens 2, filaments connate entirely or to about the middle.

28. 3. *pycnostachya*, And. Inner dry valleys of the North-West Himalaya, 12-15,000 ft., growing in clumps in dry stream-beds, cultivated in Ladak. Generally a shrub, at times a small tree, 16 ft. high with a trunk 2 ft. girth and divaricate branches. Young shoots silky, branchlets smooth, shining. L. lanceolate or linear-lanceolate, entire or serrulate, 1-3 in. long, sometimes slightly hairy beneath. Fl. after the l., ♂ catkins on leafy peduncle 1 in., ♀ 2 in. long, bracts yellow or brown. The l. turn red before falling. 29. *S. ...* a, And. Outer and middle ranges of the North-West Himalaya 6-11,000 ft. A shrub or small tree. Similar to 28, l. larger, lanceolate, serrate, fl. with or a little before the l., bracts of ♂ catkins black, of ♀ brown. ♀ catkins 2-3 in. long. 30. *S. angustifolia*, Willd. Inner dry valleys of the North-West Himalaya, 7-15,000 ft.—Western Tibet, Yarkand, Kashgar, Songaria. North

Persia and the Caucasus. A shrub or small tree, branchlets glabrous. L. very narrowly linear, rigid 1-3 in. long. Fl. after the l. ♂ catkins $\frac{1}{2}$ - $\frac{3}{4}$ in. long, bracts glabrous, capsule sessile, silky. *Sl. & divergens*, Arel. Kishwar. Baluchistan-Zaskar, 13-15,000 ft. A small, much-branched shrub, l. oblong or obovate-oblong, $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Catkins $\frac{1}{2}$ - $\frac{3}{4}$ in. long, ♀ longer, capsules densely silky.

2. POPULUS. Link. ; Fl. Brit. Ind. v. 637.

Leaves as a rule broad, petioles generally exceeding one-fourth the length of blade. Bracts of catkins caducous, crenate or lobed. Stamens 4-20, inserted on the cup-shaped oblique disk, filaments generally less than twice the length of anthers. Capsule usually supported by the flat membranous circular or lobed disk, 2-4-valved, the valves spreading, a placenta along the median line of each valve. Species 18, northern temperate regions.

A. Leaves more or less lobed, buds pubescent, not viscid.

1. *P. euphratica*, Olivier, Brandis F. Fl. t. 63. Vern. *Padar*, Bal.; *Bahan*, Sind; *Bhan*, *Safedar*, Punj.

A middle-sized, usually gregarious tree, extremities sometimes hoary, buds



FIG. 108. *Populus euphratica*, Olivier. ♀.

slightly pubescent, not viscid. L. most variable in shape, those of seedlings, young trees, pollard- and coppice-shoots linear, short petiolate, 3-6 in. long, those of older trees on branches with short internodes, as a rule broad-ovate, rhomboid or cordate, blade 2-3, pet. 1-2 in. The broader l. are dentate, cut or lobed, while the narrow l. are generally entire. Intermediate forms frequent on the same tree and on the same branch. ♂ bracts oblanceolate, disk flat, 8-cleft, on a long slender stalk, stamens 8-12. Capsule lanceolate, 3-valved, $\frac{1}{2}$ - $\frac{3}{4}$ in., on a long slender pedicel.

Common in the forest belt of Sind along the Indus, particularly in upper and middle Sind, where it forms standards over the underwood of Tamarisk. Not uncommon in the valleys of Baluchistan and the Suliman range on small feeders of the Indus, up to 3,000 ft., also here and there on the main river below Attock. On the lower course of the Sutlej river. Nubra along the Shayok river 10,000-12,500 ft. forming pure woods, often of considerable extent. Fl. Febr., nearly leafless Jan. to March. Coppices vigorously and throws up abundant root-suckers. Where subject to inundation the

lower part of the trunk often gets covered with short horn-like roots, and short, hard, spine-like processes are found projecting from the wood into the bark.—On the banks of rivers in Afghanistan, Turkestan, Persia, Kurdistan and Central Arabia. Along the Euphrates and Tigris as well as along the Jordan in Palestine. Northern China. Algeria, on the hills of Oran. Within tropical East Africa. 2. *P. alba*, Linn. Vern. *Siddi*, Bal., Afg.; *Safala*, Haz.; *Mot. Bash.* North-West Himalaya, 4-10,000 ft. wild and cultivated. Planted in Baluchistan, Sind, Trans Indus and the Punjab—Europe, North Africa, Northern and Western Asia, China. In India a middle-sized, in Europe a tall tree. Buds, branchlets, petioles and underside of l. densely clothed with white tomentum. l. deeply lobed, blade 2-4, pet. 1-2 in., basal n. 5, midrib penninerved. Catkins hairy, stamens 4-10.

B. Leaves not lobed, buds viscid.

3. *P. ciliata*, Wall.; Boyle D. t. 84.—Syn. *P. rotundifolia*, Griff. in Pl. As. t. 546. Vern. *Pulach*, Haz.; *Cham. Krammel*, Bash.; *Chelawa*, Simla; *Pohari Pipal*, Hind. North-West Himalaya 4-10,000 ft., not known from the inner arid valleys, though not uncommon near Chini and Pangri in Kumaon. Sikkim 3,500-9,000 ft. Bhutan. A lofty tree, buds lanceolate, viscid, the yellow resinous gum sometimes secreted in large masses. l. as a rule finely ciliate along the edge, pale and often minutely pubescent beneath, denticulate, usually cordate, blade 3-7, pet. 2-4, basal n. 3-5, midrib penninerved, 2-4 in. long, pedicels as long as fl. Capsule glabrous or nearly so, ovoid, mentioned as a species evidently distinct in woods about Kalimpong and Damsong. 3-4,000 ft. l. quite glabrous, base not cordate, but rounded or truncate, bracts of 2 fl. long, not early deciduous, capsule 2-valved, valves bifid at the apex. Haines sends specimens (82) Tonglu, Pankasari, 7,000-10,000 ft.) of a large tree with thick fluted bark, branchlets cottony, young l. densely tomentose, mature glabrous, base straight or cordate, sec. n. bright red above, petioles compressed, red. Capsules 2-3-valved, valves densely tomentose. This as well as the tree mentioned by Gamble merit careful study in the forest. *P. ciliata*, it must be remembered, is a very variable species. 4. *P. microcarpa*, Hook. f. & Thoms. Bhutan 7,000 ft. Quite glabrous, l. orbicular, sinuate, base rounded or subcordate, capsule 4 in. long, nearly sessile. 5. *P. nigra*, Linn. The pyramidal (rather cypressiform) variety (Lombardy Poplar) is frequently planted in the North-West Himalaya, particularly in Kashmir, in Ladak as high as 12,000 ft. Also occasionally in the plains of the Punjab, and of late years in Baluchistan. The variety with spreading branches is indigenous in Europe, in Northern and Western Asia and Northern China. A large tree, buds viscid, branchlets and l. glabrous. l. almost triangular, acuminate, crenate, blade 2-4, pet. 1-2½ in. long, basal n. 3, midrib penninerved. Catkins glabrous, 2 pink, stamens 15-30, 2 lax, drooping, disk shallow, pedicel short. Fruiting catkins 4-6 in. long. *P. cascadensis*, Moench (*P. deltoides*, Sargent Silva t. 494), the cotton wood of North America, differs chiefly by ribbed branchlets, more deeply toothed l. and more numerous stamens. 6. *P. balsamifera*, Linn. Indigenous on the Shiyok river in West Tibet and in arid valleys of the inner N.-W. Himalaya 8-14,000 ft. Afghanistan.—Northern Asia. China. A large tree, buds viscid, resinous, branchlets angular. l. glabrous, pale beneath, ovate or ovate-lanceolate, dentate, blade 2-5, pet. 1-3 in. Fr. spikes 3 in. long, capsule nearly sessile, valves 2-4, usually 3, thick, almost woody, rachis pubescent. The North American *P. balsamifera* (the *Balsam Poplar* or *Toconmatoc*), usually united with this, is considered by Sargent, Silva tt. 490, 491 as a distinct species.

ORDER CIX. LILIACEJE. Gen. Pl. iii. 748.

Perennial herbs, with a creeping rootstock, bulbs or fibrous roots. Shrubs or trees in a few genera. Fl. as a rule bisexual. Perianth usually 6-merous in 2 series, imbricate in bud. Stamens 6 in most genera, ovary 3-celled, style 1, ovules 2 or more, rarely one, in the inner angle of the cells. Embryo small, surrounded by the horny or fleshy albumen.

The stems of *Dracops* and *Cordylina* have a regular bark, and as they grow older they increase in diameter by means of a concentric layer of cambium cells, in which additional pith-cells and fibre-vascular bundles are formed.

Stem simple or slightly branched, erect or procumbent, l. lanceolate or linear, with numerous longitudinal nerves, basal or at an acute angle from the midrib.

Ovule 1 in each cell.

Ovules numerous in each cell.

1. DRACOPS.

CORDYLINA (p. 641).

Mostly climbing, stems much branched.

L. broad, 3-7 basal n. joined by reticulate veins

Z. SMILAX.

Narrow linear cladophylls in the place of leaves. E. ASPIDAGRA.

1. DRACÆNA, Linn.; Fl. Brit. Ind. vi. 327.

Stem erect or procumbent, usually annulate, simple or forked, sometimes with a large branching head (*Dracena Draco*, L., of Teneriffe). L. usually crowded, forming a terminal crown, lanceolate or linear, with a midrib often faint, and α longit. n., transverse veinlets oblique. Fl. in terminal panicles. Perianth tubular or campanulate, 6-cleft, lobes narrow. Stamens 6, inserted at the mouth of the perianth-tube, anthers versatile. Ovary 3-celled, style filiform, 1 ovule in each cell. Berry 1-3-seeded, albumen horny, embryo small. Species 35, tropical and sub-tropical regions of Africa, Asia, and Australia. Besides the two following, a number of smaller species in India.

1. *D. angustifolia*, Roxb.—Syn. *D. varifolia*, Wall. Vern. Kwalisset, Burma, Khasi hills, Andaman, Tebasserim—Malay Archip. New Guinea, Australia, China. Stem 8-30 ft. high, l. linear, sessile with a broad base, 12-24 by 1-1½ in. Fl. white or with purple tips, ½-1 in. long, in large spreading panicles. 2. *D. spirata*, Roxb. Assam, Khasi hills, Cachar, Chittagong, Andaman, Western Ghats and Nilgiris. Stem 10-15 ft. high, l. elliptic-lanceolate, narrowed into a broad-based petiole, 12-15 by 1½-2 in., the midrib scarious towards the apex. Fl. greenish-yellow, scented, slender, in a long, contracted, racemiform panicle. Berry crimson.

Cordylina terminalis, Kunth. Cultivated in gardens, and run wild in India and Burma, original home probably Malaya. Attains 8-10 ft., stem slender, l. lanceolate or elliptic-lanceolate, narrowed into a broad-based petiole, nerves branching off from the midrib at a very acute angle, blade often variegated purple and black, var. *sericea* 12-24 pet. 3-6 in. long. Fl. white or purple, in an ample terminal panicle. Ovary 3-celled, ovules several in each cell, bicarinate.

2. SMILAX, Linn.; Fl. Brit. Ind. vi. 303.

Climbing shrubs, stems slender, from a creeping rootstock, a few herbs. L. persistent, basal n. 3-7, joining at the apex, with a system of reticulate veins, petiole usually with 2 tendrils at the base. Fl. umbellate, dioecious. Perianth-segments 6, free. Ovary trigonous, 3-celled, 1 or 2 pendulous ovules in each cell. Berry globose, seeds usually 2, hemispheric. Species 180, cosmopolitan in the tropics and temperate regions. Of the Indian species only three, large and widely distributed, can be mentioned.

A. Umbels sessile.

1. *S. aspera*, Linn.; Gillett *Stipa* Fl. 522, fig. 175.—Syn. *S. maculata*, Roxb.; Wight *l.* t. 238. Outer Himalaya from Kashmir eastwards, ascending to 6000 ft. Khasi Hills, Upper Burma, Nilgiris, Palnis.—Ceylon, montane zone up to 7000 ft. Mediterranean region. An extensive climber, branches armed or unarmed, l. often blotched, triangular or ovate, base more or less cordate, blade 2-5, pet. 1 in., basal n. usually 7. Inflorescence spiciform, umbels numerous sessile. Berry ½ in. diam. in large pendulous bunches, red, finally blue-black.

B. Umbels pedunculate.

2. *S. prolifera*, Roxb. Vern. *Bam-datana*, Dehra Dun; *Sesambou*, Burn. Subhimalayan tract and outer hills, from the Jumna eastwards, ascending to 4000 ft., common in Sal forest. Dioecious bushes in the moister parts of India and Burma. Ceylon moist region to 3000 ft. A stout climber, stem prickly, up to 1 in. diam. L. rigidly coriaceous, ovate to orbicular, the 2 inner nerves separating from the midrib some distance above the base, blade 4-8, pet. 1 in., usually 5-ribeled. Umbels in large axillary panicles, fl. pale-green. Berry ½ in. diam., red when ripe.

3. *S. macrophylla*, Roxb. Vern. *Kandata*, Hind. Subhimalayan tract from Kumaon eastwards, Behar, Chutia Nagpur, Central Provinces, common. The Konkan, Assam, Chittagong, Pegu, Cooch islands. A large prickly climber, l. ovate to orbicular, blade 6-18 in. diam., basal n. 5-7, pet. narrowly sheathing, not 5-ribeled. Umbels 2-3, alternate on a common peduncle. Berries large.

3. ASPARAGUS, Linn.; Fl. Brit. Ind. vi. 314.

Stems straggling or climbing. Minute scales, often spinescent, in the place of leaves, bearing in their axils tufts of needle-like branchlets, "cladodes," which have the function of l. Fl. rarely unisexual, pedicels jointed. Perianth deeply 6-lobed, ovary 3-gerous, cells 2- or more ovuled. Berry globose, seeds 2-5. Species 100, temperate and tropical regions of Europe, Africa and Asia. Only two of the larger and more common species can here be named.

1. *A. racemosa*, Willd.; Wight l. c. 224. Vern. Satawal, Dehra Dun, Sar-wal, Sata-wal, Hind. Sub-Himalayan tract and outer hills ascending to 5,000 ft. Common in most parts of India, not reported from Burma.—Ceylon, mostly in the dry regions. Tropical Africa. Java. Australia. A tall, much branched, rambling and climbing vigorous undershrub on a tuberous rootstock, prickles $\frac{1}{2}$ in., cladodes $\frac{1}{4}$ -1 in. long, in tufts of 2-6. Fl. white, fragrant, in racemes 1-4 in. long. 2. *A. filicina*, Ham. Outer North-West Himalaya, Kashmir to Kumaon, 4-5,000 ft. Blutan. Assam. Khasi hills. Manipur. Upper Burma.—China. Erect unarmed, cladodes flat, $\frac{1}{4}$ -1 in. long, in tufts of 2-5. Fl. white, single or in pairs, on long slender pedicels.

ORDER CX. PALMÆ. Gen. Pl. iii. 870.

Stem solid, either an underground perennial rhizome, producing flower-stalks and tufts of leaves, or more commonly above ground, erect or climbing. The stem above ground is in a few instances forked or sparingly branched: as a rule it is cylindric, simple and without leaf-bearing side branches. As regards the surface of the trunk two great classes may be distinguished. The stem of the first class is smooth and shining, annulate with raised rings (the scars of the leaf-stalks), and according to the length of the internodes these rings are at greater or less distance from each other. Many species of this class have the l. close together at the top of the trunk (*Arcaea*, *Coccoloba*), while in others (*Calamans*) the internodes are longer, the l. stand at some distance, often occupying a considerable length of the stem. The species of the second class (*Borassus*, most sp. of *Phoenix*) always have short internodes, and the surface of the stem is covered with the persistent base of petioles or their scars, which are arranged around the stem in a series of close spirals.

The l. of seedlings, as a rule, are undivided, while the l. of mature plants are either pinnately or palmately divided, the pinnae or segments being mostly folded longitudinally, provided with numerous longitudinal nerves and transverse veins, which in the dry leaf are conspicuous in many genera. The petiole is always broad-based and generally amplexicaul or sheathing. The l. here designated as pinnate are in reality pinnatifid, the segments not appearing as distinct protuberances in the young bud, but being united in the youngest stage (Eichler, *Palmenblätter*, in *Abhandlungen d. Königl. Preuss. Akademie d. Wissensch.* Berlin, 1885). The pinnate l. of *Phoenix* and other genera have a more or less pronounced spiral twist.

The inflorescence is terminal in a few species, but as a rule lateral, in the axils of existing or fallen leaves. It generally is a panicle enclosed in bud by large sheathing bracts (spathes), the common peduncle (spadix) being often thick and sometimes woody. The species of several genera are monocarpic, not only those with terminal (*Corypha*) but also some with axillary inflorescence (*Caryota*, *Arenga*) the stem of which dies after the last spadix has ripened its seed. The fl. are usually sessile on the last ramifications (spikelets) of the spadix, and they are supported by one or several bracts (spathels), which are often cup-shaped or tubular. They are dioecious, monoecious, or polygamous, rarely bisexual. Calyx and corolla, as a rule, consist of 3 segments or leaves each, the perianth of the fertile fl. being commonly persistent in fr. Stamens 6, rarely 8, 9 or numerous, anthers 2-celled. Ovary 3-celled, one ovule in each cell, sometimes 3 distinct 1-celled carpels. Seed with a small embryo and a large endosperm, the cells of which are either filled with oil or have their walls much thickened,

forming a hard, bony substance, which, when the seeds germinate, is converted into sugar.

The base of petioles as a rule occupy the entire circumference of the trunk, and consequently the leaf-traces (fibro-vascular bundles) of each leaf enter the stem from all sides. If we follow their course downwards we find that in their upper portion they bend towards the centre of the stem, while lower down they gradually bend outwards, and (frequently uniting with the traces of earlier leaves) run down near the circumference of the trunk. In their upper portion each leaf-trace consists of a few vessels, which in *Calamus* and other scandent palms (as in *Fixis* and other climbing) are very large, over 0.5 mm. diam., with thin-walled phloem, tracheides, and parenchyma, as well as a large mass of thick-walled wood-fibres, whereas the lower portion almost entirely consists of thick-walled wood-fibres. The space between the fibro-vascular bundles is occupied by parenchymatous tissue, which as a rule predominates in the centre of the trunk. Hence it follows that the hardest portion is near the outside of the trunk, consisting mainly of closely packed bundles of wood-fibres. Near the centre the tissue is softer, and hence in some species old stems are often hollow.

Preparatory to the production of flowers and seed the parenchyma in the trunk of *Phoenix* and other genera (analogous to what we find in the Beech before a seed year) is full of starch, which at the time of flowering is transformed into sugar. The starch of many species is utilised as *Sago*, while the sugary sap is obtained either from the cut spadix or (in the case of *Phoenix*) from the trunk below the crown of leaves.

I. Leaves pinnate or pinnatisect.

A. I. simply pinnate, leaflets induplicate, no midrib, fl. drooping

1. *Phoenix*.

B. I. simply pinnate, leaflets in the species here described, linear or lanceolate with midrib and reduplicate sides, the terminal leaflets often confluent as a plaited limb

(a) Spadix axillary, on the stem below the leaves.

a. Tip of spike with σ only.

σ fl. infinite, stamens 3 or 6, anthers basifixed

2. *ARECA*.

σ fl. in the axils of broad bracts, stamens 6, anthers versatile

PITHOGRAPHS (p. 657)

σ γ fl. in upper portion of spike, both sexes in lower portion, fl. sunk in cavities of the spike

3. *BENTHOSKIA*.

γ Clusters of β fl. (1 γ between 2 σ) all along the spike, stamens numerous

4. *PIRANGA*.

(b) Spadix among the leaves.

a. Erect, unarmed, spadix usually unisexual, fr. sessile, epicarp smooth, naked.

(1) Stems tall, stout.

Leaflets pruinose, auricled, stamens 2

5. *ARECAL*.

Leaflets acute, stamens 6

6. *COCOS*.

(2) Tufts of large l. from a creeping rhizome

NIPA (p. 648).

β . Mostly climbing, armed, epicarp clothed with scales, usually shining

(1) Stem short or none

7. *ZALUCA*.

(2) Stem elongate.

Spikelets concealed under large spathe

8. *PLECTOCOMIA*.

Spikelets in the axils of large cylindrical or open deciduous spathe

9. *DACODOROUS*.

- Spikelets in the axils of tubular or tubulobulliform spathe.
- Upper leaves reduced to a sheath without leaflets.
- All l. with leaflets, rachis mostly without flagellum.
10. CALAMUS.
11. CARYOTA.
12. WALLICHA.
13. DIDYMOSPERMA.
14. LIVISTONA.
15. LICHTALA.
16. TRACHYCARPUS.
17. BORASSICA.
18. CORYPHA.
- C. Leaves pinnate or decomposed, leaflets rhomboid or ovate, etc.
- (a) L. decomposed.
- (b) L. simply pinnate.
- (1) Fl. bisexual, fr. covered with scales.
- (2) Fl. unisexual, fr. naked.
- ♂ calyx tubular or of 3 connate sepals, stamens 6 or more.
- ♀ calyx cup-shaped, stamens 10-30.
11. CARYOTA.
12. WALLICHA.
13. DIDYMOSPERMA.
14. LIVISTONA.
15. LICHTALA.
16. TRACHYCARPUS.
17. BORASSICA.
18. CORYPHA.
- II. Leaves Sabelliform.
- A. Spadix axillary, among the leaves.
- (a) Petiole unarmed.
- (b) Petiole spinous.
1. Fl. bisexual, carpels 3, distinct.
- Leaf-segments connate to the middle.
- Leaf-segments free.
2. Fl. polygamo-monoecious, drupe 1-3.
3. Fl. dioecious, drupe large, with 1-3 fleshy pyrenes.
14. LIVISTONA.
15. LICHTALA.
16. TRACHYCARPUS.
17. BORASSICA.
18. CORYPHA.
- B. Spadix terminal, tree monocarpic.
- NANORHIZUS (p. 635).

1. PHOENIX, Linn.; Fl. Brit. Ind. v. 424.

Tall trees or low shrubs, the entire stem or the upper portion only closely covered by the more or less rhomboid bases of the petioles, stems occasionally branched. The first l. of seedlings, and sometimes the first l. of root-suckers are lanceolate, entire. Leaves pinnate, leaflets entire, linear, folded longitudinally and attached obliquely with their folded base to the woody common petiole, the lowest pinnae usually transformed into spines. No midrib, a slender nerve on either side of the fold, nerves longitudinal, parallel, stout and slender, the slender n. often obscure. Transverse veinlets present, but as a rule only visible under the microscope in thin sections, cut parallel with the surface of leaf. In the majority of species the leaflets in the lower portion of the petiole stand in fascicles of 4 or 6, two or three on each side of the petiole, while the upper leaflets are usually alternate or opposite. Common petiole semiterete or flat, often widening at the base into a sheath, which frequently expands into a mass of tough reticulate fibres. Fl. dioecious, sessile on the heads of long glabrous undulating spikelets, usually supported by one or two minute subulate or triangular bracts, the ♀ fl. often approximate in pairs. The spikelets are inserted in horizontal or oblique lines on both sides of a flat woody peduncle. Calyx cup-shaped, 3-toothed and often 3-keeled, petals 3, in ♂ oblong, valvate, and much longer than calyx, in ♀ rounded, much imbricate and usually less than twice the length of calyx. Anthers as a rule 6, almost sessile, carpels 3, distinct. Peduncle often lengthening after flowering, fr. a single oblong 4-seeded berry, seeds with a deep longitudinal groove dilated inwards. Endosperm horny, embryo small, usually dorsal. Species II, Africa and Asia. *Thibourou* applies to all species indigenous in Burma.

A. Leaflets in the lower portion of the leaf markedly fascicled and often quadrifarious.

1. *P. sylvestris*, Roxb.; Griffith, *Palms* t. 228. *The wild Date Palm*, Vern. *Khajur*, *Khaji*, *Salasa*, *Thakal*, Hind.

An erect tree, attaining 40 ft., trunk densely covered with the bases of leaf-stalks, and near the ground often with a dense mass of rootlets, no root-suckers. L. greyish-green, 7-12 ft., spines up to 4 in. long, leaflets 6-18 by $\frac{1}{2}$ -1 in. Common petioles at base $\frac{1}{2}$ -1 in. broad, the fascicles of leaflets up to 5 in. apart. Male inflorescence white, scented, compact, on a short peduncle. Fruiting peduncle 2-2 $\frac{1}{2}$ ft. long, 1-1 $\frac{1}{2}$ in. wide, terminating in large bunches of spikes, spathe thick, almost woody. Fr. 1-1 $\frac{1}{2}$ in., from yellow to reddish-brown when ripe. Seed $\frac{1}{2}$ in. long.

Indigenous and gregarious in many parts of India, not in Burma. On the low ground along the Manganga river in Behar, in the sub-Himalayan tract, and along river banks and on stretches of low ground in the Deccan and Mysore. Planted largely. Fl. H. S., Fr. Sept. Oct. Mats and baskets made of the L. The sugary juice is extracted in the cold season by removing in one place the lower sheaths, and by cutting a notch into the trunk, a thin slice being taken off daily from the surface of the cut.

2. *P. acutellata*, Link. *The Date Palm*, Vern. *Khajur*, *Khaji*, Hind. (Fr. *Karasa*); *Saw-hola*, Burm. Cultivated and self-cult in Sind and the southern Punjab also Trans-India. Attempts to grow it have been made in other parts of India. Believed to be indigenous in the Euphrates and Tigris basins, and in the cases of the great African Sahara. A tall tree, attaining 100-120 ft., the foot often surrounded by a dense mass of root-suckers. L. grey, longer than those of 1, leaflets making a very acute angle with the common petiole. Fr. 1-3 in. long, pulp sweet. Many varieties not cultivated.

3. *P. humilis*, Royle; Kanjilal F. Fl. 500.—Syn. *P. patauculata*, Griff. *Palms* 130; *P. Guadelupana*, Griff. Vern. *Khajur*, Hind.; *Thakal*, *Kumson*; *Konda Ita*, Tel.

Stem 4-12 ft. long, diam. up to 9 in., densely covered with the stumps of leaf-stalks, more or less spirally arranged. Root-suckers develop frequently, when the primary stem has been burnt or injured. L. 4-8 ft., leaflets pliable, 10-20 in. long, $\frac{1}{2}$ - $\frac{3}{4}$ in. wide, fascioled, more or less quadrifarious, the uppermost sometimes confluent, base not thickened and not decurrent on the common petiole, which is 1 in. broad at the base, spines up to 3 in. long. Fruiting peduncle 2-4 ft. long, $\frac{1}{2}$ in. broad, fr. $\frac{1}{2}$ in. long, orange, then black, edible.

Sub-Himalayan tract, Siwaliks and outer valleys from the Jumna eastwards. Assam and Khasi Hills (stems short). Upper Burma, Central Provinces. (Stems short in the Jabalpur district, long on the Pachmarhi). Singhbhum, North Kanara, Nilgiris, Shencrova, and other hills in the Peninsula (stems long slender on the Bahambulla hills). Grasshills of Travancore, up to 6 ft. high. Fl. C. S. Dehra Dun. Nilgiris H. S.—China. Closely allied, and probably not specifically distinct, are the two following, with tall and robust stems:—4. *P. robusta*, Hook. f. *Parasit* 400 ft. Stem 15-20 ft., diam. 12-15 in., 6-angled with short persistent rhomboidal leaf-bases. 5. A species found by G. Marshall Woodrow on the western Ghats, near Naulgaon, gregarious on the flat top of trap hills (Siam, Mur), and described by him in "Notes of a Journey from Poona to Nagotna; Records of the Bot. Survey of India," l. 1, 184. Stem 25-30 ft. high, diam. 15 in., marked with very closely and spirally arranged leaf-bases. Leaflets broader than *P. humilis*. Spathe fringed with brown wool on the keel. A *Phœnix*, with tall stems, is reported by Gamble on the western side of Mahendragiri, Northern Circars (Indian Timbers, Ed. II. 731).

6. *P. tristifera*, Roxb. *Cor. Pl.* t. 74. Vern. *Saxas Ita*, *Chitta Ita*, Tel. Commanded coast, south as far as Madras. Trunk short, not over 4 ft., diam. 6-8 in., gregarious, forming dense masses, very difficult to pass through. L. shining dark green, 3-5 ft. long, leaflets quadrifarious, the upper sometimes opposite, 9 in. long, stiff and very pungent, with a hard yellow cushion at the base. Inflorescence 1-2 ft., fr. $\frac{1}{2}$ -1 in. long, black when ripe, edible. In this as in other species of *Phœnix* the soft tissue in the centre of the stem is full of starch.

7. *P. acaulis*, Buch. Ham. Vern. *Thakal*, *Khajur*, *Khajeria*, Hind.; *Chindi*, *Gond*; *Chinnita*, *Konda Ita*, Tel.; *Thinbaung*, Burm.

Stem thick ovoid, like a bulb, densely covered with the persistent bases of petioles, the ends of which are often bristly with the protruding hard fibro-

vascular bundles. L. 2-6 ft. long, leaflets stiff, fascicled, the base thickened and decurrent, 10-30 in. long, $\frac{1}{2}$ - $\frac{3}{4}$ in. wide, spaces 2-6 in. long. Fruiting peduncle short, generally concealed among the L. Fr. $\frac{1}{2}$ - $\frac{3}{4}$ in. long, edible, blackish when ripe.

Sub-Himalayan tract from the Jumna westwards, common in grasslands and in forests of Sal and *Pinus longifolia*. Chitna Nagpur, Belari. Sal forests of the Sarpura hills. Common in the Eng. forests and grasslands of Upper and Lower Burma. Fl. C. S. Dehra Dun, H. S. Burma.

R. Leaflets nearly bifarious, not distinctly fascicled.

8. *P. rufescens*, T. And. Sticking on steep cliffs near the Tista and Mahanadi rivers. (Schiep. Lapcha). Trunk 12-20 ft. high, 8-10 in. diam. L. up to 10 ft. long, spiral twist very marked, leaflets 18 by $\frac{1}{2}$ - $\frac{3}{4}$ in., not stiff, bifarious, alternate or nearly opposite, transverse veins faintly visible in the green leaf. Fruiting peduncle 3-4 in. shining, yellow, astringent but eaten. Seed $\frac{1}{2}$ - $\frac{3}{4}$ in. long. *P. pauciflora*, Roxb. Griff. Bot. t. 229H. Common in the tidal forests of Bengal, the Andamans and Burma.—Malay Peninsula, Siam and Cochin China. Gregarious, stems tufted, slender, 2-3 in. diam., 6-20 ft. long, upper portion densely covered with the long pointed leaf-bases, lower portion clear and annulate. L. 4-10 ft., leaflets 12-18 in. long, glaucous beneath, flexible, bifarious, fine nerves very distinct. σ -fl. with 6 stamens. Fruiting peduncle long, spathe scurfy outside. Fr. $\frac{1}{2}$ in. long, black when ripe, embryo at the base of the albumen.

10. *P. Roebelenii*, O'Brien. Siam, abundant on the rocky banks of the river Mekong, may possibly be found in Upper Burma. Stem tufted, 4 ft. high, slender, almost annulate, leaf-bases deciduous. L. 2-3 ft. long, rachis thin, leaflets bifarious, in the lower portion irregularly grouped, thin, 8 by $\frac{1}{2}$ - $\frac{3}{4}$ in.

11. Mr. Gilbert Rogers informs me that a species similar to 8 forms forests on Cinque Island, Andamans, and is also found on the north-east corner of Rutland Island. Stem single, not annulate, L. bifarious, base of petiole with much dark brown fibre. Spadix and fr. orange. He thinks that this may possibly be the *Phoenix* mentioned by Kurz in "Report on the Andaman Islands, 1870," 50.

2. ARECA. Linn.; Fl. Brit. Ind. vi. 405.

Stem erect, smooth, green in the upper portion, annulate, L. pinnate, base of petiole expanding into a smooth green amplexicaul sheath, leaflets thin, often confluent, with several midribs, attached to the rachis in a vertical line. Spadix androgynous, below the L. branched, bearing numerous close-set spikes, spathe several. σ fl. many, minute, occupying the upper portion of the spikes, petals much longer than calyx, stamens 5 or 6, filaments short. f fl. larger, few at the base of spikes, sepals and petals broad, imbricate. Carpels connate into a one-celled ovary, stigmas 3 sessile, ovule 1 basal, erect. Fr. ovoid or oblong, supported by the persistent perianth, mesocarp fibrous. Seed with a truncate base, endosperm deeply ruminated, embryo basal. Species 24, tropical Asia and Australia.

1. *A. Catechu*, Linn.; Roxb. Cor. Pl. t. 78. The *Areca Palm*. Sans *Garcala*. Vern. Sapari, Hind.; Gas, Beng.; Pala, Tel.; Adile, Kan; Kes, Burm. Cultivated in the tropical and subtropical regions of India and Burma, in gardens and orchards on the West Coast and in North Bengal; in extensive woods, usually irrigated, in the Martaban hills between the Sitang and Salween. A graceful, single-stemmed palm, attains 100 ft., diam. 6-9 in., L. 4-6 ft. long. Leaflets quite glabrous, with one or several midribs, upper confluent. Lowest spathe large, glabrous, straw-coloured, parallel veined. Stamens 6. Fr. $1\frac{1}{2}$ -2 in. long, fleshy-fibrous, supported by the persistent perianth, orange or scarlet, seed in the upper half of fr. The seeds (betel nuts) are an important article of trade, the spathe are used to write upon, to wrap up parcels, and as covering leaf of sheaths in Burma.

2. *A. triandra*, Roxb. Vern. *Bawpa*, Beng.; *Tachwa*, Burma. Kha-h hills. Cachar, Chittagong, Andamans, Martaban, Tenasserim.—Malay Peninsula and Archip. Stems usually in tufts of 4-8, 12-25 ft. high, 1-3 in. diam. Spadix large, much branched, spreading or erect, spikes terminating in long deciduous fringes, the seat of the fallen σ fl. fr. few at the base of the spikes, ellipsoid, $\frac{1}{2}$ in. long. *A. magnata*, Griff. Naga hills. Vern. *Tatpat*, Naga. Similar to 2, but larger, attaining 40 ft., fr. elongated, 1 in. long, used by the Nagas instead of Betel nut.

Ptychocarpus angusta, Becc. Syn. *Arceus angusta*, Kurz in "Journ. of Botany," 1875, tab. 170. Nicobars, frequent. A tall slender palm, stem 80-100 ft. high, 1 ft. diam. L. 8-12 ft., leaflets narrow-linear, 2-3 ft. long, the lowest pair much longer. Spadix deflexed, bearing numerous long spikes, 2 fl. at the ends, supported by broad bracts. Fr. 1 in. long, scarlet.

3. BENTINCKIA, Berry; Fl. Brit. Ind. vi. 418.

Tall unarmed slender palms, stem annulate, L. pinnate, pet. short, base amplexicaul, leaflets linear, not confluent, midrib distinct. Spadix androgynous, on the stem below the L. much branched, the spikes bearing in their upper portion ♂ fl., while the lower portion is occupied by groups of one ♀ with one or several ♂ fl., spathes numerous. All fl. are sunk in cavities of the spike and supported by several bracts. Fr. exserted, oblique, trace of stigma near the base. Seed spherical, grooved, pendulous, embryo basal, endosperm uniform. Species 2.

1. *B. Coddappanna*, Berry. Vern. *Vāca Kundra* (Bect *Arceus*). Mal. South Travancore, 2,500-5,000 ft., on precipitous cliffs, local, but very common within its restricted area. Stem annulate, 20-30 ft. high, 6 in. diam. L. 3-5 ft., leaflets 30-40 pair, 24-30 by 1-1½ in. Spathe enclosing the young inflorescence, 12 by 2 in., pale brown, stands out horizontally from the stem. Spadix, after emerging from the sheathing spathe, much ramified, bears numerous short spikes, 9-15 by ½ in., the entire inflorescence red, 2 ft. long and 3 ft. broad, 2 fl. L. ½ in. diam. Fr. bright chocolate coloured when ripe, ½-¾ in. diam.

2. *B. nicobarica*, Becc. Syn. *Orontia nicobarica*, Kurz in Journ. Bot. xiii (1875), t. 171. Kamorta, Nicobars. Common, associated with *Arceus Catechu*, *Pinnanga Meisii* and *Ptychocarpus angusta*. Stem 50-60 ft. high, 8 in. diam. L. 6-8 ft., leaflets 6-24 in. long. Inflorescence 1½-2 ft. Fr. 1 in. long, scarlet.

4. PINANGA, Blume; Fl. Brit. Ind. vi. 406.

Similar to *Arceus*, but spathe usually one, spadix sometimes simple, fl. along the spike as a rule in clusters of 3, one ♀ between 2 ♂ fl., ♀ fl. smaller than ♂. Stamens more than 6. Fr. ellipsoid, pointed at the ends. Species 24, India and Malaya.

A. Fruits in 3-6 rows on the spikes.

1. *P. gracilis*, Bl.; Syn. *Arceus gracilis* Griff. Palms t. 292 A. C. Vern. *Bam gae*, Beng.; *Tarboos*, Burm. Sikkim, subhimalayan tract and valleys up to 2,000 ft., common. Assam. Khasi hills. Cachar. Chittagong. Arakan Yoma. Pegu. Martaban, Tenasserim, in damp evergreen forest, ascending to 3,500 ft. A graceful palm, stems usually in tufts of 4-8, 6-20 ft. high, 1-1½ in. diam. L. 3-4 ft. long, the upper leaflets confluent. Fruiting spadix stout, 6-12 in. long, pendulous, often simple, fruits in 3 rows, ½-¾ in. long, scarlet or orange. 2. *P. griffithii*, Becc. Khasi hills. Fr. in 4 rows on the spike. 3. *P. hexasticha*, Schef. Southern end of the Pegu-Yoma. Stem 25-30 ft. high, 4-5 in. diam. Spadix simple, reflexed, fl. spirally arranged in 4-6 rows, rachis thick fleshy.

B. Fruits in 2 rows on the spikes.

4. *P. Dicksonii*, Blume. Syn. *Arceus Dicksonii*, Hook. Western Ghats in evergreen forest up to 3,000 ft., from North Kanara southward. Slender, scabelliferous, often gregarious, stem smooth, 16-25 ft. high, 1-3 in. diam. Leaflets confluent. Spikes distichous on a short stout spadix, enclosed in bud by a thick rigid compressed spathe. Sepals nearly as long as petals, stamens 20-30. Fr. ½-¾ in. long. 5. *P. Hookeriana*, Becc. Khasi hills. Stem slender, 3-4 ft. high, internodes clavate, scurfy while young, as also petioles and leaflets. Leaflets thin, opposite, 12 by 1 in., obliquely acuminate, the uppermost pair connate at base. Spikes distichous, 4-8 in. long, on a short spadix. Fr. ½ in. long, edible.

6. *P. Kuhlii*, Blume. Syn. *P. costata*, Bl.; Kurz F. Fl. II. 638. Andamans—Sumatra, Java. Stems tufted slender, 20-30 ft., 1½-2 in. diam. L. 3-4 ft. long. Spikes numerous, 6-15 in., on a stout spadix 3-10 in., fr. ½ in. long. 7. *P. Manii*, Becc. Andamans and Nicobars. Stem solitary, 50 ft. high, 5½ in. diam. L. 15-20 ft., leaflets 31 by 5 in., leaf sheaths 4½ in. long, clasping the stem. Spikes numerous, slender pendulous. Fr. broadly oval. 8. *P. hymenospatha*, Hook. C. Tenasserim. Stem slender 4 in. diam., petiole and leaf-rachis scurfy. L. 12-15 in. long, leaflets numerous, alternate, not confluent, 3-4 by ½-¾ in., finely acuminate, slender n. obscure, no stout n. besides the prominent midrib. Spike simple, stamens 8, spathe membranous, 1½ in. long.

5. ARENGA, Labill.; Fl. Brit. Ind. vi. 421.

Tall, stout palms, upper portion of trunk densely clothed with the black fibrous remains of the leaf-sheaths. Leaflets long, linear, usually pinnate, with a midrib and numerous longitudinal nerves, and one or two auricles at base. Spadix large, much branched, peduncle clothed with numerous imbricating spathes, branches pendulous, slender, fl. sometimes in groups, one ♀ between 2 ♂. Male: sepals 3, orbicular, petals oblong; stamens 2, filaments short, anthers apiculate. Female: subglobose, petals triangular, ovary 3-celled. Seeds 2-3, compressed or plano-convex, endosperm uniform, embryo dorsal. Species 10, tropical Asia and Australia.

1. *A. saccharifera*, Labill.; Griseb. Palmae 1: 255 A. *Malay Sago Palm*. Vern. *Tumpang*, Burm. Assam: Martaban and Tenasserim, occasionally on the Paga Yama. Commonly cultivated in India—Malay Peninsula and Archip. Trunk 20-40 ft. high, l. 20-25 ft. long, forming a dense crown, leaflets very numerous, white beneath 2-3 ft. long, denticulate, towards the tip pinnate and slightly lobed. Spadix several, axillary, 6-10 ft. long, those of the uppermost axils flowering first, and having often mature fr. when the lowest come into fl. ♂ and ♀ fl. together on most branches one or generally preponderating. ♂ oblong-club-shaped, up to 1 in. long, petals three times the length of sepals, small unpleasant. ♀ one in. diam., petals coriaceous, and enclosed by the persistent stigmas, pericarp coriaceous, endocarp gelatinous, and enclosed by the persistent stigmas, pericarp coriaceous, endocarp gelatinous, adhering to the seeds, acrid, and becoming in raphides. After all spadices have matured their seed, the tree dies. The black fibre of the petioles makes excellent cordage, the sap which runs from the cut fl. stalk yields sugar, and the heart of the stem yields large quantities of sago. The trunks of trees which have died after seeling are almost hollow, and are used as water-pipes. 2. *A. Wightii* Griseb. Palmae 1: 255 E. Vern. *Idadom*, Kan.; *Alau pesel*, Tam. North-Kamra, evergreen forest of the Ghats, very common near the falls of Gairapah. Nilgiris. Travancore 600-3000 ft. Locally gregarious, with numerous root-suckers, trunk stout, 8-30 ft. high, covered with the bases of the leaf-sheaths, l. 18-28 ft. long. Leaflets alternate, linear, auricles large unequal, the lower 1-2 in. long. Spadix 4, common peduncle 2 ft. long, quite concealed by the sheathing lacinate spathes. The cut fl. stalks yield toddy.

6. COCOS, Linn.; Fl. Brit. Ind. vi. 482.

Species 30. American.

C. nucifera, Linn. Roxb. Cor. Pl. t. 73. *The Cocoa-nut tree*. Sans. *Narikera*. Vern. *Narel*, *Nariyal*, Hind.; *Narikel*, Beng.; *Tenkaya*, *Kollari*, Tel.; *Tengina*, Kan.; *Tenani*, *Tenkai*, Tam.; *Ca*, Burm. Trunk annulate, often curved, rarely branching, base thickened with a mass of rootlets. l. 6-12 ft. long, leaflets equidistant, linear lanceolate. 2-3 ft. long, petiole stout. Spadix stout, androgynous, divided into numerous drooping spikes bearing at their base ♀ with a few ♂ fl., the upper portion being densely covered with ♂ fl. Male fl.: sepals small, valvate, petals 1 in. long, stamens 6. Female fl.: ovary, supported by several broad bracteoles, perianth accrescent, sepals 1 in. diam., round, concave, petals similar to sepals, but smaller. Fr. 3-cornered, 10-15 in. long, pericarp thick, fibrous, endocarp bony with 3 basal pores, indicating the 3 cells of the ovary. Cavity of endosperm before maturity large, filled with the cocoa-nut milk. The cut fl. stalks yield toddy.

Cultivated throughout the tropics, chiefly in the vicinity of the sea, but also inland. Original home uncertain. Abundant on the Ceylon and other uninhabited islands in the Bay of Bengal (on the Andamans locally), but possibly not originally wild. Prain in Journ. As. Soc. Beng. 69, 332. In India fl. in the dry season, the nuts require 8-10 months to ripen.

Nipa fruticans, Wurmbe; Griseb. Ic. Pl. As. Bar. 1: 244-247. Vern. *Gulpe*, *Gabor*, Beng.; *Loai*, Burm. Estuaries of rivers and tidal swamps, Sundriban, Andamans, Chittagong and the Burma coast, Ceylon, Malay Peninsula and Archip. Australia. From a stout branching rhizome, creeping, either underground or along the surface, and rooting on the underside, spring tufts of huge plumate l. 15-30 ft. long, leaflets numerous, coriaceous, 2-4 ft. long, many longitudinal n. on both sides of

midrib. Fl. monoecious, densely crowded, the ♂ in cylindrical spikes, the ♀ on a globose head, the spadix of both sexes with sheaths and bracts on the peduncles. Male: sepals and petals uniform, linear, ovate, anthers 3, adnate in their entire length to a cylindrical staminal-column. Female: 3 distinct 1-celled carpels, surrounded by a few scales. Fruit a large nodding head, 1 ft. diam., consisting of numerous densely crowded angular one-seeded drupes, the exocarp fibrous fleshy, the mesocarp hard, fibrous, and the endocarp spongy. Seed erect, the size of a hen's egg, grooved on one side, endosperm horny, with a central cavity, embryo basal, obconic. L. used extensively for thatching.

7 ZALACCA, Reinw.; Fl. Brit. Ind. vi. 472.

Stemless, scabrous, armed. L. pinnate, leaflets linear-lanceolate, longitud. n. numerous, transversa veinlets conspicuous. Spadix usually unisexual, having cylindrical, pendulous, catkin-like spikelets, in the axils of, and at first enveloped by, persistent spathes, fl. densely crowded. ♂: calyx 3-lobed, stamens 6, inserted on the tubular rigidly coriaceous corolla, at the base of the 3 segments. ♀: sepals 3, more or less cohering, membranous, petals cohering, rigidly coriaceous, ovary densely clothed with stiff hairs, which (as the fr. ripens) develop into scales, the tip of which is brittle and often breaks off. Seeds 1-3, outer coat fleshy. Species 9 or 10. India and Malaya.

1. *Z. Wallichiana*, Mart.—Syn. *Z. edulis*, Reinw.; Wall. Pl. As. Bar. t. 222-224 (*Rumphii*); Griff. Palms t. 176; *Z. macrostachya*, Griff. Palms t. 178 A. B. C. Vern. *Yingon*, Burm. Pegu, Martaban, Tenasserim, common in evergreen forests.—Malay Peninsula and Archip. L. 15-20 ft., petiole half the L. or longer, leaflets lanceolate, margin distantly spinulose ciliate, approximate in groups of 2-4, 12-20 by 1½-2½ in., the upper confluent, 4-6 stouter n. on either side of midrib. Sheaths and petiole densely armed with fine sharp spines in oblique half whorls, on the rachis gradually becoming solitary. Spadix nearly as long as petiole, spreading and often touching the ground, bearing distant cylindrical, villous, pale rose-coloured, all but the lowest sessile, spikelets 2-3 in. long, enclosed by long spathes, which, as the fl. develop, split up into long shreds, rachis decidedly rusty-woolly. Fr. obliquely obovoid, 1-3 in. long, densely clothed with retrorse scales, terminating in a reflexed brittle bristle. 2. *Z. Beccarii*, Hook. f. Pegu. Leaflets strict, 18-24 by 1½ in., shining on both surfaces, margins with numerous strong sharp bristles, stouter n. 2-4 on either side of midrib. 3. *Z. secunda*, Griff. Palms t. 186, Upper Assam, Naga hills. Spikelets peduncled, much longer than spathes, fr. clothed with spreading lanceolate scales.

8. PLECTOCOMIA, Mai t.; Fl. Brit. Ind. vi. 477.

Lofty climbers, stem up to 100 ft. long, L. pinnate, leaflets linear-lanceolate, petiole spiny, rachis prolonged into a thorny flagellum. Inflorescence terminal in *P. himalayana*, in the other species as far as known axillary. According to Hooker Fl. Brit. Ind. vi. 465, *Plectocomia* and *Plectocomiopsis* are monocarpic. Fl. dioecious on short, spikelets, each spikelet in the axil of and concealed by large, usually imbricating distichous bracts (spathels). ♂: calyx cup-shaped, 3-toothed or -lobed, petals lanceolate, valvate, stamens 6-12, filaments connate below. ♀: ovary 3-celled, surrounded by 3 staminodes, perianth accrescent. Fr. globose, usually 1-seeded, protruding beyond the spathels, pericarp thin, clothed with slightly appressed scales, which terminate in pointed, soft or stiff, spreading or recurved appendages.

1. *P. himalayana*, Griff. Palms t. 219. Vern. *Tukri Bet*, Nep.; *Rasul*, Lepcha, Sikkim 4-7,000 ft., common. Leaflets alternate, green on both sides, linear-lanceolate, narrowed into filiform tips 2-3 in. long, 2 stout longitud. n. on either side of midrib, rachis armed with stout hooked prickles, confluent at the base. Inflorescence a terminal panicle, clothed with rust-coloured tomentum, branches drooping, the lower supported by perfect L., the upper in the axils of sheaths and flagella, without leaflets, bracts (spathels) distant, not markedly imbricating, 1-2 in. long, cuneate, with a triangular apex, 2 fl. ½ in. long, supported by 3 narrow bristle-pointed bracteoles, spikelets half the length of spathels. Fr. ½ in. diam., scales shining, fimbriate.

2. •: *kha^yana*, Griff. Palms t. 218.—Syn. *P. assamica*, Hook. Bot. Mag. t. 5100.

Khasi hills. Stems 10-20 ft. long, as thick as the arm. L. including the flagellum 20 ft. long, leaflets pale beneath, 5-16 by 2-3 in., stouter n. 3-5 on either side of midrib, the underside of rachis armed with short digitate spines. Male spadix branched from the lower branches 2-3 ft. long, drooping, bearing numerous spikelets enveloped by the oblong imbricating distichous spathe, 1-2 in. long, which are white with a green tip and a brown band across. Fr. 1 in. diam., scales smooth or with ciliate margins. A. P. *macrostachya*, Kurz in Journ. As. Soc. Beng. 13, p. 16 ff. Vern. *Kawaboa*, Burm. Bithola range, between the Yonzalia and the Salween at Great Rapids. (D. R. April 1890.) Probably not uncommon elsewhere in Lower Burma. A lanky climber, internodes short, L. 10, flagellum 2 ft. long, leaflets approximate in pairs 4-5 in. across, white-farinoso beneath, lanceolate, 8-24 by 1-1.5 in., midrib and two longitudinal nerves close under the edge very stout, sheath and rachis with straight slender spines up to 1/2 in. long, in groups of 2 or 3 or in half whorls, appendage of scales stiff linear. Branches of male spadix 4-5 ft. long, pendulous, closely covered with broadly obovate distichous imbricating spathelets, brown with black border, in the axils of which are the spikelets, shorter than bracts with alternate distichous fl. Calyx very shortly 3-toothed, limb woolly or ciliate, petals rigid, lanceolate, anthers 5-stamens 6. Fr. 1-1.5 in. diam.

4. P. *assamica*, Griff. Assam. Leaflets white-furfuraceous beneath, 9-20 by 1 1/2-2 in., margins thickened, stouter longitudinal n. numerous on either side of midrib but not very conspicuous, pet. stout, 1 1/2 in. broad, armed with clusters and oblique lines of straight slender spines on a thick central base. Branches of fruiting spathe 4-5 ft. long, rachis rusty-tomentose, spathelets 2 1/2 in. long. Fr. globose, 1 in. diam., bright rusty-red, villous from the long-ciliate recurved points of the scales.

9. DÆMONOROPS, Blume; Fl. Brit. Ind. vi. 462.

Included under *Calamus* by Drude in Engler u. Prantl ii. 3, 52.

Leaf rachis produced into a long flagellum. Spathes large, at first concave and completely enclosing the branches of spadix, the outer largest, declivous, & fl. pedicelled. A red resin (Dragon's blood) exudes from the fruit of several species. Species 80, India, Malay Peninsula and Archip.

1. D. *Jenkinsianus*, Mart.—Syn. *Calamus extantiformis*, Griff. Palms i. 278. Vern. *Gala* leaf, Ass. Sikkim Terai, locally common. Assam. Khasi hills. Cachar. Tippera. Chittagong. Climbing, stem stout, L. large, leaflets linear, equidistant, 20-30 by 1/2-1 in., the midrib and the 2 stouter n. sparsely setose with long bristles. Sheath armed with long, petiole rachis and flagellum with short spines. Fl. densely crowded on the branches of the much ramified unisexual spadix, spathe flat, lanceolate, cartaceous, the outer 1-2 ft., densely armed with spines 1/2-1 in. long, the inner unarmed. Fl. singly on the bends of a flexuose rachis, 1 1/2 in. long, sessile, calyx campanulate, elegantly ribbed, ciliate along the edge, chiefly near the tooth base of filaments connate with the 3-toothed pedicel into a fleshy mass, & pedicelled, supported by an acuminate bract, pedicel enclosed in 3 tubular, overlapping sheaths, calyx campanulate nearly truncate, petals narrow. Fr. 1/2 in. diam., brown, scales trapezoid, deeply channelled. 2. D. *Maria*, Bosc. Andaman. L. light yellow-green, flagellum 2 ft. long, leaflets narrow. Fr. pedicel 1/2 in. long, scales slightly channelled. 3. D. *Kurzianna*, Hook. f.—Syn. *Calamus grandis*, Kurz (non Griff.). Andaman. A lanky climber, the sheathed stems as thick as the arm, the lower sharp spines about an inch long (Kurz). L. 4-8, leaflets 1-2 ft. long, linear, equidistant, rachis stout, angular, 1 1/2 in. broad. Fr. 1/2 in. diam., pale brown, scales slightly channelled, calyx and petals explosive.

Plectocaulis paradoxus, Bosc.—Syn. *Calamus paradoxus*, Kurz in Journ. As. Soc. Beng. 48, pt. 24, 31. Thankyghat forests, Toongoo. An extensive glabrous climber, the sheathed stems 1-2 in. diam. L. 5-7 ft. long, terminating in a flagellum with hooked thorns, the sheath armed with sharp flat spines in half whorls, petiole and rachis with stout recurved thorns, often connate in claws. The upper L. reduced to sheaths with long flagella and no leaflets. Leaflets thin, inequidistant, 12-18 by 1-1 1/2 in., stouter longitudinal n. 4-6 on either side of midrib. Male spadix decumbent, simple, drooping, spathe and spathelets tubular, limb truncate, shortly acuminate, spikelets 1-1 1/2 in. long, few-fl. Calyx striate, deeply 3-lobed, petals rigid, 1/2 in. long, stamens 6.

10. CALAMUS, Linn.; Fl. Brit. Ind. vi. 436.

Armed, rarely erect, usually climbing by whip-like thorny prolongations (flagella) of the rachis, or of the spadix, or of the leaf-sheath, stem simple, in

some species attaining 3-400 ft., annulate, the upper internodes clothed with spinous leaf-sheaths. L. pinnate, leaflets linear or lanceolate, with a midrib and numerous longitudinal nerves, some of which are stouter and prominent. Transverse veins conspicuous. Fl. usually unisexual, dioecious, monocious or polygamous, spadix often unisexual, peduncle and branches sheathed by more or less tubular spathes, often with a lanceolate blade, the fl. in the axils of one or several, more or less concave or sheathing bracts (spathelets). ♂ spikelets often varying in length in the same species, calyx campanulate or tubular, 3-toothed, usually membranous, petals rigidly coriaceous, valvate, stamens 6, anthers dorsifixed, filaments dilated and frequently connate at base, pistillode 3-toothed. ♀ perianth often more or less accrescent, staminodes connate into a cup. Fr. globose or ellipsoid, beaked, pericarp clothed with appressed closely imbricate deflexed polished scales, seed one, endosperm hard, bony, uniform, or ruminant. Species 160-170. India. Malay Archip. South China. North Australia. A few in tropical Africa.

I. Leaf rachis without flagellum.

A. Leaflets few, 20 or less.

1. *C. erectus*, Herb.; Kurz in Journ. As. Soc. Bengal 43, t. 23, 24. Syn. *C. schizospathus*, Griff. Palma t. 187; *C. edulis*, Griff. Palma t. 186; *C. macrocarpus*, Griff. Palma t. 186 a, fig. 1, 2. Vern. *Kalam let*, Beng. *Tholey*, Burm. Hills. Java from Nepal eastwards, ascending to 3000 ft. Assam. Khasi hills. Manipur. Chittagong. Pegu, in evergreen forest. Stems erect, annulate, densely tufted, 12-15 ft. high, 1-2 in. diam., internodes short. L. 12-18 ft., leaflets 18-24 in. long, leaf-sheaths petiole and rachis armed with flat sharp pale spines, up to 1 in. long, semi-vericillate below, single above, leaflets green beneath, 18-24 in. long. ♂ spikelets 4-8 in. long, 1 in. broad across the imbricating spathelets, fl. 1/2 in. long. Fr. oval, 1 1/2 in. long, dark brown, scales triangular, endosperm ruminant. 2. *C. platyspathus*, Mart. Trav. Leaflets alternate, rigid 10-12 by 1-1 1/2 in. ♂ spadix long, very slender, sparsely armed, spikelets 1-4, fl. 3/4 in. long, spathes with long flat lanceolate blades. 3. *C. acanthospathus*, Griff. Palma t. 186 AB. Vern. *Gauri let*, Nep.; *Dae*, Lepcha. East Nepal. Sikkim 3-4000 ft. Khasi hills. Forms dense thickets mixed with *Medusa*. Leaflets few, inequilateral, lanceolate, 8-15 by 1 1/2-2 in., sheath stout, densely armed with long and short spines, pet. long, very stout, armed with short spines on a conical base. Flagella on sheath and spadix. Fr. stipitate, shining, chestnut-brown, 1/2 in. diam., scales slightly channelled, fruiting calyx cupular, 1/2 in. diam., seed deeply pitted. 4. *C. Feanus*, Becc. Tenasserim. Similar to 3, but fr. epiaxis, scales not channelled. 5. *C. torquatus*, Griff. Palma t. 197. Upper Assam. Khasi hills. Sikkim. Chittagong, sheaths densely armed with bristles and long spines, rachis with long spines and short curved prickles. Leaflets bright green, linear-lanceolate, few, the uppermost crowded and often connate. Spadix long, decoupled, spikes distichous, short, spreading and recurved, flagellum on the spadix long, armed with simple or compound recurved spines. Spikelets numerous, short, recurved. Fr. globose, 1/2 in. diam., shortly beaked, scales pale yellow, channelled down the back.

6. *C. Brandii*, Becc. Coartallum. Stem slender, leaflets few, fascicled, sheath with solitary or aggregate slender flat straight spines, mouth with long needle-shaped spinulae, pet. slender with few very long straight slender spines. ♂ spadix elongate, shortly flagelliferous, spathes narrow, tubular.

B. Leaflets numerous, equidistant.

(a) Fruiting calyx not pedicelliform.

7. *C. arborescens*, Griff. Palma t. 185a, s; Kurz in Journ. As. Soc. Bengal, 45, t. 22. Vern. *Zonia*, *Danda*, Burm. Pegu Yoma, southern part, common and gregarious in evergreen forest. Stems erect 15-20 ft. high, annulate, green and glossy, stoloniferous, internodes 7 in., leaves 6-8 ft. long, no flagellum on sheath or spadix. Sheaths and pet. armed with more or less oblique whorls or half whorls of brown or black broad sharp spines, up to 1 1/2 in. long, the spines on the rachis smaller and less numerous. Leaflets white beneath, nearly opposite, 1-2 ft. long, black bristles along the edges and here and there on the stouter nerves. Spadix 5 ft. long, pendulous, spathes tubular, the lower armed with scattered spreading black spines. ♂ spathelets short, closely imbricate, truncate, fl. nearly 1/2 in. long. 8. *C. Flagellum*, Griff. Palma 48. Syn. *C. Jorkissensis*, Griff. Palma t. 186 a, fig. iii. Sikkim, ascending to 3,000 ft. Assam. Khasi hills. Cachar. East Bengal. Somewhat resembles 1, but scandent and 1 smaller, 6-7 ft., leaflets numerous, equidistant, 24-30 in. long. Petiole deeply channelled, armed along the back with a solitary row of large hooked, along the edge with fascicled spines,

leaf-sheaths armed with solitary and few 3-to 5-br. bristles, leaf-sheaths bearing a whip-like leaflet armed with spines and bristles. Spathe erect, peduncle long, armed with stout club-shaped prickles. Fr. 1 by $\frac{1}{2}$ in., scales deeply furrowed, pale with a dark band down the middle. 9. *C. Guraha*, Hain.—Syn. *C. Mollis* Griff. Palms t. 29. Vern. *Saukhet*, Ass.; *Kyiesol*, Burma. Assam. *Khat hills, Cachar. Mouth of Megra. Chittagong. Burma, in evergreen forest. Slender, climbing, 1-3-4 ft. long, petiole and rachis pubescent when young, armed with reddish-brown spines, leaflets equidistant, linear, 6-12 by $\frac{1}{2}$ - $\frac{3}{4}$ in., usually 3-nerved. Thorny flagella on sheath and spathe. Spathe long slender, spathe tubular terminating in long flat brown or green blades, the lower spathe arched, the upper often unarched. Male and female fl. on separate spikes, spikelets distichously alternate on the slender ramifications of the spathe. Fr. $\frac{1}{2}$ in. diam., scales pale, narrow brown. My old notes of April, 1859, say: "Sheath, rachis and flagella purple. 10. *C. nitida*, Mart. Tansanian. Similar to 9, spathe distichous, terminating in long leafy blades. Possibly not distinct. 11. *C. leptospathe*, Griff. Palms t. 104. *C. Sikkim*, in damp places along rivers, ascending to 2000 ft. Khat hills Manipur. Scandent, forming tangled thickets, stems slender, foliage leathery. L. 2-4 ft. long, leaflets very numerous, thin, 8-10 in. long, narrow, acuminate, 2-stemmed, as prominent as the midrib, rachis armed with single recurved claws, spikelets slender, pendulous, flagellum very long, armed with recurved claws, spikelets numerous, recurved, $\frac{1}{2}$ -1 in. long, spathe white, membranous, in globose, $\frac{1}{2}$ in. diam.

12. *C. pseudocantha*, Bosc. Western Ghats and adjoining hill ranges from Nook Agara southwards—Ceylon, low country. Extensive climber, stems slender. Leaflets finely acuminate, 10-15 by $\frac{1}{2}$ -1 in., scouter nerves on either side of midrib 2-5. Petiole and lower part of rachis with straight spines up to 1 in. long, upper part of rachis with single stout recurved spines. Spathe with long flagella, armed with short stout recurved spines, usually several connate into a claw. $\frac{1}{2}$ fl. $\frac{1}{2}$ in. long, closely packed on short recurved spikelets up to $\frac{1}{2}$ in. long with 10-15 fl., sometimes packed on short recurved spikelets with beak $\frac{1}{2}$ in. long, scales short and shy with 2-3 d. Fr. nearly globose, with beak $\frac{1}{2}$ in. long, scales pale, edge of basal appendix dark brown. 13. *C. Thwaitesii*, Bosc. Ghats of North Kanna, in evergreen forest, and near the sea coast at Marmagao, 300 ft. long, rising low country below 200 ft. A large climber, stems stout, 10-15 by 1-1 $\frac{1}{2}$ in., forming impenetrable cane brakes, leaflets sharply acuminate, petiole and scouter nerves on either side of midrib 3-5, edges with long sharp bristles. Petiole and lower part of rachis with straight flat (often fasciated) spines, upper portion of rachis with clava of short recurved spines. Spathe with flagella, 15-20 ft. long, armed with 2-6 in. long. Fr. ellipsoid, including beak, $\frac{1}{2}$ in. long, scales furrowed, pale brown with dark beak, endosperm uniform.

(b) Fruiting calyx pedicelliform.

14. *C. tenuis*, Baker Griff. Palms t. 195 A. B. C.—Syn. *C. Roplewskyi*, Griff. & 191. Vern. *Bot. Best*, Hind. Damp places in the subhimalayan tract locally abundant from the Dehra Dun eastwards. Assam. East Bengal. Sundrihan. Chittagong. Paga. A slender climber, forming extensive cane brakes, stem without the leaf-sheaths not thicker than a common quill. L. 11-2 ft., pet. 5-9 in. long, leaflets usually 3-nerved, 6-12 by $\frac{1}{2}$ - $\frac{3}{4}$ in., pet. and rachis with single thorns. Thorny flagella from leaf-sheaths and spathe. Fr. $\frac{1}{2}$ in. distichous, usually on separate spikelets, 11-2 in. long, often on the same spathe with 7 spikelets, sometimes 2 and 7 fl. on the same spikelet. Fr. straw-coloured, nearly globose, with stalk and beak $\frac{1}{2}$ in. long, endosperm uniform. Called *C. Latang*, Linn. in *Reandis F. Fl. 529*. 15. *C. melanacanthus*, Mart. Tansanian. Rachis with a single row of short recurved black spines, fr. $\frac{1}{2}$ in. long, ellipsoid, scales pale, channelled, endosperm ruminated, embryo lateral. 16. *C. Rotang*, Linn.—Syn. *C. Rotherplii*, Griff. Palms t. 192. Vern. *Botanica*, Tel.; *Pirawala*, Tam. Occasional coast. Palmet. Coarctatum.—Ceylon, dry region, common. Closely allied to *C. tenuis*, differs by shorter petioles, 2 spikelets $\frac{1}{2}$ in. fl. $\frac{1}{2}$ in. long. Fr. subglobose, $\frac{1}{2}$ in. diam., pale yellow with a shallow median channel.

17. *C. Hugeliana*, Mart.—Syn. *C. Wrightii*, Griff. Palms t. 216. *C. Nilgiria*. Leaflets equidistant, pale beneath, linear, long acuminate, 12-18 by $\frac{1}{2}$ -1 in., pet. and rachis armed with very stout short recurved spines. Spathe erect, spathe tubular, truncate. Fruiting spikes recurved, fr. globose, black, shining, $\frac{1}{2}$ in. diam., seated on the pedicelliform calyx with spreading lobes. 18. *C. Gambler*, Bosc. Nilgiria. Leaflets 20-30 in. long, fr. pale brown, scales deeply channelled, pedicel, including the campanulate calyx, $\frac{1}{2}$ -1 in. long.

C. Leaflets numerous, more or less fasciated.

(a) Fruiting calyx not pedicelliform (fr. unknown in 21 and 22).

19. *C. viminalis*, Willd.—Syn. *C. fasciculatus*, Roxb.; Griff. Palms t. 195 A. B. Vern. *Buru bel*, Beng.; *Paga*, Tel.; *Kyiesol*, Burma. Lower Bengal, common in the village

Bamboo jungles, Orissa, Ganjam, Chittagong, Andamans, Lower Burma.—Malay Peninsula, Coochinchina. Tufted, erect while young and in the open, usually climbing, stems long, without the sheaths $\frac{1}{2}$ in. diam., the younger parts and sheaths covered with white powder. L. 3-5 ft. long, leaflets fasciated, linear-lanceolate, stouter longitudinal nerves 2-3 on either side of midrib, nerves midrib and edge of leaf with sharp by-sties, pet. and rachis armed with straight sharp spines $\frac{1}{2}$ -1 in. long, sheaths with flat whorled or single spines. Spadix 1-2 ft. long, much branched, drooping, terminating in a long flagellum. Fr. globose, mucronate, $\frac{1}{2}$ -1 in. diam., endosperm uniform. 20. *C. concinna*, Mart. Mergui (Dr. Hoffer, Jan. 1839). Climbing, leaflets glossy, nearly equidistant, 12-20 by 1-1½ in., 3-6 stout n. on either side of midrib. 21. *C. hypoleuca*, Kurz in Journ. As. Soc. Beng. 43, t. 18.—Syn. *Dacnodytes hypoleuca*, Kurz. Thauogyin. L. 2-3 ft. long, leaflets fasciated, lanceolate, white beneath, 6-9 by ½ in., stouter n. numerous, sheaths densely shiny, rachis with short sharp recurved spines, 2 spadix short slender, spathes large, oblong-lanceolate. 22. *C. myrianthus*, Booc. Tenasserim. Leaflets 20 by 2 in., white beneath, stouter n. numerous. 2 spadix long, slender, much ramified, spikelets $\frac{1}{2}$ in. long.

(b) Fruiting calyx pedicelliform.

23. *C. longisetus*, Griff. Palms t. 189 AB.—Syn. *C. tigrina*, Kurz in Journ. As. Soc. Beng. 43 t. 25, 26. Andamans, Coco Islands (*C. tigrina*, Kurz; Prain in Journ. As. Soc. Beng. 60, p. 532). Pegu Yoma, eastern slopes in evergreen forest, Martaban, Tenasserim. Stems scabrous (erect, stemless, Griffith), surrounded by tufts of leaves. Pet. and rachis armed with black broad sharp spines up to 1½ in. long, in oblique whorls or half whorls in the upper portion less numerous and often single, leaflets green beneath, thorny whip-like tendrils from the leaf-sheath. Spadix decumbent, nodding, terminating in a long flagellum. Fr. ovoid, beaked and stipitate, 1 in. long, with yellow and brown horizontal bands, scales produced downwards into a large membranous lacinate appendage, endosperm uniform. 24. *C. gracilis*, Roxb.; Griff. Palms t. 189. Vern. *Mopoi best*, Beng. Upper Assam, Khasi hills, Cachar, Chittagong. Climbing, slender. L. 2-3 ft. long, leaflets lanceolate, in opposite groups of 2-5 on either side of the rachis, sheath the short petiole and rachis armed with short hooked spines. Flagella on sheath and spadix. Spadix slender, drooping, spathes tubular, sparingly spinous, spathe not imbricate. Fr. oblong, $\frac{1}{2}$ in. long, seated on the campanulate calyx, scales straw-coloured. 25. *C. Helleriana*, Kurz. Tenasserim. Slender, climbing, sparingly armed, rachis slender, trigonous, leaflets 8-12 by ½-1 in., in series of 2-6 on one side. Spadix very slender, spathes narrow, tubular, 2 ft. $\frac{1}{2}$ in. long, sheaths smooth, not striate.

26. *C. travancorica*, Bodd. Vern. *Teyera teyera*, Mal. Malabar, Travancore. Climbing, stem very slender. L. 18-24 in. long, leaflets in distant opposite groups of 3-5, 4-6 by ½-1 in., the greatest width at or above the middle, thence tapering to a capillary point, stouter n. not very prominent. Spadix long, slender, spathes with a long lanceolate blade, 2 spikelets $\frac{1}{2}$ in. long. 27. *C. Rhoadsii*, Griff. Vern. *Kata teyera*, Mal. Malabar. Leaflets in very distant groups of 3 linear-lanceolate, longer than in 26. Fr. ellipsoid or oblong, endosperm ruminated.

II. Leaf rachis produced into a long flagellum.

A. Fruiting calyx pedicelliform.

28. *C. latifolius*, Roxb.; Griff. Palms t. 189.—Syn. *C. macrocarpus* et *C. borealis*, T. And. Vern. *Koek best*, Beng. *Fanada*, Burm. Subhimalayan tract from Sikkim eastwards, ascending to 2000 ft. Assam, Khasi hills, Cachar, Chittagong, Lower Burma. A powerful climber, stem more than 100 ft. long, without the sheaths up to 1 in. diam., 1-8-12 ft. long, leaflets usually in pairs on the same side of the rachis, lanceolate, 10-20 by 1-4 in., stouter n. 2-5 on either side of midrib, margins spinose-ciliate, n. naked. Sheaths densely armed with short spines and large broadly triquetrous ones up to 1 in. long, rachis and flagellum armed with claws of stout recurved thorns. Spadix very large, fr. nearly 1 in. long, pale, seated on the broadly campanulate rigid calyx to be, endosperm ruminated. On the Salween in Tenasserim, in 1859, this species was esteemed most for rafting, and the ropes at the Kyodan were mostly made of it. Other rattans considered useful in those days were: *C. Garcke*, Ham. (*Kyodan*), and *Korthalsia laciniata*, Mart. (*Wapo Kyelo*). *Pholocoma macrocarpa*, Kurz (*Kyodan*) was pronounced to be useless. 29. *C. Deriant*, Booc. Burma. Fr. oblong, ½-1 in. long.

B. Fruiting calyx not pedicelliform.

30. *C. andamanicus*, Kurz. Andamans, Nicobars, Coco Islands. A leafy climber, not tufted, the sheathed stems as thick as the arms, the canes up to 1 in. diam. L. 6-8 ft. long, leaflets equidistant, alternate, linear, 24-30 by 1 in., margins and n. on the underside with scattered long spinose-ent bristles, sheaths reddish-brown armed with oblique

ball umbels of slender black spathe white lobes off readily, rachis stout as well as sheath, armed with about recurved spinous points in groups (claws). Spadix large, spreading, bearing spikelets on naked peduncles partly enclosed by the spathe. Fr. numerous, distichous, ovate, $\frac{1}{2}$ in. long, pale brown, scales convex, not furrowed, apically spinulose. The base large some of the Andamans. III. *C. palustris*, Griff. Palmæ Ind. Andamans. Tenasserim—Malay Penins., Ceylon, C. *palustris*, Griff. Palmæ Ind. *palustris*, with which Kurz makes it. Fr. smaller, calyx-tube not polliciform.

Imperfectly known:—

C. B. quinquevittata, Roxb. Sabet. III. *C. dilacerata*, Dec. Nicobars. 34.
C. nicobarica, Dec. Nicobars.

11. CA RYOTA, Linn.; Fl. Brit. Ind. vi. 422.

Tall Palms, 1 few, broad, bipinnate, leaflets (pinnules) green beneath, very obliquely cuneate, tip proemorse or rounded. Spadices large, axillary, much branched, the branches pendulous, spathe 3-5, tubular. Fl. usually in groups of three, the central and lowest being ♀, the two others ♂. Male: sepals rounded, imbricate, petals coriaceous, oblong, valvate, stamens numerous. Female: fl. subglobose, sepals imbricate, petals triangular, valvate, ovary 3-celled. Fr. globose, seeds 1-2, endosperm ruminated, embryo dorsal. Species 10, from India to Australia.

1. *C. urens*, Linn. The *Mhar palm* of Western India. *Vern. Muri*, Hind. *Birli*, Mar.; *Baini*, Kan.; *Jiluga*, Tel.; *Konda panni*, *Thippati*, Tanj.; *Chunda panna*, Mal.; *Minbar*, Burm. Trunk annulate, attaining nearly 50 ft. and a diam. of 2 ft., no root-suckers. L. 18-20 by 10-12 ft., outer margin of leaflets produced into a narrow triangular point, terminal leaflets 2- or 3-lobed. Spadix 10-12 ft. long, the uppermost flowering first, and so on, until that next the ground has flowered and seeded, when the tree dies. Peduncle stout, curved, entirely covered with large coriaceous spathe, branches long pendulous, resembling a huge horse-tail. ♂ fl. half in. long or more, stamens 40-45, tip of anthers bifid or emarginate. Fr. reddish, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam.

Subhimalayan tract from Nepal eastwards, ascending to 5000 ft. Assam. Khasi hills. Manipur. Chittagong. Upper Burma. Pegu. Western Ghats, in evergreen forest. Orissa. The Circars. Shady valleys of the hills on the east side of the Peninsula.—Ceylon. Malaya. Fl. H. and B.S. The *Kita* fibre from the leaves, sugar from the interior of the stem, sugar and toddy from the cut spadix.

2. *C. obtusa*, Griff. Palmæ t. 236 A, a (*obtusidensata*). Mishal hills 3400 ft. Similar to 1, but leaflets obtuse, outer margin not tailed, ♂ fl. smaller. *S. C. mitis*, Lour.—Syn. *C. subulifera*, Wall.; Griff. Palmæ t. 236 C. Arakan Yoma. Martaban. Andamans—Malay Penins. and Archip. Tufted, trunk 8-10 ft. high, 4-6 in. diam., with numerous root-suckers. L. 8-9 ft. long, leaflets (pinnules) obliquely proemorse, the outer margin acuminate. Fl. not regularly arranged in groups of 3, ♂ & ♀ in. long, flesh-coloured, stamens 17.

Kortalsia lactiflora, Mart.—Syn. *K. scaphigera*, Kurz (non Mart.) Journ. As. Soc. Beng. 43 t. 20. 21.; *Colomesogyne lactiflora*, Griff. Palmæ t. 188. *Vern. Waga*. Khasi Burma. Andamans. Tenasserim. Climbing, often forked, the cane (without sheath) up to $\frac{1}{2}$ in. diam. L. pinnate, 2-4, sheath stout, 2 ft. long, leaflets narrowed into a short petiole, equidistant, alternate, ovate or cuneate-rhomboid, proemorse, to flabellate, scouter 8-12, transverse, venule numerous, sheath produced into a tubular cochlea 4-5 in. long splitting up into fibres. Spadix stout, piercing through the back of the leaf sheath, branched, fl. bisexual, densely crowded on catkin-like cylindrical tawny tomentose spikelets, in the axils of tubular persistent spathe. Ovary imperfectly 3-celled. Fr. $\frac{1}{2}$ - $\frac{3}{4}$ in. long, 1-seeded, clothed with retrose imbricate scales on the leaf-sheath, inhabited by ants. In the Mergul district may probably be found *K. poly-stachya*, Mart., with slender spikelets 5-7 ft. long.

12. WALLICHIA, Roxb.; Fl. Brit. Ind. vi. 418.

L. pinnate, leaflets white or pale beneath, with numerous longitudinal n. separating at acute angles from the prominent midrib, the terminal leaflets

confluent, pet. angular, the edges separating into dark brown or black fibres. Fl. monocious, ♂ and ♀ either on a distinct spadix, or the ♀ at the ends of branches with ♀ fl. Spathes numerous, sheathing, enclosing the peduncle of the much branched drooping spadix. ♂ fl.: calyx tubular or of 3 concave sepals, petals 3, stamens 6 or more, anthers linear. ♀ fl. not sunk in the substance of the spadix; calyx shallow cup-shaped or flat, 3-toothed or of 3 sepals, petals 3. Ovary 2- or 3-celled. Seed plano-convex, endosperm uniform, embryo dorsal.

A. Stemless, ♂ calyx tubular, stamens always 6.

1. *W. densiflora*, Martineq. Bot. Mag. t. 4561. — Syn. *Beccium obtusifolia*, Griff. Palma t. 237, A. B. C. Vern. *Kala cussa*, *Guruleasa*, Kuma; *Talera*, Nep. Subhimalayan tract, ascending to 4000 ft., from Garhwal (Patthian) eastwards, in shady and moist valleys, often gregarious, forming extensive thickets. Khadi hills, Chittagong. Stemless, thick tufts of large l. 16 ft. long or more, arising from the rhizome. Pet. nearly as long as the leaf-bearing pedicel, leaflets lanceolate, slightly lobed, lobes inconspicuous, the nerves terminating in sharp points. ♂ calyx truncate, ribbed, $\frac{1}{2}$ in. long, petals linear, twice the length of calyx. ♀: sepals 3, petals concave, not ribbed. 2. *W. caryotoides*, Roxb. Cor. Pl. t. 255. Vern. *Soleppo*, Burma. Chittagong. Upper Burma, hills west of Katha, 2-4000 ft., in evergreen forest. Martaban and Tenasserim. Stemless, tufts of l. from the rhizome 4 ft. long, leaflets fringed in the lower part of the petiole, cuneate, lobed, the lobes large, prominent. ♂: calyx tubular, striate, $\frac{1}{2}$ in. long, petals linear, twice the length of calyx. ♀: sepals spreading, striate, petals ribbed. Ovary 2-3-celled.

B. Trunk 5-10 ft., ♂ calyx of 3 concave sepals, stamens numerous.

3. *W. distata*, F. And. — Syn. *H. Yoma*, Kurz. Vern. *Mislow*, Upper, *Zawng Leta*, Lower Burma. Gonda hills, Oudh (D. B. March, 1875). Valleys of Sikkim Himalaya to 2000 ft., Makim forest, Assam (D. B. April, 1879). Upper Burma, ascending to 4000 ft., in the hills east of Bhamo. Paga Yoma, chiefly on the eastern slope. Trunk 15-20 ft. high, 6-12 in. diam., in the upper portion covered with the *Eleocharis* leaf-bases, 1-6 ft. long, leaflets fasciated, linear-cuneate, prominently lobed. Spadix stout, drooping, 3-4 ft. long, ♂ fl. mostly at the ends of branches, calyx small, fleshy, consisting of 3 concave sepals, petals ovate acute, $\frac{1}{4}$ in. long, with 4-5 longitudinal or more than twice the length of calyx. ♀: pet. broad-ovate, prominently ribbed. Ovary usually 3; sometimes 2-lobed.

13. DIDYMOSPERMA, H. Wendl. and Drude: Fl. Brit. Ind. vi. 490.

Small, leaflets few, similar to those of *Wallichia*. Spadix erect, simple or branched, spathes numerous, fl. larger than in *Wallichia*, monocious or dioecious. ♂: calyx cup-shaped, 3-lobed, petals coriaceous, valvate, longer than calyx, stamens 10-30, anthers linear. ♀: subglobose, sepals rounded, coriaceous, petals thick, triangular. Ovary 2-4-celled. Species 6. India and Malaya.

1. *D. nana*, H. Wendl. & Drude: Bot. Mag. t. 6836. — Syn. *Harisa nana*, Griff. Palma t. 236 A. B. Assam and Khadi hills. Stem 2-5 ft., clothed with the rusty-hairy leaf-sheaths, leaflets about 5, trapezoid or cuneate, the lateral 7-10 in. long. Spadix stout, simple or sparingly branched, verticillately scurfy, dense-lobed. Fr. white, oblong, $\frac{1}{2}$ in. long. 2. *D. gracilis*, Hook. f. Daphia hills, Assam. Stem 2 ft., slender, leaflets 6-8, broadly cuneate, fruiting spadix 2 in. long, sparingly branched.

Sannernope Ritchiana, H. Wendl. — Syn. *Chamerops Ritchiana*, Griff.; Vern. *Pisa Pasa*, *Pfava*, Sind; *Mares*, *Trans Indus*; *Kala*, *Kohas*, Salt range. Stud on arid hills, *Trans Indus*, Salt range. Gregarious, usually tufts of l. from an underground much-branched rhizome, at times an erect branching stem, up to 20 ft. high. Petioles unarmed, concave, shortly produced into the blade, base with a mass of rust-colored wool, blade cuneately lobulate, greyish-green, consisting of 8-15 linear rigid segments, 12-15 in. long, lobed, bipartite. Fl. polygamous, male and bisexual in a large erect pyramidal much-ramified panicle, the branches in the axils of coriaceous sheaths, narrowed into a lanceolate blade, pairs of fl. in the axils of hyaline bracts in pairs, distinct or connate and bicarpelate. Calyx and petals thinly membranous, calyx flat, 3-toothed, petals cuneate at base, stamens 6 (sometimes 9 in the male fl.), anthers sagittate, dorsifixed, filaments dilated below and approximate to petals, ovary 3-celled, narrowed into the filiform style. Fr. beaked, globose, $\frac{1}{2}$ in. diam.

• 14. LIVISTONA, Robt. Brown; Fl. Brit. Ind. vi. 434.

Trunks tall, annulate, l. nearly orbicular, segments linear, connate to the middle, each with a midrib, pet. spinous. Fl. bisexual, spadix axillary, sheathed by numerous tubular spathes. Sepals rounded, imbricate. Corolla coriaceous, 3-lobed. Stamens 6, filaments short, their dilated base united into a ring, anthers versatile. Carpels 3, globose, free, styles free or cohering. Drupes 1-3, seed one, ventral face hollowed, endosperm uniform, embryo dorsal. Species 13, tropical Asia and Australia.

1. *L. speciosa*, Kurz in Journ. Ac. Soc. Bengal 43 t. 12, 14. Vern. *Tany tan*, *Tan* (see Burma). Evergreen forests in Pegu and Upper Tenasserim. Trunk 40-50 ft. tall, covered with dark-colored, curved sharp spines, up to $\frac{3}{4}$ in. long and $\frac{1}{2}$ in. broad at base, blade 6-7 ft. diam., segments sharply 2-cleft at apex, transverse veins prominent. Spadix panicle, 2-4 ft. long, drupe dark blue, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, 1-seeded. 2. *L. Jenkinsiana*, Griff. Palms t. 226 A. B. Sikkim, lower hills and outer valleys. Assam. Vern. *Tan*, *Tan* (see Burma). Trunk 30-50 ft. high, 6-7 in. diam. Leaf-blade 5-6 ft. across, segments 70-80 obtusely 2-lobed at the apex, transverse veins prominent. Spadix 2-3 ft. long, the peduncle entirely covered with chestnut-red coriaceous spines. Drupe laciniate blue, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. 3. *L. chinensis*, Robt. Brown. China and Japan, cultivated in gardens, trunk 25 ft., l. reniform, segments deeply 2-fid., long no annulate, drooping.

15. LICUALA, Rumph.; Fl. Brit. Ind. vi. 430.

L. nearly orbicular, divided to the petiole into numerous mostly cuneate segments, each with several main longitudinal nerves, pet. spinous. Fl. bisexual, spadix axillary, branches adnate to or beyond mouth of the coriaceous tubular persistent spathes, calyx tubular, 3-fid., corolla-lobes coriaceous, valvate. Stamens 6, anthers with a cordate base, filaments dilated below, biflorous, cohering. Drupes one, by the abortion of 2 carpels, supported by the persistent calyx-tube. Carpels 3, triquetrous, free or nearly so, styles oblique. Species 15, trop. Asia, Australia and Pacific islands.

A. Fl. large $\frac{1}{2}$ - $\frac{3}{4}$ in. long.

1. *L. peltata*, Roxb.; Griff. Palms t. 222. Vern. *Karad*, *Beng.*; *Patt*, *Ass.*; *Sole*, *Burm.*; *Sikkim*, deep hot valleys near the Teesta river. Assam. Khasi hills. Cachar, Chittagong. Andamans. Burma. Upper and Lower, common in damp ravines of the Pegu Yoma. Trunk 3-10 ft. high, sometimes thicker in the upper portion due to the persistent petiole bases. Pet. up to 8 ft. long, blade peltate, orbicular, horizontal, segments cuneate, 16-20, pinnate and 6-10-dentate at the apex. Spadix erect, longer than l., simply branched, with 3-5 drooping spikes, densely covered with greenish-white l. rachsia and fl. tumentose. Fr. red, $\frac{1}{2}$ in. long.

B. Fl. small.

2. *L. longipes*, Griff. Palms t. 224 A. B. Mergui, Malay Peninsula. Nearly stemless, pet. stout, 4-5 ft. long, blade 2 by 3 ft., peltate, segments 20-22, the lateral 2-4-lobed, the venation broader, cuneate. Spadix erect, shorter than l., much branched, the branches in the axils of large sheathing spathes, lacinate at mouth, spikes and fl. pubescent. 3. *L. spinosa*, Wurm. - Syn. *L. peltata*, Kurz. Andamans, tidal forests. Nicobars. Malay Peninsula. Tutul, trunk 8-15 ft. high, 2-4 in. diam., pet. up to 4 ft. long, blade reniform lacinate, 4 ft. across, segments 14-21, linear-cuneate. Spadix a little longer than l. Fr. red, $\frac{1}{2}$ in. long.

16. TRACHYCARPUS, H. Wendl.; Fl. Brit. Ind. vi. 435.

Trunk tall, l. reniform or suborbicular, segments linear, connate to the middle or nearly so, each with a midrib, pet. semi-cylindric, upper surface flat, edges spinous, separating near the base into a network of stiff fibres. Fl. polygamo-monoecious. Spadix axillary or from the axils of fallen leaves, stout, much branched, spathes numerous, coriaceous, tumentose, sheathing. Sepals 3, ovate, petals broadly ovate, valvate, stamens 3, filaments free, anthers dorsifixed. Carpels 3, distinct, stigmas recurved. Drupes 1-3, seeds erect,

ventrally grooved, endosperm uniform; etnbi'yo dorsal. Species 2 or 3, Himalaya, China, and Japan.

1. *T. Martiana*, H. Wendl.—Syn. *T. thasiana*, H. Wendl.; Bot. Mag. t. 7128; *Chamaecarpus Martiana*, Walp. Bot. Mag. t. 211; *Ch. Khasiana*, Griff. Palms t. 227. A. B. Vern. *Jhangra*, *Jhaggar*, *Tal*, *Takil*, Kumaon; *Pakha*, Ass. Central Himalaya, Kumaon and Nepal, 5-8,000 ft. Khasi hills, Manipur, 6,000 ft. Kachin hills, Upper Burma. Forests of *Pinus Khasya*, Martaban hills, 4-6,500 ft. (Kurz). Trunk slender, attaining 50 ft., but often stunted, obscurely annulate. Pet. 3 ft. long, the lower sheathing portion separates into brown tough fibres, forming a close network of rhomboid meshes, the upper portion half round, the edges slightly denticulate. Blade orbicular, segments 30-40, linear, 15-20 in. long, connate to one-third or one-half their length. Spadix stout, drooping, clothed with dark rust-coloured down, branches stout, in the axils of large coriaceous sheathing bracts. Petals ovate, concave, white, filaments longer than anthers. Ovary and the rudiment of ovary in ♂ fl. hairy. Drupe one-follicle, yellow at first, dark glossy blue when ripe. Beccari regards the Kumaon trees as distinct and describes it as *T. Takil* in Webbia 52, fr. reniform, similar to *T. excelsa*. 2. *T. excelsa*, H. Wendl.—Syn. *Chamaecarpus Fortunei*, Hook. in Bot. Mag. t. 5221. Upper Burma.—China, Japan. Trunk mostly clothed with old leaf-sheaths, fl. 2-4 clustered on tubercles. Fr. reniform, hollowed on one side.

17. BORASSUS, Linn.; Fl. Brit. Ind. vi. 481.

B. flabellifer, Linn. (the only species). *The Palmyra*.—Syn. *B. flabelliformis*, Roxb. Cor. Pl. t. 71, 72. Sans. *Trinaraja*. Vern. *Tal*, *Tilr*, Hind.; *Tad*, *Tamar*, Mar. *Patu Tadi*, the male; *Penti tadi*, the female tree, Telugu; *Tien*, Burm. Trunk attains 100 ft. and 2 ft. diam. at the base of the trunk, with a dense mass of long rootlets; white young covered with dry l. of the base of petioles, old stems marked with the black narrow scars of the petioles. L. 3-5 ft. diam., segments 60-80, shining, folded along the middle, linear-lanceolate, pet. 2-4 ft. long, semiterete, edges with sharp, linear-serratures. Fl. dioecious, spadix simply branched, sheathed with numerous open spathes, ♂ spikes 1-3 at the ends of branches, cylindrical, densely clothed with thick closely imbricating bracts, numerous minute unilateral spikelets concealed by these bracts, so as to appear immersed in the spike, the fl. coming to the surface one by one, as they successively open, stamens 6, filaments connate with the corolla into a stalk. ♀ spikes terminating the branches of spadix fl. globose, 1 in. diam., sepals imbricate, petals convolute, ovary 3-4-celled. Fr. subglobose, 6 in. diam., enclosed by the enlarged and partly fleshy perianth. Pyrenes 1-3, obovate, fibrous outside, ends of the perianth horny, hollow.

A native of tropical Africa. Cultivated and self-sown throughout India and Burma, as far north as Lat. 30°. The leaves are used for writing upon, the cut fl. stalks yield sugar and toddy, the fr. is roasted and eaten. Fl. March, April.

18. GORYPHA, Linn.; W. Brit. Ind. vi. 428.

Tall, monocarpic, dying after their seed, at the age between 17 and 20 years. L. very large, orbicular, innate, flabellately multifid, segments folded lengthwise, pet. stout concave, spinous at the edges. Spadix terminal, erect, paniculate. Fl. bisexual, small, calyx 3-lobed, petals 3, connate at base, stamens 6, filaments subulate, anthers dorsifixed, ovary 3-lobed. Fr. usually one globose drupe 2-1½ in. diam., with 2 abortive carpels at the base. Seed erect, embryo at the summit of the uniform hard horny endosperm. Species 6, tropical Asia.

1. *G. umbraculifera*, Linn. *The Talipot paha*. Sans. *Tali*. Vern. *Tara*, *Tarit*, Beng.; *Tali*, *Sari-tali*, Kan. Indigenous on the Andamanas and in the moist forests of the Kumaon and Honavar talukas of North Kanara, covering extensive areas near Gairsoppa and Yena, Talbot List, ed. ii. 943. Not wild in Travancore. Cultivated in tropical India, Ceylon and Burma. Trunk annulate, attains 80 ft. and 2½ ft. diam., pet. stout, 5-10 ft. long, shortly bifid at the base, blade 8-10 ft. diam., cleft to about the middle into 80-100 linear segments up to 6 in. broad. Spadix pyramidal, 10-20 ft.

high, the broad sheathing bracts often pierced by the primary branches, drupes large. The broad leaf-segments of this and the following are highly prized for writing upon. Umbrella made of the l. are largely exported from Kanara.

3. *C. Talera*, Roeb. *Cor. Pl.* t. 255, 256. (*Taliera*, Roxb. *Fl. Ind.* ii. 174; *Fl. Brit. Ind.* vi. 426). United with 1 by Prain in *Bengal Plants* 1891 (1893), but kept distinct by the same author in *Records of Bot. Survey of India* (ii. 298 (1905)). Cultivated in Bengal, home uncertain. Trunk 30 ft., rough from the scars of the fallen petioles, pet. entire at base, segments united beyond the middle. Spadix 20 ft. high or more, primary bristles in the axis of the broad sheathing bracts, drupes large.

4. *C. elata*, Roeb. *Griff. Palms* t. 220 n. Vern. *Bajar*, Beng. Cultivated in Bengal. Trunk 60-70 ft., strongly marked with spiral ridges, the scars of the spirally-arranged petioles. Pet. slender, 6-12 ft. long, segments united to the middle, narrow. Panicle small, compact, drupes small. To this species Prain in *Journ. As. Soc. Bengal* (2), 1891, had referred *C. macrospora*, Kurz *F. Fl.* ii. 325 and *C. Gebanga*, Kurz *ibid.* (non Blume), which is very common in Little Cooch, and is also found on Great Cooch. Later information however has induced him to refer the Cooch as well as the Andaman tree to *C. usbraculifera*, L.

ORDER CXI. PANDANACEJE. Gen. II. 949.

Warburg in Engler's *Pflanzenreich*, iv. 9.

Dioecious trees or shrubs, some scandent with aerial roots, the stem often forked and supported, as if standing on stilts, by numerous adventitious roots. Leaves coriaceous, linear or lanceolate, sessile with a sheathing base, in tristichous spirals, edges and midrib usually spinous, the spines on the edges erect, those on the midrib usually retrorse, transverse n. prominent. Spadix axillary or terminal, simple or branched, clothed with leafy spathes, fl. small, crowded, perianth 0, no bracts or bracteoles. Stamens numerous, filaments either free, on the axis of the catkin, or connate below into a staminal-column, anthers basifixed. Ovary consisting of 1 or numerous carpels, free or connate. Syncarpium consisting of numerous more or less obovoid fruits, the apex of each fruit or carpel distinct, pyramidal conical or convex, crowned by the hardened style or stigma, either drupaceous, or a many-seeded berry. Endosperm oily, abundant, embryo minute, basal.

A transverse section through the stem shows numerous fibre-vascular bundles, each consisting of a great hard horny mass of wood-fibres with one or several groups of vessels and sieve-tubes. The leaf-traces bend inwards from the leaf-basis and join on to other fibre-vascular bundles, but they do not show a regular bend outwards as is the case in Palms.

Erect or procumbent, syncarpium drupaceous, pyrene as many as fertile ovaries.

Climbing, carpels connate, forming a 1-celled ovary. Syncarpium a berry, seeds numerous, small.

1. PANDANUS

2. PANDANUS

t. PANDANUS, Linn. f.; *Fl. Brit. Ind.* vi. 483.

Erect or procumbent. Ovary of 1 or several one-celled carpels, 1 ovule in each. Carpels free or connate, no staminodia. In fr. the upper half of each carpel hollow or filled with spongy, pith-like tissue, seeds large, testa membranous. Syncarpia as a rule solitary. Species 156, tropical Africa, Asia, Australia, and Polynesia.

A. Carpels distinct.

(a) Filaments free, on the axis of the catkin.

1. *P. tectus*, Roeb.; Kurz in *Seemann's Journal of Botany* v. (1867) 101, t. 62, fig. 4-6. Vern. *Koor Inate*, Hind.; *Kochi Inate*, Beng.; *Thoyet*, *Thothagget*, Burm. Khasi hills, Cachar, Central and East Bengal, Chittagong and coast of Burma in thal forests. Prostrate, subdiferous, 3-5 ft. high, l. glabrous-green, linear, 4-6 ft. long. Spathes yellow, glossy, short sharp spines along the edges. Fl. luteid, stamens free, on a fleshy axis, filaments short, connective long, mucronate. Syncarpium solitary, 2-5 in. long, drupes 5-6-gonous, apex pyramidal, terminating in a long spinose

style 2. A sp. mentioned by Talbot (Lig. 346) as an "evergreen prostrate thin-stemmed solidiferous gregarious shrub, found in some of the North Kanara evergreen forests of the Siddapur subdivision, which may be *P. fetidus*, Roxb.," will perhaps be found to be identical with Habetacker's No. 303 from Bantwalle, South Kanara, ♀ only. This seems to be the same as specimens from Ceylon which have been described as *P. Thorelii* by Ugolino Marcelli, in Webbia 369. The ♂ spadix is very dense, the spikes 2-3 and the anthers $\frac{1}{2}$ in. long.

(b) Filaments connate into a column, bearing a number of umbellate anthers at the top.

a Style forked.

3. ? *tttt* Roxb. Vern. *Jayilo*, Nep., *Satticoe*, Burm. Sikkim, outer hills up to 1100 ft., Khasi and Manipal hills, Chittagong, Lower Burma, frequent. Malay Penins. and Archip. Erect, branched, aerial roots from the lower portion of trunk, stem 10-20 ft. high, up to 6 in. diam. L. dark green, 8-15 ft. by 4-8 in., short stout and sharp spines on edge and midrib. Spathes inodorous, the lowest of the ♂ spadix up to 3 ft. long. Staminal-column $\frac{1}{2}$ in. long, with 3-5 anthers at the apex. Syncarpium usually solitary, orange-red when fully ripe, up to 18 in. long (occasionally racemose and smaller, Kurz), drupes connate, nearly cylindrical, apex convex, styles spiny, shining, deeply 2-3 forked. Talbot, Last ed. p. 345, states that this sp. is common in the Ghats forests of Belgaum and North Kanara, a low gregarious tree, forming dense almost impenetrable thickets in marshy places near watercourses. 4. *P. canarum*, Warb. Mangalore, S. Kanara, in marshy places. The lower spathes of the ♂ spadix produced into a long spinulose flagellum, staminal column $\frac{1}{2}$ in., anthers $\frac{1}{2}$ in. long. Drupes clavate, slightly forked.

B Style not, or only slightly forked.

5. *P. minor*, Ham.—Syn. *P. angustifolius*, Hook. f. in Bot. Mag. t. 6347. Subhimalayan tract of Sikkim, ascending to 3000 ft. Khasi hills, Chittagong. A dwarf shrub 2-3 ft. high, with long prostrate densely-matted stems and roots. L. lanceolate 1 $\frac{1}{2}$ -2 ft., terminating in a narrow tail, 1-3 in. long, stout sharp spines up to $\frac{1}{2}$ in. long along the edges. Syncarpium solitary, 5 in. long, drupes smooth, clavate, apex convex, style sharp, entire or slightly forked. 6. *P. Scopula*, Warburg Lc. 76. Burma, *Satticoe*, Burm., fr. only known. Syncarpium oval, 5 in., carpels 1 $\frac{1}{2}$ in. long, the outer surface of each pyrene splitting up into numerous fibres giving the fr. the appearance of a hard brush. 7. *P. graminifolius*, Kurz. Tenasserim. L. narrow linear, 12-18 by $\frac{1}{2}$ in., glaucous beneath, edges and midrib finely spinulose.

B. Ovary of 4-12 connate carpels.

8. *P. tectorius*, Solander; Warburg Lc. 46.—Syn. *P. fascicularis*, Lam.; Prain Bengal Plants 1101; *P. odoratissimus*, Roxb. Cor. Pl. t. 94-95. Includes *P. laris*, Kurz P. Fl. II. 508. Vern. *Keuro*, *Keoro*, Hind.; *Keo*, Beng.; *Koide*, Kan.; *Megaki*, Tel.; *Talai*, Tam.; *Satticoe*, Burm. Sundrihap. Sea coast of the Peninsula on both sides. On sand along the coast of Burma. Andamans, Coco islands, common on the sea shore. —Ceylon on the coast, "usually forming a belt above high water mark, very common." Mascarenes and Seychelles, Malay Penins. and Archip. China, Polynesia. Much cultivated. Gregarious, much branched, stem bent, sometimes up to 25 ft. high, but more often shrubby, resting on strong aerial roots. L. glaucous-green, 3-5 ft. long, ciliate-acuminate, usually with strong spines on edges and midrib (var. *laris* unarmed or nearly so), ♂ spadix with numerous sessile cylindrical spikes 2-3 in. long, enclosed by long white fragrant ciliate-acuminate spathes, staminal-column $\frac{1}{2}$ - $\frac{3}{4}$ in. long, anthers cuspidate, inserted along the whole length of the upper portion. Syncarpium solitary, drooping, scarlet, drupes numerous (30-60), each consisting of 3-12 carpels, the apex of each carpel distinct, more or less convex with a small, variously-lobulate stigma.

9. *P. Leram*, Jones in Asiatic Researches III. 163, with 2 plates. Nicobars, (*Larus*.) Stem branched, 30-50 ft. high, supported by long strong aerial roots. L. dark green. Syncarpium solitary, yellow when ripe, 20-30 in. long, weighing 30-40 lb., drupes 4-12-celled, lower portion fleshy, edible. 10. *P. andamanicum*, Kurz. Andamans. Stem simple or shortly forked, 40-50 ft. high, 8-14 in. diam., L. 8-15 ft. by 4-5 in. Syncarpium solitary, drooping, the size of a man's head, scarlet when ripe.

2. FREYCINETIA, Gaudichaud; Fl. Brit. Ind. vi. 487.

Slender climbers, stems annulate, attached to supports by adventitious rootlets. Ovary 1-celled, of 1-10 carpels, often surrounded by minute staminedia, ovules numerous on parietal placentas as many as carpels.

Synacarpium, a globose or cylindrical berry, seeds small, numerous, testa crustaceous. Species 62, Ceylon, Andamans, Malay Peninsula and Archip., Australia, Polynesia, New Zealand.

1. *F. angustata*, Blume, Teyoy, Malay Peninsula and Archip. Scandent, stem slender, articulate, attaching itself to supports by adventitious roots, L. linear, 12-18 by 1-1 in., terminating in a trigonous, spinulose serrate tail, base sheathing, inflorescence a short terminal raceme bearing 2-3 spikes in the axils of large cylindrical bracts, the outer narrowed into a spinulose serrate tail. 2 spikes pedunculate, 8-10 in. long. Stamens short thick. 3-5-12 in long, ovary surrounded by minute stamens, stigma 2-4. 2. *F. insignis* Blume, Andamans Java. L. 12-20 by 1-1 in., spinulose-serrate on the margin and on the midrib beneath. Inflorescence terminal, consisting of 2-3 peduncled spikes, bracts concave, the inner pink, the outer green, stigma 2-3. *Synacarpium cylindricum*, 24 in. long.

ORDER I MI. GRAMINE&

TRIBE XIII. BAMBUSEJE. Gen. PL. iii. 1094.

With the assistance of C. B. SmaFes, Indian Forest Dept.

(Munro, A Monograph of the *Bambuseae* in Trans. Linn. Soc. xvi. 1. 1818.—Gamble, The *Bambuseae* of British India in Annals Royal Bot. Gard. Calcutta vii. 1893.—Brandis, Biological Notes on Indian Bamboos in Indian For. xv. 1, 1890.)

Perennial grasses, as a rule of extremely gregarious habit. A woody rootstock or rhizome, consisting, in the case of tufted species, of short twisted and entangled branches, producing a large number of more or less closely-packed woody stems (culms), or, in the case of single-stemmed species, with long creeping branches, producing a number of culms standing 1-3 ft. apart. The culms are jointed, hollow between joints, rarely climbing, usually erect, the outer culms of the clumps often overhanging, in some species the culms almost lying on the ground. The young shoots which come up in the rainy season, either in the midst of dense clumps or, in the single-stemmed species, separately from the ground, have the full diameter of the culm, but are quite soft. They are enclosed in large, generally coriaceous sheaths, often hairy outside, which arise from the joints or nodes and as a rule terminate in a more or less imperfect blade. These sheaths, like those which bear the ordinary green l. of the Bamboos, are strictly alternate, there is an angle or interval of 180° between the axillary buds of two successive sheaths. The shoots grow with great rapidity, usually attaining their full length in less than a month. As the internodes lengthen out telescopically and the nodes separate, the green surface of the internodes appears between the sheaths, which usually are yellow or brown, often producing a remarkable contrast. The general appearance, length, texture and shape of these sheaths and their blade afford good characters for distinguishing the different species. In many species the internodes, while young, are covered with minute silky hairs. After the culms have attained their full length, the buds, which are in the axils of the sheaths, develop, in the upper portion of the culm, into leaf-bearing, jointed, woody branches, which generally stand in half-whorls. In many species the buds in the lower portion of the stem develop not at all or only very sparingly, while in others they grow into half-whorls of branches, one or a few of which often are much stouter and larger than the others, or they grow out into short stiff, sometimes spinose branches, leafless or with a few leaves. At the nodes two rings may generally be distinguished, the lower is the scar of the culm-sheath, while the upper ring, which is not always clearly marked, corresponds to the node itself. Above the lower ring is the axillary bud, and in the lower portion of the culm not unfrequently a ring of rootlets. The rootlets, as well as the branches, when they develop before the culm-

sheaths have fallen, pierce through the sheath at its base. These rootlets rarely reach the ground, and often become hard and spinouscent.

The leaves are distichous, and consist of a tubular sheath, split to the base, and a linear-oblong or lanceolate blade with a midrib and numerous longitudinal veins (fibro-vascular bundles), usually of two classes, stout or coarse and thin, generally 5-9 thin between two stout nerves. The blade is joined to the sheath by a short petiole. Half-way between two longitudinal nerves and parallel to them is a transparent band, due to several lines of large cells, belonging to the upper epidermis, which are frequently, but not in all cases, filled with bright colourless masses of Silica (Silicon dioxide). All Bamboo leaves have transverse veins, consisting of wood-fibres, which run across from one longitudinal nerve to the next, straight, oblique, or with a bend in the middle. In many species these transverse veins are conspicuous, particularly on dry leaves, but they can usually be distinguished, under the lens or microscope, as bright translucent dots at the point where they cross the band of Silica cells. (Translucent glands, Gamble.) Pieces of dry l. boiled in water, and examined in glycerine, often show the transverse veins; they can be made more conspicuous by bleaching reagents or by scraping off part of the tissue filled with chlorophyll. On the underside of the leaf the epidermis has numerous solid protuberances or hairs, which usually are short and thick-walled, in some species long and soft. The leaves being distichous, an inner and an outer edge may be distinguished; on the inner edge (in many species on both sides) we find as a rule a colourless band, fringed with longer or shorter thick-walled sharply-pointed hairs, while the outer edge is often rough on the upper side, with lines of short rigid hairs along the outermost veins.

The identification of many species, when leaves only are available, may be facilitated by counting the number of longitudinal nerves on $\frac{1}{2}$ in. In most genera the number varies between 20 and 50. *Dendrocalamus* and *Melocalanx* have 20-50, and the following species have less than 24: *Arundinaria Walkeriana* (leaf 1-1 $\frac{1}{2}$ in. wide), *A. Hookeriana* ($\frac{1}{2}$ -1 $\frac{1}{2}$ in.), *Bambusa khasiana* (1-1 $\frac{1}{2}$ in.), *B. Griffithiana* (3 in.), *Pseudostachyum polymorphum* (1-2 in.), *Dinodichon McClellandii* (2-4 in.), *D. andamanica* (1-2 in.), *Trinostachyum Helferi* (1 $\frac{1}{2}$ -3 $\frac{1}{2}$ in.), *T. Wightii* (1-3 in.), *Cephalostachyum capillatum* (1-2 in.), *C. latifolium* (2-4 in.), *C. Fuchsianum* (2-4 in.), *Mecanum bambusoides* (1-4 in.). As may be expected, many broad-leaved species have the longitudinal n. far apart, but there also are broad-leaved species with the longitudinal nerves close together. For most species the number of n. on $\frac{1}{2}$ in. has here been stated. Conspicuous transverse veins are found in *Phyllostachys*, in the majority of *Arundinaria*, in *Pseudostachyum polymorphum*, and a few other species. When close together they form squares or short rectangles with the longitudinal nerves (*Phyllostachys*, *Arundinaria densifolia*, *racemosa*, *elegans*, *janusarensis*, *hirsuta*). In counting the number of nerves on $\frac{1}{2}$ in., only full-grown l. should be selected, and the nerves must be counted in the middle, half-way between base and tip. If this is done the results will be found to be fairly uniform, whether the leaf selected is broad or narrow. Leaves grown under exceptional conditions, for instance, in a hothouse, are apt to be irregular, and should be avoided. The nerves are often closer together near the edge of the leaf, hence an average should be struck between the countings near the edge and the midrib. Care must be taken to count the nerves only, not the translucent lines of silica cells, a strong lens or a small microscope should be used; and in the case of dry leaves it is advisable to boil a small piece in water and place it in glycerine.

Fl. mostly bisexual, in distichous spikelets, usually arranged in large panicles. The spikelet consists of a number of distichous bracts (or glumes), the lower and sometimes the upper being empty. Each flowering glume bears in its axil the palea, a membranous, usually transparent bract, which has its back appressed to the axis of the spikelet and which, except when

terminal, is 2-keeled as a rule and strongly ciliate along the keels. Enclosed by palea and flowering glume is a one-celled ovary with 4 terminal styles, with 2 or 3 linear plumose stigmas, surrounded by 3 or 6, rarely more, stamens, and in most genera by 2 or 3 membranous, often ciliate scales (lodicules). Anthers 2-celled, cells parallel, contiguous, opening longitudinally. Fr. in some genera with a thick, more or less fleshy, but more usually thin crustaceous or membranous pericarp (caryopsis). Seed as a rule with a large mealy endosperm, embryo small, basal on the outside. Embryo with a broad fleshy cotyledonary body (scutellum) contiguous to the endosperm. Some genera (*Dimocarpus*, *Melocalanus*, *Melocanna* and *Ochlandra*) have no endosperm in the ripe seed, and the germinating embryo derives its nourishment through a very large scutellum from the pericarp.

In regard to their habit of flowering, Bamboos may be divided into three great classes. *First*, those which flower annually or nearly so, the flower panicle terminating leaf-bearing culms.* Instances: *Arundinaria Wigatii*, *Bambusa lineata*, *Ochlandra strictula*. In these cases the plant does not die after flowering. *Second*, those which flower gregariously and periodically, all culms of one clump and all clumps in one district flowering simultaneously. The leaves fall, and the whole culm is one huge flowering panicle. In these cases the culms die after ripening their seed, and usually the underground rhizome also dies. Instances: *Bambusa polymorpha*, *arundinacea*, *Melocanna bambusoides*. The area over which these species flower simultaneously is circumscribed. In different districts they flower at different times. (Ind. For. xxv. 10.) *Third*, irregularly flowering species. One or a few culms in one clump, or a few clumps in one locality, are in flower at any one time, while at other times all culms of one clump and all clumps in one district are simultaneously covered with flowers. Instances: *Oxytenanthera albociliata*, *Desmodocalamus strictus*, *D. Hamiltonii*, *Cephalostachyum perygrum*. The majority of species belongs to the third class. Some species may be considered to hold an intermediate place, but as a rule it will be found convenient to maintain the three classes here indicated. It should here be mentioned that offsets taken from a clump some time before it flowers come into flower at the same time as the parent clump. There are indications, that in dry stony places and in exceptionally dry seasons Bamboos flower earlier and more abundantly.

In districts where clearings are made for purposes of temporary cultivation (Taungya, Dhya, Kauri) in Bamboo Forest, it will be found that in the secondary growth, which springs up after the crop has been reaped and the fields have been deserted, different species of Bamboo show a different behaviour. In a forest consisting of tufted species a mass of tall grasses and large herbs, together with the coppice shoots of trees and some seedlings will usually form the second growth, in which the slender shoots coming up from the burnt Bamboo clumps, only gradually assert themselves. The huge and intricate mass of rhizomes of a tufted species is close to and often partially above the surface, and hence suffers more damage from the Taungya fire than the long branches of the rhizome of a single-stemmed species, which as a rule are at some depth underground. As a matter of fact, when Taungyas are cut in forests of single-stemmed species, the second growth frequently consists entirely of a dense mass of Bamboos. There are however exceptions; thus in the Shan States east of the Salween river the second growth over large areas is reported to consist entirely of *Oxytenanthera albo-ciliata*, a densely-tufted species (H. N. Thompson, in Forest Report Southern Circle Upper Burma, 1900-1901, p. 50).

When after the flowering of Bamboos in a certain district the fires of the hot season have swept away the tangled mass of dry stems, the next rainy season produces millions of seedling Bamboos, which soon grow up into slender plants, 2-3 ft. high, forming dense waving green masses on the ground. Among these millions of plants the stouter gradually get the upper hand, and these in course of time develop into these remarkable rhizomes, consisting in tufted species of innumerable stout twisting and interlaced branches, which produce the leaf-bearing culms. The development of Bamboo seedlings into a clump is a most remarkable process, which has not yet been sufficiently studied (cf. Brandis, in Ind. For., xv. 4). Nor has it yet been ascertained how many years a seedling requires to form a clump consisting of full-sized stems. In the case of *Bambusa polymorpha* and *arundinacea* the period is

probably, between 5 and 12 years. Offsets from mature clumps produce full-sized culms in 2 or 3 years.

The mature culms of Bamboos as a rule are hollow, with transverse dissepiments at the nodes. The tissue of the culm is very firm, consisting of closed fibre-vascular bundles and, chiefly near the surface, large masses of sclerenchymatous cells and fibres. The branches of the rhizomes are solid. As mentioned above, the young shoots of Bamboos are solid, consisting of extremely soft tissue. They grow with extreme rapidity up to their full height in the first part of the rainy season. During this period the young culm would not be able to stand without the support of the culm-sheaths which at first entirely envelope it. At a later period the tissue of the culm hardens, the internodes become hollow, and branches with leaves are formed in the upper part. The nodes of Bamboos are rich in silex. In culms a few years old some internodes are full of a watery fluid, which doubtless contains Potassium silicate in solution. This probably is the origin of the Silica (Tabasheer), which is often found in the internodes of old Bamboos culms (Brand's on Tabasheer, Ind. For. xiii. 107. Also Sir Wm. Thisleton-Dyer's note on Tabasheer, p. 185 of the same volume). It has been found in *Desmodium strictum*, *Bambusa arundinacea* and *Oryzanthura nigricollis*, and is doubtless found in many other species.

- I. Culms as a rule not over 20 ft. Stamens usually 3, pericarp thin, membranous, adnate to seed.
 - A. Branches terete, transverse veins conspicuous in most species, dividing the leaf into rectangles or squares. Spikelets often pedicelled, 1- to many-fl., empty glumes 1-2.
 - 1. ARUNDINARIA.
 - B. Branches flattened on the inside, transverse veins always conspicuous, close together, usually dividing the leaf into minute squares. Spikelets sessile, supported by prominent sheathing bracts, often with a leafy blade. Fl. 1-4, empty glumes 2-3.
 - 2. PSEUDOSTACHYS.
- II. Culms tall, as a rule erect. Stamens 6, pericarp thin, membranous, adnate to seed.
 - A. Filaments free.
 - (a) Paleae entire or slightly 2-dentate, all prominently 2-keeled.
 - 3. BAMBUSA.
 - (b) Paleae deeply 2-dentate, the teeth awned, the uppermost nearly entire, indistinctly keeled.
 - 4. TRICHOSTACHYS.
 - B. Filaments connate.
 - (a) Spikelets many-fl., paleae all prominently keeled.
 - 5. GIGANTOCHLOA.
 - (b) Spikelets few-fl., paleae of upper fl. indistinctly or not at all keeled.
 - 6. GYNERANTHERA.
- III. Culms tall, sometimes climbing. Stamens 6, in *Ochloa* numerous.
 - A. Fruit small, pericarp crustaceous, endosperm large.
 - (a) Single-stemmed, culms overhanging, transverse veins conspicuous.
 - 7. PSEUDOSTACHYUM.
 - (b) Tufted, transverse veins as a rule not conspicuous.
 - α. Lodicules none, spikelets 2-3-fl. in large globose heads.
 - 8. DESUDROCALANUS.
 - β. Lodicules 3, conspicuous.
 - 1) Spikelets in long, narrow spikes.
 - * Spikelets 2-3-flowered.
 - 9. TRICHOSTACHYS.
 - ** Spikelets 1-flowered.
 - SCHIZOSTACHYUM (p. 679).
 - 2) Spikelets crowded, in globose or obconical heads.
 - 10. CEPHALOSTACHYUM.
 - B. Fruit large, pericarp fleshy or ultimately coriaceous, no endosperm in the ripe seed.
 - (a) Stamens 8, sometimes 4 or 5.
 - α. Lodicules none. Climbing culms zigzag, gunculate. Spikelets 1-fl., minute.
 - 11. DIPOCHLOA.

L. Lodicules 2 or 3.

- (1) Loosely tufted, culms spreading
often ulm-like near large trees.
Spikelets small, in distant
compact glabrous heads.

12. MELICACANTH.

- (2) Usually single-stemmed. Spike-
lets in large panicles.

13. MACDANNA.

- (3) Stems 6-120. Tufted, stems often spr-
ingling.

14. OXYLARIA.

1. A. RUNDINARI A. Michaux; Fl. Brit. Ind. vii. 376.

Usually tufted and erect, rarely single-stemmed or climbing, culms slender, terete, branches in half whorls. Ls. small, n. as a rule 21-36 on $\frac{1}{2}$ in., noteworthy exceptions: *A. falcata* 36-48, *microphylla* 48, *juncea* 33-42; transverse veins in most species conspicuous, in the Indian species usually forming long rectangles with nerves. Spikelets often pedicelled, in racemes or panicles, 1- to many-31, empty glumes 2, palea two-keeled, lodicules 3, ciliate. Stamens as a rule 3-6 in *A. Prainii* and *Clarkii*, style short, stigmas 2 or 3, plumose. Species 50, 15 in America, 1 in South Africa, the rest Asiatic.

L. Erect, unarmed, bracts of inflorescence small.

A. Inflorescence usually at the end of leafy culms, mostly flowering annually, transverse veins conspicuous as a rule.

(a) Western species.

1. *A. Wightiana*, Nees; Gamble, *Bambusa* 1, 2. Bedd. Man. 1, 28. Nilgiris above 6,000 ft., common as underwood in Sholas, but also in the open. Palghat. Tinnevely. Tufted, 8. annually, culms slender 6-10 ft., internodes 10-14 in. long, cold sheaths papery, straw-coloured, in the lower part with stiff golden hairs ribs prominent, blade subulate 1-1 $\frac{1}{2}$ in. Ls. thin, 5-7 by $\frac{1}{2}$ -1 in., n. 27-30 on $\frac{1}{2}$ in., transverse veins oblique, distance between them more than twice the interval between 2 nerves, a few bristles at the mouth of leaf-sheath. Panicles leafy, branchlets capillary, as well as the long pedicels, spikelets purple, $\frac{1}{2}$ -1 in. long, fertile 2, 2-4. 2. *A. Walkeriana*, Munro; Gamble 1, 1. Palnis—Ceylon. L. thick, elliptic-lanceolate, 5-11 by 1-1 $\frac{1}{2}$ in., n. 18-24 on $\frac{1}{2}$ in., margins cartilaginous, thickened and recurved, serrulate.

3. *A. densifolia*, Munro; Gamble 1, 7. Anjathala 8,500 ft.—Ceylon. A small prostrate shrub, $\frac{1}{2}$ -3 ft. high, stiff densely leafy culms arising from a thick rhizome, internodes 1 $\frac{1}{2}$ -2 by $\frac{1}{2}$ in. L. densely imbricate, 1-1 $\frac{1}{2}$ by $\frac{1}{2}$ in., transverse veins close together, making horizontal narrow rectangles with the n. Panicle dense, leafy, consisting of spikes bearing 3-5 1-3-4, spikelets. Style short, soon branching into 2 feathery stigmas.

(b) Eastern species.

4. *A. racemosa*, Munro; Gamble 1, 8. Vern. *Maling*, Nep. *Phing*, Bhutia. East Nepal and Sikkim 6-8,000 ft. Gregarious, single-stemmed, culms 10-30 ft. high, internodes rough in the upper portion, 12-15 in. long, diam. culms 1-5-7 by $\frac{1}{2}$ -1 in., n. 27-30 on $\frac{1}{2}$ in., transv. veins forming rectangles with nerves. This low-level species, which is common about Darjeeling, and is largely used for mat-making, for the roofs of houses, for fences and as fodder for cattle and ponies, apparently flowers at long intervals. According to the Bengal Forest Report for 1903-4, p. 3, a small patch of it flowered that year in the Darjeeling division, but I have not seen it. Gamble writes of it with a small high-level bamboo ascending to 12,000 ft. in Sikkim and the adjoining districts of Nepal, stems 3 ft. high, reddish, 1.3 by 1 $\frac{1}{2}$ in., n. 21-29 on $\frac{1}{2}$ in., transverse veins close, forming with n. squares and short rectangles, which has a leafy panicle, the branches of which are supported by persistent sheaths, spikelets 1-1 $\frac{1}{2}$ in. long, 4-8-fld., anthers purple, bifid at top, style short, stigmas 2 or 3, papillose. 5. *A. elegans*, Kurz; Gamble 1, 4. Nag's hills, 5,500 ft. *Jalla*. Hills east of Teungoo (Nawang), 5-7,500 ft. Tufted, 8. annually, culms slender, 12-20 ft. high, 1. 4-5 in. long, n. 27-30 on $\frac{1}{2}$ in., transverse veins close, forming squares or short rectangles. Spikelets 1 in. or longer, 7-8-fld., anthers purple, stigmas white, plumose, separate, sessile each on a thick bulbous base. 6. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 7. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 8. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 9. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 10. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 11. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 12. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 13. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 14. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 15. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 16. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 17. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 18. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 19. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 20. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 21. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 22. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 23. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 24. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 25. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 26. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 27. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 28. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 29. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 30. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 31. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 32. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 33. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 34. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 35. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 36. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 37. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 38. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 39. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 40. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 41. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 42. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 43. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 44. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 45. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 46. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 47. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 48. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 49. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base. 50. *A. polytachya*, Kurz MSS.; Gamble 1, 5. Sikkim 3-5,000 ft. Khasi hills. L. soft, 6-8 by $\frac{1}{2}$ -1 in., transv. veins none or separate, sessile each on a thick bulbous base.

B. Flowering culms leafless, transverse veins not conspicuous.

7. *A. falcata*, Nees; Brandis in Ind. For. xii. 206; Gamble t. 11, 12; Collett Simla Fl. 684; fig. 199. Vern. *Ringal*, Hind.; *Go Ningal*, Jauns. Erect, densely tufted, more or less gregarious, flowers irregularly, at times gregariously over large areas, while a few clumps may be found in flower almost every year, fl. stems leafless. Culms slender, 6-10 ft. high, often glaucous with a waxy covering, nodes swollen, pubescent or velvety, internodes 6-12 in. long, walls thin. Culm-sheaths thinly membranous, as long as or longer than internodes, gradually narrowed from the middle to a narrow truncate tip, blade subulate, $\frac{1}{2}$ -2 in. long. L. thin, B-5 by $\frac{1}{4}$ - $\frac{1}{2}$ in., n. 36-45 on $\frac{1}{2}$ in., transv. veins obscure. Spikelets 1-2 in. long, some sessile, others on long slender pedicels, in long densely-whorled racemiform panicles, each with 1-3 fertile and one terminal sterile fl., style short, stigmas 2, long, plumose. Caryopsis $\frac{1}{2}$ in. long.

North-West Himalaya. Chamba to Nepal, 4-7,500 ft., often as underwood in forests of *Quercus incana*. Fl. May-Oct. 8. A. Khasiaia, Munro; Gamble t. 13. Khasi hills, 5-6,000 ft. (*Nawlang*). Similar to 7, but stems stronger and harder, L. broader, transverse veinlets often faintly visible, n. 27-11 on 1 in., inflorescence more dense. 9. *A. Intenneilla*, Munro; Gamble, t. 14. Vern. *Titi Ningal*, Nep.; *Purmiok*, Lepcha. 31. Kham lower hills to 7,000 ft. Erect, tufted, gregarious, culms 8-12 ft. high, internodes 5-10 in. long, culm-sheaths as long as internodes, l. 3-5 by $\frac{1}{4}$ - $\frac{1}{2}$ in., n. 27-36 on $\frac{1}{2}$ in. (24 in specimens cult. at Kew, l. $\frac{1}{2}$ in. wide), transverse veins faintly visible, leaf-sheaths prominently striate, terminating in falcate auricles with numerous long cilia. Fl. stems leafless, spikelets 1-1 in. long in racemes varying in length and often compound, crowded in compact half-whorls, each spikelet with 3-4 fertile fl. 10. *A. Hootcertana*, Munro; Gamble, t. 15. Vern. *Singhani*, Nep.; *Prong, Pyong*, Lepcha. 32. Kham and West Bhutan 4-7,000 ft. Culms 12-30 ft., glaucous, with whitish scurf when young, internodes 8-12 in. long, $\frac{1}{2}$ - $\frac{1}{4}$ in. diam., culm-sheaths 12-24, blade 3-6 in. long. L. 6-12 by $\frac{1}{2}$ - $\frac{1}{4}$ in., n. 21-24 on $\frac{1}{2}$ in., transv. veins just visible. Fl. stems leafless, spikelets $\frac{1}{2}$ in. long with 1 fertile fl. Caryopsis $\frac{1}{3}$ in. long. Fl. in Sikkim and British Bham 1848, 1855, 1892, and 1908.

II. Erect, a ring of thorns at the nodes, bracts of inflorescence striate, transverse veins prominent.

1. *A. Griffubiana*, Munro; Gamble t. 9. British Bhutan. Kham faint in hills (*Kham*), Chin hills, Upper Burma. Tufted, gregarious, culms 10-30 ft., internodes 6-9 in. long, 1-1 $\frac{1}{2}$ in. diam., thorns short, stout, conical. Culm-sheaths as long as internodes, coriaceous, hairy outside, a thick belt of long soft tawny hairs at the base. L. 4-5 by $\frac{1}{4}$ - $\frac{1}{2}$ in., n. 21-24 on $\frac{1}{2}$ in. Panicle large, terminal, leafy, branches in the axils of sheathing bracts, spikelets 1-1 $\frac{1}{2}$ in. long on slender peduncles, fl. rather distant, glumes mucronate. Found in fl. at Mollong 1835 (Griffith). 2. *A. callosa*, Munro; Gamble t. 11. *Daphla* ami Kims; lili (*Uskoty*, *Itpar*, Khasi). Similar to 11, culm-sheaths thin, striate, glabrous. L. 8-9 by $\frac{1}{2}$ - $\frac{1}{4}$ in., n. 21-24 on $\frac{1}{2}$ in. Panicles axillary, spikelets 1-1 in. long. Found in fl. at Shillong 1885 (C. B. Clarke). 3. This I am disposed to refer a thorny Bamboo sent from the Kala Naga hills, Manipur, above 4,000 ft., by Mr. Inanada Charan Sen. Culms in thin clumps 15-20 ft., internodes 7-9 in., diam. 1 in., thorns $\frac{1}{2}$ -1 in. long. Culm-sheaths as long as internodes, very thin, almost hyaline, ribbed, transverse veins prominent, also on blade, blade narrow, 2 in. long. L. 8-12 by 1-1 in., n. 18 on $\frac{1}{2}$ in. 4. *A. aimata*, Gamble t. 119. Bernardmyo, Upper Burma, 5,500 ft. (*Maitut*, Shan, J. W. Oliver, Feb. 1894). Single stem 21 ft. high, internodes 8 in., diam., 1-1 $\frac{1}{2}$ in., walls thin, culm-sheaths thinly coriaceous, straw-coloured, 4-8 in. long, base 2-4 in. wide, tapering to a very narrow tip. L. 6-9 by $\frac{1}{4}$ - $\frac{1}{2}$ in., n. 24 on $\frac{1}{2}$ in. Fl. unknown. Possibly of this group: 5. *K. Pantungii*, Gamble t. 118. British Bhutan 11,000 ft. (in fl. 1895). Similar to 11, but doubtfully spinescent. L. 5-7 by $\frac{1}{4}$ - $\frac{1}{2}$ in., n. 27-36 on $\frac{1}{2}$ in. Spikelets 6-1 in. long, on long slender peduncles.

III. Unarmed, bracts of inflorescence large, sheathing.

15. *A. spathiflora*, Triebner; Brandis in Ind. For. xii. 16; Gamble, t. 16. Syn. *Tjifimv calamus spathiflorus*, Munro; Brandis l. Fl. 563. Vern. *Ringal*, Nagal, Hind.; *Go Ningal*, Jauns.

Erect, densely tufted, gregarious, fl. periodically] probably in intervals of 11 years (Nepal 1821, Wallicij; Jaunsar 1881 and 1882, Brandis, Fisher; Deoban 1892 and Kodarkanta 1893, Gamble). Culm- 20-30, sometimes

40 ft. high, internodes 6-15 in. long. Culm-sheaths glabrous, thin, straw-coloured, very smooth and shining within, 6-8 in. long, sides parallel to near the apex, where they are narrowed to a truncate-rounded apex $\frac{1}{2}$ in. broad, blade caducous, 2-4 in. long. L. 3-5 by $\frac{1}{2}$ - $\frac{3}{4}$ in., narrowed into a short petiole, which is articulate with the sheath, n. 24-30 in $\frac{1}{2}$ in., transverse veins conspicuous, dividing the area of the leaf into long rectangles, leaf sheaths coriaceous, straw-coloured, ribbed, fimbriate at the apex, persistent after the l. fall, forming an acute angle with the branch. Flowering distinct from the leaf-bearing stems, but the former always with a few l. Spikelets 1-2 in. long, with 4-8 fertile fl. often 2-3 together in the axil of a large membranous ribbed sheath 2-3 in. long, fimbriate at the apex like a leaf-sheath; sometimes bearing a green, but usually terminating in a short dry early deciduous membranous blade. Fl. glumes long-acuminate. Stigmas 3, long, plumose, sessile.

North-West Himalaya, Sutlej to Nepal 7-10,000 ft., often forming underwood under Deodar, Cypress, the Himalayan Spruce, Silver Fir, and *Quercus semicarpifolia*, but also forming forests of its own with a few scattered trees among the Bamboo. The clumps generally stand close together, forming extensive thickets, so that adjoining clusters cannot often readily be separated. The culms die after ripening their seed. The stems are exported largely to the plains for hookah tubes, fishing rods and other purposes. 16. *A. aristata*, Gamble, t. 17. Vern. *Rato-sigala*, Nep.; *Babusia*, Lepcha; *Bhobhoo*, Bhotia. Sikkim and British Bhutan 9-11,000 ft. Culms 8-12 ft. high, shining yellow when mature, internodes 8-12 in. long, $\frac{1}{2}$ in. diam., walls thick, nodes prominent through the persistent cup- or ring-like base of the fallen sheath, culm-sheaths prominently ribbed. Branchlets purple. L. approximate at the ends, n. 24-30 on $\frac{1}{2}$ in., transverse veins like 15, leaf-sheaths loose, strongly ribbed. Inflorescence with numerous large spathaceous bracts, often with a leafy blade, enclosing clusters of 3-5 spikelets on short pedicels. Spikelets 1-2 in. long, with 4-8 fertile fl., fl. glumes long-acuminate. Caryopsis linear-oblong, acute. Flowered on the Singalila range in 1868, 1869, 1890, and (over a small area) in 1900. 17. *A. Falconeri*, Benth. and Hook. f.; Gamble, t. 18; O. Stapf in Bot. Magazine t. 7947, and in Gard. Chron. xxxv. (1904) 305; Gilbert Rogers in Ind. For. xxvii. 285. Syn. *A. sabilla*, Milford. Himalaya from Jaunsar eastwards, 9-10,000 ft. Chakrata 6,000 ft. (D.B. in fl. April 1881). Loosely tufted, stems 20 ft., culms $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., not glaucous, sometimes striped, yellow and green, nodes rim glabrous, internodes 8-15 in. long. Culm-sheaths oblong, shortly narrowed towards the apex with convex margins. L. 3-6 by $\frac{1}{2}$ - $\frac{3}{4}$ in., thin, transverse veins obscure, but often visible on the underside of dry l., n. 21-27 on $\frac{1}{2}$ in. Spikelets 1-2 in. long, with an elongate slender sterile rachilla, fl. glumes shortly mucronate. Racemes of 5-7 spikelets in the axile of sheathing bracts, $\frac{1}{2}$ - $\frac{1}{4}$ in. long, usually truncate. Fl. gregariously. Maiden found it in seed near the Pindari glacier, Sept. 1846, and in 1847 sent quantities of the seed to England, which was the origin of the plants that flowered all over Europe and in Algeria in 1875 and 1876. In Sikkim it fld. in 1876 and at Darjeeling in 1900. Readily distinguished from *A. fulcata* by the distant longitudinal nerves, l. resembling those of *A. Hookeriana*.

IV. Mostly climbing, transverse veins not conspicuous.

18. *A. Prainii*, Gamble, t. 19. Syn. *Miconocalamus Prainii*, Gamble in Journ. As. Soc. Beng. 56. 267. Vern. *Sowpat*, Nagp. Naga and Jaintia hills 2,500-5,000 ft. A small wiry climber, culms up to 30 ft. long, internodes usually 8-9 in. long, walls thick, often quite solid, l. thin, 2-4 in. long, n. 33-39 on $\frac{1}{2}$ in., transverse veins faintly visible. Spikelets 3-6 fld., 1-1 $\frac{1}{2}$ in. long, rachis flexuose, on lax slender racemes in leafy panicles, fl. glume broad-ovate acute, stamens 6. In fl. Naga hills 1886 (Prain). 19. *A. Mannii*, Gamble, t. 20. Khasi hills (*Beneng*). Slender tufted wiry climbing culms up to 30 ft., internodes 3 ft. long, $\frac{1}{2}$ in. diam., quite solid, culm-sheaths 12-18 in. long, thin and slender, blade continuous with sheath, linear, 9-10 in. long. L. thin 6-8 by $\frac{1}{2}$ - $\frac{3}{4}$ in. n. 24 on $\frac{1}{2}$ in., transverse veins few, bent, not prominent, fl. unknown. 20. *A. Clarkii*, Gamble MSS. Manipur. A slight shrub 10 ft. high, l. 4-7 by $\frac{1}{2}$ - $\frac{3}{4}$ in., n. 24-33 on $\frac{1}{2}$ in. Stamens 6, hence placed here.

V. Fl. unknown.

A. Transverse veins conspicuous.

(a) Single stemmed.

21. *A. Jaunsarensis*, Gamble, t. 22; Kanjial F. Fl. 363. Tutnagadh, Mundali, Jaunsar 7-8,000 ft. Ranai and Dudulohi, Garhwal, 8,500-9,000 ft. Strachey and Winterbottom. Culms single, 10-15 ft. high, arising from a long creeping rhizome, internodes 9-11 in. long, $\frac{1}{2}$ in. diam. L. 4-6 by $\frac{1}{2}$ - $\frac{3}{4}$ in., n. 33-42 on $\frac{1}{2}$ in., transv.

veins close together, forming squares or short rectangles with the n., if unknown. L. similar to *A. spatulifera*, but the venation quite different. 22. *A. Relloana*, Gamble, t. 23. Naga hills 5-7,000 ft. Culms 8 ft. high, distant culms creeping rhizomes, internodes 8-12 in. long, $\frac{1}{2}$ in. diam. L. 6-8 by 1-1 $\frac{1}{2}$ in., n. 21-24 on $\frac{1}{2}$ in. 23. Lading w. Burma, Hills east of Bhamo, 6,500 ft., Montague Hill 1891. Single-stemmed, erect. Culms 21 ft. high, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. diam., nearly solid. L. 4-5 by $\frac{1}{2}$ in., fine hairs of the underside, n. 27-42 in. on $\frac{1}{2}$ in., transv. veins mostly close, forming short rectangles and squares with longitudinal nerves. Similar to *A. elegans*, Kurz, but reported to be single-stemmed.

(b) Tufted.

24. *A. hirtuta*, Munro; Gamble, t. 23. Vern. East, Khasi. Khasi and Naga hills, 5-6,000 ft. Tufted, 3-5 ft. high, culms, culms spicose, tufted, Hook. f. in north. New stems solitary from the culms, (Gamble) 1.2-7 by 1-1 $\frac{1}{2}$ in., n. 21-33 on $\frac{1}{2}$ in., transv. veinlets forming with the n. squares or horizontal rectangles, leaf-sheaths clothed with long stiff hairs, auricles at the mouth bearing long stiff bristles. 25. *A. microphylla*, Munro. Bhutan 6-10,000 ft. Gregarious, 2-4 ft. high, forming large patches in wet places, l. $\frac{1}{2}$ -1 by $\frac{1}{2}$ - $\frac{3}{4}$ in., the inner edge with very long pointed hairs, appressed of the edge, n. 48 on $\frac{1}{2}$ in., transverse veins forming squares and rectangles with the n. 26. *A. gallatya*, Gamble, t. 21. Muleyit 6,000 ft., Tenasserim. Gregarious, stems thin, l. 3-4 by $\frac{1}{2}$ - $\frac{3}{4}$ in., whitish beneath, sheath with about 3 long stiff bristles at the mouth (not seen).

B. Transverse veins not conspicuous.

27. *A. suberecta*, Munro; Gamble, t. 24. Khasi and Jaintia hills, 3-5,000 ft., gregarious by the river, stems densely tufted, erect, thin, 10-20 ft., internodes 6-10 in. long, $\frac{3}{8}$ in. diam., cavity very small. L. 2-4 by $\frac{1}{2}$ - $\frac{3}{4}$ in., n. 33-42 on $\frac{1}{2}$ in. Specimens coll. by Gustav Mann in 1880 on the banks of the Malaidu river below Jowal 3,200 ft. (Lambert) referred to this sp. by Gamble have l. 3 by $\frac{1}{2}$ in., n. 43-51 on $\frac{1}{2}$ in. 28. *A. Karzi*, Gamble, t. 25. Coasts of Tenasserim, the only low-level sp. known from India. L. very thin, 2-4 by $\frac{1}{2}$ - $\frac{3}{4}$ in., on numerous long wiry filiform branchlets (not seen).

2. PHYLLOSTACHYS Sieb. et Zucc.; Fl. Brit. Ind. vii. 386.

Usually tufted, but the rhizome often with long creeping branches which send up tufts of culms at a distance from the parent clump. Principal branches flattened above the axillary bud, hence angular, branches few (2-3) from each node. L. tessellated with numerous prominent transverse veins, forming squares with the n., sheath loose. The Indian species frequently have the uppermost l. apparently in pairs, the internodes between these l. being very short. Panicle terminal, leafy, spikelets sessile 1-4-fl., in the axils of large imbricating bracts, the bracts often with a small leafy blade. Empty glumes 2-3, palea 2-keeled, many-nerved, often bicarinate, stamens 3, style long with 3 long feathery stigmas. Species about 30, Eastern Asia.

1. *P. assamica*, Gamble MSS. Mishmi hills, forming extensive patches covering the hillside, 10-11 ft. high, makes excellent walking sticks (Griffith MSS. Notes and Journals, p. 35). Namdang, Lakhimpur district, Sadiya. Also cultivated near Silnagar. Culm-sheaths straw-colour, at the base of the narrow blade with narrow oblong auricles, covered with long bristles, transverse veins prominent on the inside of culm-sheaths. L. thin, linear-lanceolate, 4-6 by $\frac{1}{2}$ - $\frac{3}{4}$ in., pet. slender $\frac{1}{2}$ in. long, n. 30-42 on $\frac{1}{2}$ in., leaf-sheaths long bristly-ciliate at mouth. Fl. unknown. Following Munro, Gamble in *Bambuseae* united this with *Phyllostachys bambusoides*, Sieb. et Zucc.; Gamble t. 27, but he has since informed me that in his opinion the Indian plant is distinct.

2. *P. Mannii*, Gamble t. 28. Cult. at Shillong, said to have been brought from the Naga hills. Cult. at Bernardmyo, Upper Burma, brought from China. *Mai pang* pak (imported Bamboo), Shan. Culm 15-20 ft., internodes up to 10 in. long and $\frac{1}{2}$ in. diam. Culm-sheaths thin, without auricles at the apex, transverse veins not prominent, ligule long-fimbriate. L. similar to 1, but thicker, and pet. longer $\frac{1}{2}$ in. long, leaf-sheaths with few or no bristles at mouth. 3. Similar to 2, and possibly identical are specimens in leaf only (Montague Hill 1891). Hills east of Bhamo, 6,500 ft., Sodea, Burma. A small Bamboo, internodes 5 in. long, $\frac{1}{2}$ in. diam., used for pipe stems; the stems are flat on one side, and some of the l. are in pairs, pet. slender, $\frac{1}{2}$ in. long, n. 30-42 on $\frac{1}{2}$ in. To this I also am inclined to refer a specimen mentioned by Gamble under *Arundinaria elegans*, collected by J. Anderson on the Yunnan expedition at Pongshue in 1868, l. $\frac{1}{2}$ in. wide, n. 45 on $\frac{1}{2}$ in. A specimen mentioned by Gamble in the same place, collected by G. Gallatly (716), Tenasserim 3,000 ft., I have not seen.

3. BAMBUSA, Schreber: Fl. Brit. Ind. cill. 393.

Tufted, a few species (*tutans*, *Khasiana*) nearly single-stemmed, culms tall, erect, rarely overhanging or climbing. Transverse veins of l. not conspicuous, n. 21-40 on $\frac{1}{2}$ in. Exceptions: *nana* (45-54), *polymorpha* (40-45), *Dinghamsi* (42-45), *Khasiana*, *Griffithiana* (18-21). Spikelets sessile, palea 2-keeled, not cleft or only slightly. Stamens 6, ovary oblong or obovate, tip hairy. Caryopsis on one side grooved, pericarp thin, adherent to the seed. Species about 50. Eastern Asia, 1 in Australia.

I. Unarmed.

A. Fertile fl. numerous, spikelets terete, not flat.

(a) Culm-sheaths with large auricles.

1. *B. Tulda*, Roxb. Gamble t. 29. Vern. *Pela*, *Chan*, Hind.; *Tulda*, Beng.; *Deo-baux*, *Jati*, *Joo*, Ass.; *Mitengu*, Chittagong; *Thaik-wo*, Burm.

Gregarious, densely tufted, culms 20-70 ft. high, lower branches stiff, horizontal, often leafy, internodes 1-2 ft., 2-4 in. diam., walls thick. Culm-sheaths 6-9 in. long, and as broad at the base, polished within, blade triangular, cuspidate, slightly hairy within, base decurrent into large rounded long-fringed auricles or into a wavy band along the upper edge of sheath. L. 6-10 by 1 in., glaucescent and usually softly hairy beneath, n. 30-43 on $\frac{1}{2}$ in., leaf-sheath glabrous, ligule narrow, inconspicuous. Flowering culms usually quite leafless, each stem being converted into an immense oblong waving panicle, composed of innumerable supra-decompound ramifications (Roxb.). Spikelets glossy, sessile, in length between 1 and 3 in., in distant clusters or half-whorls on the glabrous branches of the panicle. At the base of each spikelet 1 or 2 bracts, then 2-4 empty glumes, then 4-6 fertile, and at the end 1 or 2 imperfect fl. Fl. glume distinctly many-nerved, $\frac{1}{2}$ -1 in. long, palea shorter, with long white cilia on the keels, penicillate at the tip, 3-5 n. between the keels. Anthers long-exserted, purple, blunt at the tip or emarginate. Caryopsis cylindrical, $\frac{1}{2}$ in. long, apex obtuse and hirsute.

Bengal, Assam, Chittagong. Burma, common on flats and along streams. Northern Circars. Cultivated around villages in Bengal and further north as far as Oudh. At times flowers gregariously, while at other times single clumps will be found in flower. The specimens from Upper Burma (Bhamo and Ruby Mines district) have the l. always hairy beneath. 2. *B. longispiculata*, Gamble MSS. Vern. *Mitengu*, Chitt.; *Thaikoo*, Burm. Chittagong hill tracts, Ruby Mines district, 3200 ft. Tufted, culms 40 ft. high, 3 in. diam. Differs from 1 chiefly by the very long slightly compressed spikelets, up to 6 in. long. L. 7-12 by 1-2 $\frac{1}{2}$ in., n. 24-34 on $\frac{1}{2}$ in. Spikelets polished, in the axils of long coriaceous sheaths without a blade, in half whorls on erect often branching spikes 11-15 in. long. Glumes empty 2, fertile 6-12, 1 in. long.

3. *B. nutans*, Wall.; Gamble t. 31. Vern. *Malla*, Sikkim. Subhimalayan tract from Kangra eastwards (probably cultivated west of the Sarda), ascending to 5000 ft. Assam. Tufts loose, the culms not crowded, otherwise similar to 1, n. 30-30 on $\frac{1}{2}$ in., leaf-sheaths hairy when young, auricles falcate with a few long bristles, ligule elongated, obtuse, hairy. Spikelets $\frac{1}{2}$ -1 in. long, glumes with prominent long radial and often with transverse nerves, anthers apiculate or slightly penicillate at apex. As far as known flowers periodically at long intervals. 4. *B. teres*, Ham.; Gamble t. 31. Assam. Densely tufted, culms attaining 60 ft., internodes 20 in. long, 3 in. diam. L. 12-14 in., n. 33-40 on $\frac{1}{2}$ in. Spikelets up to 2 in. long, fl. glume ovate-lanceolate from a broad base, many-nerved, sometimes with a foliaceous blade. 5. *B. burmanica*, Gamble t. 33. *Thaikoo*, *Thaikoo* sp., Burm. Katha district, Upper Burma, on dry hill slopes. Culms dull green, nearly solid, nodes marked by a white ring of hairs below them. L. of mature culms 8-10 by 1-1 $\frac{1}{2}$ in., whitish and pubescent beneath, pet. very short, n. 24-27 on $\frac{1}{2}$ in., l.-sheaths of young plants very hairy, of full-grown nearly glabrous. Spikelets up to 1 in. long, narrow, 5-6-8 l., distant clusters supported by long truncate bracts (sheaths without a blade). Palea obtuse white-ciliate along keels, rachilla short, stout, glabrous, anthers $\frac{1}{2}$ - $\frac{1}{2}$ in. long, apiculate. Caryopsis cylindrical, $\frac{1}{2}$ in. long, hairy at top, very short.

6. *B. Khasiana*, Munro; Gamble t. 37. Vern. *Serin*, *Turak*, *Khasi*; *Terrak*, Naga. *Elakh Jaintia*, and *Naga hills*, Manipur. Culms single, from a creeping root-stock, 30-40 ft. high, internodes clothed with appressed golden hairs when young, 3-15 in.

long, 1-1½ in. diam., walls thin. Culm-sheaths 5-6 in. long, top part little narrower than the base, blade from a broadly cordate auriculate and almost amplicaul base narrowed into a subulate point, middle portion thick, ribbed, lamellate, outer membrane wing-like. L. pale, 4-6 by 1-1½ in., ending in a subulate hairy point, n. 15-21 on ½ in. Spikelets partly short-sterile, partly long fertile, in distant often nearly globose heads on long spikes, arranged in leafy panicles. Two to three fertile fl. in the middle with 1-4 empty glumes at base and 1-2 imperfect fl. at the apex. Keels of palea with minute cilia, ovary attenuated into a short style. L. resemble *Melococco bambusoides*, but culm-sheaths quite different. Has been found in fl. 1850 and 1855.

7. *B. polymorpha*, Munro; Gamble, t. 34. Vern. *Kyethowag-wo*, Burm. Pegu Yoma, abundant about 500 ft. Rare in Martaban. Tufted, gregarious, culms 50-80 ft. high, erect, lower part naked, upper part gracefully bent, the leaf-bearing branches in half-whorls, internodes 12-30 in. long, 3-5 in. diam., walls thin, rings of rootlets at the lower nodes. Culm-sheaths about ½ the length of joint, blade concave, mucronate, extending below into elongate falcate auricles, fringed by strong pale-brown bristles. L. 4-6 by ½-¾ in., n. 40-45 on ½ in. Spikelets sessile, clustered, ½ in. long, empty glumes several, acuminate, often with a distinct blade separated from the sheath by a hairy callus, fertile fl. 3, with a terminal imperfect fl. on a long slender rachilla, palea not or very slightly ciliate along the keels, anthers emarginate, style short. Flowers at long intervals. Coll. in fl. by Dr. McClelland in Pegu in 1854. In 1858, '57, '56 I found it in leaf in the Pegu Yoma. In 1850 it fl. on the west side of the Pegu Yoma in its southern and 1850 in its northern portion. Gamble in Ann. Calc. Gard. vii. 87 states that flowering specimens were collected by me in the Zamayee forests in 1862 and by Kurz in the Thankyghat forests in 1871, and (in Nature, vol. 70, p. 428) that since then flowers have been once reported from Bassein. To this Gamble, Bambuseæ, 37, refers *Betou*, Beng., and doubtfully *Jei*, Beng., both from Sylhet. *Betou* was coll. in fl. Dec. 1863 in Sylhet. 8. Specimens (fl. and seedlings) sent by Troup from the Bawben forests, Pegu (*Kyethowag-wo*, Burm., similar to *B. polymorpha* and *Talida*, some near to 7. Tufted, 50-60 ft., internodes 11-2 ft. long, densely clothed with white silky hairs, walls ½ in. thick, often nearly solid, nodes with a ring of rootlets like *B. Talida*. Spikelets polished 3-4-fld. purple at the apex, palea not or very slightly ciliate at the keels, lodicules broad, base fleshy, anthers purple, emarginate, ovary obovoid, hairy, stigmas 3, long, plumose, sessile or nearly so. The seedlings resemble those of *B. Talida*, but the n. are closer together, 33-35 on ½ in.

(b) Culm-sheaths with small auricles or without auricles.

9. *B. affinis*, Munro. Vern. *Thide*, Burm.; *Wetou*, Kar. In an old Tanagra between Wipaga and the Bithoko range, Yuncaita (D.B. May, 1856). Tufted and somewhat scrambling, internodes under 2 in. diam. L. 4-8 by ½-1 in., n. 33 on ½ in., sheaths ribbed, perfectly glabrous, loose, baggy, not tightly enclosing the internode. Spikelets sessile, coriaceous, polished, 1 in. long, supported by large bracts, in distant clusters on long spikes, forming terminal leafy panicles. Empty glumes 4-8, not ciliate, the lowest ½ in. long, often consisting of a distinct sheath and blade. Some male and a few fertile fl., palea much smaller than flowering glume, with very long cilia in the upper half of keel, 7 nerves between keels. Ovary obovoid, glumes in the lower portion. Kurz F. Fl. B. 551 states that *B. affinis*, Munro grows in the Eng forest of Mangalan, east of the Sitang river. Gamble, Bambuseæ, 33, t. 30, identifies with this a low bush growing in the Calcutta Botanic Garden on the edge of the muddy river bank. The specimens of this in Herb. Kew, however, have entirely different l., 1½ in. wide, n. 18-21 on ½ in., with a different structure. The l-sheaths are sharply beaked and tightly appressed to the internode, and the ligule is large. 10. *B. pallida*, Munro; Gamble, t. 35. Vern. *Pak*, Lepcha; *Djib*, *Wolkhai*, *Mekal*, Ass.; *Uden*, *Sakien*, *elien*, *Khasi*; *Gyeco*, Burm.; *Moppe*, *Kachin*. Indigenous in Sikkim, Bhutan, up to 6000 ft., the Khasi, Jaintia, and Naga hills, Bhama district, in evergreen forest. Cultivated in Assam, the Khasi hills, and in the plains of Essegu Bengal. Tufted, culms 40-60 ft. high, olive-green, the young shoots covered with white powder, internodes 18-30 in. long, 2-3 in. diam. Culm-sheaths 7-12 in. long, blade as broad as, and usually longer than sheath. L. 4-8 in. long; n. 33-42 on ½ in. Spikelets pale, 1-1½ in. long, fertile fl. 3-5, at the end 3-5 imperfect fl. gradually decreasing in size. Ovary gradually narrowed into a short hairy style. Gamble, Bambuseæ 35, identifies with this *Dendrocalamus crinitus*, Kurz, Kambalu Tsung, Pegu Yoma, 3000 ft. *Gyeco*, Burm., is also applied to *Trinostachya Dulloo*, Gamble. 11. *B. nana*, Roxb.; Gamble, t. 35. A native of Japan, cultivated in India and Burma, often as a hedge plant. *Phopinsang-wo*, Burm. Densely tufted, culms 6-10 ft. high, internodes 8-10 in. long, ½-1 in. diam., culm-sheaths glabrous, 4-6 in. long, green first, afterwards yellow, blade 2-3 in. long, hairy beneath. L. 2-4 by ½ in., n. 45-54 on ½ in. Spikelets sessile, distichous, ½-1½ in. long, many-fld. in a poor

diffuse leafy panicle, palea minutely ciliate at the tip only, anthers exserted, yellow, ovary obovate, pubescent above, stigmas almost sessile.

B. Fertile fl. numerous, spikelets flat, more or less distichous.*

12. *B. Balcooa*, Roxb.; Gamble, t. 39. Vern. *Bhalkua*, Beng.; *Daluka*, *Dodana*, Ass.; *Wama*, Garo.

Densely tufted, culms 50-80 ft., lower branches stiff, leafless, internodes 8-18 in., 3-6 in. diam., walls thick. Culm-sheaths with ciliate edges, auricles narrow, not falcate, the upper 10-14 in. long, blade 6-8 in., lower culm-sheaths smaller. L. 6-12 by 1-2 in., pet. very short, sheath with long white hairs, ligule membranous, broadly triangular, n. 21-30 on $\frac{1}{2}$ in. Spikelets ovate, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, conspicuous by the protruding fimbriate keels of palea, 4-6 fld., in compact half-whorled heads, on long spikes in large compound, sometimes leaf-bearing panicles. Anthers apiculate, yellow. Ovary ovoid, narrowed into a long hairy style.

Assam. Lower Bengal, Behar. Gorakhpur. Flowers at long intervals. Highly esteemed in Bengal for scaffolding and building. Commonly cultivated near villages. (Upendra Nath Kanjilal, the *Bhalkua* Bam of Bengal, Ind. For. xvii. 52.) 13. *B. vulgaris*, Schrader; Gamble, t. 40. Syn. *B. Thonensis*, Kunth. Var. *Bariola*, Chittagong; *Fassa Kallaba*, Bombay. Home uncertain. Cultivated in tropical India. Tufted, but clumps not dense, culms polished, often striped green and yellow, 20-50 ft. high, internodes 10-18 in. long, diam. 3-5 in., culm-sheaths clothed outside with brown hairs, when young often streaked with green and yellow, 6-10 in. long, top concavely truncate, blade triangular with falcate ciliate auricles at the base, L. 16-32 by 1-2 in., hairy beneath when young, n. 21-30 on $\frac{1}{2}$ in., transverse veins visible on the lower surface, leaf-sheath appressed, white hairy. Spikelets compressed, $\frac{1}{2}$ - $\frac{3}{4}$ by $\frac{1}{2}$ in., 6-10 fld., palea thin, nerves between the keels indistinct, style long hairy, stigmas 2, plumose. 14. *B. Kingiana*, Gamble, t. 42. *Thak-icak*, Burm. Katha district, Upper Burma. Culms 60-70 ft. long, up to 4 in. diam. L. 10-12 by 1-2½ in., n. 27-36 on $\frac{1}{2}$ in., transv. veins indistinctly visible. Spikelets purple, $\frac{1}{2}$ in. long, in clusters of 1-6, fertile fl. 4-6, empty and fl. glumes ciliate along the edges, anthers with a tuft of penicillate hairs. 15. *B. lineata*, Munro; Gamble, t. 43. Syn. *B. Macgregoriae*, Kurz in Ind. For. 1. 341. Rutland Island, Andamans.—Marshy coast forests of Amboina and other islands of the Malay Archip. Tufted, internodes 16-24 in. long, ½-1 in. diam., walls thin, branches single, not whorled, culm-sheaths about 6 in. long, clothed when young with golden-brown hairs, blade as long as sheath, ovate cuspidate. L. 10-15 by 1-3 in., pale beneath, n. on $\frac{1}{2}$ in. 24-37, pet. broad, very short, leaf-sheaths ribbed, keeled, fringed at the mouth with long stiff bristles, ligule stiffly fimbriate. Fl. annually, panicle leafy, branches as well as spikelets in the axils of truncate sheaths. Spikelets sessile, $\frac{1}{2}$ in. long, fertile fl. about 10, glumes empty and flowering—long mucronate, edges ciliate. Lodicules 0. 16. *B. Binghami*, Gamble, t. 44. *Nepel-wo*, Burm. Nyanungdaung forest, Tenasserim. L. 3-6 by ½-¾ in., a few white stiff cilia at the mouth of sheath, n. 42-45 on $\frac{1}{2}$ in. Spikelets often in the axils of truncate sheaths, $\frac{1}{2}$ in. long, fertile fl. 5-6, glumes mucronate, keel cilia of palea conspicuous.

C. Fertile fl. 1-4.

17. *B. Olivertiana*, Gamble, t. 46. Vern. *Hippusua*, Burm. Upper Burma, hills west of the Ien-wadi north of Mandalay, 1-2,000 ft., in moist declivities forest in patches. Tufted, culms 20-45 ft., branched from the base upwards, internodes about 44 in. long, 1-2 in. diam. Culm-sheaths thin, nearly glabrous, striate, 8-10 in., top convex, blade triangular, 4-6 in. long. L. thin, glabrous, 4-7 by ¾-1 in., n. 33-39 on $\frac{1}{2}$ in., leaf-sheaths striate, glabrous. Spikelets $\frac{1}{2}$ in. long, 1-3 together in bracteate clusters on drooping one-sided spikes. Fertile fl. 2-4, with an imperfect fl. on a long glabrous rachilla, lodicules 0, obovate, long fimbriate, anthers obtuse, long-exserted, striped red and yellow, afterwards dull purple. Ovary hairy, style short, stigmas 2, plumose. 18. *B. schizostachyoides*, Kurz; Gamble, t. 44. Syn. *Cephalostachyum schizostachyoides*, Kurz, F. Fl. II. 565. South Andaman. Tufted, culms 20-30 ft., internodes 18-24 in. long, 3-4 in. diam., walls very thin. L. 1-7 by ½-1 in., n. 36-39 on $\frac{1}{2}$ in. Spikelets ½ in. long, sessile in lateral clusters supported by truncate bracts (sheaths without a blade), fertile fl. 2-3, palea narrow, membranous, acuminate, anthers apiculate, base unequal. 19. *B. Griffithiana*, Munro; Gamble, t. 45. Syn. *Dendrocalamus Griffithiana*, Kurz, F. Fl. II. 562. Manipur. Near Mogaung, Upper Burma. Subcaudant, culms slender, 15-28 by 3 in., pale beneath, n. 18-20 on $\frac{1}{2}$ in., leaf-sheath at the mouth with large auricles, fringed with long bristles. Branches of panicle thick, hollow, walls

thin, bearing lateral heads of spikelets at intervals of 3-4 in. Spikelets cylindrical, acute, fertile fl. 1, anthers bifid at the apex, stigmas long, plumose, sessile.

II. Branchlets spinescent.

20 *B. arundinacea*, Willd.; Roxb. Cor. Pl. t. 79; Bedd. Fl. Sylv. t. 321. Gamble t. 48. Syn. *B. spinosa*, Roxb. Vern. *Kanta Baus, Kattang*, Hind.; *Kata, Kato*, Assam; *Kalak, Puthai*, Konkan; *Kates Tokar*, Thana; *Bidru, Hethidru, Bidungulu*, Kan.; *Bongu, Mundia Vedurn, Mjogil*, Tam.; *Mala, Illi*, Mal.; *Kyakot-ica*, Burm.

Gregarious, densely tufted, culms 50-120 ft., internodes 12-18 in. long, 4-6 in. diam., walls 1-2 in. thick, the nodes in the lower part of the culm bearing dense half-whorls of stiff almost leafless branches, the upper part of the culm bending over, with large distichous leafy branches, alternating at even distances, resembling Prince of Wales' feathers. Culm-sheaths coriaceous, 9-12 in. long, shorter than the full-grown internodes, outside hairy and orange-yellow while young, shining and prominently-ribbed on the inside, blade triangular, shorter than sheath, upper side clothed with a dense brown felt of bristly hairs. Branchlets with short sharp spines at the nodes. L. thin, not exceeding 8 by $\frac{1}{2}$ in., often hairy beneath, leaf-sheaths usually hair, n. 39-45, usually 33-39, on $\frac{1}{2}$ in. Spikelets sessile, $\frac{1}{2}$ -1 in. long, glabrous, shining, glumes as a rule not ciliate, palea slightly longer than fl. glume, the ciliate keels prominently protruding, anthers yellow. Ovary almost cylindrical, style glabrous, with 3 long plumose stigmas. Grain $\frac{1}{2}$ - $\frac{1}{3}$ in. enclosed in the persistent glume and palea.

Indigenous in both Peninsulas in the plains and lower hills, ascending to 3000 ft. In Burma chiefly along the banks of rivers and in valleys on alluvial soil. Cultivated largely in Northern India. Cultivated in many parts of China. Flowers periodically and simultaneously in one district, when all buds on each culm develop into flowers, exceptionally with a few leaves. At that time as a rule all clumps in the district come into fl., a few clumps flowering in the preceding and others in the following year. The following data seem to justify the assumption that a general flowering takes place in periods of 30-32 years in one district. Malabar, South Kanara, the Wainad and Coorg 1854, 1886, and 1860. On the Nerbudda river near Jabalpur 1882, at Jabalpur 1870. (See list of the flowerings of this species in Ind. For. xxv. 11.) Rheede, Hortus Malabaricus i. 26 t. 16 (1678), however, states that this Bamboo flowers when 60 years old. A remarkable Bamboo found on the Javadi hills, Salem district, Jewara (D.B. Jan. 1882), the culms not crowded in the clumps, branches single, thorns few, culm-sheaths short, leaves like *B. arundinacea*.

21 *B. Copelandi*, Gamble MSS. Vern. *Waggi*, Burm. Largely cultivated in the Northern Shan States. A large species of uncertain position in the genus, resembling *Dendrocalamus latiflorus* in general appearance. Culm-sheaths thick, scabby black hairs outside, polished inside, 15 in. long, top rounded towards the short and narrow blade. L. ovate-lanceolate, 12-15 by 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ in., n. 21-25 on $\frac{1}{2}$ in. Spikelets glabrous, 1-1 $\frac{1}{2}$ in. long, empty glumes 2-4, with conspicuous transverse veins, flowering 2-3, longitudinal, n. 25, transverse veins obscure. Palea keeled and shortly bidentate at apex, lodicules lanceolate, hyaline. Anthers $\frac{1}{2}$ in. long, mucronate at tip. Ovary and style hirsute. Caryopsis $\frac{1}{2}$ - $\frac{1}{3}$ in. long, contracted towards the apex.

4. THYRSOSTACHYS, Gamble; Fl. Brit. Ind. vii. 397.

Panicles consisting of numerous compound pedunculate spikes, in the axils of sheathing bracts, peduncles bearing coriaceous sheaths, usually without a blade. Branches of compound spikes short, in the axils of sheathing bracts, bearing perfect and imperfect spikelets in the axils of membranous sheaths. Paleae hyaline, keeled, ciliate along the keels, those of the lower fl. in each spikelet deeply bifid, that of the uppermost fl. entire, or nearly so. Species 2.

1 *T. Oliveri*, Gamble, t. 50. Vern. *Thasaw*, Burm.; *Maitong*, Kachin. Upper Burma, on low hills, not in the northern malar districts. Flowered in 1891, and, sporadically, in the Ruby Mines district in 1902. Bruce in Ind. For. xxx. 270. Tufted, culms erect, 50-80 ft., lower half naked, internodes 14-24 in. long, 2-3 in. diam., bright green with white bloom on young stems, afterwards dull green. Culm-sheaths green

on young shoots thin, persistent, tightly appressed to stems, half to three-fourths the length of internode, blade caducous, 3-6 in. long. L. 7-10 by $\frac{1}{2}$ - $\frac{1}{4}$ in., n. 27-30 on $\frac{1}{2}$ in., sheaths keeled, minutely ciliate along the edges. Compound spikes 6-10 in. long, branches with a few perfect and numerous imperfect spikelets in the axils of sheaths, which frequently bear well-developed green triangular blades up to $\frac{1}{2}$ in. long, perfect spikelets $\frac{1}{2}$ -1 in. long, fl. 2-3, σ and γ . Fl. glumes with transverse nerves, minutely hairy on the back, anthers yellow, connective produced into a blunt point, filaments purple, long-exserted. Grain $\frac{1}{2}$ in. long, cylindric, beaked. At the base of culms frequently large tufts of thin filiform much ramified branches resembling fine grass, clothed with membranous sheaths, with or without blades. 2 σ . *stamens*, Gamble, t. 51. Syn. *Bambusa regia*, Thoms. Vern. Tico, Ti-po-va, Burm. Indigenous in small side valleys of the Salween river between the Solo and Kénapu Chaungs (D. B. May 1859). Also in Siam. In Upper Burma cultivated largely in monastery gardens. Tufted, culms 25-40 ft., straight, naked below, with dense hair-whorls of branches near the top. Internodes 8-13 ft. long of uniform length in the same culm, diam. 1 $\frac{1}{2}$ -3 in., nodes straight and elegant, walls thick. Culm-sheaths deciduous, as long as internodes, blade narrowly triangular. L. 2-6 by $\frac{1}{2}$ - $\frac{1}{4}$ in., n. 33-48 on $\frac{1}{2}$ in. Branches of panicle slender, drooping, glumes clothed on the back near the base with long soft hairs. Fl. periodically, cult. at Royal Gardens, Calcutta, where it flowered in 1892. In 1893 tufts of thin wiry branchlets appeared with small l. and a few fl. The handles of the best class of Burmese umbrellas made of the culms.

& GIGAN: FOCHLO^a, Kurz; Fl. Brit. Ind. vii. 398.

Erect or scandent, stems brancaleless in the lower portion. Fertile fl. 2-4, glumes ciliate along the edge, palea of all fl. 2-keeled, keels ciliate. Filaments connate into a tube, ovary hairy. Species about 11, Eastern Peninsula and Malay Archip.

1. *G. macrostachya*, Kurz; Gamble, t. 54. Vern. Wapayagi, Burm. Hills east of Shwegyin between the Sitang and Boeling rivers (D.B. March 1862). Also further east on the feeders of the Salween river. Clumps lax, not compact, culms with white longitudinal stripes, 20-30 ft. high, 4 in. diam., walls $\frac{1}{2}$ in. thick. When Taungya clearings have been made in the forest of this species, the Bamboo shoots spring up immediately after the harvest, instead of the usual mass of till grasses and herbaceous plants. L. pale beneath, 4-6 by $\frac{1}{2}$ - $\frac{1}{4}$ in., n. 30-35 on $\frac{1}{2}$ in., mouth of sheath with long bristles. Long fertile and short sterile spikelets in heads 1 $\frac{1}{2}$ -3 in. apart, up to 3 in. diam. Fertile spikelets linear, sharply subulate, 1-2 in. long, glumes with a conspicuous black fringe on the edge and a few black stiff hairs on the back. Caryopsis narrowly cylindric, tipped with the persistent style. I adopt the above name, as it is supported by Gamble's t. 54, the main portion of which is taken from the specimens at Herb. Cal. collected by me in 1892.

Here may be mentioned the following chiefly Burmese Bamboos, which have some resemblance to *Gigastachya macrostachya*, though the flowers being unknown, it is quite uncertain whether they belong to this genus:—

A. Single stemmed.

(a) *Tabinleng*, Burm. Karen hills south-east of Toungoo (D. B. Feb. 1860, see Brandis, Suggestions regarding Forest Administration in British Burma, 1881, p. 141). Culm-sheaths 9 in. long, gradually narrowed from a base 8 in. wide to an apex 4 in. wide, a broad undulated band on both sides of the 2 in. broad base of the triangular blade. L. 8 by 6 in., glaucous and hairy beneath, n. 30-35 on $\frac{1}{2}$ in. The Taungya clearings made in forests of this species mostly grow up in Bamboo, and the period which in 1860 was allowed for the Bamboo forest to grow up, before it was cut again, varied from 7 to 16 years. To this probably belongs Kurz's No. 156, from Burma, without locality.

(b) *Tabinleng*, Burm.; Hsi-pai, Hsi-pai, Karen. Hills on the headwaters of the Maitharank river, ascending to the crest of the Bithoko range, also in the Sinway forest of the Yunzalin valley. (D.B. March 1860, see Brandis, Suggestions, etc. pp. 154, 169, 156, 167.) Culms 2-3 ft. apart, bright green, often with yellow stripes, lower half naked, culm-sheaths thick, clothed outside with black irritating hairs. L. 8-12 by $\frac{1}{2}$ - $\frac{1}{4}$ in., n. 30-40 on $\frac{1}{2}$ in. It is possible that Kurz may have based his *B. (?) ciliolata* upon specimens collected by me of this Bamboo at an earlier date.

(c) *Tabinleng*, Burm. Mogaung Forests, Upper Burma (J. W. Oliver, Feb. 1895). Culms single, long-spaced on the rhizomes. Culm-sheaths and l. similar to (b), n. 29-3 on $\frac{1}{2}$ in.

(d) *Tabinleng*, Wuntho, Upper Burma, in cool evergreen forest, 500 ft. (Smiles

Jan., 1902). Culms 2 ft. apart, naked below on $\frac{1}{2}$ of their length, 50 ft. high, internodes 18 in. long, diam. 3-4 in., walls $\frac{1}{2}$ in., nodes not prominent, hence the culms smooth, cylindrical. Culm-sheaths 5-8 in. long, from stems to orange-colour, contrasting with the light green colour of the culms; blade 2-4 in. L. glabrous, glaucous beneath, 8-12 by 1-2 in., n. 25-35 on $\frac{1}{2}$ in. Accidental branches on the lower portion of the culm, and partially suppressed branchlets have leaf-sheaths with long bristles at the mouth, while the normal L. on the upper portion of the stem are without such bristles, and have keeled naked sheaths.

(c) *Takindalay*. Hills west of Katha, 2000 ft., in cool evergreen forest (Joseph Meiser, March 1901). Culms 1-2 ft. apart, naked more than half-way up, 75 ft. high, a few conspicuous rings of arrested nodlets on the lowest 3 or 4 nodes. Culm-sheath very large at base, 6, blade 2-3 in. long. Internodes 1-2 ft., 4 in. diam., nodes thick with a conspicuous arrested nod (angulus) at every node, 1-1 in. diam. L. bluish-white underneath, 10 by 1½ in., n. 29-37 on $\frac{1}{2}$ in., leaf-sheaths keeled, ligule large, triangular.

B. Tufted or probably so.

(f) *Wawet*. Shwegu, Upper Burma (Poeckl, 1902). Culms tufted, stems branched in the lower half, culm-sheaths thick, not much narrowed towards the truncate mouth, with broad, wavy fimbriate auricles. L. pale beneath and slightly velvety, 12 by 1½-1¾ in., ligule conspicuous, n. 30-40 on $\frac{1}{2}$ in., pet. $\frac{1}{2}$ in. long.

(g) *Wawet*. Kasha hills, Bhamo district, in moist forest, 1500 ft. (Oliver, April 1893). Culm-sheaths woody, 8 in. long, blade triangular, as long as sheath, tip spinose, L. 9-12 by 1½-2 in., glaucous and finely-pubescent beneath, n. 28-35 on $\frac{1}{2}$ in., ligule very small.

(h) *Takewok*, Garo hills (G. Mann, 1880). Culm-sheath broad, 6, blade 8 in. long, blade membranous, glabrous, conspicuously ribbed, continued into a broad fimbriate band on the top of sheath. L. hairy beneath, 3 by 1½ in., narrowed into pet. 1-½ in., apex running out into a long hairy point, n. 40-45 on $\frac{1}{2}$ in., ligule minute.

Of the Bambuses here mentioned, e, f, g, and h are included by Gamble under *G. macrostachya*. He also includes *Madi* or *Maday-so* from Chittagong, of which I have seen no specimens.

2. *O. Kurzi*, Gamble, t. 56. South Tenasserim. Malay Peninsula. L. 8-13 by ½-1½ in., n. 35-38 on $\frac{1}{2}$ in. Panicle leafy, half-whorls of 2-6 lanceolate spikelets $\frac{1}{2}$ in. long, marked by the dense fringe of long brown hairs along the edge of the glumes, style long, ending in a single plumose stigma. 3. *G. verticillata*, Munro; Gamble, t. 52. Syn. *G. arcuata*, Kurz, Ind. For. t. 318. Cultivated and wild in the Malay Peninsula and Archipelago, forming large forests in Java. China. Probably also in Tenasserim. Tufted, culms 80-120 ft., light coloured, with yellow stripes when young. Internodes 18 in., 4-6 in. diam., culm-sheaths 12 in. long, densely clothed outside with golden-brown stiff hairs, rounded to a top 1-1½ in. broad, blade small reflexed. L. 10-15 by 1-2 in., pet. 1-½ in. long, n. 21-30 on $\frac{1}{2}$ in. Panicle leafy, compound, branches long, slender, bearing distant half-whorls of ovate spikelets $\frac{1}{2}$ in. long, stamens exerted, tube long, membranous, anthers yellow.

6. OXYTENAN'IEHA. Munro; Fl. Brit. Ind. vii. 400.

Spikelets narrow-cylindric, acuminate, fl. 1-3. Palea of the lower fl. 2-keeled, that of the uppermost slightly or not at all keeled. Stamens 6, filaments united into a thin membranous tube. Caryopsis grooved, terminated by a beak. *As far as known the species fl. frequently, some probably annually, inflorescence often leafy. Species the following, one in New Guinea, and one or two in tropical Africa.

A. Panicle large, branches long, with distant half-whorls of spikelets. Eastern species:—

1. *O. albo-ciliata*, Munro; Gamble, t. 61. Syn. *Gigantochloa albo-ciliata* Kurz. Vern. *Wappugale*, *Wawet*, *Wagök*, *Wagauk*, Burm.

Very gregarious, tufted, generally deciduous, culms 20-30 ft., not erect, but bending over in all directions, forming dense low masses of nearly horizontal stems, branches in the lower part single, stout, often erect, higher up smaller, leafy, half-whorled. Internodes of culms and larger branches 24 in. long, 1-1½ in. diam., nodes oblique. Culm-sheaths thick, hard, one-third the length of internode, clothed with dark appressed hairs, blade often as long as

sheath, ligule large, $\frac{1}{2}$ -1 in. long. Lower internodes of leaf-bearing branchlets 6-7 in. long, $\frac{1}{2}$ - $\frac{3}{4}$ in. by $\frac{1}{4}$ in., n. 27-34 on $\frac{1}{4}$ in., set. very short. Fl. irregularly, at times in single clumps, at others gregariously over large areas. Branches of panicle long, slender, fistulose, spikelets $\frac{1}{2}$ -1 in. long, slender, curved, in compact half-whorls, glumes conspicuously white-ciliate. Grain cylindric, glabrous, beaked.

Upper Burma. Shan States east of the Salween river. Martaban and Tenasserim abundant, less common in Pegu. A local companion for Teak as the tangled masses of low arching stems tend to smother and break down the saplings, while those which survive are not drawn up by the Bamboo and not forced to form tall and clean stems. Tree growth does not generally flourish where the species is abundant (cf. H. N. Thompson in Forest Report Northern Circle, Upper Burma, 1900-1901).

2. *O. nigroclivata*, Munro; Gamble, t. 60. Syn. *O. auriculata*, Prain, Bengal Plants 1234; *Gigantochloa andersonii*, Kurz, and *auriculata*, Kurz; *Bambusa auriculata*, Kurz; Gamble, t. 49. Vern. Kasia, Beng.; *Talaja* var. *Burni* (Kurz). Garo hills (Hassle). Sikkim. Chittagong. Lower Pegu (Kurz). Tenasserim. Andamans in the semi-deciduous forest, often associated with Padouk; also on banks of streams forming the lower fringe of the evergreen forest. Nicobars.—Singapore. Densely tufted, evergreen, gregarious, culms erect, straight, 30-50 ft., internodes 18-20 in., diam. 2-4 in. Culm-sheaths 6-16 in., densely covered with black hairs, which readily come off on the middle line, leaving two longitudinal hairy belts, apex $\frac{1}{2}$ -3 in. wide, convexly truncate, blade triangular or lanceolate, shorter than sheath, with two small round auricles. L. 8-10 by $\frac{1}{2}$ - $\frac{3}{4}$ in., thin hairs up to $\frac{1}{2}$ in. long on the underside, chiefly on young l. n. 24-30 on $\frac{1}{4}$ in., transverse veins distinctly visible, leaf-sheaths terminating in 2 small thick glossy auricles. Panicles large, leafy, branches pubescent, fertile spikelets narrow, cylindric-lanceolate, $\frac{1}{2}$ -1 $\frac{1}{2}$ in. long, with numerous smaller sterile ones, in distant half-whorls, supported by broad sometimes elongate coriaceous bracts. Fl. 1-8, glumes conspicuously fringed along the edge with stiff black or brown hairs, longitud. n. 15-27, transv. veins few or none. Empty glumes usually 4, ovate, mucronate, palea bristly bifid at apex, lodicules 0. Staminal-tube in the young fl. as long as ovary, thick, 6 fibre-vascular bundles leading to the teeth which bear the anthers, growing out rapidly into a thin hyaline tube up to 1 in. long, elegantly marked by 6 lines of torn spiral vessels, the remains of the fibre-vascular bundles. Anthers $\frac{1}{2}$ - $\frac{3}{4}$ in. long, purple, inserted, terminating in a sharp hispid apiculus. Ovary and style densely clothed with stiff hairs. Caryopsis cylindric. Easily propagated by cut pieces of culms with the sheaths on, which, if pegged down upon the ground, root at the nodes. Fl. frequently. To this Mr. Gamble refers *Balangi Bass* of Klorida, Orissa. Specimens (l. culms and culm-sheaths) received from Southern Pegu as *Talaja* may possibly belong to this. They differ in the following points: Internodes softly velvety when young, walls thick, ring at the nodes slanting, l-sheaths beaked, elegantly ribbed, apex rounded not auriculate. 3. *O. parvifolia*, Brandis; Gamble, t. 61. Vern. zulu. *Thakira-epiata*, Burm.; *Wasa*, Kar. (D. B. March, 1880). Culm-sheaths coriaceous, 8-10 in. long. L. 3-5 by $\frac{1}{2}$ - $\frac{3}{4}$ in., set. slender, $\frac{1}{2}$ in. long, n. 31 on $\frac{1}{4}$ in. Spikelets $\frac{1}{2}$ in. long, 3-10 in. one half-whorl, lower glumes minutely ciliate along the edges, the upper glumes not ciliate, empty glumes 3-4, fertile 2-3, palea in the upper part minutely ciliate along the keels, staminal-tube long, base of ovary glabrous.

B. Spikelets in dense globose heads on erect usually panicked spikes. Western species.

4. *O. monostigma*, Beld. L. Pl. t. 234; Gamble t. 63. Vern. *Chica*, *Chona*, *Chawa*, Kan.

Gregarious, culms single, erect, when young clothed with deciduous tawny or whitish velvet, grey when old, 10-30 ft. high, internodes 15-18 in. long, 1 in. diam., cavity small, culm-sheaths nearly as long as internodes. L. 5-12 by $\frac{1}{2}$ - $\frac{3}{4}$ in., n. 18-30 on $\frac{1}{4}$ in., ligule long, leaf-sheaths striate. Heads of spikelets usually approximate on short leafy spikes, spikelets glabrous, long apices acute-acuminate, fertile $\frac{1}{2}$ -1 in. long, sterile shorter, style glabrous, stigma usually undivided.

Western Ghats and adjoining hill ranges, from the Ponn district to the Anamalais, often forming underwood in Teak—and other deciduous forests. A soft Bamboo, not valued along the coast of North Kanara, rare on the ghats. Commonly cultivated almost wild, used for punt-poles. L. 4-8 by $\frac{1}{2}$ - $\frac{3}{4}$ in., n. 23-30 on $\frac{1}{4}$ in. Fertile spikelets 2-4d., $\frac{1}{2}$ in. long, style hairy. 5. *O. Thawlessii*, Munro; Beld. Pl. Syst. t. 222; Gamble, t. 64. Western Ghats and adjoining hill ranges from the Bababudan hills

southwards. Kernel hills. Gregarious, straggling or climbing, culms 10-15 ft. long, branched from the base, branchlets whorled, ending in pilate whips with whorls of small branchlets and very small l. internodes 12-18 in. long, diam. 1 in., walls thin. Culm-sheaths $\frac{1}{2}$ or $\frac{3}{4}$ the length of internode, at the apex with large falcate auricles, which are thickly set with long stiff curved bristles, l. 4-12 by $\frac{1}{2}$ -1 in., n. 18-35 on $\frac{1}{2}$ in., leaf-sheaths with bristles at the mouth while young. Panicle large, often leafy, spikelets $\frac{1}{2}$ -1 in. long, usually 1-2d., anthers long-apiculate, style hairy, stigmas 3, short, pilose. 7. O. Bourdillon, Gamble, t. 57. Vern. *Kamba*, Tam.; *Arasida*, Mal. Travancore glats, 3-4000 ft., rare, found only on rocky cliffs. Tufts loose, not compact, culms 20-30 ft. high, internodes 3 ft. long, walls thin, culm-sheaths 6-12 in., blade triangular, sharply mucronate. L. thin, 6-9 by 1- $\frac{1}{2}$ in., n. 18 on $\frac{1}{2}$ in., ligule long, serrate. Heads $\frac{1}{2}$ in. diam. in long spikes, spikelets polished, $\frac{1}{2}$ in. long, mucronate, 3-5d., ovary hairy, style hairy, stigmas 3. Fl. at long intervals, Travancore in 1867.

7. PSEUDOSTACHYUM, Munro; Fl. Brit. Ind. vii. 400.

P. polymorphic i, Munro, the only species; Gamble, t. 85. Vern. *Filling*, Nep.; *Dajal*, *Basol*, *Nal*, *Tolli*, Ass.; *Wachall*, *Garo*; *Bacca*, *Baukwa*, *Burm.*; *Wana*, *Kachin*.

Single-stemmed, culms 25-50 ft., overhanging, often supported by neighbouring trees, lower part branchless, internodes 8-15 in. long, 1-2 in. diam., walls thin. Culm-sheaths loose, much shorter than internodes, blade early deciduous, ribbed and often with transverse veins, lanceolate or triangular, often longer than sheath. L. thin, 6-15 by 1-2 in., usually glabrous, sometimes fine hairs on the underside, pet. varying in length up to $\frac{1}{2}$ in., n. 18-22 on $\frac{1}{2}$ in., transverse veins conspicuous, often bent, where they cross the band of silica cells. Flowers frequently, in most cases fl. deformed and sterile, usually appearing as large round masses of hairy glumes. Spikelets solitary, $\frac{1}{2}$ in. long, in the axils of narrow bracts on the slender branches of a large leafy panicle. One fertile fl., palea convolute 2-keeled, keels not ciliate, lodicules large, ciliate, anthers apiculate. Caryopsis depressed-globose, surmounted by the base of style and supported by the persistent glumes, palea and lodicules.

Sikkim and Bhotan, from the foot of the hills to 5000 ft. Garo hills, Assam, Manipur. Moist districts of Upper Burma.

8. DENDROCALAMUS, Nees; Fl. Brit. Ind. vii. 403.

Tall unarmed Bamboos, in dense clumps. Culm-sheaths often very large, L. mostly large, n. 20-30 on $\frac{1}{2}$ in., usually 24 or 25 (*membranaceus* 30-40), transverse veins, if not obscured by hairs, more or less visible in dry leaves on the underside. Spikelets ovate, fl. few, rarely more than 6, usually bisexual. Glumes many-nerved, empty 2-3. Palea of lower fl. 2-keeled, ciliate, only those of the terminal fl. rounded on the back and not keeled. Lodicules as a rule none, sometimes 1-2 in *D. patellaris*, *Brandisii*, and *flagellifera*. Stamens 6, filaments free. Ovary hairy in the upper part, style long hairy, undivided, in a few species 2-3-5d. at the apex. Seed enclosed in a hard crustaceous pericarp. Species 16, South-Eastern Asia.

A. Spikelets numerous, spicose, in dense, usually globose heads, rachis of spike solid or nearly so.

1. *D. strictus*, Nees; Bedd. Fl. Selv. t. 325; Brandis F. Fl. t. 70, Gamble, t. 98, 69. *Male Bamboo*, Vern. *Baus*, Hind.; *Karail*, Beng.; *Halpa*, *Wadar*, Gaud.; *Jodo*, Kurku; *Maucel*, *Bundi*, Thana; *Sanna Veduru*, *Kanka Veduru*, Tel.; *Kib-Bilaru*, Kan.; *Kal-Mungil*, Tam.; *Myinga*, *Burm.*

Middle-sized, deciduous, culms greyish-green, often blotched, closely packed in dense clumps, the lower portion with short stiff spreading generally leafless branches, one of which is much larger than the others, those on the upper portion slender, and leafy. Internodes 10-15 in. long, 2-3 in. diam., in dry

districts almost solid, in a moist climate hollow with thick walls. Culm-sheaths a little shorter than internodes, glabrous or with yellowish-brown hairs, narrowed into the elongate-triangular blade which is hairy, especially within. Leaves densely clothed on both sides with deciduous hairs, linear, 4-10 in. long, n. 27-33 on $\frac{1}{2}$ in. Spikelets hairy, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, α in dense globose heads, 1-1 $\frac{1}{2}$ in. diam. Glumes spinescent, empty numerous, fertile 2-3. Caryopsis shining, hairy only at the apex, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, ovoid, beaked, a large portion of the style persistent, embryo distinctly visible on the outside.

Widely spread and very common throughout India and Burma, up to the borders of the arid tract of North-Western India. Saff range. Subhimalayan tract from the Indus eastwards, ascending to 3,500 ft. Aravalli hills. In lower Burma common on dry ridges and in Euphrating. In Upper Burma, not beyond 24° N., the climate further north being probably too moist. Flowers irregularly, that is, a few culms lift a clump here and there or a few clumps in one locality come into flower, while at times it flowers gregariously over large areas. Bence, Ind. For. xxx. 200 reports, that in the Ruby Mines district, 1902, this Bamboo had flowered on the most exposed situations, and in the hottest localities, while the clumps growing in sheltered and cooler areas had remained green. An abnormal case of seedlings 13 months old coming into fl. is recorded in Ind. For. xxv. 22. Muriel, Ind. For. xxix. 567, describes (Pyinmana district) longitudinal partitions in the hollows of this species, which thicken in the higher internodes, until the upper portion of the bamboo becomes quite solid. *D. sericeus*, Munro; Gamble, t. 70. Paraspath, spikelets densely silky, has in Gamble, Ind. Timb. ed. II. 761, been reduced to a variety of *D.* but is maintained as a distinct species by Prain, Beng. Plants, 1235.

2. *D. membranaceus*, Munro; Gamble, t. 71. Vern. Wappa, Burm.; *Mishong*, *Maimag*, *Mai-sai-lau*, Shan. Upper Burma; Martaban (Kurz). A most useful Bamboo, gregarious, clumps very loose, of about 6-12 stems, culms 60-70 ft., white-powdery when young, smooth, bright green when older, branches in the lower part numerous, short, stiff, internodes 9-20 in., 1-5 in. diam., walls thick, nodes prominent, culm-sheaths early deciduous, longer than internodes, narrowed into dark brown, waved and fringed auricles, blade narrow, ligule $\frac{1}{2}$ in. long, hairy and roughly serrate. α glaucous below with a few hairs near base, 5-10 by $\frac{1}{2}$ - $\frac{3}{4}$ in., n. 30-40 on $\frac{1}{2}$ in., transverse veins often faintly visible. Spikelets nearly glabrous, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, empty glumes 2, fertile 2-3. Grain $\frac{1}{2}$ - $\frac{3}{4}$ in. long, broadly ovoid, ending in a sharp point, the persistent base of style. Groups of 5-12 or more shorter internodes, 2-6 in. long, not uncommon, caused by the attack of an insect. The name Wappa (white Bamboo) is applied to other species besides this in Burma. A Bamboo similar in mode of growth and other characters sent (I. only) by the late Mr. Messer as *Wawel*, Burm. Cool Hill forests, Kachin hills, Kaiba, 5,000 ft. L. 5-7 by $\frac{1}{2}$ in., n. 40-50 on $\frac{1}{2}$ in.

B. Spikelets numerous, in large soft dense usually globose heads, rachis of spike hollow, usually green.

(a) Spikelets blunt, culm-sheaths glabrous or nearly so.

3. *D. Hamiltonii*, Nees et Arn.; Brandis F. Fl. 570; Gamble, t. 74. Vern. *Kajhai bans*, Hind.; *Tawa*, Nep.; *Paw*, Lepcha; *Kotaha*, *Kokura*, Ass.; *Wah*, Mochi; *Wabo myetsungye*, Burm.; *Mak-hak*, Shan; *Uya Kauca*, Kachin.

Culms attaining 80 ft., white-pubescent when young, mostly overhanging and often horizontal, branching, the branches often single and as long as the main stem. This species forms impenetrable thickets, the inner stems of a clump are often upright and clear of branches, somewhat resembling *Dendrocalamus giganteus*. Internodes 12-20 in. long, 4-5 in. diam., walls $\frac{1}{2}$ - $\frac{3}{4}$ in. thick. Culm-sheaths stiff, persistent, often as long as internode, convexly truncate at top, blade ovate-lanceolate, up to 12 in. long. The branches on the nodes in the lower portion of the stem are usually seated on woody knobs as large as a fist, and at these nodes when the branches have not, or have only imperfectly developed, are large very conspicuous swellings (arrested or half-developed buds), covered with brown shining undeveloped sheaths. These buds are above the lower oblique node ring (scar of the fallen culm-sheath) and below the upper ring, on which often abortive rootlets appear, their shape is lenticular and they often extend over half the circumference of

the culm. The Burmese name indicates the resemblance of this swelling to an eye. L. glabrous, but rough beneath, on vigorous shoots up to 18 by 5 in., on ordinary branches smaller, n. 18-28 on $\frac{1}{4}$ in., transverse veins faintly visible, leaf-sheaths with stiff appressed hairs, ligule long, oblique. Like *D. strictax*, this species flowers sporadically and at times gregariously. Fl. heads semiglobose, $\frac{1}{2}$ - $1\frac{1}{2}$ in. diam., supported by broad leathery shining bracts, on a stout very hollow rachis 1-3 in. apart. Spikelets glabrous, purple, ovate, $\frac{1}{2}$ in. long, glumes broad, spiculate, long-ciliate along the edges, empty 2-3, fertile 2-4, anthers purple on long glabrous filaments, ovary and style hairy. Caryopsis broadly ovoid, $\frac{1}{4}$ in. long, beaked, hairy at apex.

Garchal 4000 ft. (indigenous B.). East Himalaya, lower hills and valleys, ascending to 3000 ft. Assam, Garo, Khasi and Naga hills. Burma, Upper and Lower, chiefly near streams and in hollows, ascending to 3000 ft. Cultivated in the Duma and outer hills of the North-West Himalaya, north as far as Kangru. *Bambusa Falcata*, Munro, was based upon the l. of this and fl. of *Bambusa satana*. 4. Allied to 3, but quite different is *Wala*, a valuable large Bamboo, found in cool valleys and on the high evergreen Kachin hills in the Kacha district, fl. l., and notes sent by the late Joseph Meiser, after whom it should be named, when more perfectly known. Tufted, culms 85-100 ft. high, internodes 12-21 in. long, 5 in. diam., walls $\frac{1}{2}$ -1 in. thick, branches all the way up, near the base thickly set and sometimes 20 ft. long, conspicuous rings of arrested rootlets far 8-10 ft. from the ground, beds of undeveloped branches smaller and less prominent than in 3. Culm-sheaths 14 in. long, ligule serrate, $\frac{1}{2}$ in. broad, blade as long as sheath, blade and ligule hairy. L. 8-9 by 1 in., n. 25 on $\frac{1}{4}$ in. Spikelets $\frac{1}{2}$ in. long, numerous in dense nearly globose heads, branches of inflorescence very hollow, up to $\frac{1}{4}$ in. diam. Glumes glabrous, edges minutely ciliate, the 2 lowest empty, fl. 8-10, of which the lowest are usually 4. Ovary broad, entire, hairy. 5. *D. patellaris*, Gamble, t. 75. Vern. *Pajjal*, Lepcha; *Patsay*, Middle Hills. Sikkim and British Bhotan 2-5000 ft. Makir and Naga Hills. Tufted, culms 20-30 ft. high, internodes 12-18 in. long, 1-1 $\frac{1}{2}$ in. diam., walls thin, a broad softly hairy ring below the nodes. Culm-sheaths persistent, 19-22 in. long, upper part narrowed and furnished with a pale long-fimbriate fringe, ligule conspicuous, fringed like the sheath. L. 8-10 in. long, n. 28-30 on $\frac{1}{4}$ in. Fl. similar to 3, but sometimes 1 or 2 helical.

(b) Spikelets acute, culm-sheaths usually very hairy.

6. *D. Hookeri*, Munro; Gamble, t. 74. Sikkim (*Tsi* base, Nep.; *Pats*, Lepcha), Daphle Hills 2-3000 ft. Khasi and Jaintia hills (*Naeijong*), Hama, Cultivated near Naini Tal, Kumaon (E. E. Fernandez 1881). Tufted, branches overhanging. Culms 50-60 ft., naked below, internodes 18-20 in. long, diam. 4-5 in., walls 1 in. thick. Culm-sheaths gradually narrowed from a broad base to a truncate top, 8-12, blade 3-7 in. long. L. 12-15 by 2-3 in., pet. short, n. 15-25 on $\frac{1}{4}$ in. Spikelets often minutely pubescent, $\frac{1}{2}$ in. long, in dense globose heads $\frac{1}{2}$ -1 in. diam., rachis $\frac{1}{2}$ in. diam., hollow, but walls firm. *D. Parishii*, Munro; Gamble, t. 82, probably belongs to this species, but spikelets glabrous. 7. *D. sikkimensis*, Gamble, t. 72. Vern. *Pajrasay*, Lepcha; *Wadab*, Garo. Sikkim and Bhotan, 4-5000 ft. Tura peak, Garo hills. Tufted, but culms few, 50-70 ft. high, naked below, internodes 18 in. long, 3-7 in. diam., walls thick. Culm-sheaths 12 in. long, densely clothed with a dark golden-brown felt of matted hairs, blade decurrent on each side into a large long-fringed auricle. L. 6-12 by 1 $\frac{1}{2}$ -3 in., strigose beneath with long appressed hairs, n. 29-31 on $\frac{1}{4}$ in. in specimens cult. at Kew as low as 12, leaf-sheaths glabrous, shining, keeled, ligule short hairy. Spikelets $\frac{1}{2}$ - $\frac{3}{4}$ in. long in dense red-brown globose heads 1 $\frac{1}{2}$ in. diam. Grain obovoid, with a few hairs at apex.

C. Spikelets usually few (exceptions: *D. Brandisii*, *Collettianus*, and 15), in small heads, rachis of spike usually solid.

(a) Spikelets short, $\frac{1}{2}$ in. long and less.

8. *D. longispax*: *hus*, Kurz; Gamble, t. 78. Vern. *Ora*, Chittagong; *Khang*, Beng.; *Wayu*, sometimes *Talagu-wa*, *Wanet*, Burm.

Tufted, culms 60 ft., glaucous or nearly white when young, lower half naked, often with a ring of rootlets at the nodes, internodes 18-30 in. long, 3-5 in. diam., walls $\frac{1}{2}$ in. thick, node line horizontal, undulate, hardly thickened. Culm-sheaths densely clothed on the outside with dark (almost black) stinging hairs, thin, fragile, but long persistent, 14-36 in. long, overlapping

the internodes, blade recurved, narrow, early deciduous, a little shorter than sheath, ligule a broad band of closely-packed long hairs. L. 6-9 by 1 in.; underside soft to the touch, with extremely minute hairs, base cuneate, narrowed into a very short petiole, n. 25-30 on $\frac{1}{2}$ in.; l. sheaths keeled, striate and with minute deciduous appressed hairs. Spikelets glabrous, blunt, $\frac{1}{2}$ in. long, 2-3, sometimes more, in distant heads, $\frac{1}{2}$ in. across or less, supported by broad, polished coriaceous bracts. Glumes conspicuously nerved, minutely ciliate at edges, palea minutely pubescent. Caryopsis broadly ovoid.

Silhet. Chittagong. Arakan. Pegu, common near streams in the upper mixed forests. Martaban. Tenasserim. Flowers frequently, known to have flowered in Pegu: 1892 (D. B. Zamayi), 1871 (Kurz), 1875 (D. B. Tharawalli), 1861 (Carter). The name *Wassai* (black Bamboo) is applied to other species besides this in Burma.

9. *D. Brandisii*, Kurz; Gamble, t. 73. Vern. *Kyello-ua*, *Walo*, Burma; *Wakth*, Kar.

Tufted, evergreen, culms erect, 80 to 120 ft., near the ground often with a tuft of branches, otherwise naked in the lower portion, but with rootlets at the nodes. Internodes 20-27 in. long, 5-7 in. diam., walls thick. Culm-sheaths thick, coriaceous, 15-24 in. long, blade linear-lanceolate, contracted at base, often green, longer than sheath. L. 9-15 by 2-3 in., very minutely hairy beneath, n. 20-28, usually 24 on $\frac{1}{2}$ in., ligule conspicuous. Spikelets broad-ovate, nearly $\frac{1}{2}$ in. long, in dense heads, fertile spikelets few, sterile numerous, heads $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., on long flagelliform spikes, rachis solid, distance between heads $\frac{1}{2}$ - $1\frac{1}{2}$ in. Sometimes 1 or 2 lodicules. Caryopsis ovoid-cylindric, $\frac{1}{10}$ - $\frac{1}{8}$ in. long.

Upper Burma: Katha (*Thakha's*) Rhano. Ruby Mines district, 2,400 ft. Lower Burma: Eastern slopes of the Pegu Yama, Salwin, Yunzalin, Thauogyin, common on limestone. Attaran. South Andaman.—Singapore. Fl. frequently. 10. *D. flagellifer*, Munro; Gamble, t. 80. Nooleyit, Tenasserim 2,000 ft.—Malay Peninsula. L. 10-14 by 1-2 $\frac{1}{2}$ in., n. 21-30 on $\frac{1}{2}$ in. Spikelets few, heads small on long whip-like spikes, the uppermost nodes bearing leaf-sheaths only, with a small blade. Sometimes 1 or 2 lodicules. 11. *D. longimbristata*, Gamble, t. 81. Kyauksat ara Mali, on forest, Mergui district. (Happese, Burma.) Leaf-sheaths hairy, with long falcate and amplexicaul auricles, thickly set with stiff curved bristles, transverse veins distinctly visible.

b) Spikelets $\frac{1}{2}$ in. and longer, ovate, acute.

12. *D. giganteus*, Munro; Gamble, t. 75. Vern. *Walo*, Burma.

Densely tufted, evergreen, culms erect, 80-100 ft. high, usually naked in the lower portion, internodes 15-20 in. long, diam. 6-8 in., walls $\frac{1}{2}$ in. thick. Culm-sheaths hard, shining within, thinly hairy outside, 15-20 in. long, blade shorter than sheath, ligule stiff, dark brown, $\frac{1}{2}$ - $\frac{3}{4}$ in. broad. L. 9-20 by 2-4 in., glaucous and minutely hairy beneath while young, n. 20-28 on $\frac{1}{2}$ in. Spikelets ovate, $\frac{1}{2}$ in. long, 2-5 in a head, on long spikes, which are often leafy at top, distance between heads $\frac{1}{2}$ - $\frac{3}{4}$ in., rachis solid, glumes mucronate, 1-2 empty, 3-6 fertile, the top fl. consisting of a long, involute glume. Caryopsis oblong, $\frac{1}{8}$ in. long.

Probably indigenous in the hills of Martaban. Cultivated largely in Burma, in India (north as far as Makum, Assam, D.B. Agr. 1879), and in most tropical countries. The plantations of *Walo* near Myanong (Ind. Agr. II. 311) probably are of this species. Used for building and for carrying water. Does not split well (M. Hill). 13. *D. latiflorus*, Munro; Gamble, t. 117. Southern Shan States (West Burma), possibly introduced from China.—Tonkin. China. Formosa. Tufted, internodes short, 5 in. diam., walls thin. L. 7-10 by 1-3 in., n. 24-30 on $\frac{1}{2}$ in. (Burma specimens). Spikelets broadly ovate, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, 3-6 in reddish-purple heads, on long spikes, often leafy at top, rachis often hollow. Glumes pubescent on the back, ciliate along the edge, empty 2 fl. glumes 6-8, the lowest and uppermost sometimes sterile. 14. *D. calostachyus*, Kurz; Gamble, t. 77. Rhano and lower Kachin hills. Culm-sheaths clothed with appressed lanky hairs, ligule narrow. Spikes long flagellate. Not seen. 15. *D. Collettianus*, Gamble, t. 83. Fort Steilman, Southern Shan States. Fl. only known. Spikes often compound, heads $\frac{1}{2}$ -1 in. diam. with 6-12 fertile and a few sterile spike-

leaves. Spikelets 4-4 in. long, softly pubescent. Not seen. 18. Wabo, Burma. Cultivated in villages, southern Shan States, 1500-2100 ft. (Montague Hill). Culm-sheaths 18 in. long, thick, hard, shining within, thinly hairy outside, L thin, grey, 6-6 by 1-1½ in., scabrid on both surfaces, n. 20-24 on ½ in., petiole very short, sheath glabrous, edges ciliate. Heads of 10-20 spikelets, approximate, nearly confluent, spikelets ½-1 in. long, nearly glabrous, tip hard, pungent, fl. 2-8, ♂, ♀, and bisexual. Palea long-ciliate at base, between lewls 2-5 n., ovary and style densely hairy.

9. TEINOSTACHYUM, Munro; Fl. Brit. Ind. vii. 410.

Culms thin, overhanging, sometimes climbing. Spikelets up to 3 in. long, slender, many-fl., sometimes pedunculate, in bracteate whorls on the spiciform branches of a leafy panicle, upper and lower fl. imperfect, rachilla elongate between the fl., glumes mucronate, palea convolute, keeled, keels ciliate near the apex. Lodicules fl. 3-9-nerved. Style enclosed in and partly adnate to a cylindrical sheath. Caryopsis ovoid, beaked, pericarp crustaceous. Species 5, of which one in Ceylon.

1. *T. Wightii*, Beld. Fl. Sylv. t. 223; Gamble, t. 67. Vern. *Nay-yro*, Tam. Western Ghats from North Kanara southwards, 3-3,000 ft. Nilgiris, Anamalais, in the undergrowth of high tree forest. Culms 10-20 ft. long, supported by the neighbouring trees, branches flexuous, internodes 14-18 in. long, diam. 1-1½, walls thin. Culm-sheaths thin, nearly as long as internodes, brownish-black hairs on the back, blade narrow, half the length of sheath or more. L. 6-15 by 1-2 in., pet. ½-¾ in. long, n. 18-20 on ½ in. Panicle large, contracted, drooping, consisting of long slender spikes. Fl. at long intervals. Travancore in 1867. 2. *T. Griffithii*, Munro in Trans. Linn. Soc. xxxi. t. 3; Gamble, t. 89. Vern. *Cephalostachyum Griffithii*, Kurz. Assam (Beld.). Chittagong. Burma (Kurz.). Straggling or subscandent, culms 25-30 ft., internodes 12-24 in. long, diam. ½ in. L. 6-10 by ½-1½ in., glabrous beneath, pet. short, n. 20-30 on ½ in. Spikelets pubescent, 2-3 in. long. 3. *T. Dalmeida*, Gamble, t. 89. British Bhutan 2,000 ft. (Taktse base, Nepal). Garo hills (Woods). Assam (*Dala*, *Dala*, *Dala*, *Dala*). Sikkim. Cachar (*Bojoni*). Chittagong (*Do's*). Upper Burma: Kasha. (Theilacker). Manipal (Woods). Tufted, more or less scandent, culms 20-30 ft., internodes 15-30 in. long, diam. 2-3 in. Culm-sheaths 6-12 in. long, blade very narrow, recurved, often as long as sheath, edges convolute. L. 5-12 by 1-2½ in., pet. ½ in., n. 21-30 on ½ in. Spikes softly hairy. *Gynera* (Bhamo), which may possibly belong to this, is described by Montague Hill as a tall straight-growing graceful Bamboo, growing in clumps, but each stem very distinct, internodes 30-44 in. long, diam. 2-4 in. 4. *T. Helferi*, Gamble, t. 90. Vern. *Pseudostachyum Helferi*, Kurz. Assam. Garo (Hoff), Khasi (Tasoh), and Jaintia hills. Pegu Yoma, chiefly on the east side (Woods). Hills east of Toungoo, 4,000 ft. Salween hills, 2,000 ft. (Theilacker, Kaffen). Evergreen, eminently gregarious, forming impenetrable thickets of large extent, culms 20-40 ft. long, bending over in all directions and more or less climbing, internodes greyish-green, while young with appressed whitish bristles, 20-30 in. long, 1-1½ in. diam., walls very thin. Culm-sheaths thick, persistent, 8-10 in. long, blade narrow, recurved, nearly as long as sheath. L. 6-18 by 1½-3½ in., pet. broad, ½-¾ in. long, n. 12-21 on ½ in.

Schizostachyum Rogersii, sp. nov. Andamans (G. Rogers). Tufted, culms weak, up to 30 ft. long, to ½ in. diam., overhanging or supported by trees, walls thin. Culm-sheaths much shorter than internodes, thin, 3-4 in. long, hairs very fugacious, base 2-3½ in. broad, tapering to ½ in., with two small auricles at the apex, blade narrow, reflexed, as long as sheath. L. 7-9 by 1-1½ in., long fine hairs on the underside, n. 21 on ½ in., transverse veins prominent, oblique and bent. Inflorescence long spike, terminating leafy branchlets, with distant half-whorls (supported by bracts, which are often furnished with a blade) of 1-fl. glabrous spikelets, the fertile 1 in. long, the sterile shorter. Empty glumes 2-4, palea convolute, minutely 2-dentate, keels indistinct. Lodicules 3, unequal, anthers yellow, obtuse, ½ in. long. Ovary glabrous, continued into a thick cylindrical hollow style, terminated by a long plumose stigma. Caryopsis ellipsoid-cylindrical, crowned by the long, persistent style, endosperm farinaceous. Somewhat resembles *S. chilianthum*, Kurz; Gamble, t. 101 of the Malay Peninsula, Sumatra and Java.

10. CEPHALOSTACHYUM, Munro; Fl. Brit. Ind. vii. 411.

Tufted, in most species the stouter nerves very broad, transverse veins often visible, but not conspicuous. Fl. heads dense, broadly obconical or

nearly globose, consisting of numerous short spikes, each spike with several spikelets, the lowest spikelets usually sterile with numerous empty glumes, the uppermost with one fertile and several empty glumes. Palea thin, convolute, many-nerved, the two keels close together. Caryopsis glabrous, beaked, supported by the persistent glumes and lodicules and imbedded in a densely-packed mass of dry sterile spikelets. Species 7.

A. Heads along elongated spikes, forming a large panicle.

1. *C. pergracile*, Munro; Gamble, l. 96. Vern. *Tauca*, Burma; *Wabli*, Kar.; *Maikyang*, Shan.

Tufted, but not densely, culms erect, 30-40 ft. high, nodes in the lower part with dense half-whorls of rigid, simple green, usually leafless branches, spinescent at the ends. Internodes near the base 6, higher up 12-18 in. long, diam. 2-3 in., walls $\frac{1}{4}$ in., nodes horizontal. Culm-sheaths thick, one-third the length of internode, polished orange-brown, the lower part densely clothed with black stiff deciduous hairs, on young shoots forming a marked contrast with the green internodes, as they, while gradually lengthening out, emerge from the sheaths, blade triangular, cuspidate, on both sides with a fimbriate fringe, bordering the top of sheath. L. green beneath, 6-14 by $\frac{1}{2}$ -2 in. n. 27-30 on $\frac{1}{4}$ in.; prominent but deciduous cilia at the mouth of sheath. Fl. frequently, at times gregariously over large areas. Heads globose, to broad obconical, clothed with long soft hairs, supported by sheathing bracts 1-11 in. long, on long slender, but wiry pendulous branches of a large leafless panicle, distance between heads 2-3 in. Caryopsis cylindrical, grooved, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, beak hairy, straight, as long as caryopsis, pericarp coriaceous, embryo visible on the outside.

Burma, Upper and Lower, common, chiefly in the lower hills, in declivous forest near streams. One of the most useful Bamboos, made into houseposts, walling, mats, shingles and baskets. Rice is cooked in the joints, the outer green layer of the stem may be split very fine. Gamble refers to *C. pergracile* a Bamboo cultivated in the Sibang district of Assam (*Lalang*, Naga; *Khamla*, Singpho), said to be wild on the lower Naga hills, as well as specimens coll. by himself in 1861 in the Singphoo district. F. Dalton communicates *Tauca*, Burma, from Myitkyin, Upper Burma, which has the same culm-sheaths and L. as *C. pergracile*, but is stated to have isolated stems and a few leaf-bearing branches in the lower part of the culm. 2. *C. faveosum*, Kurz; Gamble, l. 91. Introduced from Pegu into the Royal Botanic Gardens, Calcutta (Kurz). Culms 10-20 ft. high, internodes long, 1-1 $\frac{1}{2}$ in. diam., culm-sheaths grey or golden-hairy, 4-5 in., blade triangular, 1-2 in. long, base decurrent into a broad wavy fringe, bordering the top of sheath and extending beyond it into auricles fringed with long bristles. L. linear, 5-6 by $\frac{1}{2}$ in., n. 48 on $\frac{1}{4}$ in., leaf-sheaths produced into long narrow auricles. Panicle leafy, heads smaller than in 1, hairy, on rigid spikes. 3. *C. virgatum*, Kurz; Gamble, l. 97. Upper Burma, Mogaung, Griffith (July 1867), and Indawgyee lake, in evergreen forest (J. W. Oliver, March 1865). (Wabli, Burma; *Lakra*, Kach.). Middle-sized, culm-sheath thick, hard, 3-5 in., blade triangular, cuspidate, 3-5 in. long, decurrent along the top of sheath into a narrow band bordered with stiff bristles. L. softly hairy beneath, 6-12 by 1-2 in., n. 21-24 on $\frac{1}{2}$ in., sheaths ciliate, ligule hairy. Panicle large, leafless, heads obconical, often approximate, and nearly confluent.

B. Heads usually single, terminal.

1. *C. capitatum*, Munro; Gamble, l. 91. Sikkim and British Bantua 2-8000 ft., forming dense thickets on the hillsides (*Gobio*, *Gopa*, Nep.) Khasi hills (*Sillen*, *sullen*), Hills east of Bhamo 5,500-6,000 ft. (Mount. Hill). Gregarious, densely-branching, more or less scandent, culms 12-30 ft., yellow, internodes 2-3 ft. long, diam. 1-1 $\frac{1}{2}$ in. Culm-sheaths thin, 6-12 in., blade long. L. pale green, ovate-lanceolate, blade 6-8 by 1-2 in., pet. $\frac{1}{2}$ in., n. on $\frac{1}{4}$ in. 13-21. Leaf-sheaths glabrous, shining. Fl. heads not hairy, usually single, at the ends of leaf-bearing branches, which often stand in dense half-whorls, sometimes axillary and then forming large panicles (var. *decussata*). Empty and flowering glumes convolute, concave below, ending in a long scabrous awn, palea convolute with more or less conspicuous transverse veins, lodicules veined, lanceolate $\frac{1}{4}$ - $\frac{1}{2}$ in. long. 2. *C. pallidum*, Munro; Gamble, l. 92. Bhutan, Mishmi hills, Khasi hills, Manipal and Patkol range. Small, shrubby, culms 5 ft. high, l. 3-6 by 1-1 $\frac{1}{2}$ in., n. 24-27 on $\frac{1}{4}$ in. Fl. heads single at the ends of leafy densely-

whorled branchlets, palea bifid at apex. 6. *C. latifolium*, Munro; Gamble, t. 81. Burma, Manipur. Shrubby, culms 6-10 ft. high, culm-sheaths thin papery. L. 10-14 by 2-4 in., n. 15-21 on $\frac{1}{2}$ in. Fl. heads globose, up to 2 in. diam. Caryops large, chestnut-brown, shining, ovoid, not grooved, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, pericarp crustaceous, and adhering to the testa, striate, not visible on the outside. 7. *C. Pachtanum*, Gamble, t. 94. British Burma, 6-8000 ft., in dense thickets with *Pterocarpus*, Daphniphyllum. Scandent culms small, soft, thin-walled, culm-sheaths thin, top concave, sinus fringed, 12, blade 6-8 in. long, subulate, reflexed. Lorate-lanceolate, 6-14 by 2-4 in., n. 15-21 on $\frac{1}{2}$ in., the leaves immediately below the fl. head shorter. Long white bristles on top and margin of leaf-sheath. Fl. in globose terminal heads, $2\frac{1}{2}$ in. diam., or in a short densely-packed spike of superposed heads.

11. DI-NOCHLOA. Bâse; Fl. Brit. India vii. 414.

Evergreen, climbing, culms zigzag, geniculate. Transverse veins often visible on the underside of the dry leaf. Spikelets minute 1-fld., with 1-4 empty glumes, palea convolute, not keeled, lodicules 0. Fr. ovoid, mucronate. Dr. Stapf has kindly informed me that the mature seed* of *D. Tjankorrek*, which is enclosed in a leathery pericarp (fleshy while immature) has no endosperm, but consists mainly of a large and hard scutellum, traversed by fibro-vascular strands, its cells having much thickened walls. Species 3, possibly 5.

1. *D. andamanica*, Kurz.—Syn. *D. Tjankorrek*, Bâse, var. *andamanica*, Gamble, t. 98. Andaman (the most generally distributed Bamboo in the islands). Nicobars. Culms single, green, glaucous, up to 300 ft. long, creeping along the ground (rooting at the nodes) or climbing over the tallest trees. Branches geniculate, single, as long and as stout as the culm, from which they spring, branchlets slender, numerous, in whorls, hanging down with their dense foliage. New main branches develop annually, at first leafless, curved, tendril-like, later in the season covering themselves with a dense mass of foliage, which hangs down from the supporting trees and eventually smother them. Where no large trees exist, this Bamboo forms an impenetrable tangled mass, spreading over shrubs and saplings. Internodes 9-18 in. long, 1 in. diam., walls thin, culm-sheaths green, less than one-fourth the length of internodes, as well as culms covered, while young, with a fugacious white bloom, blade leafy, deciduous, nearly as broad as sheath. L. 8-12 by 2-3 in., n. 15-21 on $\frac{1}{2}$ in., upper side polished, ligule short, entire. Panicle terminal, narrow, often leafy, spikelets minute, glossy, straw-coloured. The Malayan *D. Tjankorrek*, Bâse, Munro, Bambusaceæ, t. 5, has smaller leaves and the nerves closer together, 27-31 on $\frac{1}{2}$ in., ligule often long, fimbriate. The fr. is described as fleshy, $\frac{1}{2}$ in. diam. or more. The fr. of the Andaman species is unknown.

2. *D. McClellandii*, Kurz, F. Fl. II. 571; Gamble, t. 99. Vern. Wassei, Hurm. Chittagong. Paga Yoma, common on slopes with northerly aspect, chiefly where the heads of the strata crop out. Marabou. Texas-rim. Evergreen, climbing over tall trees and forming extensive thickets, culms greyish-green, while young silvery from minute appressed fugacious bristles, internodes 3-4 ft. long, up to 1 in. diam., walls thin, branches often single. Culm-sheaths more or less persistent, shorter than internodes, rounded at the mouth and bordered by a thickened, polished green margin, blade leafy, often longer than sheath. L. 12-15 by 2-4 in., n. 12-21 on $\frac{1}{2}$ in. Fl. not known. The l. are very similar to those of *Teinostachyum Hofferi*, Gamble. Two species, of which the fl. are unknown, placed by Munro under *Bambusa*, may possibly, when more perfectly studied, find their place in *Dinocloa*, as suggested by Gamble for one of them. 1. *B. Masternii*, Munro. Vern. Beutibasi, Assam; Dibrugarh, Assam. An extensive climber, like *Colocasia Rotundifolia*, l. 10-15 by 1 $\frac{1}{2}$ in., n. 21-27 on $\frac{1}{2}$ in. 2. *B. Marginata*, Munro. Vern. Wassei, Karen. Dumat range between Thauogyin and Haundrow, 5000 ft. D.B. April 1859. A climber, interlacing stems and branches of oak and chestnut trees, culms dark coloured, branches almost solitary. L. 9-7 by 1-1 $\frac{1}{2}$ in., the edges in the upper part densely shaggy, with long silky hairs, n. 24-27 on $\frac{1}{2}$ in.

12. MELOCALAMUS. Benth.; Fl. Brit. Ind. vii. 409.

M. compactiflorus, Benth. The only species, Gamble, t. 24. Syn. *Pseudostachyum compactiflorum*, Kurz, Ind. For. i. t. ii. fig. 13; F. Fl. ii. 567. Vern. Darul, Beng.; Latha, Cachar; Lota, Chitt.; Wauicé, Baria; Nachinwa, Kachin.

Loosely tufted, spreading and climbing over tall trees, culms 50-80 ft. long, nearly solid, internodes 12-24 in. long, diam. $\frac{1}{2}$ -1 $\frac{1}{2}$ in. Culm-sheaths

thick coriaceous, shorter than internodes, blade linear-lanceolate, recurved, l. 9-12 by 1-2 in., pet. $\frac{1}{2}$ in., n. 24-30 on $\frac{1}{2}$ in. Fl. frequently, panicle large often leafy, branches fistulose, bearing half-whorls of long hairy spikes, with globose compact fl. heads $\frac{1}{2}$ in. diam., like the heads of a rosary, $\frac{1}{2}$ -2 in. apart. Spikelets small, $\frac{1}{2}$ in. long and as broad, fertile fl. 2, lodicules large, ciliate, ovary glabrous, style short, stigmas 2 or 3. Fr. 1-1 $\frac{1}{2}$ in. diam., the pericarp fleshy while immature, ultimately coriaceous, the embryo has a large scutellum without endosperm. The seed often germinates while attached to the branch, putting forth a shoot and tuft of roots before falling to the ground.

Sikkim, Cachar, Chittagong. Upper Burma: hills N.E. of Bhamo 4000 ft., Ruby Mines district 4000 ft. Lower Burma: Arakan Yuma, Thayetwary district and hills east of Toungoo 4-6000 ft. A flowering on a large scale on the hills e. east of Bhamo reported in Ind. For. xxviii, 182. In Yunnan capitals are made of the outer glaucous fibrous layers of the internodes.

13. **MELOCANNA**, Trinicus; Fl. Brit. Ind. vii 417. Dr. Otto Stapf on the fruit of *Melocanna* in Trans. Linn. Society, ser. 2, Botany, vol. vi 401, 1901.

Spikelets usually 2-5 on an arrested axis, so as to appear fascicled, in the axils of large bracts, each spikelet with numerous empty glumes and one rarely bisexual, usually 3 with a rudimentary pistil or 2 with stamens and anthers. In the axils of the lower empty glumes, or rather bracts, frequently buds which develop into short branchlets with a spikelet at the end. The fascicles of spikelets are on unilateral spikes, which are 1-6 in. long and are arranged in long narrow pedunculate more or less unilateral panicles. The peduncle of these panicles consists of several often elongated internodes, at the nodes with sheathing bracts, rarely with well-developed l. The panicles are of unequal length (the longest up to 3 ft.) and stand in dense lateral fascicles at the nodes of the culm. Most of these panicles are androdynamous, that is predominantly or exclusively male, while others, chiefly the shorter panicles, are gynodynamous, that is, predominantly or exclusively female, bisexual fl. occurring occasionally in either. In some cases the spikelet is 2-fl., and the palea of the lower fl. has one or two pairs of nerves. Fr. large, pyriform, beaked, the cells of the thick fleshy pericarp filled with starch. Seed when ripe, without endosperm, the embryo with a large scutellum, which is separated from the pericarp by a thin layer of thin-walled more or less crushed cells. When the seed germinates the embryo derives its first nourishment from the starch of the pericarp. (This description relates to *M. bambusoides*, fl. and fr. of the other species not being known.)



Fig. 163. *Melocanna bambusoides*, Trin.: the right-hand figure represents the germinating fruit.

1. *M. bambusoides*, Trin.; Kurz F. Fl. ii 569, Gamble t. 105.—Syn. *Bam-*

bambosifera, Roxb. Cor. Pl. t. 243. Vern. *Muli*, Beng.; *Farat*, Ass.; *Watarai*, Garo; *Wati*, Cachar; *Kayung*, Arakan; *Kayinca*, *Tabindaingca*, Burm.

Rhizome with long creeping scaly branches, which turn upwards at the end to form new culms. Culms distant, erect, 40-70 ft. long, the lower two-thirds bare of branches, sometimes with a few short branchlets at the lowest nodes, internodes 10-22 in. long, 1-3 in. diam., smooth, walls thin. Buds (myetsan) small, flat. Culm-sheaths firmly coriaceous, persistent, brown, contrasting with the bright green of the young internodes, 5-7 in. long, upper third wavy, not appressed to the culm, sparsely hairy outside, top concavely truncate with rounded auricles, blade recurved, narrow ($\frac{1}{2}$ the top of sheath), longer than sheath, evenly narrowed into a long convolute apex, glabrous and striate on both sides. L. 6-14 by 1-4 in., underside glaucous, glabrous or with a few scattered hairs near the base, n. 18-24 on $\frac{1}{2}$ in., inner edge closely set with fine hairs on a broad colourless band. Transverse n. visible as evenly-distributed pellucid dots, tip long acuminate with a flat brush of rigid hairs below the scabrid point, pet. $\frac{1}{2}$ in. long. Sheaths keeled, glabrous with ciliate edges, white soft deciduous bristles $\frac{1}{2}$ - $\frac{3}{4}$ in. long at mouth, ligule short.

Garo, Khasi, and Lushai hills. Chittagong forests. Forms extensive forests in Arakan and the Upper Chindwin. Fl. at long intervals; Kurz (Ind. For. 1: 237) states that in Arakan it flowers every 30 to 35 years. The data at present available are as follows: they are not sufficient to justify any definite conclusions: Garo and Khasi hills, 1838, 1863, 1892. Chittagong, 1801, 1892. Arakan, 1864-1865, 1892. Bot. Garden, Calcutta, 1863, 1869. The fruit is 3-4 in. long, it hangs on a short peduncle clothed with sheathing bracts, and frequently germinates on the tree. *S. M. humilis*, Kurz; Garbutt t. 106. Arakan. Pegu, Paunglin valley near Wanet village (Kurz). Tufted 6-15 ft. high, l. 4-6 by 1-1 in., subulate-acuminate, glabrescent and minutely roughish pubescent beneath (not seen). *S.* A species found by G. B. Clarke in 1886 on the high road from Manipal town to Silchar, near the Icaug river. There was a large pure forest of this Bamboo, and he was in that forest for two days' march. The culms were solitary, distant, 29 ft. high, unbranched below, but on the lower nodes with sharp thorns 1-3 in. long, which rendered the forest very difficult to penetrate. L. similar to those of *M. 10* by 1-1 $\frac{1}{2}$ in., narrowed into a long tip with long stiff hairs, n. 24-30 on $\frac{1}{2}$ in., inner edge closely set with fine hairs on a colourless band. This species has not been found again, since 1885 the forest along that road has been plumed twice by the Nagas. A thorny Bamboo brought from that locality in 1885 is *Arundinaria culmifera* or near it.

4. *Tabindaing*, Attaran (Manson, Dec. 1893). Branches of rhizome 4 in. diam., bending upwards and terminating in a culm nearly naked in the lower part, internodes striped 25-30 in. long, diam. 2 $\frac{1}{2}$ in., nodes hardly swollen, walls $\frac{1}{2}$ in. Culm-sheaths sometimes green, very thick, persistent, 8-10 in. long, truncate, blade reflexed, long, striate, 3 in. broad at base, decurrent on both sides into a wavy fringed band $\frac{1}{2}$ - $\frac{3}{4}$ in. broad. L. 15-20 by 2-2 $\frac{1}{2}$ in., pale beneath and sometimes minutely velvety, transverse veins visible, n. 20-25 on $\frac{1}{2}$ in., ligule prominent. This probably is the single-stemmed Bamboo mentioned on p. 30 of my Attaran Report. (Selections from the Records of the Govt. of India, Foreign Dept. xxxii, Calcutta, 1891). "Abundant in the Attaran, frequent near limestone rocks." From *M. bambosoides* this species is distinguished by the longer culm-sheaths, tightly appressed to the internodes, blade broad not convolute, decurrent into a broad wavy band, tip of leaf without a brush, sheath quite glabrous, ligule large. From the single-stemmed Bamboo enumerated under *Gigantochloa macrostachya*, it differs by larger leaves and the distant longitudinal nerves. It has been mentioned under *Melocanna*, because an entry in Herb. Kew. shows that a flowering specimen labeled "Falcner, Moulinein" was sorted out because it was identical with a flowering specimen of *Melocanna bambosoides* from Hort. Bot. Calc., and this possibly was the single-stemmed Attaran Bamboo. It is not mentioned in Falcner's Report on the Attaran Forests. Kurz (F. Fl. II. 570) and Gamble mention *Tennisgrin* as a locality of *Melocanna bambosoides*.

Here may be mentioned a single-stemmed Bamboo (*Tabindaing*) found by me in March 1899, in the upper Salween forests, of which I have no specimens, but a description with sketch in my Notes.—Culms very tall, branches from the lower nodes simple, stiff, leafless, in dense half-whorls, the upper part of the culm with leaf-bearing branches. Internodes 12-16 in. long, 3-4 in. diam., node-rings horizontal. Sheaths glabrous outside, ciliate on the edges, deciduous, 20 in. long, top truncate. L. 5 by $\frac{1}{2}$ in., glaucous beneath.

11. *OCHLANDRA*, Thwaites; * Fl. Brit. Ind. vii. 116.

Tufted, gregarious, culm-sheaths thin, persistent. Spikelets mostly arrested in their growth, remaining small, with a few large fertile ones, the latter consisting of 2-6 empty and one flowering glume, the glumes as a rule with conspicuous transverse veins. Palea thinly membranous, convolute, often emarginate, longitudinal nerves numerous, two often stronger than the rest. Lodicules 2-12, stamens 6-120, filaments free or more or less connate, anthers long exserted, linear, usually mucronate. Style elongated, stigma 4-8, linear, plumose, usually closely twisted before expanding. Fr. beaked, large, supported by the persistent glumes, pericarp thick, fleshy, filled with starch, endosperm in the immature fr. soft, fleshy, probably crushed by the expansion of the scutellum, as the seed ripens. Some species flower annually, others at long periods, as far as known the inflorescence always bears leaves.

A. Filaments free.

1. *O. Rheedii*, Benth.; Gaubler, t. 107. Vern. *Beesha*, *Amua*, Mal. Malabar, Cochin and Travancore, low country near rivers. Culm 10-15 ft. generally mottled dark and light green, internodes about 17 in. long, 1 in. diam., walls $\frac{1}{2}$ in. thick. Culm-sheaths 4-6 in. long, purplish green, hairy while young. L. 4-10 by $\frac{1}{2}$ -1 in., ending in a long setaceous point, n. 30-45 on $\frac{1}{2}$ in. Spikelets in distant whorls on long fasciated pedunculate spikes, the peduncles consisting of several long internodes, the fertile spikelets 1-1 $\frac{1}{2}$ in. long. Lodicules 2, lanceolate, $\frac{1}{2}$ in. long. Stamens 14-17, anthers $\frac{1}{2}$ in. oblong, $\frac{1}{2}$ in. long, $\frac{3}{8}$ in. diam., crowned by the persistent indurated style. Flowers annually and does not die down after flowering.

2. *O. stridula*, Thwaites; Gamble, s. 103. Ceylon, low country, very common in the south of the island. May possibly be found in the Peninsula. Gregarious, culm erect, 6-18 ft. high, internodes 12-14 in. long, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. L. 8-12 by $\frac{1}{2}$ - $\frac{3}{4}$ in., n. 13-22 on $\frac{1}{2}$ in. Spikelets 1 in. long, lodicules lanceolate, 6-12, persistent round the fr. Stamens numerous, up to 30. Fr. 1 in. long; beak as long. Flowers annually.

3. *O. Talboti*, sp. nova. Vern. *Hada*, Mar.; *Westwaly*, Kan. North Kanara. Culms numerous, in dense clumps, slender, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., hollow, sometimes scabrous, nodes thickened, shining, glabrous. L. glabrous, pale, lanceolate, long-acuminate, 8-12 by $\frac{1}{2}$ - $\frac{3}{4}$ in., sheath glabrous, bristles at mouth early deciduous, n. 20-30 on $\frac{1}{2}$ in. Spikelets in half-whorls on a terminal erect spike, 4-8 in. long, glabrous or nearly so, a few soft hairs at the tips of glumes, fertile spikelets few, 1 $\frac{1}{2}$ in. long. Empty glumes 3-6, lodicules 6, linear, veined. Stamens 20-30, anthers $\frac{1}{2}$ in. long, connective minutely apiculate, filaments long, slender. Fr. ovoid, 2-3 by $\frac{1}{2}$ in., narrowed into a long beak, supported by 4 persistent glumes. Fl. 1866 throughout North Kanara, had not been seen in it for many years in that district. (This species had been identified with *O. Horda*, var. *virgata* and with *O. stridula*, but Talbot, List 318, justly states that it differs from both.) 4. *O. Beldamii*, Gamble, t. 110, Walp. Western slopes of the Nilgiris below Sispura, 3-4,500 ft. Gregarious. L. ovate-lanceolate, long acuminate into a twisted scabrous, setaceous point, 8-12 by 1-2 $\frac{1}{2}$ in., n. 15-24 on $\frac{1}{2}$ in., leaf-sheaths minutely pubescent, with numerous erect stiff bristles at the mouth and decurrent bristly auricles at the sides. Spikelets in few approximate half-whorls in erect terminal spikes 1-3 in. long, clothed with long brown hairs, fertile spikelets 1 $\frac{1}{2}$ in. long. Empty glumes 2-4, lodicules 5, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, lanceolate, 3-7-veined. Stamens 20-35, anthers $\frac{1}{2}$ - $\frac{3}{4}$ in. long, tip tricuspidate, the anther-cells and connective being apiculate. Fl. on the Sispura ghat in 1875 and 1876, died down after flowering; had not been known to flower for 20 years previously.

5. *O. Brandisii*, Gaubler, s. 113. Vern. *Ira-Koff*, Tinnevely ghat above 3,200 ft., with *O. transcurvata*, which it greatly resembles. Leaves smaller on short pet., n. 24-27 on $\frac{1}{2}$ in., ligule long, membranous. Lodicules 3, lanceolate, $\frac{1}{2}$ in. long. Stamens about 100, filaments free, anthers $\frac{1}{2}$ in. long, apiculate. In fl. Feb. 1882 D.B.

* In this genus I have had the kind assistance of Dr. Otto Stapf, who will I hope at an early date publish the result of his researches regarding flowers and seeds of *Ochlandra*, *Melocanna*, and *Dioschloa*, in continuation of his paper on *Melocanna bambusoides*.

B. Filaments monadelphous.

6. *O. travancorica*, Benth.: Gamble, t. 111. Syn. *Bambusa travancorica*, Bedd. Fl. Sylv. 221. *The Deyshul Grass*. Vern. *Jual, Ito Kadi*, Tam. Ghats between Travancore and Tinnevely above 2000 ft., covering immense areas, often to the exclusion of almost all other vegetation, with impenetrable thickets up to 15 ft. high, from which stand out a few scattered trees of *Fernandus*, *Eugenia*, and other kinds. Culms erect or straggling, internodes 2-6 ft. long, 1-2 in. diam., walls thin. Culm-sheaths thin, 6-8, blade narrow, subulate, 1½-3 in. long. L. 6-24 by 2-6 in., pet. thick ¼-½ in. long, n. 18-21 on ¼ in. Fl. panicles leafy, fertile spikelets few, 2 in. long, with numerous sterile ones in distant heads on fasciated spikes, which are arranged in large leafy panicles. Lodicules usually 3, lanceolate, more or less unequal, one dentate, sometimes 2nd. Stamens up to 120, anthers ¼-½ in. long, with a long point, filaments monadelphous, free at apex. Fr. ovoid, 3-4 in. long, 1½ in. diam., fleshy, surrounded by the persistent glumes and palea. Lodicules collected in fl. about 1895. I found it in fl. on the Tinnevely ghats in Feb. 1898, and in Travancore the species was reported to flower in 1905. Believed to die down after flowering. Var. *hirta*, Gamble, t. 112, spikelets thickly clothed with light brown velvety pubescence.

Fl. unknown.

7. *O. astigera*, Gamble, t. 115. Ravines above Gudalur, Nilgiris 3000 ft. Culms 20 ft., internodes 10-12, diam. ¼-½ in. Culm-sheaths persistent, 6-7 in. long, thin, gradually narrowed to a subulate hair-like blade. L. 6-9 by ½-1 in., n. 30-33 on ¼ in. sheath at mouth with long bristles.

Bamboos from Upper Burma, the flowers of which are unknown:—

1. *Wakka*, Burm. On Hmangin dam, 2500 ft., gregarious in *Taungya* pinzo (C. B. Smiles, March 1902). Tufted, stems 35 ft. long, weak, widely overhanging, often breaking when without support, internodes 9 in. long, slightly swelling in the middle, diam. 1-1½ in., walls very thin, ⅓ in. Culm-sheaths light buff-coloured, thin, closely sheathing the stem, brown hairs outside in the lower portion, blade early deciduous glabrous, finely ribbed, 3-3½ in. long. Young shoots olive-brown just above and olive-grey just below the nodes. L. glabrous, light green, 10 by 1½ in., n. 19-21 on ¼ in.; transverse veins conspicuous, distant, mostly oblique, sheaths green with a few scattered brown hairs on the margin. Similar to *Pseudostachya pilosiorrhiza*, Munro, but reported to be tufted. 2. *Sinthana*, Burm. Pyinayang forests, Meiktila district, along banks of streams and on low, moist ground (Troup, June 1902). Culms erect, clothed with light brown silky hairs, which are matted together like felt near the nodes, 50 ft. high, internodes 15-24 in. long, diam. 3½-4 in., walls ¼ in. thick, rootlets at the lowest 3 or 4 nodes. Culm-sheaths 7-10 in. long, brown-hairy outside, blade persistent, ribbed on the outside. L. densely clothed with fine hairs beneath, 6-8 by ¾-1 in., n. 21 on ¼ in., transverse veins distant. 3. *Thalaw-wa*, Burm. Cultivated in the Northern Shan States, 2-4000 ft. (Troup, June 1902). Tufted, culms light green, with minute white silky hairs, erect, 40-50 ft., internodes 14-24 in., 3-4 in. diam., walls ¼ in. thick, small branchlets at most of the nodes. Culm-sheaths thick, nearly glabrous, 5-6 in. long, 12 in. wide at base, the sides curving to a slightly concave top, 4 in. broad, with a brown fringe, blade triangular, on the inside densely clothed with brown hairs, sharply cuspidate, base 1½ in. L. 7-9 by 1 in., n. 23 on ¼ in., transv. veins visible, oblique, distant. 4. *Wamin*, Burm. Cultivated in gardens in the Northern Shan States, said by some to have been brought from China, by others from Chengmai, in Siam (Troup, May 1902). Culms loosely tufted, erect or bending stiffly up to 40 ft., usually smaller, dark green, shining and perfectly glabrous. Internodes 4-6 in. long, rarely longer, much swollen in the lower half, the swollen part 4-5 in. diam. Rootlets on the lowest 3 or 4 nodes. Culm-sheaths resembling those of *Bambusa vulgaris*, brown hairy outside, 5 in., blade 2-3 in. long with two rounded ciliate auricles at the base. L. 7-9 by ¾ in., n. 30-33 on ¼ in., sheaths keeled, edges minutely ciliate. The short swollen internodes may be a deformity analogous to that described by Kurr in Ind. For. t. 252, t. 1.

ORDER CXIII. GNETACEÆ. Gen. Pl. iii. 417.

(E. Strasburger, Die Coniferen und die Gnetaceen, 1872.)

Stem and branches jointed at the nodes. L. opposite, whorled, or reduced to a short, sometimes 2-4-dentate sheath. Fl. unisexual, ♂ with 2-8 anthers. ♀: one erect ovule with one integument, prolonged into a tube, which

has the functions of a style, and enclosed by a single or double perianth. Perianth or bracts supporting the ♀ inflorescence become fleshy in fr.

The general structure of the wood resembles that of normally built Dicotyledons, it consists of vessels, wood-fibres, wood-parenchyma and medullary rays. No resin canals. *Gnetum scandens*, like many dicotyledonous timbers, shows on the transverse section concentric bands of wedge-shaped masses of xylem and phloem, separated by medullary rays.

Membranous sheaths at the base of internodes
Leaves evergreen opposite

1. LEUCODIA
2. GNETUM.

1. EPHEDRA, Linn.; Fl. Brit. Ind. v. 640.

(Dr. Otto Stapf, Die Arten der Gattung *Ephedra*, Wien, 1889. Dr. Paul Jaccard, Recherches sur l'*Ephedra helvetica*, Lausanne, 1894.)

Rigid shrubs or undershrubs, a few species climbing; old stems often ribbed, branches terete, striate, opposite or whorled, with membranous sheaths at the nodes, which often bear 2-4 narrow leafy blades. Fl. usually dioecious, ♂ in short bracteate spikelets, which are whorled or in pairs, perianth of two opposite, compressed membranous sepals, anthers 2-8, on a central column, cells 2, opening by a short slit at the apex; ♀ fl. usually in pairs, sometimes 3 or solitary, each fl. consisting of one ovule with a single integument, prolonged into a tube, which has the functions of a style (tubillus) and enclosed in a bag, which may be regarded as a perianth. Each ♀ inflorescence (spikelet) supported by several pairs of decussate bracts. Fr. in the species here described fleshy, consisting of the succulent bracts enclosing 1 or 2 seeds. Species 31, dry regions of Europe, North Africa, Asia and America.

A. Tall, scandent, with slender branchlets.

1. *E. foliata*, Boiss.—Syn. *E. alta*, Brandis F. Fl. t. 69 (non C. A. Meyer), *E. peduncularis*, Boiss. Baluchistan, Sind. Kuram valley. Punjab plains, excepting the North-East, ascending in the Salt range to 3,000 ft. Probably in Rajasthan.—Southern Arabia. Persia. Afghanistan. Vern. *Kachas*, Punj. A tall scandent shrub, often gregarious, forming dense thickets, stem 3 in. diam., bark exfoliating in fibrous shreds, branches slender, flaccid, generally whorled, branchlets often filiform, internodes 1-4 in. long, leaf-sheath short, bearing at the upper nodes 2-4 small linear leafy blades. Fl. often monoecious, male fl. in strictly decussate pairs, 4-12 pairs in one spikelet, bracts rounded, obtuse, edge thinly fimbriate, anthers 3 or 4. Female spikelets pedunculate, often in small terminal cymes, tubillus short, straight, Fr. globose, $\frac{1}{2}$ in. diam., semitransparent, red or milky-white, showing two dark-coloured seeds.

B. Rigid erect shrubs, generally numerous stems from a woody rootstock.

2. *E. Gerardiana*, Wall.; Collett Sindh Flora 481.—Syn. *E. vulgaris*, Brandis F. Fl. Ind. 1. Kanthal F. Fl. 249. Vern. *Tatoumka*, Jansa. Hariab district, Kuram valley 11,000 ft., common. Himalaya 8-14,000 ft., also in the inner arid tracts, ascending in Sikkim to 16,500 ft.—Pamirs. Yarkand. Tibet. A rigid, nearly erect shrub, up to 1-2 ft. high. Tufts of short branches with opposite or whorled branchlets from a woody much-branched usually creeping rootstock, internodes about 1 in. long, under $\frac{1}{2}$ in. diam. Male spikelets ovate, $\frac{1}{2}$ -1 in. long, solitary or in pairs, rarely in whorls of 3, fl. 2-4 pairs, anthers 5-8. Female spikelets $\frac{1}{2}$ in. long, usually solitary, bracts 2-3 pairs, tubillus straight. Fr. sweet, odid, red when ripe. 3. *E. nebrodensis*, Timoc. Baluchistan, Juniper tracts, 7-10,000 ft. (*Qash*, *Umah*). Balti. Lahaul.—Mediterranean region, Western Asia and Caucasus. Internodes smooth, slender, $\frac{1}{2}$ -1 in. long, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. Male spikelets few-fl., solitary or 2-3 together, female solitary short-pedunculate, tubillus straight. Fr. globose, $\frac{1}{2}$ in. diam. 4. *E. intermedia*, Schrank & Meyer.—North-West Himalaya, chiefly in the inner arid valleys. Chitral 4-5,000 ft. on dry rocky slopes (*Sarosa*). Gilgit, Zaskar, Upper Chenab, Kunawar (*Khamsa*). Persia, Turkestan, Bokhara. Western China. A small erect shrub, often glaucous, internodes rough, $1\frac{1}{2}$ -2 $\frac{1}{2}$ in. long, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam. Fl. sometimes monoecious, male spikelets $\frac{1}{2}$ -1 in. long, numerous, in dense whorls at the nodes. Female spikelets shortly pedunculate, whorled at the nodes, tubillus twisted. Fr. $\frac{1}{2}$ in. long, fleshy, red when ripe. 5. *E. pachyclada*, Boiss. Baluchistan, Kakar Lora valley, 5,500-6,000 ft.—Southern Persia. Afghanistan. A small gregarious shrub, internodes 1-2 $\frac{1}{2}$ in. long, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., anthers 6-8, sessile, crowded, large.

2. GNÉTUM, Linn.: FL. Brit. Ind. v. 341.

(Lour., Life history of Gnetum in Annales du Jardin Botanique de Buitenzorg, tvi. 46, 1889.)

Climbing, one species erect, branches jointed and thickened at the nodes. Lvs. opposite, quite entire, penninerved. Fl. unisexual, usually dioecious, whorled in the axils of a cup-shaped bract, usually surrounded with multicellular hairs (a belt of (always?) imperfect ? fl. frequently above the ring of ♂ fl.), on spikes, which are solitary or in dichotomous panicles, axillary or terminal. Male fl.: perianth fleshy, clavate, more or less 2-5-l.; anther-cells 2, opening by terminal slits. Female fl.: one ovule with a single integument, prolonged into a tube, which has the functions of a style, with a lacinate mouth, enclosed in two bags, which may be regarded as an inner and outer perianth, the inner perianth wanting in flowers that remain sterile. Fruit resembling a drupe, consisting of the fleshy perianths, enclosing a hard seed. Species 15, tropical Asia, Africa, America and Pacific islands.

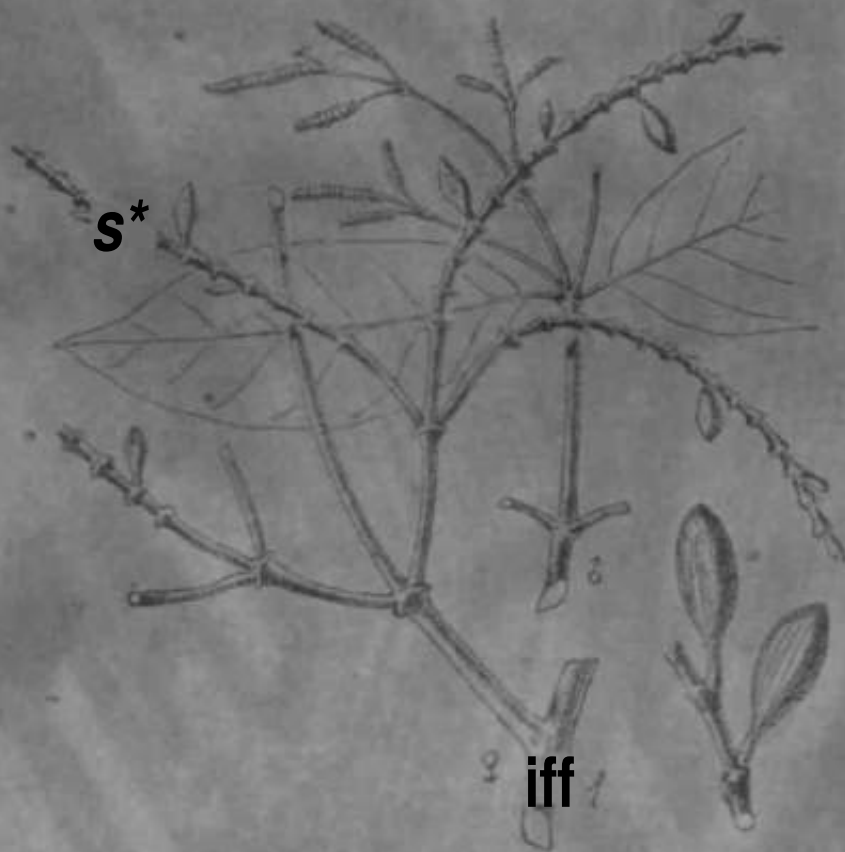


Fig. 291.—Gnetum scandens, Roxb. †.

A. Ovary and fruit sessile.

1. *G. Gnemon*, Linn.—Syn. *G. Benneonianum*, Griff. Cachar, Manipur, Mogaung, Upper Burma, Tenasserim, Nicobars.—Malay Peninsula and Archip. A small or middle-sized evergreen tree, l. elongate-elliptic or elliptic-oblong, acuminate, blade 4-8, pet. $\frac{1}{2}$ in. long. Fl. dioecious, female and pseudo-androgynous spikes on different trees, the imperfect female fl. of the latter without an inner perianth. Fr. oblong, apiculate, $\frac{1}{4}$ in. long, glossy, orange-coloured or red when ripe. The tree cultivated in the villages of Java is dioecious. According to Karsten and Lour. the ♀ fl. in the pseudo-androgynous spikes, though often attaining a considerable size, are not fertilized, and do not produce mature seed. It is, however, for inquiry whether the Burma and Indian tree is not, as stated by Kurz, monoecious. 2. *G. neglectum*, Blume. Mergui.—Malay Peninsula and Archip. A climber, l. rigidly coriaceous, blade 4-5, pet. $\frac{1}{4}$ in. long.

B. Ovary and fruit stalked. Climbers.

♂; *G. scandens*, I^{203b}.—Syn. *G. edule*, Blume; *G. funiculare*, Wight
 Ic. t. 1953. Vern. *Kumbal*, *Umbli*, Bombay; *Mūṅandi*, Kol; *Gyut-awē*,
 Burma.

An immense dioecious evergreen climber, trunk often flattened, 9-12 in.
 broad, branches dichotomous. L. elliptic, blade 3-9, pet. $\frac{1}{2}$ - $\frac{3}{4}$ in. long, reticulate
 veins lax, thin. Spikes in stiff panicles, often on the old wood. A single
 whorl of (imperfect?) ♀ above a double whorl of ♂ fl., surrounded by a mass of
 transparent hairs. Fr. covered with silvery scales when young, orange-
 coloured, edible when ripe, $1\frac{1}{2}$ in., stalk thick, $\frac{1}{4}$ in. long.

Western Ghats in evergreen forest, from the Konkan southwards, ascending to
 7,000 ft. Hills of the Northern Cheroas, Sikkim, ascending to 8,000 ft. Assam, Khasi
 hills, Chittagong, Burma, Upper and Lower, Andamans, common.—Not in Ceylon,
 Malay Peninsula, and Archaia, China. 4. *G. macropodum*, Kurz, Nicobars, closely
 allied to 3 differs by fruit-stalk $\frac{1}{2}$ -1 in. long. 5. *G. funiculare*, Blume, Chittagong,
 Lower Burma. A large climber, stem as thick as the arm. L. elliptic, rigidly
 coriaceous, reticulate veins close, prominent. Fr. glabrous, stalk slender, $\frac{1}{4}$ - $\frac{1}{2}$ in. long.

ORDER CXIV. CONIFERS. Gen. Pl. iii. 420.

Trees, sometimes shrubs, usually resinous, monoecious or dioecious. Leaves
 rigid, linear, subulate or scale-like, rarely with a broad blade. Fl. without
 perianth, ♂ (catkins) consisting of more or less numerous antheriferous scales
 (stamens) bearing 2 or more anther-cells on the back (underside). ♀ (cones)
 consisting of ovuliferous scales (open carpels, often with a second or supporting
 scale), either numerous, spirally or decussately arranged around the axis and at
 maturity concealing the seeds (perfect cones), or few (up to 20 in *Cephalotaxus*)
 not concealing the seeds (imperfect cones). In the case of most species a
 considerable time (sometimes more than a year) intervenes between the
 shedding of the pollen and fertilization of the ovule. *Eudospermi fleshy and
 oily (in *Araucaria farinacea*), cotyledons 2 or numerous.

The trunk of Coniferous trees shows the same general arrangement of tissues
 which we find in normal Dicotyledons, but the wood is without vessels, hence on a
 transverse section without pores. It consists of medullary rays and of long thick-
 walled tracheides, arranged in radial lines, with large bordered pits, usually on their
 radial walls only. In the earliest formed wood, contiguous to the pith, the tracheides
 have a spiral or annular thickening of their walls. The annual rings are distinctly
 marked by belts of very thick-walled tracheides in the outer (autumn) wood and of
 thinner-walled tracheides in the spring wood of the succeeding year. Resin canals,
 lined by small thin-walled secreting cells (as in *Diplazocarpus*) are found in the leaves,
 the bark and the wood, in the wood they are vertical among the tracheides, and hori-
 zontal in the medullary rays.

1. Seeds concealed by the scales of a perfect cone.

A. Ovules reversed, scales of cone numerous, spirally arranged round the axis.
 Pollen-grains winged, excepting *Larix* and *Taxus*.

- | | |
|--|------------------------|
| (a) L. persistent, in clusters of 2, 3, or 5, scales of
cone more or less thickened at the apex | 1. <i>Pinus</i> . |
| (b) L. persistent, in large tufts at the ends of
arrested branchlets, scales of cone broad with
a thin edge, deciduous | 2. <i>Cedrus</i> . |
| (c) L. persistent, single | |
| 1. Cones cylindrical, erect, scales deciduous,
l. flat, more or less distichous | 3. <i>Abies</i> . |
| 2. Cones cylindrical, pendulous, scales persis-
tent, l. 4-sided, all round the branchlets | 4. <i>Picea</i> . |
| 3. Cones ovoid, small, scales persistent, l. flat,
distichous | <i>Taxus</i> (p. 600). |
| (d) L. deciduous in large tufts at the ends of
arrested branchlets | <i>Larix</i> (p. 600). |

- B. Ovules erect, scales of cone few. Pollen grains not winged (*Cupressaceæ*).
- (4) Scales of cone opposite, in several tiers.
- α. Scales of cone woody, seeds with an orbicular wing 5. CUPRESSUS.
- β. Scales of cone succulent, forming a berry-like fruit, seeds not winged 6. JUNIPERUS.
- (5) Scales of cone spirally arranged on the axis, pectinate at apex, supporting scales adnate to them CRYPTOMERIA (p. 685).
- II. Cones imperfect, seeds 1 or few, not concealed by the scales (*Taxaceæ*).
- A. Ovules reflexed; pollen-grains winged 7. PODOCARPUS.
- B. Ovules bent down, seeds erect. Two anther-cells at the base of the male catkin scales. Pollen-grains winged DACTYDIUM (p. 686).
- C. Ovules erect, solitary, seed enclosed in a red fleshy cup. 3-8 anther-cells on the underside of a peltate male catkin scale. Pollen-grains not winged 8. TAXUS.
- D. Ovules erect, in pairs at the base of scales. Male ♀ in involucrate heads (compound catkins). Pollen-grains not winged 9. CEPHALOTAXUS.

TAXACEÆ are treated as a separate order by Pilger in Engler's *Pflanzenreich* IV. 5.

1. PINUS, Linn.; Fl. Brit. Ind., v. 651.

Monocious trees, the branches generally in whorls. Leaves dimorphous, those of seedlings and elongating shoots single, those of ordinary branches in clusters of 2, 3, or 5, on arrested branchlets, consisting of a short tubercular axis with a number of membranous sheathing scales surrounding the leaves. Axillary buds as a rule develop into branches only at the end of each year's terminal shoot, one whorl of side branches being formed annually, so that the age of a tree may be determined, not only by counting the annual rings in the wood, but in the case of young trees also by the number of whorls on the stem. There are however exceptions: *Pinus excelsa* sometimes forms 2 whorls in one season, and *P. Gerardiana* is apt to throw out scattered side branches, not in regular whorls. The male fl. (catkins) are in crowded whorls in the axils of membranous bracts at the base of the current year's shoot, hence on those branches, which habitually bear ♀ fl., there are breaks in the foliage, which indicate the position of previous year's catkins. Antheriferous scales numerous, imbricate, each scale with 2 anther-cells on its under-surface, prolonged beyond them into a membranous crest. Female fl. (cones) on separate branches, solitary or in whorls, often pedunculate, peduncles with scaly bracts. Ovules reversed, in pairs at the base of the carpellary scales, each carpellary with a supporting scale, which disappears before the cone ripens. Cones formed of the enlarged woody carpellary scales, which are spirally arranged around the axis and are more or less thickened at the apex. Seeds in shallow excavations at the base of the scales, oily with a hard woody testa, usually winged.

A. Leaves in clusters of five, cones cylindric, scales not much thickened at apex.

P. excelsa, Wall. Fl. As. Rar. t. 201; Griff. Ic. PL As. t. 366, an. t. 365 (*P. Griffithii*, MacClell.); Collett Simla Fl. 485 fig. 157. *The Blue Pine*. Vern. *Chitoch*, Chitral. *Biâr*, Haz.; *Kail*, Hind.; *Chil*, Junna; *Lim*, Kunawar.

A tall tree, attaining 150 ft., bark smooth, slate-coloured on young, rough with shallow fissures on mature trees, foliage bluish-green, at high elevations greyish-green. L. slender, 6-8 in. long, sheaths deciduous. Male catkins ovoid, $\frac{1}{2}$ in. long. Cones generally 2 or 3 together, 6-12 in. on peduncles 1-3 in. long, erect while young, pendulous afterwards, scales spatulate,

2-2½ in., seed ½ in. long, wing obliquely truncate, about 3 times the length of seed, cotyledons usually 9.

Kumaon valley 8-11,000 ft. Saifed Koh, Kafiristan, Himalaya, also in some of the more arid valleys, such as Lahaul, Kanasar. Eastwards as far as Nepal, not in Central and North-West Kumaon nor (indigenous) in Sikkim, but (in alpine alluvium, Wallich) in Bhutan—Afghanistan. The original home of this tree is at high elevations up to 12,500 ft., where it forms extensive forests with the Himalayan Spruce and Silver Fir. As the seed comes up in open grass-lands without shelter and as it is readily carried about by the wind, there is abundant second growth of it at lower elevations down to 5,000 ft. Whenever the trees grow at lower elevations the shoots are very luxuriant, often bent and irregular. The leaves remain 3-4 years on the branches. Fl. April-June, the cones ripen in the autumn of the second year. *P. Paver*, Griseb., mountains of Montenegro and Macedonia is closely allied.

B. Leaves in clusters of three; cones ovoid or ovoid-conical, scales much thickened at the apex.

2. *P. longifolia*, Roxb.; Royle Ill. t. 85; Griff. Ic. Pl. Asiat. t. 369, 370; Collett, Simla Flora 486 fig. 158. Vern. *Chil*, *Chir*, Hind.; *Satl*, Bash; *Sarel*, *Sirli*, Jaunsar; *Dhup*, Nep.; *Nyit*, Lepcha.

A tall eminently gregarious tree, branches symmetrically whorled, high up the trunk, forming a rounded head of light foliage. Bark 1-2 in. thick, cut by deep fissures into large plates. Leaves 9-15 in. long, slender, nearly triquetrous, sheath ½-1 in. long, greyish-brown, fimbriate, persistent. Male catkins ½ in. long, cones (a short stiff stalks, spreading or recurved, solitary or in whorls of 2-5, 4-8 in. long, diam. 3-5 in., scales 1-2 by ¾ in., beak thick, pyramidal, pointed and somewhat recurved. Seeds ½ in. long, wing thin membranous, rather longer than seed. Cotyledons about 12.

Sub-Himalayan tract and outer Himalaya. Abundant as far east as Nepal forming extensive pine forests 1,500 to 6,500, occasionally to 7,500 ft. Not in the inner arid valleys, on the Sutlej its upper limit is at Wangta. Further eastwards less common, in Sikkim usually on dry southern slopes between 1,000 and 3,000 ft. on the north side of the Great Ranjit and Tista rivers, often mixed with Sal. It is supposed (see Gamble, Darjeeling List ed. ii. 85) that the rainfall in the sub-Himalayan tract here is too heavy for this species. Fl. Febr.-April, there is some uncertainty whether the cones require 15 or 29 months to ripen. The leaves remain 2-3 years on the branches.

3. *P. khasya*, Royle*; Griff. Ic. Pl. As. t. 367, 368. Vern. *Dingsa*, Khasia; *Twayu*, Burm.; *Sija*, Kar.

A tall tree, 100-150 ft., branches more or less whorled, bark thick, deeply cracked, resin-ducts numerous in the outer and middle belt of each annual ring. L. 6-10 in. long, slender, back convex, sheath persistent, grey, lacerated at apex. Cones solitary or in pairs, sometimes in threes, ovoid, 2-3 in. long, greatest diam. 2 in., beak of scales depressed-pyramidal, with a blunt knob at the end, wings four times the length of seed.

Khasi and Naga hills. Manipur. Hills on the Upper Chindwin. Shan hills. Mountains on the head waters of the Yunnan and further north on the watershed between Sitang and Salween, 2,500-7,000 ft. Fl. Febr.-March, the cones require 2 years to ripen. Cones of several years, also empty cones remain long on the tree. The *L. persici* 1-2 years on the branches. *P. insularis*, Endl., of the Philippines and *P. Yunnanensis*, Franchet, of China, are very similar and possibly not specifically distinct.

4. *P. Gerardiana*, Wall.; Royle Ill. t. 85, fig. 2; Brandis F. Fl. t. 67. Vern. *Chajja*, Chitral (*Jalghaca*, seed); *Miri*, Pangi; *Rhi*, Kunawar.—The seed: *Nearsa*.

A middle-sized tree, branches not whorled, bark grey, smooth, thin, peeling off in large flakes, on old trees rough and cracked, foliage dark green. Leaves stiff, 2-4 in. long, back rounded, sheath deciduous. Male catkins ½-¾ in. long. Cones ovoid-oblong, glaucous when mature, 6-9 in. long, diam. 4-5 in.

* The name given by Royle to this Pine was *Kesiga* (Gordon in Gardener's Magazine xvi. 8, 1840). Parlators (DC. Prod. xv. 2) called it *P. Khasya*, Royle. The above name is that adopted in the Fl. of Brit. Ind., and should be: *P. Khasya*, Hook. f.

Scales broad, beak stout, recurved, obtusely triangular. Seeds irregularly cylindrical, 1 in. long, edible, wing short caducous.

Kashmir. Hariab district in the Kuram valley, 7-11,000 ft. North-West Himalaya, in the inner valleys with a dry climate, 5-10,000 ft. Chitral, Gilgit, Indus, between Asoor and Ishardu. Upper Chenab. A few trees on the Upper Ravi, Kunawar, occupying the lower slopes of the mountain sides near the river above Chergap and Jamb. British Garhwal, below the Niti pass. Fl. June and July, the cones ripen in the autumn of the second year. The l. remain 3-4 years on the branches. The cones of the Hariab tree have not the stout recurved beak of the scales.

C. Leaves in clusters of two.

3. P. Merksall, Jungh. Vern. Tiegaleh, Burma. Thauogyin valley above Mirawail on stretches of high ground, 500-1,500 ft., associated with *Dipterocarpus tuberculatus* (first reported by Capt. Jatter in 1848, Selections from the Records of the Bengal Government, ix., Calcutta 1852, p. 154). Shan States of Burma, in forests of *Protium*, *Sterea obtusa*, *Melastomaceae*, and occasionally *Dipterocarpus tuberculatus*.—Sumatra. Cechinchina. Philippines. Attains 100 ft., the trunk 5 ft. diam., branches forming a flat umbrella-like crown, somewhat resembling *P. Picea*, wood very resinous. L. green, 8-10 in. long, back convex, beneath grey with white fimbriate edge. The new L. appear (in the Thauogyin) Feb. March, and the old L. fall early in their second year. Cones usually in pairs, 2-3 in. long, cylindrical-conical, peduncle $\frac{1}{2}$ in. long, scales with a thick but flat pyramidal beak, the faces of which are sulcate. Seeds small, many times shorter than the unequal-sided wing.

2. CEDRUS Link; Fl. Brit. Ind. v. 653.

Three local forms, which come true from seed, here classed as species, viz., 1. *C. atlantica*, Massali. Atlas mountains, forming extensive forests at 4-7,000 ft. Leading shoot stiff erect, l. short. 2. *C. Libani*, Barr. Taurus and Anti-Taurus in Asia Minor 4-6,400 ft., forming forests with *P. Laricio*. Mountains of Cyprus. Lebanon chain. Extremities of branches stiff.

3. *C. Deodara*, London; Brandis F. Fl. 516.—Syn. *C. Libani*, var. *Deodara*, Hook. f.; Collett, Simia Flora 486, fig. 159. *Picea Deodara*, Griff. Ic. Pl. As. t. 341. *The Himalayan Cedar*, Saus. *Deodarum*. Vern. *Rogh*, Chitral; *Dhor*, *Kelu*, N.W. Himah; *Keluang*, Kunawar.

A tall tree, attaining 250 ft. under favourable circumstances, the leading shoots and extremities of branchlets drooping, heart-wood yellowish-brown, strongly scented, very durable. Foliage (in its native home) usually dark green, sometimes bluish-green. L. 1-1 $\frac{1}{2}$ in. long, triquetrous, single on elongated shoots and on seedlings, otherwise in dense fascicles on arrested branchlets. Catkins cylindrical, single, at the ends of arrested branchlets. Cones erect, 4-5 in. long, 3-4 in. diam., obtuse, scales closely imbricate, broadly concave, upper edge thin and rounded, broader than long, deciduous, leaving the axis of the cone standing erect on the branches. Seeds $\frac{1}{2}$ - $\frac{3}{4}$ in., wing triangular, $\frac{1}{2}$ in. long. Cotyledons usually 10.

Afghanistan, Kuram valley 7,500-10,000 ft. Chitral, N.W. Himalaya 4-10,000, ascending in places to 12,000 ft. in the basin of the principal tributaries of the Indus, of the Toon, Jumna and Bhaghrati rivers. On two feeders of the Alaknanda. Cultivated in Kumbon and in Nepal. Fl. Sept., Oct., the cones ripen in the autumn of the following year, about 18 months after flowering. σ and φ fl. generally are on different trees, sometimes on different branches of the same tree. Young Deodar requires shelter and stays a great deal of shade, self-sown seedlings readily come up under Oak and other trees, and in spite of the soft and drooping terminal shoots they pierce with great vigour through thickets of other trees. At Kew the Deodar is the first of the 3 Cedars to come out with a flush of young leaves, the Lebanon Cedar usually follows a fortnight later, and the Atlas cedar comes last, after an interval of a few days. Old trees of all three kinds, when growing isolated, particularly in exposed situations, are apt to form tabulated tops.

3. ABIES, Juss.; Fl. Brit. Ind. v. 654.

Tall trees, leaves more or less bifarious, linear, 1-nerved. Cone erect,

cylindric, scales thin, deciduous, leaving a woody axis, supporting scale free under the ovuliferous scale and sometimes produced beyond it. Species about 20, Northern temperate and Arctic zone.

1. A. Pindrow, Spach; Royle Ill. t. 86; Collett, Simla Flora 488, Fig. 161; Gamble, Ind. Timb. ed. II. 719; Nicholson, Dictionary of Gardening, i. 2. *The Himalayan low level Silver fir*. Vern. *Paludar, Haz; Rucar, Kagan; Kachal, Kunch valley; Rai, Chamba; Tos, Kulu; Spun, Krok, Kunawar; Pindraw, Hattu; Morinda, Jaunsar.*

A tall tree, attaining 250 ft. under favourable conditions, with a dense cylindric crown of dark-green foliage, bark smooth on young stems, greyish-brown, deeply cleft in vertical fissures, when old. L. distichous, 2-3 in. long, apex with two sharp teeth, underside with two faint lines on either side of the raised midrib, upper side dark green shining. Male catkins axillary, numerous, $\frac{1}{2}$ - $\frac{3}{4}$ in. long. Cones cylindric, 4-7 in. long, $1\frac{1}{2}$ -3 in. diam., dark purple when ripe, scales obovate, edge rounded, thin. Seeds $\frac{1}{2}$ - $\frac{3}{4}$ in., wing twice as long.

Kuram valley 8-11,000 ft. Chitral. Outer Himalaya, 8-10,000 ft., eastwards as far as Nepal. Fl. April, May. Fr. autumn of the same year. As shade-enduring as *Abies pectinata*, the Silver Fir of Europe.

2. A. Webbiana, Lindl.; Gamble, Ind. Timb. ed. II. 718; Nicholson, Dict. of Gard. i. 2. *The high level Silver fir*. North-West Himalaya 10-14,000 ft., often with the Birch and *Rhododendron campenulatum*. Usually stunted and gnarled, l. all round, the branchlets, $\frac{1}{2}$ -1 in. long on raised rough, prominent leaf-cushions, emarginate, cones shorter and thicker than 1.

3. *The East Himalayan Silver Fir*. Vern. *Gobee Salla, Nep.; Dashing, Bhutia-Sikkim* 10-13,000 ft. on the Singalila range, in the Chumbi valley and in Bhutan 8,000-12,500 ft. (*Abies densa*, Griff., Notula iv. 19). A tall gregarious tree, forming dense forests, l. crowded, more or less distichous, 1-2 in. long, retuse or emarginate, underside silvery-glaucous on either side of the raised midrib, catkins purple before opening (G. Rogers), cones cylindric, bracts long-acuminate in a young state, protruding beyond the scales, scales broader than in 1. *Pindraw*. This form might be called by the name given by Griffith to the Bhutan tree, if further study on the spot should show it to deserve specific rank.

I doubt whether the three Himalayan Silver firs here enumerated should be regarded as distinct species. The eastern form I have kept separate at the suggestion of Professor Heinrich Mayr of Munich, who visited the North-West Himalaya and Sikkim in 1887. As regards the 2 western forms my own experience is to the effect that, as you ascend to the higher ranges, the low level long-leaved form, with a tall trunk and a dense cylindric crown, gradually changes into the stunted tree with spreading branches and short leaves of the high level form. I have never seen the two growing together. The high level spruce of the Alps is analogous, it is a stunted tree with stiff branches and shorter leaves than the low level spruce, yet both are justly regarded as one species.

There is, however, this remarkable fact, that hitherto the seed of the two Silver firs of the Western Himalaya has come true, whenever cultivated in England and Ireland, and hence gardeners and arboriculturists in this country regard them as distinct species, in the same way as the three Cedars, *C. Deodara, Libani* and *atlantica* are regarded as distinct species. In his Flora of British India v. 633, Sir Joseph Hooker calls the Himalayan Cedar: *C. Libani*, var. *Deodara*. In this case I venture to think that it is more consistent to abide by the old-established practice and to regard the 3 Cedars as distinct species. They most probably are ideal forms of a tree, which in remote ages, when the climate of the Mediterranean region and Western Asia was moist and cool, extended from the Atlas to the Himalaya, but they have been separated so long that they have acquired distinct though not very important characters. In deference to Mr. Gamble and to English arboriculturists, I have in this Book separated the 2 West Himalayan Silver firs, but I wish it to be distinctly understood that their case is quite different from that of the 3 Cedars. Seeds of the high level *A. Webbiana* should be cultivated in Jaunsar to see whether there also the tree comes true from seed.

4. PICEA, Link; Fl. Brit. Ind. v. 653.

Species 12, Northern temperate and arctic zone.

P. Morinda, Link; Collett, Simla Fl. 487, fig. 160.—Syn. *Abies Smithiana*, Forbes; Brandis, F. Fl. 525; *Pinus Smithiana*, Wall. Pl. As.

Bar. t. 246; *P. Khatrou*, Royle III. t. 84; *Abies spinulosa*, Griff. Ic. Pl. As. t. 303. *The Himalayan Spruce*. Vern. Achara, Chitral; *Kachal*, Haz.; *Rai*, Kulu to Jaunsar; *Rau*, *Rajang*, Satelej; *Tes*, Kangra, Chamba.

A tall tree, usually 100-120, sometimes over 200 ft. high, branches horizontal, branchlets hanging tassel like, foliage dark green, bark greyish-brown, divided by shallow cracks into small rounded or 4-sided scales. L. spirally arranged all round the branches, stiff, pungent, 4-sided, 1-1½ in. long, readily deciduous when dry, articulate on a persistent ultimately woody base or cushion, the young shoots often capped by the old bud-scales. Male catkin usually single, cylindric, 1 in. long, sessile, antheriferous scale with a broad rounded denticulate apex, anthers linear. Cones cylindric, obtuse, 4-6 in. long, pendulous, dark brown, scales with a thin edge, seeds ½ in. long, wing broad, obliquely spatulate, ½ in. long.

Kurum valley 8-12,000 ft., associated with *Pinus excelsa*. Kafiristan. Chitral. Gilgit. Himalaya, common from Kashmir to Garhwal, 7-11,000 ft., often associated with *Quercus dilatata* and *semicarpifolia* and other broad-leaved trees, as well as with *Deodar*, *Pinus excelsa* and the Himalayan Silver fir. Does not extend far into the arid region; in Knapwar, Pangl is its limit on the right and Rispa on the left side of the valley. In Sikkim and Bhutan it grows in the inner valleys 8-15,000 ft. Fl. April-May, the cones ripen in the autumn of the same year. Specimens from the Chumbi valley have harder wood, but do not seem otherwise to differ from *Picea Merinda*. (See Addenda.)

Tinga Brunoniana, Carr.—Syn. *Pinus Brunoniana*, Wall. Pl. As. Bar. t. 247; *Abies densa*, Loudon. Vern. *Tangre Salla*, Nep.; *Tangshing*, Bhutia. North-East Kumaon, forming forests at 9-10,000 ft. Nepal. In the Srikaha valley, tributary of the Bille Rangit and elsewhere in the middle and inner ranges of Sikkim, forming extensive forests below the Silver fir at 6-10,000 ft. Bhutan. A tall tree, attaining 120 ft., branches spreading, branchlets pendulous. L. distichous, ½-1 in. long, white-mealy beneath. Cones oval, ½-¾ in. long, scales broadly elliptic, obtuse, supporting scales not projecting in the mature cone. Fl. May, June, cones ripen the same year.

Larix Griffithii, Hook. f. & Thoms.; Hook. Him. Plants t. 21. Vern. *Sak*, Sans. Sikkim. Inner ranges of East Nepal, Sikkim and Bhutan, 8-12,000 ft. Tibet, 9-12,500 ft. A moderate-sized tree, heart-wood red, branches long, pendulous, foliage pale green. L. deciduous, slender, 1 in. long, single on elongated shoots and seedlings, otherwise in dense fascicles on arrested branchlets. Cones cylindric, 2-3 in. long, erect (reversed) on the pendulous branchlets, scales persistent, supporting longer than ovuliferous scales, tips reflexed cuspidate.

5. CUPRESSUS, Linn.; FL Brit. Ind. v. 645.

Leaves small, scale-like, closely appressed, opposite, mostly imbricate, those of seedlings (juvenile form) needle-like, spreading, in whorls of 3 or 4. Fl. monoecious at the ends of short branchlets, male catkins cylindric, numerous, stamens stipitate, peltate, bearing on their lower edge 2-4 subglobose anther-cells. Scales of ♀ cones few, decussate, those at the base and at the apex sterile, the others bearing above their base 4-8 erect ovules, supporting scales none. As the cones mature the scales become woody peltate and angular, each with 4 or more small compressed winged seeds, cotyledons 2-3.

1. *C. torulosa*, Tra. *The Himalayan Cypress*. Vern. *Devi diar*, Ravi; *Galla*, Satelej; *Lauri*, Jauns.; *Surai*, *Raisal*, Garhwal, Kumaon.

A large tree, branches horizontal, whorled, with drooping branchlets, forming a broad pyramidal crown, bark peeling off in long thin strips, heartwood light brown, fragrant. L. closely imbricate, triangular. Cones clustered, ½ in. diam.

Outer range of the Himalaya from Chamba to Nepal, 6-9,000 ft., chiefly on limestone, in places abundant, but more local and less common than most other Himalayan Conifers. Fl. Feb-Apr., fr. ripens in the autumn of the second year, and is often long persistent on the tree. 2. *C. sempervirens*, Libn. Planted in gardens in Afghanistan and North West India, as well as throughout the Mediterranean region. A tall tree, stem naked, branches erect, forming a narrow dense cylindric crown of dark green foliage. Cones few, 1 in. diam., scales rough, with a projecting, convex or keeled,

point or less. *J. c. glauca*, Lamk. (*C. Issitunicus*, Mill.) commonly cultivated in Western India above Ghat, foliage and cones bluish, may belong either to 1 or to 2.
J. c. lanata, Endl. The weeping *Cupressus* (Chandlang), Bhutia. Indigenous on the hills about Ichang, China. Cultivated, chiefly near Buddhist temples and monasteries, in Nepal, Sikkim, and Bhutan. A large handsome tree, branches pendulous, branchlets distichous, cones $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., seeds small, broadly winged.

* JUNIPERUS, Linn.; Fl. Brit. Ind. v. 646.

Shrubs or trees, with distinct, generally red and fragrant heart-wood. Leaves either all linear or subulate, in whorls of 3, or dimorphous, viz. (a) scale-like, imbricate, usually opposite and decussate, (b) subulate and spreading. Fl. monoecious or dioecious, axillary or at the ends of short branchlets, $\frac{1}{2}$ small cylindrical or ovoid catkins, stamens broad-ovate, whorled, imbricate, with 3-6 anther-cells at its base. Cone ripening the second year, fleshy, nearly globose, consisting of 3-6 connate carpellary scales (the lower sterile), the tips of which are often visible on the surface of the ripe fruit. Seeds 1-3, testa coriaceous.

A. All l. linear, pungent.

1. *J. communis*, Linn. Vern. *Betar*, *Bithal*, *Chamba*; *Pans*, *Tails*, *Kunawar*.—Almost throughout the temperate and subarctic regions of the Northern Hemisphere. Kuram valley, 11-13,000 ft. North-West Himalaya, 5,400-14,000 ft., as far as Garhwal and Kumaon, east of the Sutlej restricted to high elevations. Werang pass, Kunawar. A dense diffuse shrub, sometimes a small tree, procumbent at high elevations. L. in whorls of 3, spreading, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, pungent, whitish above, convex or obtusely keeled beneath, with a more or less prominent cushion on the branchlets, persistent 2-4 years. Fl. axillary, supported by small imbricating bracts, the male catkins ovoid, yellow, antheriferous scales broad-ovate, acuminate, the $\frac{1}{2}$ small, resembling leaf-buds. Berries blue-black, $\frac{1}{2}$ - $\frac{3}{4}$ in. diam., the tips of the carpellary scales visible at the apex, pulp sweet, resinous, seeds generally 3. A dwarfed variety at high elevations with broader l. and very pronounced leaf-cushions may perhaps be identified with *J. communis*, Willd., the dwarf Juniper of Europe. *Bhiterail*, Chitral (prostrate, Barnst).

2. *J. recurva*, Ham. The weeping blue Juniper, Hook. Himal. Journ. II. 28. Vern. *Beltar*, *Puni*; *Bhakra*, *Kaghan*; *Guggal*, N.W. Himal. Kuram valley, 10-12,000 ft. Himalaya, Kashmir to Bhutan, 7,500-12,000 ft. Occasionally planted near temples in Tibet. A gregarious shrub, often covering large areas, either pure or mixed with *J. communis*, the stems decumbent, at times 6 in. diam., very long, running underground or along the surface. From these creeping stems rise numerous short erect branches, which make these thickets almost impenetrable. In Sikkim and Bhutan, a graceful tree, attaining 30 ft., with drooping branchlets, foliage glaucous blue, heart-wood reddish-brown. L. more or less appressed, in whorls of 3, $\frac{1}{2}$ in. long, lanceolate, pungent, back convex, often approximate and imbricate, when the branchlets are more or less 4-sided. Male catkins and berries at the end of short lateral leafy branchlets. Berries ovoid, pointed, $\frac{1}{2}$ - $\frac{3}{4}$ in. long, dark brown or blackish-purple when ripe, seed 1, oblong. *J. squamata* is the procumbent variety with broader often incurved leaves.

B. L. dimorphous, on most branches scale-like, decussate, appressed, imbricate, on some subulate, pungent, erect or spreading.

3. *J. macropoda*, Boiss.—Syn. *J. excelsa*, Brand. F. Fl. t. 68. *Himalayan Pencil Cedar*. Vern. *Appurz*, *Ghushki*, *Baluch*; *Obusht*, *Pushtu*; *Sârâs*, *Chitral*; *Sâr*, *Lahaul* and *Kunawar*; *Shâr*, *Upper Chenab* and *Sutlej*; *Dâup*, *Garhwal* and *Kumaon*.

A small or middle-sized tree, rarely attaining 50 ft., trunk short but of great girth, bark exfoliating in long fibrous stripes. Foliage light and open, the scale-like l. usually opposite, rhomboid, convex, obtuse, closely appressed up to the apex, with a large resinous gland on the back, the subulate l. opposite or in whorls of 3, pungent, $\frac{1}{2}$ in. long. Male catkins at the ends of branchlets $\frac{1}{2}$ - $\frac{3}{4}$ in. long, closely set with imbricate scales. Berries nearly globose, bluish-black when ripe, very resinous, the tips of the scales forming transverse ridges, seeds 2-5.

Baluchistan, 7-10,000 ft., forming open forests of considerable extent, often pure sometimes mixed with *Picea* and *Frasinus*. Kuram valley, forming fully half the forests at 9,000 ft. in the Hariâb districts. Chitral, in forests above 8,000 ft.

Inner arid ranges and valleys of the North-West Himalaya, as far as Nepal, 5-14,000 ft. Fl. in summer, the fr. ripens in Sept. of the second year.—Afghanistan, Persia. Masent. Nearly allied to and probably not different from *J. ensata*, M. Bieb., a tree of the mountains of Asia Minor and Syria, with which it was identified in my old Forest Flora. 4. *J. Wallichiana*, Hook. l. & Thoms.—Syn. *J. pseudo-sabina*, Fisch. & Mey.; Hook. f. in Fl. Brit. Ind. v. 646. Himalaya 9-15,000 ft., extending into the dry region of Western Tibet and Kuzawar. In the North-West a large gregarious shrub, covering extensive areas at the limit of tree-vegetation, associated with the alpine Birch and *Rhododendron campalotense*. In the inner ranges of Sikkim, a tree with spreading branches, attaining 60 ft. (The black Juniper, Hook. Hinn. Journ. II. 58). Foliage bushy, the scale-like l. opposite, decussate, ovate, in 4 rows, so as to make the branchlets 4-sided, more or less beaked at the back, apex not closely appressed. Berries ovoid, acute, $\frac{1}{4}$ - $\frac{1}{2}$ in. long, blue when ripe, seed 1.

Crypsomeria japonica, Don. China and Japan. A stately fast-growing tree with dark green foliage, heart-wood fragrant, dark reddish-brown. L. sharply quadrangular, the lower edge decurrent upon the branch. Fl. monocious; male catkins $\frac{1}{2}$ - $\frac{3}{4}$ in. long, clustered at the ends of branchlets, anther-cells 3-5 at the base of scales, pollen globose. Cones globose at the ends of branchlets, the axis often growing out into a leafy shoot. Supporting scales acuminate, half adnate to the ovuliferous scales, ovules erect, 2 at the base of each scale. Mature cones $\frac{1}{2}$ in. diam, scales woody pectinate, and persistent after the seeds have fallen. Seeds $\frac{1}{2}$ - $\frac{3}{4}$ in. long, compressed angular, with a narrow sharp edge. This valuable tree has been planted with other species on a very large scale in Japan, more than 200 years ago, a proof of the wonderful foresight of the great Japanese nation.

7. PODOCARPUS, L'Herit.; Fl. Brit. Ind. v. 649.

Shrubs or large trees, l. linear, lanceolate or elliptic-lanceolate, sometimes small, appressed. Fl. usually dioecious, ♂ axillary, solitary or fasciated, often cylindrical, antheriform; scales numerous, imbricate, with two cells on the under side, pollen-grains with two large round wings. ♀ usually solitary and pedunculate. Ovules reflexed on a stalk, consisting of connate bract and scale. Seed globose or ovoid, seated on the enlarged fleshy stalk, testa often fleshy outside, cotyledons 2.

1. *P. neriifolia*, Don.—
Syn. *Nageia bracteata*, Kurz.
Vern. *Ghūsi*, Nep.; *Thitminpo*,
Burma.

tall tree, branches whorled, bark thin, fibrous, wood light yellow, even-grained, moderately hard. L. scattered, linear, thickly coriaceous, 5-10 in. long, midrib prominent on both surfaces. Fl. ♂ 1-2 in. long, sessile, clustered. Seeds solitary, globose, $\frac{1}{4}$ - $\frac{1}{2}$ in. diam.

Nepal. Sikkim, evergreen forests of the outer hills, ascending to 3000 ft. Assam. Khasi hills, Cachar, Chittagong, Assamans, at the bottom of valleys, not on the hills, often gregarious. Evergreen forests of the Bithoko range, Martaban, 2-3000 ft. (D.B. May 1859). Tenasserim (Kurz). Wood highly prized in Burma. The leaves remain 2 years on the branches.

2. *P. latifolia*, Wall. Pl. As. Bar. t. 80; Bedd. Fl. Sylv. t. 257.—Syn. *P. Wallichianus*, C. Presl; Pilger in Engler's Pflanzenreich iv. 5, 59; *Nageia latifolia*, Gordon. Vern. *Niramballi*, Tam.; *Thitmin ma*, Burm.



Fig. 201. *Podocarpus latifolia*, Wall. $\frac{1}{2}$.

A large tree, wood slightly aromatic. L. opposite or nearly so, 4-7 by 1-2 in., lanceolate or elongate-elliptic, acuminate, longitudinal n. numerous. Fl. ♂ $\frac{1}{2}$ in. long, in pedunculate clusters, antheriferous scales ovate acuminate. Seeds solitary, $\frac{1}{4}$ in. diam., seated on a cylindrical fleshy scaly stalk.

Khasi hills, Cachar. Maristan and Tenasserim. Timmerhill charts 3-5,000 ft.—Malay Peninsula, Java. This must not be confounded with *P. latifolia*, B. Br.; Pilger in Engler's Pflanzenreich iv. 5, 90.—Syn. *P. Thunbergii*, Hook.; *Taxus latifolia*, Thunb., which is the Yellow Wood (*Geelhout*) of South Africa.

1. *P. compressa*, Rob. Brown; Blume, Rumphii III. 218, t. 172, fig. 2.—Syn. *P. imbricata*, Blume; Pilger in Engler's Pflanzenreich v. 5, 91. Upper Burma on water parting between Hukong and Mogaung valleys (N. B. Thompson, March 1895). Mogaung valley near Serpentine Mines (Griffith, April 1897).—Malay Peninsula, and Archipelago, Philippines, New Guinea. A tall tree, l. dimorphic, (a) on short sterile branchlets linear, flat, pungent, distichous, 1- $\frac{1}{2}$ in. long, (b) on longer branchlets small acute, more or less appressed, $\frac{1}{8}$ in. long. The seed-bearing branchlets frequently have small appressed l. in the lower part and longer ones, up to $\frac{1}{2}$ in. long in the upper portion. ♀ fl. almost enclosed by the uppermost l. Seed and fleshy stalk red.

Dacrydium elatum, Wall. Tenasserim, Kurz (doubtful).—Hills of Malay Peninsula, Ind. Archip. Cochinchina, Tonkin. A large tree with spreading branches and weeping branchlets. Leaves dimorphic, (a) small closely-embriate triquetrous and (b) needle-shaped, 4-sided, pungent, $\frac{1}{2}$ - $\frac{1}{3}$ in. long. Fl. ♂, small catkins at the ends of branchlets, scales flat with 2 anther-cells on the back at the base. ♀, a few ovuliferous scales in a short spike, ovule 1 at the base of scale often bent down when young. Seed erect, base enclosed in a shallow cup (epimatium, Pilger).

8. *T. as.* Linn.; Fl. Brit. Ind. v. 648.

T. baccata, Linn. (the only species). Vern. *Barua*, *Barmi*, *Thunu*, *Pb.*; *Arkhan*, *Bash.*; *Yandul*, *Kunawar*; *Thuner*, *Jauns.*; *Dhugre Sallo*, *Nep.*

A slow-growing and long-lived tree or shrub, bark reddish-grey, thin, smooth, peeling off in longitudinal shreds, heart-wood hard, usually reddish-brown. Foliage dark green, l. flat, linear, distichous, 1-1 $\frac{1}{2}$ in. long, 1-nerved, narrowed into a very short petiole, no resin canal. Fl. dioecious, on short axillary branchlets, which are densely clothed with imbricating bracts. ♂ pedicelled, subglobose, with numerous peltate scales, each bearing on the underside 3-6 anther-cells, dehiscing longitudinally. ♀ a single erect ovule, surrounded at the base by a disc, which is membranous in fl. but enlarges into a red fleshy cup, surrounding the seed, testa hard, embryo in the upper portion of the endosperm, cotyledons 2, thick fleshy.

Throughout the Northern hemisphere in the temperate and warmer regions, on mountains in the tropics. 6 subspecies are recognized, subsp. *Wallichiana* in India. Kuram valley 7,500-8,000 ft. Himalaya 6-10,000 ft. in shady ravines. Khasi hills. Ruby Mines hills in Upper Burma above 5,000 ft. Fl. March-May. Fr. Sept.-Nov. L. persist 6-8 years.

9. CEPHA^OTAXUS, Sieb. et Zucc.; Fl. Brit. Ind. v. 647.

Dioecious shrubs or trees, l. alternate, distichous, flat, linear, a large resin-canal near the underside, between epidermis and the fibro-vascular bundle of the midrib. ♂ fl. 6-11, in axillary globose heads (compound catkins) supported by a small involucre of imbricating scales, fl. in the axils of membranous bracts, stamens 7-12, each consisting of a stipitate scale, bearing on its back 2-3 anther-cells, pollen-grains globose. ♀ fl. small pedunculate cones, several in the axils of bracts at the base of terminal shoots, which lengthen out after the cones have been fertilized, bracts at the base of peduncle and sometimes also higher up. Scales 6-20 on the fleshy axis of the cone, each with 2 ovules at the base, one of which only develops. At a later stage the scales become fleshy and often confluent, so that the immature seeds appear as if enclosed in fleshy cups. Seeds large, usually one or two only in each cone, testa fleshy, resinous, with a thin inner hard woody layer. Embryo in the

upper portion of the endosperm, cotyledons 2. Species 6, closely allied. Eastern Asm.

A. L. narrowed towards the base.

1. *C. Manni*, Hook. f. Khasi, Jaintia and Naga hills 4,500-6,500 ft. A small tree, l. green beneath, 1-1½ in. long, gradually narrowed into a sharp point, midrib prominent on the upper, less so on the underside. Seed 1½ in. long, striate. Gaibler, Indian Timbers vol. II. p. 700, gives this from Upper Burma. I have not seen specimens. *Taxus laevata*, which is common in the Ruby Mines hills has sometimes been confused with this species, from which it may be distinguished by the absence of resin-canals in the leaves. 2. *C. Fortunei*, Hook. f. China. Pilger, Taxaceæ, 103, gives this from the Ruby Mines, Upper Burma. I have not seen specimens. A small tree, l. white beneath, 2-3½ by 1-1½ in., gradually narrowed into a sharp point. Peduncle of ♀ fl. surrounded at base by broad and short, higher up by lanceolate bracts ½ in. long, ovules 2 at the base of an ovate scale.

B. L. with a broad rounded base.

3. *C. Griffithii*, Hook. f. Mishmi hills, Assam. Manipur. Bernardiaye, Ruby Mines district, 5,500-6,500 ft. A middle-sized tree, bark brown, polished. l. falcate, whitish beneath, 1½ by 1 in., abruptly narrowed into a point, midrib prominent on the upper side. Pilger, Taxaceæ, 104, refers *C. Griffithii*, Oliver, Ic. Plant. t. 1838 (non Hook. f.) to *C. Oliveri*, a Chinese species with thick rigid l., the midrib not prominent above.

ORDER CXV. CYCADACEÆ. Gen. PL ii. 443.

Small trees, trunk cylindrical, sometimes branched. A terminal crown of leaves, bands of short coriaceous mostly woolly scales alternating with bands of large pinnate palm-like leaves. Fl. dioecious, at the apex of the trunk among the leaves, the male usually in erect cones, sometimes two together, formed of numerous thickened, flat or variously peltate scales, bearing innumerable globose anther-cells on the under surface. Anther-cells dehiscing by a longitudinal slit, often arranged in stellate groups of 3-5. Female: carpellary leaves (carpophylls) in cones or in crowded whorls round the apex of the stem, ovules large, sessile, orthotropous, integument one, near the micropyle free and often prolonged into a beak. Several months elapse between the growth of the pollen-tube and fertilization, which is effected through motile spermatozoids, analogous to *Ferns* and to *Gingko* among Conifers. Seed large, embryo enclosed in copious endosperm, the radicle attached to a long twisted filiform suspensor. Cotyledons 2.

In many species (*Cycas* particularly) the alternate bands formed by the persistent base of scales and leaves can be clearly distinguished on the outside of the trunk, the bands formed by the base of leaf-stalks being more prominent, having the appearance of thick annular cushions. The stem of Cycads is remarkable by the large size of pith and bark, both consisting of parenchymatous cells, usually filled with starch. Mucilage canals, often branched and anastomosing, lined by thin-walled secreting cells, are frequent in the bark, whence they extend to the leaves, and they are also found in the pith. Wood, cambium, bast, and medullary rays are arranged as in Conifers; the wood, apart from the medullary rays, consists entirely of long tracheides, more or less radially arranged, usually with several parallel lines of bordered pits on the radial face, the pits oblong, not circular as in Conifers. These tracheoides in some cases have spirally and scalariform thickened walls, and they might, save that their ends are not perforated, be classed as vessels. The fibro-vascular bundles (leaf-traces), which enter the petiole, run for a considerable distance through the bark before joining the central cylinder; their course is not straight, they are bent in a remarkable manner, and often anastomose. In *Cycas* and *Neocphalartos* the action of the cambium ceases, after the first central cylinder (wood and bast) has been formed, and then a fresh more or less concentric cambium layer appears in the bark, which forms a second ring of wood and bast outside the first, and this process is repeated several times, the result being on a transverse section a number of more or less concentric masses of wood, which sometimes anastomose, separated by softer layers of bast and parenchymatous tissue.

CYCAS, Linn.; FL. Brit. Ind. v. 656.

(Kuno, Befruchtung bei *Cycas revoluta*, Pringsheim, Jahrbücher, xxxiii. 557.)

Trunk annulate or clothed with the woody bases of the petioles, leaves pinnate, leaflets coriaceous, linear, quite entire, usually stiff and pungent, with a prominent midrib, involute in veneration, the lower often reduced to spines. Scales of the ♂ cone closely imbricated, cuneate, and usually prolonged in a long acuminate point. Carpophylls densely woolly, numerous in crowded whorls round the top of the trunk, at first loosely imbricate on an apparently terminal cone, then spreading, narrowed into a shorter or longer flat stalk, which bears 1-5 pairs of ovules on its edge, upper portion more or less dilated into an entire or pectinate blade. Species 12, tropical Africa to Polynesia.

A. Margin of leaflets flat.

(a) Blade of carpophyll dentate, longer than broad.

1. *C. circinalis*, Linn.; Rheede, Hort. Malab. iii. t. 15-21. Vern. *Oruguan*, *Orugano* Uriya; *Per ita*, Tel.; *Todde Prana*, Mal. Western Peninsula, deciduous forests of the Western Ghats to 3500 ft., from Malabar southwards. Hills on the east side, north as far as Orissa.—Ceylon, moist region up to 1500 ft. Eastern tropical Africa, Madagascar and Comoro islands. Malay Archip. Attains 40 ft. and grows to the age of 100 years (Rheede), trunk usually 15 ft. high, with prominent annular leaf-scars. L. 5-9 ft. long, leaflets 80-100 pairs, 8-12 by $\frac{1}{2}$ in., upper side shining, petiole with numerous short spines. Male cone 1-2 ft. Carpophylls 6-12 by 1-1 $\frac{1}{2}$ in., blade ovate-triangular with sharp narrow teeth, stalk long, bearing in its upper portion 6-12 ovules. After flowering the terminal bud in this and other species often grows out into a prolongation of the trunk. Seeds ovoid, pale reddish-yellow, 1 in. long, endosperm filled with starch.

2. *C. Rumphii*, Miq. Vern. *Mondaino*, Burm. Beach Forests on the coast of the Andamans, Nicobars, Coco islands and South Tenasserim.—Malay Penins. and Archip. New Guinea. North Australia. Similar to 1. Attains 50 ft. and nearly 5 ft. in girth on the Coco islands (Prain), on the Andamans it generally is only 4-6 and not more than 15 ft. high. Trunk very rough, often branched. L. dark glossy-green, 3-6 ft. long, leaflets 50-60 pair, 9-15 by $\frac{1}{2}$ in., petiole at base $\frac{1}{2}$ in. broad. Carpophylls densely waxy-villose, blade from ovate to ovate-lanceolate, teeth small, ovules 6-10 on the upper portion of the stalk. Seeds compressed, ovoid-oblong, 2-3 in. long, poisonous when raw.

(b) Blade of carpophyll as broad as long, deeply pectinate.

3. *C. pectinata*, Griff.—Syn. *C. Jenkinsiana*, Griff. Vern. *Thakul*, Nep.; *Mondaino*, Burm. Nepal, foot of hills. Sal forests of the Sikkim Terai and outer valleys. Assam, Khasi hills, Manipur, Chittagong, Shan States. Forests of *Dipterocarpus obtusifolius* and *Pisonia Khasia* on the Martaban hills. Trunk 4-8 ft. glabrous, 4-6 ft. long, leaflets 6-10 by $\frac{1}{2}$ in. Carpophylls densely waxy-silky, blade almost orbicular, 3 in. diam., cut into strong subulate spiny teeth, $\frac{1}{2}$ in. long, and terminating in a strong, subulate acumen, about 1 in. long, stalk as long as, or shorter than blade, ovules 4-6, glabrous. Seed ovoid, glabrous, 1 $\frac{1}{2}$ -2 $\frac{1}{2}$ in. long, orange-red or yellow.

4. *C. siamensis*, Miq. Vern. *Mondaino*, Burm. Eng forests of the Prome district and of Upper Burma.—Siam, Cochinchina, Yunnan. Often almost stemless, but at times with a trunk up to 5 ft. long, 8-12 in. diam., 1-2-3 ft. long, rusty-villose when young, leaflets thin, 5-8 by $\frac{1}{2}$ in. Carpophyll blade ovate-rhomboid, long-acuminate, at first densely waxy-tomentose, ultimately nearly glabrous, one ovule on each side of the stalk at the base of blade. Seed ovoid-oblong, smooth, $\frac{1}{2}$ in. long. It is doubtful whether this is the species cultivated as *C. siamensis* in European gardens.

B. Margin of leaflets revolute.

5. *C. revoluta*, Thunb. China, Southern Japan, Formosa, Tonkin. Commonly cultivated in gardens. Trunk 6 ft., densely clothed with the old leaf-bases, 1-2-6 ft. long, petiole thick, quadrangular, leaflets narrow. Carpophylls 4-9 in. long, blade ovate, lacinate nearly to the midrib, stalk longer than blade with 4-6 ovules. Immature seed densely tomentose. 6. *C. Beddardii*, Dyer in Trans. Linn. Soc. Ser. 2, Bot. II. t. 17. Cuddispath district, Madras. Trunk short, 1-3 ft. long, rachis quadrangular, leaflets 5-7 by $\frac{1}{2}$ in. Male cone 9-13 in. long, 2-3 in. diam., scales long-acuminate, the lower erect, the upper strongly recurved. Carpophyll 4-8 in., blade ovate-lanceolate, with long linear teeth, ovules 2-4. Seeds nearly globose, $\frac{1}{2}$ in. long.

ADDENDA

While the printing of the present work was in progress a considerable number of books and papers were published which have greatly increased our knowledge regarding the characters and geographical distribution of species mentioned in this book. Some of these publications also contain descriptions of new species, alterations of names and valuable notes which it is desirable to record here. The principal of these publications are the following:—

1. Theobald Cooke, C.I.E. Flora of the Presidency of Bombay, Vol. I. (1903), Vol. II. part I. (1904), part II. (1905).
2. David Prain. Bengal Plants (1903).
3. J. E. Duthie. Flora of the Upper Gangetic Plain, Vol. I. part I. (1903), part II. (1905).
4. Annals of the Royal Botanic Garden, Calcutta, Vol. IX. New and rare Indian Plants (1901), Vol. X. Prain, the species of *Dalbergia* of South Eastern Asia (1904).
5. Records of the Botanical Survey of India, Vol. I. (1902), Vol. II. (1903), III. I (1904), 2 (1905).
6. Hooker's Icones Plantarum.
7. Journal of the Asiatic Society of Bengal.
8. Journal of the Bombay Natural History Society.
9. Annals of the Royal Botanic Gardens, Peradeniya.
10. The Indian Forester, with botanical contributions by Prain, Duthie, Bourdillon, Hob. Rogers, Gunnison, & W. Lushington and others.
11. The following parts of Engler's Pflanzenreich: Part. *Acroces* (1902); *Koeko-Lythraceae* (1903); Winkler, *Bataluceae* (1904).

In addition to these I owe to the kindness of my friends in India numerous specimens and notes which arrived after the orders to which they belong had been printed, and which, as far as was possible, have been noticed here. Authorities are omitted in the names quoted from the book.

- P. 2. *Clematis Gandiana*. North Bengal. Chulia Nagpur.
 " " *C. Wrightiana*. Orissa.
 " " *C. orientalis*. Punjab Salt Range—Western Asia. Baluchistan.
 " " *C. Buchaniana*. Vern. *Kamra-badi*, Jauns.
 " " *C. coccinifera*. Burma.
 " " *Narcissus sylvatica*. Bengal.
 " 3. *Dillenia*, strike out: with an arillus.
 " 4. *Dillenia pentagyna*. Behar. Chulia Nagpur.
 " 8. *Michelia Champaca*. Shady valleys in Sincbum (Haines).
 " 11. *Scaevola longiflora*. Ryang valley, Sikkim.
 " 12. *Millettia macrocarpa*. Upper Burma.
 " 15. *Polyalthia fragrans*. Orissa.
 " 16. *Usnea damosa*. Upper Burma.
 " " *Usnea pinnata*. Ryang valley, Sikkim. Upper Assam.
 " 17. *Uvaria ferruginea*. Tipperah.
 " " *U. Narua*, Wall. Orissa.
 " 20. *Goniolobos Griffithii*. Andamans.
 " Add: 7. *G. peduncularis*, King and Prain in Ann. Gard. Calc. IX. t. I. Kachin hills, Upper Burma. Glabrous, fl. solitary, erect, 1½ in. long.
 P. 23. *Gonolobos Pareira*. Branches from a long creeping woody rhizome or on a short stout stem.
 P. 24. *Cyrtia peltata*. Great Coco. Andamans. Nicobars.

- P. 24. *Tinospora cordifolia*. Punjab, Bengal, common. Minbu district, Upper Burma.
- P. 25. *Anacardium occidentale*. Orissa.
- " 26. *Tillandsia cucullata*. Minbu district, Upper Burma.
- " 27. *Pyrenarrhena planiflora*. Chittagong.
- " *Hemistachya Thunbergii*. Chittagong.
- " 28. *Hibbertia latifolia*. Vern. *Bau kabai*, Haz. Fr. purple. — From Hazara eastwards.
- P. 32. *Bauhinia variabilis*. Vern. *Thamso*, Burma.
- " Add: *B. prunoides*, Guss. in *Records Bot. Survey, India* III. 23. Minbu district, Upper Burma. A shrub, branches softly pubescent, l. ovate or obovate, nearly glabrous, fr. dark brown, smooth, 1 in. diam.
- P. 32. *Crotalaria religiosa*, Forsk. Dr. Stapf has kindly informed me that this name only applies to the Tahiti tree, and that the species of tropical Africa are different from the Indian and Polynesian species. Kurz, in *Journal of Botany* 1873 p. 163, describes 5 species of British India: 1. *C. Buxarjii*, which should now be the name of the common Indian tree. 2. *C. hypoleuca*. 3. *C. lophosperma*. 4. *C. malacensis*, Ham. Subhimalayan tract from Sikkim eastwards. 5. *C. Narcata*, Ham. Along the western coast of Hindustan.
- P. 33. *Capparis zeylanica*. Midnapore, Orissa.
- " 34. *C. apollonia*. Waste lands of the Deak.
- " *C. gracilis*. Minbu district, Upper Burma.
- " *C. zeylanica*. Often climbing. Bengal, Sundrihan, near the coast. Coco Islands, Andamans.
- P. 35. *C. floribunda*. Orissa.
- " *C. horrida*. Vern. *Arlamla*, Sind.
- " *C. andamanica*, King, is *C. floribunda*, Wight. King in *Ann. Gard. Calc.* IX. 8.
- " Add: G. Cathcart, *Hemsl.*; *Ann. Gard. Calc.* IX. t. 10. Sikkim, outer hills, 4-5000 ft. A large glabrous climbing shrub, nearly allied to *C. floribunda*, fl. in pedunculate umbels, 1½ in. across, stamens 28-36.
- P. 36. *C. crassifolia*, Kurz, and *polymorpha*, Kurz, dry districts of the Irawadi valley, probably are forms of *C. horrida*.
- P. 36. *C. subulifolia*, Hook. f. and Thoms. Upper Burma.
- " 39. *Flacourtia catalpaeflora*. From the Jumna eastwards. Chittagong.
- " 40. Fig. 16 is *F. spinaria*, Roxb., not *F. Hamoutchi*.
- " *Xylocarpus longifolius*. Singbhum. Upper Burma.
- " *Gymnocardia odorata*. Makim forest, common, pulp of ripe fr. powerfully fragrant.
- P. 42. *Tournefortia Kurzii*. Chittagong. Minbu district, Upper Burma.
- " Add: *Asteriasigma macrocarpa*, Hedd. *Fl. Sylv.* t. 266, Manual t. 27. *Syn. Hydrocarpus macrocarpa*, Warburg in Engler u. Prantl, III. 6a, 21. Travancore glans 2500 ft. A large tree, young shoots minutely aureo-pubescent, l. entire, blade glans 2500 ft. A large tree, young shoots minutely aureo-pubescent, l. entire, blade 10-12 by 2½ in. Fl. whitish, 1 in. across, polygamous, ♂ and ♀ in few-8d fascicles on the older branches. Sepals 4, much tuberculate, petals 12-16, shorter than sepals, on the edge with broad scale-like hairs, furnished inside near the base with a ciliate on the edge with broad scale-like hairs, furnished inside near the base with a thick hairy 3-lobed scale. Stamens 60-70, in two or three rows, ovules 6 on 6-7 parietal placentas, stigmas as many as placentas, large, sessile, 2-lobed. Fr. globose, 5 in. diam., pericarp woody, seeds numerous, angular, testa crustaceous. Warburg unites *Tournefortia* and *Asteriasigma* with *Hydrocarpus*.
- P. 46. *Tamarix gallica*. Bengal, Banks of the Irawadi river.
- " *T. Pallavis*, Desv., a glaucous form of *T. gallica*. Baluchistan. Western Tibet. — Western Asia.
- P. 47. *Mericaria germanica*. Vern. *Sushar*, Pangl, Lahaul, this name does not apply to *Tamarix trioides* (p. 46).
- P. 48. *Hypericum patulum*. Upper Burma.
- " 52. *Garcinia laevifolia*. Kachin hills, Upper Burma.
- " *Garcinia Cava*. Upper Burma. Vern. *Yekobyin*, Burm.
- " 53. *Ocrotocarpus longifolius*. Orissa. Chittagong.
- " 54. *Calophyllum longifolium*. Vern. *Phe agit*, Tavoy. Saline tracts, Minbu district, Upper Burma.
- P. 56. Add: 4. *Kaya zanzibica*, King and Prain in *Ind. For.* XXVII. p. 62. Vern. *Nio nahor*, Ass. North Lakhimpur. A large tree, bole straight, wood hard and heavy. L. 3½-4 in., sec. n. faint (in *K. floribunda* more conspicuous). Fr. ½ in. diam. (in *K. florib.* 1½-1½ in.).
- P. 58. *Ficus*. Species 10, Eastern Asia, Pacific Islands.
- P. 58. *Ficus japonica*. Western Duars. Chittagong.
- " 60. *Schinus molle*. A large tree, hills east of Bhamo 6-7500 ft., common.
- " 62. *Saurauja nepalensis*. A glabrous variety, l. spinulose-serrate, numerous subulate scales on petiole and underside of l., in Sikkim and the Khasi hills.

- P. 65. *Dipterocarpus obtusifolius*. Andamans.
 " 66. *D. tuberculatus*. Chittagong.
 " " *D. alatus*. Andamans.
 " " Add: 10. *D. Griffithii*, Miq. Andamans, Mergul. A tall tree, leaf-buds clothed with yellow shining hair, fruiting calyx $1\frac{1}{2}$ - $2\frac{1}{2}$, wings 5-7 in. long, wings of calyx $\frac{1}{2}$ in. broad.
 P. 66. Add: 11. *D. scaber*, Ham. Tipperah; Prain, Bengal Plants 252. Regarding this and allied species see Brandis in Journ. Linn. Soc. XXXI, 98.
 P. 67. *Asiaptera glabra*. Mergul.
 " 68. *Palaucococcus*. Nambou, upper Irawaddi, lat. $25^{\circ} 20'$.
 " 67 and 71. *Hopon parviflora* and *Hightiana*, known in Tinneveli as *White Kanga*, may readily be distinguished as follows: *H. parviflora*. Vern. *Thavayam*, Travancore. Leaves: blade $3\frac{1}{2}$ by $1\frac{1}{2}$, pet. $\frac{1}{2}$ in., fl. cream-coloured, $\frac{1}{2}$ in. across, wings of fr. straw-coloured, under 2 in. *H. Hightiana*. Leaves: blade 5-8 by 2-3 in., pet. $\frac{1}{2}$ in., fl. yellow, tinged with red, $\frac{1}{2}$ in. across, wings of fr. red, 2-3 in. long. The two species of *Palasococcus*, known in Tinneveli as *Black Kanga*, differ by the following characters: *B. erecta*. Branchlets and panicles glabrous, pet. $\frac{1}{2}$ in., fruit $1\frac{1}{2}$ in. long. *B. villosa*. Branchlets and panicles hairy, petiole over $\frac{1}{2}$ in. long, fr. globose, $\frac{1}{2}$ in. diam. See Indian Forester, P. M. Lushington, XXIX, 323. Bourdillon, XXX, 18.
 P. 72. *Fatua Scapularis*. Mergul.
 " 75. *Hibiscus bilineatus*. Andamans. Grows as a tree on the sea coast and as a rampant climber in the dense forests of the Sundriban.
 P. 75. *Thespesia populnea*. Sundriban.
 " 76. *Thespesia Lampas*. Behar. Chutia Nagpur. Seeds dark brown and slightly rugose.
 P. 77. *Bombax insigne*. Style nearly undivided (in *B. malabaricum* 5-branched). The Travancore tree has large prickles on trunk, fl. salmon-pink, capsule pubescent (Bourdillon). A new one reported by Gage from the Minbu district, Upper Burma, in Records Nat. Survey India vol. III, 29.—Prain in Journ. As. Soc. Bengal vol. LXII, (1883), 65, unites *Acicoides* and *Bombax* and makes *B. asceps* a sub-species of *B. insigne*.
 P. 78. *Kydia calciana*. Vern. *Bhend*, Mar. *Pitshat*, Upper Burma.
 " 79. Add to *Malesian*: *Dicelostyles jayabhatta*, Benth.—Syn. *Kydia jayabhatta*, Griff. in Plant. As. 1, 593. Sikkim and Bhutan, 1,000-8,500 ft. A large tree, attaining 6 ft. in girth, young shoots grey-stellately tomentose, l. ovate, acuminate, blade 5-6 $\frac{1}{2}$, pet. $\frac{1}{2}$ - $1\frac{1}{2}$ in., basal p. 5. Fl. axillary, pedunculate, often in pairs. Calyx supported by a whorl of 4-5 leafy bracteoles, longer than calyx. Petals white, spatulate $1\frac{1}{2}$ in. long. Staminal-column $\frac{1}{2}$ - $\frac{1}{4}$ in., divided into 15 short filaments, anthers uniform. Capsule enclosed by the calyx and supported by the persistent bracteoles, seeds 1-2.
 P. 80. *Sternalis arvensis*. Assam.
 " 83. *S. guttata*. Chittagong.
 " " *S. coarctata*. Vern. *Shaw-4*, Upper Burma.
 " 81. Add: 14 (c). *S. Kingii*, Prain in Journ. As. Soc. Bengal 78 (1904), 192. Sikkim 2-3,000 ft. A small tree, l. ovate-lanceolate, 9-12 by 4-6 in., pet. 2-2 $\frac{1}{2}$ in. Calyx lobes lanceolate, $\frac{1}{2}$ in. long. Fr. of 4-5 red follicles, 4-5 by $1\frac{1}{2}$ in.
 P. 84. *S. caliginosa*. Andamans, Nicobars.
 " " *S. colorata*. Lushai hills. Andamans. Vern. *Kodarro*, Kattis*ar.
 " 85. *S. compressata*. Andamans.
 " 85. *Heritiera littoralis*. Strike out: Vern. *Sander*, *Sandri*, Beng.
 " 86. *H. Friesii*. Vern. *Sander*, *Sandri*, Beng. Forms nearly pure forests of large extent, stems buttressed, innumerable blind root-suckers under the trees.
 P. 88. *Eriolana quinqueocularis*. Chutia Nagpur.
 " 89. *Hillebrandia Inara*. Bengal.
 " " *H. hirsuta*. Chittagong.
 " 90. *Bastneria aspera*. Behar.
 " 92. Add to *Sterculiaceae*: *Mansonia Gagel*, Drummond. D. Prain in Journ. Linn. Soc. XXXVII, 250. Vern. *Kalamet*, Buru. On the hills along the Siamese frontier, 100 miles above the old town of Tenasserim, in evergreen forest. A tree with hard brown heart-wood which has an unpleasant smell when felled green, while the heart-wood of trees which have died naturally and have lain a long time in the forest gradually becomes scented, and is an article of export from Mergul. In structure the wood somewhat resembles Sandal wood, the medullary rays are narrow, but they are long, not short (as in Sandal) on a transverse section, the vessels are more numerous, smaller and often in radial groups of 2-4, the distance between med. rays is a little greater than the diameter of vessels. There are narrow oblique tangential lines of wood parenchyma between the rays, but they are less conspicuous than in Sandal. The structure is quite different from that of *Cordia fragrantissima*. See Brandis in Ind. For. XXVII, 516. L. elongate-elliptic, base

slightly cordate, blade 3-5 by 1-2 in., pet. 1 in., stipules lanceolate, 3-angled. Fl. bi-sexual, in axillary pubescent minutely stellate-pubescent compound corymbose pedicels fascicled, ½ in. long. Calyx spathaceous, enclosing the bud, stellately pubescent outside. Petals 5, ob-ovate, contorted in bud, ½ in. long. On a slender gynophore 1-4 in. long, 10 stamens, filaments longer than the versatile cross-ribbed anthers. Between stamens and carpels 5 oblanceolate petaloid staminodes. Carpels 5 alternating with staminodes, each carpel terminating in a filiform style, ovules 5-9 on the inner angle. Fr. a samara 1 in. long, seed 1. Planted by Prain in *Missonia*, a new tribe of *Stereospermaceae*, together with *Triplachilos*, Schumann, an African genus.

A tree, also called *Kobeset*, and reported to yield scented wood, in the Kyau-thon-kuing forest, Mergui district, 1 fl. only, l. cordate, margin sinuate, blade 3-6 pet. 1-2 in., upper side with few minute stellate hairs, underside densely clothed with round shining scales, consisting of radiating cells. Fl. unisexual, in bud enclosed in round shining scales, consisting of radiating cells. Fl. unisexual, in bud enclosed in a bag of 3 valvate membranous bracteoles, stellately hairy outside. Sepals 5, lanceolate, carinate, 1-1 in. long, outside densely clothed with stellate hairs. Petals 5, broadly ovate, almost uniform, base slightly cordate, shortly angulate, large of the cavity between the reticulate veins. Stamens 60-80; filaments glabrous, the base slightly connate in 5 bundles, anther-cells 2 parallel, attached to the thick connective, pollen-grains large, globose, aculeate. A new genus which cannot be named without the ♀ fl. and fruit.

P. 92. Add to *Stereospermaceae*: *Paradombeya burmanica*, Stapf in Ic. Plant. t. 2743a. Upper Shan States, 3500 ft. A shrub, branchlets and l. with simple hairs, l. lanceolate, serrate, 2-5 in. long. Fl. snow-white, crowded in axillary fascicles all along the slender branches; pedicels slender, ½ in. long, above the base with a whorl of 3 lanceolate bracteoles. Calyx glabrous, of 5 nearly free sepals, petals obliquely obovate. Stamens 15, five groups of 3 each, alternating with 5 linear staminodia, longer than staminodes. Ovary sessile, stellate-tomentose, 2-5-lobed, 2 ovules in each cell, fr. unknown.

P. 93. *Plagiopanax macrolepis*—Syn. *P. fragrans*, Griff.; Fl. Brit. Ind. I. 389. Griffith called the plant *P. sucolepis* in the text and *P. fragrans* on the plate.

P. 96. *Grewia nepalensis* is *G. denticulata*, Wall.; Prain in Ann. Gard. Calc. IX. t. 12. Peduncles sometimes fascicled.

P. 97. *G. laevigata*—Chutia Nagpur, Coco Islands.

P. 98. *G. multicollis*—Vern. *Bihal*, Sind. Behar. Chutia Nagpur. Orissa.

G. asiatica and *leptopetala* I regard as two parallel polymorphous species, the petals of the former with a distinct claw and a well developed gonophore, while the petals of *G. leptopetala* have no claw and no distinct gonophore. These species are parallel, because their forms exhibit the same variation in regard to hairiness and the shape of leaves. The figure of *G. asiatica*, Royle III. t. 22 apparently belongs to *G. leptopetala*. Another possible view is, that the claw of the petals and the gonophore are variable characters. Against this stands the fact that a number of species in Asia and Africa are characterized by the absence of claw and gonophore. Foresters in India will have abundant opportunities of settling this question, not by examining isolated herbarium specimens, but by studying these difficult species in gardens and in the forest.

P. 98. Add under *G. asiatica*: *G. cinnamomea*, Gamble; Prain, Bengal Plants 281. Chutia Nagpur, l. densely tawny-white tomentose beneath, stipules lanceolate falcate; cymes many (not seen).

P. 98. *G. sapida*. Chutia Nagpur. East Bengal (cn)

" 99. *G. scabra*, *G. scabra*. Fl. white. Chutia Nagpur. Chittagong.

" 100. *G. Micrococca*. Vern. *Moo-ya*, Burm.

" 101. *G. orbiculata*. Western Bhamo, rare.

" 102. *G. bicolor*. Chutia Nagpur. *Gursakri*, Jabalpur.

" *Echinocarpus acuminatus*, A. Smith.

" 102. *Echinocarpus laevis*. Hills east of Bhamo 7,000 ft. (Montague Hill, 157).

" 103. *Echinocarpus robustus*. Kachin hills, Upper Burma.

" *Echinocarpus truncatus*. Hills east of Bhamo 6,500 ft. A low spreading tree, trunk 8 ft. girth (Mont. Hill).

P. 107. *Belonocordis trippus*. N. W. Himalaya to 6,000 ft.

" 108. *Hystera Madagblata*. Vern. *Kamphai*, Jabalpur. Behar. Chutia Nagpur. Chittagong.

P. 108. *H. acuminata*. A tall climber. South Lushai hills.

" 110. *Aspidolobos nutans*. Chittagong.

" 111. *Glycyrrhiza pentaphylla*. Bengal. Andamans.

" 112. *Marruba exotica*. Fl. 1-1 in. series. Behar. Chutia Nagpur. Andamans.

" 114. *Marruba Koenigii*. Chutia Nagpur, Bengal.

" *Marruba pubescens*. Berry yellow. Singbhum.

" *Chamaecarpus*. Vern. *Pyindawethain*, Upper Burma.

" 116. *Acrotychia laurifolia*. Upper Burma.

" 117. *Zanthoxylum Ananthapellium*. Upper Burma.

- Z. obtusa*. Hills east of Bhamo 5,000 ft.
118. *Z. ovalifolius*. Kachin hills.
119. *Lumnitzera aculeata*. Jabalpur, Behar, Chutia Nagpur.
120. *Talipotia aculeata*. Vern. *Mitlat-awet*, Upper Burma.
121. *Ferussia Elephantina*. Probably indigenous in Upper Burma (fl. white). Bark used as a coarctile.
122. *Egle Maratola*. Slughépan.
123. *Persea moulana*. Andamans.
124. *P. longipila*. Sandriban. Malay Penins.
125. *Citrus medica*. Western Duars.
126. *C. Aurantium*. Indigenous in the Mothromwala swamp Déhra Dón (Kanjala); in secluded ravines of Singbhum, spinose-out. fr. 2-3½ in. diam., obovate, not marbled, with copious sweet, slightly acid juice (Haines).
- P. 126. *Ailanthus*. Species 8 in India, Indo-china, Malaya, Australia, 1 in China.
127. *A. glandulosa*. China (not Japan).
128. Add: 4. *A. Kurni*, Prain in Ind. For. XXVIII 188 t. 3. Pegu Yoma, eastern slopes, Andamans. 5. *A. grandis*, Prain in Ind. For. XXVIII 181, 210 t. 1. Vern. *Gojal*, Nep.; *Jetalaco*, Ass. Hingagora Assam, Ryang and other tributaries of the Tista river, Sikkim. A tall tree, 120-150 ft., leaflets entire, 5-8 pair, 6-8 in. long, ripe carpels 1-6 in. long, apex rounded, obtuse.
- P. 127. *Pterocarya quassinifolia*. A tall shrub or small tree.
128. *Brucea mollis*. Myitkyina, Upper Burma.
129. *Ocotea pumila*. Behar, Chutia Nagpur.
130. *Boscwellia serrata*. Central India, Behar, Chutia Nagpur.
131. CALLERIE. Calyx persistent.
132. *Cassia pinnata*. From the Surlej eastwards. Chutia Nagpur, Chittagong, Andamans.
- P. 131. *Balanocleandra Mehl.* Sind, Katiawar, Rajputana. S. E. Punjab.
133. *Balanocleandra villosa*. Andamans.
134. *B. robusta*. Chittagong.
135. *Diospyros peruviana*. Singbhum, Chittagong.
136. *D. reticulata*, King Ann. Gard. Calc. IX. t. 24.
137. *Chioschloa pumilifolia*. Chittagong.
138. *C. discolorifolia*. Chittagong.
139. *Androschloa indica*. Line 6 from below, cast the woods; afterwards purple.
140. *Melastoma andersonii*. Indigenous in West Kashmir and Hazara.
141. *Carex glauca*. Fl. C. 8. and B. 8.
142. *Carex malabarica*, when growing in tidal mud, sends up copious vertical blind root-suckers, while the horizontal snake-like scindling roots of *C. obtusa* protrude through the mud and act as respiratory organs. (Schimper. Indo-malaysische Strandflora 26, 39; Prain in Records Bot. Survey II. 298.)
- P. 141. *Amorpha habitata*. Vern. *Pittaraj*, *Tittaraj*, Beng. Seeds 1-2. Chittagong, Great Cox.
- P. 142. *A. esculenta*. Nepal. Long blind root-suckers in the Sandriban.
143. *A. Wallichii*. Western Duars. Fr. obovoid, tawny-tomentose.
144. *A. glabra*. Chutia Nagpur.
145. *A. ovalifolia*. Fl. scented.
146. *A. peruviana*. Chittagong.
147. *Lumnitzera densiflora*. Kachin hills.
148. *Sida febrifuga*. Leaflets rarely serrate.
149. *Galera microcarpa*. Tippera, Chittagong.
150. *Chloroxylon Salsoliana*. Chutia Nagpur.
151. *Oxalysandera*. Vern. *Kabandus*, Jabalpur.—Sandriban. Chittagong.
152. *O. acuminata*. Tippera, Kachin hills, Upper Burma.
153. *O. nana*. Arakan Yoma, Mulu district.
154. *Schizoneura fragrans*, Wall. Myitkyina, Upper Burma.
155. *Cassia Elaeagnifolia*. Upper Burma.
156. *Lumnitzera sibirica*. Chittagong.
157. *Ocotea acuminata*. Behar.
158. Add: 6. *Gomphandra serrata*, King and Prain in Journ. As. Soc. Bengal LXIX. 189. Kachin hills, Upper Burma. A small glabrous tree, l. serrate, fr. ½ in. long.
- P. 152. *Phalloscolopos Griffithiana*. Vern. *Wap-tha-choi*, Burm. (Mergui).
159. Add: 8. Miquel, Gibba, Baill.; Prain, Bengal Plants 326. West Bengal. A climbing shrub.
- P. 154. *Sarcostigma Wallichii*. Andamans, Tenasserim.
160. *Ber. Gula-jon*. Hills east of Bhamo 7,000 ft., fr. red.
161. *Encyrtus lacrus*, Chumbi, Bhutan.
162. Prain in Journ. As. Soc. Beng. LXXIII. 195, regards *E. Lacrus* as a distinct species.

- P. 159. Add: 23. *Eunonymus kachinensis*, Prain in Journ. As. Soc. Beng. LXXIII. 166. Kachin hills 6,500 ft. A shrub, calyx $\frac{1}{2}$ in. diam., sepals rounded, spreading, fr. deeply 4-lobed, $\frac{1}{2}$ in. long. 24. *E. subulicatus*, Prain loc. 194. Muleyit hill, Tenasserim 5,000 ft. A shrub, branches distinctly quadrangular, fr. deeply 4-lobed, $\frac{1}{2}$ in. long. 25. *E. siluruoides*, Prain loc. 194. Sikkim 5,500-6,500 ft. A shrub, near *E. bullata*, fr. depressed, slightly 4-ridged, $\frac{1}{2}$ in. across.
- P. 160. *Microtropis discolor*, Western Duars. Myitkyina.
M. bicolor, Fl. often unisexual.
 Hippocratea. Anthers often apparently one-celled.
Hippocratea indica, Behar, China.
 161. *H. obtusifolia*, Probably in the Eastern Peninsula.—China.
 Add: 4 (a) *H. sp. nova*. Vern. *Nee agua lo*, Burm. Upper Burma. (C. B. Smallex, March 1900). A climbing shrub, nearly allied to *H. obtusifolia*, fl. green-scented, in large terminal cymose panicles petals $\frac{1}{2}$ in. long, linear-spathulate, imbricate in bud. Fr. unknown, hence not named.
- P. 162. *Claustris paniculata*, Behar, Chutia Nagpur, Assam. Prain in Journ. As. Soc. Beng. LXXIII. 195 separates the following from *C. paniculata*: *C. multiflora*, Roxb. Central and Eastern Himalaya, Khasi hills, Burma, Lohlung. *C. nitida*, Roxb. Western Peninsula, l. obovate.
 P. 162. From *C. stylis*, Wall., Prain separates *C. Hookeri*, Prain, Eastern Himalaya, Khasi hills, Burma. L. thin, reddish-brown when dry, petals faintly toothed, filaments glabrous.
 P. 163. *C. monisperma*, South Lushai hills.—China.
 Add: 5. *C. Championi*, Benth. Sikkim 5-6,000 ft. Naga hills, Sikkim, Malaya, China. A very large climber, capsules obovoid, with 3 prominent angles, $\frac{1}{2}$ in. long. 6. *C. membranifolia*, Prain, Khasi hills. A shrub, l. membranous, ovate-lanceolate, serrate, pet. slender, $\frac{1}{2}$ in. long. 7. *C. listeri*, Prain, Daphla hills. A small tree, l. ovate or obovate, entire, 8 by 3 $\frac{1}{2}$ in. Fr. $\frac{1}{2}$ in. across, 3-seeded.
- P. 164. *Gymnosporia emarginata*, Orissa.
G. pallida, Myitkyina.
 164. Add: 17. *Gymnosporia sikkimensis*, Prain, Tista valley, Sikkim. A ki'jiu I unarmed tree, l. ovate, obtuse, very obscurely serrate.
- P. 165. *Sphaenodon claustrinus*, Sikkim, Andamans.
 SALICIA. Species about 85, throughout the tropics, most numerous in South America.
 P. 165. *S. Siamensis*, Fr. l. globose, $\frac{1}{2}$ in. diam. on pedicel $\frac{1}{2}$ in. long, fleshy, sweet, edible, seeds 2 or 3.
 P. 166. *S. esraconot*, Chittagong.
S. prinoides, Behar.
 167. VENTILAGO. Species 10, most in India and Malaya.
V. madraspatana, Vern. *Kesti*, Jabalpur.
 170. *Zizyphus (Eosiphia) Sundriana*, Andamans.
 171. *Z. glabra*, Upper Burma.
Z. xyloperca, Vern. *Karkata*, Kol. P. 166.
Z. rugosa, Vern. *Sagra*, Jabalpur; *Sika*, Kol.
 172. *Z. rugosa*, Assam, Chittagong, Upper Burma.
Rhusia virgatus, Nilgiris.
 173. *Gouania leptostachya*, Singbhum, Chittagong.
G. microcarpa, Yunnan.
Hellins lasculatus, Singbhum.
 176. *Ficus adnata*, Chittagong.
F. tomentosa, Chutia Nagpur, Behar.
 177. *F. quadrangularis*, Sundriana, Orissa.
F. barbata, Chittagong.
 178. *F. lanceolaria*, Chutia Nagpur, Chittagong.
 179. *F. pulata*, Chutia Nagpur, Bengal.
 The following large climbers should be added:—
 A. l. simple, fl. tetramerous.
 28. *Vitis assamica*, Lawson, Base of eastern Himalaya, Assam, Cachar, Chittagong, Upper Burma. l. glabrous, nearly orbicular, suddenly acuminate, cordate, fr. turbinate, seed 1. 29. *V. gigantea*, Boid.; Cooke, Fl. Bombay I. 250. Kanara. l. 6-8 by 5-6 in., cordate with a deep sinus, long acuminate, bristle-dentate, glabrous above, slightly tomentose beneath. 30. *V. Aubertiana*, Gage in Records Bot. Survey India III. 53. Mibu district, Upper Burma. l. glabrous, blade 4-10 $\frac{1}{2}$ in. diam., palmately divided into 3-4 long narrow segments, pet. 2 in. long.
 B. l. 3-5-foliate, fl. tetramerous.
 31. *V. japonica*, Thunb.—Syn. *V. mollis*, Wall. Sikkim 4-2,000 ft. Khasi hills, Chittagong, Andamans—Malaya, China. Pubescent, leaflets serrate, seeds 3 or 4, back convex, rugose, sides flat and pitted. 32. *V. bracteolata*, Wall. Sikkim Terai.

- North Bengal, Chittagong. Fl. minute, cymes pubescent, divaricate, branches slender or filiform. Seeds 2-5, obovate or globose. 53. *V. oxyphylla*, Wall.—Syn. *V. dubia*, Dawson. Sikkim 1-1000 ft. Chittagong. Glabrous, leaflets deeply serrate acuminate. Fr. $\frac{1}{2}$ in. diam., seeds 2, oblong $\frac{1}{2}$ in. long. 54. *V. auriculata*, Roxb. (Cass.). Chittagong Nagpur. Sikkim 3500 ft. Leaflets glabrous above, pubescent beneath. Fr. globose $\frac{1}{2}$ in. diam., seed 1, obliquely ovoid. 55. *V. andamanica*, King in Journ. As. Soc. Beng. LXV. 253. Andamans. Leaflets 3-5, glabrous, thickly coriaceous, with remote shallow teeth. Fr. $\frac{1}{2}$ in. diam., pulp scanty, seed 1.
- P. 179. *Leon elata*.—Syn. *L. robusta*, Boyle.
 " " *L. umbellata*, Chittagong.
 " " *L. robusta*, Chittagong, North Kanara.
 P. 180. *L. leucocera*. Vern. *Thungamrethas*, Burma. Himalaya from Nepal eastwards 1-5000 ft. Khasi hills, West Bengal, Chittagong Nagpur, Burma.
 P. 180. *L. microphylla*, Roxb. (not Hoffmann).
 " " Add: 14. *L. compactiflora*, Kurz. Arakay Yoma, Minbu district. Hills east of Toungoo 3-4000 ft. Assam 12-15 ft. l. bipinnate, leaflets 4-6 in. long, linear to oblong-lanceolate, blunt at the base, serrate. Fl. small, greenish-white, sessile between broad short scaly bracts.
 P. 181. *Acer oblongum*, China.
 " " *A. integratum*, China.
 " " Add: 2 (a). *A.*, Setrwevinil, iax in Engler's Pflanzenreich IV. 108, p. 33. Himalaya.
 P. 181. *A. nicum*, Malay Arabia.
 " " *A. glaberrimum*, Yunnan.
 P. 183. Add: 11 (a). *A. malta*, Pax & C. p. 15.
 " " *A. cordatum*, Wall.—Syn. *A. acuminatum*, Wall.; Pax & C. p. 15.
 " " *A. pictum*. Pax & C. 47 has now adopted the following arrangement: *A. pictum*, Thunberg, Japan, China, Manchuria; *A. lobatum*, Tenore, Southern Italy; *A. latum*, C. A. Meyer, Western Asia; Himalaya, Yunnan and Central China.
 P. 184. *A. Campbellii*, Yunnan.
 P. 185. *Euclea indica*, Bark peels off upwards in long strips.
 " " *E. paniculata*, Assam.
 P. 186. *Alphitoea* Gilg. Bengal, Andamans.
 P. 187. *Dalmanea ruscosa*, Great Coco and Barren Island, common. Sea coast of Burma and the Western Peninsula.
 P. 187. *Harpullia euphratica*, Roxb. See Cooke, Bombay Flora I. 269, under *H. integrata*, Thwaites.
 P. 189. *Lepidanthus tetraphyllus*, Karpa, Lakhandi, Mar.
 " " *L. andamanica*, Myitkyina.
 " " *Schleichera trijuga*, Koshiak, Mar. Fr. usually echinate, while young, with stout blunt prickles.—Behar, Chittagong Nagpur.
 P. 190. Add: 2. *Xerospermum glabratum*, Radlk. in: Die Sapindaceen Holländisch-Indiens (1877), 23.—Syn. *Cappisia glabrata*, Kurz F. 71. 1. 284. Khasi hills, Pegu Yoma, eastern slopes. Tenasserim near the great rapids of the Salween (D. B. April 1859). A middle-sized aromatic tree, l. glabrous, leaflets 2 pair, lanceolate, 4-8 in. long, reticulate veins conspicuous on both sides. Fl. small in terminal and axillary panicles, σ and ζ , seeds 4 or 5, unequal, petals linear-spathulate, densely woolly, stamens 8, filaments villous. My old notes of 1859 say: Ovary of 4 carpels. This would suggest another genus. Materials here not sufficient to decide the point. 3. *X. tavigatum*, Radlk. l. c. Meghal.—Malay Penins. Leaflets 1 pair, very shining.
 P. 191. *Sepindus Habarovi*, Wild on the Arakan Yoma, Minbu district.
 " " *Aphanis Damaris*, Bengal.
 P. 192. *A. rubra*, Chittagong.
 " " Narayanra, read: Ovary pubescent 2-3-lobed.
 P. 193. *N. stipularum*, Travancore. Petals minute, early caducous.
 " " Add: 5. A doubtful species is *N. Griffithianum*, Kurz in Journ. As. Soc. Bengal XLIV. 187 and F. Fl. I. 294 (Sapindaceae, Griff. l. c. Pl. As. t. 599. l.). Dewangiri, Blutan 1500 ft. Dekho valley, Assam. Hills, Upper Burma (Kurz).—Malacca, Singapore. Leaflets 3-4 pairs, oblong, 6-8 in. long, glaucous beneath, the reticulate veins very prominent on both sides. Fr. $\frac{1}{2}$ in. long, covered with soft conical prickles $\frac{1}{2}$ in. long (fl. not seen). Identified in Fl. Brit. Ind. I. 687 with *N. satabile*, Binne and by Radlkofer, Die Sapindaceen Holländisch-Indiens with *N. lappaceum*. Griffith in Itinerary Notes 112, no. 103 states: corolla 5-petala, petalis basi binaqueatis, stam. 8, stylis brevis. These are not the characters of *Nephelium*, hence the genus is doubtful.
 P. 194. *Meliosma simplicifolia*, Singbhum, Assam. 2 specimens sent by Smiles from Upper Burma (*Pago-ano*, Burm.) are apetalous.
 P. 196. *Rhus Cotinus*, lines 14 and 15 from below, read: pedicels elongate after flowering.

- P. 197. *R. semiolata*. Vern. *Bakia mila*, Nep.
 " 199. *R. insignis*. Sometimes epiphytic, the milky juice raises blisters on the skin.
 Add: 11. *R. knastana*, Hook. t.; Prain, Bengal Plants 855. Khasi hills.
 Chittagong. A large tree similar to *R. panjabensis*, differs by a glabrous slender
 petiole and leaflets incised-serrate.
 P. 199. *Pistacia nutica*. Drost, 1-5,500 ft.
 " 200. Add: 5. *P. cabulica*, Stocks, Baluchistan.
 " " *Tapiria hirsuta*, Chittagong.
 " " *Ocina Wodier*. Vern. *Jhingus*, *Jhyno*, Hind.; *Mareto*, Kattiawar; *Nanua*,
 Kol.—Andamans.
 P. 201. *Spandias mangifera*. Assam, Andamans.
 " 203. The species mentioned under 1 is *Holgarna nigra*, Bourdillon, Ind. Forester
 XXX. 95. t. 1.
 P. 204. *H. Kurzii*. Vern. *Che*, Mergui.
 " 205. *Buchanania latifolia*. Vern. *Sireka*, Gond; *Lunbo*, Burm.
 " 206. *Mangifera indica*. Indigenous in Singbhum.
 " " *M. sylvatica*, Chittagong.
 " " Add: 5. *M. longipes*, Griff. Chittagong; Prain, Bengal Plants 851.
 " 207. *Semacarpus Anacardium*. Vern. *Thitsu-bo*, Burm.—Behar. Chulia Nagpur,
 Upper Burma.
 P. 209. Add: *S. subspathulatus*, King in Journ. As. Soc. Beng. LXV. 117. Upper
 Burma. A small tree, branchlets glabrous, l. obovate-oblanccolate, narrowed from the
 middle into the short petiole. ♂ fl. only known.
 P. 210. *Moringa pterygosperma*. Vern. *Dawanishekat*, Thana. *M. concanensis*. Vern.
Banshekat, Thana.—Karnal and Kistna districts.
 P. 210. *Rourea*. Fl. small, regular.
 " " *R. commutata*, Andamans.
 " 211. *R. santaloides*. Fig. 92 in fruit.
 " 216. *Crotalaria Burhia*. Vern. *Ghagri*, Mar.
 " 217. *Indigofera pulchella*. Central Provinces. Chulia Nagpur. Ascends to
 7,500 ft. in Jaunsar.
 P. 217. *I. Hamiltonii* Grah.; Ann. Gard. Calc. IX. t. 29. Oudh. Gorakhp.
 P. 218. Add: *I. L. BhatwMta*. Gage in Records Bot. Survey of India III. 40. Arakan
 Yoma, Minbu district. A shrub, l. simple subsessile, linear mucronulate, pale green,
 1½ in. long.
 P. 219. *Mundulea suberosa*. *Sapti*, Mar.
 " 220. *Millettia glaucescens*. A species near this (*Thinwin*) *Wéou*, Upper Burma.
 April 1902, C. B. Smales. A small tree, 25 ft. high, leaflets 8-10 pair, fl. nearly 1 in.
 long, lilac, standard pubescent on back, ovary pubescent, fr. unknown.
 P. 220. *M. ovalifolia*. Minbu district, Upper Burma.
 " " *M. Brandiniana*. Minbu district.
 " " *M. pulchra*. Thayetmyo district (*Suethé*), C. B. Smales.
 " 222. *M. racemosa*. The stipules sometimes hard, spinescent, pods near black.—
 Behar.
 P. 222. *M. cana*. Minbu district.
 " " Add: *Wistaria chinensis*, Sieb. and Zucc. Wild in the Kachin hills N.E. of
 Myitkyina. Records Bot. Survey of India I. 237.—China. A large climber, fl.
 large, blue, in terminal racemes, pods thin, coriaceous, dehiscent.
 P. 223. *Desmodium Cephalotes*. Chulia Nagpur. Behar. East Bengal. Minbu
 district, Upper Burma.
 P. 223. *D. umbellatum*. Sundriban, Andamans.
 " " *D. laziflorum*. Chulia Nagpur. East Bengal.
 " 224. *D. trigetrum*. Andamans.
 " " *Ongeia daiberghioides*. Vern. *Tissa*, Jabalpur.
 " 225. *Abrus precatorius*. Vern. *Yee-nyi*, Burm. Sundriban. Andamans near the
 coast.
 P. 225. *Mucuna imbricata*. Subhim. tract, Dehra Dún to Assam. Singbhum.
 " 226. *M. atropurpurea*. Dehra Dún.
 " " *M. pruriens*. Bengal.
 " 227. *Erythrina stricta*. Orissa.
 " " *E. suberosa*. Vern. *Harawa*, Jabalpur.
 " " *E. arborescens*. Vern. *Phaleda*, Nep.
 " 228. *Dioclea reflexa*. Chittagong.
 " " *Pueraria tuberosa*. Vern. *Dari*, Mar.—Chulia Nagpur.
 P. *Thunbergiana*. Myitkyina, Upper Burma.
 " 229. *Hulea frondosa*. Vern. *Mer*, Gond; *Morud*, Kol.
 " " *H. superba*. Chulia Nagpur.
 " 232. *Flemingia stricta*. Singbhum.
 " " *F. congesta*. Vern. *Ban-chhai*; Dún.

- P. 232. *F. rosea*, Singhum. Minbu district, Upper Burma.
 " " *F. incalcarata*, East Bengal.
 " " Add: *Rhynchosia pseudo-cajan*, Camb. Vern. *Lada*, Haz. Outer North West Himalaya and Siwaliks, ascending to 7,000 ft. A shrub, softly grey-tomentose with minute yellow glands on l. and calyx. L. 3-foliate, fl. yellow in short corymbs, pod oblong, 1 in. long, 1-2-seeded, persistently grey-woolly.
- P. 233. *Dalbergia Sissoo*, Ann. Gard. Calc. X, t. 34.
 " " *D. latifolia*, Ann. X, t. 82.
 " " *D. sinoides*, Griseb.; Ann. X, t. 63; Bourdillon in Ind. For. 1905, 124, may now be regarded as a distinct species. Vern. *Fel-itti* Travancore (*D. latifolia*: Kar. *itts*). In Travancore it grows on the outer hills, up to 2,000 ft. Young foliage bright green, leaflets 5-10, generally 7, pointed at both ends, petiolules $\frac{1}{2}$ - $\frac{3}{4}$ in. long. The heart-wood never has any tint of red.
- P. 233. In Ann. Gard. Calc. X, 82 Colonel Prain unites *D. emarginata*, Roxb. with *D. latifolia*.
- P. 233. *D. rimosa*, Ann. X, t. 11.—Myitkyina, Upper Burma.
 " 231. *D. foliolosa*, Ann. X, t. 31. & *D. ovata*, Ann. X, t. 59.
 " " *D. obtusifolia*, Prain, Ann. X, t. 56 may be regarded as distinct. Vern. *Makoma*, Burma. Burma, Upper and Lower. Attains 50 ft., leaflets 5-7, 3-5 by 2-4 in. Fl. greenish white, sweet scented.
- P. 234. *D. caltrata*, Ann. X, t. 32. *Collettii*, Ann. X, t. 31. *burmannica*, Ann. X, t. 51. *rubiginosa*, Ann. X, t. 49. *angusta*, Ann. X, t. 43. *Gardneriana*, Ann. X, t. 44. *confertiflora*, Ann. X, t. 28. *castanea*, Ann. X, t. 55. *rusticata*, Ann. X, t. 36. *Kingiana*, Ann. X, t. 37. *tanacetifolia*, Ann. X, t. 48.—Chittagong.
- P. 235. *acelefolia*, Ann. X, t. 47. *malabarica*, Ann. X, t. 44. *simonsides*, Ann. X, t. 25. *multiflora*, Ann. X, t. 18. *caracasuliana*, Ann. X, t. 21. *Melanocylon*, Ann. X, t. 22. The two last species should stand under A. Trees or erect shrubs.
- P. 255. *D. Melanocylon*, Phaeon Tropical Africa, possibly indigenous in the Western Peninsula.
- P. 236. *D. paniculata*. Regarding the anatomy of the stem, see Thomas G. Hill in Annals of Botany, XV, 1901.
- P. 236. *D. lanceolaria*, Ann. X, t. 76. Subhimalayan tract from the Jumna eastwards, rare in the western portions. *D. amabilis*, Ann. X, t. 71. *paniculata*, Ann. X, t. 68. *Kurzii*, Ann. X, t. 81.
- P. 237. *D. cana*, Ann. X, t. 84. *D. glomeriflora*, Ann. X, t. 66. *D. sericea*, Ann. X, t. 65. *D. Chitri*, Ann. X, t. 75. In Ann. Gard. Calc. X, 92. *D. Praxei* is united with this species. *D. Hemsleyi*, Ann. X, t. 77. *D. Wottii*, Ann. X, t. 78. *D. volubilis*, Ann. X, t. 85.—Behar? Chhatis Nagpur, Chittagong.
- P. 238. *D. stipulacea*, Ann. X, t. 87. *D. Thomsonii*, Ann. X, t. 13. *D. spinosa*, Ann. X, t. 9.—Sundriban. *D. torta*, Ann. X, t. 42.—Sundriban.
- P. 239. *D. parviflora*, Ann. X, t. 8. *D. californica*, Ann. X, t. 31.
 " " *Pterocarpus dalbergioides*, the Andaman Padauk, is leafless for one or two months between March and May. Its principal associates are: *Terminalia bialata*, *Bombax saianum*, *Sterculia alata*, *Lagerstromia hypoleuca*, and in places *Oryzanthium nigricillata*. Near creeks which run up into the Padauk bearing tracts *Licania peltata* and *spinosa* are found. In typical Padauk forests generally a dense under-wood 10-20 ft. high of shade-bearing shrubs.
- P. 240. *P. Mecuripus*, Santal Parganas, Singhum.
- " 242. *Derris scandens*, Bengal.
 " " *D. canorensis*, Baker; Cooke, Bombay Flora I, 406 probably is *D. oblonga*, Benth.
- P. 243. *D. marginata*, Chittagong.
 " " Add: 21. *Derris pulchra*, Gage in Records Bot. Survey India III, 49, Arakan Yoma, Minbu district.
- P. 243. *Paeganisia plebea*, Andamans.
 " " Add: *Ormosia tavyana*, Prain in Journ. As. Soc. Beng. LXXIII, 46. Vern. *Taling-ris*, Burm. Tavy. Leaflets 4-6 in. long, ovate-lanceolate, pod brown polished, 2-3 in. long, seed scarlet.
- P. 244. *Sapota* *Roheri*, Singhum.
 " " Add: *Dalhouisia bracteata*, R. Griseb. Assam. Silhet (*Gopari*), Naga hills. Cachar, Chittagong. A large shrub, erect or scandent, l. rigid, ovate or elliptic, base sometimes slightly peltate, pet. 1-4, blade 4-12 in. Fl. terminating the long bracteate branches of an axillary inflorescence, bracts and bracteoles in pairs, opposite, nearly orbicular, $\frac{1}{2}$ in. diam., the bracteoles enclosing the buds. Corolla white, longer than bracteoles, stamens 10, free. Pod 3x1 $\frac{1}{2}$ in., seeds 1-3. *D. paucisperma*, Griff. Notulae IV, 445; In. Pl. As. t. 903. Assam is similar and perhaps identical. According to Griffith *D. bracteata* has persistent stipules and a 1-seeded pod. *D. paucisperma* declivous stipules and 1-3 seeds. A closely allied species, *D. africana*, S. Moore, grows in tropical Africa.
- P. 246. *Cassipouia Bonducella*. Vern. *Gataru*, Jabalpur.

- P. 248. *Mynoscopus vesiculosus*. Singbhum.
- P. 249. *Pinus* data reported to be wild on the hills of the Purlander State Kathiawar (Vern. Sidhaur).
- P. 250. *Harsholia laeta*. Grows best on sandstone or quartzose rocks. Where it is found on Trap, this rock will be found to contain much quartz in veins and nuggets. Some wood is produced annually, but good seed-years occur only at intervals of 4-5 years. The seedlings as a rule are cut back year after year during the hot season, and in dense clutting of grass roots or on hard soil, they are generally killed outright. On loose soil and under favourable circumstances, they gradually gain strength, to live through the fierce heat of the hot season, after having been cut back to the ground during 5-7 years in succession. In such cases well protected Anjan forests have all age classes, from old trees down to young seedlings. See Fernandes in Ind. For. XXIX. 517, H. F. Arbutnot XXX. 129, and E. D. M. Hooper XXXI. 102.
- P. 251. *Dialium* sp. nova is *D. tetraneurica*, Burd. in Ind. For. XXX. 243. Fr. oval, 2 in. long, seed oval.
- P. 251. *Azadirachta indica*. Tennessean. The Sundvilan tree is called *Intsia retusa*, O. Kuntze in Prain, Bengal Plants 445 and *Intsia bijuga*, O. Kuntze, in Prain, Flora of the Sundribans. Records Bot. Survey of India II. 303.
- P. 251. Add: *Trachylobium verrucosum*, Oliver. Mergui, probably cultivated, Madagascar. Seychelles. An unarmed tree, leaflets one pair, coriaceous, shining above, very unequal-sided, 3 by 14 in. Fl. in axillary panicles, ramification woolly. Sepals 5, coriaceous, imbricate. Petals white, 3 or 5, unguiculate, orbicular, with numerous large oil glands, claw linear, as long as blade. Stamens 10, ovary oblique, verrucose, a ring of long hairs at the base, ovules 3-6. One of the trees yielding Gum Copal, worth cultivating.
- P. 251. Add: *Crudia Mansoni*, Prain in Journ. As. Soc. Bengal LXXIII. 189. Tafoy. A tree, l. glabrous, imparipinnate, stipules connate at base, leaflets 5, alternate, 6-8 by 2-3 in. Fl. white, in long narrow racemes, calyx-tube short, lobes 4, imbricate, reflexed in 8, petals 0. Ovary shortly stipitate, densely tawny-velvety, style slender. Pod oblong, finely velvety, 24 by 14 in.
- P. 252. Add: *Humboldtia Bourdillonii*, Prain in Journ. As. Soc. Beng. LXXIII. 200. Travancore, 3000 ft. A tree, attaining 50 ft. Leaflets 8 pair, sessile, 2-4 in. long, rachis and petiole winged, pod silky, bright crimson, 4 in. long.
- P. 253. *Cassia Fistula*.—Syn. *C. rhombifolia*, Roxb.; Wight Ic. t. 289.
- " *Cassia sodosa*, Meitkyina, Upper Burma.
- " *C. siamea*, Leaflets sometimes emarginate.
- " *C. timoriensis*, South Lushai hills.
- P. 253. *Cassipouira micranoides*, Wall. Sundriban. Is separated from *C. ramiflora* by Prain in Records Bot. Survey India II. 303.
- P. 255. *C. polyantha* Assam, Chittagong.
- " *B. racemosa*, Chutia Nagpur.
- " *B. malabarica*, Pod often straight. Upper Burma.
- " *B. purpurea*, Singbhum, Minbu district, Upper Burma; Gago in Records Bot. Survey of India III. 53.
- P. 258. *B. variegata*, Singbhum.
- " *B. Vahlii*, Chutia Nagpur.
- " *B. rufa*, South Lushai Hills.
- " *B. glauca*, South Lushai Hills.
- " *B. macrostachya*, Chittagong.
- " *Prosopis spicigera*, Behar (Prain, Bengal Plants, 453).
- " *Dichrostachys cinerea*, Orissa.
- " *Entada scandens*.—Syn. *E. Parviflora*, DC.—Orissa. Singbhum.
- " *Abrus precatorius*. Vern. *Thoria-gau*, Mar.—Chittagong.
- " *Mimosa pudica*. Plants almost digitate.
- " *Acacia Jacquemontii*, Vern. *Kandhari*, Sind.
- " *A. Kingii*, Minbu district, Burma.
- " *A. Senegal*, Vern. *Gorad*, Kathiawar.
- " *A. Catechu*, Central Provinces, Chutia Nagpur, Behar.
- " *A. Sena*, Vern. *Shencheir*, Thana, Chutia Nagpur.
- " *A. catia*, Vern. *Gardar*, Jabalpur.—Fl. heads white or pale yellow.—Andamans. Burma (the words *not known from Burma*, should be struck out).
- P. 259. *A. pennata*, Vern. *Bansa*, Jabalpur.—Chutia Nagpur.
- " Add: 50 (a) *A. canescens*, Graham, Minbu district.
- " *A. mollis*, DC. Stamens white, as the buds open, afterwards turning yellow.—Chittagong.
- P. 271. *Albizia procera*, Vern. *Pandrai*, Kol; *Kinkoi*, Thana.—Singbhum. Reproduces readily from root-suckers.

- P. 271. *A. odoratissima*. Vern. *Toungmya*, Tenasserim.—Singbhan.
272. *A. Lebbek*. Andamans. Mr. J. R. Drummond has kindly informed me that in his opinion the tree indigenous in the Subhimalayan tract of the Punjab is not identical with the cultivated *A. Lebbek*.
- " *A. amara*. Orissa. Chittagong.
- " *A. stipitata*. Singbhan. South Lushai hills. Chittagong.
274. *Plithocodium biglandum*. Myitkyina, Burma.
279. *Prunus brahuica*. Chitral.
281. *P. cadulata*. A moderate-sized tree.
- " *P. acuminata*. Myitkyina, Burma.
282. *Pigea Andersonii*.—Syn. *P. lucida*, Anders.; Prain, Bengal Plants 164.
Add 184 (a) A small tree on the hills east of Bhamo 5,500 ft. in dry hill forest (Montague Hill, Febr. 1902), similar to *P. glaberrima*, no glands on l., pet. 5, linear-oblong, stamens 10, style short. Fr. unknown.
- P. 283. *P. acuminata*. Khasi hills, East Bengal. Burma, Upper and Lower.
283. *Neillia thuyoides*. Myitkyina, Burma.
- " *Rubus hexagonus*. Chittagong.
287. *Rosa laetevirens*. Chutia Nagpur. In Journ. As. Soc. Bengal LXXIII: 201. Prain maintains *R. Loellii* as a distinct species, with long peduncled fl. and entire bracts.
- P. 290. *Eriobotrya reticulata*. Vern. *Mya*, Nep.
292. *Pirus Khasiana*. Naga hills. Kachin hills, Burma.
Add: P. Kurzii, Wurtz; Prain in Journ. As. Soc. Beng. LXXIII: 203. Sandakhu, Phaint, 11-12,000 ft. A small tree, glabrous, leaflets 4-5 pair, $\frac{1}{2}$ in. long.
- P. 293. *Platinia mollis*. Deccan.
- " *Pteridium arguta*. Deccan.
297. *Hydrangea robusta*. Myitkyina, Burma. A shrub or tree.
298. *Dichroa polygona*. Myitkyina, Burma.
- " *Ilex macrophylla*. Kachin hills, Upper Burma.
300. *Porratia Jacquemontiana*. Vern. *Sa*, Kunawar.
303. *Rhizophora mucronata*. Vern. *Khasia*, *Phora*, Beng.
304. *Cecropia Cambalensis*. Doubtful whether in the Sundrihan. (Prain in Records Bot. Surv. of India II: 306.)
- P. 305. *Bravaisia gymnocarpa*. When germinating on the tree, the hypocotyl and radicle of this species as well as of *Rhizophora* break through the pericarp, but while in *Rhizophora* the embryo separates from the fruit and calyx before it falls to the ground, in *Bravaisia* the germinating seed remains longer attached to the fruit and calyx, and the top of the pericarp, crowned by the style, frequently remains attached to the tip of the radicle. The hypocotyl (and radicle) of *B. gymnocarpa* attains 6-12 inches, is green, and the cells are filled with starch. See A. W. Lushington in Ind. For. XXX: 122.
- P. 306. *Cerallia leblia*. Vern. *Kierpa*, Beng.—Dohm Dün, in swamps. Cooke, Flora of Bombay I: 470, regards *C. leblia*, Roxb. and *C. integrifolia*, DC., as distinct species.
- P. 307. Add: 1 (a) *Terminalia burmanica*, King in Journ. As. Soc. Beng. LXXIII: 204. Sagain, Burma. A tree, young branches densely rusty-tomentose, l. 4-5 by 2-3 in.
- P. 307. *T. bellerica*. Vern. *Lapang*, Kol. Add to the footnote: Kanjial reports glands on seedlings and coppice shoots and occasionally on l. of flowering branches.
- P. 308. *T. Cheula*. Vern. *Rata*, Kol.—Chutia Nagpur.
- " *T. citrina*. West and North Bengal.
310. *T. pyrifolia*. Upper Burma.
- " *T. tomentosa*. Vern. *Halana*, Kol.
311. *T. Arjuna*. Jammu, Kashmir. Chutia Nagpur.
- " *T. Oliveri*. J. W. Oliver informs me that the bark is rich in tannin.
312. *Cudratera decandra*. Bengal, Andamans.
- " *C. parvifolia*. Mitha, Upper Burma.
- " *C. latifolia*, Vent. Vern. *Sauk*, Burm.
313. *C. unguiculata*. North Bengal. Chittagong.
- " *C. fragrans*. East Bengal.
- " *C. discosa*. Mitha district, Upper Burma.
- " *C. squamata*. East Bengal.
- " *C. ovalifolia*. Chutia Nagpur. Orissa.
- " *C. wynnii*. Chutia Nagpur.
314. *C. extensa*. Fr. dark red. Chutia Nagpur. Chittagong.
- " *Quisqualis indica*. Vern. *Dauk-hmaing*, Burm.
- " *Calyptranthes docibanda*. The cut stem yields large quantities of watery fluid. Vern. *Kyut-ut-ut*, Burm.—Orissa.
- P. 315. *Lumnitzera racemosa*. Andamans.

- P. 315 *Asperula pentala*. S. E. Punjab
A. latifolia. Vern. *Daha*, Hind.; *Heml*, Goud.—Churia Nagpur, Behar.
 Orissa.
 P. 315 *A. sericea*. Peduncles frequently bearing leaves and leaf bracts.
A. acuminata. Vern. *Chakua*, Beng.—Duar. Churia Nagpur, South Lushai
 hills.—Prain, Bengal Plants 580, separates *A. lanceolata*, Wall., from *A. acuminata*.
 Chittagong. L. narrow lanceolate, bracteoles small, linear, very deciduous.
 P. 317. *Asperula nana*. Chittagong.
 " *E. formosa*. Vern. *Phal-jam*, Beng.
 " 318. *E. Bawa* Pursh, Boardl. in Indian Forester XXX. 147: 2.
 " 319. *E. occidentalis*, Boardl. in Ind. For. XXX. 195.
 " *E. daridara*. Myitkyina.
 " *E. Wrightiana*.—Syn. *Sappanum Wrightiana*, Wall.; Wight & Aynott, Prod-
 romus 1830.
 " P. 321. Add: 32 (a) *E. grilmuun* Duthie, in Fl. Brit. Ind. II. 181. Myitkyina,
 Burma, Singapore.
 P. 321. *E. tomentosus*. South Maratha country, Cooke Bombay Flora I. 494.
 Add: 35 (a) *E. praetermissa*, Gage in Ind. For. XXXII. 6 t. 2. Assam. Khasi
 and Lushai hills. Khasi, Upper Burma. A tree attaining 50 ft., resembling *E.*
Griffithii, Duthie, allied to the Malayan *E. chlorantha*, Duthie.
 " 322. *E. polyantha*. Vern. *Mothaka*, Burma.
 P. 322. Read: *E. petala* as a rule calyptrate.
 P. 323. *E. sperculata*. Vern. *Hoti-Jam*. *E. obovata*, Wall., is sometimes regarded as
 a distinct species.
 P. 323. *E. Heynana*. Churia Nagpur.
 " Add: 181 (a) *E. venusta*, Roxb. Vern. *Thalyga*, Burma. Tipperah. Lower
 Burma. Branchlets white, petals free.
 P. 324. Strike out: (a) Leaves large, blade over 8 in.
 " 325. *E. macrocarpa*, Ahmednagar, Cooke, Bombay Fl. I. 494.
 " *E. colganii*, North Kanara, Cooke, Bombay Fl. I. 494.
 " 326. *Myrtus communis*. Vern. *Māny*, Pushtu. Panjkora valley, Bajaur, 3-3,500 ft.
 very common, truly wild, attaining 12-15 ft. Fr. calic. (Barrett Nov. 1901)
 P. 329. *Barringtonia acutangula*. Vern. *Hidjal*, Beng.; *Pear-igii*, Mar.
 " 333. *Melastoma malabaricum*. Vern. *Palor*, Mar.
 " *Glycyrrhiza paniculata*. Myitkyina, Burma.
 " 334. *Odontia stellata*. Chittagong.
 " *O. nepalensis*. East Bengal.
 " 336. *Memecylon edule*. Chittagong.
 " 337. *M. corallinum*. Vern. *Thalyga*, Burma.
 " 338. Add: 2 (a) *Lagerströmia venusta*. Wall. Irawadi near Thayetmyo. Calyx
 with 6 linear accessory teeth.
 P. 339. *Lagerströmia Flac Regina*. Vern. *Eik-hmee*, Upper Burma.—ri, utia Nagpur,
 Prain, Bengal Plants 504.
 P. 339. Add: 8 (a) *L. hirsuta*, Lam. A doubtful species, based upon t. 22 of Rheede,
 Hort. Malab. IV.—Malabar.
 P. 339. *L. macrocarpa*. Chittagong.
 " 340. *Lacuna alba*.—Syn. *L. incana*, Linn., and *L. spissosa*, Linn. Kochner
 Lychnosee in Engler, Pflanzenreich IV. 216 p. 270, and Cooke, Bombay Flora I. 511
 adopt *L. incana*.
 P. 340. *Scaevolla acida*. Vern. *Lama*, Burma.—Andamans.
 " 341. *Panicum Gramatum*. Vern. *Thale*, Burma.
 " 344. *Cissampelos tomentosa*. Bengal.
 " *C. Formos*. Tipperah, Chittagong.
 " 345. *Hemodorum grandiflorum*. Vern. *Tamng-thit-yin-bo*, Burma. Mergui.
 " 346. *Tetrasia umbellata*. Vern. *Upod*, Banda, Mar.
 " 348. *Heptapleurum cuneatum*. Vern. *Dain*, Hind.—Behar. Singbhum.
 " 351. *Andia acuta*. Myitkyina, Burma.
 " *A. foliolosa*. Chittagong.
 " 352. *Acanthopanax aculeatum*. At times climbing.
 " *Heteropanax fragrans*. Singbhum.
 " *Bumelia*. A. Leaves undivided or divided less than half-way down.
 " 353. *Trevesia palmata*. Vern. *Dau*, Upper Burma.
 " 354. Add: *Woodburnia penduliflora*, Prain in Journ. As. Soc. Beng. LXXIII. 25.
 Khasi hills between Myitkyina and Sadou, 4,500 ft. A small tree, attaining 15 ft.,
 trunk unbranched, prickly, with a tuft of large digitate l. at the top. Blade 30 in.
 diam. on a stout pet. 24 in. long, leaflets on broadly winged petiolules. Fl. densely
 rusty-tomentose, with the stout pedicel 2-3 in. long, in axillary umbels on long
 peduncles. Calyx with 7-10 linear-lanceolate segments, petals 5 small, stamens 5,
 ovary 8-13-celled.

- P. 351. *Mastixia arborea*. Bourdillon regards *M. pedunculata* as a distinct species with larger and pubescent leaves.
- P. 352. *M. emarginata* Prain, Brit. Burian, in evergreen forest 1,000 ft. A tree 50 ft. with smooth bark, ramifications of thyrses clothed with deciduous hairs, fl. numerous. Drupa 1 x 1/2 in., olive green or blackish when ripe. (Haines 916, specimens received Jan. 1901.)
- P. 353. Add: 10 (a). *Lonicera Xylosteum*, Linn. Jambatal 5-6,500 ft. (Duthie, Chitral Relief Expedition in Records Bot. Survey of India I. 156). Differs from *L. quinque-lobata* by smaller fl. in pairs on axillary peduncles.
- P. 354. *L. asperifolia*. Chitral.
- P. 355. Add: 28. *L. Griffithii*, Hook. f. and Thoms. Druak, Chitral valley, 5-6,000 ft. Climbing on *Quercus Ilex*, l. broadly elliptic to orbicular, blade 2, pet. slender 1/2 in. long, the uppermost l. almost sessile. Fl. numerous in dense pedicelled solitary heads, the bracteoles of each whorl of fl. connate, corolla bilabiate, glandular-hairy outside, 1 in. long. Fr. a compound berry 1/2 in. diam. consisting of numerous confluent carpels, edible.
- P. 356. *Lycularia formosa*. From the Ravi eastwards.
- P. 357. *Fibricum coriaceum*. Myitkyina.
- P. 358. *V. arvense*. Dir, Mirga, 7-8,000 ft. (Duthie, Chitral Relief Expedition, 156.)
- P. 359. *Sarcocaulis Missionis*. Vern. *Atta danji*, Mal.
- P. 360. *Anthocaulis Cudumba*. Assam.
- P. 361. *Idina cordifolia*. Vern. *Heda*, Thana; *Manja Kodumba*, Mal. and Tam.
- P. 362. *Nauclera Griffithii*. Peduncles often two or three, shorter than in *N. purpurea*, with 2 pairs of bracts.
- P. 363. *Strychnos*. Northals, in a dissertation, printed at Bonn in 1839, established the genus *Mitragyna*. In his great work: *Krankkunde in Verhinderung über die Naturliche Geschichte* (1839-42) he substituted the name *Stephogyne*, giving a description of the genus and of the Indian *S. pterocarpa*. As synonym he gives *Mitragyna*, without however quoting the Bonn dissertation. *Stephogyne* was adopted (as a subgenus of *Nauclera*) by Miquel in his *Flora of Niederländisch Indis* (1856), and as a genus in *Genera Plantarum* and *Fl. Brit. Ind.* The Index Kewensis however prefers *Mitragyna*, followed by Haviland and Cooke, *Flora of Bombay* I. 581. Common sense seems to demand the retention of *Stephogyne*. Miquel, Benthams and Hooker doubtless had good grounds for their decision.
- P. 370. *Stephogyne parvifolia*. Vern. *Chana Kodumba*, Tam. East Bengal.
- P. 371. *S. diversifolia*. Fl. heads sometimes orange-coloured. There may be two species in Burma under this name.
- P. 372. *Encaria saccophylla*. North Bengal. Myitkyina.
- P. 373. *E. sessiliflora*. Myitkyina.
- P. 374. *E. lasigata*. Kachin hills, Upper Burma.
- P. 375. Add: 10. *E. hemomalla*, Miq. Jaintia and South Lushai hills—Sumatra.
- P. 376. *Hymenodictyon excelsum*. East Bengal.
- P. 377. *Luculia gratissima*. Myitkyina.
- P. 378. *Wendlandia exserta*. Behar.
- P. 379. *W. puberula*. Chamba, Kangra, Tirhut.
- P. 380. *W. buxifolia*. Chulia Nagpur. Mainwisingh.
- P. 381. *Hedyotis scandens*. Myitkyina.
- P. 382. *Mussaenda frondosa*. Vern. *Saryal*, *Banthex*, Mar.
- P. 383. *M. macrophylla*. South Lushai hills. Kachin hills, Upper Burma. Andamans.
- P. 384. *M. Roxburghii*. Myitkyina.
- P. 385. *Wibera corymbosa*. Andamans.
- P. 386. *Gardenia latifolia*. Chulia Nagpur. Central Provinces.
- P. 387. *G. laevigata*. Vern. *Kachar*, Jabalpur.—Andamans. Minbu, Upper Burma. Mr. A. E. Lowrie reports from Raipur, Centr. Prov., that, in the hot season, by stroking the stem gently up and down, the whole tree is set vibrating in all its branches and leaves, while other trees around do not show the slightest movement.
- P. 388. *G. erythroclada*. Upper Burma.
- P. 389. *Randia uliginosa*. Vern. *Poddern*, Mar.—East Bengal.
- P. 390. *R. demata*. Vern. *Kon*, Burm.—Bengal.
- P. 391. *R. fasciculata*. Chulia Nagpur.
- P. 392. *Hypianthera stricta*. Bengal. Chulia Nagpur.
- P. 393. *Peltandra Roxburghii*. Sundriban.
- P. 394. *Diplospora singularis*. Chittagong.
- P. 395. *D. confusa*. Minbu, Upper Burma.
- P. 396. *Cestrum didymum*. Behar. Chulia Nagpur.
- P. 397. *C. glabrum*. Bura. Andamans.
- P. 398. *Parvella indica* (c) *toenulosa*, from the Bias eastwards.
- P. 399. *Ixora decumbens*. Chittagong.

- P. 380. *I. subseriata*. South Lushai hills.
 " " Add: 4 (a) *I. Kingdonii*, Hook. fil. Andamans - Malay Penins. A shrub or small tree, l. shining, glabrous. Blade 5-8 pet. $\frac{1}{2}$ in., net n. 15-18 pair. Compound cymes dense, 3-4 in. diam., peduncle stout, 1 in. long; calyx lobes broad, blunt.
- P. 388. *I. spectabilis*. Chittagong.
 " " *I. parviflora*. Vern. Kaw, Jaisalpur.
 " 389. *I. cuneifolia*. Chittagong.
 " " Add: 18 (a) *I. villosa*, Roxb. Sikkim, foot of hills. Assam. Garo Khasi and South Lushai hills. Khabang forests, Pegu. A shrub, branchlets, petioles and cymes pubescent or tomentose, stipules with long filiform points. Corolla-tube 1- $\frac{1}{4}$ in. long, very slender.
- P. 390. *I. scutellata*. Behar. Chutia Nagpur.
 " 390. *Coerxa*. Stipules bipart.
 " " *C. arulata*. Berry crimson.
 " " *C. liberica*. Berry crimson.
 " " *C. Javanica*. Kachin hills, Upper Burma.
 " " *C. bengalensis*. Chutia Nagpur.
 " 391. *Hamilltonia macrolepis*. Chutia Nagpur. Central Provinces.
 " " Add: 3. *Paderia tomentosa*, Blume. Sikkim, to 6000 ft. Assam. Khasi hills, Upper Burma. - Malay Penins. and Archip. - China, Japan. Leaves ovate-lanceolate, blade 3-8, pet. 1-2 in., fr. globose, $\frac{1}{2}$ in. diam. J. P. Grassmann, Prain in *Revue Bot. Survey of India* I. 248. Myitkyina. Similar to 3, fr. ovoid, crowned by acute calyx lobes.
- P. 392. Prain in Bengal Plants, 578; regards *Morinda laevigata*, Roxb. as distinct from *M. citrifolia*. River banks and sea face of the Sundriban. Sea coast of the Andamans and Tenasserim.
 P. 392. *M. toctaria*. Vern. Nipau, Burma.
 " 394. *Psychotria fasciata*, Tallot, De Cocke, Bombay Flora I. 617, regards as a distinct species.
- P. 394. *P. adanophylla*. Myitkyina.
 " " *P. calocarpa*. Kachin hills, Upper Burma.
 " 395. *P. cratica*. Kachin hills, Upper Burma.
 " " *Chamaea curviflora*. Myitkyina.
 " 396. *Lasiacanthus Wallichii*. Chittagong. Myitkyina.
 " " Add: 5 (a) *L. pilosus*, Wight. Mergut - Malay Penins. A shrub or small tree, branchlets, petioles, underside of l. and cymes hirsute with long dark-coloured spreading hairs, outer bracts as long as or shorter than flowers.
- P. 397. *L. truncatus*. Orissa.
 " 399. *Vernonia cinerascens*. Punjab Salt range.
 " 401. *Jussiaea cuspidata*. Punjab Salt range.
 " " *Blumea balsamifera*. Tipperah.
 " 402. *Artemisia vulgaris*. Kachin hills, Upper Burma. Strike out the words: "uppermost linear-lanceolate, entire."
- P. 402. *Senecio arvensis*. Myitkyina, Upper Burma.
 " 414. *Musa paniculata*. South Lushai hills.
 " 415. *M. dalia*, united with *M. indica* by Cooke in Bombay Flora II. 82.
 " 416. *Myrsine semiserrata*. South Lushai hills.
 " 417. *Embellia strictiflora*. Mahabaleswar.
 " 418. *Ardisia Amabilis*. Andamans.
 " 420. *A. crenata*. Kachin hills, Upper Burma.
 " " *Pterandra Griffithii*. Kachin hills, Upper Burma.
 " 421. *Antistrophe argantha*. South Lushai hills.
 " " *Egiceras majus*. Vern. Chawer, Sind.
 " 422. *Solanum tomentosum*. From Behar to Orissa.
 " 423. *S. grandifolium*. Vern. Tau-the-poo, Burm.
 " " *Chrysophyllum Boerhaavii*. Vern. Thangua, Burm.
 " 425. *Dalmanea Gatta*. See Burn Murchie in Ind. For. XXXI. 368.
 " 426. *Bassia latifolia*. Vern. Mhaura, Mar.; Irs, Goud.
 " 427. *Répoussin brevifolia*. Drosch. 4500 ft.
 " 428. *Diospyros*. Herbert Wright, The Genus *Diospyros* in Ceylon. *Annals Royal Gardens Peradeniya* II. 1 (1904). Wright states that many species are often polygamous, among those here described: *D. insignis*, *vilgiva*, *spicata*, *affinis*, *Eubryopteris*. He also states that the γ fl. of the following species are frequently in clusters of 3-6: *insignis*, *ococotus*, *spicata*, *Tupania*, *Eubryopteris*.
- P. 430. *D. chloroxylon*. Vern. Andali, Orissa.
 " 431. *D. microphylla*. Vern. Thare Kool, Mal.
 " " *D. montana*. Central Prov. Bengal. Minbu district, Burma. Travancore, common. - Ceylon. Vern. Konda, Konda, Ph.; *Pencol*, N. E. Rajputana.
 P. 432. *D. spicata*. Chutia Nagpur.

- P. 432. 11 *D. Kanjhalii*, Duthie in Ind. For. XXXI, 367 t. 28. Dehra Dun, Sitwalik range, Ghanda, Centr. Prov. Santal Parganas, Ganjam, Anantapur, Bellary.
- P. 432. *D. Lotus*, line 91, strike out in the Punjab and.
- " 433. According to Wright, loc. p. 106, *D. affinis* in Ceylon has 6-9-18 stamens in the ♂ fl., while *D. crassicaulis*, p. 197, has 8-14; the seeds of *affinis* are ovate, wedge-shaped, $\frac{1}{2}$ in. long, while those of *crassicaulis* are flattened and elliptic, nearly 2 in. long.
- P. 435. *D. asiatica*, Vern. *Kurus thali*, Tam.
- " " *D. Embryopteris*, Bengal.
- " 435. *D. acutifolia*, Orissa.—Ceylon.
- " " *D. Bourdillonii*, Vern. *Kurus chathi*, Tam. ♂ fl. roset: corolla ovate-campanulate, tube tomentose outside, glabrous inside, $1\frac{1}{2}$ in. long, lobes spreading.
- P. 436. 47. Is a large tree.
- " " Add: 39. *D. sp.* var. not named, because specimens are imperfect. Travancore. Evergreen and secondary forests at low elevations (Bourdillon 1823, 1881, Vern. *Kari*). A middle-sized tree, l. glossy on both sides, coriaceous, elliptic-oblong, blade 6-9 by 2-4, pet. $1\frac{1}{2}$ in. long. ♀ fl. axillary or on the old wood, sessile, solitary, or in clusters of 2-5, supported by thick round bracts. Calyx thick-coriaceous, on both sides densely velvety, deeply divided into 5 triangular auricled lobes. Corolla tomentose, lobes 5, thick, cohering, stamens 5. Ovary densely clothed with long hairs, styles 5, glabrous. Fr. a truncate cone with 10 deep furrows, hairy when young, $1\frac{1}{2}$ in. long, diam. at base 1, at the apex $\frac{1}{2}$ in., supported by the flat thickly-coriaceous calyx with undulating margins. Seeds 10, black, flat, $\frac{1}{2}$ in. wide and nearly 1 in. long. Embryo $\frac{1}{2}$ in. long, radicle longer than cotyledons. Albumen uniform.
- P. 438. *Symplocos Baldouvi*. A middle-sized tree, racemes 1-5 in. long, fl. white, fragrant.
- P. 439. *S. macrocarpa*, Vern. *Peralei*, Tam.
- " 441. *S. thalifolia*. Haines reports that specimens collected in Sikkim have a curved embryo.
- P. 442. *Syzygium serrulatum*, Duars, Assam.
- " " *Oraxox* omit: attached to the inner angle.
- " " *Nepenthes arbor tristis*, Vern. *Khierati*, Goud.
- " 443. *Fraxinus excelsior*, Basin of the Indus.
- " 444. *Fraxinus rostrataoides*. Dr. Aug. Henry informs me that *F. dimorpha*, Cosson et Durieu, of Algiers and Morocco, is very closely allied and possibly the same species.
- P. 445. *Scheuchzeria palustris*, Chulia Nagpur, Orissa.
- P. 446. *Strychnos Emodi*, ascends to 12,000 ft.
- " 446. *Olea cuspidata*, Punjab Salt range.
- " 447. *Olea dioica*, Vern. *Yaldalei*, Tam. (Bourdillon).
- " 449. Add: 2 (a) *Jaeminum listeri*, King in Records Bot. Survey of India I. 349, South Lushai and Chittagong hills. A scandent shrub, l. nearly glabrous, lanceolate, blade 2-5 by $1\frac{1}{2}$ in., sec. n. prominent beneath, corolla white, lobes 6.
- P. 449. *J. pubescens*, From the Ravi eastwards.
- " " *J. Battlerianum*, Behar, Chulia Nagpur.
- " 450. *J. coarctatum*, Chittagong.
- " " *J. scandens*, Myitkyina.
- " " *J. decussatum*, Myitkyina.
- " " *J. arborescens*, Behar, Chulia Nagpur.
- " " *J. laurifolium*, Chittagong.
- " " *J. anastomum*, South Lushai hills.
- " 452. *J. dispersum*, From the Ravi eastwards.
- " 453. *Salvadora persica*, Western Behar, Prain, Bengal Plants, 693.
- " " *S. decoides*, Gujarat.
- " " *Azida tetracontha*, Orissa.
- " 455. *Carissa spinarum*, Vern. *Kaa*, Burm.—Andamans.
- " 456. *C. pauciflora*, Behar, Prain, Bengal Plants, 669.
- " " *C. macrophylla*,—Syn. *C. inermis*, Vahl; Cooke, Bombay Flora II. 125.
- P. 456. *Melodina*, Species 15-20, India to the Pacific islands.
- " " *M. vanagynux*, North Bengal.
- " 457. *Rauwolfia serpentina*, Bengal.
- " " Add: 1 (a) *R. chinensis*, Hemsl. South Lushai hills.—China. Nearly allied to 1. sec. n. faint, fl. $\frac{1}{2}$ - $\frac{3}{4}$ in. long.
- P. 457. *Gynopogon stellatus* is *Alysic stellata*, Roem. and Schult.: Fl. Brit. Ind. III. 636.
- P. 458. *Plumeria acutifolia*, Vern. *Tajok-saga*, Burm.
- " 459. *Alstonia scholaris*, Bengal, Assam, Andamans.
- " " *Halorrhena antidysenterica*, Vern. *Kala Kura*, Mar.—Bengal.
- " 460. *Wrightia tinctoria*, Vern. *Pandra Kura*, Mar.
- " 461. *Wrightia coccinea*, Chittagong.
- " 462. *Vallaris Hancei*, From the Ravi eastwards, Myitkyina.

- P. 462. *Pectis cantanensis*. Myitkyina.
Nerium odorata. Aravalli range. S. E. Punjab.
Streptanthus Walllichii. Chittagong.
 464. *Agrostis elymus* G. Don; Wight in. & 1864.
 465. *Ichnocarpus frutescens*. From the Jhelam eastwards. Jabalpur.
 467. *Cryptolepis Bhamani*. Assam. Bengal.
Periplora Hylaeophila. Punjab Salt range.
Periplora calophylla. From the Jhelam eastwards.—Myitkyina.
 468. *Hemidesmus indicus*. Sundriban.
Holostemma Bhamani. Chutia Nagpur. Minbu district, Burma.
Narcotium laevigatum. Chutia Nagpur.
Dryas volubilis—Syn. *Maradonia volubilis*, T. Cooke, Bombay Fl. II. 166.
Dryas angustifolia. North Bengal.
 469. *Davallia cuneata*. Outer Himalaya, ascending to 4,000 ft. Jabalpur.
Raphistemma pulchellum. Upper Burma.
Gynema kirilum. Chutia Nagpur.
G. venustum. Chittagong.
G. tinctorum. Behar. Minbu district.
 470. *Macrodia tenuisecta*. Jabalpur.
M. Baplei. Chamba.
 471. *M. Bacteria*. Chittagong.
Chateaugia gigantea. Vern. *Alonra*, Jabalpur.—Sundriban, sea-level.
 472. *Leptandra reticulata*. Minbu district.
 476. *Nyctanthes Wallichiana*. Chittagong.
 476. *Geloumian elegans*. Myitkyina.
Fragaria obovata. Assam.
 477. *F. auriculifolia*. A tree 50 ft. high, Kurz. Report on the Andamans, 48.
 478. *Gordia Myra*. Vern. *Gidara*, Sind.—Bengal.
 479. *C. Wallichii*. Chutia Nagpur.
C. musica. Orissa.
 The species mentioned under No. 8 may possibly be *C. Clarkei*, Bracc. in Prain, Bengal Plants, 714, described as a large tree. East Bengal. Chittagong. C. B. Clarke's 5088 is from Malimunsingh, not from the Khasi hills.
 P. 481. *Euclea ovata*, Roxb. is regarded as a distinct species by Cooke, Bombay Flora II. 204.
 P. 482. *Tournefortia viridiflora*. Chittagong.
 483. Add: 1 (a). *Erycibe albiflora*, Hallier; Prain in Journ. As. Soc. Bengal LXXIII. 14. Sikkim 1-6,000 ft. Assam. Khasi hills, Silhet. A large climber, stems over 50 ft. long, branches and branchlets angled, l. glabrous on both surfaces. Fl. in narrow but lax terminal panicles, corolla white, $\frac{1}{2}$ in. across.
 P. 483. Cooke, Bombay Flora II. 226 regards *E. Wightiana* as a variety of *E. paniculata*.
E. longipata. Yunnan.
 484. Add: 10 (a). *E. citriflora*, Griff.; Prain in Journ. As. Soc. Bengal LXXIII. 17. Sea-coast near Tavoy and Mergui. A small tree, branches terete, l. carinose, quite glabrous, obovate-lanceolate. Fl. in dense subsessile axillary rusty-pubescent cymes, corolla creamy-yellow within, $\frac{1}{2}$ in. across.
 P. 484. *Ricin arnata*. North Bengal. Duars. A large spreading shrub, Prain, Bengal Plants 769.
 P. 484. *R. hypograteiflora*. Vern. *Boldi*, Halderabad. Leaves, after boiling, eaten in times of famine.
 P. 485. *Argemone argentea*. Chittagong.
 Add: 15 (a). *A. Burneyi*, Gage in Records Bot. Survey of India III. 78. Upper Burma. A scandent shrub, branches, petioles and underside of l. clothed with dense soft silky grey tomentum, l. cordate, blade 5-6, pet. 2-2 $\frac{1}{2}$ in. long.
 P. 485. *A. lilifolia*.—Syn. *Stictocardia lilifolia*, Hallier f.; Prain, Bengal Plants 740.
A. splendens. Chittagong.
 Add: 15 (a). *Lettsomia campanuliflora*, Gage in Records Bot. Survey of India III. 79. Minbu district, Upper Burma. A scandent shrub.
 P. 487. *Pisonia paniculata*. Vern. *Sesga*, Jabalpur.—From the Ravi eastwards. East Bengal. South Lushai hills.
 P. 487. *P. racemosa*. South Lushai hills.
 Add: 1 (a). *Ipomoea longiflora*, R. Br. Sundriban. Konkan and Kanara near the coast.—Coasts of South East Asia, Australia, Polynesia. L. often lobed, corolla-tube wide-funnel-shaped. *I. glaberrima*, given by Prain in Journ. As. Soc. Bengal, LXIII. (1894) 102, from the Sundriban is referred to *I. longiflora*, R. Br. in Bengal Plants and in the Flora of the Sundriban (1903). 1 (b) *I. Yoma*, Kurz. Pegu Yoma. Tenasserim. Branchlets, petioles, underside of l. and sepals in fl. appressed pilose. Corolla white, tube straight, 5-6 in. long. 1 (a) and 1 (b) are included under *Ipomoea granulifera* and *trichosperma* in Fl. Brit. Ind. IV. 498.

- P. 487. *L. bona var.*—Syn. *Colocynthis bona var.* Bur.; Prain, Bengal Plants, 738; *C. speciosa*, Cholsy; Cooke, Bombay Flora, II. 252.
- P. 488. *L. illustris*, Prain, as a distinct species in Bengal Plants, 735.
 " *L. Turpethum*, R. Br.—Syn. *Operculina Turpethum*, Manas; Prain, Bengal Plants, 731.
- P. 489. *L. biloba*,—Syn. *L. Pav. Cypra*, Sweet; Prain, Bengal Plants, 736.—Andamans.
 " *Braconia cordata*,—Syn. *Boumania semidigitata*, Hallier f.; Bengal Plants, 733.
 " *B. latifolia*, Kuthiawar.
- " 489. *Solanum cerberifolium*, Vern. *Arusa*, Bengal.—From the Ravi eastwards, Assam, Bengal.
- P. 489. *S. torcum*, Assam.
 " *S. indicum*, South Lushai hills.
 " 490. *S. gracilipes*, Salt range.
 " *S. reflexa*, var. *incana*, Prain. Myitkyina. No trace of prickles, needle-like hairs on fr. less numerous.
- P. 490. *Withania umbellifera*, Chamba, common at 5,000 ft., G. A. Gamble in Records Bot. Survey of India, I. 205. Minbu district, Upper Burma.
- P. 490. *W. corymbosa*, The locality: Sutlej valley at 8,000 ft. requires verification.
- P. 491. *Withania gigantea*, Assam; Khasi hills, Ruby Mines district.
- " 492. *Tecoma undulata*, S. E. Punjab, Northern Rajputana.
- " 493. *Dalbergiopsis Lowii*, Behar.
- " 494. *D. stipitata*, Andamans.
 " *D. Rhodii*, Upper Burma.
 " *Heteropogon sulfureum*, Minbu district, Upper Burma.
 " *Pajanelia Rhodii*, Vern. *Arlanthu*, Mal. Travancore, Chittagong.
- " 495. *Stereospermum chelonoides*, Assam.
 " *S. monodelmum*, Behar.
 " *S. glandulosum*, South Lushai hills.
 " *S. xilocarpum*,—Syn. *Rodermachera xilocarpum*, K. Schum.; Cooke, Bombay Flora, II. 254.
- P. 495. *Gracilaria indica*, From the Ravi eastwards, Assam, South Lushai hills, Andamans.
- P. 497. *Thaibergia grandiflora*, Behar, South Lushai hills, Chittagong, Upper Burma.
- P. 497. *T. coccinea*, Assam, Myitkyina, Burma.
 " *Jonathus longiflorus*, Andamans.
- " 498. *Baccharis longiflora*, Orissa.
 " *B. striosa*, Minbu district, Burma.
 " *Jussiaea Gendarussa*, Assam, Bengal.
 " *Adiantum Falcia*, Vern. *Bokha*, *Pasaha*, Beng.—Bengal, Centr. Prov.
- " 499. *Dendroicastrum serratum*, From the Ravi eastwards.
 " *D. xalapense*, Minbu district, Burma.
- " 500. *Strobilanthus pectinatus*, Flowers once in 12 years. Osmaston in Ind. For. XXX. 195.
- P. 501. *Phlogacanthus thursiflorus*, From the Ravi eastwards, Assam.
 " *P. curviflorus*, Assam, Chittagong, Myitkyina, Burma.
 " *P. tubiflorus*, South Lushai hills.
- " 502. *Lantana scabra*, Often climbing.
- " 504. *Vitex Negundo*, Sundriban.
 " *V. trifolia*, Bengal, Chittagong.
 " *V. pubescens*, East Bengal, Chittagong.
 " *V. Leucocylon*, Santal Parganas, Andamans.
- " 505. *Tectona grandis*, Regarding Teak in evergreen forest, see Bruce in Ind. For. XXIX. 29. Brandis, *Ibidem*, 187. Burn-Murdoch, XXX. 460 and Oliver, XXXI. 417.—Coppice shoots in Jabalpur 8 years old, 18 ft. high, Hole in Ind. For. XXX. 585.
- P. 505. *Holoptelechia sanguinea*, Chutia Nagpur.
- " 507. *Clerodendron Phlomidis* (not *phlomidoides*), Cooke, Bombay Flora II. 431. Vern. *Gharit*, Sind.
- P. 507. *C. infortunata*, South Lushai hills, Chittagong, Andamans. In Travancore this sp. and *C. serratum* come up in large masses in places where fires have been kept out.
- P. 507. *C. serratum*, Chittagong.
 " *C. squamatum*, Andamans.
- " 508. *Gmelina arborea*, Assam, Central Bengal, South Lushai hills, Chittagong, Andamans.
- P. 510. *Premna bengalensis*, Chittagong.
- " 511. *P. latifolia*, Jabalpur, Orissa.
 " *P. villegona*, Myitkyina.

- P. 511. *P. Lactuca*. Behar. Myitkyina.
Callitriche arborea. Vern. *Hornallo*, Beng.—Assam.
- " 512. *Caryocarpus Wallikiana*. Tibet.
- " 513. *C. paniculata*. Myitkyina.
Sphenantheus angustata. Andamans.
- " 514. *Syntherisma polydromum*. Orissa.
- " 516. *Blechnum teretifolium*. Assam. Maimansingh. Chittia Nagpur.
- " 516. *Agrostis Putschalis*. Regarding the plants which yield this perfume see
 Prain in Journ. A. Soc. Beng. LXVI. 519.
- " 517. Add: *Perowskia striptinifolia*, Benth., Baluchistan. Kuram valley. Afghan-
 istan. Ditch. Iskaris Karakorum range. Ichnul. A gregarious undershrub
 with a strong lavender scent, covering large areas in the Chitral valley to the
 exclusion of other vegetation (Barrett). Fl. purple, sometimes white, in large
 terminal panicles, calyx tubular, densely clothed with long silky hairs, upper lip
 nearly entire, lower 2-dentate. Corolla bilobate, upper lip 4-lobed. Stamens 2, anthers
 cells parallel, stigma with 2 broad lobes.
- P. 517. *Pisonia aculeata*. Orissa.
Pisonia excelsa. A tree with a short thick stem, up to 3 ft. diam. and a
 wood filled with a sweet juice, which is a favourite fodder of elephants.
- P. 518. *Daeringia reticulata*. From the Ghazab eastwards. Central Bengal.
- " 519. *Halimolobos recurva*. Vern. *LanaBadr*. For Punjab plains substitute S. V.
 Punjab.
- P. 519. *Sanda califolia*. Orissa.
- " 520. *Polypodium molle*. Vern. *Tutsai*, Nep. Large panicles of white fl.
- " 521. *Calligonum polypanoides*. East as far as Hissar and northern Jaipur.
- " 522. *Aristolochia Rosharshiana*.—Syn. *A. Togoia*, Chamisso in *Musca*, VII. 207
 (the older name); Gage in Records Bot. Survey of India III. 97.—China. Philippines.
- P. 522. *A. indica*. Burma.
A. truncata. Chittagong.
- " 527. *Cryptocarya ceylanica*, Nees.—Syn. *C. aculeata*, Nees; Prain, Bengal
 Plants, 807.—Assam.
- P. 528. *Delaunayia* sp. (Haines 559). Haines informs me that he has obtained fl. which
 are similar to those of *Cyananassa Coccidaphus*, anthers 4-celled.
- P. 528. *Bellechmidia Boardbilloni*. Fr. ellip-oid, 1½ by ½ in., blue; peduncle red.
- " 529. *Bellechmidia anomala*. South Lushai hills.
- " 531. *Alcedaphus petiolaris*. South Lushai hills.
- " 532. *Phoebe attenuata*. Kachin hills, Burma, 2-5,000 ft.
- " 533. *Cinnamomum obtusifolium*. Assam.
- " 535. *Actinodaphne vickinsonii*. Myitkyina.
- " 536. *Litsea sebifera*. Andamans.
- " 540. LINDERA, Species 69. Eastern Asia and North America.
- " 540. *L. anomala*. Kachin hills. Burma.
- " 544. *Daphne oleoides*. Vern. *Churing*, Chitral.
- " 545. *D. pendula*. Pegu. Myitkyina.
- " 548. Identification of *Loranthaceae* by their leaves. A. W. Lushington in Ind.
 For. XXVIII. 56.
- " 548. *Loranthus heteranthus*. Chittagong.
- " *L. pentapetalus*. Chittagong.
- " 549. *L. terrestris*. Khasi hills.
- " *L. cordifolius*. Behar.
- " *L. longiflorus*. Vern. *Bitungli*. Thana.
- " 550. *Loranthus longiflorus* is known to grow on the following genera and species:
Bauhinia, *Shorea robusta*, *Melia*, *Mangifera indica*, *Buchanania*, *Bambusa*, *Inga delcis*,
Acacia Catechu, *Albizia*, *Hecitiern*, *Terminalia*, *Anogeisus latifolia*, *Adina cordifolia*,
Stephanos perisphala, *Bassia latifolia*, *Dianthus*, *Mallotus philippinensis*, *Ficus*,
religiosa, *Quercus dilatata*. A. E. Lowrie reports from Raipur, Central Provinces,
 that nearly all Mulwal trees in that district had been badly attacked and that large
 numbers were being killed by *Loranthus*, this or other species.
- P. 551. *L. involucratas*. Chittagong. Myitkyina.
- " 552. *Ficus masoniana*. Behar. Chittia Nagpur.
- " *F. articulata*. Vern. *Harsore*, Thana.—Chittia Nagpur.
- " 553. *Santalum album*. As stated by me in Ind. For. XXIX. 8, Mr. John Scott in
 1871 established the fact that *Santalum album* is a parasite on the roots of numerous
 species. In connection with the Spike disease, the life history of Sandal has lately
 been carefully studied. Mr. Barber (Ind. For. XXVIII. 310) drew special attention to
 its being a root-parasite, M. Rama Rao (Ind. For. XXIX. 386 and XXX. 248, 337)
 examined its attachment to the roots of about 70 species, on which it lives. Mr.
 Barber (Ind. For. XXX. 545 and XXXI. 186) investigated the structure of the
 haustoria, by which the Sandal tree takes up water, mineral and other substances

- from the roots of the foster plant, finally Dr. Butler and Mr. Barber have investigated the nature of the Spilgy disease (Ind. For. XXIX.).
- P. 554. *Oxyia arborescens*. A species, which occurs Trans-Indus and in Baluchistan, may possibly be distinct.
- P. 555. *Euphorbia Natalis*. The central sessile involucre sometimes fertile (Haines).
- " 556. *E. serrifolia*. Orissa, wild, in rocky places (Prain, Bengal Plants 923).
- " " *E. antiquorum*. Andamans.
- " 557. *Saxum ussuriensis*, var. *microphylla*. A dwarf shrub in North East Kumsou and West Nepal, 11-12,000 ft. Also in China and Japan.
- " 558. *Hidellia retusa*. Assam.
- " " *B. barmanica*. Arakan Yoma, Minbu district.
- " " *B. dipaloria*. South Lushai hills.
- " " *B. pubescens*. Kachin hills, Burma.
- " 559. *Clatanthus collinus*. Andamans.
- " " *C. patulus*. Orissa.
- " 560. *Andriaceae cordifolia*. Chitral.
- " 561. *Baccarea injida*. Andamans.
- " " *Ajaccio oblonga*. South Lushai hills. Upper Burma.
- " 562. *Andriaceae Ghosembilla*. Andamans.
- " " *A. Busia*. South Lushai hills.
- " 563. *A. colutina*. Chittagong.
- " " *Sepcosca pruniformis*. Himalaya, 5-10,000 ft.
- " 564. *Daphniphyllum himalayense*. Vern. *Lal Chandaz*, Nep.—Upper Burma.
- " 565. *Bregnia patula*. Chulia Nagpur. Orissa.
- " 566. *Saururus trinervis*. Brit. Bhutan 1,000 ft. A small tree, 1-2-4 in. long, stipules subulate, conspicuous.
- P. 570. *Phyllanthus reticulatus*. Vern. *Makbru*, Jabalpur.—Assam. Bengal. Andamans.
- P. 571. *P. albizioides*. Minbu district. Burma.
- " *P. Clarkei*. Brit. Bhutan 800-1,500 ft. Branchlets deciduous, leaf blade 1-1 in. long.
- P. 572. *Glochidion Helferi*. Andamans.
- " " *G. ceylanicum*. Vern. *Kombala*, Mal.
- " 573. *Croton*. ? fl. usually at the base.
- " 574. *C. oblongifolius*. Assam. South Lushai hills.
- " " *C. Joffra*. Chittagong.
- " " *C. Tigina*. Vern. *Lepcha Bis*, Nep.—Truly wild in British Bhitun above 8,000 ft., in forests remote from any cultivation (Haines).
- P. 575. *Gicstia rotlerifolia*. Vern. *Fandartel*, Tam.
- " 576. *Gelonium multistorum*. Myitkyina.
- " 577. *Balloperasma axillare*. Central Provinces.
- " " Add: *Endospermum chinense*. Beuth. ? Prain, Bengal Plants, 946. Chittagong. Malay Peninsula. Hong Kong. A tree, l. alternate, coriaceous, entire, hoary or almost silvery beneath, broadly ovate, obtuse, blade 3-7, pet. 1-4 in., basal n. 3-5. Fl. dioecious, in simple spikes or racemes, $\frac{1}{2}$ clustered, subsessile, $\frac{1}{2}$ solitary, pedicelled, petals 9. Ovary 2-celled, ovule 1 in each cell. Fr. tomentose, nearly $\frac{1}{2}$ in. diam.
- P. 585. *Eroscuria Agallocha*. Schimper, Indo-Mal Strandflora 85, reports having seen it in Ceylon on short silts, similar to those of *Bruguiera*.
- P. 587. *Alchornea*, fl. in simple or panicle unisexual spikes or racemes.
- " " *A. rugosa*. South Lushai hills.
- " 588. *Mallotus Roxburghianus*. Behar.
- " " *M. nepalensis*. Myitkyina.
- " 589. *M. muricatus*. Courtallum.
- " " *M. polyaceros*. Peduncle leaf-opposed.
- " 590. *M. philippinensis*. Assam. Andamans.
- " 591. *Macroranga Roxburghii*. Andamans.
- " " *Cleidion javanicum*. Assam.
- " 592. *Homonais riparia*. Chittagong.
- " 593. *Holoptelea integrifolia*. S. E. Punjab.
- " *Celtis australis*. Vern. *Binja*, Chitral. Not often planted in the plains of the Punjab.
- P. 596. *C. tetrandra*. Travancore, 3-5,000 ft. Attains 50 ft., 1 ft. diam.
- " " *C. cinnamomea*. Travancore, up to 7,000 ft.
- " 597. *Trema orientalis*. Vern. *Ami*, Mal.
- " " *T. politoria*. Vern. *Andia*, *Mañi*, Jabalpur.
- " 598. *Ficus subulata*. South Lushai hills.
- " 599. *F. Dalhousii*. Travancore.
- " " *F. myrsinifolia*. Myitkyina.
- " " *F. Burghii*. Sundriban.—Usually begins as an epiphyte.

- P. 602. *F. inflexa*. Chulia Nagpur, Sundriban, Chittagong, Andamans.
 " 603. *F. robusta*. Sundriban.
 " *F. glabellata*. Chittagong.
 " 604. *F. hispida*. Andamans.
 " *F. unguiculata*.—Syn. *F. lasiocarpa*, Hawd.; Prain, Bengal Plants, 982. In
 January 1905 Kanjilal found in the valley of the Palajo river, Garhwal, on the water-
 edge, in a very shady place, a remarkable specimen with lanceolate opposite l-
 narrowed into a very short pet. and prominent lanceolate stipules, but 12 ft. high and
 10 in. girth, with the characters of *F. unguiculata*, but in habit approaching *F. hispida*.
- P. 606. *F. Osmia*. Bengal.
 " 607. *F. palmata*. Chitral, common (Kew).
 " 608. *F. hirta*. South Lushai hills.
 " *F. pyrifolia*. Chittagong.
 " 609. *F. unguiculata*. Jabalpur, Guntia Nagpur, Chittagong.
 " *F. laevis*. Chittagong.
 " *F. glomerata*. Central Provinces.
 " 610. *Allanathus Kurzii*. South Lushai hills.
 " 612. *Artocarpus Lakucha*. Vern. *Thiki pilars*, Tam.—Bengal, South Lushai hills.
 " 612. *Morus alba*. Vern. *Mesok*, Chitral.
 " 614. *Braconnetia papirifera*. See W. H. Craddock in Ind. For. XXVI, 613.
 " 615. *Streblus asper*. Vern. *Majai*, Jabalpur.—Central Provinces, Andamans.
 " 617. *Balaocera macrophylla*. Assam, Kachin hills, 2-2,500 ft.
 " 618. *Sarcocaulis pulcherrima*. Minbu district, Burma.
 " *Dibococcia hypoleuca*. Punjab Salt range.
 " 619. *Juglans regia*. Vern. *Birbagh*, Chitral.
 " *Platanus orientalis*. Not now cultivated in Kashmir, the existing trees are
 mostly old. (J. B. Drummond.)
- P. 620. *Mirica Nogi*. Probably not indigenous in the Punjab Himalaya.
 " 621. *Casuarina cuspidata*. From a paper by E. B. Murray on the Casuarina
 plantations Nellore (Ind. For. XXXI, 475) it appears that in that district the yield per
 acre per annum is under 2½ tons.
- P. 625. *Quercus Ilex*. Vern. *Banj*, Chitral.
 " 626. *Q. incana*. Salt range, above 3,500 ft., rare.
 " 629. *Q. Lindleyana*. Arakan Yoma.
 " 632. *Q. dombata*. Minbu district, Upper Burma.
 " 633. Add: To section V, probably belong 2 imperfectly known species: 18,
Q. Listeri, King, Ann. II, t. 82. Syn. *Q. Jenkinsii*, Benth. in Hook. Ic. Pl. t. 12-13
 Upper Assam. L. coriaceous, entire, acuminate, base acute, upper surface glabrous,
 shining, lower pale, minutely pubescent, blade 10-14, pet. 1½-2 in. ♀ fl. in narrow
 erect axillary panicles, the branches stiff, ½-¾ in. long, nearly at right angles on the
 rachis. ♀ fl. in clusters of 2, on stout short simple spikes. Acorns supposed to belong
 to this, resemble those of *Q. lauceifolia*, 99. *Q. Jenkinsii*, Benth. in Hook. Ic. Pl. t.
 1212. Upper Burma. A doubtful species of King, Ann. II, 83.
- P. 636. *Salix nemophylla*. Vern. *Budha*, Sind.
 " 640. *Populus ciliata*. Mirga, Chitral 7,200 ft.
 Add: 3 (a) *P. Jacquemontiana*, Dode in Extraite d'une Monographie du Genre
Populus, p. 60, Paris 1905. North West Himalaya. Differs from *P. ciliata* by
 pubescent capsules. The 2 species mentioned under *P. ciliata* have now been named
 as follows: 7. *P. Gambelii*, Dode, Lc. 63, the species mentioned by Gamble, Ind. Trib.
 ed. II, 600; British Bhutan, 1-1,000 ft. Leaves variable, those of the normal form
 with a straight, not ciliate base, repand-serrate, teeth large, those of the large-leaved
 form coriaceous, evenly serrate, blade 8-10, pet. 2-3 in. long, 2 large glands at base of
 leaf. Bracts of ♀ fl. lanceolate, ½ in. long, nearly entire, not caducous, edges densely
 ciliate with long silky hairs. Capsule very narrowly ovoid, 3 times as long as broad,
 disk scarcely toothed. 8. *P. glauca*, Haines MSS. From Nepal to Bhutan, 7,500-
 10,000 ft., chiefly on the crest of ridges, but not common. Attains 50 ft. and 5½ ft.
 in girth, branchlets with prominent leaf-scars. L. glabrous, very glaucous beneath,
 nerves and petioles red. Fl. ♀ or ♂, male not yet found, rachis and pedicels woolly.
 Bracts from elliptic to orbicular, ½-¾ in. long, lacinate and fimbriate. Disk large,
 unequally 3-7-lobed, stamens usually 1-4, sometimes more, anthers red. Capsule
 tomentose, 3-4-valved.
- P. 641. *Dryocopa angustifolia*. Lt. Col. Prain informs me that *D. ensifolia*, Wall., is
 a distinct species of British Bhutan, Assam, the Khasi, Naga and Lushai hills, and
 the Kachin hills of Upper Burma. *D. angustifolia*, Roxb., he regards as a littoral
 species. See Kurr F. Fl. Burma II, 548 and Prain in Records Botanical Survey of
 India I, 1902.
- P. 641. *Salix macrophylla*. Andamans.
 " 646. *Phania* sp. No. 11. Endosperm emarginate, embryo dorsal (Rogers).
 " 647. *Pinanga gracilis*. Kachin hills, Upper Burma. *

- with the exception of a few short branches near the ground. Internodes 24-29 in. long, 24-3 in. diam., culm-sheaths firm, outside with black irritating hairs, root with two broad up-lifting bands on both sides of the blade. Genus unknown, neither *Gigantochloa* nor *Cymbopogon*. The distinctly keeled palea is against *Miscanthes*.
 P. 674. *Cymbopogon nigrescens*. Vern. *Kayawey*, Burm. Women, Karen (Papua). Pleasant in Martaban, on the hills between the Bowling and Salween rivers. The culms of the first year bright glossy green, finely streaked with white lines, all black hairs 1/4 in. long on the upper part of internode, below the nodes (Manson). The lowest fl. in the spikelet is the youngest, staminal-tube short, enclosing the ovary; in the middle fl. the anthers are shedding their pollen, the staminal-tube being nearly as long as the style and enclosing it. In the uppermost fl. the caryopsis is nearly mature, 1/4 in., crowned by the persistent style 1-1 1/2 in. long.
 P. 676. *Dactyloctenium aegyptium*. Vern. *Huyin-dye-ye*, Burm. Papua, Martaban, F. B. Manson.
 P. 678. *Panicum Hageri*, Garbale. *Thau-thau*, Kar. Hills east of Papua, Martaban, F. B. Manson.
 P. 681. *Dactyloctenium aegyptium*. Vern. *Sin-ai-ye*, Burm.; *Baw*, Kar. Hills on the left-waters of the Maitbarack stream.
 P. 684. *Ochlandra*. Species 7 in India, 1 in the Malay Peninsula.
 P. 692. *Alois Webbiana*. Dr. Augustine Henry has drawn my attention to a remarkable character observed by him in all specimens cultivated in Great Britain, viz. that the furrows between the raised leaf cushions are clothed with minute brown hairs, while the branchlets of *A. Pindrow* are perfectly glabrous. It would be interesting to ascertain the origin of the seed, from which the specimens of *A. Webbiana* now growing in Great Britain, have been raised.
 P. 693. Dr. Henry informs me that the Spruce of the Chumbi valley is *P. marindojana*. Böhler in Sargent Trees and Shrubs, l. p. 95, tab. 48, described from a specimen cultivated in France.

P. 170. *Zizyphus Jujuba*. A shrubby form, more or less gregarious, in the sub-himalayan tract, Oudh, Chutia Nagpur and elsewhere.

A. W. Lushington in Ind. For. XXX. 161 and G. M. Ryan on p. 450 have justly drawn attention to the large number of Indian trees which reproduce themselves by root-suckers, commonly known as root-suckers.* The following list is based almost entirely upon these two most useful communications. The subject will doubtless receive more attention in future, and many species will then be added to the present list.

Polypodium crassipes, *Annona squamosa*, *Kydia calycina*, *Eriolobus gajagularis*, *Holoptera laeta*, *Greigia orbiculata*, *Egle Marmelos*, *Balanites Barbarchii*, *Alaythus glandulosa*, *Garruga pinnata*, *Roucellia serrata*, *Protium cantalium*, *Simarouba tubosa*, *Sesuvium portulacastrum*, *Chloroxylon Swietenia*, *Gynostegia emarginata*, *Elaeagnus glauca*, *Zizyphus nummularia*, *Dalmania excelsa*, *Schleichera trijuga*, *Olina Wulfer*, *Buchanania latifolia*, *Ougeinia dalbergioides*, *Halea frondosa*, *Dalbergia latifolia*, *D. Siana*, *D. paniculata*, *Pterocarpus Marquian*, *P. ovalis*, *Passania glabra*, *Hardenbergia binata*, *Cassia Fistula*, *C. vianna*, *C. montana*, *C. auriculata*, *Tamarindus indica*, *Pongamia pinnata*, *Xylia delabriformis*, *Ancina arabica* (doubtful, Ryan), *A. charas*, *A. leucophylla*, *A. Catechu*, *A. dentata*, *Albizia procera*, *A. odoratissima*, *A. Lebbek*, *A. amara*, *Terminalia tomentosa*, *Amoimia latifolia*, *Alopius Linnæi*, *Morinda tinctoria*, *Diospyros melanoxylon*, *Chloroxylon Schreberianum*, *Halacrydium falcata*, *D. crispata*, *Heteropogon polyanthus*, *Wrightia tinctoria*, *Dalichandrea falcata*, *Millingtonia hortensis*, *Lantana camara*, *Vitex negundo*, *V. alliania*, *Hippodamia ulicifolia*, *Santalum album*, *Brillia apollocha*, *Mullata philippinensis*, *Trachia nudiflora* (abundantly, Ryan), *Ficus hispida*, *Artocarpus hirsuta*, *Alnus incana*, *Populus euphratica*.

FURTHER ADDENDA.

P. xvi. Mr. Talbot's excellent account of the Forest Flora of Bombay and Sind, Ind. For. XXXII. 8, 50, 129, containing on p. 60 a detailed description of the Kaus and evergreen forests, reached me after the Introduction had been printed.

* Mr. Lushington objects to the term root-sucker because roots do not as a rule produce leaf-buds. But the roots of Elms and Poplars which in Europe produce abundant root-suckers (French dragon) are real roots, not rhizomes, and this doubtless is the case with the Indian trees here mentioned.

- P. XVII. The Sal forests of the Balgarh range, Balaghat Division, Central Provinces, are stated to be on trap and laterite.
- P. 28. C. K. Schneider (Bulletin Herbar. Boissier 1905, p. 666) considers that the Northwest Himalayan shrub, hitherto referred to *Berberis vulgaris*, is *B. pichayensis*, Koch.
- P. 29. C. K. Schneider classes the Nilgiri *Berberis* under 3 species: *B. hastata*, Lessert., *B. Wightiana*, C. K. Schneider, and *B. wyleiana*, C. K. Schneider. The Himalayan shrub, hitherto called *B. aristata*, he classes under *B. aristata*, DC., and *B. chilensis*, Lindl. (p. 473). He also describes *B. pichayensis*, C. K. Schneider, from Garhwal, and *B. Thunbergiana*, C. K. Schneider, from Sikkim.
- P. 40. *Grewia odavata* is called by Prain, Bengal Plants 232, *Chenopodium odavata*, Roxb.
- P. 42. *Taraxacum* var. *Karzi*, Vern. *Chaulmagra*, Chittagong. It is now certain that this tree yields the Chaulmagra oil of commerce. Cf. D. Hooper in Agricultural Ledger, No. 3, of 1906.
- P. 138. *Samyda granuliferus*, Chumbi, Bhotan.
- P. 257. *Busa Collettii*, Prain, in Journ. As. Soc. Bengal LXXIII, 263, states "styles connate."
- P. 290. *Pyrus* is now generally divided into 4 genera: *Malus*, *Pyrus*, *Sorbus* and *Microseris*.
- P. 291. *Pyrus aestiva* is called by C. K. Schneider (Laubholz Kunde I. (85), *Sorbus capitata* Ledebund.
- P. 292. C. K. Schneider (ibid. p. 680) calls *Pyrus foliolosa* *Sorbus arvensis*, Desv., and *P. Wallichii* *Sorbus foliolosa*, Spach.
- P. 292. The Afghan and Indian tree here called *P. Annapurna*, is identified by C. K. Schneider (ibid. p. 685) with *Sorbus thimshanica*, Ruprecht.
- P. 36. *Calocaryon Simonsii*, Hort., and *C. Dasyphylla*, Hort., should be *C. Simonsii*, Baker, and *C. Dasyphylla*, Baker.
- P. 360. Alfred Rehder, in his Synops. of the Genus *Lonicera*, published in the 14th Annual Report of the Missouri Botanic Gardens (1903), p. 124, substitutes for *Lonicera densipes* the older name *L. lanceolata*, Wall.
- P. 359. *L. glauca* is identified by A. Rehder (ibid. p. 121) with the older species *L. Semenovii*, Regel, from Turkestan.
- P. 390. A. Rehder (ibid. p. 121) identifies *L. parvifolia*, Edgew., with *L. chlorata*, Boyle, and on p. 44 calls the species described under no. 24 *L. Myrtillus*, Hook. fil. et Thoms.
- P. 479. *Cordia Mouloukii*, Vern. *Hodang*, Kan.
- P. 565 line 29, 30: *Melanthera* (not *Melantheropsis*) *obliqua* and *M. truncata*. In the letterpress Wight calls the last-named species: *M. turbinata*.
- P. 568, line 16 from below: *Bryonia rhamnoides*, the female fl. are solitary.
- P. 573, line 5 read: *Olochotia lanceolaria*, Vahl. Syn. *Phyllanthus lanceolaria*, Muell. Arg.
- P. 575, line 35, read: *G. lanceolaria*, Vahl.
- P. 580. Add: *Nepenthes lanceolata*, Spence de M. Moore in Journal of Botany XLIII, 149, tab. 471. Mulyll hill, Travancore. A shrub or small tree, branchlets and l. pubescent or tomentose, l. alternate, entire, subcoriaceous. Fl. monocious panicle, ♂ numerous, ♀ solitary on long pedicels at the end of the ramifications of panicle. 4: sepals 5, petals 5, anthers 3, on a slender column, at the base with a disk of 5 fleshy glands. 9: petals 0, the sepals accrescent in fr.
- P. 619. *Ficus pumila*, Vern. *Ka-awaggi*, Burma.
- P. 627. A thorny bamboo, collected on the Hsin-Fang range, Lushai hills, Vern. *Po-o*, Lushai (two culm pieces, a few twigs and detached l., no notes, recd. May 1906), may possibly be an *Arundinaria*. Internodes 3-6 in., diam. 1-2 in., walls thick. At each node a ring of numerous sharp thorns, up to 25, slightly bent downwards, mostly 1, some 1 in. long. Culmsheaths membranous, longer than internodes, densely clothed with dark brown hairs, the thorns piercing the sheath, blade triangular. L. 6 by 1-2 in., 22 n. on 1 in., transverse veins conspicuous.
- P. 671. *Bambusa arundinacea*, Vern. *Dongi*, Kan.
- P. 683. *B. baccifera*, Chittagong 1861. Roxb. Hort. Beng. p. 25.
- P. 693 and 729. The Spruce of Sikkim and Bhotan probably is *P. mucronoides*, Rehder. Griffith (Journal 250, itin. Notes 145) called this tree *Abies spinulosa* and figured it in Te. Pl. As. 1, 368, under the name of *Pinus spinulosa*. Cf. Hooker's Himalayan Journals II, 35, 45.

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