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PRELIMINARY REPORT

ON THE

FOREST AND OTHER VEGETATION

OF

PEGU.

BY

SULPICE KURZ,

CURATOR OF THE HERBARIUM AND LIBRARIAN,

ROYAL BOTANICAL GARDEN, CALCUTTA.

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ERRATA.

Page, 16, in the lithograph of the N. E. quarter of the globe, correct *Cold* zone into *Wintry* zone.

Page 24, lithograph of W. to E. section of Burma, correct (at right-hand side) tropical, subtropical and sub-temperate *zones* into *regions*.

Page 33, line 28 from above, read tree-stems for "tree restems."

Page 37, line 21 from below, read *Acer isolobum* for *Aceri solobum.*

Page 43, line 8 from below, read aërial *goshts* for *spokes.*

Page 73, line 17 sqq. from above, should be corrected to the effect, that steam-rollers are already largely in use in the tea-districts of India.

Page 76, line 16 from below, omit the Chinese tallow tree, which is a leaf-shedder and thus unfit for the purpose indicated.

Page 86, line 14 from above, read wiped for whipped.

Page 92, line 19 from above, omit the words: "on a peculiar soil, as in its prevalence or better growth on such soil."

N. B.—The nomenclature of some of the plants mentioned in this Report is to be changed as follows:—

Psilobium = *Morindopsis; Pterospermum fuscum* = *P. cinnamomeum; Garcinia cowa* = *G. Kydia; Semecarpus heterophyllus* = *S. albescens; Hiptage arborea* = *H. candicans; Melia Toozendan* = *M. Birmanica; Lepisanthes montana* = *L. Burmanica; Desmodium reniforme* = *D. oblatum; Pollinia tectonum* (teak grass) = *P. micrantha; Otosemma macrophylla* = *Millettia extensa.*

N. B.—For further corrections see list of errata at the end of appendix B on page 95 and of appendix E on page 34.

PRELIMINARY REPORT

ON THE

FORESTS AND VEGETATION GENERALLY

OF

PEGU.

By S. KURZ, Esq., Botanist on Special Duty.

In submitting this report on the vegetation of Pegu, with special reference to the forests of this province, I wish to remark, that I did not consider it necessary to go into minute botanical details. Nor, indeed, would time have allowed me to do so; for it is quite impossible, in a few months only, to arrange and name carefully so many species of plants, (about 2,200 species of phanerogams) as I have collected in Pegu. Consequently, the determinations of most plants referred to in the following pages, are hand and eye determinations, of comparatively little scientific value. My present object has been to draw up only a general sketch of the vegetation of the country.

Nor have I fully brought under review the many agencies that co-operate in the modification of vegetation, such as exposure and physical configuration of land, the influence of greater masses of elevated hill ranges in connection with geographical latitude, that of winds and of the neighbourhood of larger expanses of water, or the influence of temperature, of subsoil, moisture of atmosphere, the intensity of solar radiation, &c. Nor am I able to discuss here in a proper way such an important question as the influence of chemical composition of soil and subsoil upon the presence or absence of certain plants. Although I have collected a fair amount of material in this direction, it will take a good deal of time before the chemical analyses of the specimens of soil collected can be executed, without which a discussion of this question would be simply empirical, and therefore of little positive value.

All the above-named conditions, or as they are more properly called, *factors*, offer so many variations in Burma, that not only a longer stay in the country would be required, in order to come to any reliable conclusions, but the full consideration of all these data would far exceed the scope of a simple general report. For these reasons I have confined my remarks to some of the most important and interesting questions connected with the distribution of plants; and these I have treated as briefly as possible, only occasionally and cursorily introducing matters of a more scientific character, which may possibly interest forest officers of a more inquiring turn of mind.

I have treated of such questions in the present report, because there will be no opportunity to discuss them in my forthcoming book on the forest trees of Pegu, for the official instructions before me do not include the introduction of any other information beyond a description of plants important to foresters, and a practical treatment of the forests, cursorily reviewed also in this report, under § 8.

A proper practical review of the different varieties of forests will be given in my book, after the whole of the Flora of Burma has been worked out; for only after this has been done will it become possible to give reliable scientific names of the trees, and to have them accompanied by vernacular names. In the meantime I have given here such a practical conspectus of the Pegu forests as above described, introducing in it only such Burmese names for trees, &c., as appeared to me tolerably trustworthy.

The present report may, therefore, be divided into the following sections :

PART I.—GENERAL REPORT.

A.—GENERAL ASPECT OF THE COUNTRY, ITS GEOLOGICAL FEATURES AND CLIMATE, IN CONNECTION WITH THE FLORA.

§ 1.—Limits of Pegu as defined in this report, with a short topographical sketch of the country.

§ 2.—Geology of Pegu, as far as connected with the flora.

§ 3.—Climatological notes on Pegu.

§ 4.—Brief review of other conditions that influence vegetation, such as physical structure of substrata, &c.

B.—BOTANICAL DESCRIPTION OF PEGU, WITH SPECIAL REFERENCE TO ITS FORESTS.

§ 5.—Position of the Pegu Flora with regard to surrounding floras, and division of the flora into natural zones and districts.

§ 6.—Distinction of the vegetation into an original and a secondary one.

§ 7.—Enumeration of the different kinds of forests, &c., and their general character.

§ 8.—A brief practical conspectus of the above forests of Pegu alone.

§ 9.—A table of the natural families of plants represented in Burma, together with an approximate estimate of the number of species growing in Burma.

PART II.—SPECIAL REPORT.

§ 1.—Conservancy of Forests in Pegu with reference to soil and climate.

§ 2.—Utilisation of deserted toungyas, with cursory remarks on timber plantations.

§ 3.—Some hints with reference to the study of the quality of woods in India.

§ 4.—Conclusion.

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Appendix A.—List of Burmese trees.

Appendix B.—General Key for naming the Burmese trees.

Appendix C.—Collection of Burmese names for other plants than trees.

Appendix D.—Lord Mayo's tree *(Mayodendron)*, a new genus from Martaban.

Appendix E.—Communications from Mr. Kurz's Journal of his tours in Burma.

EXPLANATION OF SIGNS &c. USED IN THE SKETCHES, &c.

To avoid repetitions, I append here a table of signs, &c., employed in the sketches that I have introduced from time to time in the body of this report. They are all very simple and easy, and might be used also in future forest surveys of Pegu.

EVERGREEN FORESTS.

	Mangrove forests.		Pine forests.
	Tidal forests.		Drier hill forests.
	Evergreen tropical forests.		Stunted hill forests.
	Palm-groves.		Damp hill forests.
	Swamp-forests.		

DECIDUOUS FORESTS.

	Savannah forests.		*Sha* forests.
	Bamboo jungle.		*Eng* forests.
	Lower Mixed forests.		Low forests.
	Teak trees.		Hill Eng forests.
	*Pyen-kadoo* trees.		Upper dry forests.
	*Pyen-ma* trees.		Beach jungle.
	Upper Mixed forests.		Grass lands.

SUBSTRATA.

	Alluvium.		Soft grey sandstone.
	Diluvium.		Calcareous sandstone.
	Older formations, chiefly metamorphic strata.		

PART I.

GENERAL REPORT.

A.—General Aspect of the Country, its Geological and Climatological Features, in connection with the Flora.

§ 1.—*Short topographical sketch of Pegu.*

Pegu, as understood in this report, comprises the whole of the country lying between the Irrawaddi, or Tharawaddi, and the Sittang rivers, and extends from the seashore northwards to the frontier of Ava. Virtually it extends into Ava; but that northern portion is not included in my present report. It consists, therefore, politically, of parts of Pegu, Prome, Martaban, and other districts.

Geographically the country extends from N. Lat. 16° to nearly 19½°, and from E. Long. 95½° to 97°, having a length of about 210 miles, and a breadth varying from 60 to 80 miles. The area comprises about 15,600 square miles, of which hardly one twenty-fifth part is under cultivation.

The *Pegu Yomah* (so called to distinguish it from the *Arracan Yomah* or *Yeomatong*) runs nearly S. and N. parallel with the Irrawaddi and Sittang rivers, forming the watershed between these two rivers as far as Lat. 18½°. Here the main range divides into two, the one forming the watershed between the Irrawaddi and Pazwoondoung rivers, and the other between the Pegu and Sittang rivers. The hill range itself begins at Rangoon, but branches of hardly perceptible elevation are also met with in the delta: as for instance, those at Syriam pagoda and the Twon-tay-Kon-don, south of Shan-soo-gyee. These hills are surrounded on all sides by low lands, except towards the north, where they expand all over the country to the banks of the Irrawaddi, as well as to those of the Sittang. It is a very rugged, but low range, dividing in all directions into numerous spurs, which again are intersected by steep valleys and ravines. The highest tops are the Kambala toung (north) of about 3200 feet elevation, and the Kyouk-pyoo, perhaps a hundred feet higher. The average height of the main ranges varies from 1000 to 2000 feet, occasionally rising to 2,500 feet. The southern extremities, as well as the parts on the head waters of the Pannyo-gyee and Khayengmathay choungs, are much lower than 1000 feet.

The principal rivers, besides the Irrawaddi and Sittang, are the Pegu river, with the Pazwoon-doun-choung, and the Hlein river. These two latter rivers, and all the streams that flow into the Irrawaddi and Sittang, rise in the Pegu Yomah.

The principal streams falling into the Irrawaddi (enumerated from the north) are the following:

1.—The Paday choung with its feeders: the Khyoung Koung gyee (called in its lower course Bhot-hlyee choung) and the Naweng choung, of which the Myouk-naweng, Choung-souk and Toung-naweng are the principal feeders.

The Hlein river, is a peculiar river running parallel with the Irrawaddi, of which it has apparently been some time ago (and is still to a certain degree) a branch, in the same way, as the Hooghly is only a branch of the Ganges. The upper part of the Hlein river is called Myitmakha choung, and has its sources in the low hills of the Prome District.—It receives feeders only from the east, and these are the following:

The Suaylay, Toung-nyo, Myoung, Mengla, Beeling, Thonsay, Okkan, Magyee and Mayzelee choungs.

The streams that flow eastward into the Sittang, are the Hswa choung with the Theing, Longyan and Sabyeng choungs as principal feeders.

2.—The Khaboung stream with numerous feeders, as the Panbay, the two Choungmenahs, Kyetsha, Myouk-nway, Hnget-pyoo, Sean-yay and Thabyay choungs.

3.—The Pyoo Choung.

4.—The Koon choung, with the Khayeng-mathay-choung.

5.—The Tonkan choung

6.—The Yay-nway choung, with the Pean choung.

7.—The Bheingda choung.

8.—The Kaulee-ya-choung; and, finally,

9.—The Bhamee and Kyon-lee choungs, uniting into the Malaka choung.

The Pegu river, running from north to south, receives the Wou, Thaymay, Kodoo-gway and Khayasoo choungs.

The Nga-mo-yeat or Pazwoondoung stream, also called the Pounglin river, with the Mahooya choung as principal feeder, runs in the same direction as the Pegu river, of which it might almost be said to be a feeder.

The fall of the principal rivers is inconsiderable, and amounts in the Irrawaddi and Sittang rivers, between the sea and Prome and Tounghoo respectively, to not more than about 6 inches in a mile.

§ 2.—*Geology of Pegu, as far as connected with the Flora.*

When speaking of the geological formations of Pegu in connection with the vegetation, it must be borne in mind, that a botanist's treatment of the geological features of a country differs to a great extent from the treatment of the same subject by a professional geologist, inasmuch as a botanist has not to take into account all those minute details, which are required for fixing the age of the rocks, &c. The botanist has simply to consider the extent and quality of the rocks and soils which are represented in his botanical district, and to draw inferences from them upon the vegetation that grows on each of those formations. Only when he enters into speculations as to the age of floras, their origin and the later geographical distribution of plants, has he also to take into account such geological disturbances as have taken place in former epochs.

The geology of Pegu itself is very simple and uniform, for the hills are composed solely of sandstone, skirted along their base by a broader or narrower strip of diluvium, interrupted by a deeper or shallower alluvium, wherever choungs come down from the hills; and succeeded by the vast alluvial plains, through which the Irrawaddi and Sittang flow. It is owing to this uniformity in the nature of the rocks, that we can so easily understand the distribution of plants, while the Martaban or Karen hills, &c. offer many apparent anomalies, which can be explained only after more close study.

We have then to consider here the following principal formations :—

1.—*Alluvium,* deep and shallow.

2.—*Diluvium,* in the form of laterite, sand or diluvial clay and loam.

3.—*Softer grey sandstone,* almost destitute of fossils.

4.—*Calcareous sandstone,* often full of fossils.

1.—*Alluvium.* The alluvial plains stretch along the principal rivers, for more than 150 miles to the north, where, at Tounghoo and Prome, they have an absolute elevation of about 90 feet only. The surface soil in the valleys of the Sittang and Pegu rivers, as well as in that of the Irrawaddi, is usually a grey stiff clay of greater or lesser depth, resting often on loose sand or diluvial loam. Diluvial formations of smaller extent crop out in various localities in the midst of alluvium, and especially also in the deltas of the rivers, in which respect these deltas greatly differ from the Gangetic Delta in Bengal. Wells, in the villages all over the Irrawaddi alluvium from the banks of the Irrawaddi to the base of the hills, are rarely dug deeper than to about 12 to 24 feet in average.

The vegetation of these alluvial plains is tidal as far up as the salt water influences them; passing then into savannahs and savannah-forests, enclosing often swamp forests in depressions. Towards the hills, the savannah forests gradually pass into lower mixed forests. The presence of Lower Mixed forests may be ascribed to two causes, *viz.*, to the lesser depth of the alluvium, and to the neighbourhood of the hills.

Generally, the effect of deep alluvium upon vegetation is twofold. First, it prevents a large number of trees from establishing themselves, and secondly, it affects the growth of those which do take possession of the soil, rendering them short stemmed and in many cases crooked.

2.—*Diluvium.* The diluvial formations stretch nearly all along the base of the Pegu Yomah, until they converge at the northern extremities of the alluvium, *viz.*, near Prome and above Tounghoo, with the same formations of the Arracan and Karen hills, where they cover a more or less extended area, variously interrupted by sandstones and alluvial formations.

This diluvium is composed of various kinds of lateritic rocks, and of gravelly soils, such as sand or loam; sometimes of very stiff clay. Conglomerates chiefly composed of coarser or finer quartz or ferruginous sandstone pebbles, either cemented by ferruginous loams, &c. or loose, are also frequent, especially in the Prome districts. Along certain tracts the diluvial formations do not crop out at all, but are covered with a thin layer of alluvium, which then usually bears the peculiar low forests, which combine the character of Eng and lower mixed forests. Such is the case especially along the base of the Yomah from the latitude of Thonsay down to the Pazwoondoung valley near Pounggyee.

The term "laterite," as used generally by foresters in Burma, comprises several heterogeneous rocks and soils, all characterized by a more or less ferruginous appearance, but really connected in no other way, than that they are all permeated by hyperoxide of iron: in fact, they derive their origin from two very different sources; the one being diluvial, while the other series is the product of decomposition of underlying rocks. All the laterite along the western base of the Pegu Yomah, and along the Sittang, is decidedly diluvial, but many laterites on the summits and along ridges of the Prome and Martaban hills belong to the latter class, which is, especially in Hindustan, largely developed. The influence, however, of all these rocks on vegetation is the same, or nearly the same.

Laterite is a formation of the highest importance in the various floras of India. No other formation except metamorphic and volcanic ones can boast of such a variety of species, in spite of its apparent sterility, as laterite. It is this rock that affects vegetation so much, that the great difference between the floras of Malacca, Borneo, Sumatra, &c., on the one hand, and that of Java on the other side, is produced. It is also this formation which allows so many Australian genera, like *Melaleuca*, *Baeckea*, *Tristania*, *Leucopogon*, *&c.*, to spread so far to the north-west, some of which, like *Tristania*, spread as far north as the Ava frontier. If all laterite plants were to be erased from a list of the plants of Pegu proper, the flora would be rendered very uninteresting indeed.

From about 12 miles S. S. W. from Toungboo down to Pegu, no true laterite occurs, but a yellowish loam, intermixed with coarse quartz pebbles takes its place. Sometimes the alluvium, here often very light and loose, seems to rest on the sandstone itself. In such localities a strange mixture of evergreens with deciduous forest trees (moist forests) has grown up, changing usually into true tropical forests, where choungs intersect them. The loam soil of yellowish colour, intermixed with small angular pebbles, is especially developed all along the borders of the Pegu and Pazwoondoung alluvia, stretching down as far as Rangoon. According to its stiffer or looser constitution, *Moist* or *Low forests* prevail on them.

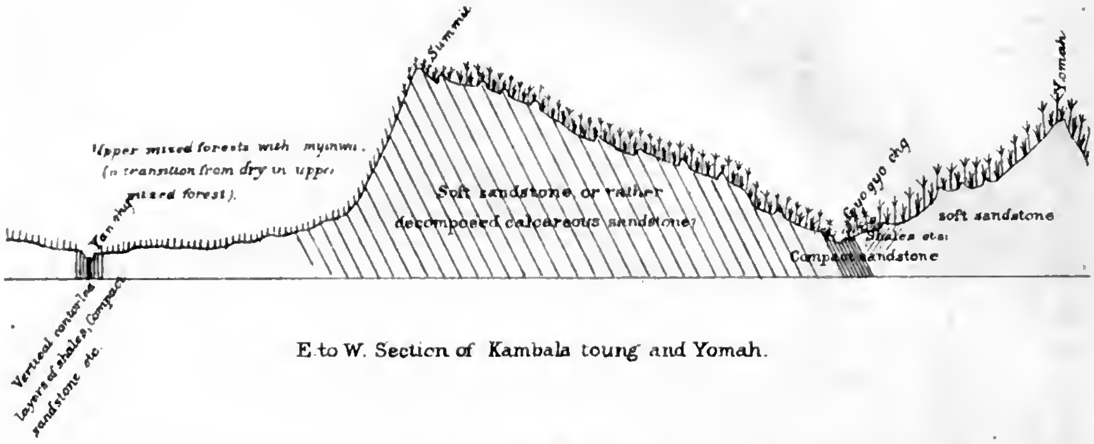
The gravelly sand soil is predominant in Prome, and not a few peculiar plants occur on it in the Eng forests of that region. The pebbles and sand-granules of that region vary greatly in size in different localities, but all seem to form an impermeable or almost impermeable substratum,* or to rest on such an one. Here boulders and large fragments of fossiliferous calcareous sandstone, of lateritic rocks, and sometimes blocks of fossil wood, are often observed sticking out from the ground or loosely resting on it.

3.—*Soft grey sandstone.* The next and most important formation, forming nearly one half of the area under consideration, is a soft grey sandstone, composing nearly the whole of the southern range of the Pegu Yomah, from the headwaters of the Hswa choung down to the diluvial formations of the Pegu and Pazwoondoung valleys. Thin layers of older calcareous sandstone are also found, but only occasionally, as for instance at the obstruction of the Hpyoo choung at Hpyoo-Menglan. But around Kambala toung, the upper part of the Koon and Khayengmathay-choungs, and possibly all around the Prome district, soft and calcareous sandstones are deposited alternately, in thinner or thicker layers. This soft sandstone is everywhere distinctly stratified, the strata, however, are rarely horizontal, but more or less undulating, and more especially so towards the main axis of the Yomah, dipping in the directions of N. E. to E. N. E. and S. W. to W. S. W. at various angles.

The highest crest of the main range of the Yomah, and all the spurs that compose the Kambala toung, consist of a slightly different coarser pale brownish-grey sandstone, dipping regularly to E. by N. at an angle varying from 25 to 50 degrees. Possibly it is only a decomposed calcareous sandstone, on which at least the Kambala beds seem to rest.

In the Yan valley, adjoining Kambala toung on the west, the beds of soft and calcareous sandstones and shales are highly folded, almost contorted and cropping out nearly vertically.

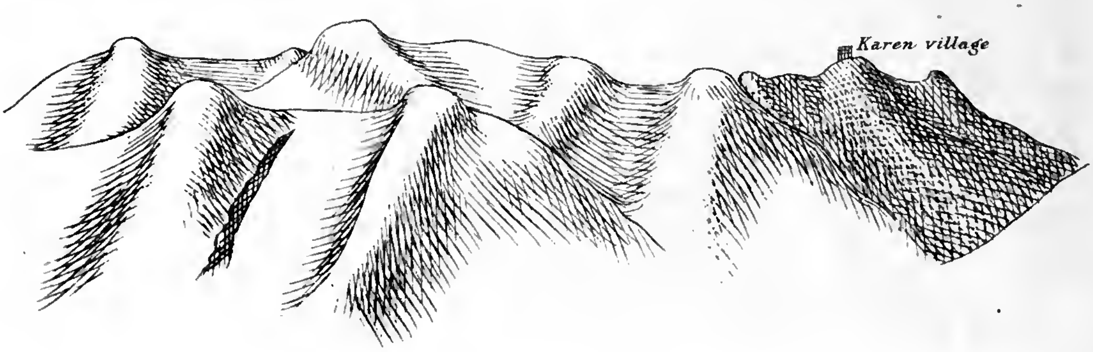
* To avoid misunderstanding, I will remark here, that any bed is to me impermeable, if the constituents of it, whether solid rock, detritus or pebbles, are themselves impermeable. Thus a sand-bank, consisting of siliceous pebbles, is in my eyes impermeable, although mechanically quite permeable; while a similar sand-bank consisting of pebbles of permeable sandstone, would be doubly permeable, *viz.*, mechanically and physically.



E to W. Section of Kambala toung and Yomah.

Fossil shells of the genera *Ostrea* and *Pecten*, along with Foraminifera, were met with in the interior parts of the Southern Yomah between Wanet, Wachoung and Kenbatee. At the former place, on the watershed between the headwaters of the Pazwoondoung and Kenbatee choungs, at a considerable elevation, say about 700 or 800 feet, in large blocks similar to reefs, they are much weathered out. In a choung on the Kenbatee side, called Kayoo choung, which is passed in crossing from Wachoung to Kenbatee, fossils are still more numerous, the fossiliferous rocks covering, as it were, the whole bed of the choung. There are several Kayoo choungs in the Yomah, for instance one in Upper Zamayee, which might suggest a similar occurrence of fossils.

This sandstone forms a most intricate labyrinth of low ridges, diverging from a main chain and branching usually almost at right angles, and rendered still wilder by the many ravines and gorges, that are formed by the heavy rains during the south-west monsoon. All these spurs and ridges are, as a rule, steep, often so much so (especially along the main range) that it becomes sometimes very difficult to ascend them, comparatively low as they may be.



Configuration of sand stone ridges in Yomah

Very curious is the regular occurrence of the rounded small knolls, that appear so frequently on the ridges, especially where other ridges branch off. These cause tiresome ups and downs in marching along ridges otherwise level and easy. The main range itself, of about 1,000 to 1,500 feet elevation, runs in general from north to south with a little westing. Towards the north it winds much, attaining an elevation of 2,000 to 2,500 feet.

The soft sandstone is of a very permeable nature, and bears, as a rule, a very rank vegetation, although the ground is rather poor in herbs and shrubs, and still more so on the higher and steeper ridges.

This whole soft sandstone formation is covered by a very uniform and usually lofty forest, *viz.*, the upper mixed forest But in the moister valleys, especially along the Sittang side, evergreen tropical forests are frequent, while on the exposed crests of the highest parts of Kambala toung, &c., upperdry forests for the first time make their appearance.

The area is scantily peopled by Karens (Squau), and Burman villages are seen only along the outer skirt of the hills. A great part of these hill-Burmans along the Sittang side are called Yabines.

4.—*Calcareous sandstone.* As we approach the north-west corner of Pegu, a highly indurated impermeable rock of a rather greenish colour becomes so prevalent, that it produces a striking change in the vegetation. This older sandstone is compact, indistinctly stratified, and is often also highly fossiliferous. It is usually so extremely hard, that scarcely any water is allowed to percolate. Hence decomposition goes on very slowly and very incompletely. This older sandstone formation possibly extends far into Ava, and is probably accompanied by limestones. I infer this from the Botanical collections which Dr. Wallich made there in 1826. Thin incrustations of calcspar are not unfrequent, but nowhere in large quantities.

Sometimes layers of soft grey sandstone are conformably superposed upon the older beds, as for instance, on the path that crosses the watershed between the Paday and Khyoung-Koung-gyee choung, and then an upper mixed forest appears rather abruptly, with such trees. as *Homalium tomentosum*, *Millettia Brandisiana* (thitpagan) and fine-grown teak. Soft and calcareous sandstones, with shales, are frequently seen alternating with one another and forming folded or undulating strata, as I have already indicated. Numerous fossils may in places be obtained from this sandstone, and the whole Prome tract up to the main range of the Yomah appears to abound with larger or smaller boulders, which are particularly fossiliferous.

The vegetation on this older formation is peculiar, and quite dissimilar to any occurring in British Burma. This vegetation consists of the Sha forests, curiously mixed up with other trees, that are found elsewhere only on laterite, as for instance, *Eng*, *Engyin*, &c. The country looks, during the dry season, barren, dry, and in many respects not unlike Behar.

The above-mentioned would appear to be the principal rocks that influence the vegetation. A granitic rock is also observed (as Major Twynam was good enough to inform me) at Toungho, not far from the ferry over the Sittang to Myatson-yee-noung, where a quarry has been worked for some time. But such a local and limited occurrence is of no consequence in a botanical point of view.

Schists, syenites and other metamorphic rocks, often accompanied by mountain limestone, appear to cover a great extent of the country east of the Sittang, where they, in the same way as along the Pegu Yomah, are bordered all along the base towards the Sittang by laterite formations, often forming hill ranges 300 to 400 feet high ; but more frequently the outer spurs are covered by numberless larger and smaller fragments and boulders of granitic (syenitic?) and other rocks. Some huge boulders of granite rest on the ground (the under strata probably of schistose rocks) broken up into several pieces, but evidently belonging to one and the same gigantic block.

A granitic boulder, broken up, on the ridges towards
Shan tounggyee toung, E. of Tounghoo.

During the dry season, the springs on the higher ridges for the most part dry up, but trickling springs, which are actually nothing but percolations of rain water, are still frequent at favourable exposures in the valleys. The only spouting spring I met with in Pegu, is at Kenbatee village, in the soft sandy bed of the choung, whence the villagers fetch their water. Spouting springs are such as owe their origin to impermeable strata, and the occurrence of a spouting spring in a locality surrounded by low forests, would confirm my supposition of there being a laterite bed beneath the stiff yellowish clay, which I distinguished as diluvial clay.

This scarcity of spouting springs all over the Yomah hills has struck me much. On the other side, pools of water were observed by me as late as towards the end of March, in the beds of choungs in the driest parts of the Prome district (on compact impermeable sandstone), while on permeable strata such would have been searched for in vain, owing to the permeability of the substrata.

§ 3.—*Climatological notes on Pegu.**

It should be kept in mind, in perusing the following very incomplete sketch of the climate of Pegu, that both seasons (1868-69 and 1870-71) in which I travelled were described to me as unusually hot ones. I was also unable to make hygrometrical observations, as the only hygrometer I had with me went to pieces on the back of my elephant on the very day I started. I must speak, therefore, about such matters only empirically. Nor can I make proper use of my thermometrical observations, extending only over a few (chiefly the hot) months, while travelling in a hilly country, where the results necessarily must be of a very problematical and varied character.

The chief topics, in climatology, at least to a forester, are always—

(1). The temperature.
(2). The degree of moisture.
(3). The winds.

There are, besides, many other minor points to be observed, many of which, however, such as temperature of soil, become really important† only in higher latitudes. In the following sketch I shall not discuss such matters separately and fully, as the material before me is too incomplete to enable me to do so.

In a tropical climate like that of Burma, the first question is always, whether the country enjoys an equable climate (like many of the islands of the Malay Archipelago) with rains and dew all the year round, or whether the year is divided into a dry season and a rainy season. The latter is the case with Burma.

It is then chiefly the *hot dry* season, which in Pegu, as everywhere else in tropical countries more particularly affects the vegetation, regulates its growth and calls into existence the large tracts of *deciduous forests*. The rainy season is, comparatively, of less importance in the consideration of a tropical flora (Desert floras excepted) for although a great number of xerophilous plants necessarily must disappear, a far greater number of hygrophilous plants will replace them (as is the case in the Martaban hills, when compared with the flora of the Pegu Yomah).

The seasons of Pegu are similar to those of Lower Bengal, but the *cold* season is of shorter duration, and the *dry hot*, and often also the *rainy*, season commences a month earlier than in Calcutta.

The *dry* season, divided into a *cold* and *hot* one, extends about from December to April, over a period of four to five months. The cold season terminates ordinarily about the end of February, sometimes somewhat earlier, and often rather abruptly. The hot season comprises the months of March and April, during which time (usually in March) one or two heavy thunder-storms moderate the intense heat, until in the first half of May the regular monsoon rains set in, which cease more or less completely during November. The above is nearly the regular course of the seasons.

The thermometer rarely rises above 88° in the shade during the cold season, and often sinks as low as 57°, occasionally to 55° or 54°, before sunrise. Heavy dew is the rule, and fogs are often troublesome in the morning hours. During the remainder of the day, the sky is tolerably clear and serene. Rains are almost unknown in the cold season, and the hygrometrical state of the atmosphere is apparently the same as in Bengal.

In the hot season, the thermometer rapidly rises to 95° to 100° in the shade, but the nights still remain cool and agreeable; for even at the height of the season in the hottest province of the country (Prome), the thermometer never indicated to me more than 74° before sunrise. The deposit of dew is hardly perceptible, and the atmosphere is nearly as dry as that of Lower Bengal, with the difference that here the sky is very hazy nearly all the day, while in Behar and Bengal it is tolerably clear. The first shower, usually a very heavy one, occurs in March, and thunder-storms, prognosticating the commencement of the rainy season, usually break at the end of April or during the first days of May.

* Although I am expecting a series of thermometrical and hygrometrical observations at various stations in Pegu, which Captain W. J. Seaton, Conservator of Forests, British Burma, is kind enough to endeavour to procure for me, I have not thought it advisable to delay the submission of this report, ready since August 1871, for an uncertain period.

† In expressing myself thus, I do not imply that a lower subterranean temperature might not effect changes in the tropical vegetation as interesting as those produced by a higher temperature of the soil in temperate latitudes, or vice versâ.

In the Prome district, the heat and dryness is considerably greater than in the Irrawaddi and Sittang districts; for although I had in the Sittang valley at the end of April thermometer readings of 104° to 106°, and on one occasion even 108° in the shade, these were exceptions; while during my stay in the Prome district (in March) the thermometer in the shade at midday never stood below 100°, but remained almost stationary between 101° and 103° till 3 or 4 P. M. The sky was then so hazy, that the sun after 4 P. M. regularly, and not seldom during the whole day, appeared only as a large red disk emitting a dull light, hardly equal in intensity to that during a partial eclipse. The temperature in the shade and in the sun, shewed a difference only of 1½ to 2 degrees, and I often worked on such days at my table exposed to the direct sun-beams without feeling any more discomfort than in the shade (if such a thing really can be had at this period in the Prome forests).

While such a drought reigns in the open country and on the ridges, dew falls in the narrow valleys of the eastern slopes of the Yomah and in the Martaban hills, where evergreen forests skirt the streams, often so heavily that one becomes quite wet when marching in the early mornings through the herbage along their bank. But after an ascent of a hundred or two hundred feet we meet with the same dryness again in the deciduous forests, as in the open lands. It is here that we can almost every morning observe a white sheet of vapour in the depths of the valleys resting on the forests, which enables us to appreciate clearly the rôle which evergreen forests play in the attraction of the currents of vapour.

The vicinity of the sea is always accompanied by a greater degree of dampness, especially if no dry land-winds check its influence. It is often remarked that high level plants, such as *Polypodium Dipteris*, *Rhododendron*, *&c.*, (growing in Java at above 4000 feet elevation) grow along the western coast of Sumatra, Banca, etc. almost down to the edge of the sea. A more careful inquiry into the true circumstances would only shew that they grow there in sheltered damp gorges, where the temperature is moderated by moisture to such a degree, that the difference between the two stations is but small or merely nominal. Nor is elevation always an exponent of lower temperature. What Professor O. Sendtner has shewn to be the rule in the Bavarian Alps, *viz.*, that the temperature on the top of hills or ridges is higher than in valleys of the same elevation, is also—and to a more marked degree—true in the Pegu hills (and generally in the tropics). One has no need to consult his instruments: this difference of temperature is great enough, not only during the day, but still more so at night. Any one, who has encamped one night in a valley and the following night on an exposed ridge, may have made the observation. When sleeping at the end of February in the Gyo-Gyo valley, at the base of the Kambala toung, I required a blanket; but 2000 feet higher up near the crest of the ridge, the nights were sultry and rather oppressive. The thermometer fully confirmed this, for while it stood at the lower station at 59½° to 60° before sunrise, it was at my hill-camp as high as 70½° to 74° at the same hour of the day. In a similar way, the difference of temperature at the two stations at midday amounted to from 2 to 3 degrees in the shade. I have also observed similar great differences* of temperature between hill and valley stations in other parts of the Pegu Yomah as well as in the Martaban hills. Such observations, however, were all made during the hot and dry season, and I have reason to believe that during the rains the differences are either nominal or less marked. With such facts before us, it need not surprise us, if we see, amongst many others, *Gleichenia dichotoma*, *Pteris aquilina* or *Blechnum orientale*, a perfect nuisance in the plains of Java, while in Pegu they appear only above 2000 feet elevation; or that, for example, *Linostoma pauciflorum* or *Vaccinium* should be found in Singapore and Sumatra on laterite ground at sea level, while in Burma it grows in the pine forests, on primary substrata at elevations of from 3000 to 4000 feet and upwards. The fact that pine forests (as I learn from Dr. F. Mason) are met with in Tennasserim so low as at an elevation of only 500 feet, is no doubt to be explained by the same cause. On the other hand we can now correctly understand, why so many plants, (especially trees) which are high-level plants in the Khasya hills, are met with in the deep gorges of the Pegu Yomah at low elevations; or why so many plants, specifically identical, should be found in the Malay peninsula, and even Java, and should re-occur in the damp tropical valleys of the Himalayas.

While in the above examples, moisture, and—as a consequence of it— lower temperature, are the chief—although not sole—conditions for the existence of those plants, we meet with another set of plants in Pegu, which—although usually looked upon as temperate forms—vegetate and develope themselves in the hottest and driest season of the year. It is in March and April, at a temperature of 120° to 130° and even higher in the sun, that we see along the banks of the Irrawaddi in flower and fruit *Ranunculus sceleratus*, *Veronica Beccabunga*, *Artemisia carnifolia*, the various species of *Polygonum*, *Rumex*, etc. and along the Ganges and Bramapootra in Bengal these are accompanied by *Rosa*, *Potentilla*, *Cochlearia flava*, *Juncus*, *Polypogon*, etc.! Now here it is evident that these plants, although growing in moist stations, are not hygroclimatics†—at least not tropical hygroclimatics.

* Radiation of insolated heat must be brought into account here.

† In fact, all temperate and European forms in Lower Bengal, as *Cardamine*, *Lathyrus*, *Vicia*, etc. come up only during the dry cold season.

I have little experience of the rainy season in Pegu. Towards the close of April, or in the first days of May, gales, occasionally of extreme violence, are experienced, usually accompanied by heavy showers. It is this period which I may point out as the most favourable, although at the same time the most unhealthy one, to a botanist in Pegu. The amount of old trees, branches, etc. thrown down during such a tempest is often astounding, offering an easy and fruitful harvest of specimens of woody plants otherwise quite out of reach on account of their height. It is true, that at other seasons, apes, and more especially squirrels, are most useful agents for procuring the flowers or fruits of lofty trees, where a gun fails to secure a branch, but it is rarely that one can just guess at the time when such trees are in a stage of development attractive to the animals just mentioned.

The temperature of course at this season rapidly falls at the very commencement of the rains, the thermometer indicating to me (in May and June) from 70° to 75° before sunrise, to 90° to 95° in the shade at the hottest time of the day (about 1 P. M.). There was not a day without rain. The annual rain-fall is said to amount at Rangoon to about 85 inches, but in the Prome district—the climate of which resembles in every respect that of Ava—it is certainly considerably less, and further to the north, at Mandalay, the rain-fall is in some years insufficient for the cultivation of rice. As a contrast to this, the annual rain-fall in Tenasserim amounts at Moulmein to 175, and at Tavoy to 208, inches.

The prevailing winds in Pegu are, of course, the monsoon winds, modified, however, so much by the hilly configuration of the country, that they are traceable only on the summit of the higher hill ranges. The whole southern part of Pegu, including the Irrawaddi and Sittang deltas, is exposed to a steady sea-breeze, usually setting in about midday and felt far inland. In the Irrawaddi plains, however, this sea-breeze is soon (above Henzadah?) checked during the hot season by a dry North West wind, which is probably only a North East monsoon wind modified in its course by the Arracan Yomah 7000 to 8000 feet high, that separates Arracan from Ava. Hence it is that the valley of the Irrawaddi is so much drier than that of the Sittang, which is sheltered on the north by hill ranges of upwards of 5000 feet elevation.

From the above fragmentary and necessarily confused notes, it is clear that the climate of Pegu is in every respect far superior to that of Bengal. All the year round—with a few days' exception—cool refreshing nights prevail. The cold season in Pegu, although of a slightly higher temperature, has one thing in its favour, and that is, the absence of musquitoes.

Postscriptum.

Since the submission of this report, the meteorological observations alluded to in my remarks at page 8, have, with the exception of the hygrometrical observations, come to hand. After perusal of these tables, I see no reason to modify any of my statements regarding the climate of Pegu, as made in the foregoing pages, except as to the direction of the wind in the Irrawaddi valley. Dr. Hanks says that, during the hot and rainy seasons, winds generally come from the south and south-west, during other months from the north and north-west, and the observations of Dr. White and others confirm this.

My thermometrical observations were chiefly taken inland, where the temperature is necessarily somewhat higher than along the course of large streams, where evaporation, especially in closed valleys, reduces thermometrical readings.

I give here an abstract of the records placed at my disposal, but in doing so, I must mention, that some of them have to be taken with caution. Not to mention the discrepancy that may be observed in the elevation of the stations (Thayet Myo being put at two hundred and forty feet only, while Prome, situated some thirty miles further down the stream, is two hundred and sixty feet), there are items which call for remark. At one station the observations were made for six months by means of "an old metal thermometer—condemned," while the minimum, e. g. at Henzadah, is considerably higher* than the mean temperature of December and February. The observations of Suaygyeen I consider quite unreliable, representing a climate with occasional snow-fall and freezing, were it not for the odd minimum 10 degrees higher than the mean temperature of the hottest month of that station (April, 76°). The Rangoon observations form a contrast to this, shewing a clime hotter than that of Sinde or the Punjab!

The observations of *annual* means of the hygrometrical state of the atmosphere and barometric pressure I have omitted here, these being of no value in the consideration of vegetation, where only *monthly* means and *extremes* come into account.

* This can only be explained by assuming that the readings were taken from a minimum and maximum thermometer, while the ordinary observations took place possibly at a later hour, say at 9 A. M. But in this case, such minima ought to be brought into account in the computations of mean temperature.

Table of Meteorological Observations.

STATIONS.	Year of observation.	Elevation.	Monthly mean temperatures.												Extremes.		Annual rainfall in inches.	Remarks on winds, dew, etc.	Name of observer.
			January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Maximum.	Minimum.			
Rangoon, ...	1871	—	89	92	95	99	94	90	90	91	87	87	88·5	87	—	—	143·6	Winds variable. Dew falls in the months of July, August and September.*	Not given.
Bassein, ...	1870	c. 60	81	80	84	85	84	80	80	78	77	76	78	78	90·7	75·9	87·54	Prevailing winds, SW. and NE. From January to July, the observations were taken by mean of an old metal thermometer—condemned.	A. C. Nisbet. Civil Surgeon.
Henzadah, ...		c. 30	75·5	77·9	80·7	87.7	81·9	82	79 5	80.2	81	79·4	78·8	73·6	99	79	74·13	Prevailing winds, from January to May, NNE. and SW.; from June to September, SE., SW. and NE. During the months of January, and February, the mornings are cold and foggy.	P. G. Paul. in C. M. charge.
Snay gyeen, ...		90	69	70	73	76	72	72	73	73	70	69	65	49	100	86	216·9	Prevailing winds, NE.E., variable, SE. S. calms, SW. and NW. Barometer out of order.	J. G. Cooper, Civil Surgeon.
Toungoo,.........	1869	c. 300			81	88	87	87					77	79	102	59	46·9	Prevailing winds, S., SW., SSW. and SE.	C. R. S. Parker, Civil Surgeon.
	1870		77	76	85	86	86	83	81	83	83	84	77	71	107	54	64·53		
	1871		72	76	80	86	86	80	80	83	82	82			105	52	93·85		
	Mean,		74	76	82·5	86	86	81·5	80 5	82	82·5	83	77	75					
Thayet myo, ...	1870	240	74·83	78·61	86·51	87·88	85·54	83·16	81·22	82·28	82·39	82·96	82·31	73·76	102	52	40·56	During the Hot and Rainy Seasons winds generally come from S. and SW., during other months from N. and NW. During the winter months the early mornings are hazy and there is a considerable amount of dew. No Barometer supplied.	W. Hanks, Civil Surgeon.
Prome,†	1870	260	82·5	80 5	88·7	90·2	82·2	83	81 7	77	80·7	83·7	78·5	74·2	103	52	46 21	Prevailing winds NE. and SW.	J. White, Civil Medical Officer

* Sunrise—maximum 86.5°, sunset—minimum 77°: this is a new way of taking extremes.

† The true elevations, based upon levelling, are for Prome 94′, for Thayet myo 110′, and for Tounghoo 100′.

I am indebted for these data to Mr. Eug. Oates.

§ 4.—*Brief considerations of other agencies which influence vegetation.*

Before passing to the botanical description of Pegu, I have thought it might not be uninteresting to notice here a number of conditions which more or less influence vegetation. I must, however, ask indulgence for the fact that the subjects presently to be discussed are not recorded in a more consecutive form, and are treated rather heterogeneously. This want of sequence arises from the fact that I wish to direct attention only to some of the more interesting agencies, omitting many others.

The consideration of the origin of Pegu plants, their probable immigration from adjacent or remote countries across ancient mountain-chains, etc., has little or no value in the eyes of a forester. To him it is indifferent whence his trees have come: it is sufficient to know that they are present. The occurrence of wild vanille, wild tea, or rhea has more interest to him than such a puzzling circumstance, for instance, as the occurrence of a species of plantain *(Musa glauca)*, which is found in the northern Yomah, and turns up again along the southern slopes of Java—a fact which sets at defiance all existing theories of the geographical distribution of plants, as no satisfactory cause whether former continuity of land, or agency of man or bird, can be assigned for its immigration. Nor does he care to consider the strange accumulation of Hindustan plants, which are found in such numbers and so unexpectedly in the Prome zone, and of which the origin* is almost as problematical as that of the plantain just alluded to.

I shall, therefore, pass from speculations to facts, and bring under review :

(1) The influence of physical structure of soil, etc.
(2) The influence of light.
(3) The influence of elevation.
(4) The influence of exposure.
(5) The influence of winds.
(6) The influence of jungle-fires.
(7) The influence of the nature and germinating power of seeds upon the prevalence of forest trees.

(1.)—*The influence of the quality of rocks, etc.* and that of their chemical composition is differently estimated by different authors. While Thurmann (Essai de phytostatique appliqué à la chaîne du Jura) admits the importance of the former only, Unger and others (especially Sendtner in his admirable work† on the vegetation of Southern Bavaria and that of the Bavarian Forest) have shewn in a clear and convincing manner the important part which certain chemical elements play in vegetation. Schnitzlein and Frikhinger, in their work on the vegetation of the Woernitz and Altmühl, and also Bogenhard and others, look upon both these factors as equally important, and to a certain degree I adopt their views.

The physical and the chemical nature of soil act, in my opinion, reciprocally upon one another. A soil consisting entirely of silicious sand can no more support vegetation than oil can give existence to aquatic plants. A crumb of bread, perfectly dry and exposed to a dry atmosphere, will not be covered by *Penicillium* or other mucorine growth, but let the atmosphere become damp, and all conditions for the developement of fungoid growth are given. The fact that any cubic yard of soil contains, after all, all the chemical elements necessary for the requirements of any particular plant, may, to a superficial observer, necessarily convey the idea, that the chemical composition is of no material importance to vegetation ; but this very fact, that such chemical elements must be present, would *a priori* suggest to me an opposite opinion.

If we know on the one hand from facts, that the organic constituents of one and the same species may vary according to the chemical quality of the soil on which the plant grew, we know on the other hand the not less important fact, that there are chemical compounds, which have a decided influence upon plants, either in modifying, or altogether suppressing, their growth. If we syringe a plot of luxuriant meadow with a strong solution of corrosive sublimate, or arsenic, we shall in a very short time see the whole vegetation on this plot completely die out, although the chemical elements, necessary for the growth of the plants that have grown here, have not been changed or removed in any way by the experiment. Chloride of sodium, or common salt, is a necessity to tidal or saline plants, but it is also fatal to many inland plants, although it may be accompanied by all those chemical ingredients, believed to be necessary to the nourishment of such plants. The influence of manure upon plants is too well known to need illustration.

* Drs. Hooker and Thomson, in their *Flora Indica* ascribe this to a climate similar to that of the Carnatic. I can only suggest, that most of these are calcareous plants. What *kunkur* is in Behar and Hindustan, *fossil shells* may be in the Prome (and Ava) district. This assumption becomes more probable if we take into account such of these plants—although few—as turn up again on limestone in the Martaban and Moulmein districts, and even in lower Siam.

† This work seems to have remained quite unknown in England, although it is one of the most important productions in the field of geographical botany, based upon truly scientific principles.

If we may rely upon Rev. Ch. Parish's "Botanical Notes, made during a month's tour from Moulmein to the three pagodas, &c,"* the part which lime and silica play would appear to be not very important in Burmah. Unfortunately, I myself have never had an opportunity to explore pure limestone districts in India, and this circumstance has been a great drawback in all my studies regarding the influence of chemical composition upon vegetation in India.

In the above notes it is indicated that chemical influence exists, and that it is of primary importance. I may now show that the physical structure of rocks, &c., is not less important.

It is all very well to shew from an analysis, that all chemical constituents are present, and in the needful proportions; but a more important question, it would seem to me, is, whether these elements are also represented in such a soluble state as to be taken up by plants in the quantities required by them. It is here then that the physical structure of the rock, and more especially its permeability and *hygroscopicity* are forced upon our consideration. But *hygroscopicity* is nothing but the ability to absorb moisture, the most important chemical agent in nature, which brings about all those changes, of which we become aware from the decomposition of rocks and their products.

The permeability of soil is, in my opinion, as important a factor† as is the hygrometrical state of the atmosphere in climatology; in fact both are closely connected and depend upon one another. A perfectly impermeable soil, if such could exist, would simply exclude all phanerogamic vegetation. The degree, however, of *hygroscopic quality* of substrata is variable, and therefore, the vegetation on the same is equally variable. But by studying the effects which are produced by extreme conditions, we arrive at a due appreciation of such a factor: degree is here a matter of valuation, but extremes are matters of fact.

On such principles as are here laid down, I can understand, why so few plants should grow on a sandbank: for the simple reason, that here the chemical elements, contained in the pebbles, are not disclosed for a more luxuriant vegetation. I can understand also, why on laterite and other impermeable formations, the forests should be so poor in growth, and the trees so scattered, or why in a deep sandy alluvium a similar, though modified growth should exist. The occurrence of calcareous plants in small numbers in a purely silicious district would as little surprise me as, for instance, a raspberry or strawberry, on a Burmese hill.

The same rock, however, of the same chemical and physical quality, will be disintegrated (especially if of a *more permeable* nature) to a greater extent in a damper climate or in damper and more shady situations, and in this case the vegetation that grows on the moister locality will necessarily differ greatly. I simply point to the evergreen forests, which grow in the valleys of the Pegu Yomah, and the upper mixed forests, which grow above them on the same sandstone, where hardly one species out of five is found in both sorts of forests. If we reject *moisture*, or what is equivalent to it, *water*, as a chemical agent, the theories of the influence of chemical composition‡ would appear to receive a fatal blow through this example, but we shall learn below of other factors, which are the true causes of this change in vegetation.

Highly impermeable rocks, however, are also in very damp climates, as those of the Malay islands, sterile to a greater or less degree, and especially where they embrace large tracts of lands. How far impermeable formations are connected with a drier climate, I cannot elucidate here clearly,§ but that they cause a general dryness one can perceive from the laterite vegetation, which appears nearly all along the base of the Yomah in detached patches, enclosed all round by permeable alluvial-beds and sandstone formations. The chemical elements that compose the laterite, in which, amongst others, the great percentage of hyperoxyde of iron is remarkable, do not certainly here come into play; and this becomes clear, when we find the same laterite plants again upon the calcareous compact sandstone of the Prome district, a rock which may prove to differ little in percentage of oxide of iron from the soft grey, but highly permeable, sandstone. I refer here to such plants as are found both on the pure laterite and on calcareous sandstone.

There is, however, a vegetative element present in the Prome flora, so peculiar to this zone and so restricted, that for these plants other causes must be sought, and possibly—in the absence of chemical analyses—they may be found in the presence of a great percentage of lime, represented here in the form of fossil shells.||

* Published in the Journal of the Asiatic Society of Bengal.

† Amongst Indian Botanists, Griffith, in his itinerary notes, has also admitted the same, although he denies the influence of chemical quality of soil.

‡ Those who wish to learn more on this subject, may refer to Dr. Liebig's well-known work "Chemistry adapted to Agriculture and Physiology," 2 vols. 8th edition, 1865. Much information is contained also in the book *How crops grow.* By S. W. Johnson, by Rev. A. H. Church and Thiselton Dyer, 1 vol. 1869.

§ I will here refer only to the Australian plateaus and to the Cape of Good Hope, as also to the Eastern parts of Hindustan and Mexico.

|| A rude qualitative examination of this sandstone since made, has taught me, that it is of so calcareous a nature, that it effervesces like calcspar when treated with acids. It is, therefore, more properly called a *calcareous* or *marl-sandstone*. It is remarkable, that the same rock, when decomposed, loses all its carbonate of lime.

All the above remarks have reference more to the general growth and habit of trees than to their nature as species. This latter is the critical question, for although even modern experiments tend to shew, that such a marked influence on the specific value of a plant does exist, they cannot shew that such is a general rule.

As far as my own experience in tropical countries goes, I can state, that a formation physically and chemically different, if of some extent, produces everywhere a flora, not only physiognomically but also specifically different, but this is not the case where only small patches of such a different formation occur. While many plants pertinaciously affect a certain soil, a far greater number belong to a class, termed *soil-vague*, and others are in one district *soil-vague* and under different climatic conditions *soil-steady*. Only careful analyses of the soils and of the plants themselves can in such cases settle the question. I do not advocate the theory that a species is restricted to a certain soil, but I believe that the same species can occur on any soil, but it cannot, if chemical conditions are contrary to its requirements, support itself as such for successive generations: it will succumb, or lose reproductive power,* or modify its habits more or less.† Thus those characteristical botanical combinations are produced, which form the most interesting portion of phytogeography.

This would have been the place to remark on representative species, which occur on the various formations of Pegu, and more especially to contrast those that occur on permeable and impermeable strata, but in doing so, I should have to enter again into scientific speculations, and I really fear that I have already far too much extended the above notes. But the importance of the soil question to a forester in Pegu must be my excuse, and I shall have an opportunity in the second part of my report to point out, that large sums might have been saved, had this question been always carefully considered in timber plantations.

In considering the physical structure of substrata, &c., we have to observe other forms of soils, such as sand—fine or coarse, loose conglomerates, fine clayey or loamy soils, gravels, shingle, &c. For the sake of brevity, I shall only separate the sandy from the clayey soils, for my principal object is to show the general effect of cohesion of rocks and not to specialize all the intermediate conditions. The sandy or gravelly soils, if poor in aluminous ingredients, bear as a rule Eng forests, with certain peculiar additions, such as *Cycas, Dipterocarpus grandifolius*, &c, If rich in clay, they still continue to possess the laterite character along the drier Irrawaddi side; but along the damp Eastern slopes of the Yomah, they also bear high growing moist forests. The clayey sand or loam soils are, in fact, favourable to the growth of trees and plants generally, and it is on such a soil, that we see the finest wood-oil trees, as *Dipterocarpus alatus* and *D. lævis*, along with Ka-Thitka *(Pentace Burmanica)*.

Fine clay, if very stiff, becomes to a certain degree impermeable, and therefore fit for the support of the low forests. But a more porous clay, with or without fine silicious sand, especially if very deep, generally produces a peculiar shortness of stem, and a comparatively large developement of crown, as can be observed everywhere in the savannah-forests. But the trees in the lower mixed forests, on the alluvial strata, are also comparatively short in stem and of irregular growth, branching out low down. The number of plants, that grow in Pegu, is so great, that it would be difficult to enter into specialities, and to say which species are peculiar to clay, and which to other soils, and if I were to distinguish the soils as minutely as Thurmann did, I fear I should make the understanding of the influence of mechanical structure of soils upon plants only the more difficult.

As porous clay soils in Pegu are chiefly alluvial, it is sufficient to direct attention to the vegetative combinations, that are represented on alluvium, such as the alluvial mixed forests and swamp forests, &c.,

There is a peculiarity, which all the larger alluvial plains of India show, and which it may be interesting here to notice: namely, the great paucity of species, and more especially of species of trees. Alluvium has hardly any plants peculiar to itself, except those which occur in the littoral and swamp forests, both which combinations must be attributed to other causes, *viz.*, either to the saline quality of the soil, or to superabundance of water. Nearly all plants, if not introduced and spread, are found also on the surrounding older formations, so that there can be little doubt that the plants growing on alluvium, have immigrated from the surrounding non-alluvial lands. Owing to the uniform chemical and physical qualities of alluvium, only such plants would thrive well here, as are adapted for such a uniform and comparatively poor soil: hence a great many plants of the surrounding land became ex-

* With regard to this, compare Wiegmann's and Polstorf's trials, which are taken up also in Liebig's Chemistry, p. 331 Sqq. A remarkable example is afforded by the R. Botanic Garden, Calcutta, which is so rich in woody plants that have become impotent for the reasons above mentioned. These usually flower yearly without producing germinable seeds. There are only a few species amongst them, where *heteromorphism* of the reproductive organs can be adduced as the cause of sterility.

† The mimetic analogies of plants, so much talked of at the present day, find their solution in the soil question, not in "mimicry."

cluded. It is, therefore, interesting to find, in crossing a large alluvial valley, that a great number of plants disappear in these plains, which are common on the rocky or gravelly soil that we have just left, but that the same plants reappear again on the other side as soon as other conditions are again present. Here permeability appears to play a great part, for the change of vegetation is greatest, if we pass from alluvium to compact sandstone or other impermeable strata, while the soft permeable sandstone improves, it is true, the growth of the trees very much, but does not in the same degree change the botanical character of the forests. I speak here chiefly of trees.

I will here notice one of the most striking of the many examples in Bengal, that occur to me, of a marked change in the character of the herbaceous and perennial vegetation. At Titalya, a station on the road from Kissengunge to Darjiling is a bungalow, which stands upon a low diluvial hillock hardly fifty feet in height, formed of silicious pebbles, cemented by sand and loam. This hillock is a mere speck in the surrounding alluvium, distant about 16 to 18 miles from the nearest diluvial formations. Along the ravine, through which runs a cart road between the bungalow and the Mahanuddee river, we meet such plants as *Eriophorum comosum* in abundance, *Cheilanthes farinosa*, *Onychium auratum*, *Zornia diphylla*, *Apocopis sp.* *Crotalaria albida* and *acicularis*, *Batratherum*, a *Pogonatum* without fruits, a terrestrial lecideous lichen not yet determined, &c. These all are plants that nowhere occur in alluvial soil, and are found again only on the diluvium of the Sikkim Terai, but *Eriophorum* is, to the best of my belief, absent there also, occurring in the Khasya and Nipal hills up to the North-West Himalaya. Here either the physical or chemical influence of soil is quite apparent.

Ruined pagodas, &c. in the alluvial plains of Pegu often bear plants that are not found in alluvium at all, such as *Sonerila*, *Adiantum*, *Cheilanthes*, &c. Here also the cause must be looked for in the quality of the bricks, of which the pagodas, &c. are built.

(2.) The influence of light is probably most practically shewn, if we pitch a tent on a luxuriantly growing pasture-ground, close it and let it stand there for several weeks. The longer the tent stands, the greater will be the destruction of the plants that grow on the spot. About six or seven weeks are sufficient to kill all the grass. Here the deprivation of the light is the cause of the death of the plants. The influence of light affects vegetation in the tropics greatly, and I have simply to point to the evergreen forests, and more especially to the tropical forests on the one side, and to the mixed forests on the other ; and the effect of light becomes clear in the great difference of the trees and other plants in the two cases. It is not necessary, therefore, to give lists of shade and light loving plants : they are quickly enough recognised, if we simply compare the vegetation of evergreen and deciduous forests.

An observation of Dr. Sendtner, in his chapter on Bavarian forest-trees, is not out of place here. He tells us, that light-loving trees bear as a rule *winged fruits*, for the reason that they are compelled to grow far from each other in order to obtain the necessary degree of light. His acute observation holds good also in tropical countries, and though some exceptions occur, these can be explained by other contrivances with which their fruits or seeds are furnished. Thus, trees like peema (*Lagerstraemia*) have capsules which split loculicidally, and so remain on the tree that the winged seed may be dispersed by the winds. The teak-tree has its light capsules enclosed in a dense woolly cover, which again is surrounded by a loose bladdery sack, so light indeed, that it is only a sport for winds, &c.

The influence of Solar radiation makes itself chiefly felt in accelerating the development of the reproductive organs and in shortening the cycle of vegetative life.

(3.) The influence of elevation is tantamount to difference of climate. It is well known, that in ascending a very high mountain, we pass through different regions, (called sometimes also hypsometrical zones) each of which corresponds to a different zone of geographical latitude, except that the atmospheric pressure, the duration of days, and seasons, and the degree of moisture, are not congruent.

The Pegu Yomah is too low to show this difference in climate clearly, but the occurrence of some temperate forms, like *Heracleum*, *Vaccinium*, etc. in the dry forests of the hills is an indication of elevation. In the Martaban hills, where peaks of more than 7000 feet elevation exist, the influence of elevation upon vegetation is, however, very marked.

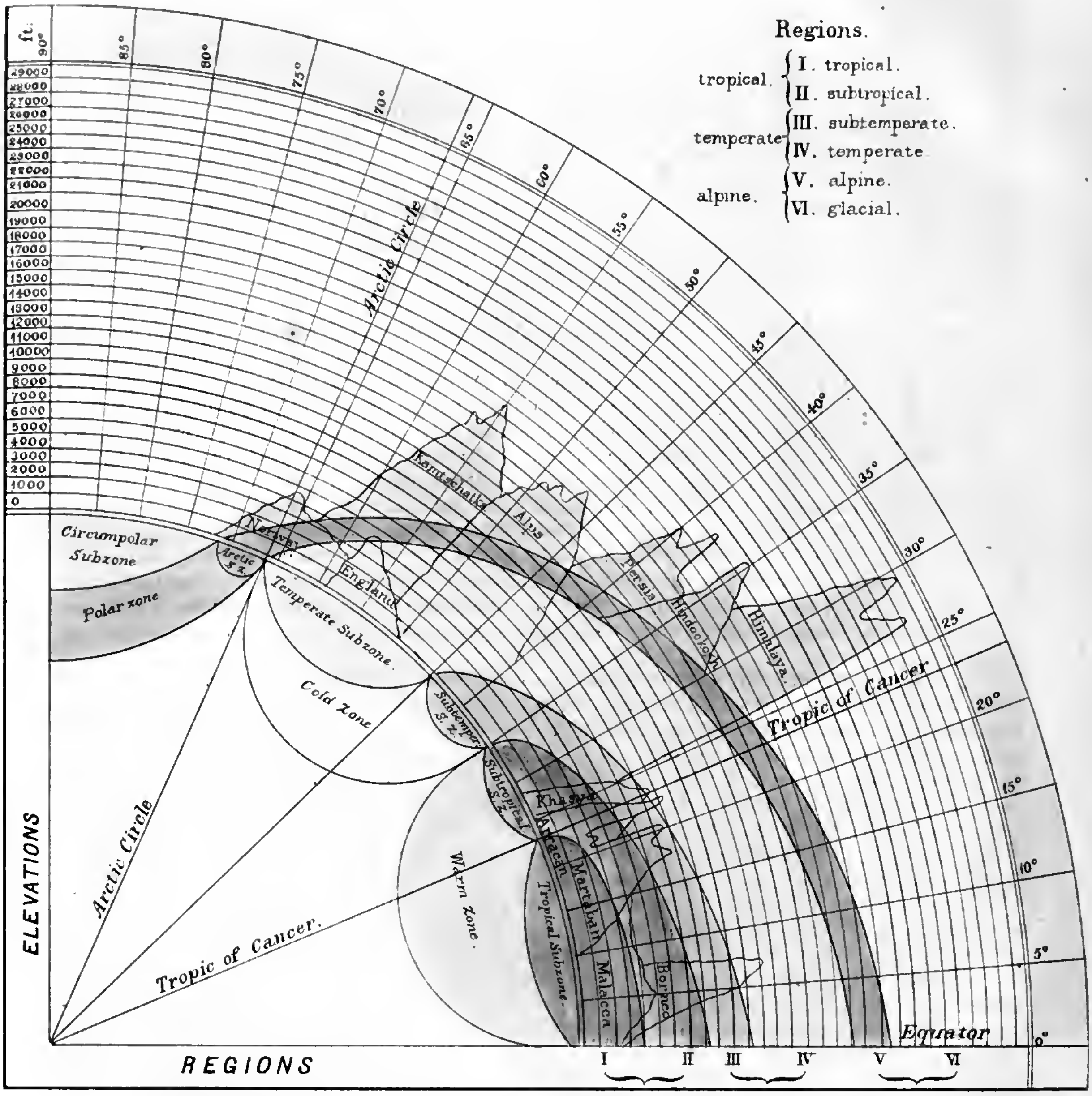
Indian botanists distinguish the following three chief regions, each of which can be subdivided into two sub-regions, *viz.* :—

I.—The tropical region, up to 6 or 7000 feet elevation, divided into a tropical (up to 3000 feet), and a sub-tropical (up to 6 or 7000 feet).

II.—The temperate region between 7000 (in places 6000) to 12000 feet elevation, similarly distinguished into a subtemperate (up to 9—10000 feet) and a temperate region (from 9 or 10000 up to 12000 feet elevation).

III.—The alpine region between 12000 and 16000 feet elevation or more, which again may be divided into an alpine (between 12000 to 16000 feet) and a glacial region (above 16000 feet elevation).

This, of course, is an approximate scale for the Eastern Himalaya and Khasya hills only, but as we proceed towards the equator, the corresponding regions become higher situated in the same ratio, as the colder regions gradually descend towards the poles, until zone and region become united in the plains of the polar circle.* Besides this influence of geographical zones, exposure depresses and raises regions considerably. No attempt has as yet been made to settle regions in India from a scientific point of view, and, therefore, such determinations are only arbitrary and of very relative value.



NORTH-EAST QUARTER OF GLOBE SHEWING ZONES AND REGIONS.

In the above section of the north-eastern portion of the globe, I have attempted to give a rough graphic representation of the different elevations of the principal regions in the different northern latitudes, with special consideration of the Burmese mountains. As regards the zones here adopted, I must refer to § 5 in the sequel.

The Martaban hills, and the hill ranges generally of the whole of Burma, extend only into the subtemperate region (a few peaks in Arracan also into the temperate), and in these regions also we have hoar frost in January.

* Dr. Grisebach's work "The Vegetation of the world in relation to climate" (2 vols.) reached me only while these sheets were passing through the press, and I can, therefore, make no use of the valuable information therein contained.

The extent to which the vegetation is changed by elevation, will be made clear in the subsequent consideration of the forests of the Karen or Martaban hills. Vegetation does as a rule change with greater elevation, but not at regular intervals. The range of the lower regions is larger up to about the limit where the atmospheric moisture has become considerably diminished by absorption in the lower regions; in other words, up to a height, where the atmosphere has become so clear and dry, that dampness, although still perceptible, ceases to be a powerful factor. A thousand feet of elevation, therefore, in the alpine region in the tropics affects vegetation more than a difference of 2000 or 3000 feet in lower regions.

With elevation is also connected the period of flowering and fruiting of plants. It is well known, that in temperate climates the flowering takes place later in the season in the proportion as we ascend to higher regions. But in tropical countries, this rule does not apply to all plants, as Mr. H. Zollinger has already (Tydschr. v. Ned. Ind.) shown to be the case in Java, for if we attentively observe the state of development of different plants, we shall find some of which the flowers open later as we ascend higher; and others, which have put forth their flowers or are already fruiting, in the higher regions; while in the lower parts they are found still in bud. Thus, for instance, in the beginning of March I found the *Rhododendra* and *Gentianae* on Nattoung at 4000 to 5000 feet elevation in bud only, while on the top of the Nattoung itself they were in full flower. If we examine such plants and compare those which shew a development of flower retarded by elevation, with those whose development is accelerated by the same cause, we find that the former are mostly species of a more tropical nature, and therefore ascending forms, while the latter are more temperate and therefore descending forms: thus the apparent anomaly is explained.

Here, however, I suggest caution as to the correctness of the above conclusion, plausible enough as it may appear at first sight. The factors which exert influence upon the phases of the life of plants are so various, that without special study, one may easily arrive at deductions diametrically opposed to a true state of things. For although I conclude from the nature of the plants observed, that the premature flowering in higher elevations of these hills is due to their general hypsometrical range, it is not to be forgotten that an augmented solar radiation, which necessarily accompanies higher regions, causes (as already alluded to in my remarks on light) a more rapid development of vegetation. Hence we see, for instance, in the Alps, *Erigeron acre, Calluna vulgaris, Parnassia palustris, Gentiana germanica*, &c. in full flower on the top of high hills (6000 to 7000 feet) while in the plains they are still in bud. But it should not be overlooked, that in this case the plants themselves are considerably reduced in size and foliage, and therefore, their vegetative organs are reduced in the same ratio as the development of the reproductive organs is accelerated, or, in scientific language, the *metamorphosis* is here reduced so as to allow *paramorphosis* in a shorter period.

Another peculiarity due to elevation is the fact that certain shrubby epiphytical plants, which in lower regions are restricted to the highest branches of trees, descend with increasing elevation and become even terrestrial in the higher regions. The cause of this, however, may possibly be found in the light-loving propensities of such plants.

The growth of trees is very much impaired at higher elevations,* where the trees become lower and lower, stunted, crooked and gnarled, until they become reduced to mere shrubs in the alpine regions. Strange to say we find the same peculiarities of growth produced in the higher regions by climate, as are seen in the plains on very poor and sterile soils, such as laterite or sand.

4. *The influence of exposure* can be clearly seen on stems of trees and on rocks that surround us. Any one who has paid attention to the cryptogams which grow upon bark or stone, especially lichens, will also have noticed that in open localities these are always in greatest profusion on the northern sides of stems or rocks, while the opposite ones are quite or nearly free of them. In the Southern hemisphere, of course, the reverse takes place. What takes place in this case on a small scale, becomes a powerful factor on a large scale in hilly countries.

But the importance of exposure is not equally great throughout all latitudes: it is greatest, where the difference between damp and dry season, or between winter and summer is greatest. Nor have the same exposures the same influence upon vegetation in different countries. While in temperate and cold climates the S. and S. W. exposures are the favourable ones, it is just the reverse in Burma and other warm countries that are under the influence of the monsoons. This contrast is due to the fact that intense dry heat is as injurious to vegetation as a winter with rough northern winds in temperate zones of the Northern latitudes.

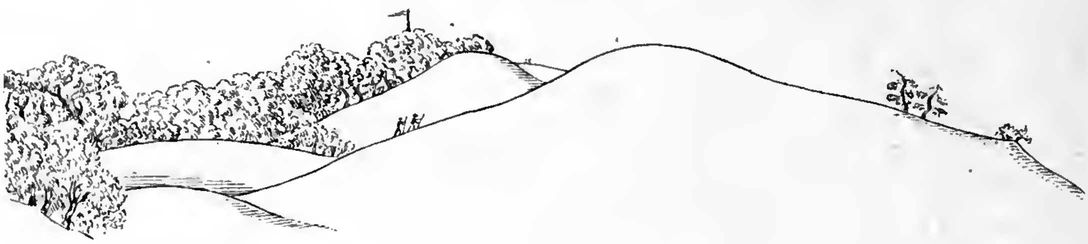
I have, for the sake of brevity, called all north, north-east and east exposures in Burma, favourable ones; while south, south-west and west exposures are considered by me more or less unfavourable to the tropical† vegetation. But this holds good only up to about 7000 or 8000 feet, at which elevations the reverse gradually takes place, as in temperate zones.

* Dr. Sendtner ascribes this solely to solar radiation.

† In using the word "tropical" I always mean "hot and damp," whereas heat and dryness would effect aridity.

Highest ridge of Nat-toung.

E. and W. slopes.



Camping place on Nat-toung.

E. and W. slopes.

The above two sketches serve to show this influence of exposure on the Nattoung hills, Martaban. The forests here are stunted hill-forests, while the west and south-west exposures are occupied by hill pastures almost destitute of woody vegetation.

The Himalaya belongs geographically to the subtropical zone, and, therefore, might be supposed to form an apparent exception to the influence of exposure as detailed above. But this is not the case at all, for this range belongs, (owing to its great elevation) more to the temperate zone, and, therefore, we see the north-east flanks of the range barren and desolate and confirming the importance of exposure on the grandest scale possible. In fact, if we ascend into the alpine region of Sikkim, we again see all those laws in force that prevail in northern countries, while in the lower portions of the Sikkim-Himalaya, the unfavourable exposures are the same as in Burma

I have taken exposure into account everywhere in the following description of the Pegu forests, and it is therefore not necessary to specialize here all the variations in vegetation, that are produced by this very important factor.

Any one who follows up the courses of the numerous choungs along the eastern slopes of the Pegu Yomah, such for example as the Koon and Khayengmathay, will observe also the abrupt change from an evergreen to a deciduous forest, whenever he passes one of the numerous bentings bordered by steep hill sides. If he consults his compass, he will also recognise the importance of exposure as suggested above. Wherever he thinks to have detected an exception to these rules, let him then consult the terrain that surrounds him, and he will find that there is a simple explanation for such an apparent exception, and will either perceive commanding ridges overtopping or sheltering the sides of a choung, where he expected, according to exposure, a deciduous forest, or will discern the slopes of the ridges to run at such a low angle, that the influence of exposure is entirely or partially annulled. Steady hot winds blowing against a favourably exposed slope may also suppress (as is the case in the dry hot Prome district) evergreen forests, and so again, a sterile impermeable rocky or pebbly soil may produce a crooked and stunted vegetation even in the most favourable sites. For every apparent exception in nature, there is an explanation ; and a forester, who has made himself master of all the various factors which govern vegetation, will look no more upon the extensive mass of forests that spreads out before him as an unmanageable chaos of trees, but will recognise, in all its intricacy, an order and wisdom, which must materially add to the pleasures which an educated man can derive from nature.

5. *Influence of winds.* Winds can influence vegetation in two different ways, viz. (1) they can cause a drier or moister climate according to their general direction and to the tracts over which they blow, or (2) they can influence the general growth of trees or prevent their growth at all. The first named case belongs to climatology, and is already discussed under § 3. The winds that influence the growth of trees are chiefly the S. W. monsoon winds which blow forcibly during the rains. In the northern latitudes of our globe they are represented by the northern winds. Trees in exposed situations are, therefore, often bent in conformity with these winds, or at least an eccentric growth of the annual rings can be observed on the sections of trees thus exposed. But in higher regions, as for instance in the Karen hills, these monsoon winds also cause the suppression of jungle growth. In such localities we then find the so-called hill-pastures, on which few or no trees can support themselves. A crooking of the tops of the crowns of trees is also often the result of such winds.

6. *Influence of jungle-fires.* Jungle-fires are happily not often the object of consideration with a botanist, but here in Burma they are so regular and so extensive as to become a powerful prohibitive factor in vegetation. During the hot season here a botanist has to collect his flowers enveloped in smoke and surrounded by fires in all directions.

The full influence of jungle-fires will only duly be appreciated after the authorities shall have succeeded in suppressing these destructive agencies, at least so far, that they cease to be the rule and become only exceptions. Against the fire-raising propensities of Burmans and Karens, the most energetic action of Government will hardly succeed, and it will be very difficult to prevent these people from setting fire to their toungyas, to which jungle-fires must be chiefly attributed.

The jungle-fires may be divided into superficial and destructive ones ; the former affecting only the low growth, the latter often destroying also trees and other woody plants.

Superficial jungle-fires are annual ones, occurring more or less regularly every hot season, sometimes twice over, and burning down the fallen leaves and the dried up grasses and herbs. Old half-rotten but dry logs are often consumed, healthy ones are rarely more than scorched by the fires. Sometimes, but very rarely, the fires enter the outskirts of the evergreen forests, burning up the dry fallen leaves, but doing little damage beyond scorching the undergrowth.

The destructive jungle-fires do not occur annually,* but periodically. They set in after the bamboo has come into flower. It is well known, that most of the bamboo species, which often form such a dense undergrowth in the Burmese forests, flower rarely ; and that when a species gets into flower, all or nearly all individuals of the same locality flower simultaneously, although the same species in other localities does not. Those few that do not flower the same year, do so usually the following year, a confirmation of the presumption that they are nothing but stragglers of the same stock. After flowering and fruiting they die off. However the dying off is not rapid, but slow, sometimes taking two to three years. The spikelets protrude one behind the other in such profusion, that it is no wonder that the plants become exhausted. It is then, when the bamboo dies off and has become dry enough, that the destructive jungle-fires commence.

The quantity of seeds and seedlings burnt up upon such occasions must be astounding, and the comparative scarcity of shrubs may also be attributed to these fires. Perennials and half shrubs are usually burnt down to the ground. They develop leaves or flowers only after the fires have raged over them : whether this is attributable to a normal state of development or to a forced inheritance, I cannot say. These young flowering shoots are often very different looking from those that are thrown out at a later period, or from individuals that have escaped injury. They resemble somewhat scapiferous plants, or, if branched, such plants as are continuously browsed by cattle.

* However, the savannah fires, really fearful in certain respects, may occur annually. They shew us what an amount of heat trees can resist, for although the bark is scorched and often enough burnt to coal, and the foliage totally scorched, they recover again perfectly during the ensuing rainy season. The flames not seldom envelope the whole lower part of the crown, especially if the grasses consist of *Saccharum procerum* and *Phragmites.*

In a flowering tin-wa (*Schizostachyum pergracile*) jungle, I met not a few tin-wa plants hardly half a foot to one foot high, all flowering profusely. They appeared to me, at first sight, seedlings, but on digging them up, I found a greatly developed stock, so that there remained no doubt that they had been often, probably annually, burnt down, and were thus suppressed in their upward growth, like some of those curious dwarf bamboos which the skilful Japanese produce. Such is also the case with teak and other trees. Their seedlings are burnt down to the ground almost yearly, while their subterranean stock grows every year more and more developed and vigorous, until the yearly shoots from it become strong enough to withstand the fires and to grow up to become trees.* Often, however, two or more shoots emerge, and hence are formed those double and triple stems, so often seen in these forests.

(7.) *Influence of germinating power of seeds upon prevalence of forest-trees.* The germinating of seeds is a chemico-physiological process, which goes on if certain conditions of warmth, moisture and light are given. The plants which, like some fungi, can grow in perfect darkness are few in number.

I distinguish quick germinators and slow germinators. Under quick germinators I include such seeds as either germinate immediately after they have been shed, or at least during the course of the same year of shedding. Some, like mangroves, germinate while still on their parent tree. All such seeds usually ripen very shortly after flowering, and perish very soon after their proper period of germinating has passed away. Slow germinators seldom germinate freely, but remain slumbering often for long years, until certain conditions favourable for their germination set in. Many of them require a long period for their perfection after fecundation, sometimes they ripen not before the next following year. They may be caused to germinate by artificial means, such as dipping into hot water, etc., but they are often difficult to raise. There are many gradations between quick and slow germinators, but such are of no material importance in the present question.

Unimportant as the vitality of seeds may appear at first sight, it is not so when the matter is carefully inquired into, and the relationship between trees producing quick and slow germinating seeds is more closely studied.

If we examine any forest in Burma, and select from it the prevailing types, we shall find to our surprise, that nearly all the prevailing trees are quick germinators, while the slow germinators form only a very subordinate part. Unfortunately my knowledge of the germinating power of the seeds of Indian plants is very limited, but it is sufficient to support these inferences of a general character. It would far exceed the purpose I have in view, were I specially to enumerate all the principal trees of the different forests and to discuss separately the nature of their seeds. It is sufficient to treat the matter here *en gros*, and to exhibit only the results drawn from a general treatment. Those families of Indian plants that are characterized by quick germinating members are chiefly : *Capparideae, Guttiferae, Ternstroemiaceae, Dipterocarpeae, Bombaceae, Malpighiaceae, Aurantiaceae, Burseraceae, Meliaceae, Sapindaceae, Anacardiaceae, Mimoseae, Caesalpinieae, Rhizophoreae, Combretaceae, Myrtaceae, Melastomaceae, Lythrarieae, Artocarpeae, Acanthaceae, Verbenaceae, Cordiaceae, Labiatae, Laurineae, Cupuliferae, Juglandeae*, and some others. At the same time the seeds of these families are for a great part also of a perishable nature, and more especially so the *Guttiferae, Dipterocarpeae, Sterculiaceae, Aurantiaceae, Anacardiaceae, Rhizophoreae, Myrtaceae, Laurineae, Cupuliferae*, and partly *Artocarpeae :* and these families include the trees most common and abundant. In how far the perishable nature and quick germination stand in relation to the absence† of albumen, or to the nature of the albumen itself, whether mealy, fleshy or oily, I am not prepared now to say. If we compare the prevailing types of the Pegu (and also of the Malayan) forests, it is striking indeed that nearly all come to range with one or other of the above named families.

But there are not only some very common trees which do not come within these families, but also some important exceptions, which require special consideration.

Of the former class I may mention *Xanthophyllum, Heritiera, Pterospermum, Grewia, Buettneria, Lophopetalum, Connarus, Celtideae, Holarrhena, Jasminum, Chionanthus, Aegiceras* and *Orchideae*, all these having very little or no albumen, although some of their congeners possess plenty of albumen.

Some of the more important and direct exceptions that deserve to be named are *Euphorbiaceae, Hydnocarpus, Coniferae, Compositae*, and *Bassia* with oily albumen ; further *Dilleniaceae*, many *Menispermaceae, Flacourtia, Elaeocarpus, Toddalia*, many *Leguminosae*, such as *Cassia* and *Bauhinia, Casearia, Homalium, Araliaceae*, many *Urticaceae, Antidesmeae, Symplocos*, most of *Rubiaceae*, and *Loganiaceae, Apocyneae, Solaneae, Gnetum, Myrsine, Ebenaceae, all Palmae, Ericineae* and others ; also such important families as *Cyperaceae* and *Gramineae*,

* The number of plants which do thus withstand the fires and ultimately become trees is very small indeed ; the vast majority perish miserably. *Remark by Dr. G. King.*

† Teak has no albumen as stated by Schauer, but large oily cotyledons, and, therefore, offers no exception to the above remark.

Ampelideae, and *Anonaeeae*. In fact, low herbs and half-shrubs, of which the greater part are light-loving, offer most of the exceptions, and seem to follow different laws from those which govern woody plants. *Stereulia* and palms, however, are not strict exceptions, and may safely be classed among the quick germinators and perishable seed-bearing plants; so may several others of those exceptions when the vitality of their seeds shall be known and properly understood.

Although the list of exceptions is considerable, it would appear to me that in Pegu, as also in Malayan countries, quick germinators supersede slow germinators; and, what is still more perplexing, it seems, as far as my experience goes, that those trees which produce the most perishable seeds, are also those which are most numerous in individuals and have the greatest distribution over an area similar in climate and physical character.

Another peculiarity, which deserves mention here, is the fact that many woody plants that are introduced from hilly or rocky tracts into deep alluvial plains, often produce no good seeds, or fail altogether to seed. This is important to know, for it tends to explain the absence of many trees, that are common on older formations all round such alluvial plains. It would appear, although I speak here only empirically, that seeds of such trees may be carried into the plains, and there germinate and grow up into trees, but that, owing to certain unknown causes (possibly the peculiarity of soil), they have lost to a greater or less degree their power to produce good seeds with a healthy embryo.*

Dr. Sendtner has made the interesting observation, that the plants of certain tracts of bog-grounds in Bavaria shew a remarkable unproductiveness and scantiness of fruit. Analyses of such bog-waters have testified the absence of phosphate of lime, so necessary not only to the production of seeds, but also to the formation of bone in cattle.†

B.—Botanical Description of Pegu, with special Consideration of the Forests.

§ 5.—*Position of the Flora with regard to surrounding Floras, with a division of the Flora into natural zones.*

The Indian Flora, as a whole, is composed of five‡ very different floras, *viz*:—

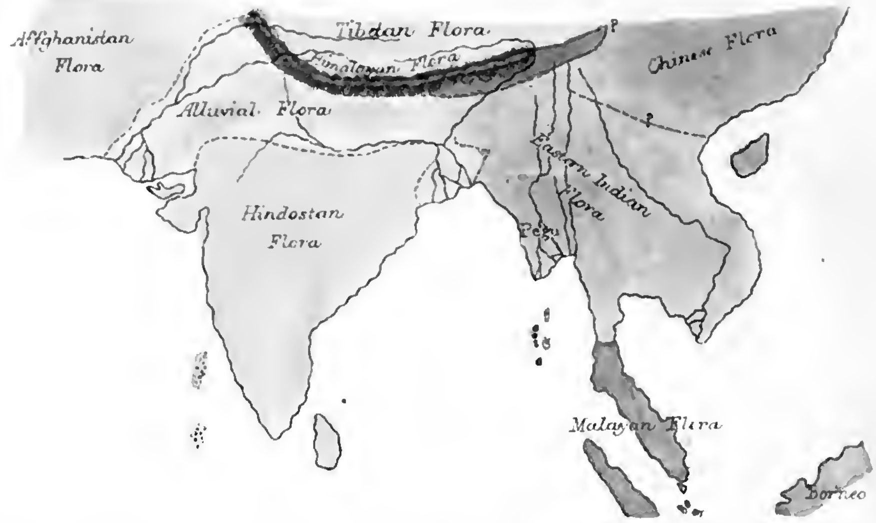
1. The Affghanistan and Sind Flora, an eastern extension of the Mediterranean Flora.
2. The Hindostan Flora.
3. The Himalayan Flora.
4. The Eastern Indian Flora.
5. The Malayan Flora, which includes Malacca and the Malayan Archipelago; bordering to the South the Australian, and to the East the allied Polynesian Floras.

Between Hindostan, the Himalayas and Eastern India a dead alluvial plain extends (on the bed of an ancient sea), known as the Gangetic and Indus plains, which cannot properly be referred to any of the above Floras. It is botanically a neutral ground, at present almost destitute of indigenous forests except along the sea-coast, and to a botanist a dreary field for explorations. So poor is its Flora, that the whole of these alluvial plains number not above 1300-1400 sp., and even Lower Bengal cannot boast of more than 900-1000 really indigenous plants, amongst which agrarian, swamp, and aquatic plants and grasses predominate.

* The same phenomenon takes place in any large garden situated *on deep alluvium*, the most unfortunate site which could be selected. The number of woody plants that never seed, increases in ratio as the plants become more and more exhausted. Sometimes, after many years' rest, a petrophilous tree may produce fertile seeds, but these are rare exceptions, chiefly due to the accumulation of fallen leaves etc. that are allowed sometimes to collect and to moulder, thus returning to the soil a certain quantity of the chemical nourishment which the trees have derived from it for a longer period.

† However, this is hardly the true cause here in the alluvial vegetation, and certainly is to a certain degree in direct opposition to the fact, that alluvial plains produce the greatest amount of cereals, &c. Whatever may be the cause of the reductive quality of alluvium, it is *certainly not* ascribable to competition of woody plants with the powerful coarse grasses; for if we leave the zone of savannahs and enter the lower mixed forests, these grasses disappear, although alluvium is still the formation. In absence of sections I can only suggest that a substratum of plastic retentive clay may exist which causes the waters to stagnate.

‡ I have omitted from this classification the high Asian or Tibetan flora, which properly forms part of the North-Asian floras.



The Burmese Flora is a part of the Eastern or Further Indian Flora, of which the Khasya hills form the extremest North-west, and Siam and Cochin-china the extremest East and South-east parts. It may be divided into several tracts, such as the Arracan Yomah, Pegu Yomah, the Martaban or Karen hills, and finally into the Tenasserim and Ava tracts. Each of these tracts has its peculiarities, which, however, I do not consider it necessary to elucidate here.

Before treating of the zones of Pegu, we must distinguish, first, general or geographical, and, second, special or local zones.

Botanically we usually distinguish the following general zones on the Northern (and also Southern) hemisphere of our globe, which nearly agree with the geographical ones, *viz* :

1. The equatorial zone, from the equator to North Lat. 15.°
2. The tropical zone, from North Lat. 15° to 23.°
3. The subtropical zone, from North Lat. 23° to 34.°
4. The warmer temperate zone, from North Lat. 34° to 45°.
5. The colder temperate zone, from North Lat. 45° to 58.°
6. The subarctic zone, from 58° to 66.°
7. The arctic zone, from 66° to 72,° and
8. The polar zone, from 72° to the pole.

For these somewhat too artificial zones, founded chiefly on the yearly means of temperature, I wish to substitute the following revised scheme :*

I.—The warm zone (*Thermozone*), from the equator to 35° North Lat. The seasons of the year are either little marked, or are more usually divided into a *dry* and *rainy season*. The thermometer very seldom sinks below freezing-point and then only along its borders in contact with the wintry zone. There is almost no difference between day and night under the equator, but it varies gradually towards the northern borders of the zone from a fraction of an hour to about 4 hours. It is divided into :

1. A tropical subzone, from the equator to the tropic of Cancer, and
2. A subtropical subzone, from the tropic of Cancer ($23\frac{1}{2}$°) to 35° North Lat.

Each of these subzones must again carefully be distinguished into such tracts as have a moist climate (hygroclimatic tracts), and such as are more or less destitute of rains (Xeroclimatic tracts), such as the African and Asiatic deserts.

II.—The wintry zone (*Cheimazone*), from 35° North Lat. to the arctic circle, ($66\frac{1}{2}$°). The seasons of the year consist of a winter and a summer, with spring and autumn. During winter there is freezing and a more or less regular fall of snow. Here the days and nights are still distinct, but the difference between day and night varies from 5 to 24 hours. There are two divisions of this zone, *viz :*

1. A subtemperate subzone, from 35° to 45° North Lat. and
2. A temperate subzone, from 45° North Lat. to the arctic circle.

III.—The polar or frigid zone *(Polozone)*, from the arctic circle to the pole. Summers are of very short duration, winters very long and rigorous, and, towards the poles, eternal. There is no daily difference between day and night, but a long day from two to more than six months duration, alternating with a night of a similar length, during which only mysterious lights, such as the *aurora borealis*, present a substitute for the sun. The two subzones are :

* In doing so it will be observed that I have abandoned the old-fashioned notions of botanists regarding "temperate forms." This, however, is not the proper place to discuss the reasons of my views.

1. The arctic subzone, from the arctic circle to 72° North Lat. Scanty vegetation.
2. The circumpolar subzone, from 72° North Lat. to the pole. No vegetation. (?).

For convenience sake, I have marked off these zones and subzones at the geographical lines, but these actually follow no mathematical lines, but are rectified by the lines of equal summer and winter temperatures (isochimens and isotherms of the respective seasons, or rather of the coldest and warmest months of the year).

The whole Eastern Indian Flora belongs, according to my scheme, to the warm zone, and the Pegu Flora, which we have here to consider more specially, would have to be placed in the tropical subzone.

It is usual to divide larger tracts into smaller or special zones, quite independent of the zones above discussed, and so I do here. This is done to facilitate the understanding of the distribution of plants and other peculiarities in climate, &c.

The Pegu province does not bear an uniform Flora, but extends into the Ava tract. It is, however, not necessary here, for the special purpose for which this report is written, to make such a distinction of Floras. We shall, therefore, treat the part which belongs scientifically to the Ava Flora, as a mere zone.

From § 3 it is already clear that the climate of Pegu allows of a division into zones, each of which has its peculiarities, as well in vegetation, as in general appearance. I distinguish three principal zones in Pegu, *viz.* :

1. The tidal zone, the limits of which may be drawn in a straight line from Bassein to Khayazoo on the Sittang river, interrupted only by the Southern extremity of the Yomah that terminates at Rangoon. The characteristic trees here are mangroves and other tidal trees.

2. The Pegu zone, which extends over the whole province with the exception of an almost rectangular tract at the North-Western corner. Owing to peculiar climatological conditions, this zone might be subdivided into a Sittang and a Tharrawaddi district. The former being the moister one, permits so many evergreens to immigrate from the Martaban hills as to make its Flora more allied in a botanical point of view to that of Martaban. The Tharrawaddi district holds the mean between the Sittang district and the next or Prome zone. True continuous evergreen forests (swamp-forests excepted) are here almost unknown, although patches of evergreen trees form a substitute for evergreen forests in more sheltered valleys.

It is interesting to observe here, how few of the evergreen trees of the Sittang district cross the Yomah range into the Tharrawaddi district, although physical facilities do exist. From the Arracan Yomah, which is said to be covered by evergreen forests, no evergreens seem to come over the broad alluvium of the Irrawaddi. The true cause of this lies probably in the unfavourable exposure of this side of the Yomah, and all the unfavourable climatological changes that accompany such an exposure.

3. The Prome zone, the line of which may be drawn from Myanoung on the Irrawaddi to the top of the Kambala toung, and thence along the main range to the frontier,* is the driest zone in the whole of Burma and is, so far as I could learn, quite destitute of evergreen forests. Towards Mandalay in Ava the climate becomes so arid that there is often not sufficient rain during the rainy season for the cultivation of rice. This dry Prome (or more correctly Ava) climate allows such plants to grow, as *Cochlospermum Gossypium*, *Tribulus*, *Priva*, *Premna viburnoides*, *Boerhaavia repanda*, *Balanites*, *Azima*, forests of *Acacia Catechu*, *Celsia Coromandeliana*, *Polygala Vahliana*, *Dccaschistia sp.* near *crotonifolia*, *Hibiscus Solandra*, *Sebastiania Chamaelea*, *Ruellia suffruticosa*, *Andrographis echioides*, *Peristrophe calyculata*, *Holmskioldia sanguinea*, *Polanisia Chelidonii*, *Psoralea corylifolia*, *Indigofera viscosa*, *Ranunculus sceleratus*, *Blepharis Maderaspatana*, *Bauhinia racemosa* and *B. diphylla*, *Acacia Farnesiana*, *Rosa involucrata*, *Monenteles spicata*, *Carissa*, *Pavetta parviflora*, *Morinda tomentosa*, *Sphaeranthus amarantoides*, *Strychnos potatorum*, *Hibiscus micranthus*, *Artemisia carnifolia*, *Linaria ramosissima*, *Iphigenia indica*, &c. All these are forms which remind one of Hindostan, and most of them do not occur anywhere else in Burma, nor in Arracan and Chittagong, but are found in the adjoining parts of Ava. The true sal-tree (*Shorea robusta*), is also said to occur further to the North, *viz.*, in Ava, and there is little cause left for hesitation to believe this, after such a number of Hindostanee plants have been found, many of which even form the prevailing types of the Prome Flora. The chief characteristic forms of Prome are *Tectona Hamiltonii* (ta-hat) *Erythrina sp.* (eng kathit) *Acacia leucophloea* (dha-noung), *Hymenopyramis brachiata*, *Capparis grandis* (Koungkwa) and very many others.

Of course, none of these zones abruptly terminate at the lines drawn. As I hardly need explain, they gradually merge one into the other. But along the main range of the Yomah the division is rather abrupt; for in travelling during March or April from the Prome district to the Sittang side, a change is met with in the vegetation, when passing the main range, which must impress any one, whether he be a careful observer or not.

* The country along the frontier North of Tounghoo is unknown to me, but I have reason to suspect that the line of the Ava zone extends to the Sittang along the watershed of the Lonyan choung.

The accompanying map of Pegu will give an idea of the different zones in this province. The map itself is a copy* from Dr. Brandis' Sketch-map of the teak localities in B. Burma, with very few alterations. It would have been desirable to compile a new and more correct map on a larger scale, and to enter in it the different forests, soils, &c., but this is not practicable at present.

§ 6.—*Distinction of the vegetation into an original and a secondary one.*

The vegetation of Pegu, as of any other country, must be distinguished into an original and a secondary one, the latter being produced by the agency of man. The limits between the two are arbitrary and in many cases can by no means be traced satisfactorily. It is, however, useful to distinguish between original Flora and cultivation, and to keep them apart, for reasons easily to be comprehended.

The mixing up of these states of vegetation may change the whole botanical physiognomy of a country so as to make it very unintelligible or misleading. For instance any one who would draw up a description of the Flora of the Gangetic Delta as it now presents itself, would produce a picture quite different to what really existed when cultivation had not yet advanced so far in Bengal; for the alluvial plains of lower Bengal have been at some time exactly what the Irrawaddi valley is now. My own explorations have shewn me clearly, that the Gangetic plains must have been covered by the same kinds of forest (consisting, however, partially of different species), as we now find along the Irrawaddi. There have been extensive savannahs and savannah-forests gradually passing into lower mixed forests towards the base of the Himalayas, Behar and the Khasyah-hills, and as gradually running into savannahs and tidal jungles towards the sea coast. Laterite and diluvial formations are not so developed in Bengal, but where they occur along the borders of the vast alluvial plain, the vegetation on them is as characteristic and peculiar as it is in Pegu; for although the plants differ to a great extent specifically, their habit and physiological character are equivalent.

The accompanying plate contains two sections, one of Burma from Toungoop to the Salween, the other of the Gangetic valley from the Rajmehal hills to the Himalayas. A cursory inspection of these two sections will shew that, in spite of all the differences in the geological nature of the hill tracts, the relationship and distribution of the vegetation is, and still more has been, in Bengal precisely the same as that of Pegu. The Eng-forests are here represented by sal-forests,† while the upper mixed forests, &c., are in habit also the same, although differing greatly in their specific constituents.

This section, therefore, will serve two purposes, first to bring under view the whole chain of forests from the Irrawaddi to the Sittang; and, second, to give at the same time a hypsometrical exhibition of the Burmese hills, as compared with those of the Himalayas.

In a botanical point of view, the study of the vegetation of such large expanses of alluvium, as that of the Ganges and Bramapootra, is interesting in so far as it teaches us that these alluvia offer as powerful a barrier as the sea, if not one even more powerful, to the dispersion of plants. But these are considerations of little interest to the forester.

In the second part of my report I shall introduce more botanical sections on a larger scale, which will show more clearly the regularity of distribution of the forests of Pegu.

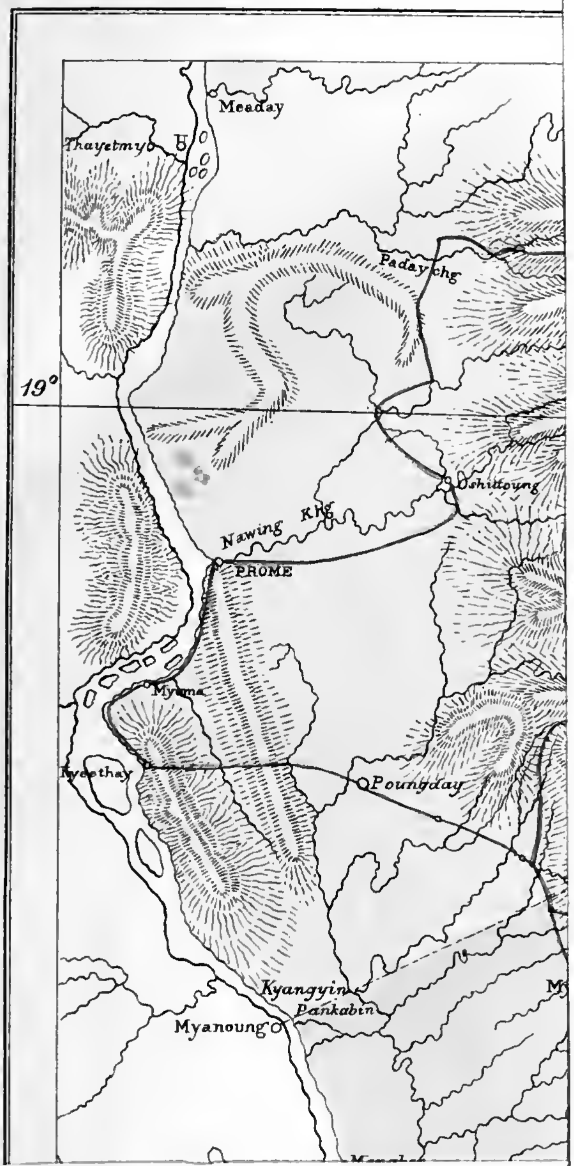
Another division of the different vegetative combinations, if I may be allowed to call the different kinds of forests, savannahs, &c., by this denomination, is into forests and low natural vegetation. This is a practical division, introduced more for the sake of rendering the subject easier for forest officers, than as one based upon sound scientific principles.

The forests may be distinguished into evergreen forests and those that shed their leaves during the dry season. The transition from deciduous forests to evergreen forests is not unfrequent, but, generally speaking it is not so difficult to detect this, as it is to distinguish recently cultivated lands from original vegetation.

As regards the different kinds of forest, I need hardly say that they are classified only as a means for distinguishing certain associations of trees; for so great is the variety of forests in Pegu, that I might easily have doubled their number had I seen any real advantage in doing so. It must not be supposed that these forests present themselves everywhere in the same proportions and under the same conditions; on the contrary, they offer so many transitions, that I found myself several times in a dilemma, not knowing exactly in what kind of forest I was then travelling. Scientifically such irregularities and

* It is a matter of infinite regret to me, that this copy has been executed by the artists under my charge so carelessly and so incorrectly. These men are only accustomed to draw plants, and have hardly any idea of maps. However, I hope, the map will be good enough to shew the zones, and to exhibit roughly also the routes I took when in Burma.

† These sal-forests are all along the base of the Himalayas situated on raised diluvial banks; throughout Behar and the Rajmehal hills they appear on gradually rising laterite and other impermeable strata, pertinaciously avoiding alluvium and permeable strata, just as the eng-forests in Burma.


Meaday
Thayetmyo
Paday chg
19°
Shittoung
Nawing Khg
PROME
Poungday
Kyangyin
Pankabin
Myanoung

aberrations can be explained more or less easily; practically, they will remain a source of difficulty to those who are not botanists.

However, there are certain indications, derived from the conditions of soil, and especially of the substratum, and from the physical nature of the locality, by which (guided by certain characteristic plants) one can finally reduce such doubtful jungle formations to their proper places more or less accurately. Let me give an example. The savannah mixed forests of the deep alluvium of the Irrawaddi plains are very easily recognised in their normal state, but when the trees in them get crowded, as along the cart road from Tharawa (opposite Henzada) to Thabyaygon on the Hline river, they become composed of so many trees, derived from the lower mixed forests, as to make it difficult to say whether we have to do with a savannah or lower mixed forest. In this case the conditions of soil and climate are the same, but the alluvium is probably not deep enough to produce a vegetation identical with that which we might have expected here. Possibly also a different substratum exists. The general growth, however, of the trees, and especially the long coarse wild sugarcane so characteristic of savannah forests, are indications strong enough to place the present forest in the same division with savannah mixed forests, or to make a slight variety of it.

The vegetation of cultivated lands, swamps, waters, &c., is of course of little or no value to forest officers, but I allude to it here for the sake of completeness.

§ 7.—*Enumeration of the different kinds of forests, &c., and their botanical characters.*

Having shewn in the preceding section how I distinguish the larger divisions of vegetation in Pegu, it remains for me to classify the different smaller variations of vegetative combinations, as the different kinds of forests, savannahs, &c., are called by phytogeographists.

I shall first submit a conspectus of them, and afterwards treat them one by one in the same order as here indicated. I find some little difficulty in treating the same kind of forest under one and the same heading, because, although practically identical, the same kind of forest contains often an admixture of trees peculiar to the zone in which they grow. In such cases I have usually added some of the more striking peculiarities in the different zones. Some of the forests occur only in one single zone, such as the Sha forests in the Prome zone.

It was my intention to omit in the present scheme of forests, &c., all those forests which are met with East of the Sittang, and to restrict myself solely to the vegetation between the Irrawaddi and Sittang rivers. I should have done so for two reasons, *viz.*, (1) because I understood from the official correspondence before me, that the area should be limited to that extent, and, (2) because a due appreciation of the character of the Karen or Martaban hills (as I have ventured to call the whole range of hills between the Sittang and Salween rivers) can only be attained from a longer residence in those regions. I myself have travelled but little in those parts, and I spent hardly more than two weeks in exploring the interior portions up to 7000 feet elevation. After reconsideration, however, I thought it might be useful, in spite of the incompleteness of my experience, to introduce those forests. These are all high level forests, *viz.* the evergreen hill forests and the hill Eng forests.

I.—ORIGINAL VEGETATION.

A.—Forests.

AA.—Evergreen Forests.

1. Littoral forests.
    - *a.* Mangrove jungles.
    - *b.* Tidal forests.
2. Swamp forests.
3. Tropical forests.
    - *a.* Closed tropical forests.
    - *b.* Open tropical forests, or moist forests.
4. Evergreen hill forests, or temperate forests. (All unrepresented in the Pegu Yomah).
    - *a.* Drier hill forests (3000-7000 feet).
    - *b.* Pine forests (3000-7000 feet).
    - *c.* Damp hill forests (3000-6000 feet).

BB.—Deciduous Forests.

5. Open forests (chiefly on diluvial formations).
    - *a.* Hill Eng forests (not represented in Pegu).
    - *b.* Eng or laterite forests.
    - *c.* Low forests.

6. Mixed forests.
    a. Alluvial mixed forests, (on alluvium).
        aa. Lower mixed forests.
        bb. Savannah forests.
        cc. Beach jungle.
    b. Upper mixed forests, or teak forests. (On permeable sandstones and metamorphic rocks).
        aa. Moister teak forests.
        bb. Drier teak forests.
7. Dry forests (chiefly on calcareous substrata).
    a. Mixed dry forests.
    b. Sha forests.
    c. Hill dry forests.

B.—Savannahs and low natural vegetation.

AA.—Land vegetation.

8. Bamboo jungles.
9. Savannahs.
10. Natural pastures.
    a. Long-grassed or jungle pastures.
    b. Short-grassed or lowland pastures.
    c. Hill pastures (not represented in Pegu).
11. Riparian vegetation.
    a. Vegetation of rivers, &c., with sandy or clayey beds (on alluvial formations).
    b. Vegetation of rivers, choungs, &c., with rocky beds (chiefly on older formations).

BB.—Vegetation of swamps and waters.

12. Sweet water vegetation.
    a. Vegetation of swamps.
    b. Vegetation of lakes and other stagnant waters.
    c. Vegetation of running waters, such as rivers, &c.
13. Saltwater vegetation.
    a. Vegetation of tidal swamps, salt lakes, &c.
    b. Vegetation of the sea.

II.—VEGETATION OF CULTIVATED OR LATELY CULTIVATED LANDS

1. Vegetation of agrarian lands.
    a. Lower agrarian lands, as rice fields, &c., turning after harvest usually into pastures.
    b. Upper cultivated lands or toungyas, turning after desertion into poonzohs and jungles.
2. Village vegetation.
    a. Native gardens, waste places, &c.
    b. Village vegetation itself.
3. Naturalized plants.

I.—ORIGINAL VEGETATION.

A.—Forests.

Instead of giving a dry resumé, where and under what conditions forests are found in Pegu, I will introduce here a few passages from the lecture,* which Dr. F. v. Mueller in Melbourne delivered to the colonists of Australia, with regard to Australian forests, their functions in nature and their use to man.

"How forests beneficially affect a clime, how they supply equable humidity, how they afford extensive shelter, create springs, and control the flow of rivers: all this the teachings of science, the records of history, and, more forcibly still, the sufferings or even ruin of numerous and vast communities, have demonstrated in sad experiences, not only in times long past, but even in very recent periods. In what manner the forests arrest passing miasmata, or set a limit to the spreading of rust-spores from ruined cornfields; in what man-

* Baron F. v. Mueller, Forest culture in its relation to industrial pursuits.

ner their humid atmosphere and their feathered singers effectually obstruct the march of armies of locusts in the Orient, or hinder the progress of vast masses of acrydia in North America, or oppose the wanderings of other insects elsewhere, all this has been clearly witnessed in our own age. How the forests, as slow conductors of heat, lessen the temperature of warm climes, or banish siroccos; how forests, as ready conductors of electricity, much influence and attract the current of the vapours, or impede the elastic flow of the air with its storms and its humidity far above the actual height of the trees, and how they condense the moisture of the clouds by lowering the temperature of the atmosphere, has over and over again been ascertained by many a thoughtful observer. In what mode forests shelter the soil from solar heat, and produce coolness through radiation from the endlessly multiplied surfaces of their leaves, and through the process of exhalation ; how, in the spongy stratum of decaying vegetable remnants, they retain far more humidity than even cultivated soil ; how they with avidity re-absorb the surplus of moisture from the air, and refresh by a never-wanting dew all vegetation within them and in their vicinity, has been explained, not only by natural philosophy, but also often by observations of the plainest kind. How forest trees, by the powerful penetration of their roots, decompose the rocks, and force unceasingly from deep strata the mineral elements of vegetable nutrition to the surface ; how they create and maintain the sources for the gentle flow of watercourses for motive power, aqueducts, irrigation, water traffic and navigation ; how they mitigate or prevent malarious influences, of all this we become cognisant by daily experiences almost everywhere around us. We have to look, therefore, far beyond a mere temporary wood supply, when we wish to estimate the blessings of forest-vegetation rightly ; and our mind has to grasp the complex of causes and sequences originating with and depending on the forests, before their value as a total can be understood."

"Let us then take timely warning ; let us remember that denuded earth parts with its warmth by radiation, and is intensely heated by insolation ; that thus in woodless countries the extremes of climate are brought about in rendering the winter-cold far more intense and boisterous, and the summer-heat far more burning and oppressive. Let us remember why the absence or destruction of forests involves periodic floods and droughts, with all the great disasters inseparable therefrom. Let us bear in mind that even in our praised Australia many a pastoral tenant saw his herds and flocks perish, and even the very kangaroos off his run ; how he looked hopefully for months and months at every promising cloud which drew up on the horizon, only to dissolve rainless in the dry desert air ; while when the squatter's ruin was completed, the last pasture parched, and the last waterpool dried up, great atmospheric changes would send the rain-clouds over the thirsty land with all the vehemence of precipitation, and would convert dry creeks into foaming torrents, or inundate with furious floods the very pastures over which the carcases of the famished cattle and sheep were strewn about ! Picture to yourselves the ruined occupant of the soil, hardly able to escape with his bare life from the sudden scenes of these tragic disasters ! Fortunately, as yet such extreme events may not have happened commonly ; yet they did occur, and pronounced their lessons impressively. Let it be well considered, that it is not alone the injudicious overstocking of many a pasture, or the want of water storage, but frequently the very want of rain itself for years in extensive woodless districts, which renders occupation of many of our inland tracts so precarious. Let it also not be forgotten, how, without a due proportion of woodland, no country can be great and prosperous ! Remember how whole mountain districts of Southern Europe became, with the fall of the forests utterly depopulated ; how the gushes of wide currents washed away all arable soil, while the bordering flat land became buried in debris ; how its rivers became filled with sediment, while the population of the lowlands were at the same time involved in poverty and ruin ! Let us recollect that in many places the remaining alpine inhabitant had to toil with his very fuel for many miles up to the once wooded hills, where barrenness and bleakness would perhaps no longer allow a tree to vegetate ! It should be borne in mind that the productiveness of cereal fields is often increased at the rate of fully 50 per cent. merely by establishing plantations of shelter-trees ; that the progress of drift-sand is checked by tree plantations ; and that a belt of timber not only affords protection against storms, but also converts sandy wastes finally into arable meadows, thus adding almost unobserved, yet unceasingly, so far to the resources of a country."

"Shall we follow then the example of those improvident populations, who, by clearing of forests, diminished most unduly the annual fall of rain, or prevented its retention ; who caused a dearth of timber and fuel, by which not solely the operations of their artisans became already hindered or even paralysed, but through which even many a flourishing country tract was already converted almost into a desert. Should we not rather commence to convert any desert tract into a smiling country, by thinking early and unselfishly of the requirements of those who are to follow us ? Why not rather imitate the example set by an Egyptian sovereign, who alone caused, during the earlier part of this century, 20,000,000 of trees to be planted in formerly rainless parts of his dominions."

AA.—Evergreen Forests.*

The evergreen forests comprise all forests, the trees of which do not shed their leaves during the hottest and driest part of the year, or from February to the beginning of the rains in May. I do not, however, mean that all the trees represented in such forests. are evergreens: the evergreen trees are only the prevailing types in them. But although a mathematical line cannot be drawn between evergreen and deciduous forests, the demarcation between them is nearly as conspicuous as that of the Eng forests and mixed forests. Not rarely these evergreens are seen in valleys intruding their dense dark-green heads into the drier mixed forests above them.

1.—*Littoral forests.*

The littoral forests stretch all along the coasts, wherever flat shores and alluvial deposits prevail. They extend as far into the interior (especially in the so-called deltas of larger rivers) as the tidal wave penetrates. In Pegu itself the tidal zone in a line drawn from Khayazoo to Bassein will probably indicate the general limit of the littoral forests. They do not, however, cover the whole extent of the country (as is the case in the Soonderbuns of lower Bengal) south of this line, but are restricted to the alluvial formations, and more especially to the immediate vicinity of the rivers and tidal channels. They are often enough interrupted by other kinds of forests, which either grow on the higher grounds or on diluvial formations. Neither are they uniformily composed of the same trees, but vary as much in their constituents as do all other forests in Burma. For this reason I found it useful to divide them into the two following varieties, *viz.:*

a. Mangrove jungles and swamps, covered regularly by all tides.
b. Tidal jungles, usually covered only during spring and higher tides.

a.—Mangrove jungles. These forests, in the sense I take them, occupy the flat muddy shores along the sea, and especially along the estuaries of rivers and streams, forming the outer skirt of vegetation, and often extending (during flood tide) far into the sea. They are regularly submerged by the tides, and are very poor in species, when compared with other forests. They form rather dense and usually low jungles of 40 to 70 feet in height with glossy dark-green foliage. The most characteristic trees and shrubs found here are those which are generally known under the name of mangroves, such as *Bruguiera gymnorhiza*, and sometimes *B. oxyphylla*, *Rhizophora conjugata* and *Rh. mucronata* (all these called by the Burmans *pyoo*), further *Ceriops Roxburghiana*, *Kandelia Rheedei*, *Sonneratia apetala*, *S. acida* and *S. Griffithii*, *Lumnitzera racemosa*, *Carapa obovata*, *Scyphiphora caryophyllacea*, *Brownlowia lanceolata*, *Aegiceras corniculata*, *Acanthus ilicifolius*. Amongst the poor shrubbery *Acanthus volubilis*, *a Hoya*, *Acrostichum aureum*, and a few others are found.

Where *Bruguiera* and *Rhizophora* prevail, the soil is washed out from the roots by the sea in all directions, so as to form often a complete labyrinth of network, presenting an ugly and dirty aspect. Numerous irregular short stems of undeveloped trees, looking like pinnacles, or irregular knobs arising from the exposed roots, accompanied by numerous mangroves in all stages of growth from the stick-like seedling up to the full-grown tree, make walking amongst them very troublesome. The grey mud, which is so soft that one sinks continually up to or above the ankles, bears hardly any other plants, except seedlings of such families as are of a mangrove character. The ground, burrowed by various sea-animals, such as crabs, &c., is submerged during flood tide, when the lower trees and shrubs show only their crowns above the sea, while the higher mangrove trees, sticking out from the expanse of water, appear like a floating forest. These are usually the trees of which we first catch sight when approaching the shores of a low country.

b.—Tidal jungles. The tidal jungles resemble in many respects the mangrove jungles, especially along the very borders of the tidal channels, but they are usually devoid or nearly so of true mangroves, such as *Bruguiera*, *Rhizophora*, *&c.* They not only occupy the sea-shore, but far up country, especially along the various river systems. They are even found, where the influence of tide is very inconsiderable, and the water only very slightly brackish. Their average height is from 40 to 50 feet, or even in some cases higher, and sometimes they are reduced to shrubs. They have plenty of shrubby undergrowth. During spring tides they are more or less inundated, but ordinary tides seldom reach them. The most

* Compare also
1. Dr. Brandis' report on the Attaran forests for the year 1860. (Selections from the Records of the Government of India, No. XXXII. 1861), and
2. Dr. Brandis' Auszug eines Briefes des Dr. D. Brandis. Domdamee Forests, 23rd March, 1862. (Botanische Zeitung, 1863, p. 43).
3. H. Falconer. Report on the Teak Forests of Tenasserim. (Selections from the Records of the Bengal Government, No. IX. 1852).
4. Dr. McClelland. Report on the Teak Forests of Pegu. (Selections from the Records of the Government of India, No. IX. 1855).

tic trees here are *Sonneratia apetala* and *Avicennia tomentosa*, forming nearly one-third of their entire bulk. According as the one or the other of these two trees prevails, we see these forests assuming a rather willow-like appearance, with drooping branches and lax linear foliage of a light greyish green color; or low jungles present themselves of a mean height hardly exceeding 25 to 40 feet with a broad dull green foliage collected into dense almost spherical crowns.

The other trees and shrubs that are associated with the above trees are, for the great part, the same as those in the mangrove jungles. These are especially: *Sonneratia acida* and *S. Griffithii*, *Aegiceras corniculata*, *Kandelia Rhcedei*, *Hibiscus tiliaceus*, *Thespesia populnea*, *Heritiera littoralis* and *H. minor*, *Pavetta nigricans*, *Pongamia glabra*, *Tamarix Indica*, *Clerodendron inerme*, *Excoecaria Agallocha*, *Pluchea Indica*, *Lumnitzera racemosa*, *Salacia prinoides*, *Antidesma Ghaesembilla* and *A. diandrum*, *Glochidion multiloculare*, *Erythrina ovalifolia*, *Dalbergia monosperma*, *Pandanus foetidus*, *Browntowia lanceolata*, *Ficus cordifolia*, *Cerbera Odallam* (usually on rocky ground), *Cordia myxa*, *Aegialitis annulata*, *Breynia rhamnoides*, and, strange to say, sometimes *Salix tetrasperma*.

Of creepers and climbers are chiefly seen: *Acanthus volubilis*, *Flagellaria Indica*, *Derris scandens* and *D. uliginosa*, *Finlaysonia obovata*, *Pentatropis*, *Sarcolobus*, and such like.

Nipa fruticans and *Pandanus foetidus* form often dense bushes in certain localities, while *Phœnix paludosa* is very frequent, generally forming dense, almost impenetrable patches of jungle (similar to those of *Calamus arborescens* further inland), which look very attractive on account of the numerous large bunches of red fruit that contrast beautifully with the glossy dark or yellowish green foliage.

On the muddy ground are found *Acrostichum aureum* in abundance, *Wollastonia biflora*, *Wedelia calendulacea*, *Acanthus ilicifolius*, *Malacochaete pectinata*, *Leptochloa Wightii*, one or two species of stiff *Fimbristylis*, *a Phragmites*, *Eragrostis procera*, coarse *Cyperi*, like *C. procerus*, *canescens*, *incurvus*, *articulatus*, and especially *C. mucronatus*, *Sesuvium portulacastrum*, *Alternanthera sessilis*, *Suaeda fruticosa*.

Only a few species of ferns and orchids are observed on trees, although they are not scanty in individuals. *Polypodium quercifolium* is amongst them the most conspicuous one. Also *Hoya* and *Dischidia* are rarely missed. *Cassytha filiformis* is most abundant, often completely covering the shrubs with its yellow or green, smooth, thread-like stems.

On deep alluvium (as in the Sittang Delta), these forests gradually merge into savannahs. Where diluvial formations protrude, as is frequently the case in the Irrawaddi Delta, they are more or less abruptly bordered by lower mixed forests or moist forests. On the higher situated grounds these tidal forests change into a peculiar kind of forest, which I had no opportunity to explore properly.—In such are represented *Bambussa spinosa*, *Zizyphus œnoplia*, *Ichnocarpus frutescens*, *Albizzia elata*, *Ficus cordifolia* and *F. nitida*, *Streblus aspera*, *Cassia Fistula*, *Olax scandens*, *Barringtonia racemosa*, *&c.*, thus forming a kind of savannah forest, but differing in aspect from the true mixed forests.

2.—*Swamp Forests.*

The swamp forests are probably the most curious forests in Burma, and to a botanist they are of high interest. In fact, their constituents are so dissimilar to those of the surrounding forests, that one must necessarily ask, how all these trees come here? The greater part of them do not occur anywhere but in swamps or similar watery places, and they overleap large tracts of country to reappear again in analogous places adapted for their growth. They might be called the mangrove forests of the fresh waters, the ground being almost as exposed and swampy as that of the mangrove swamps.

Whether the swamp forests are properly classed by me among evergreen forests, is still an open question, for Captain Seaton informed me, that the most wonderful feature of these forests is, that they shed their leaves completely in the rainy season. If this is really the case, we have here another instance, where the most opposed factors, *viz.*, the highest degree of dryness of soil and climate, and the greatest amount of moisture and a watery situation, effect the same phenomenon, *viz.*, the shedding of leaves, with the difference only in the period of shedding. Most of the trees belonging to this formation which I passed at the beginning of the rainy season, had all appearance of evergreens, and if we restrict the distinction of evergreen and leaf-shedding forests, as they appear during the driest period of the year, the swamp forests may still be retained amongst the evergreen forests.*

The swamp forests are frequent in the deep alluvium of the Irrawaddi valley, especially between this large river and the Hline river, where they attain their greatest development. They are, however, found also along the Sittang, especially around the small lakes and jungle swamps where they are often blended with the surrounding forests.

* From the collections of Tenasserim plants in the Herbarium of the Calcutta Botanical gardens, I should arrive at the conclusion, that such swamp forests are also represented along the Tenasserim streams. It is puzzling, however (and this probably arises from superficial observation) that such plants are frequently said to grow "on limestone rocks."

In the mixed forests along the base of the Yomah, around swamps or rather accumulations of rain water in depressed localities, a limited number of trees, peculiar to swamp forests, make their appearance.

We may distinguish developed or true swamp forests, and riparian or bordering swamp forests.

A. True Swamp forest. The true swamp forests are restricted to deep alluvia, where they appear especially along courses of streamlets, and in depressions covered by water up to four or five feet (sometimes six or seven feet) during the rainy season. As in evergreen tropical forests, four stratas of vegetation can easily be distinguished, *viz.*, the lofty trees, the smaller trees, and finally, the shrubs and soil-clothing.—The lofty trees, about 60 to 70 feet high, are chiefly a variety of *Anogeissus acuminatus*, *Mangifera longipes* and *Xanthophyllum glaucum.* Of smaller trees are chiefly seen *Memecylon Helferi*, *Elaeocarpus photiniaefolia ? Pavetta parviflora*, and *P. nigricans*, *Gonocaryum Lobbianum*, *Symplocos leucantha*, *Glochidion sp. Hemicyclia Sumatrana*, a species of *Flacourtia*, *Cassia fistula*, a *Randia* with very small leaves, two species of *Eugenia*, two small leaved species of *Aporosa*, *Garcinia succifolia*, *Barringtonia acutangula*, *Dalbergia flexuosa*, and many others not yet determined. The shrubbery consists often of *Glycosmis pentaphylla*, *Capparis disticha*, *Hymenocardia Wallichii*, *Grewia sinuata*, a new species of *Psilobium* with glossy leathery leaves, *Crataeva hygrophila*, *Combretum trifoliatum*, a small new *Gardenia* with shining dark green leaves. Climbers are rather plentiful, and some of them very curious, having very short stems of only a few feet high, (usually as high as the water level, during the rains), sending out disproportionately long flexuose and arched branches, forming a complete entanglement, through which it is almost impossible to penetrate. The most common ones are a species of *Jasminum*, *Gmelina Asiatica*, *Pachygone odorifera*, *Sphenodesma eryciboides*, a new large-leaved *Tetracera*, *Acacia pennata ? Ancistrocladus Griffithii*, *Combretum tetragonocarpum*, *Roydsia obtusifolia*, *Derris scandens*, *D. elegans* and *D. uliginosa*, etc, etc. The herbage on the grey muddy ground is poor and scattered, consisting chiefly of a species of *Carex* (*C. Wallichiana*), that forms sometimes small patches of meadows along the borders of swamps, but is never touched by cattle, *Maranta* in abundance, *Polygonum*, *Lasia aculeata*, a probably new species of *Cyperus* (near *C. moestus*), *Fimbristylis* etc, etc.

Orchids are here very common, covering in masses the branches and stems of trees, especially around lakes. They are usually accompanied by such ferns as *Asplenium nidus*, *Polypodium quercifolium*, *Drymoglossum piloselloides*, etc., along with an abundance of *Macromitrium* and other mosses and *Hepaticæ.*

The water in the lakes and swamps is usually very discoloured and dirty, and is therefore very poor in plants, but, when clear, an enormous amount of water plants appear, floating as well as submerged. Their constituents will be recorded in the sequel along with the vegetation of sweet waters.

B. Riparian Swamp forests. The other swamp forests which I distinguish under the name of riparian or bordering swamp-forests, are strictly not forests. They are mere patches of certain swamp forest trees, which occur usually around lakes and swamps in the midst of other forests, or along the muddy borders of choungs in alluvial soil; hence the name riparian.

Only a few species of the true swamp forest trees appear, but these in such a large number of individuals, as to cause a peculiar darkness and shade, which expel a great number of the light-loving plants of the surrounding (usually mixed) forests. They are marked also by numerous pendulous mosses (*Meteorium* chiefly) that hang down from the branches, indicating a much greater dampness of atmosphere, than exists in the mixed-forests around them, which are often not more than 20 to 50 paces off. The principal tree is *Xanthophyllum glaucum*, often accompanied by *Barringtonia acutangula. Mangifera longipes* and *Anogeissus acuminatus* are usually not far off in such places, and in more favoured spots several of the trees, shrubs, etc. already indicated under the true swamp-forests, associate themselves, but always in small numbers. *Combretum trifoliatum*, *Roydsia obtusifolia*, *Aporosa*, *Ixora nigricans* are such as are frequently seen.

In such swampy places some of the water-loving palms are sometimes met with in large numbers, especially *Areca*, of which *Maranta dichotoma* may be considered a regular companion.

The water in these periodical swamps is usually very clear, and generally quite free from other water plants, except a few duck-weeds. When they are deeper and of a more permanent nature, they appear more open, and, therefore, access is given to a greater amount of light, allowing the usual water-plants to grow. Orchids, and other epiphytes are here as plentiful, as in the true swamp-forests.

I have been unable to attend to these swamp-forests as carefully as they deserve. During my short stay in them, a few only of the plants were in flower or fruit. I can find in the Calcutta Herbarium hardly any specimens agreeing with the leafy branches I brought home from these forests: a certain sign of their peculiarity.

3.—*Tropical Forests.*

The evergreen tropical forests owe their origin to a damp equable climate, without shewing any predilection to substratum, for we find (under certain conditions) tropical forests as well on permeable as on impermeable strata. They were, no doubt, of much greater extent in Pegu in former periods than they are at present; but as the destruction of these forests went on, the climate became drier and drier, and they became restricted to the more protected valleys of the Yomah, especially along its eastern slopes. Along the western slopes of this hill range, evergreen forests are seen only in small detached patches. Judging from the occurrence of certain evergreens in various valleys, now destitute of entire evergreen forests, these forests may have probably existed, where now mixed-forests occupy their place. On the drier ridges, however, if we take into account the configuration and climate of the whole country, evergreen forests could never have existed, even under the most favourable conditions. Deep alluvium also shews no vestiges of having possessed at any time a tropical evergreen forest, for even the Sittang valley, the dampest and most favoured of all Pegu river-beds, is destitute of them.

The large number* of trees which vary so much in different localities, makes it utterly impossible to reduce the character of these forests to a few principal constituents. Here Humboldt's words are applicable: "Die uebergrosse Mannichfaltigkeit der bluehtenreichen Waldflora verbietet die Frage, woraus diese Urwaelder bestehen?" A forester unacquainted with botany will, however, easily recognise such forests by the general aspect that moisture, accompanied by a certain degree of shade, effects. If we, in the hot season, travel for long distances through forests destitute of leaves, and finally enter a dark cool forest, where we find ourselves protected from the sunbeams by a dense cover of foliage, we may naturally presume, that we have entered a tropical forest. But it is quite different, when travelling during the rains, for there the contrast is not so marked. Some botanical knowledge is therefore required, to distinguish leaf-shedding from evergreen forests, and this is more especially the case, if the forest partakes of the character of what I call *moist* forests.

Most of the trees in these forests have no Burmese—although many possess Karen—names. Burmans, who name, quite correctly, tree after tree in an open mixed-forest from distances quite astounding, will with difficulty recognise here even such trees as grow in mixed-forests, or will not be able to recognize them at all.

In giving here a sketch of these forests, I divide them into two varieties, *viz.* the closed and the open tropical forests, two formations produced chiefly by degrees of moisture. This division is only applicable to Pegu, and not to the hills, east of the Sittang.

a. Closed tropical forests.—The average height of the trees in the closed tropical forests ranges from 150 to 200 feet, rarely less; trees of 250 feet in height are of no rare occurrence. The clean stem of the higher trees varies from 80 to 100 feet and more. Jungle-fires rarely, if ever, occur in these forests, and therefore the fallen leaves etc. are allowed to decay slowly, and to form, generally, a good black humus-soil.

Dr. Brandis, in his report on the Attaran forests (p. 54) truly speaks of these forests as being clothed with an unbroken stratum of vegetation of 150 to 200 feet depth, and there are really 4 and often 5 strata of vegetation distinguishable. The lofty trees tower above all others, forming, as it were, a *leaf-shedding* open forest above the lower stratum of evergreen trees. These are chiefly *Sterculiae*, such as *St. scaphigera*, *campanulata* (*Pterocymbium, Javanica*† *R. Br.*) and *St. alata*, *Tetrameles nudiflora*, *Parkia leiophylla*, *Acrocarpus fraxinifolius*, *Albizzia Lebbek* and *stipulata*, *Xylia dolabriformis*, *Guatteria lateriflora*, *Swintonia Swenckii*, *Pterocarpus Indicus*, *Duabanga sonneratioides*, *Artocarpus chaplasha*, *Lacoocha* and *echinatus*, *Pentace Birmanica* and some others. Of lofty trees the few following are the more conspicuous true evergreens: *Dipterocarpus alatus*, *laevis* and *turbinatus*,‡ *Parashorea stellata*, *Hopea odorata*, *Ficus laccifera*, *Anisoptera glabra*, *Payena paralleloneura*, *Garcinia cowa*, *Antiaris toxicaria.*

Then follow the big trees, which rest on shorter trunks, though in bulk they are not probably inferior to the lofty trees. They form the medial stratum, and are chiefly evergreens, as are *Mitrephora vandaeflora*, *Pterospermum semisagittatum* and *fuscum*, *Bursera serrata*, *Dysoxylon sp.*, *Kurrimia robusta*, *Semecarpus heterophylla* (?), *Marlea tomentosa* and *begoniaefolia*, *Stereospermum fimbriatum* (?) *Vitex peduncularis*, *Adenanthera pavonina*, *Cedrela Toona*, and *C. multijuga*, *Sapindus rarak*, *Lagerstroemia tomentosa* (?), *Mangifera Indica*, *Xanthochymus pictorius*, *Sandoricum Indicum*, *Dalbergia glaucescens*, *Ficus obtusifolia*, *Tsjela* etc., *Podocarpus polystachya*, *Albizzia lucida*, *Pithecolobium lobatum*, *Payanelia multijuga*, *Amoora Rohituka*, *Discospermum sphaerocarpum ?*, *Diospyros cordifolius ?*, *Tetranthera* 2 or 3 species, *Bischoffia Javanica ; Trewia nudiflora*, *Hibiscus vulpinus*, *Pterospermun acerifolium*, *Sterculia ornata*, *Elaeocarpus tuberculatus* etc., etc.

* In the tropical forest of the Toukyeghat valley which stretches between the seven pagodas and the Bogelay ridges (an area of hardly 8 to 9 square miles), not less than 300 to 350 different kinds of trees alone have been observed by me. Not a day passed, without my having had to add 1 or 2 kinds more to my lists, and so it went on until I became compelled by sickness to leave this forest-tract. The best mixed forest of equal extent would hardly give 70 to 80 kinds of trees.

† Not *St. Javanica, R. Br.*, which is identical with a Blumean species.

‡ These wood-oil trees are strictly no evergreens, but the succession of leaf-shedding and leaf-forming is here so rapid, that young leaves are already developed, while the old ones are still dropping off.

A third stratum is composed of smaller trees, all or nearly all evergreens, and seldom higher than 30 to 50 feet. They are numerous in species, especially along choungs. Some of the more frequent and characteristic are: *Alsodeia longiracemosa*, *Phoebe pubescens*, *Hydnocarpus heterophyllus*, *Siphonodon celastrinus*, *Baccaurea sapida*, *Micromelum pubescens*, *Spathodea ignea*, *Turpinia pomifera*, *Stylocoryne densiflora*, *Haasia sp.*, *Cinnamomum*, *Ostodes paniculata*, *Elaeocarpus grandifolius*, *floribundus*, *etc.*, *Erioglossum edule*, *Tetranthera Roxburghii* and *macrophylla*, *Aglaia* 2 or 3 species, *Holigarna Grahamii* (*Semecarpus Wight*), *Maesa ramentacea*, *Drimycarpus racemosus*, *Celtis mollinscula*, *Suregada* sp.; *Ardisia anceps* and another species, *Ficus macrophylla*, *fistulosa*, *etc.*, *Millettia atropurpurea* and *M. sericea*, *Erythrina sumatrana* along choungs, *Dalbergia cana*, *Eugenia formosa*, *Memecylon ovatum* and *luteolum ?*, *Saccopetalum Brandisii*, *Aporosa dioica*, *Cupania glabrata*, and *Sumatrana*, *Nanopetalum myrianthum*, *Sumbaria macrophylla*, *Cleidion Javanicum*, *Macaranga gummiflua*, *Chaetocarpus castaneaecarpa*, *Excoecaria baccata*, *Castanopsis argentea*, *Sponia orientalis ?* *Gunizanthus pilosulus*, *Cyathocalyx martabanica*, *Goniothalamus*, *Garcinia cornea* and *heterandra*, *Eurya serrata*, *Grewia Microcos*, *Zanthoxylon Budrunga*, *Glycosmis citrifolia*, *Murraya exotica* and *Koenigii*, a *Clausena*, *Atalantia sp.*, *Picrasma Javanica*, *Ochna Wallichii*, *Melia Toozendan ?* *Schizocheton grandiflorum*, *Heynea pubescens*, *Jlex godayam*, *Evonymus glaber*, *Diospyros oleifolia*, *variegatus* and one or two other species, *Euphoria Longana*, *Linociera terniflora*, *Cylicodaphne sp*,. *Antidesma*, *Barringtonia macrostachya ?* *Nephelium hypoleucum*, *Vitex heterophylla*, *Myristica longifolia*, *glauca* and *Jrya*, *Antidesma menasu*, *Lepisanthes montana*, and many others.

Of bamboos I give only the native names, as my examination of Burma bamboos has not yet closed. Bamboos in these forests are very frequent, growing sometimes as high as the stratum of the big trees, say nearly 90 to 100 feet. The kinds especially met with are wabo, wapyoo gyee, waya, kyattounwa, and the smaller sort of wathabwot. Wanway is a large powerful climber.

Of palms and screw pines, a splendid *Livistona*, *Arenga saccharifera*, *Areca* 1 or 2 sp. *Licuala peltata*, *Caryota urens*, *Wallichia oblongifolia*, *Zalacca* sp. and *Calamus arborescens* along choungs, are the more common ones. *Pandanus furcatus* is also not unfrequent, especially in the hilly parts of Martaban.

Another stratum, which deserves consideration, consists of shrubs, large and small. Many of the shrubs shoot up with a single stem, like a treelet; others are climbers or creepers. It is difficult to deal with the members of the latter category, of which some have stems as thick as trees; they are stem clasping or climbing, and run into the crowns of the loftiest trees, often hiding the crowns or drooping down from them in ornamental but almost inaccessible festoons. Such climbers and creepers are *Malaisia sp.*, *Ventilago calyculata*, *Hibiscus scandens*, *Illigera* 2 sp., *Artabotrys Burmanica*, *Calycopteris Roxburghii*, *Dalbergia stipulacea ?*, *Salaciá sp.*, *Acrostichum scandens*, *Colubrina*, *Zizyphus glabra*, *Scindapsus pertusus*, and *officinalis*, *Pothos scandens*, *Naravelia smilacifolia*, *Thunbergia laurifolia*, *Porana speciosa*, *Acacia intsia ?*, *caesia* and *rugata*, *Gouania leptostachya*, and *integrifolia*, *Vanilla sp.*, *Jasminum reticulatum*, *laurifolium*, *anastomosans*, and a few other species, *Tinospora nudiflora*, *Stephania*, *Cocculus glaucescens*, *Neuropeltis ovata*, *Chondrospermum smilacifolium*, *Parabaena sagittata*, *Buettneria aspera* and *pilosa*, *Momordica sp.*, *Aspidopteris*, *Erythropalum scandens*, *Rhynchospermum Wallichii*, *Fagraea globosa*, *Phytocrene gigantea*, *Vitis lanceolaria*, *oxyphylla*, *rhodoclada*, *discolor*, *pentagona*, *repens*, *adnata*, *etc.*, *Chariea* 2—3 *sp.*, *Hiptage sp.*, *Elaeagnus sp.*, *Mezoneuron enneaphyllum*, *Cnestis platantha*, *Combretum decandrum* and *Chinense*, *Modecca trilobata*, *Hodgsonia heteroclita*, *Ancistrocladus extensus*, *Toddalia aculeata*, *Uncaria pilosa*, *sessilifructus* and another *sp.*, *Conocephalus*, *Gnetum*, *Griffithia*, *Smilax ovalifolia* and another species, *Spatholobus sericophylla ?*, *acuminata*, *Dalbergia cana*, *Bauhinia ornata*, *B. anguina*, and 3 or 4 species of *Calamus*.

The principal erect shrubs are *Alsodeia Bengalensis*, *Mephitidea Wallichii*, *Ixora* (several species, but all with white or pale rose flowers,) *Gendarussa vulgaris*, (especially along choungs,) *Rottlera muricata ?*, *Alsophila contaminans* and (in Toukyeghat) *glabra*, *Angiopteris erecta*, *Bohmeria malabarica* and *platyphylla*, *Chasalia wallichiana*, *Grumilea elongata*, *Morinda umbellata*, *Adenosacme*, *Petunga Roxburghii*, *Clerodendron infortunatum* and *nutans*, *Claoxylon longifolium*, *Unona desmos*, *Anaxagorea Zeylanica*, *Capparis membranifolia*, *Sterculia coccinea*, *Sideroxylon nervosum*, *Wall*; *Glycosmis pentaphylla*, and *arborea*, *Leea sambucina*, *Lepisanthes montana*, *Dissochaeta cyanocarpa*, *Trevesia palmata*, *Maesa Indica* and *permollis*, *Ardisia crispa* and another sp., *Diospyros chartacea*, *Connarus monocarpus*, *Pavetta Indica ?*, *Mussaenda*, and others.

The last and lowest stratum is the vegetation that covers the ground. Owing to a certain degree of darkness that reigns in these forests all the year round, the number of herbs, etc., is comparatively small. In the denser parts of these forests the ground is covered only with decaying leaves, rotting trunks of trees, etc., and vegetation is excluded here to a great extent, but where the forests become more open, as is especially the case along choungs, the vegetation becomes rich, and we see often an abundance of *Strobilanthes flava*, *neesii*, *fimbriatus*, and especially *S. rufescens*, *Daedalacanthus Parishii*, *Phlogacanthus insignis* and another magnificent species (*Ph. curviflorus*), *Justicia flaccida, Peristrophe, Eranthemum elatum, Ebermeyera lanceolata, Bragantia latifolia, Elatostemma sesquifolium* and some other species, *Chavica Roxburghii, Siriboa, Wallichii ?* and *bohmeriaefolia, Colocasia fornicata, Aglaonema simplex* and *oblongifolium, Homalonema* and other *Aroideae, Desmodium reniforme* (?) *Geophila reniformis* especially under the shade of bamboo, *Ophiorrhiza, Pogonia plicata, Tupistra nutans, Monochilus nervosus, Corymbis disticha, Molineria capitulata, Dianella ensifolia, Dracaena terniflora* and *ensiformis*,(?) *Ophiopogon Wallichii, Reliosanthes violacea, Disporum sp., Floscopa paniculata, Pollia Indica* and *thyrsiflora*, (?), *Carex Indica, Scleria elata*, (?) and *pandanophylla, Cyperus moestus, Panicum plicatum, Centotheca lappacea*, along with numerous *Scitamineae* and *Marantaceae*.

If grass-clothing is almost unknown in true tropical forests, (except along the courses of larger choungs exposed to light) the ferns often replace the grass by the density of their growth. Amongst them the following deserve mention: *Davallia strigosa* and *hirta, Lindsaea ensifolia, Pteris cretica, pedata, quadri* and *bi-aurita, Asplenium resectum, sylvaticum, polypodioides* and *esculentum, Nephrodium calcaratum, terminans, extensum, molle, abruptum, Leuzeanum, decurrens* and *polymorphum ; Polypodium multilineatum, tenerifrons, irregulare* and *pteropus, Davallia Australis, Acrostichum appendiculatum, variabile, flagelliferum* and *virens*. All these are terrestrial. On trees or rocks are observed chiefly *Hymenophylleae*, as *Trichomanes Henzaianum, Filicula, pyxidiferum* and *Javanicum, Davallia bullata, Asplenium nidus* and *laserpitiifolium, Nephrolepis exaltata, Polypodium irioides*, and *axillaris*. Amongst twiners etc., are chiefly *Lygodium polystachyum* and *pinnatifidum*, as also *Acrostichum scandens*.

A great part of the perennials and sometimes of the annuals nestle on the stems and still more on the upper branches of trees, thus vying for light. These are the aerial or epiphytical plants, of which especially *Orchideae* and *Cyrtandreae* deserve mention. A few *Scitamineae* also grow sometimes on trees. The tropical forests of Pegu proper are comparatively very poor in epiphytical plants, if compared with those of Martaban aud Tenasserim.

The mosses etc. in these forests are but sparingly represented, and are stricted more to the rocky slopes and to boulders in and along choungs, while the tree restems are poorly inhabited by small adpressed kinds, chiefly scale mosses. The green clothing of the trees, caused by mosses, etc. is nearly wanting here, and the stems, though usually embraced by climbing *Aroideae*, ferns, etc. shew their bark in its natural state, or only sparingly invested by mosses and lichens, the latter being usually surrounded with a peculiar bluish or leaden coloured indistinct thallus. Lichens are still more scanty here, but they reappear in great number on the exposed upper part of trees, and more so on the branches of the loftier trees, owing, no doubt, to their light-seeking propensities. Bamboo, however, is frequently seen covered by 3 or 4 very singular lichens with greenish white thallus.

Of mosses are chiefly seen several species of *Fissidens, Macromitrium, Calymperes*, and *Hypna ;* of scale mosses *Lejeunia, Lophocolea*, and similar forms. The abundance of ephiphyllic scale mosses, accompanied by some lichens, on leaves of trees, shrubs, etc. is characteristic of evergreen forests. Fungi, of course, find favourable conditions in these forests, and their development is accordingly great, especially during the rains. *Sphaerias* however, are remarkably rare; in fact, with the exception of *Xylaria*, I met with only two or three species.

An orange-coloured Alga (*Chroolepus flavum*) is often enough seen on stems and branches, and on living leaves one or two other species of green *Algae* are not unfrequent (chiefly *Scytonema*).

I may mention also as characteristic of tropical forests, that the foliage of many of the shrubs, etc. show a peculiar more or less distinct metallic steel blue hue ; some of the plants, (like *Selaginella*,) so much so, that they have become favourites with gardeners.

C. *Open tropical forests*.—The moist forests, or open tropical forests, differ from the former chiefly in their lesser degree of dampness and the reduction of the several vegetative strata to only three or four, as also in the smaller amount of climbers, thus rendering these forests more open and less difficult to penetrate. They are to a certain extent a combination of mixed, and tropical forests. These moist forests are found especially along the eastern base of the Pegu Yomah as far down as Rangoon. In the latter district they occupy the lower and moister parts of the laterite range, that terminates at the confluence of the Pazwoondoung and Rangoon rivers. But usually they grow on more gravelly soil or on raised shallow alluvium resting on gravel or sandstones. They are often difficult to distinguish from the former, and merge from one into the other, where the terrain is of a varied character. The shrubbery in them is comparatively scanty, and often enough the herbage on the ground differs in little or nothing from that of the more shady mixed forests.

The principal trees are such as occur above described in the true tropical forests, but appear to be much more poorly represented in species. Those chiefly seen are *Dipterocarpus laevis* and *alatus, Parashorea stellata, Pentace Birmanica, Antiaris toxicaria* (the Javanese upas tree), *Eugenia sp.* (toung thabyay), *Beilschmiedia sp. ?, Garcinia cowa, Eugenia sp.* (*thabyay nee*), *Carallia integerrima, Albizzia lucida, Engelhardtia Roxburghii, Millettia atropurpurea, Baccaurea* *sapida, Chrysophyllum Roxburghii, Lagerstroemia tomentosa, Dillenia parviflora*, and similar ones.

Amongst the lower trees may be noted *Grewia microcos, Maesa ramentacea, Crypteronia paniculata, Miliusa tomentosa, Cinnamomum obtusifolium, Castanopsis argentea, Erioglossum edule, Aporosa dioica, Castanospermum, Turpinia pomifera, Phoebe pubescens*, etc.

Of shrubs and climbers, amongst the numerous seedlings and young trees that shoot up here, may be mentioned *Grumilea elongata, Melastoma Malabathricum, Jasminum sp. Connarus, Cnestis, Uraria macrophylla*, a tomentose yellow-flowered *Bauhinia, Combretum decandrum, Ventilago, Toddalia aculeata*, etc. Also *Wallichia oblongifolia, Zalacca sp., Areca*, and *Licuala* are frequent.

Strobilanthes rufescens is a characteristic plant here, accompanied usually by *Molineria capitulata, Clerodendron infortunatum, Dracaena ensifolia ?, Polygonum Chinense ?; Aglaonema oblongifolium, Adenostemma latifolium*, numerous *Scitamineae*, etc.

To these associate themselves numerous annuals and perennials of the leaf-shedding forests, especially of the lower mixed forests, so that the soil-clothing resembles more the last named forest formation.

4.—*Hill-Forests.*

(Not represented in Pegu, but introduced here for completeness sake.)

The evergreen hill-forests are solely the product of the influence of elevation, and hence they are found only on those hill ranges, which attain a height favourable for their growth. Although they descend in Martaban as far down as 3000 feet, they nowhere occur at a similar elevation on the Yomah range from the Kambala toung to Kyouk pyoo toung. The cause of this would appear to be the great dryness of the country all round, and the dry N. W. winds during the hot season. The impermeability of the calcareous sandstone, that composes these ranges, has also, in my opinion, much to do with the the absence of these forests in the Pegu Yomah. The occurrence on these crests of *Vaccinium* and other epiphytical and more temperate plants, although specifically different from those of the Martaban hills, is to my eyes sufficient proof, that the climate alone is not the sole cause of the absence of nearly all temperate terrestrial plants, but that the cause is more particularly due to the substratum.

These hill forests appear on the hills east of Sittang, hardly 30 miles distant from the opposite base of the Yomah, and extend, no doubt, as far to the north as the Himalayas, and still further in a southerly direction. They have, I feel sure, once occupied all the elevated ranges of the country to the east of the Sittang from about 3000 feet and upwards, but they are now greatly reduced by the never-resting axe of the Karens. In fact, they have disappeared altogether along many of the greater valleys, although the character of the vegetation on the deserted toungyas still sugests their former existence.

I divide this class of forests into the following three varieties :—

a. Drier Hill-forests (3 to 7000 feet).

b. Pine-forests (3 to 7000 feet).

c. Damp Hill-forests (3 to 6000 feet).

It is possible, that further and more extended explorations in the Karen hills, will necessitate the introduction of more varieties of hill-forests. I myself have traversed only a very small area during a very hurried tour.

a. Drier hill-forests.—The dry evergreen hill-forests or, as they may be called more briefly, the drier hill-forests, occupy the ridges and summits of the hill ranges, resembling in this respect the upper mixed forests. They range usually from 4 to 7000 feet elevation, but along unfavourable exposures (especially along the S. and S. W. faces of the ridges,) they may be found as low down as 3000 feet. The average height of the trees in them is about 40 to 60 feet, and the growth is often stunted and gnarled, especially at exposed situations. Botanically they might be called the forests of oaks and *Ternstroemiaceae*, but I believe, the name given above to them is the more preferable.

The dryness during the hot season is here, (especially below 4000 feet,) considerable, although naturally it is not so great as in the dry forests of the plains, and jungle-fires are frequent in spite of the laudable precautions of the Karens to prevent them when they burn their toungyas. The formation of humus-soil is therefore only partial. The forests may be distinguished into the upper drier hill-forests, or briefly the stunted hill-forests, and the lower drier hill-forests. Both these varieties of forests have so many forms in common, that it is more their general appearance, than the presence of any peculiar vegetative forms, that marks them.

Stunted hill-forests. These forests are restricted to the highest crests and ridges of the Martaban hills, usually above 6000 feet elevation, and possibly are rarely, if ever, subjected to jungle-fires, owing to their remoteness from human habitations. They gradually pass into the lower drier hill-forests in such a way that it is often quite impossible to say where the one begins and the other ends. But where they are much exposed to the prevailing winds and to the influence of weather, they appear to be more abruptly separated, and the distinguishing line is therefore conspicuous. They consist chiefly of stunted and often pygmean trees, up to 30 (most of them, however, only up to 20) feet in height, with very short stems and compact and usually spherical crowns from a glossy yellowish to a brownish dark green colour, shewing numerous gnarled and crooked branches. They often grow so close together that it is difficult to force one's way through them, and during heavy gales, which often occur at these heights, this dense mass of a glossy varied foliage is curiously moved by the wind resembling from an elevated position the waves of a disturbed sea. Owing to the very limited area in Martaban which rises to such an elevation, these forests are necessarily of very small extent. On the summit of the Nattoung, one of the highest peaks in the Karen hills, they are cut off very abruptly at the unfavourable situations giving place to a scanty shrubby vegetation, which again soon passes into hill pastures, which will be described in the sequel. The whole top of a hill (the name of which I have unfortunately forgotten, but it is I think the same as Segako hill in Dr. Brandis' map of Martaban), situated about 2 or 3 miles from Nattoung, and probably 2 or 300 feet higher than it, is completely covered by them.

The principal trees and shrubs, (for it is not easy to distinguish here between the two) as observed by me are : *Gauttheria punctala ?*, *Vaccinium bracteatum ?* and 2 or 3 other species, *Andromeda ovalifolia*, *Myrsine semiserrata*, *Anneslea monticola*, *Ternstroemia Japonica* (stunted), *Eurya chinensis* and *E. wallichiana*, *Schima Noronhœ ?* (stunted,) *Pyrenaria diospyricarpa*, *Erythroxylon Kunthianum*, *Pirus Karensium*, *Bucklandia populnea* (stunted), *Myrsine semiserrata* and *avenis*, *Cornus oblonga*, *Symplocos lucida* and *S. sulcata*, *Rhododendron formosum*, *Quercus sp. nov. ?* *Castanea*, *Myrica sapida* (stunted), *Turpinia Nepalensis* and a few others.

Climbers and scandent shrubs still occur in these forests, but are stunted like the trees. Those chiefly noted by me, are *Milletlia monticola*, *Brandisia discolor*, *Embelia floribunda*, *Jasminum attenuatum*, *Smilax*, *Rubus rugosus* and *alpestris*. The undergrowth is chiefly composed of a low *Arundinaria*, which grows often so dense as to fill up the whole space between the trees and shrubs. Further, *Ardisia crispa*, *Erodia gracilis*, *Hypericum triflorum*, *Strobilanthes foetidissima*, *Osbeckia crinita* and many others. An erect *Smilax*, *Polystichum aculeatum* and a few other ferns are locally very frequent.

Epiphytic plants are here numerous, besides a great variety of Orchids amongst which a beautiful *Pleione* is most common. *Cyrtandraceae* are also not uncommon, and there are numerous ferns.

The stems and branches are loaded with mosses and scalemosses, amongst which dense patches of *Hymenophyllaceae* (chiefly *H. exsertum* and *Javanicum*) are interwoven. During the hot season however these shrivel up to a certain degree, but recover with the first shower of rain. Here it is that shrubby lichens become more numerous and conspicuous, and a *Peltigera* of a peculiar green colour is seldom missed amongst the patches of moss.

Lower drier hill-forests. The lower drier forests are rather stunted forests of a mean height varying according to exposure and to the degree of resulting dampness from 50 to 80 feet. The trees resemble in habit somewhat those which are seen in the Eng or low forests of the plains. They occuy nearly all the exposed ridges from 4,000, or often from 3,000, feet and upwards. Jungle fires are here frequent, but not regular. While in the stunted forests *Ericineœ* formed the typical constituents, here *Ternstroemiaceœ* and *Cupuliferœ* prevail. The following are the more frequent trees : *Ternstroemia Japonica*, *Eurya Chinensis* and *Japonica*, *Anneslea monticola*, *Sauranja sp.*, *Schima Noronhœ* and *oblata*, *Pyrenaria camelliœflora*, *Echinocarpus sp.*, *Turpinia Nepalensis*, *Bucklandia populnea*, *Nelitris paniculata*, *Symplocos polycarpa*, *lucida* and *sulcata*, *Cornus oblonga*, *Diospyros kaki ?* *Andromeda ovalifolia* *Callicarpa arborea*, *Cinnamomum sp.*, several species of *Tetranthera*, *Daphnidium caudatum ?* *Aperula polyantha ?*, *Litsœa foliosa* and other *Laurineœ*, *Betula acuminata*, *Helicia excelsa* *Quercus leucocarpa*, *brevicuspis*, and others, *Castanopsis inermis* and 1 or 2 other species, *Pinus khasya* passim, *Coffea tetrandra*, *Garcinia anomala*, *Myrica sapida*, *Pithecolobium montanum ?*, *Albizzia stipulata*, *Dillenia aurea*, *Wendlandia ligustrina*, *Engelhardtia serrata*, *Rhus semialata ?*, *Heptapleurum glaucum* and *hypoleucum*, *Macropanax oreophilum ?*, *Olea dentata* *Beilschmiedia sp. ?*, *Alstonia scholaris ?*, *Emblica officinalis*, and others.

Of palms only a stunted *Chamaerhops* (*C. khasyana ?*) occurs here but scantily.

A climbing bamboo, with fruits as large as a woodapple, is frequent here, and another berry-bearing but erect species is locally a prevailing type. In the lower parts bamboos are still more prevalent, and two gigantic species (wabo and kyellowa) are common at elevations below 4,000 feet.

The climbing vegetation here I have explored but little, but those climbers and scandent shrubs which occurred to me most frequently were *Mucuna prurita ?* and *macrocarpa*, the latter with stems nearly as thick as the trees themselves upon which they rest, *Rubus rugosus*, *Millettia ?*, *Embelia ribes* and *floribunda*, *Clematis* sp., a species of *Ampelopsis* (*A. Himalayana ?*), 3 to 4 species of *Vitis*, a fine *Calamus* possibly new, *Smilax lanceaefolia*, *Bauhinia sp.*, *Dalbergia velutina*, *Cnestis ignea* and several others.

Of shrubs and halfshrubs the following are the more conspicuous—*Linostoma pauciflorum* *Melanthesopsis fruticosa*, *Melastoma malabathricum* (the normal form with longer calyx-scales), *Osbeckia crinita* and *pulchella*, *Rottlera sp.*, *Pteroloma triquetrum* with hairy pods, *Evodia gracilis*, *Inula cappa*, *Polygala karensium*, *Polygonum chinense*, *Lespedeza sp.* (near *L. eriocarpa*), with beautifully blue flowers, *Daphne pendula ?* and *involucrata*, *Maoutia Puya*, *Indigofera uncinnata*, *Desmodium concinnum*, *multiflorum ?* and *gyroides*, *Pueraria Wallichii Flemmingia semialata*, *involucrata* and *sericans*, *Artemisia vulgaris* locally, *Senecio densiflorus*, *Vaccinium* 2 to 3 *sp.*, *Brandisia discolor*, *Clerodendron villosum*, *Colquhounia sp.*, *Crotalaria ferruginea ?* and *Chinensis*, *Dalbergia velutina*, *Psychotria capitata*, *Grumilea elongata ? Ixora sp.*, *Mussaenda glabra*, *Phyllodium pulchellum*, *Camellia sp.*, *Tabernaemontana sp.*, *Leea*, and many others.

An arborescent fern with a short black fibrous stem (*Breynia insignis*) is not uncommon, especially in more shady localities. *Pteris aquilina*, *Gleichenia dichotoma* and *longissima* are the more prevailing terrestrial ferns, along with *Onychium auratum*, *Blechnum orientale*, etc.

The ground is covered by grasses and other plants in localities where the forest is more open. The most common grasses are *Arundinella sp.*, *Spodiopogon sp.*, *Heteropogon sp.*, *Androscepia gigantea*, *Panicum montanum*, *plicatum*, *Royleanum*, etc., *Trisetum sp.*, and in lower regions the so-called Teak-grass (*Pollinia tectonum* of Brandis). Besides these *Batratherum sp. ?*, a *Phragmitoid* grass, *Imperata cylindrica*, *Thyssanolæna acarifera*, are locally not uncommon. *Carex baccans*, *condensata* and several other species, as also *Scleriæ* are nowhere to be missed.

Associated with these grasses we find *Hedyotis polycarpa ?* and *ulmifolia ? Polygonum Chinense*, *Plectranthus striatus*, *Smilax sp. erect.*, *Sonerila maculata*, *Anaphalis adnata*, *Ophelia pulchella ?*, *Gentiana pedicellata* and *marginata ?*, *Knoxia lasiocarpa*, *Galium asperifolium*, *Strobilanthes foetidissima*, *Brandisii*, *Karensium*, etc., *Anisomeles ?*, *Prenanthes sp.*, *Geniostoma strobiliferum*, *Acrocephalus capitatus*, *Saussurea deltoidea*, *Alectra Indica*, *Drosera peltata*, *Myriactis Lepidagathis*, *Lobelia Wallichiana*, *Ainsliaea pteropoda*, *Vernonia cinerea*, *Blumea runcinnata* and *alata*, *Conyza viscosula* and *absinthifolia*, *Dumasia sp.* near *D. congesta*, *Shuteria vestita*, *Pogostemon parviflorum* and *strigosum*, *Elsholtzia polystachya*, *Scutellaria discolor*, *Achyrospermum densiflorum*, *Leucas ciliata*, *Smithia conferta*, *Commelyna obliqua*, *Cyanotis fasciculata*, *Gnaphalium ochroleucum*, *Senecio Griffithii ?*, *Exacum pteranthum*, *Ophiorrhizophyllum macrobotryum*, *Didymocarpus mollis*, *Bupleurum tenue*, *Selinum sp.?*, *Viola serpens*, *Alpinia nutans*, *Peliosanthes*, *Eulophia*, *Phayus*, *Smilax sp.* (near *S. rigida*), *Dianella montana*, *Costus speciosus*, *Dichrocephala latifolia*, *Siegesbeckia orientalis*, *Viola serpens* along choungs, etc, etc.

The trees are inhabited by numerous mosses and scalemosses, as also by Lichens, which latter appear here especially developed. A long *Alectoria* depends from nearly all the crooked branches, and shrubby lichens, like *Peltigera*, *Cladonia*, etc., now make their appearance from about 6,000 feet elevation and upwards. Numerous and beautiful orchids, large and small, ornament the stems and branches. It is here, that we first meet with *Cypripedium* (near C. *villosum*). *Oberonia*, *Coelogyne*, *Cryptochilus*, *Eria*, numerous *Dendrobia*, *Pleione*, *Vanda*, *Saccolabium*, etc., etc. represented by numerous species. Amongst other epiphytic plants deserve to be mentioned, a probably new species of *Vaccinium*, and *Vaccinium variegatum*, *auriculatum*, and *loranthifolium*, *Xyris wallichii*, *Centrostemma multiflorum*, *Aeschynanthus sp.*, *Lysionotus ternifolius*, *Hoyae*, etc., and numerous ferns, such as *Vittaria elongata?* and *falcata*, *Hymenophyllum exsertum* and *Javanicum*, *Asplenium ensiforme*, *normale*, *Polypodium lineare*, *normale*, *rhynchophyllum* and *conjugatum*, *Lycopodium aloefolium* and others.

The granitic and schistose rocks are covered by lichens, mosses and *Selaginellae*, accompanied by little annual phanerogams, such as *Sonerila*, *Xyris wallichii* and *Didymocarpus mollis*, along with several grasses, and *Asplenium heterocarpum*, *planiculme*, and *australe*, etc.

Parasites are also numerous and plentiful, amongst which *Loranthus hypoleucus* with its burning red flowers and *Henslowia heterandra* with dark green foliage quickly attract attention. A species of *Viscum*, very near to the European mistletoe, is often seen here. On the roots of trees the curious *Balanophora globosa* is conspicuous.

As in European forests so also here the ground, where exposed, affords shelter to a number of acrocarpous mosses, like *Campylopus*, *Pogonatum*, etc. *Funaria hygrometrica (var. Nepalensis)*, true to its habits everywhere in the world, selects recently burnt up localities, and as jungle-fires are extensive, so is its distribution. Terrestrial lichens also appear here, such as *Baeomyces*, *Cladonia*, etc., but not so frequent as in the pine forests.

b. Pine forests—The Pine forests, called from a pine (*Pinus Khasya*), that forms the greatest portion of it are rather local, and restricted to the unfavourable situations, viz. to the S. W. and S. slopes. They are much subjected to jungle-fires, which are here destructive in the extreme, often burning down the finest trees. Many a burnt down trunk of a pine may be met with in the midst of the forests looking from a distance like a black pillar.

The average height of these forests is 70 to 80 feet, sometimes more; but along much exposed slopes, very much less. These forests are very open and almost without climber-vegetation. It is seldom that we find really pure pine forests; they are more frequently mixed up with trees from the drier hill forests. As a rule the upper part of spurs and ridges is covered by these, pine forests, but the ravines and deep narrow valleys between them are occupied by drier hill forests. It is almost unnecessary to sum up the leafy trees which associate with the pines, as they are the same which I have summed up under the head of drier hill forests, but I shall note here a few of those which I met more frequently: *Daphnidium, Aperula, Helicia, Albizzia stipulata, Pithecolobium montanum? Wendlandia ligustrina*, an arboreous *Vaccinium, Andromeda ovalifolia, Myrsine, Dillenia aurea, Anneslea, Eurya, Myrica, Tristania Burmanica, Engelhardtia, Ternstroemia Japonica, Turpinia Nepalensis*, etc. *Chamaerops Khasyana* is here still to be met and presents a curious sight along with pine trees.

Of shrubs *Linostoma pauciflorum, Melastoma malabathricum, Maoutia Puya, Lespedeza, Desmodium*, etc. occur sparingly.

A scandent or semiscandent bamboo with berry-like fruits is here not uncommon.

The ground is usually densely covered by the fallen needles of the pines, so much so, that no vegetation can spring up except scantily. Burmans, who do not wear shoes, have the greatest difficulty in getting over such localities, and even to a European it is very tiresome to climb up such ridges, in consequence of the ground being rendered slippery by those needles. The plants, which I met growing amongst the needles, were *Senecio, Inula cappa, Dianella, Lespedeza, Panicum montanum, Imperata, Scleria, Androscepia*, etc. Of ferns *Gleichenia dichotoma* and *longissima*, and *Pteris aquilina* were nearly the only ones I saw.

Those pine forests, which are mixed up with leafy trees, have the ground usually—although not to the same extent—covered by similar grasses and shrubs, as in the dry hill-forests.

In spite of the greater dryness that prevails in these forests, such epiphytical plants as orchids, asclepiads, etc. are still frequent, and some of them characteristic. Cryptogams are also numerous, especially the lichens, which become here quite conspicuous. *Baeomyces roseus* forms often large rounded patches on ground destitute of vegetation.

C.—*The damp hill-forests.*

The damp hill-forests, ranging from about 3,000 to 6,000 feet elevation, so much resemble in external aspect the true tropical forests of the plains, that they can be distinguished from them only by the occurrence of botanically different trees, and chiefly by the total, or nearly total, absence of certain plant-families, such as *Dipterocarpeae, Meliaceae, Sapindaceae, Dilleniaceae, Sterculiaceae, Anacardiaceae, Lythrarieae*, and *Sapotaceae*. The average height of these forests stands little below that of the tropical forests, and jungle fires cannot possibly enter them, so dense, and moist are they. The formation of humus is therefore undisturbed. These forests occur only along favourable situations and in sheltered valleys, especially along choungs.

The great height of the lofty trees composing the damp hill forests, and also the very short time I spent in them when passing by, renders it perfectly impossible for me to give a correct idea of the nature of the trees that grow in these forests. I therefore can note only a very few of them. *Quercus* (several species) and *Cupuliferous* trees generally seemed frequent, *Ilex daphnephylloides, Ternstroemia Japonica, Bucklandia populnea*, several fig-trees *Eugenia, Laurineae, Ostodes paniculata, Podocarpus, Gynocardia odorata, Diospyrus sp.* and numerous others.

Of smaller trees *Turpinia nepalensis, Cinnamomum, Litsaea, Eriobotrya notoniana, Calophyllum polyanthum, Aceri solobum, Mæsa Indica, Rhododendron Veitchianum* and sometimes *Rh. arboreum, Spathodea ignea, Garcinia anomala*, etc.

A semiscandent bamboo, not unlike in foliage to *Melocanna baccifera*, is often met with along choungs; also an elegant fern-tree (*Alsophila comosa*) of 20 to 25 feet height, and *Pandanus furcatus*. Except a fine *Calamus* or two, I missed (strange to say) palms, and only at lower elevations met such trees as *Areca, Wallichia, Arenga saccharifera, Caryota urens* and *Licuala peltata*.

Of shrubs, climbers, etc. I observed during my run through these forests: *Rubus alpestris* and *Moluccanus, Jasminum attenuatum, Adenosacme* several species of *Smilax* as *S. lanceæfolia* and *elegans, Microtropis gracinifolia, Hoya* fusca, a *Vernonia, Ardisia crispa* and *elliptica*, large climbing *Fici, Clematis acuminata, Solanum membranaceum, Strobilanthes lamioides*, and many others.

The ground is usually destitute of grass-clothing, but occasionally small patches of *Carex, Scleria elata?* and others species occur. The grass is locally replaced by *Ophiopogon, Peliosanthes macrophylla* and *Molineria capitulata*, all of which are plants which form a prevailing type of the low vegetation in these forests.

Of herbs and perennials, which are often very numerous and luxuriant, especially along choungs, the following may be mentioned: *Polygonum sp., Ainsliaea Brandisii* with white flowers, *Polygonatum punctatum*, (often epiphytic), *Elatostemma ficoides, umbrosum* and another small-leaved species in great profusion, two species of *Sonerila*, an *Arisaema*, and many other *Aroideae, Strobilanthes penstemonoides, Begonia barbata* and *laciniata, Ophiorrhiza eru-*

bescens, *Hypoxis minor*, *Disporum sp.*, *Sarcopyramis nepalensis*, *Justicia caloneura*, *Brandisii* and sometimes *quadrifaria*, and others.

Of terrestrial ferns occur *Polystichum aculeatum*, *Davallia immersa* and *nodosa*, *Pteris bi-and quadriaurita*, *Asplenium ensifolium*, *Gymnogramme ellipticum*, *Diacalpe aspidioides*, two species of *Selaginella*, etc.

The plants creeping or trailing round the stems of trees are chiefly *Piperaceae*, *Aroideæ*, (especially *Scindapsus* and *Pothos*), *Lygodium pinnatifidum* and *polystachyum*, *Acrostichum scandens* etc.

Orchids are seldom seen here, for they have retreated to some extent to the upper parts of trees. Mosses and scalemosses cover most of the stems in dense patches, along with *Hymenophylla*, *Vittaria* and *Polypodium*, *Antrophium*, etc. as also *Cyrtandraceæ*, etc. On account of the darkness, lichens are again rare, but epiphyllous lichens along with epiphyllous scalemosses overgrow the leaves of shrubs, etc., that often show the same bluish metallic lustre, which is seen in the tropical forests.

The above sketch of these damp hill-forests does not give a correct description of them, but comprises only the results of observations made during a short run through them. A proper exploration of these forests would take as many months as I have spent hours in them.

BB. Leafshedding Forests.

The leafshedding or deciduous forests are the most important to a forester in Burma, for they yield the most valuable timber trees of the country. They are quite or nearly quite leafless during the dry seasons, but many of the trees put out their young leaves long before the rains set in. The shedding of leaves of the various trees is also not simultaneous, nor does this phenomenon take place at precisely the same period in each of the four zones, but sets in later in damper climates. Junglefires are in all these forests more or less regular and re-occur often in the same year.—The varieties of these forests is great, and the demarcation between those varieties often very obsolete. However the three chief varieties, where they present themselves in a pure character, are well marked, and the impression which an " Eng-dein" (Eng forest) produces is not easily to be forgotten.

These three chief classes of leaf-shedding forests are the *open forests*, the *mixed forests* and the *dry-forests*.

5. *Open Forests.*

The open or diluvial forests comprise nearly all those forests, which grow chiefly on diluvial formations, such as laterite, gravelly soil, rocky debris and even stiff clay or loam, especially when resting on impermeable substrata. These forests are to a botanist the most interesting amongst the leaf-shedding forests, as they abound in novelties and in plants peculiar to them alone. Practically they appear as dry and more or less stunted and crooked forests, at present of little value to a forester, except the Eng tree which gives a valuable wood. The soil is usually unsuitable or nearly so for rice cultivation, but wherever but a comparatively thin layer of clay or loam overlies the laterite, rice, I am informed, does grow beautifully and gives a 60 to 70-fold harvest.

As the trees which grow here stand far from each other, these forests are very open and sunny and the vision is not hindered by large undergrowth or climbers, for the latter are reduced to a few species, which often lose their climbing habits to a great extent, owing to dryness and quantity of light.

I have distinguished them into the three following kinds, *viz.*

A. Hill Eng forests, which are not represented in Pegu, but are frequent in the east of Sittang, on rocky debris and laterite, that cover the lower ridges there.

B. Eng or Laterite forests, so called from a species of woodoil tree (Eng), that is peculiar to them.

C. Low forests, which much resemble the former but are usually destitute of Eng trees, and offer other peculiarities.

A. *Hill Eng forests.*—These forests stand in a certain relation to the drier hill-forests, and transition from the one to the other occurs sometimes. They grow chiefly amongst debris of metamorphic and schistose rocks, but also on hill-laterite, on all the lower outspurs of the Martaban hills towards and along the Sittang river up to 2,000 feet elevation. They resemble the Eng Forests lower down, so much, that in external appearance, they are identical with them. A number of trees and other plants, are, however, found in them, which though they make a distinction will I fear after a longer exploration of transitional forests finally reduce this variety of forests to a simple modification of Eng forests. There are many difficulties with which one has to struggle in classifying forests, and it is only after long experience that the true characteristic features of a variety of forest can be fixed. I cannot but quote here Dr. Brandis' own words *(Selections of Government of India, No. XXXII. Report on Attaran forests for* 1860, *p.* 37*)* relative to these difficulties : " Hesitation therefore in submitting reports on a subject (character of forests) the very principles of which have yet to be developed may appear excusable. Their investigation unavoidably involves many questions of a purely scientific nature, and it is not always possible to determine beforehand the extent of time required for a satisfactory completion of researches of that nature."—These are words which ought to be carefully weighed by those who believe, that one has simply to take out his notebook and to write down the names of trees, etc. that surround him. A correct understanding of forests implies discrimination between characteristic and accidental constituents.

The average height of the trees here is variable, ranging between 30 to 60 feet. Most of the trees that will be enumerated hereafter under the head of Eng forests are also found here, but those which occur more frequently are the following: *Tristania Burmanica*, *Anneslea fragrans*, *Engelhardtia serrata*, *Dipterocarpus gonopterus*, and *obtusifolius* (also *D. tuberculatus* is not missed), *Quercus semiserrata Brandisiana*, *Buncana* and *annulata*, *Lantana arborea*, *Dillenia augusta*, *Melanorrhœa glabra*, *Castanea*, *Dalbergia cultrata*, *Vitex sp.*, *Pentacme Siamensis*, *Kydia calycina*, *Wendlandia sp.*, *Rhus sp.*, *Randia erythroclada*, *Schima*, *Xylia dolabriformis*, *Olea dentata*, *Vernonia volkameriæfolia*, etc.

The shrubby and perennial vegetation is almost the same as in the Eng forests, and so are the few climbers.

Of herbs, etc., we meet frequently with *Urena lobata*, *Lepidagathis hyalina*, *Blumea flava* etc., *Lygodium*, *Knoxia lasiocarpa*, *Acrocephalus capitatus*, *Scleria lithosperma*, *Ophiurus corymbosus ?* *Arundinelia sp.*, *Inula cappa*, *Eugenia sp.*, (thabyay pyoo) *Vernonia rigiophylla*, *Desmodium gyroides*, *Exacum pteranthum*, *Mitreola*, *Crotalaria neriifolia* and *albida*, *Flemmingia latifolia ?* and *involucrata*, *Hedyotis galioides*, *Tropidia curculigoides*, etc.

Orchids, epiphytical on trees, along with ferns are almost the same as in the Eng forests. Mosses, etc., are scarce, but lichens abound, especially the cortical ones; there are however but few stone-lichens.

B. *Eng or Laterite Forests.*—These forests grow, as the name already indicates, chiefly on laterite, but occur also on other diluvial formations in a less developed form. These diluvial formations are composed chiefly:

(1.) Of a yellowish loose clayey sand soil.

(2.) Of a reddish or rather rusty coloured sand soil, mixed with ferruginous clay.

(3.) Of a yellowish heavy stiff clay.

(4.) Of gravelly laterite with silica pebbles and debris.

(5.) Of a pinkish coloured silicious gravel (especially in Prome).

(6.) Of laterite rock, covered by flying fine sand.

(7.) Of vesicular or cavernous ferruginous heavy laterite-rock, enclosing pebbles of silica or other rocks (in the latter case similar to almond-stones and more or less disintegrated.

(8.) Of a fine-grained angular ferruginous sand-stone ? or shales ? (especially in some localities of the Rangoon district).

The depressions in these lands are usually filled up with fine loose sand, clay or loam, and are probably inundated during the rains. Such places are then overgrown chiefly by grasses and sedges of a character which I denominate jungle-pastures (cf. 10, a). The average height of these forests is variable, depending chiefly upon the depth of the substratum. In pure laterite it is depressed to 30 to 40 feet while an admixture of a clayey or loamy soil causes the Eng trees to grow up to a height of 70 to 80 feet. Most of the trees show dark-ashgrey or blackish stems, usually covered by a very brittle cracked and tabulated thick bark. With the exception of Eng and a few others, the trees are usually more or less crooked, and many have the branching of their crowns gnarled and crooked, and, I might say, unproportionately thick and ungraceful. All these give to these forests a peculiar aspect, and, when growing on pure laterite, they possess to a great extent the habit of those alpine stunted forests, which are exposed to prevailing storms. The principal tree is here, as already mentioned, the Eng or Ein tree (*Dipterocarpus tuberculatus*), but this tree is not necessarily present in all localities, for there are many so called Eng-forests without a single Eng tree in them. Where however laterite is exposed and forms a cavernous glazy rock, Eng is the prevailing tree. Of the other trees, which occur in larger numbers, the following are the more important: *Dillenia pulcherrima*, *Shorea leucobotrya*, *Pentacme Siamensis*, *Walsura villosa*, *Lophopetalum wallichii*, *Zizyphus rugosa*, *Buchanania latifolia*, *Melanorrhœa usitata*, *Symplocos racemosa*, *Diospyros Birmanicus*, *Myrsine-lucida* *Phyllanthus* (*Emblica*) *macrocarpa*, *Aporosa macrophylla*, *and villosa*, *Dalbergia cultrata*, *Xylia dolabriformis*, *Wendlandia tinctoria*, *Nauclea cordifolia*, *Terminalia tomentella* (*pangah*), *Careya arborea*, *Lagerstrœmia macrocarpa*, *Strychnos nux vomica*, *Heteropanax fragrans*, *Odina wodier*, *Pterocarpus Indicus* rare, *Terminalia alata* (tomentose toukkyan), several *Randiæ*, *Gardeniæ*, such as *G. pomifera*, *suaris* etc., a *Sterculia*, *Eugenia Jambolana ?*, *Schleichera trijuga*, etc., etc.

Also one or two stray trees, characterestic of lower mixed forests, are found here, and the teak tree forms on a pure laterite spur near Karway on the Sittang an almost pure but small forest, partaking quite the habits of other trees growing on laterite.

On gravelly soil we find in the Prome district many other peculiar trees along with the above, such as a new species of *Leucomeris*, a *Tetranthera*, *Dipterocarpus obtusifolius*, a stemless *Cycas* (*C. Siamensis*), *Hiptage arborea*, *Rhus paniculata*, *Gardenia turgida* and *dasycarpa, Flacourtia sapida,* and many others. These may probably be immigrants from the Ava Flora, with which I am unfortunately only imperfectly acquainted.

Besides these prevailing trees we meet locally with other trees which are peculiar, because they are restricted to these or similar diluvial forests, and occur nowhere in conspicuous quantities: they are sporadic and endemic at the same time. Such are for instance *Anneslea fragrans, Tridesmis pruniflora, Ochrocarpus Siamensis, Tristania Birmanica,* and such like.

Most of the trees in these forests flower during the hottest time of the year, when destitute of leaves, and a lovely sight it is to see the crowns of many trees at the same time enveloped in red, white, and yellow blossoms, while all around is barren, and hardly a green leaf is visible for miles. Of bamboos there are only teiwa (*Bambusa tulda*) and, chiefly in the Prome district, myinwa (*Bamb. stricta*), but these are very common, especially along the outskirts of these forests. Of palms the only one I met with was a stemless date palm *(Phœnix, acaulis)*, but this is frequent enough. The heart of it is a vegetable much sought after by Burmans. The shrubbery is meagre and often low, consisting chiefly of *Uraria ferruginea, Thespesia Lampas, Micromelum hirsutum, Ochna fruticulosa, Leea pumila, Strobilanthes phyllostachya, glaucescens* and *auriculatus, Barleria cristata, Neuracanthus tetragonostachyus, Premna hirta, Indigofera atropurpurea,* and *Brunonis, Desmodium polycarpum, Flemmingia semialata* and *cordifolia, Bauhinia acuminata, Ixora subsessilis, Phyllodium pulchellum, Sauropus sp., Desmodium triquetrum, Vernonia rigiophylla, Inula polygonata* and *cappa, etc.* Most of these are, however, no true shrubs, but rather large perennials and sometimes annuals.

Climbers are, as above alluded to, scanty and often resemble erect shrubs with a tendency to climb. They are nearly all of such kinds as grow in the drier mixed forests from whence they have probably intruded, without finding here a congenial substratum. Such are *Otosemma extensa, Zizyphus oenoplia, Colubrina asiatica, Breweria elegans? Cocculus villosus, Zehneria umbellata, Butea superba, Embelia villosa,* some *Ipomoeae* and *Argyraia,* etc.

The herbage of the ground is either scanty in the extreme, the reddish, yellowish, or white soil being exposed in all directions, or more usually numerous herbs and perennials in company with andropogonous grasses and sedges loosely cover the surface, without being crowded, except in clayey or loamy moulds and depressions. The chief plants which are nearly equally distributed all over the diluvial forests are: *Sida carpinifolia* and *rhombifolia,* and *Mysurensis?, Urena lobata* and *speciosa, Triumfetta angulata, Nelsonia origanoides* along with a very large-leaved variety, *Ebermeyera Maclellandii,* and *diffusa, Hygrophila salicifolia, Barleria polytricha, Lepidagathis incurva* and *mucronata, Justicia decussata, Borreria lasiocarpa, Spermacoce, Aneilema scapiflorum, Gynura sinuata?*, several terrestrial orchids, as *Peristylus, Microstylis,* etc. *Microrhynchus glaber, Cephalostignia paniculatum, Exacum stylosum, Canscora Schultesii, Pterostigma capitatum, Limnophila conferta, Vandellia mollugino ides, Buchnera tetrasticha* and *cruciata, Sopubia stricta, Anisomeles ovata, Leucas mollissima, Globba expansa?, Crotalaria alata, acicularis, calycina* and *linifolia?, Uraria crinita* and *hamosa, Alysicarpus bupleurifolius?, Dunbaria mollis, Eriosema Chinense, Cassia mimusoides, Blumea flava, racemosa,* etc. *Rungia pectinata, Costus speciosus, Osbeckia Chinensis,* several species of *Eriocaulon* and *Xyris, Mitrasacme Indica, Hitchenia sp., Ammannia multiflora* etc. etc. The grasses are chiefly *Scleriae, Rhynchospora Wallichiana* and *Prescottiana Lipocarpha sphacelata, Cyperus niveus, Eragrostis plumosa, Brownei, Zeylanica,* etc., *Haemarthria, Ophiurus, Muehlenbeckia?, Dimeria, Antisthyria, Cymbopogon, Schizachyrium brevifolium,* several species of *Andropogon* and *Ischaemum, Pollinia, Setaria glauca, Chrysopogon Gryllus, Rottboellia, Hymenachne Indica, Panicum angustatum,* etc.

Of ferns may be seen *Adiantum lunulatum, Cheilanthes varians, farinosa* and *tenuifolia, Nephrodium filix mas var. cochleata.*

As we travel through these forests, we alight often upon patches of solitary plants, which turn up from time to time, of such beauty or rarity,* that they richly compensate a botanist for the long and hot walk he has to undertake to get at them. Here are *Solomonia longiciliata, Chloranthus insignis, Neuracanthus grandiflorus* and *subuninervius Polygala leptalea, Eulophia, Aneilema spectabile,* etc.; there we see a few plants of *Oleandra Cummingii,* a probably new and almost erect *Lygodium,* a hairy dull yellow *Gynura, Drosera peltata* and *Burmanni, Sonerila tenera, Blinkworthia lycioides,* and others, again we come through a profusion of a large new species of *Knoxia, Smithia grandis,* a hairy new species of *Cassyta,* a probably new sp. of *Clausena, Linostoma Siamense, Artabotrys Kurzii* or we find in the vesicular holes of laterite rocks in sheltered places a curious new genus of *Aroideae* with snow-white spathes, (*Hapaline Benthamiana*) or the little plants of an *Ariopsis.*

During the hot season a number of gaudy coloured flowers spring up, making truly a flower garden of the blackened burnt ground. Such are especially *Scitamineae* and *Amaryl-*

* Similar to what we experience in wandering, for example, over the sterile and monotonous heath-lands of Southern Bavaria, etc., where we meet at great distances here a patch of *Adonis vernalis,* there one of *Pulsatilla,* etc., etc.

ideae, as *Kaempferia candida*, and *Parishii*, *Curcuma rubescens ?* , *Crinum sp.*, *Gastrochilus Hemiorchis Birmanica*, *Gynura*, etc., besides *Ochna suffruticosa* and such like stemless dicotylids.

The trees, owing to their coarse fissured bark, are especially fitted for the support to epiphytical plants, and these are, therefore, developed here to a degree, which would appear quite extraordinary, were it not, that they comprise mostly such plants as need light rather than dampness for their development. A host of orchids make their appearance, flowering at the height of the hot season ; when they exhibit the splendour of their blossoms in a most wonderful manner almost unknown in evergreen forests. *Dendrobium anceps*, *Dalhousieanum*, *aggregatum*, *hedyosmum*, *barbatulum*, *cretaceum*, *chrysotoxum*, *formosum*, *moschatum*, *nodatum*, etc., *Eriae*, *Aerides odoratum*, *Bolbophyllum*, *Saccolabia*, *Vanda teres*, *Bensoni*, *coerulescens*, *Cymbidium*, etc. etc. are frequent every where. In fact the most peculiar orchids are restricted to these and other drier forests exposed to the sun, while such as are identical or nearly allied with Malayan forms occur only in the evergreen forests, and more especially in the hill forests.

Dischidia mummularia and several *Hoyae*, along with *Drymoglossum*, *Niphoboli* and *Platycerium* are the chief plants on the trees. Mosses are scarce, a *Macromitrium* and a *Leucoblepharum* being the chief ones on the trees, while *Garckea phascoides* is the most common on the ground. Lichens are here plentiful and many of them are very remarkable species.

C. Low forests.—These resemble in every respect the former, but differ from them essentially in the following points: They are greatly mixed up with trees of the lower mixed forests and grow like these, not on a rocky or stony ground, but on clay or loam, resting most probably on impermeable strata of diluvium. The ground is rather densely covered by long and stiff grasses and the Eng tree is seldom found here. The soil is either a very heavy stiff and usually yellowish clay or loam, on which Andropogonous grasses chiefly spring up, or a grey alluvial clay, on which *Imperata cylindrica* is often the chief grass which grows. They might therefore be distinguished into two groups, the former occurring chiefly along the western slopes of the Yomah from Thonsay southwards, while the other is peculiar to the lands adjoining the eastern slopes of the Yomah from the Koon Choung to near Pegu. But as they contain almost the same trees and herbage, I treat them under one and the same head.

The height and growth of the trees is the same as in the Eng forests, and when I say that they are a combination of the lower mixed forests and the Eng forests, I give them their true character. Here are to be found nearly all the trees of both these varieties of forests, and not rarely teak, Eng and myaya (*Grewia microcos*) are seen growing side by side. Even *Homalium tomentosum* which so pertinaciously avoids diluvial formations, is found here occasionally.

The following kinds of trees are also to be found associated with the above : *Miliusa velutina*, *Walsura villosa*, *Daphnidium, argenteum*, *Albizzia lucida*, *Anogeissus acuminatus*, *Aporosa macrophylla*, *Symplocos racemosa*, several species of *Randia* and *Gardenia*, *Aporosa villosa Zizyphus rugosa*, *Nauclea Brunonis*, *Dillenia pentagyna* and *pulcherrima*, *Strychnos nuxvomica*, *Xylia dolabriformis*, *Holarrhena pubescens*, *Dalbergia cultrata*, and *D. purpurea* (thitpoh) ; *Terminalia tomentella* (pangah), *Odina wodier*, *Pterospermum semisagittatum*, *Terminalia Belerica Lagerstroemia macrocarpa* and *L. flos reginae*, *Cinnamamum obtusifolium ?* , *Antidesma diandrum*, *Emblica officinalis*, *Careya arborea*, *Grewia microcos*, *Terminalia alata* and *crenulata*, *Lophopetalum*, etc.

As in Savannah mixed forests, so also here in these low forests, certain trees become prevalent to the exclusion of the greater part of their usual companions, and we meet with *Dalbergia cultrata* (Yind-yke) *Terminalia alata* (toukkyan), *Strychnos nux-vomica* (Khaboung) forests, etc.

Bamboo is very subordinate here, but groups of wapyoogeley, teiwa, tinwa and myinwa are met with.

Climbers are here more numerous, without however impairing the openness of the forest. They are all such as grow in the Eng or lower mixed forests, as for example *Butea superba*, *Sphenodesma*, *Otosemma macrophylla*, *Calycopteris Roxburghii*, etc.

The undergrowth is composed of rather high but meagre grasses, amongst which the following prevail : *Ischaemum bijugum* and *obliquivalvis ?* , *Andropgon pertusum ?* , *Gryllus*, and many other species, *Leptochloa ?* , *Eragrostis Brownei*, *rubens* and 2 or 3 other species, *Coix heteroclita*, *Pollinia*, *Androscepia gigantea*, *Hymenachme Indica*, *Panicum angustatum*, *Chloris digitata*, *Ophiurus perforatus*, *polystachyus ?* , etc., *Scleria lithosperma*, *Haemarthria ?* , *Dimeria*, *Aristida setacea*, *Anthistyria*, *Cymbopogon*, *Schizachyrium brevifolium*, *Cyperus Silhetensis*, *niveus*, etc. *Panicum brizoides*, and others. When *Imperata cylindrica* is the principal grass, few others spring up with it.

Amongst the grasses grow numerous perennials and half shrubby plants, such as, *Flemmingia involucrata*, *strobilifera* and 1 or 2 other species, *Crotalaria alata*, *acicularis*, *sessiliflora calycina*, *linifolia*, and *albida*, *Teramnus mollis*, *Dunbaria mollis*, *Cassia mimusoides*, a *Habenaria* with yellow flowers, *Gloriosa superba*, *Ophiopogon Wallichii*, *Pterostigma capitatum ?* , *Sida rhombifolia* and *carpinifolia*, *Urena rigida* and *speciosa*, *Micromelum hirsutum*, *Osbeckia*

Chinensis, Nelsonia origanoides, Ebermeyera Maclellandii and *diffusa, Strobilauthes glaucescens* and *phyllostachya, Neuracanthus tetragonostachyus, Uraria hamosa, Sopubia stricta, Flemmingia lineata, Desmodium polycarpum, triquetrum, pulchellum, trichocaulon ?*, and *triflorum, Justicia decussata, Tephrosia purpurea, Urena lobata, Ageratum conyzoides, Vernonia cinerea, Lepidagathis recurva, Phaylopsis, Lygodium pinnatum, Knoxia lasiocarpa, Acrocephalus capitatus, Triumfetta angulata, Costus speciosus, Xyris, Eriocaulon, Impatiens Chinensis, Ardisia Wallichii, Lepidagathis mucronata, Phrynium parviflorum ?*, *Asparagus acerosus, Leea* 2 or 3 species, *Blumea flava* and several other species, *Musa rubra, Alpinia Allughas*, etc. etc.

The epiphytical vegetation is here much the same as in the Eng forests.

These low forests shew many transitions into lower mixed forests along their lines of contact, and it is often very difficult to distinguish between the two.

6.—*Mixed forests.*

Under this heading I comprise a variety of forests, which grow chiefly on permeable substrata, such as alluvial and sandstone formations. These differ from the open forests amongst other things in their general aspect and in the height and growth of the trees, as also in the prevalence of climbers. They comprise more than half of the area, which I comprise under the denomination of Pegu. They are at the present time most important to a forester, but at the same time are most difficult to subdivide into marked varieties. I shall however try to overcome some of the difficulties by taking these varieties of mixed forests in as extended a sense as possible. I divide them, therefore, into the two following divisions, each of which will be subdivided again under its respective headings :—

a. Alluvial mixed forests.
b. Upper mixed forests.

A.—Alluvial mixed forests. These forests occupy chiefly the alluvial plains from the base of the hills to the banks of the larger rivers. Towards the Irrawaddi, Sittang and other large rivers they assume the character of savannahs while towards the hills they gradually pass into the upper mixed forests, especially when growing in shallow alluvium resting on sandstone. They are of a moister character than the upper mixed forests, and therefore are richer in trees and climbers, but lower in growth and much poorer in bamboo-growth. Kyattounwa and wayah are rarely if ever seen in true lower mixed forests, and a number of small herbs, indicative of a greater dryness and more light, are here wanting or at least are very rare. I shall consider these forests under the following headings :—

aa. Lower mixed forests.
bb. Savannah forests.
cc. Beach jungles.

aa. Lower mixed forests. These forests are distinguished from the low forests with which they often alternate, or grow side by side, chiefly by the absence of trees characteristic of laterite forests, and by the absence or scarcity of any dense grass-clothing of the ground. Their general aspect is also greatly different, being more closed by numerous climbers and creepers. The average height of these forests rises to about 70 to 80, and sometimes up to 100 feet, in fact they bear a great resemblance to the upper mixed forests, especially when in these latter the bamboo have died off and burnt down. The principal trees here are *Dillenia pentagyna, Cratoxylon neriifolium, Kydia calycina, Bombax malabaricum, Sterculia colorata, Pterospermum semisagittatum, Garuga pinnata, Schleichera trijuga, Mangifera sp., Odina wodier, Spondias pinnata, Carallia integerrima, Terminalia tomentella, Belerica, pyrifolia* and *crenulata, Anogeissus acuminatus, Lagerstroemia flos reginae, tomentosa* (*laizah*), and *villosa* (tsoumbelay), *Homalium tomentosum, Diospyros ehretioides* and *cordifolia, Spathodea stipulata,* and *Rheedei, Heterophragma adenophylla, Stereospermum suaveolens, Calosanthes Indica, Antidesma diandrum, Emblica officinalis, Albizzia odoratissima* and *procera, Nauclea Brunonis, diversifolia* and *cordifolia, Ficus cuneifolia* and *hispida*, as also some species of the *Urostigma* section, *Vitex Leucoxylon ? Cassia Fistula, Strychnos nux vomica, Careya arborea, Barringtonia acutangula, Randia* and *Gardenia sessiliflora, erythroclada*, etc.

Locally more or less common are : *Miliusa velutina, Garcinia cowa, Eriolaena Candollii, Berrya mollis, Grewia laevigata* and *microcos, Hiptage Bengalensis, Bursera serrata, Casearia canziala, Heptapleurum venulosum, Heteropanax fragrans, Schrebera swietenioides, Hollarrhena pubescens, Vitex pubescens, Phyllanthus coccineus, Cinnamomum obtusifolium, Briedelia retusa,* and *B. tomentosa, Dalbergia cultrata,* and *purpurea* (thitpoh), *Bauhinia Malabarica ?*, *Xylia, dolabriformis, Nauclea wallichiana* and *sericea, Randia uliginosa* and 1 or 2 other species, *Glochidion sp., Ficus cordifolia, Croton oblongifolium, Acacia catechu* towards Prome. district, *Crypteronia paniculata, Eugenia Jambolana, Albizzia lucida, Dalbergia ovalifolia* (madama), *Gmelina arborea, Hymenodictyon thyrsiflorum ?*, *Dillenia parviflora, Kydia calycina, Baccaurea sapida, Derris robusta*, etc.

Of bamboo are chiefly to be found tinwa, wapyoogelay and teiwa, and towards the Prome district myinwa. The shrubbery is formed of *Thespesia Lampas, Grewia hirsuta, Premna macrophylla* and *amplectens, Clerodendron serratum ?* , *Sauropus albicans*, and *Ceratogynum, Phyllanthus simplex ?* , *Baliospermum montanum*, 2 species of *Calami* (kane nee and kane ga), *Desmodium cephalotes, triquetrum, polycarpum* and *pulchellum, Flemmingia congesta, strobilifera*, etc., *Grumilea elongata* in moister localities, *Helicteres plebeja, Ardisia wallichii*, etc., etc.

Amongst climbers the most conspicuous are *Butea superba, Spatholobus Roxburghii, Gnetum scandens, Entada purshaeta, Naravelia Zeylanica, Uvaria macrophylla, Stephania hernandifolia, Buettneria pilosa, Cardiopteris lobata, Celastrus paniculatus, Zizyphus oenoplia, Colubrina Asiatica, Gouania leptostachya, Vitis Linnaei, adnata* and other species, *Otosemma macrophylla, Paederia tomentosa, Smilax prolifera, Caesalpinia Bonducella, sappan* and *mimusoides, Mezoneuron enneaphyllum, Acacia pinnata, Dalbergia stipulacea, Pueraria tuberosa, Phaseolus grandis, Mucuna prurita* and another species, *Dolichos, Scindapsus officinalis, Abrus precatorius, Briedelia stipularis, Pottlera repanda, Congea tomentosa, Aristolochia Indica, Symphorema involucrata, Sphenodema unguiculata, Combretum ovate,, squamosum* and *extensum, Calycopteris Ronburghii, Luffa cylindrica, Zehneria umbellata*, a climbing species of *Heptapleurum, Thunbergia laurifolia, Streptocaulon extensum* and *tomentosum, Fagraea crassifolia, Argyreia capitata, barbigera* and *populifolia, Ipomoea vitifolia, Lygodium, scandens* and similar ones.

The herbs and perennial plants that grow here, are not usually very crowded, but grow at some distance from each other, so that the grey or yellowish soil is exposed everywhere. These are chiefly *Scitamineae*, such as *Costus speciosus*, 1 or 2 species of *Amomum, Zingiber squarrosum*, etc., *Hitchenia molliuscula, Curcuma leucorrhiza ?* , *Phrynium* 2 or 3 species *Kaempferia, Hemiorchis Birmanica*, etc., as also *Musa rubra*, which latter is especially frequent. Then come to front : *Sida carpinifolia* and *rhombifolia, Urena lobata, Triumfetta angulata, Corchorus angulatus, Leea latifolia, Staphylea, hirta* etc. *Nelsonia origanoides, Phaylopsis parviflora, Strobilanthes glaucescens, Lepidagathis incurva, Iusticia procumbens* and *decussata, Peristrophe, Anisomeles ovata, Achyrospermum densiflorum, Gomphostemma strobilinum* and *parviflorum, Psilotrichum trichotomum, Cyathula prostrata, Amorphophallus chlorospathus*, and *bulbifer, Crotalaria sp.* (near *C. Assamica*), *Uraria crinita* and *hamosa, Geodorum sp., Hypoxis orchioides, Asparagus racemosus, Commelyna obliqua, Aneilema scapiflorum* and *herbaceum, Scleria lithosperma, Cyperus moestus, Panicum plicatum, Dimeria, Pollinia, Ischaemum rugosum, Centotheca lappacea, Leersia sp., Elephantopus scaber, Eragrostis plumosa* and several other species, *Crotalaria acicularis, Ageratum conyzoides, Vernonia cinerea, Blumea runcinata, Saccharum spontaneum* in single stocks, *Barleria polytricha, Panicum brizoides*, etc.

Mosses and scale mosses are not uncommon on trees, but are poorly represented in species, the most conspicuous of them being a *Meteorium* and a *Neckera*. On the ground *Fissidens* prevails. Lichens are frequent, but are not so fairly developed as in the open forests. Certain trees are regularly infested* by lichens, while others are free or nearly free from them. To the former class belong for instance Thitpagan (*Millettia Brandisiana*,) Diedoo (*Bombax malabaricum*, Thayet (*Mangifera sp.*), Khaboung (*Strycknos nux vomica*), Shaw, *Sterculiae* generally, Kway (*Spondias pinnata*) etc. To the latter belong *Blackwellia tomentosa, Carallia, Garcinia cowa, Butea frondosa, Xylia dolabriformis, Anogeissus acuminatus*, most of the *Randiae* and *Gardeniae, Odina wodier, Dilleniae*, the wood oil trees, *Pterospermum semisagittatum, Tectona grandis, Ficus glomerata, cunia*, etc., *Terminaliae, Lagerstroemia flos reginae* etc. etc.

Orchids are frequent, but usually widely distributed forms, such as *Cymbidium, Pholidota, Eria, Saccolabium, Dendrobium* etc. Of other epiphytals a few ferns are seen, as *Platycerium biforme, Drymoglossum piloselloides, Acrostichum scandens, Davallia elegans, Polypodium quercifolium, adnascens*, and *irioides*, besides the never failing *Hoyae* and *Dischidiae*. On the ground are often met *Pteris Cretica, longifolia* and 4 *aurita, Asplen. esculentum, Nephrodium molle, Acrostichum appendiculatum* and a few others.

Parasites are here very plentiful and these become especially conspicuous during the period of leaf-shedding, when they appear as evergreen, and more or less compact spherical bushes, infesting often every branch of a tree and looking, as Zollinger observed, like as many aëral spokes. *Loranthus obtectus, ferrugineus, rhopalocarpus, buddleoides, pentandrus, longiflorus*, as also *Viscum articulatum* are the most troublesome parasites here.

b.b. Savannah forests.—The Savannah forests occupy chiefly deep alluvium where they attain their greatest development near the larger rivers. They appear also in shallower alluvium between hill ranges, along larger streams, specially when these run through open valleys.

The trees here are as low as those in the Eng-forests, but differ a great deal from the Eng-forest trees in their habits and growth. They have very short stems (a peculiarity

* I refer here only to the trunk of the tree, matters (with the exception of Blackwellia) change at the upper branchings.

produced by all deep alluviums) and are often not higher than the elephant-grass that surrounds them ; their crowns are usually disproportionately developed, rounded and spreading, or sometimes much lengthened or flattened out. There are, however, many exceptions with regard to the last mentioned quality.

The chief character of these forests lies in the very dense almost impenetrable growth of elephant-grass, amongst which the trees grow up apart from one another, and often at great distances from one another, in which latter case the localities partake more of the character of true Savannahs. Owing to the coarse, almost woody, stems of these coarse grasses, jungle-fires, which are here regular, do great damage, for nearly all the stems of the trees are found on examination to be scorched or otherwise injured by these fires. The number of species of trees is here greatly reduced, for we can hardly find a locality, where, in a circuit of a mile, more than thirty species occur. Many localities are found, in which only eight to twelve different kinds do occur, and sometimes only a single or a very few species people the whole forest. All these trees, with hardly any exception, grow also in the lower mixed forests, from whence they most probably have immigrated. At the same time these are all of such kinds, as are of ubiquitous occurence having no particular predilection for any subtratum and, if I may be permitted to express myself in this way, they are the proletarians of the proper forests towards the hills.

Sometimes the trees grow close together, when they assume more the character of lower mixed forests, from which, however, they still can be distinguished easily by their undergrowth consisting of coarse elephant-grass.

The trees that are chiefly found here are *Streblus aspera*, *Butea frondosa*, *Nauclea wallichiana*, *parvifolia ?*, *sericea*, and sometimes also *N diversifolia*, *Ficus fistulosa*, *Terminalia crenata*, *Anogeissus acuminatus var.*, *Dalbergia cultrata*, and *purpurea* (thitpoh), *Butea frondosa*, *Careya arborea*, *Lagerstroemia flos reginae*, and *macrocarpa*, *Terminalia pyrifolia* *Strychnos nux vomica*, *Vitex Leucoxylon*, *Acacia catechuoides*, *Tectona grandis*, *Zizyphus jujuba*, *Pterospermum semisagittatum*, *Antidesma Ghaesembilla*, *Kydia calycina*, *Odina wodier*, *Stereospermum chelonioides*, *Ficus cordifolia*, *Calosanthes Indica*, *Randia uliginosa*, *Gardenia sessiliflora*, *Albizzia elata*, *Tetranthera Roxburghii*, and a few others.

But besides these, nearly all of the trees mentioned as growing in the lower mixed forests can be found, the one here, the other there, without however giving a different character to these forests.

It often happens, as already stated, that some one or other forest-tree assumes the prevailing type, for instance there are Savannah-forests consisting only of yindyke, thitpoh and baup, others solely of *Butea frondòsa* (baup.) or of *Nauclea parviflora ?* I have even observed a teak-savannah-forest of considerable extent E. of Poungday.

The undergrowth is here, as already mentioned, the so-called elephant-grass, under which denomination the coarse grasses generally pass. Such are *Saccharum spontaneum* and another broad leaved species, *Andropogon muricatum*, *Coix heteroclita*, *Phragmites Roxburghii* and another species, sometimes also *Coix lacryma* and *Imperata cylindrica.* The former-named grasses grow here so high, that a man on horseback is completely concealed. The culms of these wild sugarcanes grow to be nearly as thick as a finger and in strength equal certain small species of bamboo (*Arundinariae*). At the same time they grow so dense, that one cannot successfully penetrate them except on the back of an elephant. The sharp margins of the sugarcanes are especially troublesome to a traveller, who seldom emerges from these grass-jungles without having cut his face and hands.

Only a few shrubs and larger plants are seen here, such as *Solanum Indicum*, *Clerodendron Siphonanthus*, *Thespesia Lampas*, *Melochia corchorifolia*, *Hygrophila salicifolia*, and *longifolia*, *Desmodium polycarpum*, *Melanthesopsis patens*, *Securinega obovata*, *Crotalaria verrucosa*, *retusa* and *striata*, *Tephrosia purpurea* locally, *Desmodium umbellatum*, and *Gangeticum*, *Flemingia lineata*, *Morinda lanceolata*, *Alpinia Allughas*, *Urena lobata*, *Triumfetta angulata*, *Costus speciosus*, *Sida acuta*, *Musa rubra* locally. Smaller herbs and perennials are so subordinate, that unless specially searched for they are hardly observed. Such are chiefly *Microrhynchus glaber* and *asplenifolius*, *Ophioxylon serpentinum*, *Ardisia wallichii*, *Hemiagraphis hirta*, *Amorphophallus chlorospathus*, *Smithia sensitiva*, *Pogonia*, a new viscose very small-flowered *Ebermeyera*, *Polygonum plebejum*, *Ageratum conyzoides*, *Lepidagathis incurva*, *Blumea runcinata*, *Ischaemum*, *Impatiens Chinense*, *Curcuma*, and a few others, chiefly *Cyperaceae* and herbs of an agrarian character. Sometimes tracts are found destitute of elephant-grass, but covered by *Imperata cylindrica*, the so-called tatch-grass, in which case still fewer plants are met with.

The stiff culms of *Phragmites* and of a broad-leaved *Saccharum*, often as thick as a finger, are capital supports for twiners, which are plentiful here, but which do not change the monotony of these grass plains. Those which most frequently occur are : twining *Convolvulaceae* and *Leguminosae*, as *Ipomoea vitifolia* and *cymosa*, *Phaseolus calcaratus*, *Cylista scariosa*, *Atylosia mollis*, *Calonyction grandiflorum*, *Teramnus labialis*, a yellow *Lepistemon*, a yellow flowered *Vigna*, further *Dioscorea tomentosa*, *glabra*, and *hirsuta ?* *Lygodium bipinnatum*, *Cocculus incanus*, *Cissampelos Pareira*, *Vitis trifoliolata*, *Cardiospermum Halicacabum*, *Passiflora foetida* locally, *Trichosanthes bracteata*, *Luffa cylindrica*, *Cephalandra grandis*, *Muckia Maderaspatana*, *Zehneria umbellata*, *Oxystelma esculentum*, and another twining *Apocynea*, &c.

Where the trees get closer, scandent shrubs and climbers of the common kinds appear, like *Calycopteris Roxburghii*, *Butea superba*, *Spatholobus Roxburghii*, *Brachypterum scandens*, *Briedelia scandens*, *Streptocaulon extensum*, *Celastrus paniculatus*, *Acacia pinnata*, *Otosemma macrophylla*, and similar ones from the lower mixed forests.

On trees, few epiphytical plants occur, although light is plentiful and the surface of the barks appears very favourable for their reception. Jungle-fires are most probably the cause of this. Orchids are poorly represented, and besides the never failing *Hoyae*, the following ferns *Niphobolus*, *Drymoglossum piloselloides*, *Polypodium quercifolium* and *Platycerium* are frequently observed.

c.c. Beach-jungles.—These jungles are a sort of lower mixed forest containing a combination of trees which occur chiefly along the sandy beaches of the sea. They are seldom of any great extent, but form usually a narrow strip, much interrupted by other forests, wherever clayey or rocky ground turns up. They never become inundated by the tides, although they often border the beach at the water's edge. They are to a certain degree a mixture of tidal forests and of the surrounding inland forests, and appear often so blended together, as to render their recognition difficult. If of a pure character, we find the following trees growing chiefly in such forests, *Pongamia glabra*, *Erythrina Indica*, *Bombax malabaricum*, *Paritium tiliaceum*, *Pandanus verus*, *Cynometra bijuga*, *Guettarda speciosa*, *Cycas Rumphii*, *Thespesia populnea*, along with *Scaevola Koenigii*, *Colubrina Asiatica*, *Derris sinuata*, *Breynia rhamnoides*, *Brachypterum scandens*, *Caesalpinia Bandhuc*, *Ipomoeas*, etc. Creeping on the sand between these shrubs and trees, or exposed on the sandy beaches themselves, are seen *Ipomoea pes caprae*, *Ischaemum muticum*, along with some other grasses, etc.

Polypodium quercifolium is, as a rule, very frequent on trees in these forests, along with *Hoya*, *Dischidia*, and several orchids.

These forests are very incompletely, if at all, developed in Pegu, owing to the clayey alluvium ; but they occur not only along the Arracan and Andaman coasts, but still more so in Tenasserim, where *Casuarina muricata* becomes a prevailing tree, while *Spinifex squarrosus*, a curious grass, facilitates the binding of the loose sand.

b. Upper-mixed forests.—The upper-mixed forests are, as already pointed out by Dr. Brandis in his reports, the principal seat of teak, and they might therefore be called *par excellence* the teak forests of Pegu. They occupy exclusively the soft sandstone formations of the Pegu Yomah, and also the older strata of the Martaban hills. Those growing on the latter formations differ, however, a good deal from those growing on sandstone, not only in their general growth, but also by an admixture of trees, which do not occur on the sandstone. This difference is due, no doubt, to the quality of both these rocks, but, as the difference is more external than essential, I do not venture to separate them here. While on the Pegu Yomah these forests attain an average height (especially on the higher and drier ridges) of about 120 feet, those growing on syenitic and shistose substrata seldom exceed 80 to 90 feet in height, and the growth of their clean stems is never so straight and regular ; in other words, the soft sandstone produces *lofty*, while metamorphic rocks yield only *big* trees. Grass clothing of the soil is only exceptional, and is then chiefly composed of the so-called teak grass (a *Pollinia*). The usually yellowish or grey surface soil, the product of disintegretion of sandstone, is therefore everywhere exposed. Jungle-fires are regular and frequent, but not very injurious, except in years when the bamboos have died off. The number of species of trees is smaller than in the lower mixed forest, and still more so on the higher ridges ; the trees also usually grow more remote from each other. These forests are in fact higher grown, but in species they are poorer than the *lower mixed forests.* Especially large bamboos, (Kyattoun, wayah and tinwa) play here an important role, while certain kinds of shaw trees (especially *Sterculia villosa* and *urens*) along with *Milletia Brandisiana* (thitpagan), *Grewia elastica*, *Duabanga grandiflora* (myoukgna) and *Erythrina stricta* and *suberosa* (toung kathit) may be called the characteristic trees of these forests. Teak is here the rule—its absence the exception. The southern extremity of the Yomah is especially poor in teak as far upcountry as Wachoung. I think that the influence of the sea, and the greater dampness of the air connected with it, is in part the cause of this. Also the very decomposed condition of the sandstones may be unfavourable for its growth, but this later statement is doubtful.

The chief trees here are *Xylia dolabriformis*, an almost unfailing companion of the teak-tree, *Dillenia parviflora*, *Garcinia cowa*, *Eugenia Jambolana*, *Bombax insignis*, *Sterculia urens*, *foetida*, and *villosa*, *Pterospermum semisagittatum*, *Eriolaena Candollei*, *Garuga pinnata*, *Bursera serrata*, *Canarium Bengalense ?*, *Semecarpus cuneifolia*, *Spondias pinnata*, *Terminalia tomentella*, *crenata*, *pyrifolia* and *Bellerica*, *Anogeissus acuminatus*, *Lagerstroemia flos reginae* and *tomentosa*, *Homalium tomentosum*, *Briedelia retusa* (thseikgyee), *Millettia Brandisiana* (thit-pagan), *Heterophragma Roxburghii*, *Pajanelia multijuga*, *Cordia grandis*, *Gmelina arborea*, *Bell-*

chmedia Roxburghii, Dalbergia glauca, (madama), *cultrata, ovata,* and *purpurea* (thitpoh) *Pterocarpus Indicus* (especially in Martaban and along the eastern slopes of Yomah), *Nauclea Brunonis* and *cordifolia, Vitex alata, Milletia leucantha* (thin win), etc.

Amongst these the following smaller trees are seen : *Cratoxylon neriifolium, Sterculia colorata, Grewia elastica, Diospyros ehretioides* and *cordifolia, Antidesma Ghaesembilla, Rottlera tinctoria,* two arboreous *Euphorbiae* (*E. antiquorum* and *nivulia*), *Holarrhena pubescens, Cassia florida* and *nodosa, Bauhinia Malabarica, Strychnos nux vomica, Odina wodier, Kydia calycina, Lagerstroemia macrocarpa, Croton oblongifolium, Flacourtia cataphracta, Calosanthes Indica, Ehretia laevis ?* , two or three species of *Randia, Gardenia costata, Ficus cuneifolia* and *hispida, Premna pyramidata, Phyllanthus* (*Emblica*) *albizzioides* and *officinalis,* and others.

The bamboo growth is much developed here and consists chiefly of large species. In moister situations or along favourably exposed slopes appear Kyattounwa along with tinwa, while waya occurs especially along choungs ; in drier situations is to be found tinwa, the principal bamboo, often associated with myinwa.

Shrubs are here few and meagre ; the chief of them are *Helicteres plebeja, Thespesia Lampas, Grewia hirsuta, Limonia alternifolia, Baliospermum montanum, Desmodium gyroides, pulchellum, triquetrum* and *strangulatum, Premna hirta, Sauropus compressus* and *ceratogynum, Clerodendron urticifolium, nutans* and another species, *Flemmingia, Vernonia saligna* and *divergens,* a small broadleaved *Coelodiscus, Leea Staphylea ?, Bauhinia polycarpa,* etc. Climbers are comparatively few in individuals, but are nevertheless conspicuous without interfering much with the openness of these forests. Such are especially 2 or 3 species of *Combretum, Calycopteris,* 2 or 3 species of epiphytical *Fici, Hemidesmus Wallichii, Embelia villosa, Thunbergia laurifolia, Cylista scariosa, Abrus precatorius, Butea superba, Spatholobus Roxburghii, Argyreia capitata* and another species along choungs, *Pueraria tuberosa, Symphorema involucrata, Sphenodesma unguiculata, Mezoneuron enneaphyllum, Pterolobium macropterum, Acacia rugata* and *pinnata, Ipomoea barbata, Otosemma macrophylla, Cyclea peltata,* etc.

The exposed ground nourishes the following more frequent forms : *Sida carpinifolia* and *rhombifolia, Urena lobata, Triumfetta annua, Pimpinella Heyneana, Nelsonia, Phaylopsis, Strobilanthes phyllostachya, glaucescens, auriculatus,* and sometimes *pterocaulis, Daedalacanthus macrophyllus, Barleria polytricha, Neuracanthus tetragonostachyus, Lepidagathis falcata, incurva, mucronata* and *fasciculata, Crotalaria acicularis, albida, dubia* and a new ? species (near *C. Assamica*), *Mecopus nidulans, Uraria refracta, Canscora decussata, Aeginetia Indica, Anisochilus pallidus, Achyrospermum, Leucas procumbens, Gomphostemma, Aerva scandens, Hedyotis scapigera, Argyreia sp.* almost erect with broad large leaves, *Blumea virens, runcinata var., hymenophylla, racemosa, holosericea* etc., *Peristrophe, Mitreola, Musa glauca* and *sapientum ? Geodorum, Hypoxis orchioides, Stemona Griffithii, Aneilema herbaceum, ovatum* and *scapiflorum, Scleria* locally, *Hypolytrum trinerve, Cyperus moestus, Panicum plicatum, Centotheca, Selaginella semicordata* and *tenera, Adenostemma latifolium, Oplismenus sp., Crotalaria filiformis, Sonerila tenella, Justicia decussata, Hibiscus furcatus* and another species, a yellowish-leaved variety of *Elephantopus scaber, Lygodium bipinnatum, Acrocephalus capitatus, Hitchenia sp., Pollinia tectonum, Blumea flava, Crotalaria alata, Corchorus acutangulus, Panicum montanum,* and others.

Terrestrial ferns are few in number, and are all of sorts tolerant of a great degree of dryness, such as *Pteris longifolia, cretica, Nephrodium filix mas var. cochleata, Adiantum lunulatum,* etc.

Orchids and other ephiphytical plants are not conspicuous here and are mostly restricted to the upper parts of trees. They are almost the same as those occurring in the lower mixed forests. Mosses are still scarcer, but a few species of *Fissidens* and *Hypnum* cover in profusion the wet sandstone rocks along the choungs, where also *Selaginellae, Marchantiaceae* and *Jungermanniaceae* appear. Stone-lichens are remarkably rare along the whole of the Yomah range, and only along the Zamayee choung did I meet with a few on the boulders of compact sandstone, and also with a species on the fossiliferous rocks between Wanet and Kengpadee.

These upper-mixed forests might be divided into moist and dry upper mixed forests. Such a distinction, however, is too artificial, for these two varieties are nothing more than the product of favourable and unfavourable exposures. Besides the Kyattounwa, characteristic of the moister upper-mixed forests, some one or other tree from the evergreen forests associates itself, such for instance as *Albizzia lebbek, Caryota urens, Dipterocarpus alatus,* etc.

Wallichia oblonga, Colocasia fornicata, Grumilea elongata, Aneilema ovatum, Cyperus moestus, Panicum plicatum, Phrynia and other *Scitamineae, Girardinia heterophylla, Boehmeria diffusa, Charica Siriboa,* the rare and beautiful *Impatiens Tavoyana* with flowers much resembling those of *Jonidium,* and especially also *Ophiopogon Wallichii* are all such plants, as settle themselves when conditions are favourable to their growth. The teak grass is also here more frequently met with, especially along the northern slopes of the ridges. The drier upper mixed forests are destitute of such plants as those just mentioned, and when myinwa gets the upper-hand, as is often the case, the vegetation on the ground is reduced to only a few such plants as are of more general occurrence.

7.—*Dry-Forests.**

We have now to examine the last class of forests that I have found advisable to treat under a separate name. These are the dry-forests, restricted to the formation of compact calcareous sandstone and to shallow alluvium, resting on such, or on diluvium.

Unfortunately I travelled in the Prome district at the height of the hot season, when everything had been burnt down, and the trees even completely leafless as to make it extremely difficult to recognise them, especially as a great many of these trees were quite new to me.

When better known and explored in a more favourable season, they will probably become still more interesting on account of the large percentage of Hindustani plants that are found in them. The transitions between the open forests and these dry-forests also require careful study to settle the question, whether these forests might not rather be associated with the open forests as modified varieties, produced by a different soil and climate. The trees here are generally middle sized, of an average height from 50 to 70 feet, but on the higher Yomah ridges, under favourable conditions, they grow up to about 100 feet in height. Carbonate of lime appears to be the principal cause of the modification of vegetation here.

The forest is very open, but looks rather uninviting owing to the prevalence of thorny trees and shrubs. Jungle-fires are here more frequent than in any other forests in Burmah, and, when myinwa has died off, they become destructive.

For the present I distinguish the following 3 varieties only :

A. Mixed dry forests.
B. Sha-forests.
C. Upper dry forests.

A. Mixed dry forests.—These forests very much resemble in external aspect those forests in Behar, which grow on the lower stony hills. The chief trees are here, besides teak (which is also here frequent but of very inferior growth), *Dalbergia cultrata*, *Pentacme Siamensis Dipterocarpus tuberculatus* locally, *Diospyros Birmanicus*, and *cordifolius ?*, *Buchanania latifolia*, *Crataeva religiosa*, *Cochlospermum Gossypium passim*, *Hiptage arborea*, *Harrisonia Bennetii* frequent, *Balanites Roxburghii*, here and there, *Melia Azedarach* and *azadirachta*, *Chickrassia velutina*, *Zizyphus Jujuba*, *Combretum apetalum*, *Sideroxylon tomentosum*, *Dalbergia purpurea* (thitpoh) ; *Calosanthes Indica*, *Microptelea parvifolia*, *Pterocarpus Indicus ?*, *Premna pyramidata*, *Albizzia lebbek*, *Cratoxylon neriifolium*, *Tectona Hamiltonii* locally, *Albizzia lucida* frequent, *Hymenodictyon thyrsiflorum ?*, *Holarrhena antidysenterica*, *Strychnos nux vomica*, and *potatorum*, *Bauhinia racemosa*, and *variegata ?*, *Flacourtia sapida*, *Ehretia laevis ?* , *Acacia Farnesiana* rare, *Rhus paniculata*, *Morinda tomentosa*, *Anogeissus acuminatus*, *Albizzia odoratissima*, *Odina wodier*, *Emblica officinalis*, *Hiptage arborea*, *Bombax*, *Garuga pinnata*, *Flacourtia sp.*, *Eugenia Jambolana*, *Vitex alata* and *canescens*, *Acacia leucophloea* (*dha noung*), *Capparis grandis*, *Premna viburnoides*, *Shorea obtusa*, *Schleichera trijuga*, *Dillenia pulcherima*, *Xylia dolabriformis*, *Nauclea Brunonis*, *Cordia grandis*, *Spathodea Rheedei ?*, *Hollarhena pubescens*, *Cassia fistula*, *Lagerstroemia tomentosa*, &c.

Of shrubs and little shrub-like trees deserving mention are, *Thespesia Lampas*, *Barleria cristata* and *dichotona*, *Desmodium pulchellum*, *Carissa carandas ?*, *Azima tetracantha*, *Posoqueria spinosa* and *pubescens*, *Calotropis gigantea*, *Woodfordia fruticosa*, *Tephrosia purpurea*, *Flemmingia lineata* and two or three other species, *Cassia absus*, *Clerodendron infortunatum*, *Collaea lutea*, *etc.*

The only palms here are an erect *Calamus* (Kanega *C. fasciculatus)* and the stemless *Phoenix acaulis.*

The more conspicuous climber-vegetation consists of *Bauhinia diphylla*, *Hymenopyramis brachiata*, *Capparis horrida*, *crassifolia* and *polymorpha*, sometimes *Zanonia sarcophylla*, and *Vitis quadrangularis*, *Sphaenodesma*, *Wattakaka viridiflora*, *Holmskioldia sanguinea*, *Ichnocarpus frutescens ?*, *Hoya orbiculata* and another species, *Opilia amentacea*, *Hemidesmus Wallichii*, *Spatholobus Roxburghii*, *Congea*, *Cocculus Leaeba*, *Bryonia laciniosa*, *Mezoneuron enneaphyllum*, *Caesalpinia* 1 or 2 species, *Aristolochia Indica*, *Vallaris dichotoma*, *Scindapsus officinalis*, *etc.*

Bambusa stricta (*myinwa*) is here the chief bamboo, besides which only *Bambusa tulda* (*teiwa*) is found, the latter chiefly along choungs.

Most of the herbs and perennials are such as are found also in the mixed and open forests, like *Sida rhombifolia*, *acuta* and *humilis*, *Barleria polytricha*, *Neuracanthus tetragonostachyus*, *Justicia decussata*; *Mitreola sp.*, *Eragrostis* several species, *Desmodium triquetrum*, *Urena lobata*, *Lepidagathis incurva*, *Blumea flava*, *racemosa*, etc., *Lygodium bipinnatum*, *Knoxia lasiocarpa*, *Costus speciosus*, *Scleria*, *Tephrosia purpurea*, *Rhynchosia sp.*, *Cephalostigma*, *Stemona Griffithii*, *Urginea Indica*, *Mitreola paniculata*, *Chrysopogon Gryllus*, *Anthistyria*, and others. But not a few appear here for the first, being nowhere else found in Pegu as *Abutilon Indicum*, *Blepharis Maderaspatana*, *Andrographis tenera*, *Justicia Betonica*, *Tephrosia tinctoria var*, etc.

* The natural position of these forests in my scheme is between the open and the mixed forests. When I wrote the description of these forests in 1871, I had not yet worked up my Burmese plants : hence the misplacement.

Lichens are less frequent than one would expect in such open forests, and only in more favourable situations are they really conspicuous.* Mosses and scale-mosses are rare, and so are—during the hot season—the fungi, of which only a few *Polypori* are seen. *Algae* are also scarce, at least in number of species ; for what reason I do not understand.

Epiphytical plants are represented—although in modest numbers—chiefly *Dendrobia* and *Saccolabia*. Ferns, terrestrial and ephiphytical, are here to be found in widely distributed forms, but in very small numbers. Those mostly seen are *Adiantum lunulatum* and *rhizophorum*, *Niphobolus adnascens* and *Platycerium*.

These forests, and indeed, all forests of the Prome district, require further careful examination at a more favourable season, and, no doubt, will repay a botanist richly for his labours.

The calcareous sandstone is greatly subject to decompostion and, to all appearance, was still more so at a time when the rain-fall in the Prome district has been greater. The decomposed rock closely resembles the permeable silicious sandstone not only in its chemical but also in its physical qualities. It is a more coarse-grained smoke-grey highly permeable sandstone and supports forests almost identical with the upper mixed forests of the higher crests of the Yomah itself. I strongly suspect, that the greater part of the main range, or the axis, of the Yomah is composed of decomposed calcareous sandstone ; at least the samples I collected in the several crossings of the Yomah, South of the Prome district, do not in the least differ from the decomposed sandstone of the Kambala layers. I am supported in my supposition by the fact, that there exist large tracts of myinwa (a bamboo characteristic of calcareous sandstone and laterite) in the drier upper mixed forests. Such metamorphoses in the character of forests cannot surprise, if we carefully bring into account the amount of rain-fall and perfect drainage: both will suppress dry stunted forests, and call into existence lofty grown upper mixed forests as soon as decomposition has removed the injurious lime. Water has the property of absorbing a certain proportion of carbonic acid, rain takes up more or less carbonic acid,† it dissolves the lime of the calcareous sandstone and carries it away in the form of a bicarbonate. We can, therefore, well understand, why the highest and steepest regions of the Prome Yomah (where complete drainage is the rule) should have been first metamorphosed. It is easy to trace (for example in ascending the Swa-passes) the gradual transition from dry forests into upper-mixed forests according to the degree of decomposition of the calcareous sandstone rocks. It is here that we find *Pentacme Siamensis* (a most characteristic tree of the Prome district) still growing in the midst of the true upper-mixed forests on the main range itself.

B. Sha forests.—The principal tree here is, as the name given to these forests indicates, the Sha-tree (*Acacia catechu*). This tree, although it also occurs sparingly in the Irrawaddi zone, becomes here a conspicuous feature, in the same way as Eng, teak and similar trees do in other parts of Pegu. Along with sha, a small number of trees—a curious mixture of open and mixed-forests species—occur here, along with a few trees, which are peculiar to the Prome zone.

C. Upper dry forests.—I have separated these forests on the supposition that we might be able to give them a more fixed and peculiar character preparatory to an exploration of those which occupy the highest crests of the Yomah main range towards Kyouk pyoo toung and Bhambway beng Sakhan. For the present my remarks refer only to those which grow on the Kambala range and along the Yomah crest from this hill to Yan choung, ranging from about 2500 to 3000 feet elevation. These forests may best be designated as crooked and low upper-mixed forests, with an admixture of dry-forest trees, containing certain temperate forms, like *Vaccinium*, *Heracleum*, *Hymenopogon*, *Didymocarpus*, etc., indicative of the influence of elevation. The average height of trees is here reduced to a minimum, viz. from 10 to 30 feet, and the trees are scattered and crooked like those in an Eng-forest. Their aspect is peculiar in the extreme. This strange growth of trees is not attributable to elevation, but to two powerful agencies, viz. the dry winds and the dry climate generally (they are situated in and near the Prome zone), the influence of which is increased by the second agency, viz. the presence of lime in the sandstone. The section of Kambala toung under § 2, No. 3, gives a good idea of the position these forests occupy with reference to the surrounding forests. Besides the unfavourable conditions already named, to which these forests are subjected, must also be added their exposed situation and solar radiation. Jungle-fires occur here regularly, burning up not only the scanty dried up vegetation, but also running up the short stems of the little trees, and often consuming the shrivelled up mosses and grasses that grow on them.

A tree that is seldom seen in Southern Pegu, but which becomes frequent in the Prome zone, is *Hiptage arborea*, and this tree becomes here a conspicuous and principal constituent of these forests. With it grow a number of others, nearly all denizens also of the upper-mixed forests, such as *Sterculia villosa*, and *colorata*, *Grewia elastica*, *Gardenia suavis*, and *sessiliflora*

* These are nearly all crustaceous species, the foliaceous and shrubby species seem to be more hygrophilous.

† Jungle-fires, which play such a conspicuous role in excessive tropical climates, form another source of supply of carbonic acid to the atmosphere (see Schleiden, Lehrbuch der Botanik, II. p. 460, 3rd Edit.).

Croton oblongifolium, *Dalbergia cultrata*, *Eriolaena*, a *Bauhinia* with large beautiful flowers (*B. variegata ?*), *Kydia calycina*, *Erythrina sp.* (toung kathit), *Pterospermum aceroides*, *Bombax insigne*, *Heteropanax fragrans*, *Grislea tomentosa*, *Emblica officinalis*, *Dillenia pentagyna*, *Flacourtia cataphracta*, *Dalbergia purpurea* (thitpoh), and a few others. Amongst these I found a single tree of each of the following species along the Kambala crest : *Sterculia ornata*, *Nauclea Brunonis*, *Gmelina arborea*, *Ficus cordifolia !* *Odina wodier*, and *Tectona grandis*.

True erect shrubs are seldom met with here, but of climbers are seen *Pueraria tuberosa*, *Acacia rugata*, *Congea*, *Calycopteris* etc.

Then come the epiphytical plants which become more conspicuous here than in any of the other varieties of leafshedding forests. Mosses and scalemosses are not numerous in species, but *Macromitrium Moorcroftii* and *ellipticum* and *Meteorium squarrosum* are so plentiful along with *Brathymenium Hookeri*, *Hyophila Birmensis*, *Rozea decolorata*, &c., that they literally clothe the northern face of the stems and branches of trees, although they are quite shrivelled up during the hot season. The southern and S. W. faces are occupied by light-loving lichens of common forms, especially a species of *Opegrapha* and *Lecidea*. Amongst the mosses grow two curious little orchids, the one a dark purple *Bolbophyllum*, the other (hardly half an inch high and one-fruited) unknown to me. A small creeping plant (possibly an *asclepiad* or an *Aeschynanthus*) was also frequent, but in a state unfit for determination. A little *Stipa*-like and very elegant looking grass (*Tripogon bromoides ?*) played gracefully in the wind, while *Selaginella caulescens* and *Polypodium fissum* seemed to be the principal epiphytical ferns. A fine large shrubby *Vaccinium* (*Thibaudia obliqua*, *Griff*) with brilliant scarlet flowers is to be seen everywhere in the branchings of the trees, and *Hymenopogon parasiticus* and a small viviparous Aroid, besides a small leaved pendulous *Aeschynanthus* (*A. gracilis ?*) make the contrast between the tropical dry vegetation and that of the temperate forests only more conspicuous and interesting to a botanist.

Orchids are numerous, indeed, and the plentiful *Dendrobia* with white, rose coloured yellow, and purplish flowers form a splendid sight in these sunny regions. Of parasites *Loranthus farinosus* and *ferrugineus* were observed.

The chief or rather only bamboo here is *Bambusa stricta* (myinwa) which grows all along the crests, and especially along the unfavourable exposures ; also a rather small bamboo, probably a *Schizostachyum*, near or identical with my *Sch. flavescens*, which seems really to be restricted to the N. E. side of the Kambala toung, just beneath its top, for I never met with these peculiar bamboos anywhere in Burmah* except here. However, this bamboo does not strictly belong to these upper-dry forests, but rather to the flora of the evergreen forests, which ascend here along a deep gorge up to the top of Kambala toung.

Although the undergrowth during my visit was perfectly burnt down, I was able in some of the less injured localities to note the following plants, which especially interested me, viz., an *Umbellifer* (*Heracleum Burmanicum*,) 4 to 6 feet high and 2 species of *Cyrtandraceae* (a *Baea* and a *Didymocarpus*) as also a grass, looking like *Agrostis*, which locally prevailed here. The *Heracleum* grew abundantly here all along the higher crests of the main range of the Yomah. The other herbs and perennials were nearly all of the nature of those which occur also in the drier upper-mixed forests, such as *Triumfetta annua*, *Panicum montanum*. *Sida rhombifolia*, a villous variety of *Urena lobata*, *Pollinia tectonum*, *Ammannia multiflora*, *Justicia decussata*, *Zingiber squarrosum ?*, *Desmodium triquetrum*, and *pulchellum*, *Strobilanthes scaber*, *auriculatus*, *phyllostachya* and *dasysperma*, *Daedalacanthus macrophyllus*, *Barleria polytricha*, *Lepidagathis mucronata*, *Thespesia Lampas*, *Leea staphylea ?*, *Lepidagathis fasciculata*, *Cyperus umbellatus !*, *Thyssanolaena acarifera*, *Flemmingia*, *Polygonum chinense ?*, *Ischaemum spec*,. etc., etc.

On shady sandstone rocks of favourable exposure a few mosses along with *Selaginella* occur, and a *Metzgeria*, too, is not unfrequent. A peculiar yellowish green *Alga* (*Bulbochaete Peguana*) is met with, growing at the tips of a moss in such a way, that the rock wall, on which it grows, appears as if overgrown by a *Jungermannia*.

B.—Savannahs and low natural vegetation.

Between forests, and low shrubberies and bamboo jungles, the line is not always so sharply drawn as it might appear at first sight, but in Pegu I know very few instances, where a forester might actually fail to say where the forest ceases and low vegetation begins, and this is chiefly the case in bamboo jungles. A division of the low vegetation into that which grows on dry or wet lands (land-vegetation,) and into a vegetation growing in swamp and waters, is surely artificial, for between dry land and water there are so many gradations, that the one passes almost imperceptibly into the other, or lands, which are quite dry during the dry season, are swamps or even lakes during the rains. We must therefore try to systematize them the best way we can, and the difficulties are after all not so great as they appear.

* The Karens as they assured me have no name for this bamboo, and wanted one from me, but they were not much impressed by my knowledge, when I told them, it might be a sort of tinwa.

A. A.—Land-Vegetation.

The land-vegetation comprises—

1. The bamboo jungles.
2. The savannahs.
3. The natural pastures, and finally,
4. The riparian vegetation.

8.—*Bamboo jungles.*

The bamboo jungles are such an ambiguous formation, that I should have really omitted them entirely were it not, that in some localities these jungles become so pure and extended, that they cannot be brought into direct connection with the surrounding forests. I do not consider bamboo jungles to be forests, however high may be their growth; they are actually nothing more than the undergrowth of forests, and stand in the same relation to them as the savannahs, for instance, do to the savannah forests. Their chief character lies in their great uniformity, and in the poorness of their undergrowth. Seldom do we find more than two different kinds, and often, only a single kind of bamboo in these jungles, and, therefore, the different varieties of the bamboo jungles might justly be called after the prevailing description of bamboo that is found in them. Such bamboos, as are locally found to form jungles for themselves, without an admixture of higher trees, are *myinwa*, *tinwa*, *Kyattounwa* and *wapyoo gelay*, all these growing on rocky strata or on shallower alluvium, while *Bambusa spinosa* (Yakatwa) is restricted to the plains in deep alluvium near larger rivers.

All the bamboo stocks usually flower together at the same time, and this is the case also with those growing as undergrowth in the forests; they then die off one by one after maturing their seeds. It is believed that they do so regularly after a certain number of years, which is variously set down at from 40 to 60 years. For the larger kinds this may be a fair estimate; but I know of a bamboo in Java, 25 feet high, which flowers and dies off every three years, and of others which flower regularly at the ends of the branches for many years (especially *Schizostachya*), until they finally become a whole gigantic panicule of flowers ere the close of their lives.

Shrubs or other kinds of woody plants are so few as hardly to need mention, and only where the jungles become more open, or along their borders do shrubs appear in modest numbers; all these are of an ubiquitous nature. In the same way herbaceous plants are scarce in the interior, but become more conspicuous in open situations, where we meet with plants like *Cyperi*, *Blumea lacera*, and several other species, *Flemmingia lineata*, and another species, *Rungia repens*, *Leeae*, etc.

During the time of flowering, when the leaves are shed either partially or entirely, numerous light-loving plants spring up, which, no doubt, have come over from the surrounding mixed forests; and in low situations, various grasses of the savannah character spread rapidly, accompanied by shrubs and other plants of a similar character.

Where the bamboo grows very thickly, and the species is one which may be reckoned amongst evergreens (at least under certain conditions, like *Kyattounwa*) *cryptogams* settle in numbers, and we find here many a peculiar description of moss and lichen. A *Hypnum* is then not unfrequent, inhabiting chiefly the lower nodes of the culms, while some very remarkable lichens form white or greenish thalli on the stems further up, fructifying, however, only rarely. On the ground, too, several mosses, as *Hypnum* and *Fissidens* become sometimes conspicuous, forming lovely green dense patches.

9.—*Savannahs.*

These savannahs, or, as they are often called by Europeans in Pegu, elephant grass jungles cover the plains in deep alluvium, where the arboreous growth has been either quite suppressed by the powerful coarse grasses that compose them, or the trees are so scattered, that only one or the other can be seen at great distances from each other; they do not therefore form true forests. Along the Irrawaddi, especially towards its delta, they are often very extended, and in the lower parts between the Pegu and Sittang rivers, at about the latitude of the town of Pegu, they assume such dimensions that they may fairly be compared with those occurring in America. It is not necessary at all to specify the plants that grow here, for they are the very same as those forming the undergrowth of the savannah forests, viz. the different kinds of elephant grass, along with those shrubs and herbs mentioned already under 6 *a. bb.* (page 44).

Little creeks often intersect these jungles, and along such we often find vividly green patches of *Carex Wallichiana*, further *Helminthostachys*, *Ceratopteris*, *Adiantum lunulatum*, *Asplenium esculentum*, *Polypodium proliferum* and sometimes *Nephrodium molle*.

Towards the tidal zone these savannahs become more extended passing into tidal savannahs, in which *Arrhenatherum muricatum*, *Eragrostis procera*, *Cyperus tegetus*, and such like tidal grasses become conspicuous. Also *Tamarix*, *Pluchea*, *Glochidion*, and other tidal shrubs along with trees, such as *Paritium tiliaceum*, *Erythrina ovalifolia*, *Butea frondosa*, *Bombax*, *Thespesia*, and similar ones, scattered over the plains, turn up one by one as we proceed southwards, until we enter the tidal forests themselves.

10.—*Natural pastures.*

The natural pastures in contra-distinction to meadows, which latter are either produced by culture or grow up in neglected culture-lands, are of very limited occurrence, not only in Pegu, but in India generally, for they are usually replaced by the savannahs and bamboo-jungles above described. The characteristic of these pastures is the absence or scarcity of such coarse grasses as have been already treated of as elephant-grasses. While the savannahs give fodder only to buffaloes and elephants, these afford pasturage for domestic cattle. They are found best developed in the higher regions of hill ranges, especially in the alpine region. Those which occur lower down in the plains are all of very doubtful character, being either the undergrowth, left after forests have disappeared by some natural cause (fire ?), or the growth upon tracts of lands, which may possess one or the other peculiarity by which the growth of trees became suppressed. The hills of Burmah are not high enough to produce, as in the Himalaya, alpine pastures which come nearest to European pastures, in aspect as well as in character, and we have only the following three varieties to discuss here :

a. Long-grassed or jungle-pastures.
b. Short-grassed or lowland-pastures.
c. Hill-pastures (not represented in Pegu).

a. Long-grassed or jungle pasture.—The jungle pasture is a variety, which is to be found chiefly on shallow alluvium resting on impermeable strata, chiefly along the base of the Yomah hills. Such pastures are found most developed in the Pazwoondoung valley. We fall in with them, when crossing the cultivated alluvium towards Kya-Eng, where they alternate and often border the low forests. They are actually nothing but the undergrowth of these low forests and consist of the same *andropogonous* grasses along with the same shrubs and other plants which are to be found in them. I need therefore do no more than refer to 5, *c.*, where they are characterised.

b. Short-grassed or lowland-pastures.—The lowland pastures appear either as dry and meagre or as moist or sappy pastures. On such dry pastures prevail the following plants .—*Chrysopogon aciculatus, Andropogon pertusus ? Spadiopogon obliquivalvis, Alysicarpus vaginalis, Eragrostis, Scleria, Digitaria, Fimbristylis diphylla, Ischaemum rugosum, Sporobolus diander, Cynodon dactylon, Dactyloctenium*, etc., along with *Sida retusa, Vernonia cinerea, Desmodium auricomum ?* and *triflorum, Osbeckia, Sida acuta, Panicum brizoides* and *repens, Lepidagathis hyalina, Knoxia lasiocarpa*, etc.

During the dry season *Gramineae* prevail in such short-grassed pastures, but during the rains *Cyperaceae* get the supremacy, and then associate with a number of other plants, of which during the hot season hardly a vestige can be seen, such as *Geissaspis cristata, Smithia sensitiva, Burmannia juncea, Anilema ochraceum, Drosera Indica, Mitrasacme Indica, Selaginella Junghunii, Impatiens Chinensis, Aneilema nudiflora*, and *nanum* and *vaginatum*, and such like.

The moist or sappy pastures are to be found chiefly in swampy places or in shallow lakes that dry up during the hot season. The vegetation of these consists of a very few kinds only of soft and sappy grasses, such as *Hymenachne myurus* and *interrupta, Paspalum scrobiculatum, Panicum crus galli*, and *antidotale*, a soft debile *Isachne, Leersia hexandra*, and a few others, which grow in great profusion, sometimes to a mass of a foot in thickness which floats when the rains set in ; these form dense floating meadows very fine to look at, but very difficult to penetrate even with boats, as the boats soon become so entangled in the mass of vegetable matter that no progress can be made except by cutting it.

Owing to the moist situation swamp-plants accompany these grasses, such as *Jussiaea repens* and *suffruticosa, Adenosma triflorum, Xyris, Eriocaulon, Scirpus juncoides*, etc., *Hygrophila salicifolia, Dysophylla verticillata, Justicia peploides, Hydrocotyle Asiatica, Commelyna communis*, etc.

The latter variety of pastures offer possibly the best pasturage* for all kinds of cattle. In general appearance they resemble European meadows, more than any others do between the tropics. Those that cover the bottom of shallow lakes offer also during the hottest part of the year splendid emerald-green grass plains of limited extent, but they are chiefly restricted to the lower parts of the Sittang valley, especially North of the town of Pegu, while in the Irrawaddi valley, on account of the greater dryness of the atmosphere, they often entirely disappear around the swamps of the savannahs.

C. Hill pastures.—The hill pastures are of limited extent and are restricted to the sub-temperate region above 6000 feet elevation. Such as deserve the name of hill-pastures, I met with on the higher part of the Loko ridges and on the top of the Nattoung itself. The escarpments of a western and S. W. situation are also often occupied by them as low down

* However, strange to say, I invariably observed the grazing bullocks (and also my own pony) to prefer the dry pastures wherever these bordered (as is often the case) the lower lying moist pastures.

as 5000 feet elevation. They are subject to junglefires, and when I passed these in March, 1868, they were just burnt down.

They consist chiefly of a coarse bluish *Arundinella* and a coarse hairy *Andropogon*, along with a species of *Ischaemum* and a tender *Bathraterum* (?) as also a few other grasses and *Scirpeæ*, which were all so dried up or injured by fires as to be in a state unfit for determination. Of other plants I could recognise two species of *Gentiana*, a narrow leaved *Ophelia*, *Anaphalis adnata*, *Osbeckia sp.*, *Pteris aquilina*, *Gleichenia longissima* and *dichotoma*, *Senecio Griffithii ? Saussurea deltoidea*, *Cyanotis barbata*, *Umbelliferæ*, *Drosera lunata*, *Lycopodium clavatum*, *Galium*, etc. Mosses and lichens are also found frequently on the ground, especially where the soil assumes more the character of a black turf ground.

These hill-pastures are hardly more than the undergrowth of pine and hill forests, with or without a few pine or other trees scattered over them. They are always found on situations unfavourably exposed to prevailing winds.

11.—*Riparian vegetation.*

A vegetation springs up on the bed or along the edges of half-dried up choungs, rivers, etc., which is usually distinguished as riparian vegetation. But, as elsewhere, the physical nature of the ground produces a change in the vegetation, we have to bring into consideration the streams, choungs, etc., that flow over rocky or pebbly beds, and those which take their course through alluvium.

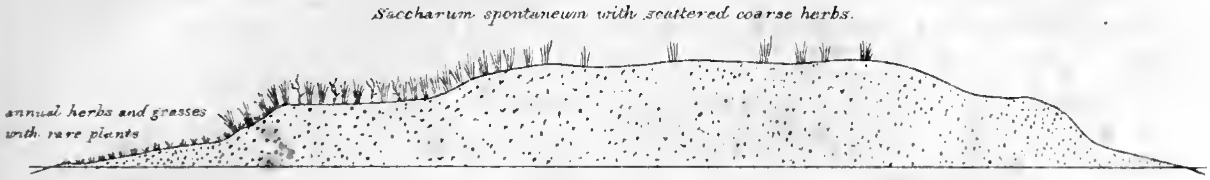
A. Vegetation of streams, etc., in alluvial lands.—The bed of streams, etc., when they enter the alluvium, have usually a sandy or clayey soil, and only the more rapid rivers carry down pebbles which are deposited according to the laws of gravity. It is on such pebbly or shingly beds, that we often find plants in the midst of alluvium, which we would not be able to find elsewhere except by entering the hilly tracts. Pebbly deposits may also be met with occasionally along the Irrawaddi, as far south as Henzadah, but the localities I passed through had no vegetation on them. Where rocks pierce through the alluvium in river-beds, of course, rock-plants (which will be described in the sequel) make their appearance, as for instance at Myoma, S. of Prome, where *Homonoya riparia* is frequently found on such rocks. The fine loose sand and clay, however, along the course of such rivers, as the Irrawaddi, Sittang, and other larger streams, bears a vegetation of an agrarian character. Where flying sand is prevailing or forms extended sand banks (and that is often the case), a grass makes its appearance before all others, and this is *Saccharum spontaneum*. It is a highly sand binding but very troublesome grass, found everywhere over the whole of Pegu and India generally. It possesses the same land-forming qualities along river banks as the mangroves, or other sand binding plants along the sea-shores, and may be compared, in this respect, with the reeds of the Danube,* and other large rivers of Europe. Few plants associate with this grass, and these chiefly towards the tidal zones where it is accompanied by such shrubs, as *Tamarix*, *Fluggea*, *Desmodium*, *&c.*,

It is especially along the edges of the rivers themselves, or along their escarpments, from whence numerous trickling springs are running down, that the true riparian vegetation is properly developed. The following are probably the most frequent riparian plants, growing on sandy or clayey soil : *Cleome icosandra*, *Polycarpum depressum*, *Bergia ammannioides*, *Ludwigia prostrata*, *Gymnopetalum integrifolium*, *Mollugo glinus*, and *M. Spergula*, *Gnaphalium-Indicum*, *multiceps*, and *crispatulum*, *Microrhynchus asplenifolius*, *Sphenoclea Pongatium*, *Heliotropium Indicum*, *Celsia Coromandeliana*, *Brassica juncea*, *Ilysanthes parviflora*, *Ageratum conyzoides*, *Ludwigia parviflora*, *Jussiæa repens* and *suffruticosa*, *Crotalaria sericea*, *Polygonum plebejum*, *Colocasia virosa*, *Bonnaya verbenaefolia*, *Lippia nodiflora*, *Chenopodium album*, *Celosia argentea*, *Vernonia cinerea*, *Polygonum possumbu*, *plebejum*, *orientale ?* etc., *Hedyotis racemosa*, *Burmanni*, and *Heynei*, *Fimbristylis pallescens*, *miliacea*, etc. *Isolepis dipsacea*, *Cyperus corymbosus*, *Pangorei*, *rotundus*, *distans*, *Jrio*, *umbellatus*, *difformis*, *polystachyus*, *dilutus*, *compressus*, *pulvinatus*, *Haspan*, *pilosus*, *pygmaeus*, *Eragrostis*, *verticillatus*, *pallidus*, *digitatus*, *Courtoisia cyperoides*, *Kyllingia*, *Crotalaria verrucosa* and *striata*, *Cotula pinnatifida*, *Ranunculus sceleratus*, *Veronica Beccabunga* with white flowers, *Rumex dentatus*, *Bonnaya veronicaefolia*, *Grangea Maderaspatana*, *Cynodon Dactylon* on drier stations, *Dentella repens*, *Portulaca oleracea*, *Mazus*, *Amarantus spinosus*, *Sphaeranthus hirtus*, *Xanthium strumarium*, several species of *Blumea*, as *B. Wightiana*, *lacera*, etc., *Eclipta alba*, *Spilanthes acmella*, *Nasturtium*, *Ficus heterophylla* especially along escarpments, *Alternanthera sessilis*, *Thespis divaricata*, *Hydrocotyle Asiatica*, *Commelyna communis*, *Aneilema nudiflorum*, and similar ones. Amongst the above-named a number of cultivated plants also settle down, such as *Nicotiana Tabacum*, *Foeniculum*, *Ricinus communis*, *Raphanus sativus*, *Physalis Peruviana*, *Datura alba*, *Gomphrenaglobosa*, etc.

Cryptogams are remarkably rare here, but along the escarpments of the large rivers, like the Irrawaddi, a purplish species of *Marchantia* or *Grimaldia* is as common, as along the Bramhapootra in E. Bengal.

* See a paper by Reisseck, in Flora, 1856, p. 622.

It is remarkable that the borders of certain sandbanks are, so to say, studded with rare plants, coming from higher latitudes or regions. Such isolated banks are met with often at great distances, and are at the same time more than others subject to be carried away by floods during the rainy season. I suppose, that it is hardly the prevalent current, which carries the seeds of such plants on to these favoured banks, while all others, although quite similarly circumstanced, are destitute of them.



Section of a sandbank.

The above sketch of a section of such a sand bank will give an idea of the configuration of the terrain, shewing at the same time, that it is the gradual, and not the abrupt, slope, along which such rare plants, as are termed more correctly *fugitives*, may be found. The sand is there usually mixed with a considerable proportion of vegetable mould.

b. Vegetation of streams, etc., with a rocky or stony bed.—The vegetation of the rocky or stony beds is restricted more to the upper parts of the streams, etc.; but those choungs that do not enter the alluvium, possess solely rock bed vegetation. Accordingly, as the course of such choungs is through leaf-shedding, or through evergreen forests, the change in the vegetation is marked by the absence or presence of xerophilous or hygrophilous plants.

On such rocky or stony beds do by preference grow: *Rungia pectinata*, *Cyclocodon truncatum* and a fine large white-flowered *Lobelia* (*L. Wallichiana*, especially on sand-stone rocks), *Pentasacme caudatum*, *Canscora diffusa*, *Rhabdia viminea*, *Lindenbergia urticaefolia* and *Philippinensis*, *Torenia parviflora and cordifolia*, *Ajuga decumbens*, *Celosia argentea*, *Cyathula prostrata*, *Pouzolzia Indica*, *Cryptocoryne spiralis*, *Lasia aculeata*, *Crotalaria ferruginea*, *Ophiorrhiza*, *Goodyera procera ?*, *Selaginella tenera* and *imbricata*, *Cyathocline lyrata*, *Pogonatherum*, *Equisetum debile*, 2 or 3 species of *Nephrodium*, several species of *Elatostemma*, *Plectranthus*, *Polypodium pteropus*, *Gymnopteris*, *Adiantum lunulatum*, *Trichomanes Javanicum*, *Hymenophyllum*, some species of *Eragrostis*, *Cyperi sp.*, *Polygonum*, *Asplenium esculentum*, *Thyssanolaena acarifera*, *Dysophylla*, etc.

Between the rocks, growing on the pebbly gronnd, many a shrub settles itself in spite of the torrents during the rains. Such are *Salix tetrasperma*, *Sarcochlamys pulcherrima*, *Cassia palmata*, *Ficus ischnopoda* and another allied species, *Homonoya riparia*, *Debregeasia velutina*, *Bohmeria Malabarica*, *Eugenia contracta ?* and a few others.

When the course of such choungs leads through evergreen forests, the rocks and boulders are usually covered by cryptogams, such as *Marchantia*, *Metzgeria*, *Fissidens*, *Hypnum* and other species, between which grow several species of *Elatostemma*, *Selaginella semicordata* and *tenella*, *Trichomanes*, *Hymenophylla*, etc.

Certain trees also shew a particular predilection for such hill streams, like *Eugenia macrocarpa*, *Macaranga Indica*, *Cassia Timorensis* (*mayzelee*) *Bischoffia Javanica*, *Erythrina lithosperma*, *Euphorbia antiquorum ?*, and *neriifolia*, a white flowered *Ixora*, *Ficus glomerata* and *macrophylla*, *Dillenia Indica*, *Gunizanthus*, *Cassia palmata*, *Calamus arborescens*, *Trewia nudiflora*, and others.

A curious ochre-yellow *Alga* (*Leptothrix ochracea*,) is met with frequently in many localities of hill choungs, protruding from amongst soft sandstone or moist walls of the same rocks forming sometimes a soft jelly-like mass, half a foot thick, which on closer microscopical examination is found to be composed of very thin fragile filaments, giving a peculiar amianthlike structure to the slabby mass.

Other ochre or rust-coloured matters are frequently seen in and along the numerous trickling wells of the alluvium, floating like an oily sheet on the surface of stagnant little pools, encrusting the plants growing in the neighbourhood, or depositing themselves on the ground. These substances, however, are possibly nothing but iron oxydes, sometimes transforming into what is called Rasenerz. Only Diatoms are found in such places, but rarely other Algæ.

B.B.—Vegetation of the swamps and waters.

I will now refer to the vegetation that grows in a medium of sweet or salt water. Most of the water plants, however, root in the ground, and derive therefore their nourishment from the soil, in which they grow. Comparatively few of these are suspended, either floating or submerged, and only these may fairly be said to derive their nutriment from the water in which they vegetate.

But as the water is the element which effects the growth of such plants, I shall make in future no distinction between these two modes of attachment, but treat them simultaneously.

Many of the water plants are amphibious, *i. e.*, they grow both in water and on land, and consequently often change their habits. Such amphibious plants afford ample material for those who desire to study the variations of plants.

As a first division of the aquatic formation I shall take the vegetation, peculiar to sweet waters, in contradistinction to those of brackish and seawaters. The brackish waters cause to a certain degree a transition of the fresh water vegetation into the tidal vegetation.

12.—*Sweet-water-vegetation.*

The vegetation of the fresh or sweet waters might be divided into vegetation

- *a.* of swamps.
- *b.* of lakes and other stagnant waters, and,
- *c.* of running waters, such as rivers, etc.

The first named connect, as already mentioned, the land and water vegetation.

a. Vegetation of swamps, etc.—True swamps and morasses in India should be only such as are inundated also during the dry season, those that dry up are rather low inundated lands which have already been treated under 10 *b*. Sometimes *Phragmites Roxburghii*, and another species, form a sort of jungle in shallow swamps that are destitute or nearly so of other grasses. They more often, however, consist of low grasses and water plants, almost identical with those of the low moist pastures. These are *Hymenachne interrupta*, and *myurus*, *Paspalum scrobiculatum*, *Anosporum cephalotes*, *Cyperus pallidus* and other species, *Panicum crus galli*, and *colonum*, *Leersia hexandra*, and sometimes also wild rice. *Ipomoea reptans* is almost everywhere a companion of the above grasses, along with several species of *Fimbristylis*, and *Eleocharis*, *Ludwigia parviflora*, *Jussiaea repens* and *suffruticosa*, *Hygrorhiza aristata*, *Oenanthe stolonifera*, *Rungia repens*, *Marsilea erosa*, *Commelyna communis*, *Centrostachys aquatica*, *Sesbania paludosa*, *Aeschynomene Indica*, *Neptunia oleracea*, *Sagittaria sagittifolia*, *Butomus lanceolatus*, *Monochoria hastata*, *Cyanotis axillaris*, *Floscopa paniculata*, *Lasia aculeata*, *Enhydra fluctuans*, *Eriocaulon*, *Hygrophila salicifolia* and *longifolia*, *Dysophylla verticillata*, several species of *Utricularia*, a small creeping *Hydrolea* and similar water plants.

Lower Algae and Diatoms are chiefly found amongst the floating roots and branches of these water plants, and a few *Zygnemaceae*, especially the common species of *Spirogyra*, cover the ground. Often enough, however, the water remains quite clear.

b. Vegetation of lakes and other stagnant waters.—Mountain lakes are very rare in Burma but a few are to be found in the Martaban hills. Those in Pegu are mostly alluvial lakes, often of a very doubtful character. In the diluvial zone several lakes are met with, of which perhaps the one near Rangoon is the largest. The low land lakes are very numerous indeed ; some of them are rather large ; the greater part, however, form only small expanses, sometimes not larger than a middle sized tank.

If they possess muddy water, as is often the case in the Irrawaddi alluvium, especially in the tracts of savannah forests, little is seen of water plants, and even Diatoms are very scarce. But if the water is of a clearer quality, a profusion of water plants, fixed as well as floating, inhabit the lakes.

Attached to the ground we find a species or two of *Nitella* in abundance ; also further *Ceratophyllum tuberculatum*, *Myriophyllum*, *Nymphaea Lotus*, and sometimes *stellata*, *Nelumbo nucifera* locally, *Blyxa*, *Villarsia cristata*, and *Indica*, *Aponogeton monostachyum*, *Najas minor*, *Hydrilla verticillata*, *Nechamandra alternifolia*, *Vallisneria spiralis*, *Ottelia alismoides*, *Sagittaria*, etc. Further *Utricularia flexuosa*, *diantha*, and 2 or 3 other species, *Neptunia oleracea*, *Ipomoea reptans*, *Jussiaea repens*, *Hygrorhiza aristata*. Of floating plants the following deserve special mention : *Pistia stratiotes*, *Salvinia cucullata* and *natans*, *Azolla pinnata*, *Lemna paucicostata*, *polyrrhiza* and *tenera*, *Wolfia arrhiza*, 2 or 3 species of *Riccia*, etc.

Algae are found plentiful in such clear lakes, especially when they are of small size, floating as well as attached to the water plants. Amongst the labyrinth of these plants numerous Diatoms can be collected, and beautiful forms of *Desmidieae*, of which especially *Closterium*, *Cosmarium*, *Pediastrum* and similar genera are very rich in species.

Such shallow lakes, when in sunny open localities, are often covered by a green, and not seldom also by a brick-coloured scum which, on microscopical examination, turns out to be no Alga at all, but animalculæ (chiefly *Euglena viridis* and *sanguinea*). They often also occupy the swamps, above referred to, and develope themselves there so prodigiously that (especially the brick-coloured species,) they form sheets of coloured matter of several hundred square feet, which entirely hides from view the water beneath, and attracts the attention even from a distance of several miles.

The green colour, so often adduced in introductory outlines of botany as a character for fresh water algae, is in India of little avail, for not a few animalculæ of the most vivid locomotion have here an intense green colouring. Smaller or larger patches of a lovely emerald green matter misled me repeatedly, although I had ascertained it on former occasions that they consisted only of colonies of a beautiful emerald green *Vorticella*.

c. *Vegetation of running waters.*—The vegetation of running waters is so poor in Pegu, that I cannot mention a single phanerogamic plaut, which might be rightly brought under this head. The cause of this deficiency is to be found partially in the fact, that most of the choungs dry up to such an extent, that no water plants can sustain themselves permanently; also, that most of the supposed species which inhabit running rivers are nothing but elongated varieties of well known forms. Such elongation of water plants takes place in Pegu, especially along the currents that traverse the swamps and inundated rice-fields, where we see many of the plants lengthened to an unusual extent, their foliage following the same direction of growth. Such elongated forms occur especially among *Alismaceæ*, *Eleocharis*, *Isolepis*, etc.

The larger rivers of the plains may be destitute of them, because the soft alluvium does not favour their growth. But whatever may be the true cause, all phanerogamic plants, that I have seen (during the dry season) in choungs etc. were restricted to such parts of these choungs, as formed stagnant pools or water courses, such as are called on the continent, old waters. Of cryptogamic plants, however, Algae are frequent enough, and 2 or 3 species of *Spirogyra*, *Oscillaria*, etc. attach themselves often to the rocky ground, elongating in consonance with the rapidity of the waters. Brown gelatinous patches of Diatoms, too, are frequently met on the ground of such running waters, with such Algae, as *Anabaena*, *Staurospermum*, etc.

13.—*Saltwater-vegetation.*

The phanerogamic vegetation is poorly represented in the brackish waters, and becomes almost extinct in the sea, where sea weeds find their home.

We may first treat the vegetation of the brackish or tidal waters, and then that of the salt waters.

a. *Vegetation of the tidal swamps, lakes, etc.*—The vegetation of the tidal waters, whether running or stagnant, remains much the same; the cause of this lies no doubt in the movements to which both are subjected by the influence of the tides. However in sheltered stagnant pools the vegetation is more crowded, while along the channels, it is restricted to the borders. Of phanerogams are only such plants still found, as grow in the ground. I never met with a freely floating phanerogam except where the water had become so sweetened by the rains as to allow of a transition to sweet-water vegetation. Besides the plants I alluded to, when treating of the tidal forests and which I referred to as land-vegetation, I can only sum up the following few plants, which occurred to me in truly brackish waters in the tidal zone of Pegu, viz. a *Nitella ?* *Ceratophyllum* and, but very rarely, a *Potamogeton*.

Algae, of course, are plentiful, but as the deltas of the Pegu rivers (at least so far as I have explored them)* are formed of alluvium, they find no proper substratum to which to attach themselves, and are generally poor in species. They are found, (in the absence of rocks, etc.) chiefly on the roots and on the lower submerged part of stems of trees, as also on floating or submerged wood and branches, while others attach themselves to water plants and riparian grasses. *Diatomaceae*, *Zygnemaceae* and similar lower Algae are found also on the soft mud. It would be idle to sum up the species of marine and tidal *Algae*, that are found here, for they are the same as those which will be mentioned when treating the vegetation of the sea itself. The marine Algae, however, do not go so far up the Pegu river, as they do on the Ganges. Although *Hypoglossum* does inhabit the piles of wharfs at Rangoon, it is very rare there, while in the salt lakes, near Calcutta, a great profusion of marine Algae is met with.

b. *Vegetation of the sea.*—The vegetation of the sea in Pegu presents no phanerogams, and the only two pelagic phanerogams I know in Burma, are *Enhalus acoroides*, frequent along the coasts of the Andamans along shallow shores on sand-stone grounds, and a little plant (*Halophila Beccarii*) growing submerged on sand in dense patches in a saltwater channel near the flag-staff at Akyab.

The amount of mud in the river-water that is carried into the Martaban gulf is so enormous, that for more than 30 miles from the shores of Pegu, no truly marine vegetation can support itself, for the sea water is so sweetened and discoloured, that it resembles more a tidal water. The number of sea weeds is therefore small and restricted to the shores, where they grow analogically to those found in the tidal waters.

The sea is divided by phycologists in a similar manner as the land, into zones and regions. As a zone, the seas about Pegu belong to the Indian ocean. The depth of the sea

* Towards Bassein laterite crops out in the alluvial delta, and there we may naturally expect a more favourable harvest of Algae.

is divided in a descending order into the following regions (called usually bathymetrical regions) the littoral, circumlittoral, median, infra-median and deep sea region. The coasts of Pegu belong all to the littoral region, and the most common forms are here *Chthonoblastus, Polysiphonia,* and *Phycoseris, Catenella opuntia, Bostrychia, Caloglossa, Hypoglossum, Gongroceras, Vaucheria* and *Campsopogon.*

On the mud along the line of the ebb at Elephant point and other places, South of Rangoon, larger or smaller brown or yellowish patches are seen, consisting of a jelly-like matter or of threads often 2 inches long. These consist chiefly of Diatoms, such as *Amphitetras* or *Isthmia, Homœocladia.*

II.—VEGETATION OF CULTIVATED OR LATELY CULTIVATED LANDS.

I have thus treated of the vegetation of Pegu, as it presents itself in a supposed original state, and will now refer to the plants that are cultivated, and also (cursorily) to the plants that are found associated with them, or which spring up in such places, where cultivation has either been neglected or given up altogether.

As we are now tolerably acquainted with the original flora, the vegetation of cultivated or lately cultivated lands can easily be understood by assuming, that by far the greatest bulk is from the surrounding forests, etc., while only a small fraction has been introduced either by man or by other instrumentalities.

A classification of cultivated or neglected lands is not expedient, and I will only separate some of the more marked varieties to facilitate the treatment of such lands in a more concise form.

I shall, therefore, introduce the following three topics :—

1. Vegetation of agrarian lands.
2. Vegetation in and around villages.
3. Naturalized plants.

1.—*Vegetation of agrarian lands.*

The vegetation that springs up on agrarian lands, while under cultivation, varies sometimes with the crop that is grown on them, but this variation is reducible to causes affected by the amount of irrigation to which such lands are subjected, and it is natural, that rice fields, etc., during inundation will produce water and swamp plants, while in tobacco, sun or other dry fields the usual garden weeds spring up. I shall therefore make no distinction between the various crops. But there is a certain change in the species of weeds observed in the two chief zones, viz., the Prome and Pegu zone, and such aberrations we shall have to keep in view.

I shall divide all culture in Pegu into two categories, corresponding with the 2 principal modes of cultivation, viz., the hill rice and the usual low land rice cultivation ; and I will treat such lands as :

a. Upper agrarian lands.
b. Lower agrarian lands.

a. Upper agrarian lands.—The upper agrarian lands are known in Burma generally under the denomination of *toungyas.* If I call them upper agrarian lands, I do not necessarily mean that they occupy hill tracts ; they may be situated also on level lands, if the substratum is rocky, and the alluvium sheet, resting on it, is of no great depth. The plants that are cultivated on such lands are various, but hill rice is the principal crop. Besides this smaller toungyas are prepared by the natives, on which they cultivate a number of plants, useful for their household. These are rarely planted separately but are curiously mixed, although not without a certain degree of order. Such plants are especially, *Lagenaria vulgaris* (boo hseu sway) ; *Luffa acutangula* (tabwot) ; *Benincasa cerifera* (kyouk phayung); *Momordica charantia* (yinga or kyet hen kha) ; *M. dioica* (sabyet) ; *M. Cochinchinensis* (samong nway) ; *Cucumis sativus* (tha-kwadee) *Cucumis melo* (tha-kwamhae) ; *Citrullus vulgaris* (pharai) ; *Cucurbita moschata* seldom (shway pha-yung) ; *Carum Roxburghianum* (kambaloo) ; *Peucedanum sowa* (tsameik) ; *Capsicum minimum* (nayook) ; *Morus Indica* (posa) ; *Coix Koenigii ?* (gyeit) ; *Andropogon sorghum* (pyoung-gyan) ; citroon grass (tsabalin) ; *Nicotiana Tabacum* (tabin or hsæ) ; *Zea mays* (pyong) ; *Solanum melongena* (kayan) ; *Coix lacryma* (kalethee) ; *Sesamum Indicum* (hnan) ; *Lycopersicum esculentum* (khayan mya phung) ; *Datura alba* (padaing katha) ; *Chavica Betle* (kwon rwet) ; *Batatas edulis* (kazwoon) ; *Arachis hypogaea* (myæ boi) ; *Cajanus Indicus* (pæzin goong) ; *Ricinus communis* (kyessoo) ; *Carica papaya* (thing boi) ; *Trichosanthes anguina* (pailen mwæ) ; *T. cucumerina* (thabwot kha) ; *Dolichos Lablab,* (pai) ; *Hibiscus Surrattensis* (wetma chimboung) ; *H. Sabdariffa* (chimboung nee) ; *H. Abelmoschus* (baloo wa) ; *H. esculentus* (yung ma dhæ) ; *Gossypium herbaceum* (wa) ; *Brassica juncea* (mung-nyen) ; *Lepidium sativum* (sa-mung-nee) ; plantains, divers varieties of *Dioscorea ; Eleusine Coracana ; Setaria Italica ;* sugarcane ; *Solanum ferox* and *S. trongum ; Pachyrhizus angulatus,* and similar plants.

The Karens usually plant mulberry, with *Solanum melongena*, *Hibiscus*, *Andropogon Sorghum*, *Nicotiana Tabacum*, *Sesamum Indicum* and such like together on one field, or plant a little of everything on smaller hill fields, etc.

Amongst these crops are seen coming up: *Cleome icosandra*, *Gynandropsis pentaphylla*, *Portulaca oleracea*, *Triumfetta angulata*, *Corchorus acutangulus* and *capsularis*, *Oxalis sensitiva* and *corniculata*, *Ammannia pentandra*, *peploides*, and *baccifera*, *Thladiantha dubia*, *Hemiadelphis polysperma*, *Gnaphalium multiceps*, *Solanum nigrum*, *Celosia cristata*, *Ageratum conyzoides*, *Solanum torrum*, *Indicum*, and *verbascifolium*, *Achyranthes aspera*, *Kyllingia*, *Blumea Wightiana*, *runcinnata*, *pterodonta* and *aurita*, *Sida acuta* and *rhombifolia*, *Buddleia neemda*, *Vernonia cinerea*, *Amaranthus sanguineus* and *spinosus*, *Lindenbergia macrostachya*, *Ipomoea vitifolia*, *Eleusine Indica*, *Nelsonia origanifolia*, *Gossypium herbaceum*, *Desmodium triquetrum*, *Strobilanthes auriculatus*, and *scaber*, *Ardisia Wallichiana*, *Spilanthes acmella* and *paniculata*, *Cylista scariosa*, *Argyreia*, *Thunbergia laurifolia*, *Luffa cylindrica*, *Rungia pectinata*, *Strobilanthes glaucescens*, coarse *Cyperi*, *Onychium auratum*, *Pteris longifolia* and *Cretica*, *Ficus heterophylla*, and similar plants.

At higher elevations in the Karen hills, *Strobilanthes flaccidus* is often seen cultivated for its dye. There appear also many plants of higher elevations on those hill toungyas, which are wanting in the Yomah, such as *Sonchus arvensis*, *Youngia lyrata*, *Scirpus mucronatus*, *Eleocharis tetraquetra*, *Clerodendron infortunatum*, *Rubus Moluccanus*, and *rosaefolius*, *Conyza absinthifolia*, *Alectra Indica*, *Gnaphalium hypoleucum*, and numerous others.

The trees that have been felled and burnt previous to the formation of such toungyas, are usually not completely burnt, but many of these logs, seriously damaged and scorched by fire, are scattered on the ground. The stumps of the felled trees are also seen sticking out everywhere, and often throw out numerous shoots that grow up again into trees.

After the harvest has been brought in, these toungyas are left to themselves for the next 8 to 12 years, by which time they become, as a rule, converted again into young forests. These are then considered by the Karens to have become "strong" enough to yield a sufficient amount of alkalies, etc., for another routine of hill rice culture. They are seldom kept under cultivation for a second year, and then no rice is cultivated, but only cotton, mulberry, and such like, along with the usual culinary vegetables.

After such toungyas are completely abandoned, they are called toungyas poonzoh, or briefly poonzoh: deserted toungyas. The vegetation in the next season is usually not much changed on such poonzohs. The crops that stood on them have of course disappeared, but stragglers are still plentiful, and the usual weeds of cultivation get the supremacy. The second year, however, the scene changes altogether. The whole poonzoh becomes covered by certain weeds that have got the supremacy over the others, such as *Conyza balsamifera*, *Blumea lacera*, *runcinnata etc.*, *Conyza viscosula*, *Solanum torrum* or *verbascifolium*, *Sida*, *Vernonia cinerea*, *Achyranthes aspera*, *Triumfetta angulata*, *Ageratum conyzoides*, *Triumfetta annua*, *Lygodium scandens*, *Paederia tomentosa*, *Buddleia neemda*, *Flüggea*, *Urena lobata*, *Centotheca*, etc. Such is the case especially in the level tracts, but in hilly parts coarse grasses spring up which supersede all other herbaceous growth, and these are chiefly *Thyssanolaena acarifera*, *Saccharum spontaneum*, *Androscepia gigantea*, and *Coix heteroclita*. Bamboos appear only when in the surrounding forest tracts the bamboos flower and fruit at the time when such toungyas become deserted. One cannot pass such deserted toungyas without being troubled by such plants, as *Urena*, *Triumfetta* (especially *T. annua*), *Desmodium polycarpum*, *Centotheca lappacea*, and *Chrysopogon aciculatus*, the fruits of which adhere firmly to the clothes. These, as well as the stiff fragile hairs on the sheathes of *Coix heteroclita*, cause a great deal of irritation to the skin when one has to penetrate such dense grass-jungles.

The grasses, above named, rapidly expel all the weak weeds, and only shrubs and seedlings of the more frequent trees can overtop these powerful intruders, until they have grown up high enough, to check the further growth of coarse grasses by their own shade.

The trees that seemed to me most frequently to come up on deserted toungyas are *Anogeissus acuminatus*, *Lagerstroemia macrocarpa* and *tomentosa*, *Premna pyramidata*, *Ficus hispida*, *Nauclea sp.* (maoo letshok), *Dalbergia purpurea* (thit-poh), *Nauclea Brunonis*, (bingah), *Spondias pinnata* (Gway); *Ficus cuniata*, *Duabanga grandiflora*, *Nauclea sericea*, *Spathodea*, *Bombax*, and such like: these are all light-loving trees. In the Karen hills many others appear, like *Sponia velutina*, *Schima*, *Hibiscus vulpinus*, *Croton oblongifolium*, *Lantana arborea*, and others; while in higher elevations above 3000 feet, numerous trees from the drier hill forests appear, amongst which especially *Eurya*, *Ficus hirta*, *Nelitris paniculata*, and *Ternstroemia Japonica*, are most abundantly met with, along with such undergrowth as *Pteris aquilina*, *Androscepia*, *Clerodendron infortunatum*, *Jasminum linearifolium*, *Hedyotis scandens*, *Asparagus curillus*, etc.

I could trace no rule by which trees might be classed that grow up in poonzohs. Any tree from the surrounding forests can spring up, either singly or in numbers, and those that grow best are always such as probably grew before the formation of such toungyas. Light-loving species are always such as appear first, while the feeble* evergreen trees, as a rule, grow up only after those lofty leaf-shedding trees of the evergreen forests (which I have already enumerated when treating of these forests) have attained a height sufficient for their shelter. At elevations, however, above 3000 feet, this rule falls to the ground, inasmuch as here no more leaf-shedding forests establish themselves on account of the increased moisture of the atmosphere. Therefore we may safely assume, that poonzohs, as a rule, revert into forests, either identical with, or very similar to, those forests that existed on them before cultivation commenced.

I have above alluded to bamboos, and stated that bamboos appear on deserted toungyas only when the surrounding bamboos in the forests are fruiting. Another reason why bamboos do not overgrow such deserted toungyas in the first year that they are left to themselves, may be, that the Karens avoid as much as possible planting rice in localities, where bamboos are expected to come into flower. The true reason for this practice is, I think, because wandering rats increase in jungles containing fruiting bamboos to such an extent, that it is known that whole toungyas have had to be given up to these voracious creatures. When the new leaf-shedding forests have grown up sufficiently, young bamboos are regularly seen, as soon as the coarse grasses have disappeared. I do not think, however, that the seeds of such bamboos were buried and slumbering all the time, but should rather suppose that in the meanwhile bamboos in the neighbourhood had come into fruit.†

b. Lower agrarian lands.—By the term lower agrarian lands I understand all such fields, no matter whether growing rice, tobacco, maize, sun, or others, that are formed on alluvial lands. Many of them are during the rains more or less inundated, especially the rice fields. The crops that are chiefly raised on them are the common water rice *(Oryza sativa)*, *Phaseolus mungos* (bhæ nan) ; *Crotalaria juncea* (paik hsan), *Cicer arietinum* (Kula pai) ; *Raphanus sativus* (mungla) ; along with all those plants already mentioned as growing in the upper agrarian lands, hill rice and mulberry excepted.

In the Prome district, and rarely also in the Irrawaddi zone, we find also fields of *Melilotus leucanthus*, *Carthamus tinctorius* (hsoo) and *Indigofera tinctoria* (mai nai).

Besides these we meet frequently on fields : *Apium graveolens (sa-mwot) ; Pachyrrhizus angulatus ; Cyamopsis psoralioides* (pai-pa-soon) ; *Brassica oleracea ; Colocasia esculenta ; Coriandrum sativum, Lablab vulgaris, Batatas edulis ; Amarantus oleraceus ; Allium porrum* and other species ; *Lepidium sativum ;* 2 varieties of sugarcane, sometimes *Pisum sativum* (pai) ; *Physalis Peruviana* (pung) ; *Canavalia gladiata* (pai-noung-nee) ; *Psophocarpus tetragonolobus* (pae zom gyah), and possibly some more.

On inundated fields we see chiefly the following plants amongst the crops : *Fuirena ciliaris, Fimbristylis miliacea, Scirpus juncoides, Cyperus distans, Iria, umbellatus, difformis, dilutus, compressus, pulvinatus, Haspan, pygmæus, Eragrostis verticillatus, cephalotes,* etc., *Courtoisia Kyllingioides ; Leersia hexandra, Isolepis* 2-3 species ; *Eriocaulon ; Xyris ; Ludwigia parviflora ; Sphenoclea Pongatium, Dopatrium junceum, Commelyna communis, Pontederia* etc. etc. Submerged in the water itself a *Nitella* along with some *Utriculariæ* are not unfrequent.

After harvest these fallow fields become (at least in lower situations) usually peopled by numerous plants, that supersede more and more the annuals‡ of the rainy season, forming a kind of soft pasture until the hot season fairly sets in, when they turn as dry and barren as those which are situated higher up. Grasses and sedges are then here, as everywhere, the predominant plants, but are however, like all other plants here, short-lived, such as for instance the soft tender *Isachne* often covering some fields almost exclusively, *Diplacrum caricinum, Fuirena ciliaris, Fimbristylis pallescens, miliacea, diphylla* and *ovalis ; Kyllingia, Abildgaardia monostachya, Cyperus rotundus,* and other species, *Elythrophorus articulatus, Dactyloctenium Aegyptiacum, Eleusine Indica, Arundinella avenacea* and *agrostoides, Chaetocyperus setaceus, Scirpus juncoides, Isolepis* and *Eleocharis, Panicum colonum, Courtoisia cyperoides, Andropogon pertusus, Eragrostis, Ischaemum rugosum, Paspalum scrobiculatum, Panicum sanguinale* and *ciliare, Setaria glauca* and such like. To these associate themselves *Vandellia crustacea, Scoparia dulcis, Dysophylla auricularia* and *verticillata, Digera arvensis, Dentella repens, Eriocaulon Wightianum* and other species, *Emilia sonchifolia, Adenosma biplicata, Hemiadelphis polysperma, Utricularia Griffithii* and 2 other species, *Stylidium Kunthii, Drosera Indica,* 3 species of *Xyris, Lobelia trigona,* several species of *Limnophila,*

* I call them *feeble* evergreens, but under the shade of other trees, they become *powerful*, inasmuch as they attain altogether the supremacy, sparing only those leaf-shedding trees, which are able to grow up lofty enough to escape the injurious effects of the deprivation of light which they cause.

† It is really astounding, that after all the various depredations, to which bamboo seeds may be exposed, the ground is still so densely covered by seedlings, as to appear more like a meadow. The struggle for supremacy must be fierce, for full-grown bamboo clumps grow at several feet distance from each other, so that at least a hundred seedlings had to be extirpated to give place to a single clump.

‡ Many of them are better called 4 to 5 monthly plants, for that is the period they require to complete their cycle of life. On very sterile ground, as for instance on brick or stone paths, sands, etc., many of the plants like *Ageratum, Bonnaya,* etc., remain pygmean, often reduced to 2 or 3 little leaves only and a single flower. In such cases 1 or 2 months are the period in which they flower, fruit and die.

Aneilema nudiflorum and *ochraceum*, *Burmannia juncea*, *Mitrasacme Indica*, *Urena*, *Ageratum conyzoides*, *Triumfetta angulata*, *Osbeckia chinensis*, *Geissaspis cristata*, *Butomus lanceolatus*, a prostrate *Hydrolea*, and amongst others chiefly such as I have mentioned as occurring along the banks of alluvial rivers.

The fields on lands situated higher up soon parch up and become cracked in all directions with the increasing dryness and heat of the hot season. Other plants then make their appearance, of which the following are the chief : *Coldenia procumbens*, *Vandellia crustacea*, *Polygonum elegans*, *Crozophora plicata*, *Dentella repens* in sheltered fissures, *Scoparia dulcis*, *Lippia nodiflora ; Gnaphalium crispatulum*, *Microrhynchus asplenifolius*, *Hemiadelphis polysperma*, *Sphaeranthus hirtus ; Grangea maderaspatana*, *Athroisma laciniatum*, and a few scattered grasses, like *Dactyloctenium*, *Chrysopogon aciculatus*, *Andropogon pertusum*, *Cynodon* etc., which during this period must give a scanty pasturage to cattle.

In the dry Prome zone not a few other plants appear together with the above, such as *Monenteles spicatus*, *Sphaeranthus amarantoides*, *Psoralea corylifolia*, etc.

2.—*Village-vegetation.*

If I speak here of the vegetation of villages and of native gardens, I do not intend to give a picture of a Burmese village, with its trees, shrubberies, and gardens. It is not necessary for me to describe the houses of the Burmans, which are so like those of the Javanese, that the similarity of these two nations in their household, in their character and clothing, becomes still more striking to one who has lived amongst both. I have only to note what trees, shrubs, and other plants, are generally seen here, and how they grow.

Many perhaps may object to the inclusion under this head of the vegetation of waste places etc., but any one who examines the neglected gardens of Burma will find no great difference between them and waste places ; in fact, I have made this division a sort of lumber-room, in which I may collect all that does not appear to me sufficiently important to deserve special consideration.

a. Native gardens, waste places, etc.—I begin with native gardens, because they shew the greatest resemblance to agrarian lands treated in the former section, and are, at the same time, often nothing but toungyas on a smaller scale. The gardens of the Burmans rarely deserve the name, and are best compared with Kitchen-gardens, wherein vegetables are grown along with a few favourite flowers or medicinal plants.

All the plants, that are found in toungyas, are also here represented, and it would be idle to sum up again the plants already enumerated when treating of agrarian lands.

In the Rangoon district we meet with extensive gardens of bananas (nanat), which are chiefly raised in shady orchards of Jack-trees, and beautifully they grow there on the laterite, for it is this formation which produces also in Singapore and Banca the most delicious fruit.

The Burmans usually plant in such gardens a few of their favourite plants and flowers in a single row, or in a few rows, before their houses. Such plants are chiefly *Ocymum sanctum* (pein zein) ; *Elsholtzia blanda* (yoon boay) ; *Celosia cristata*, yellow variety (Kyemoukwa) and purple variety (Kye man) ; *Cassia alata* (thin bou mayzelee) ; sometimes *Acorus Calamus* (len hae) ; *Canna Indica* (budda tharana) ; *Pardanthus Chinensis* (thet sa) ; *Plumbago Zeylanica* (Ken-khyouk-phyoo) and *P. rosea* (Kangyoup nee) *Gendarussa vulgaris* (bawa-net) ; *Vinca rosea* (themban ma hnyo ban) ; *Gomphrena globosa* (mo nhyo) ; *Mirabilis Jalapa*, diverse varieties (myæ zu) ; *Quamoclit pinnatum* (myat læ nee) ; *Datura alba*, and *Tatula ; Passiflora* (a-tha-wadee) ; *Clitoria ternatea* (bu-gyee) ; *Impatiens Balsamina* (pan-sheet) ; *Bryophyllum pinnatum* (ywet-kya-pen-pouk) ; *Zinnia ; Graptophyllum pictum ; Pyrethrum Indicum, Tagetes ; Coreopsis ;* and others. Of shrubs and little trees we see frequently *Nyctanthes arbor tristis* (hseik-baloo) ; *Hibiscus rosa Sinensis* (Khoung-yan) ; *Lagerstroemia Indica ; Quisqualis Indica* (daway-hmaing) ; *Rosa centifolia* (hnen hsee) ; *Calotropsis gigantea* (ma-yo) ; *Morinda citrifolia* (nyan gyee) ; *Allamanda cathartica* (pha-young-ben) ; *Calpicarpum Roxburghii* (sa-lat) ; *Cassia glauca*, *Cassia alata* (mayzeleegyee) ; *Vitex trifolia ; Ixora Bandhuca*, etc. ; *Hamelia*, *Nerium odorum ; Cordyline atropurpurea*, *Caesalpinia pulcherrima* (doung-souk) ; *Lawsonia inermis*, (dan) ; *Pandanus odoratissimus* (tsattapoo) ; and some others.

The Karens, too, are fond of certain flowers, and in most of the toungyas, often situated in the remotest out-of-the-way corners of the Pegu Yomah, are seen especially *Celosia cristata*, *Gomphrena*, *Tagetes*, *Plumbago*, etc.

In European gardens, and in those of more wealthy Burmans, are often seen a number of European vegetables, such as *Cichorium Endivia*, *Lactuca sativa*, *Brassica oleracea* and *Rapa* (chiefly Kol and Kolrabi), *Daucus Carota*, *Beta vulgaris*, *Spinacia oleracea*, *Pisum sativum* and such like. These thrive well here during the cold and hot season, especially in the drier districts like Prome. Potatoes have also become a favourite object of cultivation with Europeans. Major Lloyd informed me that in the Sittang valley of his district (Tounghoo) any amount of potatoes can be raised for the supply of the Commissariat Department. I consider it out of the scope of this report to dwell upon the ornamental plants and trees, introduced and cultivated by Europeans.

b. Village-vegetation.—The principal trees, rarely missed in larger Burmese villages, are mango-trees (thayet); tamarinds (magyee); *Moringa pterygosperma*, (dandalone); *Carica papaya* (them-ban-thee); *Citrus decumana* (shouk-tung) and the sweet and acid limes *(Citrus nobilis)* such as shouk-lieng-mau, shouk-kyo, and thau ba ya shouk, *Sesbania grandiflora* (pouk-pan) and *S. Aegyptiaca* (yæ-thoo-gyee); *Psidium Guava* (mhaulaka), diverse species of bamboo, varying according to the zone in which the village is situated, *Mesua ferrea* (gan-gau); *Sandoricum Indicum* (thit toh); *Artocarpus integrifolia* (peing-nay); *Ficus cordifolia; Pithecolobium bigeminum* (Gway danyin); *Corypha umbraculifera* (paë); *Cocos nucifera* (ung); *Borassus fabelliformis* (htan). The following are also frequently cultivated: *Phyllanthus (Cicca) distichus*, (thembon hzee phyu); *Achras sapota* (thwo-la-bat); *Averrhoa carambola* (soung-ya); *Cassia florida, Anacardium occidentale* (thee-ho-thayet); *Mimusops Elengi* (Kha-ya); *Plumieria acuminata* (ta-joke-sa-ga); *Areca catechu* (Koon-thee); *Bixa Orellana* (theed-in); *Aegle marmelos* (oak-sheet); *Croton oblongifolium* (thathyin); *Dillenia Indica* (thabyoo); *Melia azadirachta* (thimbou tamakha); *Michelia champaca* (sagga); *Anona squamosa* (orza); *Ochrocarpus Siamensis* (tala phee); *Baccaurea sapida* (Karnasoo); *Citrus Hystrix* (shouk pouk); *C. medica* (shouk thakwa); *Feronia elephantum* locally (hman); *Zizyphus jujuba* (tsee); *Euphoria Longana* (Kyet mouk); *Acacia Farnesiana* (nanlung Kyeing); *Lagerstroemia flos reginae* (peema); *Bouea oppositifolia* (mayan); *Spondias pinnata*, (gway); *Pterocarpus Indicus* (padouk); *Bauhinia purpurea*; *Thevetia neriifolia*. *Artocarpus Lacoocha* (myouk-loke); *Nephelium hypoleucum* (Kyet-mouk); *Eugenia Jambos*, and *aquea*, *Calophyllum inophyllum*, (phung-nyet).

Such are the trees we meet principally in villages, in Pegu proper, but if we enter the Prome zone, many of these disappear altogether, and some others replace them, such as *Parkinsonia aculeata*, *Punica granatum*, *Melia azedarach*, etc.

All the trees named grow quite wild and without any order, except when they are planted around the numerous Kyouks (monasteries) of poungyees. In this casesome sort of arrangement can be detected. It is here, around such Kyouks, that gardening first commences, for hardly is a village established, when trees are seen planted along with favourite shrubs and flowers around these Kyouks.

Several of the fruit trees are cultivated in greater numbers so as to form orchards, and there can be seen occasionally orchards of Jack, Lime or Papaya trees. The plantains should also be reckoned here, as they may be fairly said to be the most extensively cultivated of all other fruits. Only 8 varieties of plantains have occurred to me,—a small number when compared with that of Java, where there are about 70 to 80 sorts.

In the Prome district, where all vegetation is regulated by the presence of lime and a hot and dry climate, we see extensive orchards of custard-apples (orza), which cover a great part of the low hills around Prome itself. The *Aegle marmelos* (oaksheet) is also found here in greater numbers than anywhere else. The htan *(Borassus flabelliformis)* is so abundant, as to form the principal feature in the landscape.

In the Martaban hills, E. of Tonghoo, plantations of *Areca catechu*, on which betle is trailed, are very frequent along small feeders of choungs. The Karens understand very well how to irrigate these plantations by draining the waters of these chounglets, so that they form a whole network of shallow running rivulets, through which, with lowered temperature, the evaporation is caused to increase so much, that at elevations far below 1000 feet a number of high level plants spring up like weeds. Such are *Bidens pilosa*, *Drymaria cordifolia*, *Siegesbeckia orientalis*, *Polygonum Nepalense ?*, and some others.

For hedges are especially used *Pedilanthus tithymaloides*, *Opuntia Dillenii* (Kala zoung letwa), *Croton Tiglium* (Khan-na-kho); *Jatropha Curcas* (thembau-kyet-hsoo); *Euphorbia antiquorum* (Kyessoung pya-that), *E. tirucalli* (sha-zoung-leng-nyo) and *neriifolia*, *Cereus*, bamboo, several species of *Caesalpinia*, etc.

Besides many of the ornamental shrubs, already mentioned as occurring in these villages, are others which are suffered to grow under the shade of the village trees, such as *Croton Tiglium*, *Ricinus communis*, *Manihot utilissima*, *Jatropha curcas* and sometimes *glandulifera*, *Copiaeum variegatum*, *Panax cochleatum*, *Poinsettia pulcherrima*, *Pedilanthus tithymaloides*, *Cereus grandis*, 2 or 3 species of arboreous *Euphorbiae*, *Glycosmis pentaphylla*, *Jasminum sambac*, *Tabernaemontana coronaria*, etc.

Then come the weeds and weedy looking plants on the ground which spring up everywhere, several of which are of the sort termed ammoniacal plants. *Colocasiae* are seen everywhere in abundance, cultivated as well as wild, *Cleome icosandra*, *Gynandropsis pentaphylla*, *Portulaca oleracea*, *Tephrosia purpurea*, *Oxalis corniculata*, *Ocymum*, *Moschosma polystachya*, *Corchorus acutangulus*, *Cassia sophera* and *Absus*, *Scoparia dulcis*, *Oplismenus Burmanni ?*, *Bryophyllum pinnatum*, *Ammannia baccifera*, *Cyamopsis pubescens*, *Spilanthes acmella* and *paniculatus*, *Eclipta*, *Datura*, *Solanum nigrum*, *Xanthium strumarium*, *Ageratum*, *Urena lobata*, *Triumfetta angulata*, *Sida rhombifolia*, *Vernonia cinerea*, *Solanum torvum*, *Eleusine Indica*, *Achyranthes aspera*, along with herbaceous twiners as *Luffa cylindrica*, *Zehneria umbellata*, *Ipomoea*, *Basella alba*, etc.

Cucurbitaceous plants are everywhere grown around and before the houses on bamboo trailings or other supports, offering a friendly sight during the hottest part of the year, when, with the exception of tamarind and mangos, all trees have shed their leaves.

c. Waste places, ruins, etc.—The vegetation that grows on waste places, along road-sides and in rubbishy places, such as are called by botanists *ruderata*, as also the plants that grow on old brick walls, or on ruined pagodas, are often very interesting, although the greater part of these plants are usually weeds of general disribution.

It is not necessary here to go more fully into this matter. I therefore content myself with summing up a few of the names of the more frequent plants that grow :—

(1.) On waste places and along road-sides.

(2.) On rubbishy places and old brick work.

On the former are seen chiefly *Leonotis nepetaefolia*, locally *Jatropha glandulifera*, *Ocymum*, *Ricinus communis*, *Tephrosia purpurea*, several species of *Blumea*, such as *B. Wightiana*, *lacera*, etc., *Phaylopsis*, *Triumfetta angulata*, *Spilanthes acmella* and *paniculata*, *Vernonia cinerea*, *Cyamopsis pubescens*, *Chrysopogon aciculatus*, *Eleusine Indica*, *Zoysia pungens*, *Sidae*, *Sporobolus*, and numerous others of similar stamp.

In localities of the latter nature, and more especially on old ruined pagodas, we find a number of curious plants, which we were accustomed to collect chiefly on diluvial and other rocky formations, and such plants attract our attention here* still more, as they are found growing on these pagodas in the midst of alluvium, where, for 30 to 40 miles around, no vestige can be seen of them, except on old brick-work in villages, a situation identical with the above, only differing sometimes in the amount of shade and moisture. But even this is of no consequence, for if we walk round a circular or quadrangular pagoda, we find fully developed all the changes that exposure creates.

Burnt clay (brick-stones) possesses (like iron-oxyde) to a remarkable degree the capacity of forming (with ammonia) solid combinations. It absorbs with avidity ammonia from the atmosphere and retains it, and Liebig therefore calls burnt clay and soils rich in iron-oxyde (like laterite) veritable absorbers of ammonia. It is no doubt due to this quality that old ruins etc. possess such a prolific vegetation.

The following are the plants I met with more generally in such localities : *Blumea runcinata* and *flava*, *Knoxia lasiocarpa*, *Triumfetta angulata*, *Sida acuta* and *rhombifolia*, *Vernonia cinerea*, *Lindenbergia urticaefolia* and *macrostachya*, *Scoparia dulcis*, *Achyranthes aspera*, *Boerhaavia repanda ; Phyllanthus niruri* and *urinaria*, *Euphorbia pilulifera*, *Spermacoce*, *Batratherum latifolium*, *Apocopis*, *Sonerila tenera*, *Selaginella tenera* and *Junghuhnii*, *Pogonatherum crinitum*, *Cheilanthes argentea*, *Adiantum lunulatum*, and *caudatum*, *Osbeckia chinensis ?* , *Crotalaria acicularis*, *Amarantus sanguineus*, *Celosia cristata* (the purple variety chiefly), *Schizachyrium brevifolium*, *Eragrostis amabilis*, *Brownei*, etc., *Vandellia crustacea*, *Canscora diffusa*, *Sida cordifolia*, *Ageratum conyzoides*, sometimes *Gomphrena globosa*, *Ipomoea vitifolia* and other species, *Lepidagathis fasciculata* and *recurva*, *Nelsonia origanifolia*, *Emilia sonchifolia*, *Leucas*, *Rungia pectinata*, etc. etc. Some *Algae*, like *Scytonema cinereum*, along with acrocarpous mosses (chiefly *Pottia* and *Tortula*) are also frequently seen along the shady sides.

As in other waste places, so also here, coarse grasses like *Saccharum spontaneum*, *Polytoca heteroclita*, *Thyssanolaena acarifera* spring up especially along the sunny sides, while trees also (chiefly fig-trees) soon settle themselves on the ruins and grow up undisturbed.

3.—*Naturalized plants.*

The naturalized plants are of some interest, as their spread and acclimatisation often give some hints with regard to the migration of plants generally. Some suppose also that plants from the new world, when brought over, supersede those of the old world. I myself never could understand clearly this hypothesis, and believe it has originated with men, who see only the effects, but not the cause of such supersession.

Light seems to be the principal regulator of colonisation of introduced plants. Light-loving plants have everywhere the best chance of succeeding in the struggle with indigenous plants. Cultivation, therefore, greatly favours the spread, while forests, and partially also savannahs, set a powerful check to their dissemination. Again shade-lovers, even in favourable countries, like Java, spread very slowly, and even when completely established (like a few Brazilian plants about Buitenzorg etc. in W. Java) they remain localized. This is just what really takes place with the same class of indigenous plants, and any one who has botanized in tropical forests must have observed the patchy occurrence of shade-loving herbs. The scanty dissemination of exotic trees in India (if we except *Anona squamosa* and a

* It formed at one time a matter of no little perplexity to me to find such plants, as *Clematis Gouriana*, *Porana* etc., growing at Gour (an ancient town, E. of Rajmehal, Bengal), in the midst of alluvium. I set out for this place to enquire into this anomalous occurrence, and found to my full satisfaction all those plants growing on the debris of the colossal ruins (an artificial diluvial formation indeed !), but nowhere in alluvium.

very few others) demonstrates the importance of the study of forest trees in any question of phytogeography.

In Burmah a large number of exotic ornamental plants are in cultivation, and not an inconspicuous part of them are met with in Burman gardens. Even Karens have American flower-plants in their remote and isolated toungyas. Ample facilities are therefore given to the plants in question to disseminate and spread, but in spite of that the number of really established exotic plants in Pegu is exceedingly small in comparison with Bengal and other countries in India; and these few are restricted to the cultivated plains or to waste places in and around villages, while in the toungyas of the Karens those that still shew themselves in the first years of abandonment, disappear as quickly and completely as all other plants of an agrarian or savannah character. The cause of this appears to be here the same as it is in the Andamans: the woody terrain and savannahs of Pegu are not favourable to the growth of most of these ornamental plants. Even small trees, like *Bixa*, *Carica* and *Ricinus* settle themselves only along the banks of choungs, and there only scantily enough.

The half indigenous plants in Pegu are the following: *Adenolepis*, plentiful; *Tridax procumbens* locally, *Angelonia*, locally, *Gomphrena globosa*, *Ricinus communis*, *Bixa Orellana* seldom, *Asclepias curassavica*, passim, and *Impatiens Balsamina*. These are all that can be considered as established, although strictly speaking only the first named enters the flora as an element. There are, besides, others of the more cultivated forms, which spring up occasionally, especially on waste places in and near villages, along the courses of streams and rivers and also on neglected toungyas or gardens. Their existence, however, is too ephemeral to admit of their being fairly grouped with established species. They appear and disappear, like other weeds, according as a locality is subjected to changes arising from thinning or overcrowding, and must be looked upon as mere escapes from cultivation or gardens.

§ 8.—*A practical conspectus of the forests of Pegu alone.*

In the former pages I have treated of the plants and of the vegetation generally of Pegu on a more extended scale for the use of the higher grades of foresters who must necessarily be acquainted with the physical sciences generally, and who can be expected also to have such botanical knowledge, as is indispensable to a forester of education in India.

It remains now for me to give also such a simplified and short review of the forests, that those who have undergone no botanical training whatever, may be enabled to recognise, at least in the greater number of cases, the kind of forest through which they may pass. I have restricted myself, in doing so, to that part of the country which lies between the Irrawaddi and Sittang rivers, and which I have already specified as Pegu proper. The Burmans have, so far as I could make out, no distinct denominations for all the varieties of forests, which I have distinguished, and it would be really desirable, that there should be created names for at least the more conspicuous classes of forest, by which intercourse between the forester and the native forest people would be greatly facilitated. At present one has to ask a Burman for the trees that grow in a forest, in order to recognise from them the kind of forest one enquires for, but even such information is not always sufficient in localities where forests of different kinds alternate with each other at short intervals.

I shall now follow the same principles as already laid down in my former paragraphs, simplifying the matter by restricting myself to what might be called the external characteristics of those forests.

Forests are either evergreen, when they retain their leaves all the year round; or are leaf-shedding, when they shed their leaves at any time during the cold or hot season of the year.

If the waters that take their course through or along such evergreen forests, are saline or brackish, we may with confidence presume, that we have littoral forests before us. Such trees and shrubs like pyoo *(Rhizophora)*; Pinlay-kyoung-ben *(Clerodendron inerme)*, Kambala *(Sonneratia apetala)*; tamoo *(Sonneratia Griffithii)*, boo-tayat *(Aegiceras corniculata)*, Khayah *(Acanthus ilicifolius)*, ka-yoo *(Pluchea Indica)*, ta yan *(Excoccaria Agallocha)* are sure indications of a littoral forest, no matter what other trees and shrubs grow beside them. Practically (at least according to the notion of the present foresters in Burma) these forests are of no importance and are rarely, if ever, visited by them. Pinlay dein might be an appropriate Burmese term for these forests.

Again, if we enter an evergreen forest, where we find the waters quite sweet, and where the stems of trees shew such marks as lead us to infer that they stand during the rains under water to a certain height, we have every reason to expect this to be a swamp-forest. In a forest of this sort we have such trees and shrubs* prevailing, as dhae lay *(Symplocos*

* I regret to say that I find myself surrounded with great difficulties in giving the names of truly characteristic forms growing in this and the following kinds of forests. I have tried in vain to obtain a correct Burmese name for many plants, which form the principal feature of such forests, as for instance for *Acrocarpus*, *Swintonia*, etc. in the tropical forests.

leucantha) ; theet pyoo *(Xanthophyllum glaucum)* ; yay kadat *(Cratœva hygrophila)*, souw pein *(Combretum trifoliatum)* ; bambhæ (*Ancistrocladus Griffithii)* and pang nayoo (*Roydsia obtusifolia)*. The ground is then always more or less marshy, shewing scanty or no herbage. Yay dein is the only term in Burmese I can suggest for swamp-forests.

If we travel between the hills and descend from the ridges to the bottom of the numerous choungs, we frequently fall in with patches or whole tracts of evergreen forests, which are especially conspicuous during the hot season, when they are still clothed with most lovely verdure. In these forest we see such trees as thit-pouk *(Tetrameles nudiflora)* ; thit-kadoo (*Cedrela toona*) ; toung peing nay *(Artocarpus chaplasha)* ; teepiooh *(Sterculia scaphigera)* ; Kat-thit-ka (*Pentace Birmanica*), thingadoe (*Parashorea stellata*) ; thingan (*Hopea odorata*) ; Thit-toh (*Sandoricum Indicum*) ; Yueh-woon (*Hibiscus vulpinus*) ; Mayaynay ? (*Acrocarpus combretiflorus*) Thingadoo *(Anisoptera glabra)* ; Kanyeen-nee (*Dipterocarpus laevis*) ; Karloh (*Hydnocarpus heterophyllus)* ; myouk-oak-sheet (*Siphonodon celastrinus*) ; Tha-nat-kha (*Murraya exotica)* ; line-loon *(Excoecaria baccata)* along with numerous other large and small trees, for which Burmans possess no name.*

The undergrowth consists of shade-loving plants, such as numerous small and large ferns, Gamoong-byang (*Peliosanthes*), say-nah *(Stobilanthes rufescens)*, etc. Canes, like yamatha, and lemeh, and various palms, like tau-than, pyen-khan, toung-oung, tau-koonthee, etc., are characteristic of that variety of evergreen tropical forests which are called *close tropical forests*, while herbs mostly of the sorts for which Burmans use the collective denominations of Katsenay (*Urena*, *Triumfetta*, etc.) and Kadoo (*Blumea* and other herbaceous compositæ), indicate *open forests*.

The characteristic kinds of bamboo, growing in tropical forests, are chiefly wa-noay and wa-thabwot ; in some parts also Kyellowa and wa-pyoo-gyee.

The leaf-shedding forests are much more difficult to distinguish accurately, as the limits between the varieties of these forests are rather arbitrary. The three principal classes of leaf-shedding forests, viz. the open, the mixed, and the dry forests, are recognised easily enough. In order to overcome certain difficulties, which always accompany a treatment of the various forests for men unacquainted with botany, we must make ourselves familiar with certain trees so frequent, that almost every Burman (at least those living in the neighbourhood of forests now under consideration) is acquainted with them. To do this, we shall put them into the following 3 categories :

(1.) The Eng or Ein (*Dipterocarpus tuberculatus*) ; Engyeen (*Pentacme Siamensis*) ; Phthya (*Shorea leucobotrya*) ; toukkyan with hairy leaves (*Terminalia alata*) ; Engyen (*Aporosa macrophylla*) ; Tay (*Diospyros Birmanica*) ; byoo (*Dillenia pulcherrima*) ; moondeing (*Lophopetalum Wallichii*) ; lambo (*Buchanania latifolia*) ; tsee tsee (*Melanorrhoea usitata*) and joe (*Walsura villosa*).

The bamboos which require notice are teiwa (*Bambusa tulda*) and myinwa (*Bambusa stricta*).

(2.) Toukkyan, with smooth leaves (*Terminalia crenata*) ; myouk-shaw (*Homalium tomentosum*) ; gyo (*Schleichera trijuga*) ; pyenma (*Lagerstroemia flosreginae*) ; lepan and didoo (*Bombax malabaricum* and *B. insigne*) ; nagyee (*Pterospermum semisagittatum*) ; chinjouk (*Garuga pinnata*) ; Kway (*Spondias pinnata*) ; titsein (*Terminalia* Belerica) ; lein (Terminalia *pyrifolia*) ; Kinbalin (*Antidesma diandrum*) ; bingah (*Nauclea Brunonis*) ; thitmagyee and theet (*Albizzia odoratissima*, and *A. procera*) ; madama (*Dalbergia ovata* and *glauca*) ; thymbyoon (*Dillenia pentagyna*) ; boaygyeen (*Bauhinia malabarica*) ; maoo (*Nauclea*) ; touksha (*Vitex leucoxylon*).

Of bamboos are notable, tinwa (*Schizostachyum pergracile*) Kyattounwa (*Bambusa polymorpha*) ; wapyoo gelay (*Bambusa albo-ciliata*).

Another subordinate group of trees (forming savannah forests) comprises baup (*Butea frondosa*) ; tein thé (*Nauclea*) and kyee nee (*Barringtonia acutangula*). The only bamboo we have here is the yakatwa (*Bambusa spinosa*).

(3.) Sha (*Acacia catechu*) ; ta-boo (*Harrisonia Bennetii*) ; Khamaka (*Melia Azedarach*) ; nebbhoo (*Combretum apetalum*) ; palan (*Bauhinia racemosa*) ; dhanoung (*Acacia leucophloea*) ; Koung-khwa (*Capparis grandis*). The only bamboo along with these trees is myinwa (*Bambusa stricta*). Two remarkable characteristic climbers are palan nway (*Bauhinia diphylla*) and tsheen-telay-nway (*Hymenopyramis brachiata*).

It is understood that the trees named above are only examples, but they are more important than the others that occur along with them. Teak and pyen-kadoo, therefore, are of very little value in the determination of various kinds of forests, for the simple reason that they occur in all sorts of leaf-shedding forests.† These trees should therefore first of all

* So great is the number of trees here, for which Burmans have no name, that out of 5, certainly 4 are ma-thee-boo (I don't know). Burmans have also no separate denomination for this sort of forests, and should, a name be given to them, no better could be proposed than ma-thee-boo dein.

† In fact they are really missed only in the littoral and swamp forests.

be studied, and in a land like Burma, where every native knows his trees better than many a European does in his own country, a forester will find no difficulty in having them pointed out to him.

To apply now these 3 groups of trees for the practical purpose of recognising the various kinds of leaf-shedding forests, we have simply to keep in view that all forests, which have trees under No. 1, are open forests. Those under No. 2 are mixed forests, while those under No. 3 are some of the most characteristic trees, which occur in the dry forests. As regards these dry forests it should be added that any trees mentioned under Nos. 1 and 2 may occur along with the sha-trees.

The open forests are sometimes accompanied by numerous trees, named under No. 2, and in this case the ground is densely covered by grasses. Such are the *low forests.* If Eng (*Dipterocarpus tuberculatus*), phtya (*Shorea leucobotrya*) and engyeen (*Pentacme Siamensis*) are represented together in the same forest, it is almost a rule that the forest is an *Eng-forest.*

The varieties of mixed forests may be briefly divided into—

1. Savannah-forests,* if the trees are very scattered and the ground covered by elephant grasses, such as the Burmans call kyoonabin (*Phragmites Roxburghii ?*) ; hpoungah (*Saccharum procerum ?*) ; thekkaygyee (*Saccharum spontaneum*), and pan yen (*Andropogon muricatum*). In this case, thein-théh, baup, yindyke, thitpoh, and lepan, are often the sole trees.

2. *Lower mixed forests,* if the trees under No. 2 are not lofty, but branch off from their first half or a little above. They never grow on rocky soil, but always on alluvial soil. The grasses just mentioned above, are not found here, at least they form no dense undergrowth. The bamboos also do not form an uninterrupted undergrowth, but occur in patches, one here another there. The sight, therefore, in these forests is open. Teak† occurs in these forests, but is usually of inferior growth.

3. *Upper mixed forests* differ from the former in the loftiness of their trees, the dense undergrowth of bamboos,‡ of which tinwa and kyattounwa are the most characteristic, and in the comparative scantiness of herbage. Myinwa occurs chiefly in the drier upper mixed forests. The most characteristic trees are thit-pagan (*Milletia Brandisiana*), myouk-gna (*Duabanga grandiflora*) ; pindayoh (*Grewia elastica*) ; show-bew (*Sterculia urens*), toung-kathit (*Erythrina stricta*) and show wa (*Sterculia villosa*). Teak and pyen-kadoo have here their principal seat, and grow up into lofty trees of fine growth.

4. The upper dry forests are stunted and crooked, wretched looking forests of very limited extent. They are restricted to the highest crests of the Yomah, and therefore are rarely, if ever, visited by a forester.§

§. 9.—*Table of the natural families of plants, represented in Burma.*

The following conspectus of the natural order of plants which are known to be represented in Burma, is made up for the purpose of giving an idea of the richness of the Burmese Flora. The number of species attached to each family are the result of careful examination of the material at my disposal, while those marked with an asterisk are approximate only. But for guidance I may remark here that such estimates are, as a rule, taken too low by about $\frac{1}{4}$ to $\frac{1}{3}$.

The area in Burma, botanically still unexplored,‖ may fairly be set down at $\frac{2}{3}$ of the whole country. It includes such various climates and physical variations, that the approximate sum of plants (exclusive of cryptogams) growing in Burma is not overrated in estimating it at between 5000 and 6000 species.

* Possibly, thekay dein might be a suitable Burmese name for these forests.

† As regards teak (of which pyenkadoo is almost an inseparable companion in the upper mixed-forests) I must refer to Dr. Brandis' report on the Attaran Forests (Selections of Government of India XXXII p. 51), where he pays special attention to this tree.

‡ Of course, when bamboos have flowered and died off, only a dense mass of seedlings is found in their place.

§ I believe that the only forester who has visited this kind of forest, has been Dr. Brandis.

‖ I do not consider tracts cursorily and hurriedly run over by amateur-collectors of orchids and ferns as "botanically explored."

DICOTYLEDONS.

Name of natural order.	Number of species.	Name of natural order.	Number of species.
Ranunculaceæ,	10	Datiscaceæ,	1
Dilleniaceæ,	10	Cacteæ,	1
Magnoliaceæ,	6	Ficoideæ,	7
Anonaceæ,	58	Umbelliferæ,	19
Menispermaceæ,	20	Araliaceæ,	10
Berberideæ,	1	Cornaceæ,	4
Nymphæaceæ,	6	Loranthaceæ,	23
Papaveraceæ,	2	Caprifoliaceæ,	2
Cruciferæ,	8	Rubiaceæ,	178
Capparideæ,	21	Dipsaceæ,	1
Violaceæ,	7	*Compositæ,	112
Bixineæ,	10	Stylidieæ,	2
Pittosporeæ,	1	Goodenovieæ,	1
Polygaleæ,	16	Campanulaceæ,	13
Caryophylleæ,	4	Ericaceæ,	17
Portulaceæ,	3	Epacrideæ,	1
Tamariscineæ,	1	Plumbagineæ,	3
Elatineæ,	2	Primulaceæ,	4
Hypericineæ,	8	Myrsineæ,	36
Guttiferæ,	19	Sapotaceæ,	14
Ternstroemiaceæ,	18	Ebenaceæ,	23
Dipterocarpeæ,	28	Styraceæ,	15
Malvaceæ,	50	Jasmineæ,	28
Sterculiaceæ,	37	Apocyneæ,	54
Tiliaceæ,	41	*Asclepiadeæ,	49
Lineæ,	5	Loganiaceæ,	15
Malpighiaceæ,	8	*Gentianeæ,	17
Zygophylleæ,	1	Hydrophyllaceæ,	1
Geraniaceæ,	16	Boragineæ,	17
Rutaceæ,	33	*Convolvulaceæ,	50
Simarubeæ,	6	*Solaneæ,	21
Ochnaceæ,	5	*Scrophularineæ,	65
Burseraceæ,	5	*Lentibularieæ,	9
Meliaceæ,	32	*Orobanchaceæ,	3
Chailletiaceæ,	1	*Gesneriaceæ,	21
Olacineæ,	25	Bignoniaceæ,	18
Ilicineæ,	3	Acanthaceæ,	148
Celastrineæ,	27	Pedalineæ,	1
Rhamneæ,	15	Verbenaceæ,	54
Ampelideæ,	38	*Labiatæ,	74
Sapindaceæ,	31	*Chenopodiaceæ,	4
Sabiaceæ,	3	*Amarantaceæ,	27
Anacardiaceæ,	32	*Polygonaceæ,	18
Moringaceæ,	1	Nyctagineæ,	5
Connaraceæ,	11	Myristiceæ,	4
*Leguminosæ,	270	Laurineæ,	56
Rosaceæ,	18	Proteaceæ,	5
Crassulaceæ,	4	Thymelæaceæ,	6
Droseraceæ,	3	Elæagnaceæ,	3
Hamamelideæ,	2	Santalaceæ,	2
Halorhageæ,	3	Aristolochiaceæ,	3
Rhizophoreæ,	13	Euphorbiaceæ,	156
Combretaceæ,	29	Cupuliferæ,	27
Myrtaceæ,	52	Juglandaceæ,	3
Melastomaceæ,	36	Myricaceæ,	1
Lythrarieæ,	31	Salicineæ,	1
Onagrarieæ,	5	Ulmaceæ,	2
Samydaceæ,	5	Celtideæ,	10
Passifloraceæ,	5	Betulaceæ,	1
Cucurbitaceæ,	35	Urticaceæ,	99
Begoniaceæ,	18	Podostemmaceæ,	2

Name of natural order.	Number of species.	Name of natural order.	Number of species.
*Piperaceæ,	13	Taxaceæ,	2
Gnetaceæ,	4	Coniferæ,	2
Balanophoreæ,	2		
Cycadeæ,	3	Total,	2801
Casuarineæ,	1		

MONOCOTYLEDONS.

Name of natural order.	Number of species.	Name of natural order.	Number of species.
*Palmæ,	40	*Thismiaceæ,	1
*Pandaneæ,	5	*Amaryllideæ,	15
*Aroideæ,	33	*Dioscoreaceæ,	20
*Lemnaceæ,	5	*Liliaceæ,	38
*Najadeæ,	3	*Alismaceæ,	4
*Hydrocharideæ,	6	*Pontederaceæ,	4
*Scitamineæ,	66	*Commelynaceæ,	21
*Marantaceæ,	7	*Xyrideæ,	5
*Musaceæ,	5	*Restiaceæ,	11
*Orchideæ,	220	*Cyperaceæ,	87
*Apostasieæ,	1	*Gramineæ,	170
*Burmanniaceæ,	6		
*Irideæ,	1	Total,	774

CRYPTOGAMS.

Name of natural order.	Number of species.	Name of natural order.	Number of species.
*Rhizocarpeæ,	4	*Fungi,	60
*Lycopodiaceæ,	12	*Lichenes,	120
Characeæ,	4	*Algæ,	230
*Equisetaceæ,	1	*Diatomaceæ (in my individual opinion animalcules,)	80
*Filices,	147		
*Musci,	120		
*Hepaticæ,	50	Total,	828

Thus the total sum of species already published or deposited in our herbaria would be,

Dicotyledons, 2801	Flowering plants,	3575	species.
Monocotyledons, 774			
Cryptogams,		828	species.
	Grand Total,	4403	species.

PART II.

SPECIAL REPORT.*

The remarks on the utilisation of toungyas, on plantations, &c., must necessarily be accepted with some reservation, for I am neither a trained forester, nor an agriculturist, nor is my present position one which could offer me practical experience in such matters. I have however, greatly profited in this direction, while connected with the Botanical gardens at Buitenzorg (Java), the finest and richest garden that exists within the tropics, and besides this, my deductions are based upon a careful study of the vegetation in the field and upon a general acquaintance with collateral branches of science. Under such circumstances, these notes may serve for what they are intended, viz., as theoretical hints which may become useful in the hands of an intelligent practical man.

The list of Burmese trees, forming Appendix A. of this report, is made up to the best of my knowledge, and any incompleteness in the same must be ascribed to the impossibility of collecting, as a traveller, every tree in a country, of such a varied character as Burma. I have left more than fifty different kinds of trees unnamed, because I am unable to compare them on account of their being without flowers or fruit. A further exploration of the Prome and Sittang districts during the rains will swell up the list considerably.

The naming of the trees, &c., has chiefly caused the delay in the submission of this second part of my report, for I have taken some pains to adopt only such botanical names as may hereafter be least liable to the continuous changes now going on in botanical literature.

The subjects remarked upon in the following pages are briefly as follows :—

1. Preservation of forests with regard to soil and climate.
2. Utilisation of toungyas, with cursory remarks on timber plantations.
3. Some hints with reference to the study of the quality of woods in India.
4. Conclusion.

APPENDICES.

Appendix A. List of Burmese trees.
,, B. Key for the determination of Burmese trees.
,, C. Collection of Burmese names for other plants than trees.
,, D. Lord Mayo's tree (*Mayodendron*) a new genus from Martaban.
,, E. Extracts from Mr. Kurz's journal of his tours in British Burma.

I.—*Conservancy of forests in Pegu with regard to soil and climate.*

My remarks under this head have nothing to do with practical conservancy, but refer merely to the preservation† and the clearing of forests as a whole, in connection with clime and soil, and independently of the resources that might eventually accrue from them. Pegu has too many forests, and the proportion of hilly ground to alluvial plains is so much in favour of the former, and these again are in such close vicinity to the banks of the principal rivers, that no fear need be entertained of the climatic sequences, even if all the forests on alluvial land are removed, provided that those on the hills are maintained.

Although opinion is divided upon the question‡ of the influence of forests upon climate, it is now so far settled, that we have the plainest proofs in support of those who hold that forests stand in close connection with the hygrometrical state of a tropical country. Only those can still persist in their scepticism, whose narrow-mindedness does not permit them to grasp the intricacies of cause and effect, or who believe that all sorts of forest must necessarily produce the same effect.

Deciduous forests have in tropical countries no material influence upon climate generally, and their influence upon moisture must be considered doubtful, although their existence may possibly affect to a great degree the prolongation§ of the rainy season. Evergreen forests can

* I prepared and submitted my reports when the new system of transliteration of vernacular names was still under discussion ; hence the difference in the spelling of the first part, which was submitted early in 1872, and that of the second part, which was submitted the subsequent year.

† In the following pages "preservation" and "protection" should not be confounded with "strict reservation."

‡ This question was discussed in India many years ago. See Journal Asiatic Society Bengal, XVIII. 1849, 791, (Lieut. W. H. Parish, on the influence of forests on climate). If I am not mistaken, an article on the same subject also appeared in Corbyn's Indian Review.

§ Numerous facts, especially in France, demonstrate the theory that forests in temperate regions exercise no material influence upon the amount of rainfall. It is stated that the amount of rainfall in France has not diminished but also have no direct influence upon the cosmical temperature of a locality, but this cannot be said with reference to the amount of moisture. In India the evergreen forests are the true condensers of moisture as they deposit the moisture in the soil, which nourishes the springs and creates an equable drainage in the plains. The destruction of such forests regularly diminishes the amount of water-drainage and the consequences are at once apparent—evaporation in the plains diminishes and the hot dry season is rendered more excessive. A dry hot season, however, is for India as injurious to the growth of vegetation, as a severe winter is in temperate regions, and it is this period of the year, which (along with the impermeability of substrata) prevents the extension of evergreen tropical forests over large tracts, and restricts them to sheltered and well-watered vallies in the hills. Our aim, therefore, should be to equalize the amount of moisture as much as possible, for though the atmosphere may be greatly heated, if it is sufficiently saturated it will promote tropical vegetation.

Wanton destruction of forests has told its lesson everywhere between the tropics, while examples of the beneficial influence of forests are not wanting. When the Romans subjugated Spain it was a fertile country, the Southern provinces of which, especially, were covered with forests; now it is an arid country, devoid of forests. Ali Pasha burnt down the forests of the Peloponnesus, and the consequence was drought and famine. The Russian General Dibitsch Balkansky destroyed the forests of the Caucasus for the purpose of routing and starving the brave Circassians and completely succeeded in his inhuman design. Mauritius, the Azores, Jamaica and other West Indian islands, and even North America, have all had their lessons in this respect. On the other hand we learn, that the planting of 20 square miles of trees in Egypt has increased the number of rainy days to 40; the planting of thousands of acres with trees, chiefly *Acacia mollissima* and *lophanta*, *Eucalyptus*, etc., in Algiers, as also the restoration of forests on St. Helena and Mauritius, have doubled the amount of dew and rain. The Departments des Landes in France (along the Bay of Biscay), where malarious fevers prevailed, have now become healthy districts under Napoleon III, who caused upwards of 16 German square miles of swampy lands to be planted with trees (chiefly *Pinus maritima*).

The French and German Forest literature furnish additional material in support of the importance of forests in nature's household, and E. Ebermeyer's work on the Physical influence of the forests upon air and soil etc. treats the question more fully and scientifically.

It can, therefore, be no more a question, whether forests influence the climate of a country, but the questions in future should rather be: How can we best prevent the destruction of forests? How can we raise forests in arid districts; of what kind should they be and, where should they first of all be raised? The Government, however, can hardly be expected to take upon itself this heavy duty single-handed and the co-operation of the inhabitants is therefore indispensable. A Forest Officer who succeeded in replanting large tracts of land with forests, and who by doing so shewed a large financial deficit, would hardly be thanked for a measure which yielded no present returns, for the public is often slow to recognize the good intentions of the originator of such schemes. Yet the beneficial results of the measure would undoubtedly be felt in after years when the Agricultural population reaped the fruits of a country rendered fertile by the existence of forests whose beneficial influence would avert or mitigate the horrors of famine. Laws exist in several countries which render the planting of trees by the people compulsory, but I need only mention two examples here, viz., that in Japan every one who cuts down a tree is required to plant another in its stead; and in Biscay (France) every land proprietor who fells a tree is required to plant two in its stead. In some countries like Java, it is a custom with the natives to plant a fruit tree on the occasion of the birth of a child, and this tree is carefully looked after as being the only record of the age of the child. Dr. Schomburgk in his interesting lecture on the influence of forests on climate (of which I have made free use) tells us an anecdote which well deserves a place here, as it may influence the native mind: When Ulysses, after a ten years' absence, returned from Troy, he found his aged father in the field planting trees. He asked him, why, being now so far advanced in years, he put himself to the fatigue and labour of planting what he was never likely to enjoy the fruits of? The good old man, taking his son for a stranger, replied, "I plant for my son, Ulysses, when he comes home."

rather increased within the last 100 years in spite of the enormous extirpation of forests. The amount of rainfall at Viviers in Southern France has increased in the period between 1777-1818 from 31 to 37 inches, although the forests in the environs have been almost totally destroyed. The wooded plains of Germany have not only an equal but a rather lesser annual rainfall than woodless Holland. The forests only act upon the distribution of the annual rainfall and as reservoirs for moisture, and as such they are certainly of high importance. The amount of rainfall in Europe is produced not so much by local evaporation as by passing currents of air laden with moisture, but matters are altogether different between the tropics, where the amount of moisture directly depends upon local evaporation; the destruction of forests must, therefore, conspicuously effect the diminution of rainfall, for forests serve a two-fold purpose here—on the one hand a powerful evaporation is produced from the surfaces of the leaves of trees, while on the other the coolness that reigns in the forests causes the precipitation of atmospheric moisture. So far Kabsch (Das Pflanzenleben der Erde 1870, p. 125).

In all forest conservation, it should be remembered that the substratum plays an important part in the growth of trees, and that much depends upon it. By way of illustration, and for a better understanding of my subsequent remarks, I give the annexed sketch of the different growth of Yindyke* (*Dalbergia cultrata*) on various substrata.

Yindyke and its various proportional growths on different substrata (fig. 6 is circ. 70 ft. high).

Fig. 1. Usual form of savannah forests on deep alluvium.
Fig. 2. Extraordinary of ditto ditto ditto.
Fig. 3. Low forests on stiff plastic clay, with jungle pastures. (See my journal-entries of 8th January, 1868 (the tree with its children).
Fig. 4. Eng-forests on laterite.
Fig. 5. Lower mixed forests on shallow alluvium.
Fig. 6. Upper mixed forests (higher crests of Yomah) on permeable siliceous sandstone.

* I entertain some doubt as regards the difference in growth of yindyke as shewn in figs 1 and 2. I suspect that growth 1 is the product of alluvium resting on highly plastic and retentive clay ; while growth 2 may be produced by alluvium resting on fine quartz sand. Unfortunately I have had no opportunity of obtaining a section of the strata in these localities

(1.) The *evergreen tropical forests* are for the geatest part restricted in the Yomah to the more inaccessible valleys, and are only of limited extent. In practical forestry, they are not considered very important, but still in a climatological point of view they are of importance, because they regulate excessive climes. The greater half of these, so far as I could make out, have already yielded to the destruction caused by toungya cultivation, especially those forests situated on comparatively level lands. Their destruction is at present carried on higher and higher along the courses of the choungs flowing eastwards into the Sittang. So much appears to me certain, that these forests should be cared for, for although they appear to be practically of little value to Government, they supply during the hot season a large amount of water drainage to the plains of Pegu.

These forests, and more especially the tropical forests of Martaban and Tenasserim, may become at some future time important, for they furnish the only localities suitable for the cultivation of the ipecacuanha plant. This little herbaceous perennial is so easily propagated, that it is reproduced in Brazil simply from the roots that remain in the ground after the creeping rhizome has been torn up by the collectors; and in 3 to 4 years it is supposed to have again attained its proper maturity. In equable damp tropical climates it might be grown in almost every village under the shade of such groves of trees, as are formed by mango, jack and bamboo together.

(2.) The *swamp forests* of the Irrawaddi alluvium are submerged for a long period during the rainy season, and the lands on which they grow are for this reason unfit for agricultural purposes. The trees in them are not altogether valueless, and some of them are even of good quality, such as thitpyu, mango, and yung. In my opinion these forests ought to be protected, and in fact, so far as I could observe, they seemed to be but little touched by the inhabitants.

(3.) The *littoral forests* grow chiefly on saline alluvial ground, at present more or less unfit for agriculture. These lands, however, may be reclaimed by proper treatment, and, as far as the tidal forests are concerned, might be converted into paddy lands. This is actually done to a much greater extent than in the Sunderbuns of Bengal. Whether these forests should be protected or not, remains an open question. They contain some good trees, such as penlay ung, penlay kanazu (sundri), and several others, of which the timber is said to be valuable for certain purposes. Any how, they will in future like the Sunderbuns supply fuel to the surrounding towns and villages. Hence, patches of the best grown and most valuable tracts at proportional distances on lands least suitable for culture, may become valuable; while a restriction, caused by the preservation of certain tracts, would not interfere with the demands of the present population. The mangrove forests of the coasts themselves, although considered malarious, discharge important functions in the formation of new lands, which, especially along the Pegu coasts (the country being apparently a rising one), seemed to me apparent.

Unlike the Sunderbuns of Bengal, laterite ridges of a peculiar character crop out in various localities, usually selected by Burmans for their pagodas and Khyoungs. These bear a different kind of forest intermediate between evergreen and deciduous forests, but I had little opportunity of studying these as carefully as they deserve. Any how, the lands on which they grow are agriculturally unimportant, and therefore the destruction of the forests might be prevented.

(4.) The *savannah-forests* of the deep alluvium are hardly of any other importance in a climatological and practical point of view than that they supply firewood and other small timber for the immediate wants of the villagers living in them. I think they might be given up altogether to the population without any reserve. Teak grows in them occasionally, but this, as well as all other trees here, is of bad growth, and might be given gratis to the villagers. This would reduce the area of controlled forest-lands on the one hand, and would also relieve the villagers themselves, who dare not, on account of existing forest rules, cut down even wretchedly grown teak trees which often stand in the midst of their fields.

(5.) The *lower mixed forests* are, also, as regards the growth of trees, of inferior quality to the *upper mixed forests ;* and the lands (alluvium) on which they grow are of high value for agricultural purposes. They contain mostly leaf-shedders, and for this reason, are of very subordinate importance in climatology. Owing to my want of acquaintance with the influence of alluvium upon the quality of timber, it is difficult for me to deal with these forests in a conclusive manner. However, if subsequent experiments shew, that timber grown on alluvium is inferior, or only equal to that grown on sandstone or metamorphic substrata, I think these forest-lands might also be freely given up to an enterprizing agricultural population, only those patches being reserved (at proper intervals, and with due consideration of the wants of the present and coming population) which contain the best grown and most valuable timber-trees. I should not, however, regard teak as the leading tree. There are many tracts in which the teak trees (scattered as they are over the whole area) are hardly worth the trouble which their conservancy would involve. To what extent such selected forests would then be made communal forests, or placed under the direct control of the

Forest Department, is a matter upon which I am not prepared to give an opinion. Their value would, of course, hardly be appreciated as long as such a large amount of forest-land co-exists, but as the area of agrarian lands increases, their importance would soon be felt.

(6.) The *dry forests* of the Prome district are the most difficult forests to deal with. Practically, few of them are of real market value to the country, and, being leaf-shedders, they contribute little towards a moderation of the excessive heat of this district. The *sha-forests* are here the most valuable, and those growing on rocky or gravelly soil, would be best fitted for reservation. In fact I should think that the "sháh" forests are in the Prome district of greater importance than the few teak-forests there are, and it is a mistake to allow these trees to be used for fuel for the Irrawaddi steamers, or to be indiscriminately cut down for the manufacture of cutch. The peculiarity of the Prome district (owing to the sterile impermeable nature of the substrata and consequent aridity) rests in the probability that it is more easy to destroy good grown forests than to recall them to existence hereafter.

Had I to deal with the Prome forests, I should invariably protect all forests of whatever kind that grow on rocky or coarse gravelly grounds, while I should give up arable lands to the population without any restriction.

(7.) The *open forests* are of a varied character, and many tracts in them, especially the *low forests*, furnish good agrarian lands in spite of the heavy stiff clay, of which they are composed. The true eng-forests, growing always on indurated laterite, may fairly be classed along with the *dry forests* of the Prome district, and dealt with in the same way, while the low forests might be given up unconditionally to agricultural enterprise.

The kaboung *(Strychnos nux vomica)* forms here sometimes whole forests, and might possibly give a handsome outturn by the manufacture of strychnine, but the same tree is also common in the upper-mixed forests.

(8.) The next class of forests comprise those growing chiefly on permeable silicious sandstone (and also on metamorphic rocks), and are generally known to foresters as the *upper mixed forests*. With reference to the growth of trees, these are undoubtedly the best grown deciduous forests of Pegu, and, therefore, for large timber are the most important. But at the same time the destruction that is going on in them, is in my opinion comparatively greater than that which takes place in the plains, owing to the wasteful system of toungya cultivation. The quality of the teak-timber, however, grown on these sandstone hills is considered inferior to that of the hills east of the Sittang (chiefly schists and syenites), and also to that of the Malabar hills, and this can easily be explained from the physical nature of the rocks on which they grow. Whatever may be the practical difficulties in the transport of timber (water-carriage, cooly-hire, etc.) or the physical difficulties in the nature and configuration of the hills themselves, the whole Yomah, as far as silicious sandstone exists, is judiciously made at present the nucleus of the reserved forests of Burma. The hills are hardly fit for the support of a large population, even when rational agriculture shall have supplanted the present erratic method in vogue amongst the Karens. But there are difficulties of no small degree to be contended against in a strict conservation of the forests, and the interior of the Yomah hills is hardly more than nominally under control, for toungya clearings are made in situations which would hardly be permitted if a forest officer had been applied to.

These are the remarks I have ventured to offer as a botanist; practical foresters may possibly dissent from my views.

It is, in my opinion, not quite correct to judge climatological questions merely from a consideration of the woodless plains* of lower Bengal. It is my conviction, that in a climatological point of view the absence of forests in the lower Gangetic alluvium is quite counterbalanced by the presence of the numerous village groves, consisting chiefly of mango, jack, bamboo, and other evergreens, which influence the climate more powerfully than large tracts of deciduous forest could do. After all, we could hardly expect on these plains other forests (had they been spared) than savannah and lower-mixed forests. Both are of little climatological importance; they are not by any means regulators of excessive climes, and besides this, the drainage which these plains receive from the Himalayas and Khasya hills, etc., is enormous. At the same time I should think it would not be at all a bad plan to raise evergreen tropical forests on such large alluvial expansions as those of the Irrawaddi, Ganges, etc. The trees to be chosen for the purpose would necessarily have to be of a character most suitable for alluvium, and least subject to the influence of an excessive clime, and I should think that mango, jack, and tamarind trees intermixed with bamboo, would be suitable. Possibly mahogany might be added, but this tree loses its seeding qualities to a great extent,† probably on account of its being a lime-stone loving tree, or on account of the physical quality of the subsoil. After such a forest is well established, other trees, of a more delicate nature, might be added at will, such as wood-oil-trees, litchi or other fruit-trees. Such a

* These remarks only refer to *extensive alluvial* plains.

† While West Indian trees fruit freely, and have from 40 to 60 seeds in each capsule, the mahogany trees in the Botanic Gardens, Calcutta, gave according to Dr. Anderson's and Dr. Cleghorn's reports, only 4 to 5 capsules, with only 10 to 30 seeds in each. This would form a serious obstacle to the self propagation of the tree, but I entertain some hope that these relations will be equalized if the tree is grown on calcareous substrata.

selection would form a dense shady forest, shewing clean stems of 30 to 40 feet even in deep alluvium, while hereafter wood-oil or other light loving trees would tower above them, and grow up possibly from 50 to 60 feet. In regions where firewood, etc., is abundant, pure blocks of caoutchouc trees *(Ficus elastic a)*, with mahogany, might be preferred as more remunerative.

There is also some hope that the American method of parallel shelter-plantations would be suitable in the vast alluvial plains of India, provided the trees planted were evergreens. According to this method, belts of trees are regularly planted at a distance of about ¼ to ⅓ of a mile apart, the belts themselves being, according to circumstances, from 4 to 8 rods wide, and planted in such a manner as to front prevailing winds (in India SW. to NE.). Such shelter-belts have proved so advantageous to cereal crops in N. America as nearly to double them, while a judicious management of these forest-belts themselves will also supply fuel for the villages.

The practice occasionally observed in the Irrawaddi valley, of allowing trees to remain standing along the borders of the fields, is commendable and might be encouraged. It reminds one of a similar custom in certain districts of Holland, where, however, these border-trees are purposely planted. The roads in Pegu are still without avenues, and I hope, in selecting avenue trees, the mistake often committed in India of planting leaf-shedders, will be avoided in Burma. The trees should be evergreens and, if practicable, should be quick growers, such as fig-trees, mango, bastard-cedar, Casuarinas, *Polyalthia longifolia*, etc. Leaf-shedders are destitute of leaves just at the hottest season of the year.

II.—*Utilization of deserted toungyas, with cursory remarks on timber-plantations.*

The " ya" or " toungya" is a clearing in the jungles on which the felled trees are burnt down, and on which, in the beginning of the rains, hill-rice is sown. The following year, or, according to circumstances, the second, third, or fourth year, the toungyas are either left to themselves and become poonzôhs (deserted toungyas) overgrown with weeds, coarse grasses, shrubs, and trees ; or (which is rarely the case) they are partially planted with other crops, amongst which are chiefly mulberry for silk-worms, and culinary vegetables, tobacco, and such like. It is with regard to these poonzôhs that the subsequent remarks are submitted.

For practical purposes in forestry, toungyas might be divided into those which are cut in level *alluvial* lands, and those which are situated in rocky and hilly localities. The former needs not the special consideration of the forester, if the principle is adhered to, that *alluvial lands* are *par excellence* agrarian lands. The amount of hilly ground in proportion to level country is, as already stated, so large in Pegu, that no fear can be entertained about short-comings in forest-culture.

Those toungyas which are cut on rocky substrata, overlaid by a thin surface soil, are of the greatest importance. These I have designated as " upper cultivated lands and toungyas" in the first part of this report. They include two very different classes of toungyas, viz., those cut in evergreen, and those cut in the deciduous forests. It is of some importance to distinguish these two varieties, for they are the exponents of those conditions that are produced by the degree of dampness caused by exposure and sheltered situations.

The toungyas that are cut in evergreen forests are often situated along the borders of choungs, and in this case, are still damper than they otherwise would be. Many of them are of a tolerable extent, especially in Martaban, and when deserted, would be valuable for the raising of such evergreen timber as may in future be recommended for special consideration ; (this recommendation is supposed to be the result of an ameliorated system of testing woods).

For the present caoutchouc* (*Ficus elastica*) together with the caoutchouc climber (*Urceola elastica)* might be tried, and there is little doubt that these will grow freely without any special attention being paid to them besides sowing. Mahogany would be well located in those damper valleys of the Yomah which border the Prome district, and where calcareous sandstones come in contact with those that are silicious, but still better success for this valuable timber tree might be looked for in the larger valleys along the Eastern slopes of the Yomah and in the Moulmein districts, where in well selected localities, I entertain some hope of growing the tree as lofty as in Jamaica and the Honduras of Guatemala. The rasamala tree of the Malays, (*Altingia excelsa*) or nanta yoke of the Burmese, grows not only in Southern Tenasserim, but also in the Khasya and the Kakhyen hills ; it is considered in Java to be not inferior to teak, and would thus be eligible for the Martaban hills. This tree also freely germinates, is easily propagated, and would require but little care, if a certain inductive mode of planting them out were observed. This is theoretically as follows :

The damp toungyas are, after desertion, more or less regularly overgrown with *Bœhmerias*, *Sponia*, and other members of the nettle tribe, thus preparing the necessary shade for

* The true caoutchouc tree *Hevea Guyanensis*, *Siphonia elastica*, grows very well in the Botanic gardens of Java, and seeds might be obtained from there. Some climbers indigenous in Burma yield also very good caoutchouc, such as *Willughbeia* and *Melodinus*. The product obtained from *Ficus laccifera*, a tree frequent in Burma, and especially in the Andamans, yields caoutchouc probably not inferior to that of *F. elastica*.

the other evergreens which spring up between them. Of this natural course, advantage might be taken, and, instead of the *Urticeæ*, already named, the rhea plant might first be grown, which would perform the same services as the evergreens before mentioned, and would at the same time give a handsome outturn. The damp valleys of the Pegu Yomah, and more especially those of Martaban, are well adapted for the cultivation of rhea, and it is difficult to understand why this plant has not yet been cultivated there. Requiring little or no attention, growing like a weed in favourably exposed grounds, and more especially along choungs, it would soon become a source of wealth for Burma. In similar places in the Martaban hills, the Chinese green dye (*Rhamnus chlorophorus)* might advantageously be introduced. I also pointed out, while in Burma, the suitability of the Martaban hills for the tea plant, which would flourish there on account of the alkaline substrata and the favourable climate. The scantiness of the population, and the consequent high wages for labour in these districts, are, however, hindrances to the cultivation of the plant. I have ltttle doubt, however, that experimental plantations could be established amongst the Christian Karens, and that they would soon voluntarily propagate a plant which would give them a favourite beverage.

Dr F. v. Mueller has suggested that the laborious manual process of curling the fresh tea-leaves under moderate heat could be superseded by adopting rollers for the purpose, worked and heated by steam, which no doubt would simplify matters considerably. Tea could, however, hardly be manufactured in its commercial form by the Karens themselves, and a field is therefore open to any enterprising person who might be disposed to establish factories amongst a tea-planting population and to purchase the supply of leaves from the producers. It is only surprising, that no similar enterprising attempt has yet been made amongst the silk and tobacco producing Karens and Yebaings with regard to the collection of the silk cocoons, the reeling of the silk and the production of larger quantities of tobacco, etc. In fact, I think that such private enterprise should be encouraged, for it lays the germs of an extended activity in our commercial relations with these tribes.

The famous *acari* and other wingless insects that attacked so many of the Bengal tea-plantations to the great loss of the planters, might possibly be repelled by simply planting bhang *(Cannabis sativa)* between the rows of the tea-plants. Should the strong smell impair the flavour of the product, these bhang plants might be grown as a broad cordon (say 4 to 5 feet broad) along the borders of the plantation, and thus prevent the *acari*, etc., from passing through it. This is not a new idea, but is often resorted to in Germany for similar contingencies.

Much, however, remains to be known of the history of these insects, of the time of their appearance, etc., before we can plant the hemp at the proper season to arrest their ravages.

On the Martaban hills large quantities of *Aperula* grow, a tree that yields a fair quantity of benzoin, but is now cut down lavishly by the Karens. *Cinnamomum parthenoxylon*, which yields sassafras not inferior to that of North America, is also not unfrequent in Tenasserim, and probably also in Martaban. The introduction and cultivation of gutta-percha *(Isonandra gutta)* in Southern Tenasserim would prove a success. In fact a species of gutta percha, very nearly allied to *Is. gutta (I. obovata)*, grows wild, and it would be worth while to examine its product. Cajaputi trees are also found in Southern Tenasserim and would give employment to an intelligent manufacturer.

The camphor tree *(Dryobalanops camphora)* might possibly be grown in the southern provinces of Tenasserim (Mergui), though its unquestionable success can only be looked for in Malacca and Singapore. The same may be said of cacao *(Theobroma cacao)* and true vanille *(Vanilla aromatica)*. The clove-tree (*Caryophyllus aromaticus)*, true cinnamom *(Cinnamomum Zeylanicum)*, nutmeg (*Myristica moschata*) *Styrax benzoin*, *Uncaria gambir* and pepper are other products worthy of cultivation in the South.

Coffee, which I have heard recommended as an object for enterprise in Pegu, could hardly be cultivated successfully in the upper parts of Burma; at least it cannot be expected to flourish there. Malacca is the best country for it, and it is there that it finds a soil and climate similar to, or, I should say, identical with, the western coasts of Sumatra, from whence the Dutch derive such a large share for their market.

I turn now to those toungyas which are cut in upper mixed forests, and with which a forester in Pegu is particularly interested. Two varieties can be distinguished by the substratum : the one established on older and richer alkali rocks, such as schists, syenites, etc. (in Martaban), and those on permeable silicious sandstone in Pegu. I have not sufficiently studied the first named variety, and must, therefore, restrict my remarks to the latter. The Marban hills, East of the Sittang, being of a less rugged nature, and having their spurs usually more rounded, have a greater area of toungyas than the Yomah. The destruction of forests going on there is simply alarming, and can only be explained by assuming that there is no control over permits for cutting toungyas. The yield of rice crops in the Pegu Yomah is said to be from 60 to 80 fold. I can rely but little on Karen information, but in the second year, it is said the return is only ½ to ⅓ of that amount, and for this reason the ya is abandoned after the first year. This evidently shews us that the primary cause of the rapid decline in the production of grain is the exhaustion of phosphates* in the soil.

No doubt the rude way in which toungyas are prepared, viz. by felling all the trees growing on such a "ya," burning them down and sowing the crop in a rather lavish manner at the commencement of the rains, is in itself prejudicial to the production of a good return, but to these disadvantages must be added the steepness of the slopes themselves, on which this kind of cultivation is carried on.

The loss of the valuable ashes that are carried down these slopes at the beginning of the rains, cannot be overrated at two-thirds of the whole quantity obtained by the burning of the ya, and, to comprehend this more clearly, it must be remembered that the thunderstorms and showers, at the commencement of the monsoon, are very heavy. With this great percentage of loss of ashes, coincides the fact that very gentle slopes allow a second year's crop, and flat lands are usually still longer occupied, often as long as in the plains themselves. On steep slopes, all those valuable ingredients are not only lost to the cultivator, but to a greater or lesser degree also to the whole country, for they are carried down into the sea. It is true that a portion of these waters inundates the plains, and thus fertilizes the fields there, but in Burma this hardly takes place to such an extent as in the Nile valley. Besides, it may be doubtful whether these submarine fertile deposits at the estuaries of our streams will ever benefit future generations. This loss of phosphates, etc., might easily be replaced by artificial means, but it would be simply wasteful to introduce manures, while such rude cultivation is carried on. The first step towards improvement would probably be the introduction of rice culture *en terrasse*, as carried on near Rangoon, in Java, and other tropical countries. But this necessarily involves a good deal of earthwork, for which Karens do not even possess the necessary implements; and besides this, the system could be adapted only to hills with gentle slopes of from twelve to fifteen degrees inclination, and not to those steep ridges on which the hill-rice is chiefly cultivated. I have reason, however, to believe that the occupation of these lower lands and gentle slopes would alone be sufficient to support even double the present population if a proper management was introduced, resting chiefly on the rotatory system, and if the clanships and concomitant claims to fixed lands would allow of a more equable division of culturable lands. As it is, a *Tay* of less than 100 families cuts down yearly for its support a quantity of timber, quite sufficient in tonnage to build a first class man of war, and if the whole Karen population in Burma be taken into account, the timber consumed by them (of course taken quantitatively and not qualitatively) would represent in tonnage the whole English fleet. All the trees which are cut down, and which are the natural pumps of crude vegetable nourishment from the depths of the substrata, have to grow again, in order to give another crop to these people. But I fear, with regard to the Christian Karens in Martaban, that the natural reproduction of the forests is by no means proportionate to their annual destruction.† Toungya cultivation in this country will always remain a question of vital importance not only to the forester, but also to the public generally, and the destruction of forests caused by such a ruinous system, must sooner or later become a matter for serious consideration. The remedy for the evil is probably not so difficult as it may at first sight appear to be. It is only a question of time, and it is hoped that in the future by a gradual and judicious introduction of changes in the present system, the sad consequences that must necessarily result, if the same principle is carried on with an increasing population, will be diminished. As long as these unsettled tribes were left to themselves, the consequences of such a system were not so conspicuous on account of the continuous warfare in which they were engaged, which necessarily thinned the population, and thus counterpoised the evil; in present peaceful times, however, matters assume a different aspect, and it cannot be said that toungya cultivation is the result of idle habits on the part of the people, for harder work than this can scarcely be imagined. It is an innate hereditary custom suited to the migratory propensities of the people, against which the only *modus operandi* will be the *suaviter in modo et fortiter in re.*

It would really be a boon if the missionaries, who have so much influence with the Karens (at least with the Christian portion), would take it upon themselves to teach these

* This is not, however, always the cause. Leaving sexual relation alone, an unfavourable substratum may even in the presence of phosphates and sulphates, produce abortion of seeds. Amongst many examples I may mention the following as an illustration: In 1868, I visited parts of the Sunderbuns, South of Mutla (saline alluvium), and there met with several experimental rice fields. The rice plants were fairly developed, although thin and meagre, with about 30 to 40 fold produce, but the husks were all invariably empty. On the other hand the agrarian weeds that sprung up along with the rice, like *Blumea, Pongatium, Commelyna, Cyperus*, etc., had their seeds perfectly developed. Here evidently the saline character of the alluvium has—in spite of the presence of the other chemical compounds necessary for the development of seeds—produced abortion in the rice plants, while other plants remained unaffected. This shews us also why in deep alluvium a scantiness of chemical food or an absence of certain necessary compounds may affect the constitution of certain trees and produce similar abortion of seeds either directly or in the course of time, while others seed regularly.

† Compare my journal of 12th March 1868, where it is stated that some 36 square miles teak-forests have disappeared since Dr. Brandis' sketch map of Martaban was published in 1861.

people the blessings of a more rational agriculture ; for I believe that the various topics which even the simplest culture involves are more suitable for the advancement of civilization amongst the people, than instruction in mathematics, geography, and the like.

The want of cattle amongst these people, and the difficulty of keeping them in these hills, is also a serious obstacle, but it will be overcome as settled cultivation progresses.

After this short digression, I shall attempt to show how good might be derived from evil, and how such deserted toungyas might be utilized for forest purposes. The right of cutting toungyas in forest districts is, I suppose, subject to the permission of the forest officer of the district. Hence if the conditions for a subsequent occupation of the ground were favorable for the raising of timber plantations, they would readily, it is believed, be accepted by the parties interested, and a good deal of expense in felling trees and preparing the ground for a plantation would be saved. Such toungyas would be only suitable for leafshedders, but not (in the greater number of cases) for evergreens. It has been ascertained that teak does not spring up very freely in toungyas, and it is supposed therefore that toungyas are not generally favourable for the dissemination of teak.* The causes of this are apparently the following :

(1.) Karens usually avoid cutting toungyas in localities, where bamboo fruits or begins to fruit, for they know very well that rats would be attracted and would destroy their crops.

(2.) As a consequence of this, coarse grasses, etc., spring up instead of bamboo seedlings, necessarily suppressing, to a greater or lesser degree, the growth of teak and other trees.

(3.) Toungyas are not allowed to be cut in localities where teak is abundant, and therefore the supply of seed that is carried to them by winds after they are deserted is necessarily small or only nominal.†

On the other hand, we know of teak :

(1.) That its seedlings come up freely where bamboos have flowered and died off.

(2.) That teak attains its greatest perfection in size and growth where Tinwa and Kyattounwa are largest. In fact the growth of these two bamboos may be considered an infallible criterion for the growth and size, not only of teak, but also of many other leafshedding trees, which elongate their stems in proportion to the average height of these bamboos.

(3.) That teak and other leafshedders, without bamboo undergrowth, remain small sized with short stems, and, if grown on deep alluvium or on impermeable substrata, often become deformed.

From the above facts, we may, with a certain degree of probability, conclude, that the present system of planting teak‡ in Pegu is not in conformity with the natural requirements of the tree, and will by no means realize the expectations which foresters may entertain. No one can predict from the growth of young trees what their future size and shape will be, until the rapid upward-growth becomes arrested and the engrossing of the stem commences. Facts in nature also point forcibly against the establishment of pure teak-plantations, and shew that although teak may be grown thus, the trees do not attain the perfection to which they are capable under a natural process. To this may also be added the fact that some of these plantations (now abandoned, if I am correctly informed) are laid out on laterite, calcareous sandstone, deep alluvium, etc., which are all naturally unfavourable to the good growth of the tree. The future results of such a culture will be clearly seen in the patch of pure teak forest of the Myitmaka choung West of Poungday (Prome), or in those pure teak-forests to which I alluded in my journals of the 6th and 9th February, 1871.§

Tropical leafshedders, at least by far the greater part of them, are pre-eminently unsocial in excessive tropical regions, and competition with other trees improves their growth. This latter fact is well known to foresters in Europe with regard to leafed forests, and they plant, therefore, oaks and beeches together, because they know that the growth of the former will improve by competition with the latter. This phenomenon simply rests upon the different light-loving propensities of the trees themselves, which compels the one either to push his head above his neighbour, or to succumb or perish altogether.

The practice‖ of planting trees close together, so as to cause the early clearing of the

* Capt. W. J. Seaton states in one of his reports, that it was an erroneous view that toungya cultivation facilitates the reproduction of teak.

† To this may be added the fact, that, as a rule, only a few of the numerous seeds which a tree produces yearly germinate (some say only one in a hundred), owing to the struggle for existence that is ever going on in nature. Hence the natural necessity there is in a practical point of view for removing, first, the cause of suppression, before the free development of the teak-seedlings can be looked for.

‡ My remarks refer only to those teak plantations which I saw in 1868, and to the Prome plantation in 1871.

§ Viz. in the fork of the confluence of the Ban-deo choung and Ye noë, and in a similar fork between the Pyit choung and a small feeder at Hsa-byeng.

‖ Tropical leafshedders cannot be compared with temperate leafshedders and be treated accordingly, for the latter follow quite distinct laws. Therefore tropical arboriculture must necessarily differ from European arboriculture, and even the arboriculture of excessive, and that of equable tropical climes, is based upon different principles. Excessive heat and icy winters must affect the growth of trees in a different way, although the physiological effects of both resemble one another remarkably.

upward-growing stems can,in the tropics, only be applied to evergreens, or to leafshedders when grown together with evergreens. Leafshedders of one and the same species only, if not very densely planted out, will clear their branches normally, *i. e.*, the stems will grow just as high as the quality of the substratum prescribes. Therefore a teak-tree in deep alluvium will never reach the size of one grown in shallow alluvium, and still less that which grows in an upper mixed forest. But if various trees are grown together of different light-loving qualities and rates of growth, competition is fully established, and the growth of a tree may thus so far be improved, that a deep alluvial tree may equal a shallow-alluvial tree.

It is also quite probable, and theoretically sustainable, that teak may be grown to a noble size, if bamboos of large size are grown on the same soil. Hence, several Bengal bamboos, like banka bans, or even the Burmese Kyellowa and Wábo, might produce a beneficial effect upon the length of the teak stem, provided they are sown together, and that the teak is not planted in bamboo groves already existing. That this may be attained, one can judge from the better growth of trees in villages than those in the open country.

Leafshedders can then in my opinion, only be advantageously grown together in a compact block, if there is a suitable under-growth, and, in Pegu, the most valuable undergrowth for permeable strata and alluvium is bamboo, the species of which should be selected according to the nature of the substratum. The gist of all the above remarks may be stated in a few words : *Cœteris paribus,* the subsoil rules the growth of a tree, while competition amongst the trees themselves, or their undergrowth, improves their growth within certain limits fixed by the capacity of the substratum itself.*

No amount of arboricultural skill, therefore, will raise a well sized and well shaped teak tree on pure laterite or impermeable calcareous sandstone. But on the other hand, the quality of the timber of such a stunted and crooked tree, may be, and I strongly suspect is really, superior to that of a lofty grown tree on highly permeable strata. Before we can judge of such matters, and all the important practical bearings depending upon them, we first require a thorough knowledge of the laws according to which the quality of timber is affected by soil. Towards a settlement of this question, I shall introduce hereafter a scheme for studying the quality of wood according to soil and climate.

To return now to the poonzohs or deserted toungyas, we must keep in mind that hardly any advantages can really be derived from them, except when they are occupied immediately after desertion. It is then that measures can be taken to prevent the springing up of coarse grasses and weeds, which are so injurious to the free development of tree growth. The natural course would seem to be to sow bamboo seeds and teak together, instead of (as is done now) to sow til, cotton, rice, brinjals, chillies, and such like crops. Indeed, I do not see what direct influence these crops can exercise upon the growth of the young teak trees themselves. They are in verdure during the rains when shade is not required, and become just dry enough in the hot season to give additional food to the jungle-fires. The small profits, derived from the sale of the outturn of these crops, can hardly counterbalance the necessary consequences of want of competitive vegetation, viz. the bad growth of the teak-trees themselves. Bamboos would perform this service, but surely not such annual crops as these. If shade is actually required, we must look out for other substitutes, which will not only furnish shade, but at the same time cause the young trees to compete together for an upward-growth. Such shade plants must at the same time be of such a kind as will suppress the upward-growth of coarse weeds and grasses, and for this reason, they should neither be leafshedders nor very finely leaved evergreens. They ought to be broad-leaved, but very loosely crowned plants. I would suggest for the present, castor-oil and papaya trees (and the Chinese tallow-tree ?) ; I can for the present note only these few trees as suitable for permeable sandstone formations. It has already, I hope, been made clear from my previous remarks, that the same trees do not grow at the same rate on different substrata ; it is necessary therefore that their selection should be regulated upon this principle, that a tree will grow fastest on very permeable, and slowest on impermeable rocks, and one has to study the different rates of annual growth of every tree, before one can advantageously provide for a good competition among leaf-shedders. The abovementioned trees will, however, successfully keep out wild sugarcane and other coarse light-loving grasses, while weak soft grasses and herbs will spring up, and will have rather a beneficial effect, because they will remain green the greater part of the hot season, and will thus be less subject to jungle-fires.

If the immediate planting together of bamboo and teak seed would not be preferred, I would suggest the following plan of operations, as an experiment :—

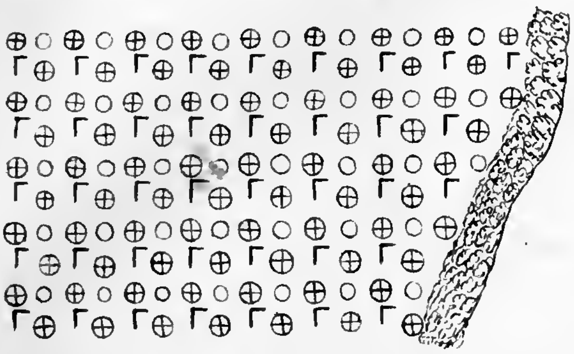
1st.—Rainy season. Sow teak and castor-oil or papaya-seeds together.
2nd.—Rainy season. Sow Bamboo-seeds at proportional distances.
3rd.—Rainy season. Statu quo.

* Much depends also upon the quality of the seeds themselves, and weak seedlings often succumb altogether, or remain sickly on a soil otherwise most favourable for their growth.

4th.—Rainy season. Cut down the castor-oil and papaya trees, leaving the bamboo and teak-trees to themselves. Creepers should be kept out as much as possible.

The regular planting out of the trees is preferable to simply sowing them, as every tree receives by such a process the same share of space, shade, etc. The wild plantain is also a good shade plant, and, if grown at proper distances, keeps out the wild sugarcane even more effectually, but the planting of suckers necessarily involves additional labour and loss of time.

The subjoined sketch explains the proposed arrangement of the plantation; allowance must, however, be made for the width of the intervals according to the angle of the slope.



Γ—Teak; ⊕ papaya or castor-oil; O bamboo, outer skirt a plantain hedge with Bryophyllum for protection against junglefires.

The squares are here taken at 5 feet at each side; castor-oil trees are nearest the teak-seedlings, while the bamboo-clumps, after removal of the castor-oil trees, will be at distances of nearly 15 feet; giving a total of 440 teak-trees per acre.

The outlay for such a plantation would not probably much exceed the estimated cost of present plantations, for the planting itself can be done by a few men only, and the keeping up of the plantation is greatly simplified, as injurious coarse weeds are kept out by the shade trees themselves, which act at the same time as competitors. On the other hand, the expense of felling trees and the clearing and primary preparation of the ground is saved, as this has already voluntarily, although unconsciously, been accomplished by the former occupiers of the toungya.

If mixed plantations are preferred, bamboos might be dispensed with; I believe however, that in all plantations of leaf-shedding trees, the bamboo is a highly important constituent. The forester must decide which trees should chiefly be selected for such mixed plantations; but a group like the following would, in my opinion, give a fine jungle when grown on lands that were formerly occupied by upper mixed forests, especially if the exposure is favourable: teak, pyenkadu, thit-katu, Kathitka, Kanyin-ni and Kyattoun-wa. If the land is situated at the bottom of a valley, or in other sheltered situation, thingan, Koungmu, Kathitka, thingadu, Kokko, Kanyin, thit-katu and pyenkadu may be grown, but no teak. On calcareous strata of a similar exposure mahogany should be added. If the land has an unfavourable exposure, teak and pyenkadu along with tinwa should be grown, and if the substratum consists of schists or other older rocks, rich in alkali, padouk might be added.

On sea-beaches of fine sand, such as are frequently found along the Tenasserim shores, the following trees would form good and valuable forests, and would at the same time be sand-binding: tinyu *(Casuarina equisetifolia)*; poung nyet *(Calophyllum inophyllum)* along with cocoa-palms; and probably the cinnamon tree *(Cinnamomum ceylanicum)* might be associated with them. At least, I understand that it is cultivated in Ceylon along similar shores and in similar situations.

There are numerous exotic trees—timber as well as dye-woods—which would prove valuable, and many of them would be preferable to those named above, but their successful acclimatization depends upon an intimate knowledge of their natural requirements, and unfortunately it is just such questions of soil and elevation which are so much neglected in the introduction of these exotics.

An exotic timber-nursery would certainly be a great boon to the forester, and would, with proper management, soon become of importance. Endeavours should be made to introduce really useful, and not fancy, trees, from Brazil, Mexico, &c., a selection being made from the export lists of those countries; and in nursing them, two or three different subsoils should be selected, so as to afford some insight into their soil-requirements. As a rule, evergreens would have to be kept in damp shady situations, but not leaf-shedders, which are for the most part light-loving. If these points are attended to, the losses would hardly amount to 1 in 5.*

I have now to consider those toungyas which are cut in the Prome district on calcareous sandstones and even on laterite grounds. For these, other trees must necessarily be selected, and amongst those that are indigenous, the *sha* is probably the best. The selection of valuable trees for this dry district is a most difficult subject, because so little is known about limestone-loving trees of other countries, but I strongly suspect that we shall have to look

* If shade-loving evergreens are awkwardly placed in open sunny places, the result will, as a rule, be that their stems will be shortened, and their branches lengthened (especially the lower ones), often so much, that they will spread all round and thus protect the ground on which they grow by their own shade from the injurious effect of solar radiation.

to Southern Australia, if we want valuable introductions. The climate in S. Australia is still more excessive than that of Prome or Ava, and the geology is similar though not identical. Very valuable timbers grow there, such as the *Eucalypti*, *Casuarinæ*, *Grevillea robusta*, etc. Many of the Australian trees also produce timber which is supposed to be superior to that produced by Indian trees, and they attain at the same time enormous sizes, but unfortunately Australian botanists have neglected the soil-question quite as much as the Indian botanists, and without some information on this question, no decisive opinion can be formed as to the results should these trees be introduced. Many of the Mediterranean trees might also be found suitable for this district.*

Cotton and indigo are already in cultivation all over Pegu, but the shallow calcareous porous alluvia in the Prome district may be found adapted for more lucrative and extensive plantations. Poppy cultivation may at some time or other be adopted in the Prome district, although its rocks are apparently poor in alkalies, but I should rather like to see this plant used only as a rotatory crop, so as not to diminish the rice cultivation on arable lands.

Although well aware that the above remarks greatly differ from the views now generally adopted with reference to such questions of Indian forestry, I trust that they will not be found useless, and that they will at least be considered deserving of a practical trial at the hands of Forest Officers.

III.—*Some hints with reference to the study of the quality of woods in India.*

A question of importance to the forester is the quality of timber as affected by soil and climate. Great and often serious discrepancies are met with in books treating of timber, and I myself have been puzzled by finding that many contradictory statements had crept in with reference to the quality and colour of my collected woods, so much so, as to lead me to pass over my own remarks in the belief that some of the labels had been displaced. All these circumstances have induced me to devise a scheme by which it might be possible to acquire a more or less thorough knowledge of Indian woods. At the same time my chief aim has been to make the experiments as cheap as possible, and to cause as little interference as possible with the general duties of the forester upon whom the task would necessarily devolve. Up to the present time the universal custom has been to collect the various timbers in a province or district, for local or international exhibitions; but numerous as the contributions have been, the results, as regards the quality of Indian woods have rather increased than diminished the uncertainty already existing. Most of the officers charged with the collection of such woods had not—and often could not have—a special botanical knowledge of the forest trees and their names. Every one collected as many sorts as possible, sometimes receiving the same sort twice over or oftener, under different native names, and with the aid of some book, such as Balfour's, have tried to identify these by means of the native names, or have only given the native names.

Great as the progress of forestry in India has been in the last decennium, it cannot be denied, that with comparatively few exceptions, our knowledge of the quality of Indian timbers is still very fragmentary, and an intimate and thorough acquaintance with them is felt to be more and more necessary. The results of experiments, as carried on chiefly in ordnance departments, are very useful, but in the absence of a uniform plan, they do not admit of a proper comparison.

The usefulness of timber of the same species is described in different terms, and this is not surprising when we bear in mind the fact that the timber must vary according to locality, and that the value must needs vary in different districts for want of better substitutes.

I do not think, therefore, that a fair, and what I should call a rational, solution of such questions can be arrived at, until the study and collection of timber is carried on upon a uniform plan, based upon simple but sound principles. In the following pages I venture to submit a scheme, which I hope will be found not only useful and simple but also economical. At least the outlay appears to me so small in comparison with the advantages to be derived from such a system, that I entertain some hope that the same may be acceptable to foresters, either in its original shape, or with such alterations as may suggest themselves. I cannot, however, suppress the belief that some disadvantages will be felt in succeeding thoroughly with the system of testing woods, because good agronomical or rather lithological maps, correct

* Dry infertile soils can be made fertile to a certain degree in a comparatively short time by planting succulents on them, like *Cactus*, *Opuntia* etc. If calcareous, fig-trees (even the caoutchouc trees) can be employed for the same purpose. *Opuntia* might thus be raised for the rearing of the Cochineal-insect. In Sicily this practice of planting *Opuntia* is carried out in fertilizing lava. The caoutchouc tree grows in abundance in Southern Java, chiefly on limestone beds, along with other fig trees. Compare Dr. Junghuhns' excellent botanical description of that island in the first volume of his "Java, its vegetation and geological structure." This may be a hint for utilizing, in somewhat humid climates, rocky sterile tracts of land otherwise unfit for timber-plantation.

general deductions of meteorological observations, and the like, still remain desiderata. The supply of such information through the forester himself would necessarily cause an enormous loss of time.

I shall discuss the points connected with the present question in the following order, separating the executive from the auxiliary branch.

A.—*Executive Branch.*

1. Preliminary rational forest-survey.
2. Selection and collection of forest trees.
3. Testing of timber.
4. Preservation and keeping of wood-specimens.
5. Difficulties in carrying out the system and some of its direct advantages.

B.—*Auxiliary Branch.*

1. Climatology.
2. Soil.
3. Collecting and drying botanical specimens.

A.—Executive Branch.

§ 1.—*Preliminary rational Forest Survey.*

I call this survey a rational one, as it greatly differs from the present practical forest surveys in every respect. The latter have more to do with the gauging, estimating and working of the forests generally, with reference to a single or a few *a priori* useful timber trees; while the former refers to the whole of the forests, and all their natural relations, independent of their practical usefulness.* It is a study of the whole district, of its physical and geological structure, and of all its vegetable products, carried out according to principles harmonious with scientific intuition. The results of such a survey would lead to a correct understanding of the vegetative combinations (forest etc.) and their relationship to soil and climate. Such a survey, of course, requires a botanical training, and, therefore, the work would rest with the higher grades of foresters, and more especially with the Conservators, who *a priori* could do little in their position without a good knowledge of botany.

The carrying out of surveys of this description must necessarily vary according to varying circumstances, and no rules can be laid down in this respect. In hills bordering alluvial plains, it is always useful to try to cross the watersheds at various places from the banks of one tributary to those of another, and, if of some elevation, it is necessary to ascend the highest points. In the plains a zig-zag mode of travelling is the one which places us quickest in a position to acquire a fair knowledge of the country. Travelling in plains which lie along the banks of rivers, is in my opinion a waste of time, for it never gives a correct insight into the nature of the country itself. However, all depends here upon good maps, and more especially upon lithological maps, which latter can best prescribe the routes, these being selected over all the different geological formations, and over the most varied topographical conditions. Some of the most salient points for the consideration of soil and climate that come under consideration in such surveys will be found noticed in the auxiliary branch of this report.

§ 2.—*Selection and collection of forest trees.*

After a forester has obtained an intimate knowledge of the geology, climate, and physical nature of his district, and has mastered the various varieties of forests, it may reasonably be expected that he will be able to select the trees with due regard to surrounding circumstances, and thus lay the basis for testing the timbers in a rational manner. All, however, depends upon a correct selection of the trees the timber of which is to be tested; if trees are taken, for instance, from substrata of a doubtfully mixed nature, the deductions regarding the influence of substratum upon the quality of timber will necessarily be doubtful, and the results may even be highly injurious to the solution of the question. The chief object in such selections should, therefore, be to obtain the trees from the best marked formations in their typical form.

I think that the question of the influence of substratum upon the quality of timber should first be settled by experiments. In order to arrive at anything really reliable and decisive, the ubiquitous trees should first be selected, *viz.* those which grow on the greatest variety of substrata and under the most varied climatological conditions. Moist localities, or very fertile deep soils in Europe, usually accelerate the growth of trees, and at the same time render the annual rings broader and the wood softer and more loose-grained, while the weight, durability, etc., must needs be changed as a natural consequence. Again, while in Europe winters and cold retard the growth of a tree, it is aridity and heat that produce the same effect in tropical countries. At the same time the quality of the timber, but not

* Rational forest survey stands thus in a similar relationship to practical forestry as the Geological Survey to practical mining.

its shape and size, improves. Pines in the north of Europe at high elevations, produce hard wood with narrow annual rings, while those grown in the plains in light soil, are the very reverse. In the same way the attainable age of trees varies according to the locality in which they grow, and it stands to reason why, for instance, the larch in Northern Russia should be a tree of great durability, and should attain there a great age, while this is not the case in the low lands of Germany. The value of timber must necessarily vary, and one and the same kind of timber is therefore paid for at different rates according to its quality. In tropical India the same variation in the quality of timber is observable, but the causal factors differ to a certain degree from those of temperate climes. The annual concentric layers of wood are, especially in evergreens, not so distinctly marked, or are not distinguishable at all, and thus the study from the wood alone is rendered much more difficult. It is also well known, that the wood of the different parts of a tree, such as the root stock, branches, etc., may be different from the timber of the mainstem. It is very necessary, therefore, that these matters should be carefully studied, in order that advantage may be taken of such variations for practical purposes.

I would name for a first trial the following trees in Pegu, which are best adapted for an experimental enquiry into such questions:

Teak, thein gala *(Nauclea sessilifolia)*, nau *(Nauclea cordifolia,)*, pyenkadu, thit *(Albizzia procera,)* lepan or didu *(Bombax Malabaricum)*, baup *(Butea frondosa,)* nabbé (*Odina Wodier*,) yindyke *(Dalbergia cultrata,)* Kwé (*Spondias pinnata*,) mango, thit magyi (*Albizzia odoratissima*,) yung *(Anogeissus acuminatus)*. All these trees should be full grown, and their timber should be examined according to the soil in which the trees grow, whether it be—

(1.) From deep alluvium, in tidal regions (thus saline to a certain degree,) like didu, thit and baup.

(2.) From deep alluvium (fresh water) as in the typical savannah forests.

(3.) From true (cavernous) laterite as in the typical eng forests.

(4.) From permeable siliceous sandstone, as in the typical upper mixed forests.

(5.) From impermeable calcareous sandstone, as in the dry forests of the Prome district.

(6.) From metamorphic rocks, such as syenites, shists, etc., as in many of the upper mixed forests of Martaban, E. of Sittang.

Some of these trees may also possibly occur on limestone-strata ; if so, these should be added. Teak in Java* also grows on volcanic (chiefly trachytic) rocks and debris.

It is obvious that an examination of the timber grown on so many different substrata must, on the principles laid down, give results of the greatest interest and importance, and they will most probably shew that permeable strata will produce softer, and impermeable strata harder timber. It is also clear that if a greater number of species are used for this purpose, the value of the results will be greater. If at the same time the same trees are examined under the same soil conditions in two very different climates (say an equable damp and an excessively dry one) and in different elevations, the results would be still more conclusive.

When the relationship of the quality of timber on those typical formations has been ascertained, it will be an easy matter to draw from it deductions with regard to timber grown on strata of an intermediate nature.

* Dr. Junghuhn writes (Java, I. p. 347. sqq.):

" Travelling through the island (Java) from W. to E. one sees—

(1.) The first teak forests in the plains, which spread out between Tji mánúk and the promontory hills of the northern base of Gunung Tjerimai, growing on hard clayish soil. Further, we find teak forests:

(2.) In the hills of the northern base of Gunung Prau, over which the road leads from Pekalongan to Samarang, on hard red-coloured clay-soil.

(3.) On a similar soil, resting on sandstone, at the N. W. and N. base of Gunung Ungaran.

(4.) On the low hills which begin in the vicinity of the E. base of the Gunung Ungaran and G. Merbabu, and which extend from here to the northern banks of Kali Solo and further up at both sides of the river in an easterly direction as far as the vicinity of Sedayu and Surabaya. In this region, many limestone beds are found, but teak grows on the sandstone.

(5.) On the northern half of Gunung Kidu-en of Jogjakerta, on sandstone, for instance, between Kebo Kuning and Awu Awu.

(6.) Round the W., N. E. and N. base of Gunung Wilies teak makes its appearance eastward of the second post station Tjaruban where the trunk road from Madiun to Kediri runs through the plains and extends to the other side of the 4th post station Wilangan at the N. E. base of the hill: over this whole area teak grows on a bed of trachytic pebbles on which a hard heavy surface soil rests.

(7.) In the Residency (province) Kediri and the neighbouring Residency of Surabaya, teak grows around the base of the hills Ardjuno and Kelut, and more especially on the S. W. and S. slopes of the last named hill in the districts Srengat and Blitar, here growing on volcanic sand."

Teak is now planted in Java in large quantities and the cultivated teak is said to produce timber of a better quality than that of the wild grown trees. Here the average age of a full grown teak tree is said to be 100 years. It is considered useful to burn yearly the shrubbery and grass in the teak forests, by which process the ground cracks and becomes looser and richer in ashes. Teak does not grow high in Java, and trees of 70 to 80 feet are rare, the average height being 50 to 60 feet, with somewhat crooked and knotty stems, and a few far spreading branches, the surface of which is as smooth and pale coloured as the stems stripped of their bark. In March and April teak trees are in foliage and in blossom, but they shed their leaves in July.

The trees should of course be selected by the Conservator of the district during his tours of inspection, etc. There should be only three trees selected in each division of his district, and the forester in charge of each division should be responsible for the execution of the orders received. The instructions to be given to the forester of the division should be as follows:—

a. The tree should be numbered and branded with the hammer and the current No. and the mark should always be branded at such a height on the trunk, that the party who fells the tree may be able to remove the piece of the trunk which has the *number on it.*

b. He should be personally present if the tree comes into flower or fruit, (a fact which should be reported to him by the goungway) and he should personally superintend the collection of the botanical specimens. Of course if the tree is in flower or fruit at the time of selection, the specimens should be collected at once. If the tree is a leaf-shedder, the flowers, fruits and leaves will often have to be collected at different seasons, but only few complete specimens will be required, say for three or four parties (one for the divisional officer, one for the provincial office, one for the head-quarters office, Calcutta, and one possibly for England).

c. After he has procured the prescribed specimens, he should give the necessary orders for the girdling or felling of the tree at the proper time.

d. He should then procure the required slab from the tree, see that the size and shape are of the required dimensions, and that the number and mark are left on it, and then forward it to the head office.

e. Any information respecting the uses, native names etc., of the tree which he can obtain with the assistance of his native subordinates should be entered in his note-book, and a copy of such information forwarded to the head office along with the specimen.

(2.) The goungway should be charged as follows:

a. He should be made responsible that the tree is not removed by other parties.

b. He should find out the time when the tree flowers or fruits* (if the flowers and fruits have not already been collected at the time of selection) and should inform his superior when the flowering takes place.

c. He should be present, and should superintend the girdling and felling of the tree, and see that the branded number is left on the piece of the trunk cut out.

It would be well if the Conservator kept a note book, in which to enter the current No. of the trees as branded on the stems, the native names, if any, of the trees, the locality selected, the nature of the substratum, the kind of forest in which the trees grow, the exposure, slope, and elevation, the name of the officer to whom the further care of the trees has been entrusted, and, finally, other remarks which he may think useful, such as height, girth, clean stem, uses, etc.

It would be well also for the officer of the division to keep a similar book in which to enter the current No. given him by the Conservator, the native names, if any, of the trees, the locality in which they grow, and the name of the goungway who is made responsible for the tree.

It is a matter of indifference whether the slab from such a tree is cut to a certain size by the officer of the division, or sent entire to the head office. The latter course is, however, preferable as it ensures uniformity. The bundles of dried plants should always be well packed in waxcloth or tarpaulin when forwarded. A short account of the manner in which plants may be dried will be found in § 3. of the auxiliary branch.

Under such an arrangement as that described above, the Conservator of a province consisting, for instance, of 6 divisions, would have to select yearly 18 trees, while divisional officers would each have the care of only 3. This might appear somewhat too small, but as the work advances, the number of trees for selection becomes smaller, and the search for them more and more difficult. The more important trees should of course be taken first, and with regard to these a larger number than here proposed might be selected, in order to obtain a more rapid solution of the question of the relative strength of their timbers.

Whether the selected trees should be girdled or felled green, is a question which I must leave to the consideration of professional foresters. The advantages of girdling with reference to specific weight are too well known, but, on the other hand, a tree if girdled would require to stand two, if not three years, before it was completely seasoned ; an officer of a division would, therefore, have to pay attention to 6 or 9 trees in place of only 3, and mistakes might easily arise from forgetfulness or mismanagement.

To increase the number of trees to be selected would also, it is feared, not facilitate the rapid working of the scheme, unless indeed additional expense was incurred by the appointment of a staff of officers to control the work. Suppose that from Madras, Bombay, Bengal, N. W. Provinces, Punjab, Burmah etc., only 15 specimens were sent by each to the head-

* In this there is often some difficulty, especially if the tree has very small flowers or fruits. A Burman will often say, that the tree never flowers, and will talk about " male and female trees" according to his ideas.

quarters office at Calcutta, the total would amount to more than a hundred yearly, and these would all have to be tested, named, arranged, and reported upon.

§. 3.—*Testing of timber.*

The log that furnishes the specimens of wood for a wood-collection, should also furnish the material for the testing of the timber. It is, of course, only intended to obtain a general knowledge of the timber, and therefore the tests cannot be carried out on such a large scale as is done in the ordnance and other departments. In testing wood nothing should, however, be left to arbitrary and individual views, but everything should be based as far as possible upon actual experiments, carried on according to a uniform and rational plan, from which alone positive results can be expected, which will not only be valuable to the experimenter himself, but also to the general public. The first requirement, therefore, is a strictly uniform system over the whole country by which a clear and satisfactory comparison of the various woods of India could be made.

It is highly desirable that for testing the breaking weight* and elasticity etc. of wood, a sort of construction should be devised on which only pieces of wood of exactly the same size and shape, could be used, and which at the same time would be self-working, thus preventing abnormalities caused by awkward handling. I think that a four-cornered staff of wood, half a square inch thick by 2 feet long, might be made the normal basis. Five such sticks would be equal to $\frac{1}{20}$th of a cubic foot, which would simplify the arithmetical calculations connected with the testing of the timber. But should future experiments shew that the thickness of the staff is not in proportion to its length, and that it breaks too soon, a staff 1 inch square might be used, five of which would equal $\frac{1}{10}$th of a cubic foot.† In this case, however, the construction to be used for testing timbers would have to be made stronger in proportion.

In the annexed sketch I have attempted to give an idea of how such a wood-tester should be constructed, so as to give the most reliable results. I have to introduce two kinds, based upon two different principles: the one might be designated the quadrant wood-tester, and the other the pendant wood-tester.

1. *The quadrant wood-tester* (fig. I).—This wood-tester chiefly consists of a box (A) of hard wood, into which fits a drawer of utensils (B). C is a board, fastened with hinges to the box, which can be folded up : it serves to bear the counter weights (W) which will prevent the tester from turning over by the weight on the opposite side. D is supposed to be a patent-lever, but this might be replaced by a common steel-yard. E represents the wood-expander. F is the projection of the wood-tester itself with the piece of wood on it which is to be experimented upon.

Fig. II. shows the front elevation of the wood-tester, with the arrangement of its different parts : *a* is a pole on which the piece of wood is fastened by means of a screw (*a a*) ; *b* is the central pole, on which the principal weight of the piece rests, the upper inner part of this pole is rounded off convexedly, in order to allow the piece to move freely and without unequal pressure ; *c* is a brass quadrant, fastened to the central pole by means of a brass cross-bar (*c c*) which strengthens the resistance of the weights employed in the process of testing. This quadrant is hollow and receives into its body a brass solid moveable circle segment‡ (*d d*), of which fig. II. Nos. 1, 2, and 3 give three sections at different heights (No. 1 represents the uppermost end, and shews the manner in which the staff is inserted. No. 2 represents the same after the removal of the cross-bar, which keeps together the outer body of the circle-segment, and No. 3 the upper piece with an indicating needle,‡ shewing how it fits into the outer body and also the toothed inner ledge from the side). The inner ledge of this circle-segment is toothed, and these teeth play into those of a toothed wheel (*d*) furnished with a revolving brass or iron handle.

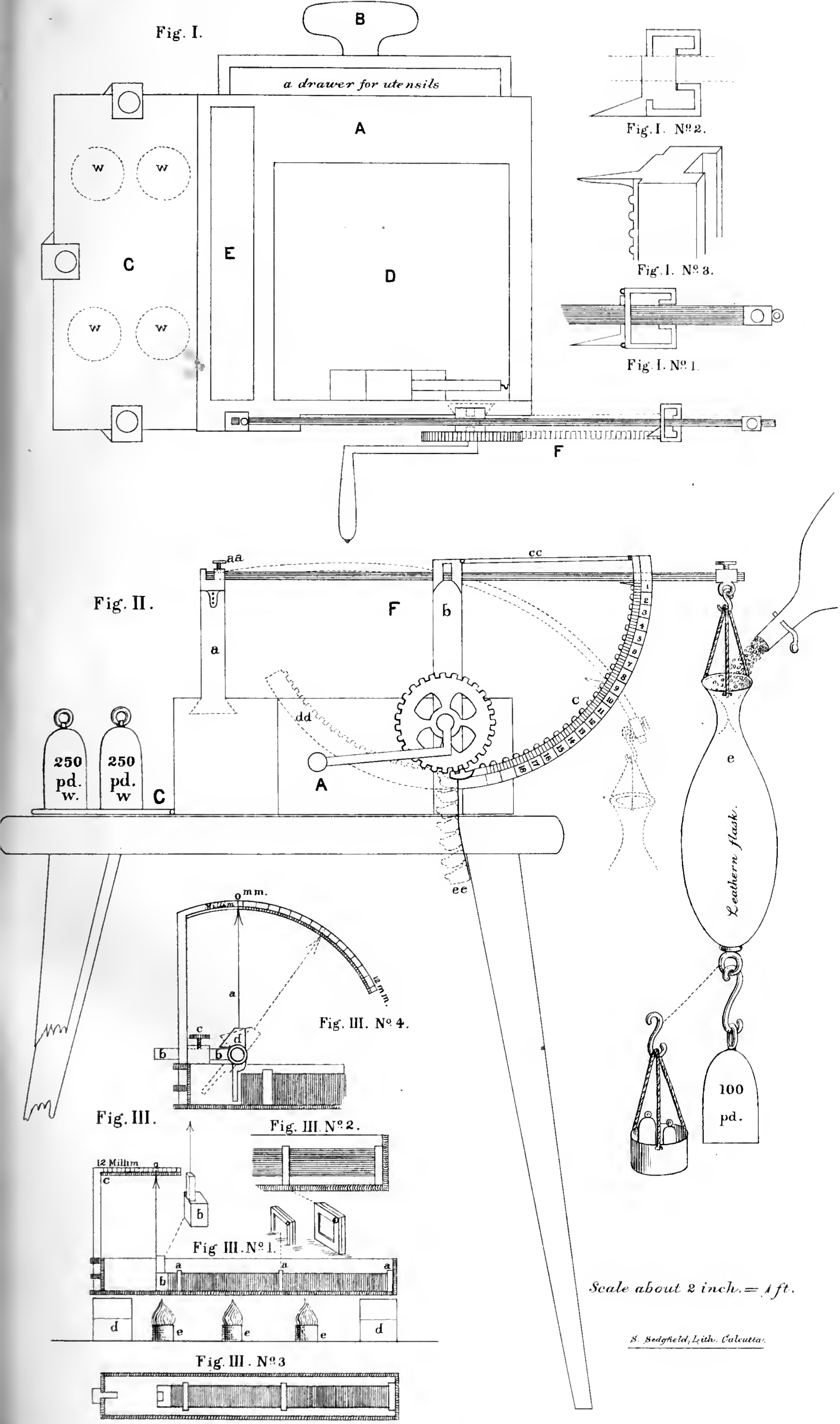
The manner in which the weights should be applied, is shewn at *e*. and can easily be understood without a description. The piece to be tested is always supposed to protrude so much from the scaled brass-quadrant that its downward movement is not impeded when it gradually shortens itself by bending under the strain of the weights attached to it.

The flask for the reception of small shot should be of very strong leather, so as to prevent its breaking in case of a sudden rupture, and its neck should be very narrow (as indicated in the fig. by dots), as it will prevent the contents falling out in case the staff under experiment should break unexpectedly. Instead of the shots and weights, water might be used, but in this case the flask would have to be made of tin and furnished with a clear and pellucid stripe of mica with a scale on it, indicating the weight according to the height of the

* It is worthy of consideration whether the breaking weight of the sapwood and of the heartwood should be tested. The strength of the heartwood, however, represents the positive strength of the timber, and is of more importance to ascertain for building purposes, than that of the sapwood, which at least, as long as as it is connected with the log itself, exercises possibly but a passive resistance.

† At the same time I think it would be very useful to have each of the 5 staffs experimented upon, so as to obtain the extremes of the breaking weight.

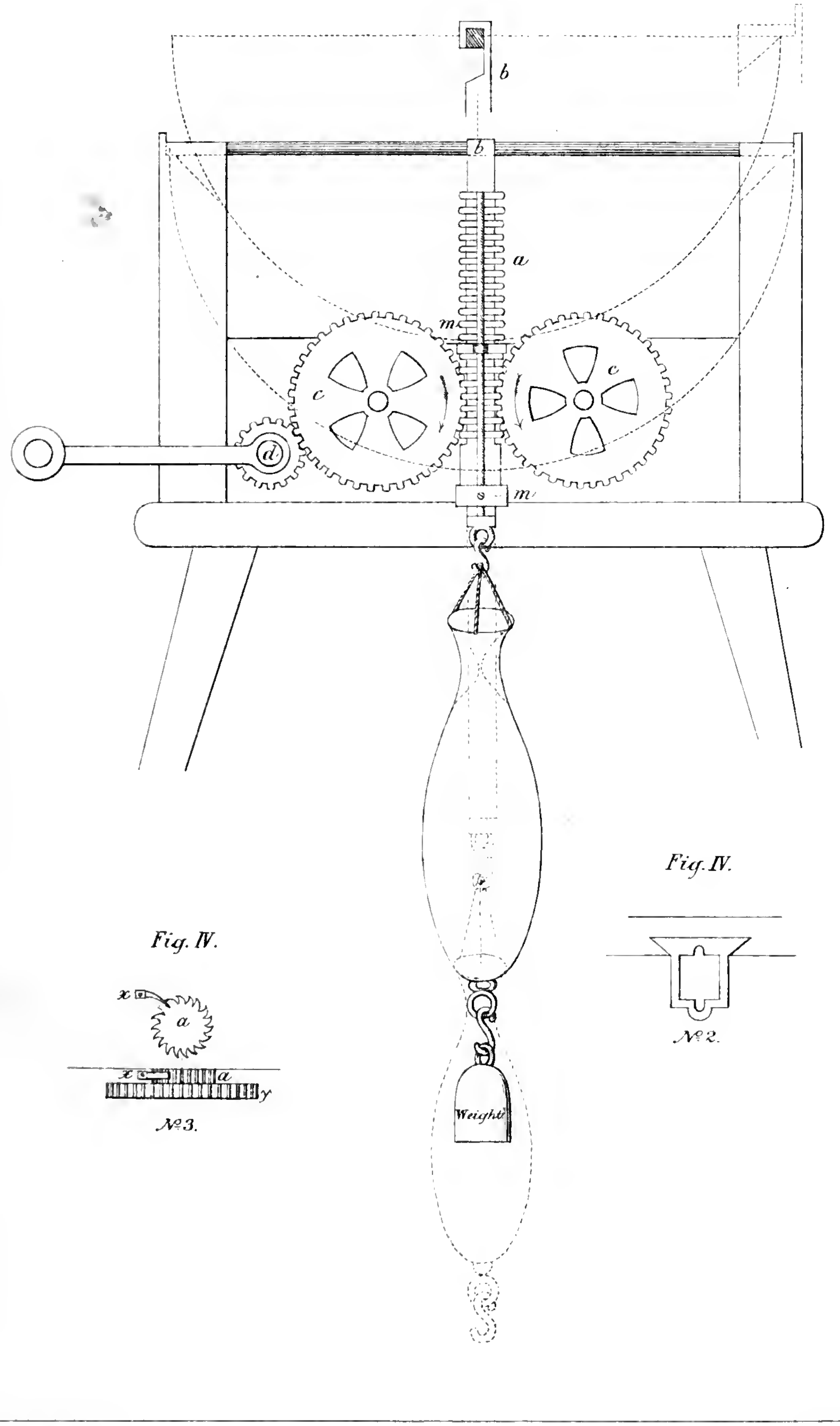
‡ This circle segment might also be constructed on the principle of a chain as indicated at *e. e.*



Scale about 2 inch. = 1 ft.

S. Sedgfield, Lith. Calcutta.

Fig. IV.



S. Sedgfield, Lith: Calcutta

water poured in. This would shorten the work considerably, but there are some drawbacks in its use. The weight of the water may vary according to its purity or impurity, and as the flask itself would be of large size, it may suffer from rough use and disarrange the accuracy of the weights indicated on it.

The manner in which the wood-tester should be used is simple. The staff is inserted as shown in the sketch ; the weights are applied with the right hand, while the left steadily holds the handle of the wheel. The downward pressure of the inner toothed body of the quadrant should be attentively watched, and its motion arrested as quickly as possible,* the moment the staff shews signs of breaking. The scale of 45 degrees† on the quadrant gives the degree of flexibility, while the weights appended shew the breaking weight.

2. The *pendant wood-tester* is represented in fig IV. It is easier to handle during the process of testing, but its defect is that the elasticity and breaking weight of the staff cannot be tested with the same degree of accuracy as with the quadrant wood-tester ; for it is clear that a wood-staff with a flexibility of 45 degrees will escape from the rest poles as soon as the bend exceeds the diameter of the space between the two poles. The construction scarcely requires any explanation. A brass moveable toothed bar (*a*) fastened with a clasp (*b*) to the middle of the wood-staff, which is laid horizontally, plays downwards between two toothed wheels (*c* and *c*), of which the teeth of the left wheel play again into the teeth of a smaller wheel, which is held with the left hand by means of a rotatory handle by which the downward-movement may be arrested at the moment the testing staff breaks. To ensure the accurate movement of the pendulous toothed and scaled bar, it is made to play through two clamps at *m m*, a section of one of which is given in fig. IV. No. 2.

The weights etc. remain the same as in the quadrant wood-tester. The dimensions of the box itself, on which the construction rests, are, however, much smaller, say about one foot long by half a foot broad and deep.

The specific gravity and weight of a cubic foot of the wood under test may be ascertained by the use of balance scales, which may be either on the patent lever principle, or of any other construction that may be preferred. As has already been remarked, the 5 testing sticks would be equal to $\frac{1}{20}$th or $\frac{1}{10}$th of a cubic foot according to the square adopted, and therefore the same experimental staffs can be used for this purpose either before or after they have been subjected to the test, and the ascertained weight has only to be multiplied by 20 or 10, in order to give the actual weight of a cubic foot. Only perfectly dry woods should be weighted, for woods are often very hygroscopic, and hence are heavier in a damp than in a dry atmosphere.

A knowledge of the degree of expansion which timber undergoes during the rainy season, or when otherwise exposed to wet, is of great practical importance. It would not, therefore, be out of place to try experiments in this direction also, and for this purpose I have devised a wood-expander.

The *wood-expander*, fig. III., consists of a narrow enameled iron vessel, about 1¼ feet long by 1¼ inches deep and wide, to the bottom of which are fixed 3 clamps (*aaa*). The central one ought to be three plated,‡ and the upper part of all three should be made to close and open by means of a hinge, so that the wood-staff may be properly inserted. It would also be a much better plan not to allow the staff to rest at all at the bottom of the vessel, but to insert it in the manner shewn in No. 2 of fig. III. A cap (*b*) terminating in a needle (indicator) is fixed to the end of the staff, and the indicator will play along a brass scale (*c*). As the wood therefore expands, it will move the cap and needle, which will indicate the degree of expansion in millimetres, or such other measure as it may be found convenient to adopt in the scale.

The experimental wood-staff should be cut transversely, and not longitudinally, and should be inserted into the clamps while *perfectly dry*. Experiments of this kind could, therefore, hardly be carried out in India during the rainy season, but would have to be done during the hot dry season, or the experimental staff would have to be subjected to artificial heat until perfectly dry. The water must be very carefully poured into the vessel ; so as not to disarrange the position of the wood, and should heat be required for the experiment, to produce expansion in warm water,§ the two bricks at *d d* and the three lamps *e e e* might be used. Fig. III. No. 3, shews the vessel as seen from above.

* In order to prevent the wheel snapping backwards, it might be well to have the projecting nut of the wheel (y) constructed on the principle of a ratchet-wheel (a) (see Fig. IV. No. 3), with a catch which would fit into the teeth of the wheel.

† In fig II. only 18 degrees have by mistake been indicated, but there ought to be 45 degrees, each of which be divided again into 5 or 10 equal portions, if really required.

‡ This is done to enable wood-staffs of shorter length (say only half a foot) to be fixed to the middle-clamp, in place of the clamp at the extreme end. The degree of expansion in this case would, of course, have to be doubled so as to make the results conform to the normal length of one foot.

§ At such a temperature as the logs would experience in tropical climates if exposed to the sun after a fall of rain, for contraction and expansion very rapidly take place according to the more or less sudden down-pour of rain, alternating with sun-shine.

It is clear that a piece of wood, only a foot long, will shew only a small amount of expansion, and that if the wood be very hard, the expansion will be almost imperceptible. To ensure more accurate readings, therefore, and to make the instrument more sensible to the changes in expansion, the construction at fig. III. No. 4, will be useful. Here the indicator *a* is not fixed to the wood itself, but is attached to the end of a horizontal moveable brass bar *b b*, which can be fixed by a screw (*c*). The triangle (*d*) serves to facilitate the insertion of the indicator and its end piece at right angles with the experimental wood-staff. I think it would also be well, if in this case a small brass cap were fixed to the end of the wood-staff, as it would ensure greater accuracy in movement. The scale here is not straight, but forms a circle-segment, of which the centre of the radius rests in the nut at the base of the indicator. This instrument will be worked in precisely the same manner as that represented in Fig. III. No. 1, the only difference between the two being that the indicator is placed at right angles to the end of the wood-staff by pushing the horizontal moveable brass bar until it touches the wood. The slightest change in the expansion of the wood in the direction of the end piece which touches the indicator will then be shewn in an exaggerated degree upon the scale, and will thus render the readings very easy.

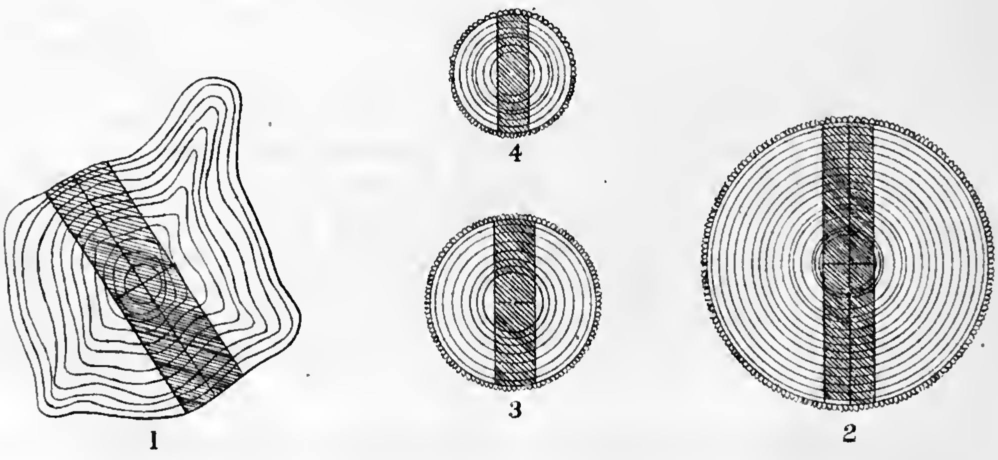
The whole of the wood-testing apparatus as above explained can be constructed in such a manner as to admit of its being taken to pieces after use and the separate parts stored into the drawer (fig. I. B) destined for them. This would form a small portable box of only about 1½ to 2 feet square or oblong.

A general description of the timber and the results of the experiments made might be most advantageously drawn up at the head-quarters office at Calcutta by one and the same officer, for it is obvious that in the face of the present vagueness and uncertainty of terms for grain, fibre, colour, texture, density, hardness and cleavage, no uniformity can be looked for, unless a strict terminology is introduced. The terms as used by cabinet-makers, etc., with which I am however, quite unacquainted, might possibly be used for this purpose.

§. 4.—*Preservation and keeping of wood-specimens.*

Although collections of woods possibly exist in every Conservator's office, I think such collections are not made upon any uniform plan, and that the shape and sizes of the wood specimens vary very much. The plan which I submit is, if I correctly understand, already in force in France,* and would I believe be preferable to the one adopted in India, according to which large pieces or rather parts of logs are selected for these collections.

A log upwards of three feet in girth may give four sections, each complete in itself, shewing heart-wood, sapwood and bark; or only two sections if it is below three feet in girth, while a log of very small girth would give only a single piece. A log may be cut into complete specimens for a wood collection, somewhat in the manner shewn in the subjoined sketches.



* I have seen similar collections with German foresters, who had these book-shaped pieces of wood hollowed out inside, in which were preserved not only the leaves, flowers, etc., of the respective trees, but also the insects injurious to them.

The specimens thus obtained are represented below. (The corresponding proportions to the above sections are not taken into account.)

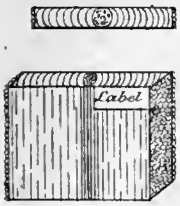


Fig. 4.

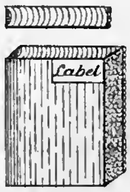


Fig. 3.

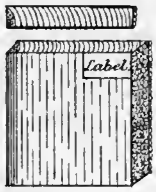


Fig. 2.

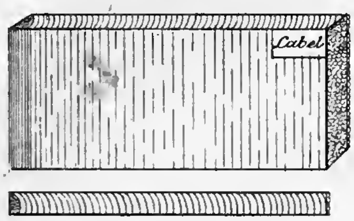


Fig. 1.

The dark-coloured pieces in the transverse sections represent the wood specimens which have been cut out of the log, while the spaces left white represent the pieces which would be rejected. These might, however, be used for other experimental purposes, or be put aside, marked with metal Nos., and exposed with the object of ascertaining the extent to which insects would attack them injuriously.

For this purpose all such rejected pieces may be piled up indiscriminately. I have often observed, how *Bostrichi* and other xylophagous beetles select precisely the same perishable kinds of woods out of such piles with astounding sagacity, while known durable woods remain perfectly untouched. The hardness of wood does not, however, give the key to the cause of such selection, for even very hard woods are subject to the ravages of these insects, more especially if they are composed of coarse, bony, vascular bundles surrounded by medullary cells. However, the degree in which the same wood is destroyed by them is apparently very variable in various climates, and a wood durable in a very dry country, may be just the reverse in a damp one. Therefore, experiments of this kind would be more reliable if carried out in a damp climate.

If a uniform length of wood specimens were adopted, say, for example, 9 inches, or a foot long, by an inch or less thick, the width, answering to the girth of the log, may vary to any extent, without interfering with the uniformity of the wood specimens themselves. A width of 3 feet would correspond with a girth of 18 feet, but it is more probable that such a thickness of stem would rarely, if ever, be required, and that the average extreme width of wood specimens might be reduced to from 2 to 2½ feet, corresponding with a girth of from 12 to 15 feet of the original log.

The advantages of having the wood-specimens cut to such a size and shape are chiefly the following :—

(1.) The book-shape thus adopted would suit admirably for a collection of woods, and would give it rather the appearance of a library.

(2.) The specimens would take up very little space without detracting in any way from the requirements necessary for a subsequent complete study of their structure, etc.

(3.) If these specimens are, as is often the custom in Europe, polished on one lateral side and along all the edges (but the lower one), the nature of the polish they take may be clearly shewn.

Whether the bark should be left on the pieces or not, is a matter of some practical importance, but if it is of a sappy nature, it will shrink to a very great degree. It is also well-known that many barks adhere so firmly to the sapwood, that it is difficult to remove them, while others fall off while still on the living tree, or during the process of drying, and cannot be kept on the specimens except by means of pegs.

A printed label stating the current No. of the head-quarters office, with the number of the Conservator's office, as also the scientific and native names of the trees, with notes relating to locality and soil, etc., might be pasted outside on the upper righthand corner.

It would be well to cut small sized timbers below a foot in girth lengthwise into halves, and to polish one half, leaving the other half plain. It may also be found desirable to keep such small specimens in a separate cabinet with narrow shelves divided into small compartments.

In order to make the collection still more useful, it would be advisable not to confine it to one, or a few specimens of each kind of wood, but to have as many as would be necessary for distribution and exchange with other Institutions. Each Conservator should also have at his office a complete set of the woods of his province, with the botanical specimens belonging to it ; while a double set (one for systematic, the other for practical arrangement and for the general use of the public) may be found necessary at the head-quarters office of the Forest Department. Possibly also another double set may be placed at the disposal of the Secretary of State. In order to secure a few spare sets for distribution, the logs from which these specimens would be cut would not probably exceed 4 to 6 feet in length. I have observed in some Indian wood collections that logs a little shorter than this have been used for a single specimen.

The cabinets in which these wood specimens are to be kept may of course be constructed variously according to taste, but they should always be 2½ or 3 feet deep, and be made so that they can be closed when not in use. Woods cannot be poisoned like plants without destroying their appearance, and, therefore, special arrangements are required to prevent not only cockroaches and other insects from destroying the labels, but also to prevent wood boring beetles from attacking the specimens themselves. To do this effectually, I would recommend camphor being kept in an open bottle with a narrow mouth, so as to prevent its too rapid volatization. To prevent white ants from attacking the specimens, poisoned pasteboards may be placed under the legs of the cabinet—the boards being an inch broader than the legs themselves. I have found this to be the only means by which I have been able effectually to keep out these destructive insects. The pieces of pasteboard, of a coarse and thick consistence, should be soaked for a whole night in a powerful solution of corrosive sublimate, or better still in arsenic (say about a table spoon full to a tumbler full of spirits of wine). They must also be whipped occasionally to remove the dust that may accumulate on them. Another method would be to place a zinc-plate at the bottom of the case, with thick projecting, rounded and polished edges, and to have the stands of the case also of metal.

The cost of conserving such a collection of woods, including the cabinets, would in my opinion not exceed, even at the head-quarters office, Rs. 300 per annum; but as carpenters are indispensable for carrying out the work, an additional outlay for establishment would be required.

Leaves, flowers and fruits, belonging to the wood specimens, would, of course, be kept in a separate cabinet, and would form the forester's herbarium.

§ 5.—*Difficulties of carrying out the above system, and some of its direct advantages.*

Simple as the carrying out of such a scheme as that proposed in the preceding chapters, would appear to be, there are certain difficulties which cannot be easily overcome. From the nature of the work it is clear, that the most responsible task rests entirely with the provincial heads of the Forest Department. When they are botanists, or have only a general knowledge of botanical matters, the work will go on smoothly, but when they are not botanists, the work will, I fear, be encumbered with many difficulties which can only be gradually removed by their mastering the more common trees. Proper control and instruction from head-quarters will no doubt spread botanical knowledge most effectually amongst foresters in the provinces. But to understand the soil-question in all its bearings is such a difficult matter, that errors in this direction cannot always be avoided; still a knowledge of its principal rudiments may and must be expected from the forester. Hence the very basis for a correct understanding of the forests of a district (the key to which would be afforded by the rational forest survey) is involved in such a network of difficulties, that even a trained botanist would not always find the means for unravelling them.

On the other hand, the direct advantages to be derived from the collection and testing of woods would not only be that the foresters under such a system would be obliged to make themselves (although slowly yet steadily and progressively) acquainted with the trees in their districts and with the quality of their timbers, but it would be a great assistance to the Conservators to have their local collections examined and named at the head-quarters office; while the officers at head-quarters would themselves acquire not only a more extended knowledge of the trees and timbers over the whole empire, but would be able to rely upon the results attained, which at present they can hardly do. Add to this the thorough knowledge of Indian timbers one may be able to acquire from the perusal of such a collection of correctly named specimens, and the facility which would be afforded to the public generally to select such timbers as are most useful and best adapted for carpentry, engineering, turning, dyeing, etc., and the importance of having a general collection of woods in the capital of India cannot be denied.

The head of the Forest Department would also be enabled to exercise a strict control not only over the working of the system itself, but also over the greater or lesser abilities in this direction of his subordinates in the provinces, for any serious mistakes in the selection and collection of woods in one province would, in most cases, soon be detected at the head-quarters office by contradictory reports from other provinces.

And in addition to this there are the probable advantages which foresters may derive in matters of timber plantations, after they have correctly recognised by direct experiments the influence of subsoil and climate upon the quality of timber, and the shape of the trees themselves. They would learn to know the substrata that produce crooked or straight stems, or that produce heavier or lighter timber, and could thus model the quality and shape of the trees at their will.

In England the value of such a collection of correctly named woods, especially if accompanied by a record of the results derived from the experiments made for testing their strength and quality, would soon be fully appreciated, and the requirements of the timber market would be increased. But there is still another field open to forest industry: if we could obtain a similar knowledge of the quality and natural requirements of other tropical trees in America (more especially in Brazil, Central America, and Mexico), and also of those in Australia and tropical Africa, a field of no little importance would be opened up. We should then be enabled to select the most valuable and suitable timber trees for our plantations, and stock desert tracts of India with such dry country trees as may be most suitable for them.

The more direct information which a forester would derive from such a system hardly requires explanation. A forest herbarium containing specimens of woody and other useful plants is indispensable to a forester in India, because he is placed under very different circumstances to a European forester (and in the higher grades, foresters in Europe are highly scientific men). A European forester has to deal at the outside with 400 species of woody plants, amongst which such ambiguous creeping things are included as *Salix herbacea*, etc., plants which an Indian forester would hardly ever accept as woody plants. But of these 400 species, barely 200 come within his direct observation, and besides this, his work is made easy by the numerous publications relating to these subjects.

The total number of woody plants in India (such at least as deserve the name of shrub) is hardly below from 7000 to 8000 species, and selecting from these such as may strictly be classed among trees, there still remain about 4000 (or I dare say 5000) species. A knowledge of these alone would stamp a forester as a systematic botanist of some reputation. Let us turn now to the local forest officer, such as a Conservator of a province in India should be: how many species of woody plants has he before him? If we exclude N. W. India, the desert tracts and alluvial plains, I do not think there is a province in which a forest officer has not to deal with about 800 species of trees and possibly 1000 of other woody plants, climbers as well as shrubs. Need I repeat that an Indian forester has a task before him, to properly master which he necessarily requires a very large amount of botanical knowledge? To these difficulties is added the necessity of working in any (even the rudest) botanical research with the knife and magnifier, without which he could not get on satisfactorily with his work.

It would possibly be a much better plan, if some of the foresters who shew themselves interested in, and competent to undertake practical botanical researches, were allowed to devote their time exclusively to this and related branches of forestry; and their work would be greatly simplified if each of them were placed over the respective botanical regions indicated in the first part of this report (p. 21) and without reference to political divisions. Thus there would be required only 3 or 4 botanical foresters, say one each for Hindustan, the Himalayas, the Khasya hills and eastern Bengal, and Burma (possibly including Malacca).* The operations connected with timber-plantations would profit greatly under the direction of these Officers, whose field-experience would be guided by scientific principles, and many violations of the most simple natural laws would thus be prevented; while the strictly practical forester would have his time reserved for the execution of his more direct duties.

B.—Auxiliary Branch.

1.—*Climatology.*†

I would have passed over this subject altogether, as one generally understood, had it not occurred to me that our knowledge of the climatology of many parts of India is still very imperfect, and in no way equal to the requirements of forestry and of the acclimatization of plants generally. The outlines given here are only general with special reference to forest operations in tropical India.

To obtain a clear insight into the climatology of a country with reference to its vegetation, it is not absolutely necessary to have such elaborate meteorological tables as are usually kept at observatories. There are, however, two extremes, where more careful details are imperative, viz. in those countries and elevations, where the temperature reaches freezing point, and again where excessive heat and dryness are so great as to prove highly injurious to vegetable growth. Tropical plants cannot endure such a great degree of temperature within certain extremes, like temperate plants, and, as a rule, the slightest change in the hygrometrical state of the atmosphere affects them greatly. This explains why many tropical trees of low lands, if shade-loving hygroclimatics, may ascend into damp regions of considerable elevation, while tropical xeroclimatics do so in a lesser degree, for instance, in the Tibetan high lands; a crossing of the two conditions would, in most cases, imply certain death to both. Such considerations are of importance in the acclimatization of plants. It would be a great mistake, for instance, to try to plant an apple tree or a vine in a damp climate, even if the elevation gives a temperature corresponding with that of the natural habitat of the tree.

* The plains and other poor or desert districts, like Scinde, Tibet, etc., do not require the services of special botanical foresters, but might be attached to the adjoining botanical regions.

† An excellent essay on Indian climate will be found in Drs. Hooker and Thomson's introduction to their *Flora Indica* p. 74, et sqq. For elementary education either Sir J. Herschel's Meteorology, or Thompson's Introduction to Meteorology may be used.

1. *Moisture.*—Thales, the most ancient philosopher of Europe, propounded in Greece the doctrine that water is the origin of all organic beings—a truth which even modern philosophy cannot shake in its principles. It is, therefore, excusable, if I put moisture at the head of factors, although temperature, light and all their consequences are almost inseparable from it.

Moisture affects vegetation in various shapes, viz., visible or invisible vapours in the atmosphere, such as fogs, dew, etc., or in the shape of water, such as rain or snow. For practical purposes the observations might be reduced to :

(1.) The reading of the hygrometer at three periods of the day, viz., just before sunrise, at noon (or rather at 1 P. M.) and after sunset.

(2.) The inspection of the gauge, in order to ascertain the amount of rainfall (only once a day). The information derived will necessarily be only approximate, for gauges at small distances from one another will often give very different results. To equalize such uncertainty the number of rainy days and observations of the clouds must be recorded.

(3.) The notice of the frequency of rain, fog and dew.

These three points will suffice for the hygrometrical requirements of tropical forestry.

2. *Temperature.*—The thermometrical readings will have to be taken synchronously with the hygrometrical readings, but it is highly necessary also to record the maximum and minimum of the day. Besides this, observations of clouds and haze will be useful, as they moderate the temperature considerably. Clouds intercept the solar rays during the day and produce coolness, while during the night they intercept the radiation of insolated heat, and retard the cooling of the atmosphere. Cloudy climates, therefore, have comparatively cool days but warm nights. I think that three ciphers are quite sufficient for our purposes to indicate the state of the sky, viz.

0. Clear, or only with few clouds.
1. Cloudy, more or less, from $\frac{1}{3}$ to $\frac{1}{2}$ of the sky.
2. Cloudy all over, or at least more than half.

If clouds alternate with clear sky, which takes place chiefly during the rainy season, it might be expressed by $O' \times 1$ or $O' \times 2$, as the case may be.

The change from the cold to the hot season, in excessive tropical climates, is usually very sudden, so much so, that we can readily fix the commencement of the hot weather within a few days. This rapid change is chiefly due to the shedding of the leaves of the trees, by which act the evaporation as well as the precipitation of moisture is so quickly diminished as to become sensible even to a superficial observer. In an evergreen forest, or in regions well stocked with evergreens, such is not the case, and here the hygrometrical changes are more gradual and regular. The commencement of the hot season greatly depends upon the amount of rainfall of the foregoing rainy season, and sets in earlier if the rainfall during that period was moderate ; but on impermeable exposed strata trees always shed their leaves earlier. The immediate cause of leafshedding is, in temperate climates, attributed to the action of cold,* but in the tropics, it appears to me to be intimately connected with the supply of moisture, for otherwise we could not explain why the same tree on a ridge should shed its leaves, while its neighbour a few fathoms below, in a moister situation, should retain its foliage for weeks and even months longer.

The intensity of solar rays is a subject of interest to a tropical forester, because it affects the growth of trees to a certain extent. Observations should therefore be taken with a black-bulb thermometer constructed on the principle of a maximum thermometer. The intensity of the solar rays in their illuminating as well as in their calorifying qualities, inversely increases with the density of the atmosphere ; hence it happens that one may so easily catch a cold on the summit of a lofty mountain, if one seeks protection from the rays of the sun under the shade of trees.

3. Other factors which affect climate are especially *wind* and *exposure.* Notes on the general direction of the winds, etc., are, therefore, useful, always supposing that we also know the character of the tracts of land or waters over which these winds have travelled, so as to enable us to bring into account their heating or cooling, and their drying or moistening effects. The exposure of the station of observation should always be noted in the same way as its elevation. If it is freely exposed on a plain or at the bottom of a valley, it will be sufficient to use the terms *free* or *sheltered.*

All these observations will have to be entered in tabular forms from which, after a few years' observation, a general diagnosis of the respective climates may be deduced.

* Dr. Inman (Proceed. of Liverpool Phil. Soc. 1844-45 p. 133, sqq.) and Dr. Ledeganck (Bulletin of the Belgian Bot. Soc. X. p. 133, sqq.) ascribe the act of leafshedding to cold which operates by causing a greater contraction of the half-dead spongy tissues of the petiole than of the tense cushion, and so ruptures the cells. I think it more probable that *expansion* takes place instead of *contraction,* for water forms a most remarkable exception to the regular laws of expansion by heat. Water acquires its greatest density at about 39.5 Fahr. Both heat above and cold below this point cause *expansion.* This anomalous expansion of water is productive of most important consequences in nature (see Tomlinson's Introduction to the study of Natural Philosophy).

Form I.

Daily Meteorological observations at *for month*

Elevation. *Geographical position.* *Exposition.*

Date.	Thermometer.			Extremes.		Maximum black bulb ther.	Hygrometer.			Rain in inches.	Clouds.	Direction of winds.			Remarks on electricity, dew, fog, haze, etc.	Barometer.		
	Before sunrise.	1 P. M.	After sunset.	Max.	Min.		Before sunrise.	1 P. M.	After sunset.			From 6 P. M. to 6 A. M.	From 6 A. M. to 1 P. M.	From 1 P. M. to 6 P. M.		Before sunrise.	1 P. M.	After sunset.
1st																		
2nd																		
3rd																		
etc.																		
Mean.	+	+	+	0	0	0	+	+	+	×	+	+	+	+	Those marked with + are reducible to the mean; those marked o require extremes only; × means total amount.	+	+	+

Form II.

Monthly Meteorological Observations at *for the year*

Elevation. *Geographical position.* *Exposition.*

Seasons.*		Months.	Thermometer.			Extremes.		Maximum black bulb.	Humidity of atmosphere, Sat. = 100			Rain in inches.	Rainy days.	Average direction of winds etc.			Remarks on electricity, clouds, dew, fog, haze, etc. (Average).	Barometer.		
Hygroscopic season.	Climatic season.		Before sunrise.	1 P. M.	After sunset.	Max.	Min.		Before sunrise.	1 P. M.	After sunset.			6 P. M. to 6 A. M.	6 A. M. to 1 P. M.	1 P. M. to 6 P. M.		Before sunrise.	1 P. M.	After sunset.
DS.	CS.	I.																		
DS.	CS.	II.																		
DS.	½ CS.	III.																		
DS.	HS.	IV.																		
½ RS.	HS.	V.																		
RS.	HS.	VI.																		
RS.	HS.	VII.																		
RS.	HS.	VIII.																		
RS.	HS.	IX.																		
½ DS.	½ CS.	X.																		
DS.	CS.	XI.																		
DS.	CS.	XII.																		
Mean	results.																			

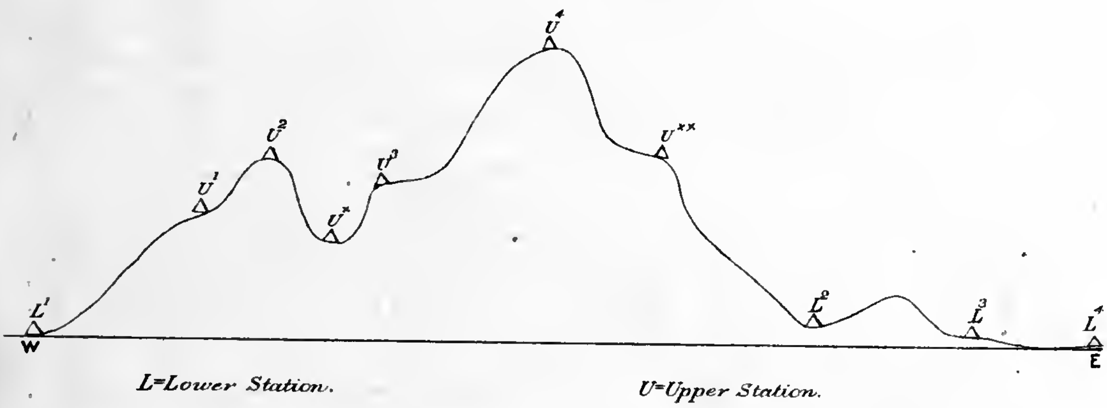
* DS. = Dry Season ; RS. = Rainy Season ; CS. = Cold Season ; HS. = Hot Season. If the season breaks up in the middle of the month or varies within a space of 1 or 2 months, a fraction will indicate this as shewn above.

The seasons should be clearly defined, and the *rainy* and *dry* seasons (if marked) should always be taken as the principal divisions of the year. In some countries (not Indian) two dry and two wet seasons succeed each other alternately. The hygrometrical observations may be reduced to the degree of humidity (saturation = 1 or 100,) and entered as such in the column allotted for this purpose in form 2 ; but the difference between the dry and wet bulb thermometer alone would sufficiently answer the purpose. The remarks on dew, etc. can only be very general. Daily means of temperature and humidity are in my opinion insufficient for practical questions, and, therefore, the three periods of the day (applicable chiefly to the plains and lower hills of India) should be kept separate, as is done in form 2.

If it were possible to establish a series of observing stations in a net-work all over India, even for a period of three or four years, and if the observations were made upon a uniform plan, results could be obtained equally important to the forester and to the agriculturist.

The reduction of the meteorological results of the various stations to climatological zones or districts, is a very difficult task, if done properly, and it can only be carried out with a perfect knowledge of the physical and geological conditions of the province itself. It cannot be based upon the annual means, but must be deduced from the monthly means with due consideration of the extremes and seasons. Besides this the stations themselves would have to be classed first according to elevation and exposure, and, of course, the lower stations with free exposures would have to form the basis.

The subjoined schematic section of a range, about 3000 ft. high, supposed (for the sake of simplicity) to run from N. to S., thus giving E. and W. exposures, may explain the points at issue:



Here L.$^{1-4}$ will shew a tolerably similar climate, but L.$^{2-4}$ is sheltered in afternoon by the range and thus escapes the maximum-temperature which usually falls in excessive climates between 3 and 4 P. M. U$^{1-3}$ will also resemble one another, but U^{4} may have a lower temperature, while U$^{\times}$ and U$^{\times\times}$ may have a climate similar to U^{4}. U$^{\times}$, although hypsometrically a lower station, will possibly shew a still lower temperature on account of its situation in a deep sheltered valley. If the same range was composed of impermeable instead of permeable strata, as here supposed, the result of both, if compared *inter se*, would differ greatly.

§ 2.—*Soil.*

This factor has been already sufficiently treated of in the first part of this report, and it remains for me only to add some general remarks connected with it.

1. *Chemical composition of soil.*—A forester can possibly do little in this direction,* beyond consulting a professional chemical man in all cases where he suspects that the chemical composition has produced a certain change in the vegetation. Chemical analysis indicates but incompletely the fertility of soil, for it gives only the proportion, but not the degree of solubility of the compounds. We must, moreover, dismiss the idea that any species is absolutely restricted to a substratum of a certain chemical quality, but still it would be wrong to neglect this question altogether. Neglect of the chemical character of the substratum is only too often the cause of failure in tree plantations in India which is caused either directly, by planting trees where the substratum is diametrically opposed to their requirements,

* However, he should be generally acquainted with the principles of chemistry and be able to detect himself the more prevalent and important compositions, such as limestone, silica, etc. German Forest-literature comprises books on Chemistry adapted to Forestry: but I am not acquainted with a similar English one. For elementary instruction the following may be useful to the Forester;—Henry Roscoe, Lessons in Elementary Chemistry. Liebig, Familiar letters on Chemistry and Johnston, Instructions for the analysis of soils.

or indirectly, by planting them on unfavourable sites which allow their growth, but not the natural development, of which they might otherwise be capable. So far as our knowledge of the influence of chemical composition upon wild vegetation extends, we have only the fact before us that certain chemical elements act injuriously upon certain plants, while to others they are a necessity. The substances which especially influence vegetable growth are lime, silica, alumina, common salt, sal-amoniac, alkalies, and possibly iron (in laterite), and still more so (as Schleiden has pointed out) water. The influence of these (water excepted) only becomes conspicuous, if present in large quantities and distributed over a large tract of land. The above named ingredients in connection with a greater or lesser degree of permeability, will form the basis of all questions in forestry relating to soil. Perennial, and more especially woody, vegetation is more affected by these than herbaceous growth; but a change through decomposition may produce apparent exceptions which are not always easy to understand.* Then we have before us the fact that by far the greater number of plants *may*† grow on almost every substratum, without being peculiar to it, or being permanently settled on it. Hence it is difficult to a mathematically trained mind to conceive the practical importance of this question, which is not so much concerned with the possibility of *making a plant grow* on a certain soil, as with the prevalence of the plant and the healthiness or luxuriance of its growth on such a *soil*, on a peculiar soil, as in its prevalence or better growth on such soil. The soil question is, in my opinion, of great importance to a practical forester. For instance the "shá" (*acacia catechu*) tree occurs in Burma on alluvium, is found sparingly on silicious sandstone and forms whole forests in good condition on calcareous sandstone: the natural lesson to be learnt from such a distribution would be to plant sha on calcareous sandstone, but not on alluvium, although it may, and really does, grow on it. According to Dr. Brandis, the sal-tree grows best on permeable (coarse-grained ?) sandstone; if we wish therefore to have fine-grown sal-timber we should select such a substratum as just named. Or take the case of the Eng tree, which I found growing plentifully on laterite, sparingly on stiff clay, and calcareous sandstone, but more especially on its ferrugineous decompositions, while a few trees were observed on calcareous alluvium resting on a bed of quartz gravel. It would be very doubtful whether Eng planted on deep alluvium, would succeed there, and if it did grow, it would in a short time lose its power of bearing seeds, and would not, if left alone, be able to maintain itself.

Unfortunately botanists in India, much to the disadvantage of science, have utterly neglected this, and generally the whole soil-question. Climate and geological structure are related to one another to an extent‡ which still requires to be explained. Under such unfavourable circumstances we have in future to look to the Indian forester for the elucidation of the subject. A wide field it is that spreads itself out before him, one full of interest and practical usefulness. The scientific spirit which has developed itself amongst foresters in several parts of India, leaves little doubt that we shall soon be as familiar in India with silica, limestone, etc. loving plants, as people are in Europe, and we shall then discontinue establishing timber plantations on *a priori* unfavourable substrata. . . . .

Garden and arable soil possess the wonderful quality of absorbing and fixing just those elements most important to plant-life, viz. potash, ammonia, phosphoric acid, and silicic anhydride. Rain is the principal if not sole fertilizer in nature; it contains besides salts, small quantities of the above named substances so necessary for the metamorphosis of otherwise insoluble salts in the soil,

* An instructive field for illustration of this subject is the calcareous sandstone formation of the Prome district, consisting probably of about 60 per cent. of silica and 35 per cent. of carbonate of lime. When in its natural state, it is an impermeable rock, bearing chiefly lime-loving trees of stunted growth, but the same when decomposed, loses all carbonate of lime and becomes a coarse highly permeable siliceous sandstone, bearing silica and lime-loving trees according to the degree of decomposition. The confused distribution of tree-vegetation in such a district can easily be imagined, but is quite explainable.

† We cultivate numerous species in our gardens under soil-conditions often diametrically opposed to their natural habits; and *they grow*, but every gardener is aware of the number of species that he yearly loses, or which die out, although they did well often for years, thus shewing that not climate but soil is the cause of their decay.

‡ I will adduce only a single example to illustrate this. The climate of Sindh has always been looked upon as abnormal, when compared, for instance, with that of Lower Bengal. We come across more such dry districts on the continent often perfectly surrounded by damp regions, such as Prome and Ava, and certain parts of lower Siam. Even in the Indian Archipelago we find the Eastern parts of Java drier than the Western, and Balie, Lombok, Sumbawa, and Timor, excessively dry. Dry winds from Australia are said to cause this, but this cannot be the case. If however we consult the geology of these countries, we find that they consist chiefly of calcareous strata, and the problem therefore approaches solution.

Dr. Brandis' Rain-map of India (Ocean Highway for October, 1872,) has brought to light the curious fact that the rainless regions of India by no means stand in direct connection with prevailing air-currents, but form so to say centres round which zones of increasing humidity are concentrically placed. The moisture of the S. W. winds may really be absorbed by the high Nilghiri hills and cause the dryness of the Hindostan arid centre, but such would not explain the aridity of Sindh, a chiefly calcareous and saline country. I think, therefore, that the absorbing qualities of salty soils and limestone and their great retentiveness of moisture must be brought into account here. Had Dr. Brandis extended his map eastwards, more such arid centres, from which hot winds arise (with concentric moister zones) would have turned up in Burmah, Siam, and the Indian Archipelago. Capt. Maury (Physical Geography of the sea) does not take such relations into account.

and thus dissolves and returns to the soil actually more crude nutriment for the plants than the *wild vegetation* requires from it; hence the increasing fertility of fallow lands. The heaviest rain cannot carry any considerable quantity of these down into the subsoil, except when in a certain excess (which in nature probably never occurs). Diluted brown-coloured sewage filtered through garden soil parts with nearly all its ammonia and potash and entirely loses its phosphoric acid; it flows off in the form of a colourless and odourless water. Soil purifies water in the same way as charcoal. It is quite different in the case of detritus of rocks, however fine this may be. Here the rain water charged with carbonic and nitric acid is not only permitted to flow off unchanged, but it will even dissolve minute quantities of the rock particles and carry them down in solution. If we find a strictly calcareous plant growing on a pure silicious soil, we have to remember such relations; for although chemical analysis may indicate only vestiges of carbonate of lime in this soil, the supply of the same substance by rain and mist, may be as sufficient, as is the supply of it in the ocean for the construction of those colossal coral-reefs that encircle so many islands. *Funaria*, a little moss, is found frequently growing on the plaster of walls, but still more so on recently burnt places, where it occurs so regularly and copiously that it is called by the French *la charbonnière*. Several other mosses and a few fungi, like *Xylaria*, grow actually on the pure charcoal of burnt trees, and equally vigorously on brick masonry. Many so-called ammoniacal plants (chiefly weeds) grow abundantly in places rich in ammonia, around human habitations, and grow vigorously and luxuriantly there in the shade; but the same plants are seen still more copiously on ruined pagodas, houses, etc., and again along the sides of brick roads, here often reduced in size or of meagre growth, but healthy. The peepul tree grows almost on every soil, and is seen as freely, growing from the ruins of brick buildings and from the plaster of walls, as it is on trees where a little humus-soil originated by the decomposition of the bark, etc., is quite sufficient for its young growth. When we meet with such variation, we might get confused and be tempted to reject chemical as well as physical influence, but if we carefully consider the quality which all these supporting media have in common, *viz.*, that of absorbing ammonia and nitric acid from the air and rain, we shall understand the real cause.

2. *Physical nature of substratum.*—The surface soil is not of such importance for trees as it is for herbaceous plants and, generally, for agricultural produce. It is the subsoil or rather substratum that is of essential importance. Nor can one with any certainty conclude from a certain surface soil what the substratum is, more especially, where alluvial or diluvial beds overlie strata of older rocks. For instance, a deep alluvial clay may chemically and physically shew in two localities quite the same character, but the tree vegetation on these localities may differ very greatly. By boring, however, it may soon be found that whereas one locality has a thin layer of retentive plastic clay, the other has fine loose quartz-sand beneath its subsoil; the former possibly calling swamp forests into existence, while the latter may bear savannah forests.

For present purposes we may class the various rocks* in the following† order.

(1.) Igneous rocks, such as some greenstones, trachytes, granites, etc. are closely allied in their mineral composition to some metamorphic crystalline schists, as gneiss, mica schist, etc. Although scientifically inadmissible, I designate them indiscriminately as metamorphic for the sake of brevity. The influence which these various rocks exercise has not yet been properly studied within the tropics. The vegetation on such is regulated by the prevalence of certain minerals which compose the rock and by the greater or lesser compactness and permeability.

The mechanical structure of such rocks, whether they are composed of several minerals in coarse grains or even crystals, like many granites, etc., or whether composed of microcrystaline or of only a very few minerals shewing at the same time a more uniform and compact structure, exercise a great influence upon the growth of trees. Exposure and the degree of humidity of the atmosphere along with the degree of light are the most powerful regulators of vegetation in districts consisting only of such rocks. They are botanically positive rocks, inasmuch as they produce the most varied vegetation with reference to species, although the vegetation itself may sometimes be poor.

2. Sedimentary rocks, often differ a good deal in their relationship to the vegetation from the former series of rocks, and are, to a certain degree, often much poorer in vegetative forms. Amongst the sedimentary rocks are:

* Those desirous of making themselves more generally acquainted with rocks, will find the undermentioned book very useful, but, of course, rocks cannot be studied from a book alone:

B. v. Cotta, Rocks classified and described, Lond., 1866.

† I have given here the names of only such rocks and formations which I have found to affect tree-vegetation in India more or less. From the sequel it will become clear, that one and the same rock may in different climates bear a vegetation which on comparison by no means agrees with what we expected. Hence the necessity of studying the vegetation on the same rock in various countries and of making oneself acquainted with the peculiarities of one and the same substratum under different climatological conditions. An arrangement of the various rocks into groups that have the same or a similar effect upon vegetation is, at least for the present, simply impossible.

(1.) Calcareous rocks, such as limestones, dolomites, calcareous sandstones, etc.
(2.) Tufa and laterite formations, if ferruginous.
(3.) Silicious rocks, such as silicious sandstones, many conglomerates, etc.
(4.) Argillaceous rocks, such as slates, argillaceous shales, etc.
3. Detritus and soils. The principal varieties may be :—
(1.) Alluvial clays (silicious).
(2.) Loams (more or less calcareous).
(3.) Sands.
(4.) Shingles, pebble-beds, etc., consisting of smaller or larger rolled stones.
(5.) Peat, bog and turf.*
(6.) Saline strata, whether alluvial or rocky. These have such a peculiar influence upon vegetation, that they must be treated separately in all questions of soil.

It is natural that formations consisting of a single mineral, like limestone, quartz, etc., or if of sedimentary and uniform character, like sand with a chemically poor cement, will have reduced the vegetation growing on them to a minimum, although this minimum may conspicuously differ in quality. The limestone may have comparatively a greater number of peculiar forms than are found even on metamorphic rocks, and may thus be positive in this respect, but the grand total of species growing on it may be negative, while, on the other hand, the permeable silicious sandstone of the Pegu Yomah has neither (or only a very few) peculiar forms, nor has it a larger grand total of species, and is, therefore, like the deep alluvium, decidedly negative in all its productions, when compared, for instance, with the Martaban hills (metamorphic).

Rocks that are mechanically very similar such as conglomerates, breccia, and coarse sandstones, may resemble one another in the vegetation growing on them, while fine grained silicious sandstones possess a flora similar to that found on alluvium, only richer in species and the plants of better growth. Here the amount of permeability and the chemical combination of the mineral constituents are the causal factors.

The permeability of rocks, so often alluded to, is the chief cause of the formation of surface soil. I have (although scientifically inadmissible) connected porosity, absorption, and hygroscopicity, all under the general term *permeable*. Permeability, as understood here, is a combination of porosity or hygroscopicity with chemical solubility. Absence of the one or the other of these qualities must result in greater or less sterility. Wherever I speak of permeable, I mean physically permeable or hygroscopic rocks. Practically this generalization of permeability is useful, inasmuch as by such a process it becomes, for instance, explainable, why the growth of a tree on poor fine quartz sand, (mechanically permeable but physically impermeable) and that on laterite and other impermeable rocks should be so similar or occasionally identical. The difficulty in keeping the above mentioned scientific terms apart, rests in the similarity of the qualities to one another, a similarity which however exists, more in degree than in kind.

Thurman's scale is constructed on the principle that the products of decomposition are either divided indefinitely or only to a certain degree. The former he calls pelogeneous rocks, because they form earthy, marly or clayey soils, while the latter are distinguished as psammogeneous rocks, forming gravelly soils, such as quartz and other detritus forming rocks. If both these conditions are represented in the product of decomposition, the rocks are called pelopsammogeneous. The following is a conspectus of his scheme :—

A.—*Pelogeneous rocks :—*

1. Perpelic, like Oxford marl, Keuper-thon, pure loam, pure Kaolin, etc.
2. Hemipelic : calcareous marl.
3. Oligopelic : Jura-calc, basalt, porphyry.

B.—*Psammogeneous rocks :—*

1. Perpsammic : quartz sand, sandy dolomites.
2. Hemipsammic : molasse, grauwacké, granular limestone.
3. Oligopsammic : certain granites, grauwacké, flysch, dolomite.

C.—*Pelopsammogeneous rocks :—*

Sandy loams, hemipelic porphyry rich in quartz, Kaolin, granites, etc.

According to the amount of detritus which these rocks add to the soil, Thurman distinguishes :—

1. Eugeogeneous rocks : perpelic, perpsammic, pelopsammic, hemipelic and hemipsammic.
2. Dysgeogeneous rocks : oligopelic and oligopsammic.

* This does not occur in India, at least not in the lower regions, and even those in the alpine regions differ a good deal from the European. In their stead humus-layers (often up to ½ foot thick and sometimes thicker) appear on trees, which nourish many epiphytic shrubs and herbs in damper climes and at certain elevations.

Practically however I hardly believe that the above distinctions can be adopted by the forester, and there are some difficulties in arranging the various rocks in India according to such a system. This difficulty is still increased in excessive tropical climates, where many eugeogeneous rocks may be dysgeogeneous according to the degree of atmospheric humidity which prevails. For a practical understanding of influences of this nature, the subject may, I think, be greatly simplified, if the distinction of mechanical and physical permeability,* as noted in former pages, is made. According to this we would obtain the following conspectus which, in its principles, is the same as Thurman's :—

Easily decomposing or eugeogeneous. { 1. Permeable rocks (pelogeneous.)
2. Half permeable rocks (pelopsammogeneous.)

Not easily decomposing, or dysgeogeneous. { 3. Impermeable (of course to a certain degree only) rocks (psammogeneous.)

There are, however, certain cases, as, for example, some calcareous sandstones, where the rocks, although impermeable under certain circumstances, are comparatively easily decomposed : this depends upon the component parts of the rock.

Amongst half permeable rocks, we may include all those composed of permeable and impermeable constituents, the former of which will decompose into indefinitely divided particles (soil), while the latter will remain unchanged in the shape of angular detritus or pebbles, as is the case with many granites, and schistose rocks, also with many coarse sands and conglomerates, when mixed with fine permeable soil or cement. These half permeable rocks and soils are the most favourable to tree vegetation, especially if rich in alkalies; but if they are of a more silicious or calcareous nature, as are certain breccias, coarse sandstones, etc., they may be in the same degree infertile and sterile. All depends here again upon the chemical nature of the cement.

The surface soil is of somewhat less importance to the forester, and is chiefly taken into account, when plantations are formed. Here of course porosity has first to be considered and then chemical composition and colour. The knowledge of the thickness of the surface layer is also important, as upon this the shape and growth of trees depend. In heavy and stiff soils seeds will not germinate, except at very small depths, probably never exceeding 2 inches on an average: but in very porous light soils, they may, as experience teaches us, germinate under circumstances at a depth of 1 to 1½ feet. However, seeds as they are shed in the jungles rarely become more than covered by earth, and this is chiefly effected by the action of rain. Very minute seeds may become imbedded in the earth by heavy night dews.

For a more correct knowledge of the qualities of surface soils, I must refer to the experiments and scales of Schuebler,† which, if I am not mistaken, are generally adopted by agriculturists.

§ 3.—*Collecting and drying of botanical specimens.*‡

The collecting and drying of plants is so simple that one must feel surprised at finding any of the foresters in India unacquainted with the process. Boys of 8 to 10 years age under my charge used to learn the art of drying plants in less than 24 hours' time, and even the Burmese peons who accompanied me on my travels required hardly more time. I think foresters in India ought all to be acquainted with the process, so as to enable them to forward proper specimens when they wish to consult botanists as to the name of a plant unknown to them.

I will give a few hints, but these remarks are intended only for practical foresters, and therefore refer only to trees and woody plants which (with a few exceptions such as arboreous *Euphorbias* and mangroves) usually are of rather a dry nature, and therefore easy to manage. I do not think it necessary to give instructions for drying orchids and other fleshy or saline plants that are difficult to deal with. Those who wish to make themselves acquainted with this process will find the necessary information in the books above cited.

For collecting plants in tropical countries, the botanical tin-box is of little use. According to circumstances and climate, baskets covered with cool plantain or colocasia leaves, or portfolios of paste-board, containing drying paper, are preferable. It is very convenient to have a peon at hand, carrying such a portfolio, or a pair of paste-boards, containing two or three quires of paper. Many plants, such as bamboos, etc., especially during the hot season, would not keep fresh up to the time of their arrival in camp, and must therefore be put as soon as possible between paper.

* Permeability can roughly be tested simply by allowing a drop of water to fall on the rock ; the quicker the drop disappears, the greater is the permeability.

† Schuebler, Grundsaetze der Agricultur-chemie.

‡ I would refer those who wish to make themselves more intimately acquainted with the collecting and drying of botanical specimens to :

G. Bentham's Outlines of Botany, and Oliver's First Book on Indian Botany.

Both these books are instructively and plainly written, especially the former, and the latter ought to be intelligible to every grade of forester, even to the more intelligent natives.

The forester should select from a tree or shrub leafy branches bearing either flowers or fruit, or both, and have them cut to such sizes as to fit into the drying paper with which he is supplied. If the leaves of such a bough, as for example those of teak, are too large, they should be folded in according to his own taste within the sheet of paper, or some of them might be put separately between another sheet of paper.

The usual way is to have a single folded sheet, in which the branch as it comes from the tree should be laid flat between the fold. These single sheets with the plants in them should be put between two separate layers of two or three (or more if the plant is very sappy) empty sheets of blotting paper, one fitting into the other : a layer of such empty paper alternating with a single folded sheet containing the plants.

When this is done the bundle of plants and papers should be put between two wooden boards cut to size, and less than half an inch in thickness, and bound together as tightly as possible by means of leather straps. Such a pile should never be higher than 1 to 1½ feet; and if the plants are very succulent, a small number should be pressed together in a separate bundle.

Every other day (or in the rainy season every day) the single sheets and also the layers should be replaced by other dry ones, and this should be done in the same way as if the plants had just come in fresh. The changing of the paper should be continued until the plants have become perfectly dry. The moist paper taken out from the bundle may be spread out and dried in the sun or (if rainy weather prevails) over fires.

When no blotting paper, wooden boards or straps are at hand, old paper of any sort, especially if of a coarse stout nature, may be used with two pieces of paste-board fastened with strings and cords, or a large stone might be put upon the bundle at night, which will serve the same purpose more or less.

Those plants that are perfectly dry should be taken out from the pile, and placed between single sheets and the current No., native name if any, locality and date should be added on a label attached to, or lying beside, the branch. After being thus carefully ticketed, they may be made up into bundles placed between two paste-boards and packed in the usual way in strong paper or, to avoid their being spoilt by wet during transit, they might be packed in wax-cloth or tarpaulin and forwarded to head quarters.

The further process of mounting, etc., and also the naming of the specimens, might best be carried out in the Botanical garden, Calcutta.

IV.—Conclusion.

In the above pages I have probably exceeded my instructions and touched upon practical subjects which are not directly connected with my duty. But this has not been done with any desire on my part to find fault, or to criticise existing defects real or supposed. I have only attempted to deduce from facts in nature, such simple conclusions as I thought might be useful to foresters, and more especially to those who may give to the physiology of plants a part of their time and attention.* Burmah is in this respect an especially instructive field, and much of the richness of its Flora is to be attributed to the variety of soil it possesses. The monotonous alluvial plains, now for a great part covered by coarse grasses and comparatively valueless jungles, also open a wide field for agricultural enterprise, requiring nothing but active hands to disclose the hidden treasures of the soil. Thousands of natives starve in overcrowded India, or work under circumstances bordering on slavery, and hundreds emigrate to foreign countries or to plantations, while under a well organized system of colonization, they might become independent cultivators in Burmah, where they would probably live as happy as the Mugh colonists in Arracan, were it not for religious and caste prejudices. But instead of active cultivators wandering into Pegu, the land becomes overrun more and more with unscrupulous native traders of all sorts, and of servants, who are often nothing but men rejected from regiments, and whose dealings can tend neither to the social nor the moral improvement of the frolicsome but rather idle Burmans. Whatever may be the future prospects of Burmah, we may confidently expect that, as population increases, the province will become one of the richest under the Government of India.

In concluding I may now be allowed to express my thanks to all in Pegu who have facilitated my labours in their official or private capacity, and more particularly to Dr. Brandis, Inspector-General of Forests, in whose company I travelled for a few months in Pegu, and from whose writings, and knowledge of the country, I have derived much valuable information. Equally grateful am I to Capt. W. J. Seaton, Conservator of Forests in Burma, who assisted me on every possible occasion, and to all other forest officers whom I had the plea-

* While preparing these sheets a *prospectus* of "Forstliche Flora von Deutschland u. Oestreich" by Dr. M. Willkom reached me. In this Dr. Willkom's view, with regard to the educational requirements of a forester, admirably coincides with my own when he says that the centre of gravity in forest matters rests in the phytogeographical relations and physiology of woody plants.

sure to meet in Pegu, more especially to Dr. W. Schlich, Messrs. W. C. Graham, J. Adamson, A. M. Buchanan, N. Daly, and others. While thus assisted by the foresters, I have received no small amount of encouragement from the local authorities, from Major-General A. Fytche C. S. I.; Lieut.-Col. R. D. Ardagh, Lieut.-Col. H. N. Davies, Col. C. A. McMahon, Major M. B. S. Lloyd, Capt. W. C. Plant, Mr. W. B. Macrone, Lieut. C. A. Cresswell, etc. Private gentlemen have also taken an interest in my work, and amongst them Mr. E. Oates, Civil Engineer at Thayet-myo, and Mr. Theobald of the Geological Survey, while my venerable old friend, the Rev. Dr. F. Mason in Tonghoo, himself active in the Burmese Flora, and the author of a book on the natural productions of Burmah, has always been a kind and untiring guide to me.

I have also to acknowledge the valuable geological information I have received, while preparing the present report, from Dr. T. Oldham and Dr. F. Stoliczka of the Geological Survey; and the disinterested assistance received from Dr. G. King, Superintendent of the Botanical Gardens, Mr. A. O. Hume, C. B., and Mr. J. Geoghegan, C. S.

APPENDIX. A.

BURMESE FOREST-TREES.

In submitting my list of Burmese forest trees, I will give a few explanatory remarks thereon with the object of facilitating the proper understanding of the lists. These remarks chiefly refer to the value and spelling of native names of plants and to the various abbreviations I have been compelled to introduce, in order to bring this present report within a reasonable compass.

Native names for plants and their value, etc. I would gladly have passed over the discussion of this subject, had it not been for the fact that, in spite of all warnings from experienced men, there are still very respectable botanists and practical men, who look upon native names for plants as something absolutely reliable. Some even believe that native names are preferable to scientific ones, because the former are permanent and are not altered from one day to another, as is the case in science. The latter point is rather a severe rebuke to botanists, and no doubt the continuous alteration of names by creating genera which originates chiefly in narrow minded views, unaided by field-experience, is a great drawback. Unlike abstract sciences, Botany, along with other branches of Natural History, is a progressive study and there will naturally be alterations year after year. Not possessing a system that will apply to all plants without exception, we have a continuous struggle with difficulties, of which a practical man has hardly any idea.

Our systems, elaborated as they are, serve only to assist us in the determination of plants and to attempt their arrangement in what appear to us to be natural groups. Practice alone is, as in all other callings, the guide which teaches us the way towards a proper understanding of the true affinities of plants.

But those who believe that native plant-names are preferable on account of their stability, must know that they often gain nothing by knowing a plant only by its native name. Take for instance the tree which the Burmese call pyinmá or pimá, how many names have they to learn, should they leave the country? In Bengal it is járul, in Canara, náli dásul, in Tamil, cádáli pua, in Malay, bungur or wungu, etc., etc.; and for all these we have the name of *Lagerstroemia flos reginæ*. Such a number of native synonyms is surely not preferable to the one scientific name, even though that name may subsequently be changed on account of new discoveries. Any one who has leisure can make a fair trial for himself by studying in Balfour's timber-trees of India, the Burmese names for trees; he will see into what confusion he will fall.

However there are exceptions which require explanation. The Burmese flora consists of at least 4,000, if not 5,000, or more, species of plants. How very different is this number for instance, in the Punjab. Here the flora is comparatively scanty, and of this scarcely more than, perhaps, 500 species, grow on the same square mile, and many tracts may be found there on which only half that number is represented. A Punjabi has, therefore, only a limited selection, and many a plant that would be considered utterly valueless and not deserving of a name in Burma (because of there being so many similar plants of superior quality there) is looked upon by him with a very different eye. The Punjabi, in order to obtain his vegetables and firewood, has to traverse large tracts of land, and the scantiness of the flora obliges him to make the best of everything. Such a life keeps him in activity and makes him acquainted with all that adds to his comfort; while the indolent Burman or Malay smokes or chews his betel and, in spite of his idleness, has the pleasure of making a *choice selection* of what nature so prodigally offers to him. Hence the value of native names in many countries and the discrepancy of opinions amongst Europeans as regards the true value of native plant-names generally.

It follows that native names for plants are more reliable in countries that possess a poor and scanty flora, than in rich tropical countries, such as the Malay islands, Burma, etc.

In spite of all these difficulties, I think that forest officers of the higher grades should invariably be acquainted, not only with the scientific names, but also with the vernacular synonyms of at least the trees of their respective provinces. With the aid of the former, they can obtain scientific or literary information, while the latter will be indispensable in their communication with native subordinates. They should keep in mind, however, that such native names have only a local value, and they cannot therefore expect to make scientific determinations from native names only.

In the following list of Burmese trees, I have recorded the Burmese names, *but I cannot hold myself responsible for the correctness of any of them.* It will be observed that several, often very contradictory, Burmese names occur under the same scientific name, and no doubt some errors have slipped in, but I am unable to remedy the defects. This ought to be done by persons resident in the country and well acquainted with the language. I have only played the part of a collector of names, I had them written down by the Burmans themselves, and submitted these afterwards to Capt. W. J. Seaton, Conservator of Forests, B. B., for correction. In several cases, however, the corrected names differed so much from those which I had received by the men themselves, that I thought it useful to add (between brackets) the latter as I heard them pronounced. It is very possible that such names were wrongly written by the man employed, and thus some misunderstanding may have arisen. The English spelling of the Burmese names of this list, was, in accordance with the orders of Government of February 1871, settled in consultation with Dr. Hunter. The result however is not satisfactory and in the Forest Flora it is intended to revert to the usual mode of spelling. Burmans have also often different names for the same plant in different provinces; for instance, in the Pegu Yomah *Bambusa albo-ciliata* is universally called wapyu geley, while in Martaban it is called wanoë. Wanoë of the Pegu Yomah, however, is a perfectly distinct climbing bamboo, which has nothing to do with the wanoë of Martaban.

Explanations of abbreviations, etc. The following paragraphs will explain the arrangement of the subjoined list, as well as the abbreviations used in describing the conditions of growth, &c.

(1.) In the first column are noted the current numbers.

(2.) The second column contains the scientific and the vernacular names. In cases where I have found it absolutely necessary to change the Latin name of a tree for reasons which the new and generally acknowledged laws of nomenclature prescribe, the old name is appended between brackets.

(3.) The third column contains remarks on the distribution of such trees, their natural requirements, etc. I have introduced only the more conspicuous uses and properties of these trees, and I have given preference to such as are usually termed jungle-products, as for example resins. To ensure brevity without curtailing useful information, I have adopted numerous abbreviations, and collected these into *formulas.* In doing so, a good deal of verbiage has been avoided. These formulas might, at first sight, look somewhat indescribably algebraic, but their solution is very simple.

(*a.*) The first letter, L. or E., means only whether the tree in question is a *leaf-shedding* or *evergreen* tree; when I have not been able to determine this, I have inserted a query or some other remark. The exponents *c.*, *d.*, *h.*, or *r.*, designate the season in which the leaf-shedding takes place, viz. *cold*, *dry*, *hot*, or *rainy* season. It would perhaps have been better to indicate the months by Roman numerals, but the shedding of leaves of one and the same tree takes place at so various periods in different districts as not to admit of any correctness in this respect. Another difficulty rests in the impossibility of always separating correctly evergreens from leafshedders. Leaving alone the degree of moisture and its influence upon the shedding of leaves, trees drop their leaves at various states of development; some are leafless while without flower or fruit, others are so during flowering-time, others again shed their leaves after the fruits have ripened. There is also considerable uncertainty experienced in the case of those trees which produce flowers at the same time that they are flushed with new leaves.

(*b.*) The fraction which follows, has reference to dimension and size of the tree. The numerator indicates the general height of a tree, while the denominator gives us the length of clear stem and (+) the girth, usually taken at 4 to 5 feet above the ground.

(*c.*) Then follows (between brackets) the distribution of the tree in Burma (in an extended sense) including all countries, from Ava and Chittagong down to Tenasserim and the Andamans. The following abbreviations are used here:—

A. = Ava.
Pr. = Prome.
C. = Chittagong.
Ar. = Arracan.
P. = Pegu generally.
Ps. = Sittang zone of Pegu.
Pi. = Irrawaddi zone of Pegu.
M. = Martaban.
T. = Tenasserim.
An. = Andamans.

The Prome district is, as already stated, actually only a part of Ava,* but as Ava is not British territory, the Prome district is marked by a separate letter.

* Of course the lower part of Ava is meant, for the ranges to the E. and W. are continuations of the Arracan and Martaban hills.

In order to indicate the frequency or otherwise with which trees are met with, I have adopted only 5 degrees, using the numericals 1 to 5 in the form of exponents. They are—

1. *Very rare*, if the tree has been met with only in a few, or in single, individuals.
2. *Rare*, if the tree is of a dispersed and sporadic occurrence, although found at least in 5 or 6 localities.
3. *Frequently*, if the tree occurs generally but only in few individuals.
4. *Common*, if the tree is generally distributed, but not forming a prevalent constituent of forests.
5. *Very common*, if the tree occurs in large quantities, thus forming a conspicuous part of the forests.

The concluding numerals, divided by, or preceded by ∠ (up to) indicates the hypsometrical range. Sometimes when the upper or lower limits are unknown, they are indicated by ∠ (ascending to) or ⁊ (descending to). This concludes the formulæ of distribution.

The next information refers to the soil-question. It is always headed by SS. meaning *Substratum* or soil. A very great number of trees grow on all formations, but on some better than on others. To express this I have adopted the mathematical sign of infinity an inverted 8, ∞, but at the same time added the substratum which the tree prefers or on which it appears to grow best. Such favourable substrata are indicated by italics. All saline soils are, however, excluded, and it is only where the abbreviation for saline strata is specially added that we may expect to find a tree growing also on saline grounds. Thus ∞, *Ca. S.*, means on all formations, but growing best on calcareous compact sand-stone, but never on saline grounds.

The following abbreviations for subsoils and substrata only convey fragmentary information. It is hardly necessary to remark here that the results arrived at by me, may hereafter prove to be subject to numerous modifications and even corrections.

Sal. = Saline, whether alluvial or rocky.
All. = Alluvium.
Dil. = Diluvium, including all diluvial deposits without special distinction such as laterite, gravel, stiff diluvial clays, etc.
Lat. = Laterite of a vitrified cavernous nature, thus being impermeable.
Lat. p. = Laterite of a more permeable nature, like that of the Southern slopes of the Pegu Yomah, and of many Malay islands.
Aren. = Arenaceous, including all the pebbly and gravelly soils, if the same are *silicious*.
Arg. = Stiff impermeable clays, etc.
Si. S. = Finegrained permeable silicious sandstone.
Ca. S. = Compact impermeable calcareous or rather marl-sandstone.
Ca. = Limestone.
Metam. = Includes all other rocks, abounding in alkaloids or basic acids, such as granites, syenites, etc., also schistose rocks, etc.

The kind of forest, in which the tree principally grows, is noted. The shade or light-loving propensities of trees and other plants are an important matter of consideration with the forester and arboriculturist in all questions of plantations. I have, therefore, also introduced remarks thereon. However I can give only approximately accurate accounts of such relations. They are indicated in the following way :

s. = Shade-loving.
l. = Light-loving.
s. + *l.* = More or less indifferent in this respect.
s. × *l.* = Shade in rainy season, light in dry season (applicable more to shrubs, etc).
s : *l.* = Shade in youth, light when full-grown (chiefly applicable to lofty, often leaf-shedding trees growing in evergreen forests).

It is natural that of far the greater number of trees the particulars indicated above are as yet unknown. The information given in this respect had to be restricted chiefly to those trees, which I was myself fortunate enough to meet with. To those collected by others little could be added, besides the province in which they grow.

I will give here some of the formulæ as examples with a view to shew how they would read, if put in words.

L. $\frac{120\text{--}150}{80\text{—}100+6\text{—}12}$ (A. C. — T. An³. ∠ 2000′). SS. = ∞ A leaf-shedding tree (shedding leaves during cold season) 120 to 150 feet high with a clean stem of 80 to 100 feet by 6 to 12 feet girth, occurring all over Burma from Ava and Chittagong down to Tenasserim, also frequent on the Andamans, up to an elevation of 2000 feet. Grows on all formations except on saline grounds, but grows best on permeable silicious standstone.

E. $\frac{80\text{—}90}{40\text{—}45+7\text{—}8}$ (A. M. --T. 3000—5000′). SS. = ∞.

An evergreen tree, 80 to 90 feet high, with a clean stem of 40 to 45 feet by 7 to 8 feet girth, occurring in Ava (but nowhere between) and from Martaban down to Tenasserim (but not on the Andamans) at elevations from 3000 to 5000 feet on all formations except saline ones.

$L^{h.} \frac{80-90}{30-35+6-8}$ (A. Pr^{5}. P^{2}. $\angle$ 1500′). SS. = *Ca. S.*, Dil., All.

A tree shedding its leaves during the hot season, 80 to 90 feet high, with a clean stem of 30 to 35 feet by 6 to 8 feet girth, occurring in Ava (frequency unknown), very common in the Prome district, but rare in the Irrawaddi district of the Pegu Zone, at elevations up to 1500 feet, grows best on compact calcareous standstone, but enters also the alluvium and diluvium.

The remaining remarks refer to timber, the more conspicuous uses, etc. The weight of a cubic foot and the breaking weight of the timber are also occasionally given in a formula, thus W. $= \frac{\square' = 59-61}{995}$ pd.* means, that a cubic foot of the timber weighs 59 to 61 Engl. pounds, and its breaking weight is 995 Engl. pound. The last figure denotes the weight required to break a piece 4 feet long by 1 inch square, laid on supports 36 inch. apart. Most of this information is taken from Dr. Brandis' List of Burmese timber trees of 1862. Major Beddome's information on this subject refers only to Madras timber, and cannot, therefore, be introduced for Burmese trees.

As regards the term "tree," although it may appear to be quite clear at first sight, I experienced difficulties on several occasions. For instance *Fagraea racemosa* and *F. obovata* are usually termed trees, but I should call them "arboreous stem-clasping climbers," which is a designation applicable also to many kinds of *Ficus*. I have, however, followed in these cases the current notion of foresters, and I did so also for the reason because such stem-clasping trees, after they have suppressed the growth of their supporters, very often become self-supporting and grow up into independent trees. The fig-trees (especially those of the section *Urostigma*) are independent trees in one locality, and stem-clasping climbers in another. These latter go under the name of *epiphytic ficus* amongst foresters. On the other hand, many shrubs, under favourable conditions, grow out into small trees, especially in damp localities with rich soils. I have occasionally, but not always, introduced, and in my choice I have selected the more interesting and curious species, especially if they belonged to families which do not contain ordinarily trees, as for example *Compositæ*, *Acanthaceæ*, etc.

* I denote the cubic foot of unseasoned timber by ○′, while seasoned one is marked thus □′.

LIST*

OF

BURMESE FOREST TREES.

Current No.	Names.	Remarks.
	DILLENIACEÆ.	
1	Dillenia Indica, *L.* (D. speciosa, Thbg. Fl. Sylv. Madr. t. 103.) တပြူ *Tá* p*i* *u*.	E. $\frac{30-50}{15-20+3-5}$ (P^2. M — T. — 1000′) SS = Si S., Metam. Moist upper mixed forests along choungs. —s.— Wood hard, brown, used occasionally for house-building. □′ = 41 pd.
2	Dillenia pulcherrima, *Kurz.* ပြူပင် P*i* *u* pin.	L^h $\frac{30-40}{5-10+5-9}$ Pr^3 P^4 — M^4 — 1000′). SS = Ca S. *Lat.* Arg.—Eng and low savannah and low forests, mixed dry F. —l.— Wood, hard and strong, used for rice mills. □′ = 69 pd.
3	Dillenia aurea, *Sm.*	L^h $\frac{50-60}{10-25+5-6}$ (M^3 — T. 2000 — 3000′). SS = Metam. Drier hill forests. —l.—
4	Dillenia parviflora, *Griff.* လုလင်ကျော် L*u* t*i*n k*i* *o*. (Língyo) S. K.	L^h $\frac{60-70}{30-35+6-8}$ (P^3 M^2—T. — 1000′). SS = All. Si S. Metam. Mixed forests. —l.—
5	Dillenia pilosa, *Roxb.*	L^h $\frac{80-90}{40-50+8-9}$ (An^3 — 1000′) SS = Si S. Upper mixed forests.—l.— Wood greyish, rather close-grained and heavy.
6	Dillenia scabrella, *Roxb.*	L^h $\frac{40-50}{10-25+3-4}$ (C — 1000′). Wood uniformly brown, close-grained, rather heavy. A good wood, takes fine polish.

* In this list no other citations of books, &c., are given, except a short reference to the plates of Beddome's "Flora Sylvatica" of the Madras Presidency, for brevity sake marked "Fl. Sylv. Madr. t."

Current No.	Names.	Remarks.
7	Dillenia pentagyna, *Roxb.* Fl. Sylv. Madr. t. 104. ဇင်ပြွန်း zím-bí-ún.	$L^h \frac{60 - 70}{25 - 35 + 6 - 8}$ (P^3—M^3—T—1000′). SS = ∞ *Si S.* Mixed forests.—l.— Wood rather heavy, fibrous but close-grained and strong, greyish brown, striate. Used for house posts in house building. $W = \frac{\square' = 48}{198}$ pd.
	MAGNOLIACEÆ.	
8	Talauma Rabaniana, *Hf. et Th.*	E. large tree (T.)
9	Talauma Candollei, *Bl.*	E. small tree (T.)
10	Magnolia sphenocarpa, *Roxb.*	E. middling sized tree (C. P^1.)
11	Manglietia insignis, *Bl.* တောင်စကား T*ou*ng s*á* k*á*.	E. large tree (P^1.)
12	Michelia Champaca, *L.* စကား S*á* k*á*. စံဂါး S*a*n g*á*	E. $\frac{30}{8 + 2\frac{1}{2}}$ (M^3 — T.) SS = Metam. Evergreen forests.—s.— Wood rather heavy, sapwood narrow, greyish, coarsely fibrous; heartwood blackish brown, close-grained, striate, takes fine polish.
13	Illicium majus, Hf. et Th.	E. $\frac{30}{?}$ (T. 5500′).
	ANONACEÆ.	
14	Bocagea elliptica, *Hf. et Th.*	E. large tree (T.)
15	Alphonsea ventricosa, *Hf. et Th.*	L. large tree (C. An.)
16	Alphonsea lutea, *Hf. et Th.*	L. large tree (A.)
17	Cananga odorata, *Hf. et Th.* ကဒပ်ငမ် K*á* d*á*p n*á*m.	L. large tree (M — T.)

Current No.	Names.	Remarks.
18	Unona latifolia, *Hf. et Th.*	$L^h \frac{50}{?}$ (T.) Dry hill forests.
19	Polyalthia lateriflora, *Bl.* ထိပ်ကောက်ပင် T*e*ip k*o*u*k* p*i*n.	$L^h \frac{90 - 100}{60 - 70 + 6 - 10}$ ($Ps^3 - M^3 - 1000'$) SS = *Metam.* Lat. p. Evergreen tropical forests.—s. : l.— Wood white, turning yellowish.
20	Polyalthia nitida, *Hf. et Th.*	Small tree. ($Ps^2 M^3 - T \angle 1000'$). SS. = Metam., Si S. Evergreen tropical forests. —s.—
21	Polyalthia Sumatrana (*Guatteria—Miq.*)	Tree (T.)
22	Polyalthia macrophylla, *Hf. et Th.*	Tree and shrub. ($T - An^3 - 1000'$) SS. = chloritic rocks, &c. Evergreen tropical forests.—s.—
23	Polyalthia costata, *Hf. et Th.*	Tree (T.)
24	Polyalthia Jenkinsii, *Hf. et Th.*	E. $\frac{25 - 30}{9 - 15 + 1\frac{1}{2} - 2}$ ($An^3 \angle 1000'$). SS. = Si S. Evergreen tropical forests.—s.—
25	Polyalthia suberosa, *Bth. et Hf.*	L. little tree (M—T).
26	Polyalthia cerasoides, *Bth. et Hf.* Fl. Sylv. Madr. t. 1.	L. small tree. (Pr.) Wood whitish, close-grained, strong.
27	Cyathocalyx Martabanicus, *Hf. et Th.*	E. $\frac{30 - 40}{8 - 20 + 2 - 3}$ ($M^3 - T - 1000'$). SS. = Metam. Evergreen tropical forests.—s.— Wood white, fibrous but rather close-grained, perishable.
28	Anona squamosa, *L.*	L^h little tree ($A - Pr^5 \angle 1000'$). SS = Ca S. Cult.—l.—
29	Anona reticulata, *L.* အေားဇာ or ဩဇာ *Au zá.*	L^h little tree ($P^1 - T.$) SS = All. Cult.—s.—
30	Anona muricata, *L.*	Little tree (T.) Cult.—s.—

Current No.	Names.	Remarks.
31	Popowia Helferi, *Hf. et Th.*	Small tree (T.)
32	Goniothalamus sesquipedalis, *Hf. et Th.*	E. tree (T.)
33	Goniothalamus Griffithii, *Hf. et Th.*	E. small tree (P^2 — 1000′) SS = Si S. Evergreen tropical forests.—s.—
34	Orophea Brandisii, *Hf. et Th.*	E. $\frac{20 - 25}{10 - 12 + 1 - 1\frac{1}{2}}$ (M^3 — 1000′) SS = Metam. Evergreen tropical forests.—s.— Wood rather light, fibrous but close-grained, pale coloured and dotted.
35	Mitrephora reticulata, *Hf. et Th.*	Small tree (T.)
36	Mitrephora tomentosa, *Hf. et Th.*	Tree (C.)
37	Mitrephora vandæflora, *Kurz.*	L^h $\frac{40 - 60}{20 - 25 + 3 - 5}$ (P^2 — M^3 — 1500′) SS = Si S. *Metam.* Evergreen tropical forests—s.— Wood light brown.
38	Miliusa velutina, *Hf. et Th.* Fl. Sylv. Madr. t. 37. သဗွတ်ကြီး Thá bót kí.	L^h $\frac{40 - 50}{10 - 15 + 3 - 5}$ (AP^4—$M^3T \angle 1000'$) SS = ∞ *Lat. p.*, *Arg.* Low forests and lower mixed forests, rarely in the upper ones.—l.— Wood grey, soft, rather heavy, fibrous but close-grained. Used for poles of carts and harrows, yokes, spear-shafts, oars, &c. □ = 42 pd.
39	Miliusa sclerocarpa, *Kurz.*	L^h $\frac{40 - 50}{15 - 35 + 3 - 5}$ (M^2 — T. 2000′ — 3000′) SS = Metam. Uppermixed forest.—l.— Wood rather heavy, fibrous, close-grained, soft, yellowish, turning brownish at exposure.
40	Phæanthus dioicus, *Kurz.*	Small tree (C. T.)
	Capparideæ.	
41	Capparis grandis, *Heyne.* ခေါးကွ Ko kwá.	L^h small tree (Pr. — 500′). SS = Ca S. Lat. Dry forests.—l.— Wood hard, close-grained, heavy and durable, good for burning.

Current No.	Names.	Remarks.
42	Cratæva religiosa, *Forst.* Fl. Sylv. Madr. t. 116. ခတက် Ká *tát.*	$L^h \frac{50 - 60}{15 - 20 + 3 - 6}$ (Pr³ T. — 500′). SS = Ca S. Dry forests.—l.— Wood very hard.
	VIOLACEÆ.	
43	Alsodeia longiracemosa, *Kurz.* (*A. racemosa, Hf. et Th., non Mart.*) ရစ်သက်ပင် Y*i*t th*a*k p*i*n. ရက်သဲပန်း Y*a*k th*e* pán.	$L^h \frac{10 - 15}{4 - 5 + \frac{1}{2}}$ (M³ — 1000′) SS = Metam. Evergreen tropical forests.—s.— Wood rather light, yellowish white, turning pale brown, fibrous but close-grained.
	BIXINEÆ.	
44	Cochlospermum Gossypium, *Dc.* Fl. Sylv. Madr. t. 171.	$L^h \frac{15 - 20}{6 - 10 + \frac{1}{2} - 1}$ (Pr² — 500′). SS = Ca S. Dry forests.—l.— Wood soft and only fit for fire-wood. Yields a gum, called in Hindustan Kadira, a substitute for tragacanth.
45	Bixa Orellana, *L.* Fl. Sylv. Madr. t. 79. သီးပင် Th*i* p*i*n. သီတင်း Th*i* t*i*n.	E. $\frac{20 - 25}{9 - 18 + 1 - 2}$ P — T — 1000′) SS = All. Si S. Cult. and escaped. Sapwood red, heart-wood pale coloured. The orange-red pulp furnishes the Arnotto dye or terra Orellana.
46	Scolopia Roxburghii, *Clos.*	Small tree (T.)
47	Flacourtia Sumatrana, *Planch.*	Small tree (T.)
48	Flacourtia cataphracta, *Roxb.* နံရုဲ Ná *yu e.*	$L^h \frac{30 - 50}{10 - 30 + 2 - 5}$ (P³ — M³ — T — 3000′) SS = ∞ *Si S.* Mixed and open forests.—l.— Wood rather heavy, brown, close-grained, rather hard and brittle, takes a fine polish.

Current No.	Names.	Remarks.
49	Flacourtia inermis, *Roxb.*	L^c (M′—1000′). SS = Metam. Evergreen tropical forests.—s.— Wood red-brown, heavy, rather hard, of a somewhat unequal fibre, but closegrained.
50	Flacourtia mollis, *Hf. et Th.*	Tree (T.)
51	Flacourtia sapida, *Roxb.* နရွဲပင် N*á* y*u* *e* pin.	$L^h \frac{25 - 30}{10 - 15 + 2 - 3}$ (Pr^2). SS = Ca S. Dry forests.—l.—
52	Flacourtia rotundifolia, *Clos.* နရွဲပင်။နရွဲပင် N*á* y*u* *e* pin.	$L^h \frac{15 - 20}{8 - 12 + \frac{1}{2} - 1}$ (An^2 — 500′) SS = Serpentine. Mixed forests. Wood heavy, brown, close-grained, the heartwood somewhat darker. Takes a fine polish.
53	Gynocardia odorata, *Roxb.*	E. $\frac{40 - 50}{12 - 20 + 3 - 4}$ (M^2—2000′). SS = Metam. Evergreen trop. forests.—s.— Wood light brown, striated.
54	Hydnocarpus castaneus, *Hf. et Th.*	E. middlesized tree (T.)
55	Hydnocarpus heterophyllus, *Bl.* ကလောဆို K*u* l*au* so.	E. $\frac{40 - 50}{12 - 20 + 3 - 5}$ (P^2 — M^3 — T — 1000′). SS = Si S. Metam. Evergreen trop. forests Wood heavy, strong, close-grained, of short fibre, yellowish white turning light brown.
55*b*.	Ryparia cæsia, *Bl.*	E. $\frac{20 - 25}{6 - 8 + 1 - 2}$ (An^2 ∠ 1000′). SS = Si S. Evergreen tropical forests.
	PITTOSPOREÆ.	
56	Pittosporum ferrugineum, *Ait.*	E. tree (T.)
	POLYGALEÆ.	
57	Xanthophyllum flavescens, *Roxb.* သစ်ဖြူ။ Th*i*t pi *u*.	E. $\frac{40 - 50}{20 - 30 + 6 - 8}$ (C. M^3 — T — 500′) SS = All. Metam. Swamp forests.—s.— Wood rather heavy, close-grained, tolerably soft, yellowish.

Current No.	Names.	Remarks.
58	Xanthophyllum virens, *Roxb.* သပြု Thá p*i ú.* (Thit pyú) SK.	E. $\frac{50 - 60}{20 - 30 + 4 - 5}$ (C — P² — 2000). SS = Si S. Evergreen forests.—s.— Wood very hard and useful.
59	Xanthophyllum glaucum, *Wall.* သိပ်ပြူ Th*it* p*i u.*	E. $\frac{40 - 60}{15 - 30 + 3 - 5}$ (P⁴ — T An. — 500′) SS = All. Swamp forests.—s.— Wood light but comparatively strong, white and pinkish, soft, probably a valuable wood for furniture, $\frac{\square' = 30 - 38}{155 - 179}$ pd.
	TAMARISCINEÆ.	
60	Tamarix Gallica, *L.*	E. small tree. (A — P³ — 0). SS = Si Aren. *All.* River-banks and Tidal savanahs. Wood coarse-grained, reddish, good for fuel.
	HYPERICINEÆ.	
61	Tridesmis formosa, *Korth.*	Lʰ $\frac{20 - 25}{8 - 15 + 1 - 2}$ (An² — 0). SS = Si S. Evergreen tropical forests.
62	Tridesmis pruniflora, *Kurz.* ယင်ပျား Y*in* p*i á.* (Bay bya) SK.	Lʰ $\frac{20 - 25}{6 - 10 + 1 - \frac{1}{2}}$ M² — T — 1000′) SS = *Lat.* Arg. Eng and Low forests.—l.— Wood rather heavy, fibrous but close-grained, soft, pale reddish brown, rather perishable and soon attacked by xylophages.
63	Cratoxylon neriifolium (*Hypericum—Wall.*) ပဲပြား P*e* p*i á.* (Bay bya) SK.	Lʰ $\frac{40 - 50}{12 - 20 + 2 - 3}$ (C A³ — P³ M² — T ∠ 2000′). SS = ∞ *Ca S. Si S. Metam.* Upper and lower mixed forests; dry forests.—l.— Wood rather heavy, brown, close-grained, rather soft. Used for building purposes, ploughs, handles of chisels, hammers and other utensils.
64	Cratoxylon carneum (*Hypericum—Wall.* တောင်ကလေး So*ung* k*á le.*	Lʰ $\frac{30 - 40}{10 - 25 + 2 - 4}$ (M³ — T 2000′ — 3000′). SS = *Metam.* Lat. Hill Eng forests.—l.— Wood rather heavy, brown or pale-brown, with darker coloured heart-wood, fibrous but close-grained, takes fine polish.

Current No.	Names.	Remarks.
	GUTTIFERÆ.	
65	Garcinia Mangostana, *L.* မင်းကုပ် M*i*n kop.	E. $\frac{40 - 50}{15 - 30 + 3 - 5}$ (T cult.)—s.— Exudes gamboge of inferior quality.
66	Garcinia speciosa, *Wall.* ပရဝါ *Pá rá wá.*	E. $\frac{40 - 50}{20 - 30 + 3 - 5}$ (T — $An^s \angle 1000'$). SS = Serpentine and chloritic rocks. Evergreen tropical forests.—s.— Wood uniformly reddish brown, very heavy, close-grained, in quality equal to the Andaman bullet wood. Yields gamboge.
67	Garcinia cornea, *L.*	E. $\frac{40 - 60}{10 - 30 + 3 - 6}$ (M^s — T — 1000′). SS = Metam. and Lat. p. Evergreen tropical forests.—s.— Wood brown or red-brown, heavy, of a coarse unequal fibre, hard, rather close-grained. Yields an inferior sort of gamboge.
68	Garcinia anomala, *Pl. et Tr.*	E. (M^s 3000 — 6000′) SS = Metam. Damp and drier hill-forests.—s.— Sapwood white, soft. Yields inferior gamboge.
69	Garcinia Merguensis. *Wight.*	E. tree (T.)
70	Garcinia cowa, *Roxb.* တောင်သလဲ To*u*ng th*á* le.	E. $\frac{60 - 70}{20 - 30 + 5 - 6}$ (C. P^s M^s — T $\angle$ 2000′). SS = *Si S.* Metam. Evergreen trop. and moister upper mixed forests.—s.— Wood white, turning yellowish, rather heavy, coarsely fibrous, very perishable. Yields inferior gamboge. □′ = 42 pd.
71	Garcinia Kydia, *Roxb.* တောင်သလဲ To*u*ng th*á* le.	E. $\frac{50 - 70}{20 - 30 + 5 - 6}$ (P^s An. $\angle$ 1000′). SS = Si S. Evergreen trop. and moister upper-mixed forests.—s.— Wood &c. as in former, and most probably only a variety of it.

Current No.	Names.	Remarks.
72	Garcinia succifolia, *Kurz.*	E. $\frac{30 - 35}{10 - 15 + 3 - 4}$ (P^3 M^3 — T — 0) SS = All. Swamp forests.—s.— Wood white, turning yellowish white, rather heavy, coarsely fibrous, very perishable. Yields little and inferior gamboge.
73	Garcinia elliptica, *Wall.* သနတ်တော် Th*a* n*a*t t*au*.	E. $\frac{40 - 60}{10 - 30 + 3 - 5}$ (P^3 M^2 — ∠ 3000′). SS = Si S. Metam. Evergreen tropical forests.—s.— Wood soft, white. Yields a superior quality of gamboge.
74	Garcinia dulcis (*Xanthochymus—Roxb.*) မတော် M*á* t*au*.	E. $\frac{30 - 40}{10 - 15 + 3 - 4}$ (An^2 — 1000′). SS = Si S. and chloritic rocks. Evergreen tropical forests.—s.— Yields gamboge.
75	Garcinia Roxburghii (*Xanthochymus pictorius, Roxb.*) Fl. Sylv. Madr. t. 88. မဒေါ် M*á* do.	E. $\frac{40 - 50}{12 - 20 + 3 - 5}$ C A — P^2 M^3 ∠ 4000′). SS = Si S. Metam. Evergreen tropical forests.—s.— Wood yellowish white with a darker coloured large heart-wood, turning pale yellowish brown, rather heavy, fibrous but close-grained, rather hard. Yields gamboge.
76	Ochrocarpus Siamensis (*Calysaccion Siamense. Miq.*) တလပိ T*á* l*á* p*i*.	E. $\frac{20 - 25}{?}$ (Pr. M^1 — 0′). SS = Lat.; *Ca S.* Dry and Eng forests.
77	Calophyllum spectabile, *Willd.* ပန်းတကာ P*ún* t*á* k*á*.	E. $\frac{50 - 60}{25 - 30 + 4 - 6\frac{1}{2}}$ (T — An^2 — 1000′). SS = chloritic and serpentine rocks. Evergreen tropical forests.—s.— Wood reddish brown, heavy and rather close-grained. Good for masts, spars, &c.
78	Calophyllum amœnum, *Wall.*	E. tree (T.)
79	Calophyllum polyanthum, *Wall.*	E. $\frac{40 - 50}{15 - 30 + 3 - 5}$ (M^4 3000 — 6000′). SS = Metam. Moister hill forests.—s.—

Current No.	Names.	Remarks.
80	Calophyllum inophyllum, *L.* ပုံညက် P*o*ug n*i* *a*k. (Pong-nyet) S. K.	E. $\frac{50-60}{25-30+6-14}$ (T — An^2 — 0). SS = Aren. Beach jungles.—l.— Wood reddish brown, broadly striate, rather close-grained, heavy, □′ = 39 pd. Good for mats, spars, railway-sleepers, machinery, &c.
81	Mesua ferrea, *L.* ဂန်ဂေါ် G*á*u *gau.* (Gango) S. K.	E. $\frac{50-60}{20-30+6-7}$ (C T — An^4 — 1000′). SS = Metam. Si S. Evergreen tropical forests.—s.— Wood reddish brown, the sap-wood of lighter colour, close-grained, very heavy, hard, much resembling Andaman bullet wood. □′ = 69 ft. Suitable for machinery, railway sleepers, also for carpentry; used chiefly for helves and handles of tool, gun-sticks, &c.
82	Mesua nervosa, *Planch.*	E. tree (T.)
	TERNSTRŒMIACEÆ.	
83	Anneslea fragrans, *Wall.*	E. $\frac{25-30}{10-15+1\frac{1}{2}-2}$ (M^2 — T ∠ 2000′). SS = Lat. Eng and hill Eng forests. —l.— Wood pale-brown, rather heavy, close-grained, of a short fibre, hard and rather brittle.
84	Anneslea monticola, *Kurz.*	E. $\frac{50-60}{15-25+4-6}$ (M^3 4000 — 7000′). SS = Metam. Drier hill and pine forests. —l.—
85	Ternstrœmia Japonica, *S. Z.*	E. $\frac{80-90}{40-50+5-7}$ (M^4 4000 — 7000′). SS = Metam. Damp and drier hill-forests.—s.—
86	Ternstrœmia Penangiana, *Chois.*	E. $\frac{50-80}{30-40+6-7}$ (T — An^2 — 0). SS = Si S., *Serpentine* and chloritic rocks. Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
87	Adinandra dasyantha, *Korth.*	E. $\frac{30-40}{15-20+2-4}$ (Pi^2 — T — 0). SS = *Lat.* Arg. Low and Eng forests.—l.—
88	Eurya Japonica, *Thbg.; Fl. Sylv. Madr.* t. 92. တောင်လက်ပက် Toung lak pak. (Toung lepet) S. K.	E. $\frac{15-25}{3-6+1-2\frac{1}{2}}$ (M^4 4000 — 7000′). SS = Metam. Drier hill forests.—l.— Wood light, pinkish-brown.
89	Eurya Chinensis, *R. Br.*	E. $\frac{20-25}{8-10+1\frac{1}{2}-2}$ (M^3 6000 — 7200′). SS = Metam. Drier hill and pine forests.—l.—
90	Eurya serrata, *Bl.* တောင်လက်ပက် Toung lak pak. (Toung lepet) S. K.	E. $\frac{30-40}{10-18+2-3}$ (P^1 M^3 — T ∠ 2000′). SS = *Metam.* Lat. p. Tropical evergreen forests.—s.— Wood heavy, red-brown, close-grained, and brittle.
91	Saurauja Punduana, *Wall.*	E. $\frac{30-40}{8-15+2\frac{1}{2}-3\frac{1}{2}}$ (M^1 2000 — 3000′). SS = Metam. Evergreen tropical forests and damp hill-forests.—s.— Wood soft, white.
92	Saurauja Roxburghii, *Wall.*	E. $\frac{30-40}{10-20+3-4}$ (M^2 — T. 2000 — 6000′). SS = Metam. Damp hill-forests and tropical evergreen forests.—s.— Wood white, soft.
93	Saurauja macrotricha, *Kurz.*	Tree (A ?).
94	Schima Noronhae, *Rwdt.* ပန်းမ Pán má. သစ်ရား Thit ya.	E. $\frac{60-70}{30-50+6-8}$ (C. A. M^4—T. 1500—4000′). SS = *Metam.* Lat. Drier hill and hill Eng forests.—l.—

Current No.	Names.	Remarks.
95	Schima monticola, *Kurz.*	E. $\frac{15-25}{3-8+2-3}$ (M^2 6000 — 7200′). SS = Metam. Drier hill-forests.—l.—
96	Schima oblata, *Kurz.*	E. $\frac{60-70}{30-50+6-8}$(P^1 M^2 — T. ∠ 3000′). SS = *Metam.* Lat. p. Open forests, hill-Eng and pine forests.—l.— Wood light brown.
97	Pyrenaria serrata, *Bl.*	E. small tree (T.)
98	Pyrenaria camelliæflora, *Kurz.*	E. $\frac{25-30}{8-15+2-3}$ (M^4. 2500 — 5000′). SS = Metam. Drier hill and pine forests. —s.—
99	Pyrenaria diospyricarpa, *Kurz.*	E. $\frac{15-25}{3-8+2-3}$ (M^2. 6000 — 7200′). SS = Metam. Drier hill-forests.—s.—
100	Camellia assimilis, ? *Champ.*	E. $\frac{12-15}{5-6+1}$ (M^2. 3500 — 4000′). SS = Metam. Damp and drier hill-forests. —s.— Wood soft, white.
	Dipterocarpeæ.	
101	Anisoptera odorata, *Kurz.*	L^h $\frac{20-30}{?}$ (T.)
102	Anisoptera glabra, *Kurz.* သင်ကတူ Th*i*n k*á* t*u*.	E. $\frac{100-120}{60-70+10-12}$ (P^3 — M^3 — 0). SS = Si S, *Metam.* Evergreen tropical forests.—s : l.—
103	Dipterocarpus tuberculatus, *Roxb.* အင်ပင် *In* p*i*n. (Eng or Ein) S. K.	L^h $\frac{70-80}{40-50+8-10}$ (A Pr^5 P^5 M^5 — T ∠ 2500′). SS = *Lat.* Arg. Ca S. Open chiefly Eng forests; also dry forests.—l.— Wood brown, with darker coloured heart-wood, rather heavy, loose-grained. □′ = 55 pd. Timber much esteemed by Burmans, and used for house-posts, canoes, planking, &c. Yields no wood-oil, but the branches exude a clear yellow resin.

Current No.	Names.	Remarks.
104	Dipterocarpus lævis, *Ham.*	$L^c \frac{100-150}{70-120+20+25}$ (C Ar^2 P^2_3 M^4 — T — 1000′). SS = *Metam.* Si S. Evergreen tropical forests.—s : l.— Wood browu, very liable to decay, and therefore little used except for rafters and planks, It is said to shrink very much, and to last only for about 2 years. Yields a superior quality of wood-oil in large quantity, and also exudes a dirty brown resin.
105	Dipterocarpus Hasseltii, *Bl.*	Lofty tree (T — An.) SS = Si S. Moist and tropical forests.—s : l.—
106	Dipterocarpus turbinatus, *Gærtn.*	$L^c \frac{150-200}{90-120+15-20}$ (C Ar^2 Ps^3 M^3 — T — 0). SS = *Metam.* Si S. Evergreen tropical forests.—s : l.— Wood browu, the narrow sapwood is of a pale colour, heavy, and rather close-grained. □′ = 55 pd. Takes a fine polish, and is used for house-building, house-posts, canoes, planking, &c. Yields plenty of wood-oil.
107	Dipterocarpus obtusifolius. *Teysm.* ကညင်ကုပ် *Ká ni in* kok.	$L^h \frac{70-80}{40-50+8-10}$ (Pr^3 M^3 ∠ 2000′). SS = Lat. Aren. Eng and hill Eng forests. —l.— Wood brown, of the quality of that of eng.
108	Dipterocarpus pilosus, *Roxb.*	$L^h \frac{80-100}{?}$ (Ar^2 M^2 — T — 1000′). SS = Si S. Metam. Evergreen tropical forests.—s : l.—
109	Dipterocarpus alatus, *Roxb.* ကညင်ဖြူ။ *Ká ni in pi u.*	$L^c \frac{150-200}{90-120+15-25}$ (Ar P^3 M^4 — T — 0′). SS = Si S. Metam. Evergreen tropical and moister upper mixed forests. —s : l.— Wood dark-brown, heavy, fibrous, and rather close-grained; the sap-wood is coarse, of a greyish-brown color, and very liable to decay. □′ = 38 pd. Of little use, but employed in house-building, especially for posts and in-door work; when exposed to wet it soon decays. Canoes made of it last only 3 to 4 years. Yields plenty of good wood-oil and exudes a dirty brown resin.

Current No.	Names.	Remarks.
110	Dipterocarpus insignis, *Thw.*	$L^h \frac{100-150}{90-100+15-16}$ (An^3 — 0). SS = Si S. Moister upper mixed forests, and evergreen tropical forests.—s : l.— Wood yellowish grey, rather coarsely fibrous, close-grained, and rather heavy.
111	Dipterocarpus incanus, *Roxb.*	Large tree (C.) Yields, according to Roxburgh, the largest proportion of best wood-oil.
112	Dipterocarpus costatus, *Gærtn.*	Tree (C.) Yields wood-oil.
113	Dipterocarpus angustifolius, *W. A.*	Tree (C.) Yields wood-oil.
114	Dipterocarpus gonopterus, *Turcz.*	$L^h \frac{40-50}{12-20+3-4}$ (M^3 — T — 2500′). SS = *Lat.* Metam. Hill Eng forests. —l.—
115	Parashorea stellata, *Kurz.* သင်ကတူ Th*i*n k*á* t*u*.	E. $\frac{120-150}{80-90+9-15}$ (Ps^2 M^4 — 1500′). SS = Metam. Si S. Evergreen tropical forests.—s : l.— Sap-wood, light brown.
116	Shorea obtusa, *Wall.* သစ်ရား Th*i*t y*á*. (Phtya or Theya.) S. K.	$L^h \frac{70-80}{40-50+6-7}$ (A Pr^4 P^3 M^3 — T — 2000′). SS = ∞ not p. *Lat.* Open forests and hill Eng forests.—l.— Wood brown, nebulous, rather coarse and light, loose-grained. □′ = 57 pd. Value of timber equal to that of Eng, excellent for tool-handles and planes, used also for canoes, &c. Yields a white resin.
117	Shorea robusta, *Gærtn.* Fl. Sylv. Madr. t. 4.	L^h (A ?) —l.— Wood heavy, greyish dark-brown, close-grained, hard; the sap-wood of a somewhat paler colour, takes fine polish, br. w. 1308-1319 pd. The sal is in India the most valued timber, and is used for beams of gun-carriages, all parts of carts, hand-spikes, perches of waggons, poles &c. Unequalled for railway sleepers, and valuable for engineering, ship and house-building. Yields abundantly resin or dammar.
118	Shorea nervosa, *Kurz.*	Tree (T) Yields a pellucid yellowish resin.

Current No.	Names.	Remarks.
119	Shorea floribunda, *Kurz.* (*Hopea-Wall. Cat.* 964.)	Tree (T.)
120	Pentacme Siamensis, *Kurz.* အင်ကြင်း *In jin.*	Lh $\frac{60-80}{40-50+5-7}$. (A Pr^5 P^8 M^4 — T — 1000′). SS = *Ca S. Lat.* Aren. Open and dry forests.—l.— Wood dark or reddish brown, tough and hard, close-grained, very heavy. □′ = 55 pd. Said to be as durable as teak, and used in house-building, for bows and for a variety of other purposes. Yields a red resin.
121	Hopea odorata, *Roxb.* သင်္ဘောက်န်း Thin kán ကောင်မှူ Koung mu.	E. $\frac{100-120}{40-80+10-15}$ (C. Ar^2 P^3 M^3 — T — 1000′). SS = Si S. Metam. Evergreen tropical and moister upper mixed forests.—s.— Wood brown, heavy and close-grained. $W = \frac{□'=46}{800}$ pd. Especially in use for canoes and boats; prized for cart-wheels. Boats constructed of thingan, said to last for more than 20 years. Yields a yellow resin.
122	Hopea scaphula, *Roxb.*	Large tree (C — Ar.) Used for making canoes.
123	Hopea gratissima, *Wall.*	Tree (T.)
124	Hopea Griffithii, *Kurz.*	Tree (T.)
125	Vatica lanceæfolia, *Bl.*	Middle sized tree (C.) The tshúá or tshowa, the product of this tree, is a strong smelling amber-coloured resin (gum anime), used by Brahmans in their temples under the name of ghúnd.
	MALVACEÆ.	
126	Kydia calycina, *Roxb.* ဒွာဘုတ် Dwá bot. ကလောပို၊၊တပို Ká lo po or tá po.	Lh $\frac{25-40}{8-20+3-4}$ (Pr^8 P^2 — M^2 — 1000′). SS = *Ca S.*, Si S., Metam. Dry and mixed forests.—s × l.— Wood white, straight-grained, good for house-building. The liber yields fibre.

Current No.	Names.	Remarks.
127	Hibiscus tiliaceus, *L.* သင်ပင် Th*i*n p*i*n. (Thimban) S. K.	E. $\frac{25-30}{6-10+2-3}$ (C⁴ — T An⁴ — 0). SS = Sal. Tidal and beach forests. —l.— The liber yields a strong fibre for cordage.
128	Hibiscus vulpinus, *Rwdt.* ရွက်ဝန်း Y*u* *a*k w*á*n.	E. $\frac{30-50}{15-30+3-5}$ (C Ar^3 P^2 M^3 T — 1000′). SS = Metam. Si S. Evergreen tropical forests.—s.— Wood white, turning pale-brown, rather heavy, fibrous but close-grained, soft. Might be used for house-posts and for other in-door house-building purposes. The liber yields a strong fibre for cordage.
129	Thespesia populnea, *Corr.* Fl. Sylv. Madr. t. 63.	E. $\frac{30-35}{3-6+3-4}$ (C^4 — T An^4 — 0). SS = Sal. Tidal and beach jungles.—l.— Wood pale reddish-brown to brown, even-grained, strong, hard, and durable. Used for cart-wheels, spokes, &c., and is good for furniture, carpentry, &c. The liber yields a strong fibre for cordage.
130	Bombax Malabarica, *Dc.* Fl. Sylv. Madr. t. 82. လက်ပန်။တိဍု L*a*k p*á*n or T*í* d*u*t. (Lépán or dídú) S. K.	L^h $\frac{60-80}{40-50+12-15}$ (C^3 A^4 — T An^4 — 3000′). SS = ∞ also Sal *Si S.* Leaf-shedding forests.—l.— Wood white, turning yellowish white, very light, coarse fibrous, loose-grained, brittle, very perishable, takes no polish. □′ = 28 pd. Used for coffins; in India for light packing-boxes and fisherman's floats. Cotton of seeds used for stuffing pillows. Yields the brown múchí-ras resin.
131	Bombax insignis *Wall.*	L^h $\frac{60-100}{40-60+12-16}$ (A Pr^3 — T — 3000′). SS = Si S. Upper mixed forests.—l.— Wood as in former species.
132	Eriodendron orientale, *Steud.*	L^h $\frac{60-80}{40-60+10-12}$ (T cult.) Wood light, good for toys. The cotton of seeds used in the same way as that of *Bombax*. Gives also a resin.
133	Durio zibethinus, *L.* ဒူရင်း D*u* y*i*n.	E. $\frac{40-60}{18-30+4-8}$ (M cult. — T wild ?).

Current No.	Names.	Remarks.
	STERCULIACEÆ.	
134	Sterculia foetida, *L.* လျှော်ဖြူ *Lí o* pi *u.* သောပြာ S*o* p*i á.* (Shaw pyu) S. K.	$L^h \frac{80-90}{40-50+8-10}$ (Pr^3 P^3 — M^2 — 2000′). SS = *Si S.*, Ca S. Upper mixed forests.—l.— Wood yellowish, very light, coarsely fibrous, and rather loose-grained, polish indifferent. Liber furnishes fibre. Exudes gum resembling tragacanth.
135	Sterculia urens, *Roxb.*	$L^h \frac{60-70}{40-50+5-8}$ ($P^3 M^2$ — T — 3000′). SS = Si S., Metam. Upper mixed forests. —l.— Wood soft, spongy, loose-grained, and worthless. □′ = 33 pd. Yields a gum resembling tragacanth. Liber furnishes fibre.
136	Sterculia versicolor, *Wall.*	$L^h \frac{16}{?}$ (A.)
137	Sterculia villosa, *Roxb.*	$L^{c-h} \frac{60-70}{40-45+4-6}$ (A Pr^3 — T An^2 — 2000′). SS = Metam. *Si S.* Upper mixed forests.—l.— Wood soft, reddish, fibrous. The liber is made most readily into very strong and durable ropes and is extensively used as such by Burmese mahouts, &c. Exudes gum.
138	Sterculia ornata, *Wall.* လျှော်ဝါ *Lí o* w*á.* (Shaw wa) S. K.	$L^h \frac{50-60}{25-40+3-5}$ ($P^2 M^3$ — T — 3000′). SS = Si S., Ca S., Metam. Evergreen forests, occasionally in hill dry forests. —l.— Wood white, soft, fibrous. Liber very strong, and used as above. Exudes gum.
139	Sterculia fulgens, *Wall.*	L^h (A. T.).
140	Sterculia colorata, *Roxb.* ဝက်လျှော် W*ak* l*í o.* (Wet shaw) S. K..	$L^h \frac{30-50}{10-25+3-4}$ (A Pr^4 — T An^3 — 3000′) SS = ∞. Leaf-shedding forests. —l.— Liber yields fibre.

Current No.	Names.	Remarks.
141	Sterculia scaphigera, *Wall.* သိးဖြူအပင် Thí p*i* *u* p*i*n.	$L^h \frac{90-120}{50-70+6-10}$ (P M — T — 1000′). SS = *Metam.*, Si S., Lat. p. Evergreen tropical forests and moister upper mixed forests.—l.— Wood white, rather light, coarsely fibrous, loose-grained, perishable. Liber yields fibre.
142	Sterculia longifolia, *Vent.*	Small tree (T ?)
143	Sterculia angustifolia, *Roxb.*	Middle-sized tree (T.)
144	Sterculia campanulata, *Wall.*	$L^h \frac{100-120}{80-90+6-8}$ (P^s — M^s — 1000′). SS = Si S., Metam. Evergreen tropical forests.—s : l.— Wood white, coarsely fibrous and rather loose but straight-grained, soft, very light and perishable, takes polish. Exudes a gum resembling tragacanth.
145	Sterculia parviflora, *Roxb.*	? $\frac{20-25}{?}$. (An^2 — 0′).
146	Sterculia alata, *Roxb.* (*St. Haynii*, *Bedd.* Fl. Sylv. Madr. t. 230). လက်ခုပ် L*a*k k*o*p. (Let-khok) S. K.	$L^h \frac{80-100}{60-70+8-10}$ (C. P^2 M^s — T^s An^s — 1000′). SS = Metam. *Si S.* Evergreen tropical forests.—s : l.— Wood white, turning yellowish white, rather light, coarsely fibrous, perishable.
147	Heritiera littoralis, *Dry.* ပင်လယ်ကနစိုး P*i*n l*e* k*á* n*á* s*o*.	E. $\frac{20-30}{4-6+4-5}$ C^4 — T — An^4 — 0′). SS = Sal. Tidal forests.—l.— Wood brown, rather light, and loose-grained.
148	Heritiera minor, *Lamk.*	E. $\frac{30-40}{15-20+4-6}$ (C^4 Ar^4 — T An^4 — 0′). SS = Sal. Tidal forests.—l.— Wood brown, strong, tough and durable. $W = \frac{\square' = 66}{1312}$ pd. Used for boats, piles of bridges, house posts, rafters, &c.
149	Heritiera macrophylla, *Wall.*	E. (M.)

Current No.	Names.	Remarks.
150	Pterospermum semisagittatum, *Roxb.* နှကျေးပင် Ná *ki e* p*i*n.	E. $\frac{50 - 60}{25 - 30 + 3 - 6}$(A C^3 P^4—T—2000′). SS = ∞ *Si S.* Leaf shedding, rarely evergreen forests.—s × l.— Wood brown, close grained, heavy.
151	Pterospermum acerifolium, *Willd.* တောင်ဖက်ဝန်း T*o*ung p*a*k w*u*n.	E. $\frac{40 - 50}{20 - 25 + 3 - 4}$(A P^4 — T — 3000′). SS = Metam. *Si S.* Ca S. Evergreen tropical and moister upper mixed forests. —s.— Wood brown, rather heavy, coarsely fibrous, strong, takes a fine polish.
152	Pterospermum aceroides, *Wall.*	E. $\frac{40 - 50}{20 - 25 + 3 - 4}$(M — T An.—1000′). SS = Si S., Metam. Evergreen tropical forests.—s.— Wood exactly as that of above.
153	Pterospermum fuscum, *Korth.*	E. $\frac{30 - 40}{20 - 25 + 3 - 4}$ (M^2 — T — 0′). SS = Metam. Evergreen tropical forests. —s.— Wood red-brown, rather heavy, coarsely fibrous, rather close grained, perishable.
154	Pterospermum lanceæfolium, *Roxb.*	E (C.) Wood strong, close grained.
155	Pterospermum suberifolium, *Lank.*	E (T ?)
156	Eriolæna Candollei, *Wall.* ဒုနှိ D*u* *á* n*í* ဒနှိ Dw*á* n*é*	L^h $\frac{30 - 60}{15 - 30 + 3 - 7}$ (P^3 — M^2 — 2000′) SS = *Si S.*, Metam., All. Mixed forests. —l.— Sap-wood pale-brown, the heart wood of a beautiful brick-red colour, close grained, tough and elastic. □′ = 47 pd. Used for gun-stocks, paddles and rice-pounders.
157	Melochia Indica, (*Visenia-Houtt.*)	E. $\frac{20 - 30}{6 - 10 + 1 - 2}$ (P M — T — 1000′). Evergreen tropical forests.—s.—
	Leptonychia heteroclita, *Kurz.* (*L. moacurroides, Bedd. Fl. Sylv. Madr. t.* 114.)	E. small tree (T.)

Current No.	Names.	Remarks.
158	Guazuma tomentosa, *H. B. K.* Fl. Sylv. Madr. t. 107.	E. $\frac{30 - 60}{10 - 30 + 2 - 5}$ (T. cult. — 0′). Wood brown or light-brown, light and loose grained, streaked, coarsely fibrous. Good for furniture, packing cases, &c. The young bark abounds in mucilage used in Mauritius for clarifying sugar.
	TILIACEÆ.	
159	Brownlowia peltata, *Bth.*	Small tree (T.) SS = Sal.
160	Brownlowia elata, *Roxb.*	E. $\frac{?}{? + 15}$ (C T.) SS = Sal. Tidal forests. —l.—
161	Brownlowia lanceolata, *Bth.*	E. $\frac{25 - 35}{8 - 10 + 2 - 3}$ (Ar^2 P^3 T — 0′) SS. = Sal. Tidal and mangrove forests. —l.—
162	Pentace Birmanica, *Kurz.* ကသစ်ခါး K*á* th*i*t k*á*.	L^h $\frac{100 - 120}{70 - 75 + 5 - 9}$ (P^3 — M^2 — T — 1000′). SS = *Si S.*, Metam. Evergreen tropical forests.—s : l.— Wood white, turning red-brown by exposure to air, the rather heavy, close grained, heart wood red. Used for boats, &c. Yields a red resin.
163	Berrya mollis, *Wall.* ဖက်ဝန်း P*e* w*á*n. (Pét wón) S K.	L^h $\frac{60 - 70}{30 - 35 + 6 - 7}$ (P^2 M^2 500 — 2500′). SS = Metam., Si S. Hill Eng forests and drier upper mixed forests.—l.— Wood red-brown. □′ = 56-62 pd. Much priced for axles, cart poles and ploughs, also for spear handles.
164	Grewia microcos, *L.* မြတ်ရာ M*i at yá*. (Mya-ya) S. K.	E. $\frac{40 - 50}{10 - 25 + 4 - 5}$ (C A P^4 — T — 1000′). SS = ∞ *Lat. p.* Moist forests, lower mixed and swamp forests.—s × l.— Wood not used. □′ = 51 pd.
165	Grewia calophylla, *Kurz.*	E. $\frac{20 - 30}{8 - 15 + 2 - 2\frac{1}{2}}$ (An^2 — 0′). SS = Si S. Moist forests.—s.— Wood yellowish-grey, with a darker coloured heart wood, rather coarsely fibrous, light.

Current No.	Names.	Remarks.
166	Grewia lævigata, *Vhl.*	E. $\frac{20 - 30}{6 - 10 + 1 - 1\frac{1}{2}}$ (C Ar² P³ — T —. 1000′). SS = *Si S.*; All. Mixed especially upper mixed forests. Wood white, turning yellowish white, and brownish, rather heavy, fibrous but close-grained, soft.
167	Grewia Asiatica, *L.*	Lʰ small tree (A ?).
168	Grewia elastica, *Royle.* ပင်တရော် P*i*n t*a* y*o*.	Lʰ $\frac{25 - 30}{8 - 15 + 2 - 3}$ (C P³ — M² 1000 — 2000′). SS = Si S., Metam. Upper mixed forests.—l.—
169	Echinocarpus sigun, *Bl.*	Lʰ large tree (T.)
170	Echinocarpus sterculiaceus, *Bth.*	Lʰ large tree (M′ — T 3000 — 5000′). Pine forests.—l.—
171	Elæocarpus Griffithii, *Kurz.*	E. small tree (T).
172	Elæocarpus obtusus, *Bl.*	E. $\frac{60 - 80}{15 - 25 + 6 - 8}$ (C. Ps³—M³—1000′). SS = Si S.; Metam. Evergreen tropical forests.—s.— Wood whitish, turning yellowish white, rather light, close-grained, soft, very perishable.
173	Elæocarpus grandifolius, *Kurz.*	E. $\frac{30 - 50}{10 - 20 + 4 - 5}$ (P² M — T ∠ 1000′). SS = Si S., Metam. Evergreen tropical forests.—s.— Wood white, soft.
174	Elæocarpus bracteatus, *Kurz.*	E. large tree (M — T).
175	Elæocarpus simplex, *Kurz.*	E. tree (T.)
176	Elæocarpus grandiflorus, *Sm.*	E. $\frac{30 - 40}{10 - 20 + 4 - 5}$ (M² — 1000′). SS = Metam. Evergreen tropical forests.—s.— Wood white, soft.

Current No.	Names.	Remarks.
177	Elæocarpus floribundus, *Bl.*	E. $\frac{30 - 40}{10 - 15 + 3 - 5}$ (C M³ — T ∠ 3000′). SS = Metam. Evergreen tropical forests. —s.—
178	Elæocarpus photiniæfolius, *Hook & Arn.*	E. $\frac{25 - 30}{6 - 10 + 2 - 4}$ (Pi²—M—0′). SS = All. Swamp-forests.—s.—
179	Elæocarpus Wallichii (*E. longifolius, Wall.*) ဝါဆိုပန်း *Wá so pán.* ဘမော်ပင် *Bá-maw-pin.*	E. $\frac{60 - 70}{30 - 38 + 3 - 6}$ (P M — 1000′). SS = *Metam.*, Lat., Si S. Moist and low forests.
180	Elæocarpus Ganitrus, *Roxb.*	Large tree (C.)
181	Elæocarpus lacunosus, *Wall.* ဘူတလက် Boo ta lek.	E. $\frac{40 - 50}{10 - 20 + 3 - 4}$ (Pi M — T³∠ 1000′). SS = Metam., Si S. Evergreen tropical forests.—s.—
182	Elæocarpus robustus, *Roxb.* တောမန်ကျည်း *Tau má kí.*	E. $\frac{20 - 30}{8 - 12 + 1 - 2\frac{1}{2}}$ (M—T An³ ∠ 1000′). SS = Metam., Chloritic rocks and serpentine. Evergreen tropical forests.—s.—
183	Elæocarpus stipularis, *Bl.*	Large tree (M — T.)
	LINEÆ.	
184	Erythroxylon Kunthianum, (*Sethia- Wall.*)	L^c $\frac{20 - 30}{4 - 10 + 2 - 3}$ (M³ 6000 — 7200′). SS = Metam. Drier hill-forests.—l.—
185	Erythroxylon monogynum, *Roxb.*	L^h small tree (P ?).
186	Erythroxylon cuneatum (*Ficus cuneata, Wall. Cat.* 4534. *E. Burmanicum, Griff.*)	E ? small tree (T.)
	MALPIGHIACEÆ.	
187	Hiptage arborea, *Kurz.* တောင်ရှုကာပန်း *Toung su ká pán.*	L^h $\frac{15 - 20}{3 - 6 + 1 - 2}$ (Pr⁵ ∠ 3200′.) SS = Lat. *Ca S.* Dry and open forests, especially hill dry forests.—l.—

Current No.	Names.	Remarks.
	GERANIACEÆ.	
188	Averrhoa Carambola, *L.* စောင်းရား S*ou*ng y*á*.	E. $\frac{20 - 25}{8 - 10 + 1 - 2}$ (P M — T — 0′). Cultivated only. Wood dark-brown.
189	Averrhoa Bilimbi, *Willd.* Fl. Sylv. Madr. t. 117. စောင်းရား S*ou*ng z*á*.	E. $\frac{8 - 10}{?}$ (P — T — 0′). Seldom cultivated.
	RUTACEÆ.	
190	Evodia triphylla, *DC.*	Tree (T.)
191	Zanthoxylon Budrunga, *DC.* မရနှင်း M*á* y*á* n*i*n.	L^h $\frac{50 - 60}{18 - 30 + 5 - 6}$ (C P^3 — T — 1000′). SS = *Si S.*, Metam. Evergreen tropical and moister upper mixed forests. —s × l.— Wood white, but by exposure soon turns yellow with a silvery lustre; rather heavy, close-grained, soft.
192	Acronychia pedunculata, *Miq.*	E. $\frac{10 - 25}{3 - 8 + 1 - 2}$ (C P An^3 — 0′). SS = Si S. Tropical forests.
193	Glycosmis citrifolia *Ldr.*	E. $\frac{12 - 15}{4 - 8 + 1 - 1\frac{1}{2}}$ (C P^1 M^3 — T An. — 1000′). S. S. = Metam. Si S., &c. Evergreen tropical forests. Wood yellowish white, turning brownish; heavy, close-grained, of a fine fibre.
194	Micromelum pubescens, *Bl.* တညင်းဘို T*á* n*i* *i*n b*o*.	E. $\frac{25 - 30}{6 - 12 + 2 - 3}$ (C A P^3 M^3 T An^3 — 1000′). SS = ∞. *Si S.* Evergreen tropical forests.—s.— Wood yellowish white, rather heavy, fibrous, but close-grained, soft.
195	Limonia acidissima, *L.* သီဟရဇါ Th*í* h*á* r*á* z*á*.	L^h tree (A).

Current No.	Names.	Remarks.
196	Murraya exotica, *L.* သနပ်ခါး *Thá nap ká.*	E. $\frac{15 - 25}{6 - 8 + 1\frac{1}{2} - 2}$ (C P^4 M^3 — T An^3 — 1000′). SS = Si S., Metam., &c. Evergreen tropical forests.—s.— Wood heavy, white, close-grained. Furnishes the Burman box-wood, used for handles.
197	Murraya Koenigii, *Spreng.*	E. $\frac{15 - 20}{4 - 10 + \frac{1}{2} - 1\frac{1}{2}}$ (C. Pi^3 — 1000′). SS = Si S. Evergreen tropical forests.—s.—
198	Clausena Wampi, *Blanco.*	Little tree (C.) Cult. only.
199	Atalantia longispina, *Kurz.*	Little tree (P T.) SS = Sal. Tidal forests.
200	Atalantia monophylla, *Corr.*	E. $\frac{20 - 30}{8 - 12 + \frac{1}{2} - 3}$ (A T.—An^3[P^3—2000′] — 0′). SS = ? Rocky sea-coasts.—l.— Wood white or pale-yellow, heavy, hard, very fine, close-grained, suitable for cabinet work. A sort of box-wood. Another larger sized variety with larger leaves, grows frequently in the Pegu Yomah, Evergreen forest, but I have no flowers from which to distinguish its species. It is probably a distinct species, and is therefore placed between brackets in the above formula.
201	Citrus decumana, *L.* ရှောက်တုံအို Sh*ou*k tong *o.*	E. $\frac{25 - 30}{8 - 15 + 3 - 4}$ (T cult. only).
202	Citrus hystrix, *DC.* ရှောက်ပုတ် Sh*ou*k p*u*t.	E. little tree (M^2). SS = Metam. Evergreen tropical forests.
203	Citrus aurantium, *L.*	E. $\frac{25 - 30}{8 - 10 + 3 - 4}$ (A — T — 0′). Cult. only.
204	Citrus medica, *L.*	E. small tree (P^1 — 0′). SS = Si S. Evergreen tropical forests. Wood white, rather heavy, fibrous but close-grained, soft.

Current No.	Names.	Remarks.
205	Citrus nobilis, *Lour.* ရှောက်လိမ္မော်ရှောက်သချို Shouk l*ei*n m*o* or Sh*ou*k the-cho. သံပုရာရှောက် Th*á*n b*á* y*á* sh*ou*k.	E. $\frac{15-25}{?}$ (A — T — 0′). Frequently cultivated. Wood yellow, heavy, of an unequal coarse fibre, but close-grained and rather hard.
206	Feronia elephantum, *Corr.* Fl. Sylv. Madr. t. 121. မှန် M*á*n.	L^h $\frac{25-30}{8-10+2-3}$ (Pr.) Dry forests? —l.— Wood yellowish white, rather heavy and coarsely fibrous, but close-grained and hard. It takes a fine polish, yields a gum like gum arabic and also gives lac.
207	Aegle Marmelos, *Corr.* Fl. Sylv. Madr. t. 161. အုပ်ရှစ် *O*p sh*i*t. (Ok-shit) S. K.	L^h $\frac{30-40}{10-15+3-4}$ (Pr? wild; A — P^s cult.) Dry forests?—l.— The well-known bél-tree. Wood light-coloured, usually of an uniformly yellowish white, or variegated with veins; heavy, very close-grained, compact, hard and very strong. It takes a beautiful polish.
	Simarubaceæ.	
208	Samadera Indica, *Gærtn.* ကသယ် K*á* th*e*.	E. small tree (T.) Evergreen tropical forests. —s.— Yields the Niepa bark of commerce.
209	Ailanthus malabaricus, *DC.* Fl. Sylv. Madr. t., 123.	L^h $\frac{60-80}{?+?}$ (Ps^2 — 500′). SS = Si S. Evergreen tropical forests.—s : l.— Wood said to be useless. Exudes a reddish resin.
210	Picrasma Javanica, *Bl.*	E. $\frac{40-50}{10-25+4-5}$ (P^1 M^3 — T An^3 — 2000′). SS = *Metam.* Si S.? Evergreen tropical forests.—s.— Wood yellowish white, amianthlike, fibrous, rather light, close-grained, soft, perishable.
211	Harrisonia Bennetii, *Hl. S. Th.* တပူပင် T*á* p*u* pin.	L^h $\frac{15-20}{?+1\frac{1}{2}-1}$ (Pr^4 M — 2000′). SS = Ca S., Ca. Dry forests.—l.—

Current No.	Names.	Remarks.
212	Balanites Roxburghii, *Planch.*	L^h small tree. (A — Pr — 1000′). SS = Ca S. Dry forests.—l.—
	OCHNACEÆ.	
213	Ochna lucida, *Lamk.* ရိုဓရား Y*o* d*á* *yá.*	L^h small tree. (Pr. T.) SS = Ca ?
214	Ochna Wallichii, *Planch.* ရိုးဒရား Y*o* d*á* y*á*.	L^h $\frac{30-50}{10-25+3-5}$ ($P^1 M^4$ — T — 1500′). SS = *Metam.*, Si S., Lat. p. Evergreen tropical forests.—s.— Wood brown, heavy, brittle, close-grained, and of flexuous fibre.
215	Ochna Andamanica, *Kurz.*	L^h small tree. (An^3 — 1000′). SS = Si S. Chloritic rocks. Moister upper mixed and tropical forests.—s.—
216	Gomphia Sumatrana, *Jack.*	A little tree (T.)
	BURSERACEÆ.	
217	Garuga pinnata, *Roxb.* Fl. Sylv. Madr. t. 118. ချင်ရုပ်ပင် Ch*i*n y*o*u*k* p*i*n. ခြင်နုပ် Ch*i*n n*o*p.	L^h $\frac{70-80}{40-50+6-7}$ (C A Pr^3 P^4 — T — 3000′). SS = Metam., S*i* *S.*, &c. Mixed forests.—l.— Wood greyish or yellowish, rather heavy, coarsely fibrous but rather close-grained. takes an indifferent polish and is not much used. □′ = 52 pd. Bark good for tanning.
218	Bursera serrata, *Wall.* သတိပင် Th*á* t*i* p*i*n. သဒိပင် Th*á* d*í* p*i*n.	L^h and E. $\frac{80-90}{30-50+6-8}$ (P^3 — M^3 — 2000′). SS = Metam., Si S. Evergreen tropical and moister upper mixed forests. —s × l.— Wood brown, turning red-brown, heavy, close-grained, of a somewhat unequal but fine fibre, tolerably soft, and takes a fine polish. Good for furniture, &c.
219	Canarium euphyllum, *Kurz.*	E. $\frac{80-90}{50-60+10-14}$ (An^3 — 0′). SS = Si S., chloritic rocks. Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
220	Canarium coccineo-bracteatum, *Kurz.*	E. $\frac{50}{?}$ (An^2 — 1000′). SS = Si S. Evergreen tropical forests.—s.—
221	Canarium Benghalense, *Roxb.*	E. large tree. (P^1 ∠ 2000′). SS = Si S. Tropical and moister upper mixed forests. —s.— Wood pale-brown, rather light, coarsely fibrous but rather close-grained, and takes fine polish. Exudes a clear amber-coloured very pure resin which soon turns hard and brittle resembling copal.
	Meliaceæ.	
222	Melia Azadirachta, *L.* Fl. Sylv. Madr. t. 14. သင်ဘောတမာခါး Thin-*baw*-tá-ma ká.	L^h $\frac{40 - 80}{18 - 40 + 4 - 6}$ (A — Pr^3 — 1500′). SS = Ca S. Drier forests.—l.— Wood very like mahogany; the sap-wood small, rather coarse and whitish; the heart-wood red-brown, heavy, close-grained, and when old often beautifully mottled. It is hard and heavy, takes a fine polish and is durable. It is good for cart-wheels, furniture, and ordinary building purposes, as well as for ship-building. The bark is bitter, and is used as a substitute for quinine. The tree also exudes a gum.
223	Melia Azedarach, *L.* Fl. Sylv. Madr. t. 13. တမာခါး Ta má ká.	L^h $\frac{40 - 50}{12 - 20 + 3 - 4}$ (A—Pr^3 P^2—1000′). Cultivated only. Wood pale-brown or reddish, striate, rather loose-grained, and light, and takes a fine polish. It is good for furniture, but warps and splits.
224	Melia Toozendan, *S. Z.?* တောတမာခါး *Tau tá má ká.*	L^h $\frac{40 - 60}{12 - 20 + 3 - 5}$ (M^3 — 1000′). SS = Metam. Evergreen tropical forests.—s.— Wood white, of a silvery lustre, rather heavy and coarsely and somewhat unequally fibrous; heart-wood brown and soft.
225	Cipadessa baccifera, *Miq.*	E. $\frac{15 - 20}{4 - 5 + 1 - 2}$ (A.)
226	Dysoxylon alliaceum, *Bl.*	E. $\frac{60 - 70}{30 - 40 + 4 - 5}$ (Ps^1 T — 0′). SS = Lat. p. Evergreen tropical forests.—s.—
227	Dysoxylon binectariferum, (*Guarea-Roxb.*)	E. $\frac{50 - 60}{?}$ (C.)
228	Schizochiton dysoxylifolium, *Kurz.*	Tree (M.)

Current No.	Names.	Remarks.
229	Schizochiton grandiflorum. (*Diplotaxis-Wall.*) သစ်ကတုံ Thitka tong. သစ်ကတိုး Th*i*t k*á* to.	E. $\frac{40 - 50}{18 - 30 + 3 - 4}$ (M' — T — 1000'). SS = Metam. Evergreen tropical forests. —s.— Wood pale-brown, heavy, with an irregularly coarse fibre but close-grained, and rather hard.
230	Sandoricum Indicum, *Cav.* Fl. Sylv. Matle. t. 319. သစ်တို Th*i*t t*o*.	E. $\frac{50 - 60}{20 - 30 + 6 - 7}$ (Ps — T ∠ 1000'). SS = Metam., Lat. p. Evergreen tropical forests.—s.— Wood dark-brownish grey, hard and heavy. Employed for carts, boat-building, &c.
231	Aglaia Chittagonga, *Miq*	E. $\frac{30 - 40}{8 - 15 + 2 - 3}$ (C. M^3 — T An^3 — 1000'). *Metam.* Si S. Chloritic rocks. Evergreen tropical forests.—s.— Wood pale-brown, heavy, fibrous close-grained, but perishable.
232	Aglaia edulis, *A. Gray.*	Middling sized tree (T.)
233	Aglaia crassinervia, *Kurz.*	E. tree (T.)
234	Aglaia argentea, *Bl.*	E. tree (Ps^2 — 1000'). SS = Si S. Evergreen tropical forests.—s.—
235	Aglaia elliptica, *Bl.*	E. small tree (T.)
236	Aglaia oligophylla, *Miq.*	E. small tree (T.)
237	Amooora Rohituka, *WA.* Fl. Sylv. Madr. t. 132. သစ်နီသံသတ်ကြိ Th*i*t n*í* or th*a*n th*á*t k*i*.	E. $\frac{50 - 60}{20 - 30 + 4 - 5}$ (P^3M^3—T ∠ 3000'). SS = Metam., Si S., Lat. p. Evergreen tropical forests.—s.— Wood white, turning pale-brown, and streaked; the heart-wood being of a darker colour. It is rather coarsely fibrous but close-grained, takes a fine polish, and is adapted for house-building purposes. The seeds yield an oil. □' = 80 pd.

Current No.	Names.	Remarks.
238	Amoora cucullata, *WA.* သစ်နီ Th*i*t n*í*.	E. middling sized tree (P — M — 0′). SS = Sal ? Wood brown, rather hard and strong, but not heavy. Adapted for house-building.
239	Walsura villosa, *W. A.* ဂြိုဖို G*io* or G*io* po. (Jo or gyoben) S. K.	$L^h \frac{30 - 50}{15 - 25 + 3 - 4}$ (A P^3 M^3 — T 500′) SS = *Lat.* Dil. Eng and low forests —l.— Wood brown, heavy, coarsely fibrous, but close-grained and rather hard.
240	Walsura robusta, *Roxb.* ကြို့ဖို K*i* *o* po. (Jo ben) S. K.	E. $\frac{40 - 60}{10 - 25 + 3 - 5}$ ($Ps^2 M^3$ — T An^3—0′). SS = Metam., Lat. p., Si S., &c. Evergreen tropical forests.—s.—
241	Walsura hypoleuca, *Kurz.*	E. $\frac{40 - 50}{? + 4 - 5}$ (An^3 — 0′). SS = Si S. ?, Chloritic rocks. Evergreen tropical forests.—s.—
242	Walsura quinquejuga, (*Heynea-Roxb.*)	Tree (T.)
243	Walsura (*Heynea*) pubescens, *Kurz.*	E. $\frac{25 - 30}{8 - 10 + 1 - 3}$ (Ps^2 — M^2 — 2000′). SS = Metam.; Si S. Evergreen tropical forests.—s.—
244	Carapa moluccensis, *Lamk.* ပင်လယ်အုံ P*i*n l*e* o*n*g.	E. small tree (An^2 — 0′). SS = Sal. Littoral forests.—l.—
245	Carapa obovata, *Bl.* (*C. moluccensis, Bedd.* Fl. Sylv. Madr. t. 136.) ပင်လယ်အုံ P*i*n l*e* o*n*g.	E. $\frac{25 - 40}{8 - 20 + 4 - 6}$ (C Ar^3—T An^3—0′). SS = Sal. Tidal forests.—l.— Wood pale or of a dark reddish-brown, broadly streaked, not very close-grained, but rather heavy and strong. □′ = 47 pd. It is good for handles of tools, hand-spikes, helves, spokes, &c., and also for house-posts. The fruits are used for tanning. The tree exudes a clear brownish brittle resin.
246	Carapa carnosula (*Xylocarpus—Zoll.*)	E. (Ar. — 0′). SS = Sal. Tidal forests.

Current No.	Names.	Remarks.
247	Chickrassia tabularis, Juss. Fl. Sylv. Madr. t. 9. ရင်းမါ Y*i*n m*á*. တောရင်မါ Taw y*i*n m*á*.	E. $\frac{50 - 90}{30 - 50 + 5 - 8}$ (C P^2 — T An^2 — 1000′). SS = Si S. Evergreen tropical forests.—s.— Wood light coloured, close-grained and elegantly veined. It is employed for furniture of various kinds and is usually called Chittagong wood. □′ = 24 pd.
248	Chickrassia velutina (Swietenia velutina, *Wall*).	L^h (Pr^3 — P^2 — 1000′). SS = *Ca S.*, Si S.? Dry forests; also upper mixed forests.—l.—
249	Cedrela Toona, *Roxb.* Fl. Sylv. Madr. t. 10. တောင်ဒမ။သစ်ကတိုး To*u*ng d*á* m*á* or th*i*t k*á* d*o*.	L^c $\frac{80 - 100}{40 - 50 + 6 - 12}$ (P^2 — M^4 — 1000′). SS = Si S. *Metam.* Evergreen tropical forests.—s.— Wood reddish, turning reddish-brown with a silvery lustre, soft, fibrous, coarse but rather close-grained. □′ = 28 pd. It is good for furniture and for house-building purposes &c., and exudes an aromatic resin.
250	Cedrela serrata, *Royle.*	Tree (A.)
251	Cedrela multijuga, *Kurz.* တောင်ဒမ To*u*ng d*á* m*á*.	E. $\frac{70 - 90}{40 - 60 + 6 - 8}$ (Ps^2 — 1000′). SS = Si S. Evergreen tropical forests.—s.—
252	Soymida febrifuga, *A. Juss.* Fl. Sylv. Madr. t. 8.	L^h $\frac{40 - 50}{17 - 20 + 3\frac{1}{2} - 5}$ (Pr. ?). Wood dull red, very durable and strong. Good for indoor work. The bark is a febrifuge.
	OLACINEÆ.	
253	Strombosia Javanica, *Bl.*	E. large tree (T.)
254	Anacolosa puberula, *Kurz.*	E. small tree. (An^3 — 1000′). SS = Si S. Evergreen tropical forests.—s.—
255	Lepionurus sylvestris, *Bl.*	E. small tree (T.)
256	Platea (Stemonurus) crassipes, *Kurz.*	E. $\frac{25 - 30}{8 - 12 + 1 - 2}$ (Ps^2 — 1000′). SS = Si S. Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
257	Apodytes Andamanica, *Kurz.*	E. little tree. (An^4 — 500′). SS = Serpentine and chloritic rocks. Evergreen tropical forests.—s.—
258	Gonocaryum Lobbianum, *Kurz.*	E. $\frac{30 - 40}{15 - 20 + 2 - 4}$ (P^3 — T — 500′). SS = Metam. Lat. p. All. Evergreen tropical and swamp-forests.—s.—
	ILICINEÆ.	
259	Ilex Godayam, (*Prinos-Ham.*)	E. $\frac{40 - 50}{12 - 30 + 3 - 4}$ (M^3 — T — 1000′). SS = Metam.; Lat. p. Evergreen tropical forests.—s.— Wood grey, rather heavy, fibrous, tough, and rather close-grained.
260	Ilex daphnephylloides, *Kurz.*	E ? $\frac{60 - 70}{25 - 30 + 8 - 10}$ (M^3 4000 — 6000′). SS = Metam. Damp hill-forests.—s.—
261	Daphniphyllum Himalayense, *Muell-Arg.*	E. $\frac{50 - 60}{20 - 25 + 4 - 6}$ (M^2 5000′). SS = Metam. Damp hill-forests.—s.—
	CELASTRINEÆ.	
262	Evonymus Javanicus, *Bl.* ဆောက် Souk.	E. $\frac{30}{10 - 12 + 1\frac{1}{2} - 2}$ (C. M^3—T—1000′). SS = Metam. Evergreen tropical forests. —s.— Wood rather heavy, pale-brown, turning brown, soft, and of a fine close grain. It is a good wood for furniture, &c.
263	Evonymus garcinioides, *Roxb.*	E. $\frac{30 - 40}{10 - 20 + 2 - 4}$ (P^1 — M^3 — 1000′). SS = *Metam.*, Si S. Evergreen tropical forests.—s.— Wood of a brown-yellowish colour, heavy, coarsely fibrous, rather close-grained, and hard, but soon attacked by xylophages.
264	Evonymus sclerocarpus, *Kurz.*	E. $\frac{8 - 12}{3 - 5 + 1}$ (P^2 — 1000′). SS = Si S. Evergreen tropical forests.—s.— Wood white, soft, straight, finely fibrous, and close-grained.

Current No.	Names.	Remarks.
265	Microtropis bivalvis, *Wall.*	E. small tree (T.)
266	Kurrimia robusta, *Kurz.* ခွေးတောက် Kw*e* do*uk*.	E. $\frac{60 - 70}{30 - 40 + 8 - 12}$ (C Ps^1 M — T — 1000′). SS = Metam., Lat. p. Evergreen tropical forests.—s.— Wood brown, heavy, fibrous, close-grained and brittle.
267	Siphonodon celastrinus, *Griff.* မြောက်အုပ်ရှစ် M*i* o*u*k *o*p sh*i*t. (Myouk ok shit.) S. K.	E. $\frac{30 - 50}{20 - 25 + 3 - 4}$ (P^3 — M^2 — 1000′). SS = Metam. Si S. Evergreen tropical forests.—s.— Wood pale yellowish, heavy, of a coarse unequal fibre, hard and rather brittle.
268	Lophopetalum fimbriatum, *Wight.*	Tree (M — T.)
269	Lophopetalum Wallichii (*Prismatocarpus littoralis, Wall.*) မုံတိုင်ပင် Mong t*a*i*ng* p*i*n. (Múng dein) S. K.	L^h $\frac{50 - 70}{30 - 40 + 6 - 8}$ (P^3 M^4 — T — 1000′).—SS = *Lat.* Metam. Dil. Open forests.—l.— Wood white, turning pale brown, finely and rather loosely-grained, hard, rather light, the annual rings very narrow, and the heart-wood brown. W = $\frac{\square' 33 - 38}{121}$ pd. Recommended for furniture.
270	Lophopetalum floribundum, *Wight.*	Tree $\frac{35}{?}$ (T.)
	RHAMNEÆ.	
271	Zizyphus rugosa, *Lamk.* မြောက်ဇီး M*i* o*u*k z*i*.	L^h $\frac{20 - 30}{8 - 18 + 1\frac{1}{2} - 3}$ (A Pr^3 P^3 — T — 1500′). SS = ∞. Leaf-shedding forests. —l.—
272	Zizyphus Jujuba, *Lamk.* Fl. Sylv. Madr. t. 149. ဇီးပင် Z*í* p*i*n.	L^h and E. $\frac{25 - 30}{10 - 15 + 2 - 3}$ (A Pr^4 P^2 — T — 1000′). SS = ∞. *Ca S.* Leaf-shedding forests.—l.— Sap-wood yellowish, heart-wood dark-brown, fine and close-grained, strong and hard. Good for cabinet-work. Gives good charcoal. Bark good for tanning. Lac is found on it.

Current No.	Names.	Remarks.
	AMPELIDEÆ.	
273	Leea sambucina, *Willd.* ကလက် Ká l*a*k. (Ka-let) S. K.	E. $\frac{15-20}{6-10+\frac{1}{2}-1}$ (Ps² M³ — T ∠ 2000′). SS = Metam., Si S. Evergreen tropical forests.—s.— Wood rather heavy, close-grained, soft, pale-brown turning darker, with a silvery lustre; the pith medullary, brown, small, and soon attacked by xylophages.
274	Leea compactiflora, *Kurz.*	E. $\frac{12-15}{4-8+\frac{1}{2}}$ (M² 3000 — 4000′). SS = Metam. Drier hill-forests.—s.—
275	Leea staphylea, *Roxb.* သကြားနွယ်သံ Thá k*i* *á* ne th*á*n.	Lʰ $\frac{10-15}{3-5+\frac{1}{2}-1}$ (P⁴ — 2000′). SS = *Si S.*, All. Mixed forests.—l.— Pith medullary and very large; the outer wood only 2 to 3 inches thick, of a dark-brown color, and close-grained.
	SAPINDACEÆ.	
276	Schmiedelia serrata, *DC.*	E. Little tree. (C Ar² T — 0·). SS = Sal. Tidal-forests chiefly.
277	Aesculus Assamica, *Griff.*	Large tree (T.)
278	Cupania regularis, *Bl.*	E. middling-sized tree (T.)
279	Cupania glabrata, (*Sapindus—Wall.*)	E. $\frac{25-30}{8-10+2-3}$(Ps³—M—1000′). SS = Si S.; Metam. Evergreen tropical forests.—s.—
280	Cupania fuscidula, *Kurz.*	E. small tree (T.)
281	Zollingeria macrocarpa, *Kurz.* ဝက်ကျွတ်ပင် Wák k*i* *u*t p*i*n.	Lʰ $\frac{50-80}{25-50+3-6}$ (Pr³ ∠ 1000′). SS = Ca S. Mixed dry forests.—l.—
282	Ratonia Lessertiana, *Bth. et Hf.*	E. $\frac{30-40}{10-15+3-4}$ (An³ — 1000′). SS Chloritic and serpentine rocks. Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
283	Ratonia adenophylla (*Sapindus—Wall.*)	E. $\frac{20+30}{?}$ (T.)
284	Ratonia Sumatrana, *Hf. et Bth.*	E. tree (P^1 T — 1000′). SS = Si S.; and Metam.? Evergreen tropical forests. —s.—
285	Mildea xestophylla, *Miq.*	E. tree (T.)
286	Hemigyrosa canescens, *Thw.* Fl. Sylv. Madr. t. 151.	E. middling sized tree (T.) Evergreen tropical forests. Wood rather heavy, yellowish-white, clouded blackish. It is close-grained and takes a very fine polish.
287	Lepisanthes montana, *Bl.*	E. $\frac{20 - 25}{15 - 20 + 1}$ (P^2 — M^3 — 2000′). SS = Si S.; *Metam.*, Lat. p. Evergreen tropical forests.—s.— Wood white, rather heavy, fibrous but close-grained. Is soon attacked by xylophages.
288	Schleichera trijuga, *Willd.* Fl. Sylv. Madr. t. 119. ကြို့ပင် J*o* p*i*n. (Gyo or kyo ben) S. K.	L^h $\frac{50 - 70}{20 - 30 + 8 - 12}$ (A Pr^4 — T ∠ 3000′). SS = ∞ *Si S.* All leaf-shedding forests. —l.— Wood brown, very heavy, close-grained durable and takes fine polish. □′ = 70 pd. Used for cart-wheels, the teeth of harrows, the pestles of oil-mills, &c. Exudes a yellowish resin, and gives also lac.
289	Sapindus verticillatus, (*Scytalia—Roxb.*)	Little tree (P M — T An^3 — 0′). SS = Sal. Tidal forests.
290	Sapindus rubiginosus, *Roxb.* ဆိပ်ချေး S*ei*k ch*e*. (tseik chí) S. K.	E & L^c $\frac{25 - 30}{8 - 15 + 2 - 3\frac{1}{2}}$ (P^3 M^2 — T An^3 — 1000′). SS = Metam., Si S., All. &c. Evergreen tropical forests, rare in lower mixed forests. Wood white or pale-coloured with pinkish brown heart-wood, strong and durable. Adapted for house-building.
291	Sapindus rarak, *DC.*	E. $\frac{50 - 60}{25 - 30 + 4 - 5}$ (P^2 — 1000′). SS = Si S. Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
292	Xerospermum Noronhianum, *Bl.*	E. little tree (T.)
293	Nephelium hypoleucum, *Kurz.* (Kyet-mouk) S. K.	E. $\frac{30-50}{15-25+3-5}$ (Ps² — M³ — 2000′). SS = *Metam.*, Si S. Evergreen tropical forests.—s.—
294	Nephelium Litchi, *WA.* ကြက်မောက် K*i* *a*k mo*u*k. (Kyet-mouk) S. K.	E. $\frac{30-40}{12-20+3-4}$ (C.) Cult. only. Wood red-brown, rather heavy, close-grained and takes fine polish.
295	Nephelium Griffithianum, *Kurz.* (*Sapindacea, No.* 1, *Griff.*)	E. tree (A.)
296	Euphoria Longana, *LK.* Fl. Sylv. Madr. t. 156. ကြက်မောက် K*i* *a*k mo*u*k. (Kyet-mouk) S. K.	E. $\frac{30-50}{15-25+4-5}$ (Ps² — 500′). SS = Si S. Evergreen tropical forests. Also cultivated by natives.—s.— Wood brown, rather heavy, finely close-grained and apparently durable. It is good for furniture, and takes a fine polish.
297	Pometia tomentosa, *Bl.* (*P. eximia, Thw.*, Fl. Sylv. Madr. t. 157). ပါဂါညက်စု P*á* g*á* n*i* *a*k s*u*.	E. $\frac{80-90}{40-45+6-10}$ (An⁴ — 1000′). SS = Si S. and *chloritic rocks.* Evergreen tropical forests.—s.— Wood whitish, very light, but very coarsely fibrous.
298	Harpullia cupanioides, *Roxb.*	Lʰ & E. $\frac{80-90}{50-60+6-14}$ (C An³ — 1000′). SS = Si S. Evergreen tropical forests.—s.—
299	Acer laurinum, *Hassk.*	L? large tree. (M² — T 4000 — 6000′). SS = Metam. Damp hill forests.—s.—
300	Acer isolobum, *Kurz.*	L? $\frac{50-60}{20-30+3-5}$ (M³ 5000 — 7000′). SS = Metam. Damp hill-forests.—s.—

Current No.	Names.	Remarks.
301	Turpinia pomifera, *DC.* ထောက်ရှာမ T*o*uk sh*á* m*á*. ကလေါပျ K*a* l*o* p*o*.	E. $\frac{30-40}{12-20+2-3}$ (P^3 — M^4 — 1000′). SS = *Metam.* Si S. Evergreen tropical forests.—s.— Wood greyish, rather heavy, fibrous but close-grained. It is tolerably soft and is soon attacked by xylophages.
302	Turpinia Nepalensis, *Wall.* Fl. Sylv. t. 159? ဒေါက်ရမ D*o*uk y*á* m*á*.	E. $\frac{20-30}{8-15+2-3}$ (M^4 3000 — 7200′). SS = Metam. Drier hill and pine-forests.—s.—
	Sabiaceæ.	
303	Meliosma simplicifolia, *Bl.*	E. $\frac{40-50}{?}$ (T.) Wood brown, rather light, coarsely fibrous, but rather close-grained. It takes a good polish.
	Anacardiaceæ.	
304	Mangifera longipes, *Griff.* သရက်သီးနီ Th*á* y*a*k th*í* n*í*. (Tayet sínní) SK.	E? $\frac{50-60}{15-30+4-6}$ (P^3 — T — 0′). SS = *All.* Swamp-forests.—s.—
305	Mangifera Indica, *L.* Fl. Sylv. Madr. t. 162. သရက် Th*á* y*a*k. ထမင်ခြောက် T*á* m*i*n ch*ou*k. (Tayet) S. K.	E. $\frac{40-60}{15-30+4-8}$ (A — Pr. P^3 — T An^3 — 1000′). SS = ∞. Lower mixed forests. Everywhere cultivated.—s × l.— Wood yellowish or dull grey, coarsely fibrous, rather loose-grained, light, but soon decays if exposed to wet. The heart-wood is about 3 to 4 inches across, of a brown or light chocolate-colour, it is close-grained and much more durable, but takes only an indifferent polish. It is used occasionally for cabinet-work, for house and coach-building purposes, and for packing cases. The tree exudes a yellowish gum.
306	Mangifera sylvatica, *Roxb.* ဆင်နှင်သရက် S*i*n m*i*n th*á* y*a*k.	E. $\frac{60-80}{?}$ (M.) Evergreen tropical forests. —s.—
307	Mangifera caloneura, *Kurz.*	E. $\frac{40-60}{15-25+4-6}$ Ps^3 — 500′). SS = *Lat. p.*, Dil., All.—Evergreen open and low-forests.—s × l.—

Current No.	Names.	Remarks.
308	Mangifera fœtida *Lour.* လမွတ် Lá mot.	E. large tree (T. cult. only.)
309	Bouea oppositifolia, *Meissn.* မရမ်း Má yán.	E. $\frac{40 - 50}{20 - 25 + 4 - 6}$ (M^2 — T An^3 — 1000′). SS = *Metam.*, Si S. Evergreen tropical forests.—s.— Wood greyish, with a broad, blackish, ebony like, knotty heart-wood. It is rather heavy, very coarsely fibrous and loose-grained.
310	Bouea Burmanica, *Griff.*	E. tree (T.)
311	Gluta Renghas, *L.* သရက်သစ်စေး Thá yat thit se.	E. tree (T.) Tidal forests ?
312	Gluta elegans, (*Syndesmis-Wall.*)	E. small tree (T.) Tidal forests ? Wood good for furniture, and when steeped in ferruginous mud, turns jet black, looking like ebony. It is used also for building purposes, boxes, &c., and for dying (with different mordants, from orange to black).
313	Gluta longipetiolata, *Kurz.*	E. $\frac{25 - 30}{10 - 15 + 3 - 4}$ (An^3 — 0). SS = Sal. Coast-forests.—
314	Buchanania laxiflora, *Kurz.*	L. (P — M). SS = Ca. Lat.
315	Buchanania latifolia, *Roxb.* Fl. Sylv. Madr. t. 165. လွမ်းဖို Lu am po.	L^h $\frac{30 - 40}{20 - 25 + 3 - 6}$ (A Pr^4 — T — 1000′). SS = *Lat.* Dil. Metam., Ca S. Open and dry forests.—l.— Wood light and soft, rather tough, but not used. It is said to give good charcoal. □′ = 36 pd.
316	Buchanania lancifolia, *Roxb.* သင်ပေါင်း Thin poung.	Large tree (C — Ar.)

Current No.	Names.	Remarks.
317	Anacardium occidentale *L.* Fl. Sylv. Madr. t. 163. သီဟိုဠ်သရက် Thí ho thá yak.	E ? $\frac{25 - 30}{8 - 15 + 2 - 3}$ (T — 0′). SS = *Aren.* Beach-jungles.—l.— Wood dark-brown, excellent for charcoal. Exudes an astringent pellucid gum like gum-arabic, forming a good varnish. The juice issuing from incisions in the bark yields an indelible marking ink. The pericarp of the nuts produces a black acrid oil (cardole or cashew apple oil), while the seeds themselves yield a very good edible oil.
318	Semecarpus Anacardium, *L. f.* Fl. Sylv. Madr. t. 166.	E ? $\frac{30 - 40}{?}$ (C — 1000′). Wood grey or reddish white, soft and useless. Nuts used as a mordant, and for making an indelible marking ink. The tree also yields a brown gum.
319	Semecarpus cuneifolius, *Roxb.* ချေးပင် Che pin.	L^h $\frac{50 - 60}{20 - 30 + 4 - 6}$ (P^s — M^s — 2000′). SS = *Si S.*, Metam. Upper-mixed forests.—l.— Wood white turning pale-brown, rather light, coarsely fibrous, and rather close-grained. It is soft and useless, being soon attacked by xylophages. The tree yields a black resin, and the nuts produce an indelible marking ink.
320	Semecarpus acuminatus, *Kurz.* ခြေးပင် Che pin.	L^h $\frac{40 - 60}{20 - 30 + 4 - 6}$ (C — Ar^s — 1000′). SS = Si S. Upper mixed forests.—l.—
321	Semecarpus albescens, *Kurz.*	E ? large tree (M — 500′). SS. = Lat. ? Exudes a black varnish.
322	Semecarpus heterophyllus, *Bl.*	E. $\frac{50 - 60}{25 - 30 + 4 - 6}$ (P^s M^s — T — 3000′). SS = Metam. *Si S.* Evergreen tropical forests.—s.—
323	Drimycarpus racemosus, *Hf. et Th.*	E. large tree (C P^s — 1000′). SS = Si S. Evergreen tropical forests.—s.—
324	Holigarna longifolia, *Roxb.* Fl. Sylv. Madr. t. 167.	E & Lh $\frac{50}{? + 5 - 6}$ (C T). Yields a black varnish.

Current No.	Names.	Remarks.
325	Holigarna Grahamii, (*Semecarpus—Wight.*)	L^h & E. $\frac{30 - 50}{15 - 30 + 3 - 5}$ (P^3 — M^4 — 1000′). SS = Si S., Metam. Evergreen tropical forests.—s.— Wood rather heavy, brown, soft, close-grained, perishable and soon attacked by xylophages. Yields a black varnish.
326	Swintonia Griffithii, *Kurz.*	E ? lofty tree (T.)
327	Swintonia Schwenckii, *T.* et *B.* သရက်ကင် Thá zak kin. သရက်ဝံ Thá yak sán. (Tayet san) S. K.	L^h & E. $\frac{80 - 120}{60 - 70 + 8 - 10}$ (Ps^2 M^3 — T ∠ 1000′). SS = Si S., *Metam.* Evergreen tropical forests.—s : l.— Wood white and soft.
328	Melanorrhœa glabra, *Wall.* သစ်စေးပင် Th*i*t se p*i*n.	Middling sized tree (T.)
329	Melanorrhœa usitata, *Wall.* သစ်စေးပင် Th*i*t se p*i*n.	L^h $\frac{50 - 60}{15 - 30 + 6 - 9}$ (Pr^3 P^3 M^4 — T — 3000′). SS = *Lat.*, Dil., Aren., Metam. Open forests and hill eng-forests.—s.— Wood red-brown, close and fine grained. □′ = 54 pd. It is used for stocks of Burmese anchors, tool helves, &c. and is recommended for handles of tools and for machinery generally, for railway-sleepers, gun-stocks, &c. The tree exudes a black gum—the famous Martaban varnish, with which almost every vessel in a Burmese house, intended to contain either solid or liquid food, is lacquered.
330	Parishia insignis, *Hf.*	E ? $\frac{80 - 100}{30 - 60 + 8 - 12}$ (T — An^3 — 1000′). SS = Si S. Evergreen tropical forests.
331	Rhus paniculata, *Wall.*	L^h little tree (A — Pr — 1000′). SS = *Lat.*, Ca S. Eng and dry forests.—l.—
332	Rhus Javanica, *L.*	L ? $\frac{25 - 30}{8 - 15 + 1 - 2}$ (A M 2000-4000′). SS = Metam. Hill eng-forests and drier hill forests.—l.— Wood greyish and white, soft and light.

Current No.	Names.	Remarks.
333	Odina Wodier, *Roxb.* Fl. Sylv. Madr. t. 123. နဘဲ Ná be.	$L^h \frac{30-60}{15-40+3-10}$ (A Pr^3 — T $\angle$ 3000′). SS = ∞. *Si S.* Leaf-shedding forests. —l.— Sap-wood rather light and coarse, of a white color turning pale-brown; heart-wood heavier, close-grained, and of a reddish-brown color. □′ = 65 pd. It is said to be very difficult to season. The heart-wood is used for sheaths of swords, spear-handles, oil-presses and rice-pounders. If well seasoned, it is a good wood for cabinet work. The tree yields a yellowish gum in considerable quantities, which furnishes an inferior varnish. The bark is good for tanning.
334	Spondias pinnata (*Mangifera—Kœnig*). Fl. Sylv. Madr. t. 169. ဂွေး Gwe. ဂွေးကြီး Gwe kí. ဂွေးသပြေ Gwe thá pi e.	$L^h \frac{90-100}{50-60+10-12}$ (Pr^2 P^4 — M^3 $\angle$ 3000′): SS = ∞. *Si S.* Leaf-shedding forests,—l.— Wood soft, coarse and useless. The tree yields large quantities of a transparent juice which soon hardens into a mild, insipid, yellowish gum, somewhat resembling gum-arabic.
335	Dracontomelon sylvestre, *Bl.*	E. $\frac{90-100}{?+8-10}$ (An^4 $\angle$ 1000′). SS = Chloritic and serpentine rocks. Evergreen tropical forests—s.—
	Moringeæ.	
336	Moringa pterygosperma, *Gærtn.* Fl. Sylv. Madr. t. 80. ဒန့်သလွန် Dán thá lun.	E. $\frac{30-40}{10-20+3-4}$ (A Pr^3 — T $\angle$ 1000′). SS = ∞. Cultivated only. Wood white and soft. Exudes yellow resin. Seeds yield the oil of ben.
	Connaraceæ.	
337	Ellipanthus calophyllus, *Kurz.*	E. little tree (An^3 — 0′). SS = Chloritic rocks. Evergreen tropical forests.—s.—
338	Ellipanthus tomentosus, *Kurz.*	E. little tree (P — T).

Current No.	Names.	Remarks.
	LEGUMINOSÆ. I.—*Papilionaceæ.*	
339	Millettia pulchra (*Mundulea* —, *Bth.*) သစ်ပဂံပင် Th*i*t pá g*á*n p*i*n.	L, tree (A.)
340	Millettia Brandisiana, *Kurz.* သစ်ပဂံ Th*i*t pá gán.	$L^h \frac{40 - 60}{15 - 30 + 4 - 6}$ (Pr^1 P^4 — 2000′). SS = Si S. Upper mixed forests.—l.— Wood white, soft, considered valueless.
341	Millettia leucantha, *Kurz.* သင်းဝင် Th*i*n w*i*n.	$L^h \frac{50 - 60}{15 - 25 + 5 - 6}$ Pr^4 — Pi^2 ∠ 2000′). SS = *Ca S.*, Si S., Lat., Dil. Dry and open forests, rare in upper mixed forests. —l.— Heart-wood black, tough, but rather small, used for cross pieces of harrows, &c.
342	Millettia ovalifolia (*Pongamia*—*WA.*)	$L^h \frac{40 - 50}{10 - 15 + 4 - 5}$ (Pr^3 — 1000′). SS = Ca S. Dry forests, entering savannah forests.—l.—
343	Millettia glaucescens *Kurz.* တောင်ကဇော Toung ká zo.	$L^h \frac{60 - 70}{20 - 40 + 6 - 8}$ (Ps^4 — M^3 ∠ 1000′). SS = *Si S.*, Metam. Evergreen tropical forests, entering moister upper mixed forests.—s.— Wood yellowish, turning light-brown, coarse fibrous but brittle and rather hard.
344	Millettia pubinervis, *Kurz.*	$L^h \frac{20 - 25}{10 - 12 + 1 - 2}$ (M^2 — 500′). SS = Metam. Upper mixed forests.—l.— Wood white, coarse fibrous, rather light, perishable.
345	Millettia tetraptera, *Kurz*	$L^h \frac{40 - 50}{15 - 20 + 5 - 6}$ (A — Pr^3 ∠ 1000′). SS = *Ca S.* Dry forests.—l.—

Current No.	Names.	Remarks.
346	Millettia atropurpurea, *Bth.* ကွေတရင် Kw*e* t*á* y*i*n. ကွဲ့ုတညင်းတညင်းနီ K*í u e* t*á* n*i i*n or T*á* n*i i*n n*i*.	E. $\frac{50 - 60}{15 - 30 + 5 - 6}$ (Ps^{3} M^{3} — T — 1000′). SS = *Metam.*, Si S., *Lat. p.* Evergreen tropical forests.—s.— Wood pale-coloured turning brownish, rather heavy, coarse fibrous and rather loose-grained, soon attacked by xylophages.
347	Sesbania grandiflora, *Pers.* ပေါက်ပန် P*o*uk p*á*n. ပေါက်ဖြူ P*o*uk pi *u*.	E. $\frac{15 - 25}{8 - 9 + 1 - 2}$ (A— T — 1000′). SS = ∞. Cult. only.
348	Sesbania Aegyptiaca, *Pers.* ရေသကြီး Y*e* th *i* k*í*.	E. $\frac{20 - 25}{8 - 10 + \frac{2}{3} - 2\frac{1}{2}}$ (A^{3} — T An — 1000′). SS = ∞. Cult. only. Wood white, soft, light, fibrous but rather close-grained. Said to furnish the best charcoal for gun-powder. Good for children's toys, &c.
349	Erythrina Indica, *Lamk.* (Penlay ka thit.) S. K. In Prome: Eng-kathit.	L^{h} $\frac{50 - 60}{10 - 15 + 5 - 9}$ (C Ar^{4} — T An^{4} — 500′). SS = *Aren.*, Ca S? Beach-jungles; strange enough re-appearing in Prome district, in the dry forests!—l.— Wood soft and white, loose-grained, very light, soon attacked by xylophages. It is the *múchí* wood of Madras, employed for children's toys, boxes, &c.
350	Erythrina stricta, *Roxb.* Fl. Sylv. Madr. t. 175. တောင်ကသစ် T*o*ung k*á* th*á*k. (Toung kathit) S. K.	L^{h} $\frac{40 - 60}{15 - 25 + 4 - 5}$ (Pr^{3} P^{4}—M^{3}—2000′.) SS = *Si S.*, Metam. Upper mixed forests.—l.— Wood white and soft.
351	Erythrina suberosa, *Roxb.*	L^{h} $\frac{40 - 50}{20 - 30 + 3 - 6}$ (P^{3} — 2000′). SS = Si S. Upper mixed forests.—l.—

Current No.	Names.	Remarks.
352	Erythrina ovalifolia, *Roxb.* ကုန်းကသစ် Koug ká thit. (Kong ka thit) S. K.	$L^{c?}\ \frac{40 - 50}{15 - 20 + 3 - 4}$ (C Ar^3 P^4 — 0′; also Tongu Distr. cult. ?). SS = All. *Sal.* Aren. Tidal forests and tidal savannah forests; beach jungles.—l.— Wood white, light, very coarse and fibrous.
353	Erythrina holosericea *Kurz.*	L^h tree (Pi.)
354	Erythrina lithosperma, *Miq.* ရေကသစ် Ye ká thit.	$L^c\ \frac{50 - 60}{20 - 30 + 4 - 6}$ (P^4 — M^3 — 1000′). SS = Metam. *Si S.* Hill savannah-forests, and upper mixed forests along choungs—s × l.— Wood yellowish, soft.
355	Butea frondosa, *Roxb.* Fl. Sylv. Madr. t. 176. ပေါက်ပင် Pouk pin.	$L^h\ \frac{30 - 50}{6 - 10 + 6 - 8}$ (A Pr^4 P^5 — T — 1000′). SS = ∞. *All.* Leaf-shedding forests, chiefly savannah-forests.—l.— Wood white, rather light and rather strong. Little used besides for common house-building purposes. Yields a red brittle and clear resin, a sort of gum kino of commerce.
356	Dalbergia latifolia, *Roxb.*	$L^{h?}\ \frac{40 - 50}{20 - 25 + 3 - 6}$ (An.) Wood greenish or greyish black, often mottled or lighter veined, close-grained, takes a fine polish. Used in India extensively for cabinet work, knees of vessels, agricultural implements, combs, &c., also in gun-carriage manufactories.
357	Dalbergia cultrata, *Grah.* ရင်းတိုက် Yin taik. ရင်းတိုက် Yin daik.	$L^h\ \frac{25 - 70}{10 - 40 + 2 - 9}$ (A Pr^4 P^4 — T ∠ 1000′). SS = ∞ *Si S.* Leaf-shedding forests, especially upper mixed, savannah-and eng-forests.—l.— Sapwood pale-coloured turning pale-brown, perishable; heart-wood extremely durable, blackish and ebony like, sometimes white and red-streaked, close-grained, rather heavy, elastic but cracky. □′ = 64 pd. Used for ploughs, bows, handles of dahs and spears. Exudes a red resin.

Current No.	Names.	Remarks.
358	Dalbergia ovata, *Grah.* မဒမ *Má dá má.*	$L^h \frac{25 - 35}{10 - 15 + 2 - 3}$ ($P^3 M^2$ — T ∠ 1500′). SS = *Si S.*, Metam. Upper mixed forests.—s + l.
359	Dalbergia glauca, *Wall.* မဒမ *Má dá má*	$L^h \frac{30 - 40}{10 - 15 + 3 - 4}$ ($P^3 M^2$ — T ∠ 1000′). SS = *Si S.*, Metam. Upper mixed forests.—s + l.—
360	Dalbergia paniculata, *Roxb.* သစ်ဝါး Th*i*t w*á*. တပေါက်ပင် T*á* pou*k* p*i*n.	$L^h \frac{60 - 80}{30 - 50 + 8 - 9}$ (A—$Pr^3 Pi^2$—1000′). SS = *Ca S.*; Si S. Dry forests; very rare in upper mixed forests.—l.— Wood white turning pale-yellowish, strong, compact. Good for common house-building.
361	Dalbergia nigrescens, *Kurz.* သစ်နံ့နွင်း Th*i*t s*á* n*u* *i*n.	$L^h \frac{40 - 50}{10 - 25 + 4 - 6}$ (A — Pr^3 — 1000′). SS = Ca S. Dry forests.—l.—
362	Dalbergia purpurea, *Wall.* သစ်ပုတ် S*i*t pot. (Thit. po) S. K.	$L^h \frac{40 - 60}{15 - 20 + 5 - 6}$ ($P^4 M^3$ — T ∠ 3500′). SS = ∞. *Si S.* Leaf-shedding forests, especially mixed ones.—l.— Sap-wood light, not much used, heart-wood black and ebony-like.
363	Dalbergia cana, *Grah.*	$L^h \frac{40 - 60}{15 - 30 + 3 - 6}$ ($P^3 M^4$ — T — 2000′). SS = Si S., Metam. Evergreen tropical forests.—s.— Wood white turning brownish, rather heavy, of a very coarse fibre, soon attacked by xylophages.
364	Dalbergia glomeriflora, *Kurz.*	$L^h \frac{30 - 40}{10 - 20 + 4 - 5}$ (Pr^2 1000-2000′). SS = Ca S. Upper mixed forests.—l.—

Current No.	Names.	Remarks.
365	Drepanocarpus ? reniformis (*Dalbergia*—*Roxb.*) ထောက်မ To*u*k m*á*.	$L^h \frac{30-40}{8-15+3-4}$ $(P^4 M^4 - T - 500')$. SS = *All.* Metam. Swamp-forests.—s.— Wood white, turning yellow, coarsely fibrous, light, very perishable.
366	Pterocarpus Indicus, *Willd.* Fl. Sylv. Madr. t. 23. ပတောက် P*á* to*u*k.	$L^h \frac{50-80}{20-50+5-9}$ $(Ps^2 M^4 - T An^4 - 1000')$. SS = *Metam.;* Lat. p. Upper mixed forests.—s ?— Wood light-brown with lighter coloured heart-wood, coarse fibrous but close-grained, narrowly streaked, heavy. Excellent for the solid Burmese cart-wheels. Yields gum-kino.
367	Pterocarpus macrocarpus, *Kurz.* ပတောက် P*á* to*u*k.	$L^h \frac{30-50}{10-25+5-6}$ $(Pr^2 M^4 - T \angle 1000')$. SS = Ca S., Lat., *Metam.* Upper mixed and eng, very rare in dry forests.—l— Sap-wood pale-brown, streaked, rather light, close-grained. Yields a red-resin, a sort of gum-kino.
368	Derris robusta, *Bth.*	$L^h \frac{30-50}{15-20+4-5}$ $(P^3 - 1000')$. SS = All.; *Si S.* Upper and lower mixed forests.—s + l.— Wood red-brown, hard and close-grained, of a short coarse fibre, soon attacked by xylophages.
369	Pongamia mitis (*Robinia*—, *L.*) Fl. Sylv. Madr. t. 177. သင်းဝင်း Th*i*n w*i*n.	$L^h \frac{40-50}{10-15+3-6}$ $(C\ Ar^4 - T\ An^4 - 0')$. SS = All. Sal. Tidal and beach forests. —l.— Wood white, turning yellowish, light, coarse fibrous.
370	Sophora tomentosa, *L.*)	E. $\frac{15-20}{6-10+1-1\frac{1}{2}}$ $(P - An^2 - 1000')$. SS = Si S. Evergreen tropical forests. —s.—
371	Arillaria robusta (*Sophora*—, *Roxb.*) ကျွဲတညင်း Ki*n* *e* t*á* ni *i*n. (Kwé tanyin) S. K.	E. $\frac{40-50}{15-25+4-5}$ $(Ps^3 - T - 0')$. SS = Lat. p. Evergreen tropical forests. —s.—

Current No.	Names.	Remarks.
	II.—*Cæsalpinieæ.*	
372	Peltophorum ferrugineum, *Bth.*	E. $\frac{50-60}{20-30+4-6}$ (An[s] — 0′). Coast forests. Wood blackish, the sap-wood whitish, coarse fibrous, light.
373	Cæsalpinia sappan, *L.* Fl. Sylv. Madr. Anal. t. 13. f. 1. တိန်းညက်။ teing-nyet.	L ? $\frac{25-30}{8+2}$ (? Pr[s]) P[1] — T[4] — 0′). SS = ? A red dye-wood and an important article of commerce.
374	Poinciana regia, *Boj.*	E. $\frac{30-40}{8-15+3-5}$ (A — T). Cult. only. Wood white, light, soft and loose-grained, takes a fine polish. Exudes plenty gum.
375	Parkinsonia aculeata, *L.* Fl. Sylv. Madr. Anal. t. 13. f. 2.	E. $\frac{25-30}{8-15+3-4}$ (A — Pr — 1000′). SS = Ca S. Cult. only.
376	Cassia Fistula, *L.* ငုကြီး Gn*u* k*i*	L[h] $\frac{30-50}{10-25+3-6}$ (A Pr[3] P[4] — T ∠ 500′). SS = ∞. *All. Si S.* Leaf-shedding forests, chiefly savannah and lower mixed forests.—l.— Wood pale reddish-brown, the heart-wood dark-brown, rather heavy, coarse fibrous but rather close-grained, strong, elastic, but soon attacked by xylophages if not seasoned. □′ = 57. pd. Used for bows, axles of carts, plough shares, rice-pounders, &c. Bark good for tanning.
377	Cassia nodosa, *Ham.* ငုသိမ် Gn*u* the*in*.	E. large tree (C M — T — 0′). Evergreen tropical forests.—s.—
378	Cassia renigera, *Wall.* ငုရှေ Gn*u* sh*u* *e*.	L[h] $\frac{30-40}{8-15+3-5}$ (A Pr[s] — 1000′). SS = Ca S. Dry forests.—l.—

Current No.	Names.	Remarks.
379	Cassia Siamea, *Lamk.* Fl. Sylv. Madr. t. 179. မဲဇလီ Me *zá* lí.	E and $L^h \frac{50 - 60}{10 - 35 + 3 - 6}$ (C A Pr^2 P^3 — T — 1000′). SS = ∞. *Si S.* Mixed forests, rare in dry forests.—l.— Sap-wood broad, white, coarse fibrous, light; heart-wood ebony-like and almost black, often streaked, heavy and very close-grained, durable, takes fine polish. □′ = 58 pd. Used for helves, walking sticks, mallets, &c.
380	Cassia Timorensis, *DC.* တောင်မဲဇလီ T*oung* me *sá* lí.	E. $\frac{12 - 18}{6 - 10 + \frac{2}{3} - 1}$ (A Pr^2 P^3 — T ∠ 1000′). SS = ∞. *Si S.* Mixed and dry forest.—s × l.—
381	Bauhinia purpurea, *L.* မဟာလေကားနီ M*á* h*á* le k*á* n*í*.	E ? $\frac{25 - 30}{8 - 10 + 2 - 3}$ (A P cult.)
382	Bauhinia variegata, *L.* ဘွဲ့ချင် B*u e* ch*in*. ပလံပင် P*á* l*án* pin.	$L^h \frac{25 - 30}{6 - 15 + 2 - 4}$ (A Pr^4 M ∠ 3200′). SS = Ca S. Dry forests.—l.—
383	Bauhinia elongata, *Korth.*	E. $\frac{24}{?}$ (P^1 T). Evergreen tropical forests. —s.—
384	Bauhinia Malabarica, *Roxb.* ဘွဲ့ဇင် B*u e* z*in*. ဘွယ်ချင် B*o e* ch*in*.	E ? $\frac{30 - 40}{12 - 20 + 5 - 6}$ (P^3 — 1500′). SS = *Si S.*, All. Upper and lower mixed forests, rarely entering savannah forests. —l.— Wood used for the cross-pieces of harrows, house-posts, &c.

Current No.	Names.	Remarks.
385	Bauhinia racemosa, *Lamk.* Fl. Sylv. Madr. t. 182. ပလံ Pá lán. ချည်ပြိတ် Chin pi it.	$L^h \frac{25 - 30}{8 - 15 + 3 - 4}$ (A ? — Pr^4 — 1000′). SS = Ca S., All. Dry forests, entering savannah forests.—l.— Wood dark-brown, mottled, rather light, fibrous but rather close-grained, the heart-wood very hard, takes fine polish. □′ = 44 pd. Bark used for slow matches by matchlock men in India, ropes can also be made from it.
386	Amherstia nobilis, *Wall.* သော်ကာ	E. $\frac{30 - 40}{?}$ (T).—s.—
387	Afzelia bijuga, *A. Gray.*	E. $\frac{40 - 60}{15 - 20 + 3 - 5}$ (An^3 — 0′). SS = ? Beach jungles and coast forests.—l.—
388	Afzelia retusa, *Kurz.*	E. $\frac{15 - 20}{?}$ (An^3 — 0′). SS = Sal ? Tidal jungles—l.—
389	Tamarindus Indica, *L.* Fl. Sylv. Madr. t. 184. မန်ကျည်းပင် Má jí pin. မန်ကျည်းပင် Mán kí pin. (Ma gyi) S. K.	L^h & E. $\frac{50 - 60}{8 - 20 + 6 - 12}$ (A^3 — T. An. — 1000′). SS = ∞ *Si S.* Cult. only. Sap-wood yellowish white, not heavy, rather fibrous and loose-grained, perishable, the heart-wood of old trees only small, very hard, dark coloured and resembling ebony, sometimes beautifully dark reddish veined. Good for oil-mills, mallets, rice-pounders, also for furniture and in house-building, but difficult to work on account of its hardness. There seem varieties of tamarinds, the one with red-brown to other with whitish timber, but I could not make out this when in Burma. Yields a white resin in small quantities.
390	Saraca Indica, *L.* Fl. Sylv. Madr. t. 57 ? (pods segnle.) သော်ကပိုး Tho ká po.	E. $\frac{25 - 30}{8 - 12 + 2 - 3}$ (Ar^3 T — 1000′). SS = Si S. Evergreen tropical forests. —s.—

Current No.	Names.	Remarks.
391	Cynometra ramiflora, *L.* Fl. Sylv. Madr. t. 315. မြင်ကပင် *Mi in ká pin.*	E. $\frac{15 - 25}{4 - 10 + 1 - 2}$ (Ar^3 — T An^3 — 0′). SS = Sal. Tidal jungles.—l.—
392	Cynometra cauliflora, *L.*	E. $\frac{15 - 20}{?}$ (Burmah). Cult. only.
	III.—*Mimoseæ.*	
393	Acrocarpus combretiflorus, *Wight.* မရားနှင်း *Má yá nin.*	L^c $\frac{80 - 100}{60 - 70 + 6 - 8}$ (P^4 ∠ 1000′). SS = Si S. Evergreen tropical forests.—s : l.— Wood white, soft.
394	Parkia leiophylla, *Kurz.* သက်မကြီ *Thak má ki.*	L^h $\frac{80 - 120}{50 - 80 + 6 - 9}$ (P^3 ∠ 1000′). SS = Si S. Evergreen tropical forests, rare in moister upper mixed forests.—s : l.— Sap-wood white, soft.
395	Parkia insignis, *Kurz.* (Myouk-tanyet) S. K.	L^h $\frac{80 - 100}{40 - 60 + 6 - 8}$ (M^3 ∠ 1000′). SS = Metam. Evergreen tropical forests. —s : l.— Wood yellowish, turning pale-brown, rather heavy, of a somewhat unequal coarse fibre, soon attacked by xylophages. Exudes a red resin.
396	Adenanthera pavonina, *L.* Fl. Sylv. Madr. t. 46. ရွေးကြီး *Yu e ki.*	L^c $\frac{60 - 70}{30 - 40 + 4 - 6}$ (P^3 M^3 — T An^3 — 1000′). SS = Metam., Si S. Evergreen tropical and moister upper mixed forests. —s.— Wood rather heavy, coarse fibrous, light-brown or yellowish greyish, turning brown at exposure, hard and close-grained, soon attacked by xylophages; the heart-wood dark-brown, solid, hard and durable. Suitable for cabinet-work. Wood yields a red dye. The scarlet seeds used by jewellers as weights, also for ornaments, &c.

Current No.	Names.	Remarks.
397	Xylia dolabriformis, *Bth.* Fl. Sylv. Madr. t. 186. ပြင်းကတိုး P*i in* k*á* t*o*.	$L^h \frac{90 - 100}{50 - 60 + 9 - 12}$ (A Pr^4 Ar^5 P^4 — T ∠ 3000′). SS = ∞. *Si S.* All leaf-shedding forests, chiefly in upper mixed forests.—l.— Wood brown to dark-brown, heavy, fibrous but close-grained, very hard, strong and durable, but not easy to work. □′ = 60 — 66 pd. "The iron wood of Pegu." The sap-wood soon attacked by white ants, but the heart-wood said to be as durable as teak. Recommended for spars, crooks of ships, railway sleepers, handles of chisels, gauges. Used for ploughs, house-posts, bridge-posts, boat anchors, in the construction of carts and for other purposes. Exudes a red resin.
398	Acacia Farnesiana, *Willd.* Fl. Sylv. Madr. t. 52. နန်းလုံးကြိုင် N*á*n long k*i aing*.	E. $\frac{20 - 25}{8 - 10 + 1 - 1\frac{1}{2}}$ (A^3 Pr^3 P^2 — T — 1000′). SS = ∞. *Ca S.* Cult. only. Wood very hard and tough, much used in India for ship-knees, tent-pegs and similar purposes. A delicious perfume is distilled from the flowers. Exudes a considerable quantity of a sort of white gum-arabic.
399	Acacia leucophlœa, *Willd.* Fl. Sylv. Madr. t. 48. ထနောင်း *Tá* n*o*u*ng*.	L ? $\frac{50 - 60}{8 - 25 + 4 - 6}$ (A — Pr^3 — 1000·). SS = Ca S. Dry forests.—l.—
400	Acacia Suma (*Mimosa-Roxb.*) A. Catechu Bth., and Bedd. Fl. Sylv. Madr. t. 49 ?, not Willd.	E ? $\frac{30 - 40}{12 - 20 + 3 - 4}$ (A).
401	Acacia Catechu, *Willd.* (*not Bth.*) A. Sundra, Roxb. ; Fl. Sylv. Madr. t. 50. ရှားပင် Sh*á* p*i*n. The brown wooded one (A. Sundra ?) : လျှော်နီ Hl*ío* n*í*. (Sha-ni) S. K. The white wooded one : လျှော်ဝါ Hl*ío* w*á*. (Sha-wa) S. K.	$L^h \frac{50 - 60}{15 - 25 + 4 - 6}$ (A Pr^5 — P^3 ∠1000′). SS = *Ca S.*, All. Dry forests and rare in lower mixed and savannah forests. —l.— Sap-wood yellowish white, varying in bulk according to age from 3 and more inches to 1 inch thickness, rather heavy, fibrous but close-grained; the heart-wood similar, but dark-brown very strong and durable; takes a fine polish. □′= 56 — 70. Employed for posts and uprights of houses, for spear and sword-handles, bows, &c. There are several varieties according to Dr. Brandis differing in shade, specific weight and yield of cutch. The wood is considered more durable than teak, and is not attacked by xylophages. Recommended for railway sleepers. Kutch or catechu (terra japonica of commerce) is extracted from the wood in large quantities. Exudes a blackish resin.

Current No.	Names.	Remarks.
402	Albizzia myriophylla. *Bth.*	E. small tree (T.) Evergreen tropical forests?
403	Albizzia stipulata, *Boiv.* Fl. Sylv. Madr. t 55. ပိုးမဲသာ P*o*ug m*e*. (Búng may sa) S. K.	L^c & E. $\frac{100 - 120}{60 - 80 + 8 - 12}$ (C A P^4 M^4 — T ∠ 4000′). SS = Metam.; *Si S.*, &c. Evergreen tropical and hill-forests.—s : l.— Sap-wood broad, white, light, coarse-grained and fibrous; heart-wood dark-brown and heavy, takes fine polish. Good for cabinet work, furniture and similar purposes.
404	Albizzia odoratissima, *Bth.* Fl. Sylv. Madr. t. 54. သစ်မကြီး Th*i*t m*á* k*í*.	L^h $\frac{80 - 100}{50 - 60 + 5 - 8}$ (Pr^3 P^3 — T ∠ 2000′). SS = ∞. *Si S.* Mixed and dry forests. —s × l.— Heart-wood dark-coloured turning almost black with age, strong and heavy, rather loose-grained, takes good polish; sap-wood white, perishable.
405	Albizzia lebekkoides, *Bth.* ? ? or new sp. ? တစ်မဧေလျှး Th*i*t m*á* k*i* *e*.	E ? $\frac{80 - 100}{50 - 70 + 7 - 3}$ (Ps^2 — 1000′). SS = Si S. Evergreen tropical forests.—s.—
406	Albizzia Lebbek, *Bth.* ကုပ်ကို Kok k*o*.	E ? $\frac{60 - 70}{30 - 40 + 6 - 7}$ (Pr^2 P^3 — T An^3 ∠ 2000′). SS = ∞. *Si S.* Evergreen tropical and moister upper mixed forests; also dry forests.—s × l.— Sap-wood white, coarse fibrous; heart-wood blackish-brown, close-grained, rather heavy, coarse fibrous but compact, takes fine polish. Good for furniture, &c. Yields a pellucid yellowish resin.
407	Albizzia procera, *Bth.* A. Lebbek, Beddome (hardly of Bth.) Fl. Sylv. Madr. t. 53. (excl. pod ?). သစ်ပင် Th*i*t p*i*n.	L^h $\frac{80 - 90}{40 - 60 + 7 - 8}$ (P^3 M^3 — T ∠ 1000′). SS = Metam., *Si S.*, All., Sal. ?, Ca S. Mixed and dry forests, entering also beach and tidal forests—l.— Sap-wood white or brownish, rather light, coarsely fibrous but tolerably close-grained; heart-wood brown to blackish-brown, rather heavy, close-grained, streaked, hard, strong and durable, takes fine polish. Good for house-building, cabinet work, &c.

Current No.	Names.	Remarks.
408	Albizzia lucida, *Bth.* သံသတ်ပင် Th*á*n th*a*t p*i*n.	$L^h \frac{50-60}{25-30+5-6}$ (A Pr^4 — P^2 ∠ 1000′). SS = Si S., Lat., *Ca S.* Dry forests, also mixed forests.—s × l.— Sap-wood white, coarse fibrous; heart-wood brown, compact.
409	Albizzia Jiringa, (*Mimosa—Roxb. et Jack*). တညင်းပင် D*á* n*i* *i*n p*i*n.	E. $\frac{40-50}{15-25+3-4}$ ($P^3 M^2$ — T ∠ 1000′). SS = Metam.; *Si S.* Evergreen tropical forests, and along choungs in moister forests.—s.— Wood coarsely fibrous but close-grained, rather heavy, the sap-wood small, white, heart-wood brown. Sap-wood soon attacked by xylophages. Exudes a blackish resin.
410	Albizzia heterophylla (*Mimosa—Roxb.*)	E. $\frac{25-30}{8-15+1\frac{1}{2}-2}$ (M^3 — T 4000-6000′). SS = Metam. Drier hill and pine-forests.—l.—
411	Albizzia dulcis, *F. v. Muell.* (*Pithecolobium—Bth.*, Fl. Sylv. Madr. t. 188). ကျွဲတညင်း K*iú* *e* *ta* n*i* *i*n.	E. $\frac{50-60}{25-30+4-5}$ (P). Cult. only. Wood reddish-brown, streaked and mottled rather light, coarsely fibrous but close-grained, hard and brittle, takes fine polish. Good for carts, packing boxes, &c.
	ROSACEÆ.	
412	Prunus Javanica, *Miq.* တောက်ရပ်ပင် T*o*uk *yá*p p*i*n.	E. $\frac{50-60}{20-30+6-7}$ (T An^2 — 1000′). SS = Si S. Evergreen tropical forests. —s.—
413	Pygeum arboreum, *Endl.*	Tree (M — T.)
414	Pygeum acuminatum, *Colebr.*	Tree $\frac{2}{?+5-6}$ (C M ?). Wood red, adapted for cabinet working.
415	Pygeum persimile, *Kurz.*	Tree (T.)
416	Parinarium Sumatranum, *Bth.*	Middling sized tree (T.)
417	Pirus Pashia, *Don.*	$L^{e?} \frac{25}{?}$ (A.)

Current No.	Names.	Remarks.
418	Pirus granulosa, *Bert.*	L^c ? $\frac{24-30}{6-12+2-3}$ (M. 7200′). SS = Metam. Drier hill-forests.—l.—
419	Eriobotrya Notoniana, (*Photinia—W. A.*)	E. $\frac{30-40}{?}$ (M^3 7000-7200′). SS = Metam. Drier hill-forests.—s.—
420	Eriobotrya macrocarpa, *Kurz.*	E. $\frac{30-40}{10-15+2-3}$ (P^1 2000-3000′). SS = SiS? Evergreen tropical forests.—s.—
421	Eriobotrya Bengalensis, (*Mespilus—Roxb.*)	E. $\frac{60-70}{?+4-5}$ (C. A. M^3 ∠ 6000-7000′). SS = Metam. Hill-forests.—s.— Wood pale-brown.
	HAMAMELIDEÆ.	
422	Bucklandia populnea, *R. Br.*	E. $\frac{60-80}{18-40+5-6}$ (M^3 4000-7200′). SS = Metam. Damp and drier hill-forests. —s.— Wood red-brown, rather heavy, fibrous but close-grained, rather hard, seems to become soon attacked by xylophages.
423	Altingia excelsa, *Noronh.* နံ့သာရုပ် Nán tá yop. (Nán tá yok) S. K.	L. $\frac{150-180}{80-100+15-20}$ (T.). Evergreen tropical forests.—s : l.— Wood brown, very hard, close-grained, oily and of a somewhat balsamic odour. Yields a kind of storax (Kandei *Sund.*) This is, to speak with Dr. Junghuhn, "the prince of the Javanese forests" and there one of the most valuable timber trees. Dr. Mason states that a considerable stream in the province Mergui derives its name from this tree, in consequence of its growing so thickly on its banks.
	RHIZOPHOREÆ.	
424	Rhizophora mucronata, *Lamk.* Fl. Sylv. Madr. Anal. t. 13, f. 4. ပြု P*i u.*	E. $\frac{15-25}{?+1-1\frac{1}{2}}$ (Ar^3 — T — 0′). SS = Sal. Littoral forests.—l.— Wood greyish, close-grained, rather heavy. Bark good for tanning.

Current No.	Names.	Remarks.
425	Rhizophora conjugata, *L.* ပြု P*i u*.	E. $\frac{15-25}{6-10+1-1\frac{1}{2}}$ (Ar[s] — T An[s] — 0). SS = Sal. Littoral, chiefly mangrove, forests.—l.—
426	Bruguiera gymnorhiza, *Lamk.* ပြု P*i u*.	E. $\frac{60-80}{30-40+5-8}$ (C Ar[s] — T An[s]—0). SS = Sal. Littoral forests.—l.— Wood reddish-brown, the sap-wood lighter coloured, close-grained, coarse fibrous, very heavy, hard, strong and durable. Bark good for tanning.
427	Carallia integerrima, *DC.* Fl. Sylv. Madr. t. 193. မနိသြော်က M*á* n*i o* k*á*.	E. $\frac{50-80}{25-50+4-10}$ (P[s] — M[s] ∠ 4000′). SS = Metam:, *Si S.*, Lat. p. Evergreen tropical and moister upper mixed forests. —s × l.— Wood red-brown, variegated, heavy and close-grained. □′ = 60 pd. Used for rice-pounders, planks, &c., good for furniture.
428	Carallia laneeæfolia, *Roxb.* မနိအောက M*á* n*í o* k*á*.	E. (T.)
	Combretaceæ.	
429	Terminalia Catappa, *L.* Fl. Sylv. Madr. t. 18.	L[h] $\frac{60-70}{30-35+6-8}$ (An[s] — 0). SS = Si S. Coast forests.—s × l.— Wood brown, waved, rather heavy, rather close-grained, takes a fine polish.
430	Terminalia chebula, *Retz.* Fl. Sylv. Madr. t. 27.	L[h] $\frac{60-70}{?+8-10}$ (C.) Sap-wood greyish, streaked, tolerably close-grained, the heart-wood hard, yellowish or dark-brown to blackish, heavy, takes fine polish. Good for furniture. Nuts used with iron-clay for a good sort of ink, they also give with alum a durable yellow dye.

Current No.	Names.	Remarks.
431	Terminalia tomentella, *Kurz.* ဖန်းခါး *Pán ká.*	$L^h \frac{80 - 100}{50 - 80 + 9 - 12}$ (P^4 — T — 2000′). SS = Metam., *Si S.*, Arg. Upper mixed and low forests.—l. Wood pale-brown, rather heavy, close-grained, the heart-wood yellowish-brown. Used for yokes and canoes. Fruit mixed with iron-clay gives ink of an inferior kind.
432	Terminalia Belerica, *Roxb.* Fl. Sylv. Madr. t. 19. သစ်ဆိမ့် Th*i*t *sein.*	$L^h \frac{70 - 80}{30 - 40 + 6 - 8}$ (A Pr^2 P^3 — T ∠ 2000′). SS = Metam., *Si S.* Upper and lower mixed forests.—l.— Wood white, rather soft, tolerably durable. □′ = 40 pd. Good for packing boxes. Exudes gum.
433	Terminalia citrina, *Roxb.*	$L^h \frac{60 - 80}{? + 5 - 8}$ (T.)
434	Terminalia bialata, *Wall.* လိန်ပင် L*e*i*ng* p*i*n.	$L^h \frac{80 - 100}{40 - 60 + 6 - 10}$ (An^3 — 1000′). SS = Si S. Upper mixed forests.—l.—
435	Terminalia pyrifolia, (*Pentaptera—Presl.*) လိန်ပင် L*ei*n p*i*n.	$L^h \frac{60 - 80}{30 - 50 + 5 - 8}$ (P^3 — T ∠ 1000′). SS = Metam., *Si S.* Mixed forests.—l.— Wood not used. □′ = 39 pd.
436	Terminalia alata, *Roth.* ထောက်ကျန်ရွက်ကြီး To*u*k k*i* *á*n *á* y*u* *a*k k*i*.	$L^h \frac{40 - 60}{10 - 25 + 3 - 6}$ (P^4 — M^3 — 0′). SS = Lat., *Arg.*, *All.* Lower mixed and open forests.—l.— Wood very heavy, the sap-wood pale-brown, the heart-wood dark-brown, fibrous but close-grained, takes very fine polish.
437	Terminalia crenulata, *Roth.* ထောက်ကျန်အရွက်သေး To*u*k k*i* *á*n *á* y*u* *a*k th*e*.	$L^h \frac{60 - 100}{30 - 70 + 6 - 12}$ (C Ar^3 Pr^3 P^4 — T ∠ 2000′). SS = ∞. *Si S.* All leaf-shedding forests.—l.— Heart-wood dark-brown. □′ = 58 pd. Used for house-posts and planking.

Current No.	Names.	Remarks.
438	Combretum apetalum, *Wall.* နဘူနွယ် *Ná pu nu e.*	$L^h \frac{15 - 25}{? + 1 - 1\frac{1}{2}}$ (A — Pr^4 — 1000′). SS = Ca S. Dry forests.—l.—
439	Anogeissus acuminata, *Wall.* ရုံးပင် Y*o*ug p*i*n.	$L^{h?} \frac{80 - 100}{40 - 80 + 9 - 12}$ (A Pr^3 P^4 — T ∠ 3000′). SS = ∞, *Si S.* Leaf-shedding forests.—l.— Wood uniformly brown, the heart-wood red-brown, heavy, close-grained, hard, strong and durable, takes fine polish. $W = \frac{\square' = 50 - 57}{262}$ pd. Good for building purposes and in-door work; exposed to water it soon decays.
440	Lumnitzera racemosa, *Willd.* ရင်းရဲ Y*i*n *ye.*	E. $\frac{20 - 40}{? + 2 - 4}$ (Ar^3 An^3 — 0′). SS = Sal. Littoral forests.—l.— Wood strong and durable, useful for posts and other purposes in house-building.
441	Lumnitzera littorea, *Voigt.*	E. $\frac{20 - 40}{? + 2 - 4}$ (T). SS = Sal. Littoral forests.—l.—
442	Gyrocarpus Jacquini. *Roxb.* Fl. Sylv. Madr. t. 190. P*i*n-l*e*-th*i*t-k*o*uk.	$L^h \frac{60 - 80}{40 - 50 + 4 - 8}$ (T An^3 — 1000′). SS = *Si S.* and chloritic rocks. Upper mixed forests.—l.— Wood white, very light and soft. Good for children's toys, boxes, &c.
	MYRTACEÆ.	
443	Melaleuca Leucadendron, *L.*	E. $\frac{20 - 25}{10 - 15 + 2 - 3}$ (T.). SS = *Lat.* Wood brown, heavy, close-grained, takes a beautiful polish. The leaves and young parts yield the well-known oil of cajapiti.
444	Tristania Burmanica, *Griff.* တောင်ရိုးပြည့်ဇင် T*o*ung *yo* p*i* z*i*n.	E. $\frac{30 - 40}{15 - 20 + 1\frac{1}{2} - 3}$ (P^3 M^3 — T ∠ 2500′). SS = *Lat.*, Metam. Open forests, especially Eng and hill Eng forests.—l.—

Current No.	Names.	Remarks.
445	Psidium guava, *L.* မာလကာပင် Má lá ká pin.	E. $\frac{20-30}{?+2-3}$ (A Pr^3 — T ∠ 1000′). SS = ∞. Cult.
446	Nelitris paniculata, *Ldl.*	E. $\frac{20-25}{10-15+\frac{1}{2}-1}$ (M^4 — T 3000-4000′). SS = Metam. Damp and drier hill-forests.—l.—
447	Eugenia* aquea, *Burm. Fl. Ind.* 114; *Roxb. Fl. Ind. II.* 492; *Wight Ic. t.* 550. (*Jambosa aquea, DC.; Wight Ic. t.* 216).	E. $\frac{20-30}{10-12+2-3}$ (C P M — T). Apparently only cultivated.
448	Eugenia Javanica, *Lamk. Encycl. III.* 200. (*E. alba, Roxb. Fl. Ind. II.* 493; *Wight Ic. t.* 548; *E. Roxburghiana, Wall. Cat.* 3608).	E. $\frac{25-30}{10-12+3-4}$ (An^3 — 0′). SS = Aren., Si S. Coast-forests.—s.—
449	Eugenia polypetala, *Wall. Cat.* 3616; *Wight Ic. t.* 610.—(*E. angustifolia, Roxb. Fl. Ind. II.* 490, *non Lamk.*).	E. $\frac{20-30}{4-6+3-4}$ (C.). Wood pale-brown, close-grained, heavy.
450	Eugenia Jambos, *L. sp. pl.* 672; *Roxb. Fl. Ind. II.* 494. (*Jambosa vulgaris, DC., Wight Ic. t.* 435).	E. $\frac{20-30}{3-5+3-4}$ (A — T — 0′). Cult. only.
451	Eugenia amplexicaulis, *Roxb. Fl. Ind. II.* 483; *Wight Ic. t.* 608.	E. large tree (C.)
452	Eugenia Malaccensis, *L. sp. pl.* 672; *Roxb. Fl. Ind. II.* 483; *Wight Ill. II.* 14. *t.* 98. (*Jambosa Malaccensis, DC., Bot. Mag. t.* 4408; *E. purpurca, Roxb. Fl. Ind. II.* 485; *Wight Ic. t.* 549; *Griff. Not. Dicot.* 654). သပြုသပြေ Thá pi a thá pi e.	E. $\frac{30-40}{?}$ (T. cult.).

* The unsatisfactory state, in which I found the genus Eugenia, compels me to introduce here a number of synonyms and citations of numbered collections, in order to facilitate the understanding of the species as understood here. I have not attempted to reduce these to their original denomination, for such would have forced me to work up the whole of the genus. I am aware that, especially with regard to Roxburghian species, I have come to conclusions somewhat different from those of former authors.

Current No.	Names.	Remarks.
453	Eugenia macrocarpa, *Roxb. Fl. Ind. II.* 497; *Wight Ic. t.* 612.	E. $\frac{25-30}{8-12+2-3}$ ($Ps^2 M^3$ — T ∠ 2000′). SS = *Metam.* Si S. Evergreen tropical forests.—s.— Wood rather heavy, fibrous but close-grained, pale-brown.
454	Eugenia formosa, *Wall. Pl. As. rar. II.* 6. *t.* 108, (1831).—(*E. ternifolia, Roxb. Fl. Ind. II.* 489. (1832); *Wight Ic. t.* 611.).	E. large tree (C. T.) Evergreen tropical forests. Wood heavy, uniformly brown, close-grained, takes fine polish.
455	Eugenia lanceæfolia, *Roxb. Fl. Ind. II.* 494; *Wight Ic. t.* 621. (*E. Wallichii, Wight Ic. t.* 536; *E. bifaria, Colebr. in Wall. Cat.* 3606).	E. very large tree. (C ∠ 1000′).
456	Eugenia cerasiflora, *Kurz.* (*Jambosa sp. No.* 19, in *Hb. Ind. or Hf. & Th.; Hb. Griff. No.* 2355 *et* 2412).	E. $\frac{90-100}{50-60+8-10}$ (M^2 — 1000′). SS = Metam. Evergreen tropical forests.—s.— Wood heavy, brown, unequally fibrous, hard.
457	Eugenia tristis, *Kurz; Hb. Brandis, No.* 1233.	E. (T.). Eng-forests.
458	Eugenia pachyphylla, *Kurz; Hb. Brandis, No.* 1337. သပြေချို Th*a* p*i e* cho.	E. (T 3000′).
459	Eugenia grandis, *Wight Ic. t.* 614.—(*E. cymosa, Roxb. Fl. Ind. II.* 492, *non Lamk.; E. firma, Wall. Cat.* 3603). တောင်သပြေ To*u*ng th*á* pye. သပြေကြီး Th*á* py*e* kyi (S. K.)	E. $\frac{50-60}{18-24+4-6}$ ($P^3 M^2$ — T ∠ 1000′). SS = *Si S.* Metam. Evergreen tropical forests, and moister upper mixed forests.—s.— Wood heavy, brown, hard and brittle, close-grained
460	Eugenia lepidocarpa, *Wall. Cat.* 3618 *p. p.; Hb. Brandis, No.* 1228. (*Probably same as Syzygium Palembanicum, Miq.*)	E. (T). Eng forests.

Current No.	Names.	Remarks.
461	Eugenia oblata, *Roxb. Fl. Ind. II.* 493; *Wight Ic. t.* 622: *Wall, Cat.* 3569.—(*E. pulchella, Wall. Cat.* 3566, *vix Roxb.*) သပြေနီ Thá *pie* ní.	E. $\frac{40-50}{12-20+4-6}$ (M³ — T — 0′). SS = Metam. Evergreen tropical forests. —s.—
462	Eugenia rubens, *Roxb. Fl. Ind. II.* 496; *Wight Ic. t.* 630.—(*Jambosa Wightiana., Bl.*)	E. large tree. (C. T.)
463	Eugenia Thumra, *Roxb. Fl. Ind. II.* 495; *Wight Ic. t.* 617.—(*Syzygium speciosum, Wall. Cat.* 3568; *Hb. Helf. No.* 2372, *et* 2374). တောသပြေ T*au* thá p*i e*.	E. $\frac{40-50}{15-20+4-6}$ (P² M³ — T ∠ 1000′). SS *Metam.* Si S. Evergreen tropical forests.—s.— Wood heavy, red-brown, close-grained and rather hard.
464	Eugenia myrtifolia, *Roxb. Fl. Ind. II.* 490; *Wight Ic. t.* 618; *Hb. Wall. Cat.* 3573. *A. p. p. intermixed.*	E. (T.)
465	Eugenia acuminatissima (*Myrtus—Bl. Bydr.* 1088. *E. altissima, Wall. Cat.* 3588; *E. ferruginea, Wight Ic. t.* 554. *Hb. Helf.* 2393).	E. (T or Au ?).
466	Eugenia cymosa, *Lamk. Dict. III.* 199. *non Roxb.; Wight Ic. t.* 555. (*Jambosa tenuicuspis, Miq. Fl. Ind. Bat. I.* 431; *Syzyg. nelitricarpum, T. et B. in Nat. Tydschr. Ned. Ind. XXV.; E. viminea, Wall. Cat.* 3593. *A; E. caudata and E. concinna, Wall. Cat.* 3591 *et* 3582; *E. toddalioides. Wight Ic. t.* 542; *Hb. Griff. and Helf. No.* 2391 *et* 2396).	E. little tree and shrub. (T — 0′).
467	Eugenia venusta, *Roxb. Fl. Ind. II.* 491; *Wight Ic. t.* 625. သပြေခါး Thá p*i e* ká.	E. $\frac{50-70}{20-25+6-8}$ (C M² — 0′). SS = Metam. Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
468	Eugenia Jambolana, *Lamk. Dict. III.* 198; *Wight Ic. t.* 535; *Roxb. Fl. Ind. II.* 484.—(*E. rubescens, A. Gray.*) Fl. Sylv. Madr. t. 197. သပြေဖြူ။ Thá pi e pi u.	E. & L^h $\frac{50-80}{18-30+5-12}$ (C A Pr' P' — T ∠ 2000′). SS = ∞. *Si S.* Deciduous forests, chiefly the mixed and dry ones, entering also evergreen tropical forests. s + l. Wood heavy, hard, brown, close-grained, but brittle. Bark, like that of most other species of Eugenia, good for tanning purposes.
469	Eugenia fruticosa, *Roxb. Fl. Ind. II.* 487; *Wight Ic. t.* 624. သပြေနီ Thá pye ni (S. K.).	E. $\frac{40-50}{15-20+4-6}$ (C P^3 M^2 — T ∠ 1000′). SS = Dil. *Lat.* Low, especially Eng, forests.—l.—
470	Eugenia leptantha, *Wight Ic. t.* 528. (*Syzygium suavissimum, Wall. Cat.* 3573; *S. sp. Griff. Not. Dic.* 654).	E. $\frac{25-30}{6-8+3-4}$ (Ps^3 T — An^3 ∠ 1000′). SS = Si S. Evergreen tropical forests. —s.—
471	Eugenia claviflora, *Roxb.* (*Wight Ic. t.* 606; *E. longiflora, Wall. Cat.* 3572. *A. et* 8085; *E. excavata, Wall. Cat.* 3574).	E. $\frac{25-30}{3-6+2\frac{1}{2}-4}$ (C T — An^3 — 0′). Evergreen tropical coast-forests.—s.—
472	Eugenia Zeylanica, *Wight Ic. t.* 73, *non Roxb.* (*Jambosa bracteata, Miq. Fl. Ind. Bat. I.* 437). Fl. Sylv. Madr. *t.* 202. သပြေပေါက် Thá pie pouk.	E. $\frac{25-30}{8-12+2-3}$ (T — An^3 ∠ 4000′). SS = Si S., chloritic rocks. Evergreen tropical forests.—s.—
473	Eugenia grata, *Wall. Cat.* 3586; *Wight Ill. II.* 15. (*E. scabrida, Wall. Cat.* 3564 *D.*; *Hb. Griff. et Helf. No.* 2364 *et* 2365).	E. small tree (T.)
474	Eugenia bracteolata, *Wight Icon. t.* 531. *Hb. Griff. & Helf. Nos.* 2386-2387.	E. (T.)
475	Eugenia cinerea, *Wall. Cat.* 3576. (*E. ribesioides, Wall. Cat.* 3553, *the fruiting specimens*; *Hb. Griff. et Helf. No.* 2401 *et* 2410).	E. (P^1 — T ∠ 1000′). SS = Si S. Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
476	Eugenia tetragona, *Wight Ill. II.* 16.	E. (A. 3000-4000′).
477	Eugenia operculata, *Roxb. Hort. Beng.* 37 *et Fl. Ind.* II. 486; *Wight Ic. t.* 552. (*Syzyg. nervosum, DC. Prod. III.* 260; *Bth. Fl. Hongk.* 119; *E. ribesioides, Wall. Cat.* 3553 *B or C*; *Syz. vastum, Wall. Cat.* 3561; *E. firma, Wall. Cat.* 3558; *Syz. Paniala, Wall. Cat.* 3557 *A p. p.*) ရေသပြေ Ye thá pi e.	E. $\frac{30-50}{5-15+3-6}$ (Ps² M² — T — 0′). SS = *All.* Metam. Swamp-forests.—s.—
478	Eugenia obovata, *Wall. Cat.* 3352 *A.*; *Hb. Griff. No.* 2403. (*Syzygium grande, Wall. Cat.* 3554; *Syzyg. polyanthum, Thw. Ceyl. Pl.* 2801, *non Wight*).	E. $\frac{30-40}{5-8+3-5}$ (A ?).
479	Eugenia Paniala, *Roxb. Fl. Ind. II.* 489; *Wight Ic. t.* 616; *Wall. Cat.* 3557.	E. large tree (C.)
480	Eugenia præcox, *Roxb. Fl. Ind. II.* 488; *Wight Ic. t.* 619.	E. (C.)
481	Eugenia cerasoides, *Roxb. Fl. Ind. II.* 488; *Wight Ic. t.* 615.—(*Syzyg. subnodosum, Miq.*; *E. polyantha, Wight Ic. t.* 543, *non Thw.*; *Syzyg. occlusum, Miq.*; *Hb. Griff. Helf. No.* 2349 *et* 2395). သပြေချဉ် Thá pi e chin.	E? $\frac{40-60}{18-30+5-8}$ (C — T).
482	Eugenia balsamea, *Wight Ill. II.* 16.	E. (Burmah, no station).
483	Barringtonia Asiatica, (*Mammea—L.*; *B. speciosa, L. f.*) ကေကြီး Ke kí. ကျိုက်ကြီ Ki e kí.	E. $\frac{30-50}{6-15+4-8}$ (An² — 0·). Coast-forests.—l.—

Current No.	Names.	Remarks.
484	Barringtonia racemosa, *DC.* ကျွီးပင် K*i* *e* pin.	E. $\frac{40-50}{20-25+4-5}$ (An[2] — 0′). SS = Si S., chloritic rocks, &c. Coast-forests. —s.—
485	Barringtonia macrostachya, (*Careya*—*Jack.*)	E. small tree (T[1] — 0′).
486	Barringtonia conoidea, *Griff.*	E. small tree (T).
487	Barringtonia augusta, (*Stravadium*—*Wall.*)	E. middling sized tree (T).
488	Barringtonia pterocarpa, *Kurz.* ကျွှသား K*i* *e* thá.	E. $\frac{30-50}{12-20+4-6}$ (Ps[2] — M[2] ∠ 1000′). SS = Si S., *Metam.*, Lát. p. Evergreen tropical forests.—s.—
489	Barringtonia acutangula, *Gærtn.* Fl. Sylv. Madr. t. 204. ကျေးနှီ K*i* *e* n*í*.	E. $\frac{40-50}{10-25+5-6}$ (C Pr[2] P[4] — M[2] ∠ 1000′). SS = Si S., *All.* Mixed and swamp-forests.—l. + s.— Wood red-brown, hard, fine-grained, used in constructing carts; bark good for tanning.
490	Careya arborea, *Roxb.* Fl. Sylv. Madr. t. 205. ဘန္ဘွေး B*á*u p*u* *e*. (Bám-bue) S. K.	L[h] $\frac{50-60}{12-20+5-8}$ (P[4] M[4] — T ∠ 1000′). SS = Dil. Ca S. All. Open and dry forests; lower mixed and savannah forests.—l.— Wood heavy, red-brown, close and even-grained, tough, strong and durable, takes fine polish. W = □′ = 55 pd. Used for gun-stocks, house-posts, planks, cart-framing, &c. Also good for furniture and cabinet-working, but too heavy. Bark used for tanning.
491	Careya sphærica, *Roxb.*	L[h] large tree (C).
492	Planchonia valida, *Bl.** ဘန္ဘဲဘွး B*á*m b*u* *e*.	E? $\frac{40-60}{15-20+4-10}$ (An[3] — 0′). SS = Si S. Evergreen coast-forests.—s.— Wood brown, the sap-wood lighter coloured, close-grained, heavy.

* This is the tree which I mistook in my Andaman Report for *Careya sphærica* of Roxburgh.

Current No.	Names.	Remarks.
	MELASTOMACEÆ.	
493	Memecylon ovatum, *Sm.* (= M. edule *Sm.* accord. Triana.)	E. little tree (C M^3 — T — 1000′). SS = Metam. Evergreen tropical and moister upper mixed forests.—s.—
494	Memecylon pauciflorum, *Bl.*	E. $\frac{20 - 25}{8 - 12 + 1 - 1\frac{1}{2}}$ (An^3 — 1000′). SS = Si S., chloritic rocks. Evergreen tropical forests.—s.—
495	Memecylon plebejum, *Kurz.*	E. $\frac{20 - 25}{8 - 10 + 2 - 3}$ (A Pr^2 — P^3 — 0′). SS = All. Swamp-forests.—s.—
496	Memecylon celastrinum, *Kurz.*	E. $\frac{30 - 40}{12 - 15 + 2 - 3\frac{1}{2}}$ (P^2 M^3 — T — 1000′). SS = *Metam.*, Si S. Evergreen tropical forests.—s.—
	M*i in* che th*á* n*i ak.*	
497	Memecylon umbellatum, *Burm.* Fl. Sylv. Madr. t. 206.	E. little tree. (T — An^3 — 1000′). SS = Si S., chloritic rocks, &c. Evergreen tropical forests.—s.— Wood very strong and tough, very hard and close-grained. Good for cart-axles and forms a sort of box-wood. Leaves and flowers a yellow dye.
498	Melastoma normale, *Don.*	E. little tree. (C A P^2 M^3 — T An^3 ∠ 5000′). SS = Metam., Si S., &c. Evergreen tropical forests, ascending into the drier hill-forests.—s × l.—
	LYTHRARIEÆ.	
499	Woodfordia fruticosa, *Kurz.*	L^h $\frac{12 - 15}{?}$ (Pr^3 — 1000′). SS = Ca S. Dry forests.—l.— The flowers yield a valuable red dye of considerable importance, but little known.
500	Lawsonia inermis, *L.* ဓဌး D*á*m. ဓဌး D*á*m.	L. $\frac{10 - 12}{?}$ (P^3 — 1000′). SS = ? Cult. only.

Current No.	Names.	Remarks.
501	Crypteronia paniculata, *Bl.* အနန်းဖို *A´* *ná*n p*o*. (A´n*á*m ben) S. K.	E. $\frac{50-80}{30-50+4-9}$ ($Ar^3 P^4$ — T — 1000′). SS = *Si S.*, Metam., &c. Evergreen tropical forests, especially the open ones; also moister upper mixed forests.—s × l.— Wood light to reddish-brown, fibrous, close but not straight-grained, rather heavy, the annual rings narrow. Used occasionally for cart-wheels, but more in use for fire-wood.
502	Lagerstrœmia Flos reginæ, *Retz.* Lagerstrœmia reginæ Roxb.; Fl. Sylv. Madr. t. 29. ပြင်မရွက်ကြီး P*i* *i*m m*á* y*u* *a*k k*í*.	L^{e-h} $\frac{50-60}{20-30+6-12}$ (C. A. Pr^4 — T — 2000′). SS = ∞. *Si S.* Mixed forests. —l.— Wood pale or dark-brown, rather heavy, streaked, fibrous but close-grained, takes a fine polish. □′ = 37 pd. Used for house-posts, planking, beams, scantling for roofs, carts, boats, paddles, oars, &c. Exudes a resin.
503	Lagerstrœmia macrocarpa, *Wall.* ကုန်းပြင်းမ Goug p*i* *u*n m*á*. (Kún pímá) S. K.	L^h $\frac{30-40}{8-15+5-5}$ (A Pr^3 P^4 — T ∠ 1000·). SS = ∞. Mixed and open forests.—l.— Wood white?
504	Lagerstrœmia hypoleuca, *Kurz.*	L^h $\frac{60-70}{25-30+5-9}$ (An^4 — 1000·). SS = *Si S.*, Chloritic rocks, &c. Upper mixed forests.—l.— Wood greyish-brown, narrow streaked, close-grained and heavy.
505	Lagerstrœmia floribunda, *Jack.* ပြင်းမပြူ P*i* *i*n m*á* p*i* *u*.	Little tree (T.)
506	Lagerstrœmia tomentosa, *Prsl.* လဲဇီ L*e* z*í*.	L^h $\frac{70-100}{50-60+7-12}$ ($P^3 M^4$ — T — 1000′). SS = Si S., Metam. Evergreen tropical and moister upper mixed forests. —s : l.— Wood dark-brown, close-grained, heavy, the annual rings distinct and narrow. □′ = 53 pd. Valued for bows and spear-handles, also used for canoes and cart-wheels. Exudes red resin.

Current No.	Names.	Remarks.
507	Lagerstrœmia calyculata, *Kurz.* ပြင်းမပြူ॥ P*i* *u*n m*á* p*i* *u*.	E ? $\frac{60 - 70}{30 - 40 + 4 - 7}$ (M^2 — 1000′). SS = Metam. Evergreen tropical forests. —s.— Wood brown, heavy, of somewhat unequal fibre, close-grained, rather soft, soon attacked by xylophages.
508	Lagerstrœmia villosa, *Wall.* ဇောင်ကလေး Z*ou*ng g*á* l*e*.	L ? $\frac{40 - 50}{15 - 20 + 3 - 5}$ (Ps^2 — M^2 — 1000′). SS = Si S., Metam. Evergreen tropical forests, especially the open ones. —s.— Wood pale-brown, rather heavy, somewhat close-grained, rather coarsely fibrous. Not much used. □′ = 40 pd.
509	Lagerstrœmia Indica, *L.*	L ? $\frac{10 - 20}{?}$ (P — T). Cult. only.
510	Lagerstrœmia parviflora, *Roxb.* Fl. Sylv. Madr. t. 31.	L^h $\frac{20 - 30}{10 - 15 + 3 - 5}$ (A ?). Wood greyish or light-brown, close-grained, straight fibrous, elastic, hard, takes very fine polish. □′ = 40 pd. Good for building purposes, beams, rafters, boats, axles, &c.
511	Duabanga grandiflora, (*Lagerstrœmia Roxb.*) မြောက်ငို M*i* *o*uk gn*o*.	L^h $\frac{80 - 100}{50 - 80 + 10 - 12}$ (C A Pr^2 P^4 — T ∠ 3000′). SS = Metam., *Si S.*, &c. Evergreen tropical and mixed forests.—l.— Wood yellowish, turning pale-brown or greyish, somewhat mottled, heavy, coarsely fibrous, but rather close-grained, rather hard, takes good polish. □′ = 30 pd. Used in house-building.
512	Sonneratia acida, *L. f.* တပူ॥တမှူ T*á* p*u* or T*á* m*u*.	E. $\frac{10 - 15}{?}$ (C T — An^2 — 0′). SS = Sal. Littoral forests.—l ?— Wood soft, light and perishable.
513	Sonneratia alba, *Sm.*	E. $\frac{10 - 15}{?}$ (An. — 0′). SS = Sal. Littoral forests.—l.—

Current No.	Names.	Remarks.
514	Sonneratia Griffithii, *Kurz.* တပြုပ်နှံး *Tá* pi *u* pán.	E. $\frac{30 - 40}{?}$ (P⁴ — T — 0′). SS = Sal. Littoral forests.—s.—
515	Sonneratia apetala, *Buch.* ကန့်ပလါ Kám pá lá.	E. $\frac{40 - 50}{15 - 25 + 3 - 4}$ (C P^5 — T — 0′). SS = Sal. Littoral forests.—l.— Wood red, coarse-grained, strong and hard. Good in house-building, for packing boxes, &c.
516	Punica Granatum, *L.* သလဲ Thá le.	E. little tree. (A — Pr.). Cult. only.
	SAMYDACEÆ.	
517	Casearia Canziala, *Wall.*	L^h $\frac{40 - 50}{15 - 25 + 3 - 4}$ (P^3 — M — 500′). SS = *All.* Lower mixed forests.—s + l.—
518	Homalium tomentosum, *Bth.* မြောက်ချော M*i* ouk cho.	L^h $\frac{80 - 90}{40 - 50 + 8 - 10}$ (P^4 — Ar^3 — M^3 ∠ 2000′). SS = ∞. *Si S.* Mixed forests. —l.— Wood light-yellow, turning pale to greyish brown, very heavy, very close-grained, but of unequal fibre, rather soft, takes very fine polish. □′ = 56 pd. Used for teeth of harrows. Good for furniture.
519	Homalium Griffithianum, *Kurz.*	Small tree (T.)
520	Homalium fœtidum, *Griff.* မြောက်ငွေး M*i* *ouk* g*we*.	Small tree (T.)
521	Homalium minutiflorum, *Kurz.*	Tree (P.)

Current No.	Names.	Remarks.
	PASSIFLORACEÆ.	
522	Carica Papaya, *L.* သင်ဘော Thim bo.	E. $\frac{20-25}{16-20+1-2}$ (A^4 — T An^4 ∠ 1000′). SS = ∞. Cult. only. Wood spongy fibrous, coarse and very perishable. Exudes a white resin. The milky juice of the unripe fruit is a powerful vermifuge. Water impregnated with the milky juice makes all sorts of meat washed in it tender.
	DATISCACEÆ.	
523	Tetrameles nudiflora, *RBr.* Fl. Sylv. Madr. t. 212. သစ်ဘုတ် Thit bot. သစ်ပေါက် Thit pouk.	L^h $\frac{120-150}{80-100+10-15}$ (Pr^2 P^3 M^4 — T An^3 ∠ 1000′). SS = *Metam.* Si S. Evergreen tropical forests, rare in dry forests along choungs.—s : l.— Wood brown, light, coarse fibrous, rather loose-grained, valueless.
	ARALIACEÆ.	
524	Aralia armata, *Seem.*	Small tree (T.)
525	Brassaiopsis palmata, *Kurz.*	E. $\frac{15-20}{8-15+1\frac{1}{2}-2}$ (C An^3 — 1000′). SS = Si S. Evergreen tropical forests. —s.—
526	Polyscias nodosa, *Seem.*	E. $\frac{20-25}{10-18+2-3}$ (An^3 — 0′). SS = Si S. Evergreen tropical forests.—s.—
527	Heptapleurum glaucum, *Bth. et Hf.*	E ? $\frac{20-30}{10-15+3-4}$ (M^3 5000-7000′). SS = Metam. Drier hill-forests and pine-forests.—s.—
528	Trevesia palmata, *Vis.* ဘော့ Bo.	E. $\frac{10-15}{6-10+\frac{1}{2}-1}$ (C P^2 M^4 — T ∠ 4000′). SS = *Metam.*, Si S. Evergreen tropical forests, ascending to the damp hill-forests.—s.—

Current No.	Names.	Remarks.
529	Heteropanax fragrans, *Seem.* တခြင်းစား *Tá chán sá.* ကြောင်တောက် K*i oung* do*uk*. တောင်ဖေါ To*u*ng hp*o*.	$L^h \frac{50-60}{25-30+4-5}$ (Pr^s P^s—M^s ∠1000′). SS = Metam., Ca S., Si S., &c. Leaf-shedding forests.—l.— Wood light-brown or grey, rather heavy, fibrous but close-grained, very perishable.
530	Macropanax oreophilum, *Miq.*	E ? $\frac{30-40}{?+2-5}$ (M^s 5000-6000′). SS = Metam. Damp and drier hill-forests. —s.—
531	Tupidanthus calyptratus, *Hf.*	E. $\frac{20-30}{?}$ (Ar.) Evergreen tropical forests.—s.—
	CORNACEÆ.	
532	Alangium decapetalum, *Lamk.* ? (A. Lamarckii, Thw.; Fl. Sylv. Madr. t. 215).	Small tree (An^s — 1000′). SS = Si S. Upper mixed forests.—l.— Wood strong, very close and even-grained, dark-brown, easy to work.
533	Marlea begoniæfolia, *Roxb.* တပုရ *Tá pu ye.*	E ? $\frac{60-70}{30-40+4-5}$ (M^s—1000′). SS = Metam. Evergreen tropical forests.—s : l.—
534	Marlea tomentosa, *Endl.* ငပုံးဆေး Gna pong se.	L ? $\frac{90-100}{?+6-9}$ (M^s—1000′). SS = Metam. Evergreen tropical forests.—s : l.— Wood pale-brown, close-grained, rather coarsely fibrous.
535	Cornus oblonga, *Wall.*	E ? $\frac{20-30}{?+1\frac{1}{2}-2}$ (M 4000-7000′). SS = Metam. Drier hill-forests.—l.—

Current No.	Names.	Remarks.
	RUBIACEÆ.	
536	Vangueria spinosa, *Roxb.* ဆေးမကြီး S*e* m*á* gyi.	L ? small tree. (Pr^3 — 1000′). SS = Ca S. Dry forests.—l.—
537	Vangueria pubescens, *Kurz.* ဆေးမဂြည့်း Se ma gyn′.	L ? $\frac{20-25}{10-15+2-3}$ (A Pr^3 P^2 — M^2 — 1000′). SS = Ca S.; Lat. Dry and Eng forests.—l.—
538	Canthium didymum, *Gærtn* Fl. Sylv. Madr. t. 221.	E ? small tree (T.)
539	Canthium glabrum, *Bl.*	E ? small tree. (Ps — T — 1000′). SS = Lat. p. Evergreen tropical forests.—s.—
540	Canthium parviflorum, *Lamk.* ?	E ? $\frac{15-20}{3-6+\frac{1}{2}-1\frac{1}{2}}$ (Pi^4 — 0′). SS = Alluv. Swamp forests.—s.—
541	Ixora tomentosa, *Roxb.* စကျွဲ S*á* k*i* *u* *e*. မြက်နှာပန် M*i* et n*á* pan.	L^h $\frac{15-20}{8-10+1-1\frac{1}{2}}$ (A Pr^3 — T — 1000′). SS = Si S., Lat., Metam., &c. Leaf-shedding forests.—s × l.—
542	Ixora rugosula, *Wall.*	E. $\frac{20-25}{10-12+1\frac{1}{2}-2}$ (P^1 T — 1000′). SS = Si S.; Metam. ? Evergreen tropical forests.—s.—
543	Ixora parviflora, *Vhl.* Fl. Sylv. Madr. t. 222.	E. $\frac{25-30}{10-12+2-3}$ (Pr^3 — 1000′). SS = Ca S. Dry forests.—l.— Wood reddish-brown, close-grained, hard, taking good polish.

Current No.	Names.	Remarks.
544	Ixora nigricans, *RBr.*	E. small tree $\frac{20-25}{?+\frac{1}{2}-1}$ (P^4 M^4 — T — 0′). SS = *All.* Swamp-forests.—s.— Wood yellowish, rather heavy, coarse fibrous, rather loose-grained, soft.
545	Ixora spectabilis, *Wall.*	E. $\frac{20-25}{5-10+1\frac{1}{2}-2}$ (Ar^3 M^3—T—1000′). SS = Si S., Metam. Evergreen tropical forests.—s.— Wood yellowish white, heavy, close-grained, hard and brittle, turning on exposure pale coloured and blackish-streaked.
546	Ixora coriacea, *RBr.*	E. $\frac{20-25}{5-8+1-1\frac{1}{2}}$ (An^3 — 0′). SS = Aren. Beach jungles chiefly.—s.—
547	Ixora brunnescens, *Kurz.*	E. $\frac{20-25}{6-10+1-1\frac{1}{2}}$ (An^3 — 0′). SS = Aren., Si S. Coast-forests.—s.—
548	Coffea Arabica, *L.* ကာဖွယ် Ká pwe.	E. $\frac{20-30}{4-8+1\frac{1}{2}-2}$ (T. cult. only).—s.—
549	Coffea tetrandra, *Roxb.* မိကင် Mí kin.	E. $\frac{20-25}{10-15+2-2\frac{1}{2}}$ (C. M^2 An^3 ∠ 3000′). SS = Chloritic rocks, Metam. Evergreen tropical forests.—s.—
550	Urophyllum glabrum, *Jack.*	E. little tree. (T.)
551	Urophyllum strigosum, *Korth.*	E. little tree. (T. ? or An. ?).
552	Urophyllum biloculare, *Kurz.*	E. $\frac{25-30}{10-15+2-2\frac{1}{2}}$ (M^1. 2000-3000′). SS = Metam. Evergreen tropical forests. —s.—

Current No.	Names.	Remarks.
553	Mussænda glabra, *Vhl.*	E. $\frac{12 - 15}{?}$ (M[3]. 3000-4000′). SS = Metam. Drier hill-forests.—s × l.—
554	Mussænda macrophylla, *Wall.*	E. little tree. (An[4] — 1000′). SS = Si S. Moister upper mixed forests.—s.—
555	Diplospora singularis, *Korth.*	E. $\frac{50 - 60}{20 - 25 + 4 - 6}$ (P[2]. M[3]. — T. — 1000′). SS = Metam., Si S. Evergreen tropical forests.—s.—
556	Webera oppositifolia, *Roxb.* စကြူ Sá ki *u e.*	E. $\frac{30 - 40}{15 - 20 + 2 - 3}$ (C. Ps[2]. M[3]. — T. An[2]. — 1000′). SS = Si S., *Metam.* Evergreen tropical forests.—s.— Wood yellowish white, turning brown, heavy, very close-grained and of a very fine grain.
557	Webera glomeriflora, *Kurz.*	E. $\frac{20 - 30}{8 - 10 + 2 - 3}$ (P[1]. — 1000′). SS = Si S. Evergreen tropical forests.—s.—
558	Randia uliginosa, *DC.* မှန်ပြူ Mhán pi *u.*	E. $\frac{20 - 30}{4 - 8 + 2 - 3}$ (A. Pr[4]. — T. — 0). SS = All. Savannah and lower forests. —l.—
559	Randia longispina, *DC.* ဆေးသံပရာ S*e* thám pá y*á*. ဆေးသံပရာ S*e* thám pá y*á*.	E. $\frac{12 - 20}{6 - 12 + \frac{1}{3} - \frac{2}{3}}$ (P[3] — M[3] — 1000′). SS = Metam., Si S., &c. Evergreen tropical forests.—s.— The fruits are said to be poisonous and used to kill fish.
560	Gardenia campanulata, *Roxb.* ဆေးသံပရာ S*e* thám pá y*á*.	L[h] $\frac{15 - 20}{4 - 5 + \frac{2}{3} - 1}$ (C. Ps — T. — 1000′). SS = ? Evergreen tropical forests. —s.—

Current No.	Names.	Remarks.
561	Gardenia sessiliflora, *Wall.* မကျီးပေါက် Má ji pouk. သမင်စာဖြူ ။ သစ်မင်စောဖြူ ။ Thá min sá pi u. ဆေးကြက်ဆူ Se ki ek su.	$L^h \frac{15-18}{2-5+\frac{2}{3}-1}$ (A Pr^4 — T ∠ 3000′). SS = ∞. *Si S.*, *All.* Leaf-shedding forests, especially mixed forests.—l.—
562	Gardenia erythroclada, *Kurz.* မှန်နီ Mhán ní.	$L^h \frac{15-25}{4-6+1-2}$ (A Pr^2 P^4 — T — 2000′). SS = Ca S., *Si S.*, All., &c. Mixed and dry forests chiefly.—l.—
563	Gardenia turgida, *Roxb.* သမင်စါနီ Thá min sá ní.	$L^h \frac{20-30}{4-6+1-2\frac{1}{2}}$ (Pr^3 — Pi^2 — 1000′). SS = *Ca S.*, Lat., Dil. Dry and Eng forests.—l.—
564	Gardenia cuneata, *RBr.*	L ? small tree (A.)
565	Gardenia dasycarpa, *Kurz.*	$L^h \frac{12-15}{3-4+1-1\frac{1}{2}}$ (Pr^2 T — 500′). SS = *Ca S.*, Lat. Dry and Eng forests. —l.—
566	Gardenia obtusifolia, *Roxb.* ရင်ခတ် Yin kat.	$L^h \frac{15-25}{4-6+1-2}$ (Pr^2 P^2 M^3 — T — 500′). SS = Ca S., Lat. Dry and Eng forests.—l.— Sap-wood pale-brown, soft. Yields fine pellucid yellow resin.
567	Gardenia resinifera, *Roth.*	L ? $\frac{20-25}{5-8+1-3}$ (C.) Wood white, close-grained, well adapted for turning. Yields yellow pellucid resin.

Current No.	Names.	Remarks.
567	Gardenia coronaria, *Ham.* ရင်ခတ် Y*i*n K*á*t.	$L^h \frac{25-30}{10-15+2-3}$ (C P^s M^s — T — 1000′). SS = Metam., Argyll., Si S., &c. Mixed forests, rarely in low forests.—l.— Wood pale-brown or white, rather heavy, of an unequal fibre, rather brittle, very close-grained. □′ = 49 pd. Used for making combs and adapted for turning, but cracky.
568	Gardenia pulcherrima, *Kurz.*	E. $\frac{30-35}{10-15+3-4}$ (An^s — 1000′). SS = Chloritic and Serpentine rocks. Evergreen tropical forests.—s.—
569	Guettarda speciosa, *L.*	E. $\frac{25-30}{10-15+3}$ (An^s — 0′). SS = Aren. Sal. Chiefly beach jungles and tidal forests.—l.—
570	Polyphragmon sericeum, *Desf.*	E. small tree. (An^s — 0′). SS = Sal. Aren. Beach and tidal forests.—l.—
571	Scyphiphora hydrophyllacea, *Gærtn.*	E. $\frac{6-8}{3-4+\frac{1}{2}-\frac{3}{4}}$ (An^s — 0′). SS = Sal. Littoral forests.—s.—
572	Morinda exserta, *Roxb.* ညောင်ပင် N*i* *o*ung p*i*n. ညော N*i* *o*.	E. Small tree. (Barma). Wood yellow to red, rather heavy, rather close-grained, hard, takes fine polish. Good for fancy work; root and bark a red dye.
573	Morinda tomentosa, *Heyne.*	$L^h \frac{15-20}{6-8+1-1\frac{1}{2}}$ (Pr^s — 1000′). SS = Ca S. Dry forests.—l.—
574	Morinda citrifolia, *L.* Fl. Sylv. Madr. t. 220. ညောကြီး N*i* *o* k*í*.	E. $\frac{12-15}{3-4+1-2}$ (An^s — 1000′). SS = Si S. Evergreen tropical forests.—s.— Often cultivated. Wood deep brownish yellow or bright yellow, close-grained, light, tough. Yielding a bright-yellow dye, or very valuable red-dye which is fixed with alum.

Current No.	Names.	Remarks.
575	Morinda angustifolia, *Roxb.* ရေယို Ye yo. စပယ်ကြီး Sá be kí.	E. $\frac{20-25}{4-6+1-1\frac{1}{2}}$ (M² — T — 1000′). SS = Metam. Evergreen tropical forests. —s.— Often cultivated. Wood yellow when fresh. Bark and root used as dye.
576	Psilobium capillare, *Kurz.*	E. $\frac{20-25}{6-8+1-2}$ (P² M² — T — 0′). SS = *All.* Metam. Swamp-forests chiefly. —s.—
577	Sarcocephalus Cadamba, (*Anthocephalus—Miq.*) Fl. Sylv. Madr. t. 35. မဥ Má u.	Lᶜ? $\frac{40-70}{15-25+6-15}$ (P² — 2000′). SS = Si S., All. Moister upper mixed forests, rare in the lower ones. Wood deep yellow, loose-grained. □′ = 73 pd. Recommended for furniture.
578	Sarcocephalus cordatus, *Miq.* Fl. Sylv. Madr. t. 318. မဥလက်တန်ရှည် Má u let tán shé. မဥ Má u.	Lʰ $\frac{40-60}{25-30+5-6}$ (P⁴ M⁴ — T — 1000′). SS = *All.* Si S. Mixed forests, especially in the lower and savannah forests. —l.— Wood pale-coloured, rather light, coarse, loose-grained. W = $\frac{□′ = 23 - 34}{80 - 120}$ pd. Soft useless wood, decays in less than a year.
579	Nauclea polycephala, *Wall.*	E. Small tree. (C. T.)
580	Nauclea excelsa, *Bl.*	Large tree. (P.)
581	Nauclea sessilifolia, *Roxb.* ထိန်ကလာ Teing ka lá.	Lʰ $\frac{40-90}{25-50+3-8}$ (C P⁴ — 1500′). SS = All., *Si S.* Mixed forests.—l.— Wood brown, rather coarse, rather close-grained. W = $\frac{□′ = 43 - 56}{208}$ pd. Recommended for furniture.

Current No.	Names.	Remarks.
582	Nauclea cordifolia, *Roxb.* Fl. Sylv. Madr. t. 33. နှင်းပင် N*i*n p*i*n. (Nau-ben) S. K.	$L^h \frac{40-80}{10-40+4-10}$ (A Pr^3 P^4 M^3 $\angle$ 1500′). SS = Ca S., Metam., Lat., &c. Leaf-shedding forests.—l.— Wood pale-yellow or brown, rather close-grained, fibrous. □′ = 42 pd. Used for making combs and possibly valuable for furniture, and house carpentry.
583	Nauclea parvifolia, *Roxb.* Fl. Sylv. Madr. t. 34. ထိန်သေး T*ei*ng th*e*.	$L^h \frac{25-50}{8-12+3-6}$ (A Pr^5 — T — 500′). SS = *All.*, Si S. Mixed forests, especially lower and savannah forests.—l.— Wood light chestnut-coloured, close-grained, heavy, the annual rings rather broad. $W = \frac{□′ = 43}{170}$ pd. Used for planking but rots soon, if exposed to wet; seems also fit for cabinet making.
584	Nauclea rotundifolia, *Roxb.* ဘင်ကာ B*i*ngá.	$L^h \frac{40-60}{20-30+3-6}$ (C Pr^3 P^4 — T — 2000′). SS = All., *Si. S.*, Metam. Mixed forests.—l.— Wood pale-yellow or brown, rather heavy, close-grained. □′ = 45 pd. Not much used, recommended for furniture.
585	Cephalanthus naucleoides, *DC.*	E. $\frac{10-20}{?}$ (Burma).
586	Hymenodictyon thyrsiflorum, *Wall.* ကူဆံ K*u* sán. ကဇွန်းပင် Ká *zu*n pin.	$L^h \frac{50-60}{25-30+5-6}$ (C Pr^4 — P^2 $\angle$1000′). SS = *Ca S.*; Si S. Dry and upper mixed forests.—l.— Wood light, loose-grained. $W = \frac{□′ = 28}{114}$ pd. Used for black boards in Burmese schools, also good for packing cases.
587	Wendlandia tinctoria, *DC.* သစ်ပြူ Th*i*t p*i u*. တမာရောက် Tá má *you*k.	E ? $\frac{20-30}{8-12+2-2\frac{1}{2}}$ (A Pr^3—T—4000′). SS = Dil., Ca S., Lat., Metam. Open and dry forests, ascending into the drier hill-forests.—l.— Wood dark-brown, fine grained.

Current No.	Names.	Remarks.
588	Wendlandia scabra, *Kurz.*	E ? small tree. (A.)
589	Wendlandia glabrata, *DC.* သစ်ပြူ Th*i*t pi *u*.	E. $\frac{20 - 25}{10 - 12 + \frac{3}{4} - 1\frac{1}{4}}$ (M² — T 2000-4000′). SS = Metam. Drier hill-forests.—s.—
590	Wendlandia ligustrina, *Wall.* ဒမစေကြီးပင် D*á* m*á* s*e* k*í* p*i*n.	E. small tree. (A. T.)
591	Wendlandia glomerulata, *Kurz.*	E. small tree (T.)
	COMPOSITÆ.	
592	Vernonia arborea, *Ham.*	E. $\frac{50 - 60}{?}$ (T.)
593	Vernonia volkameriæfolia, *DC.* Fl. Sylv. Madr. t. 225.	E ? $\frac{15 - 25}{3 + 4 - 1}$ (M² — T 2000-4000′). SS = Metam. Hill eng-forests and drier hill-forests.—l.— Wood whitish, turning pale-brown, coarse, heavy, close-grained, rather hard, the heart-wood narrow, dark greyish-brown, of a soft almost corky consistence.
594	Blumea balsamifera, *DC.* ပုံးမသိန် Po*u*ng m*á* the*i*n.	E. $\frac{15}{1 - 3 + \frac{1}{3} - {}_5}$ (A Pr² P⁵ — T 3000′). SS = ∞. *Metam.* Deserted toungyas chiefly.—l.— Wood pale-coloured, rather light but close-grained, soft. Yields camphor equal to the Chinese one.
595	Leucomeris decora, *Kurz.* နီအပွေး N*í* *á* p*u* *e*.	Lʰ $\frac{12 - 15}{3 - 4 + 1}$ (Pr³ — 500′). SS = Ca S., Lat. Eng-forests.—l.— Wood white, soft.

Current No.	Names.	Remarks.
	CAMPANULACEÆ.	
596	Scævola Kœnigii, *Vhl.* ပင်လယ်ပိန်း Pin le tán.	E. small tree $\frac{15}{2-3+?}$ (T An[3] — 0′). SS = Sal. Aren. Beach and tidal forests. —l.— Wood fibrous, milky, useless, the heart medullary.
	ERICACEÆ.	
597	Vaccinium exaristatum, *Kurz.*	E ? $\frac{20-25}{?+1-2}$ (M[4] 3000-6000′). SS = *Metam.* Drier hill and pine-forests.
598	Andromeda ovalifolia, *Wall.*	L[c] $\frac{25-35}{?+2-3}$ (M[4] 5000-7000′). SS = Metam. Drier hill-forests.—l.—
599	Gaultheria punctata, *Bl.*	E. $\frac{20-25}{?}$ (M[4] 6000-7000′). SS = Metam. Drier hill-forests—l.—
600	Rhododendron Moulmeinense, *Hook.*	E. $\frac{30-40}{10-15+3-4}$ (M[4] — T 4000-7000′). SS = Metam. Damp and drier hill-forests.—s.— Wood white, soft.
601	Rhododendron arboreum, *Sm.* Fl. Sylv. Madr. t. 228.	E. $\frac{20-30}{?+2-3}$ (M.) Hill-forests.
	PLUMBAGINEÆ.	
602	Ægialitis annulata, *RBr.*	E $\frac{6-7}{3-4+\frac{1}{4}-\frac{1}{3}}$ (C Ar[3] — T An[3] — 0′). SS = Sal. Littoral forests.—l.—
	MYRSINEÆ.	
603	Mæsa ramentacea, *Roxb.*	E. $\frac{25-30}{?+1-1\frac{1}{2}}$ (C P[3] — T An[3] — 1000′). SS=Lat. p., Metam., Si S., &c. Moister mixed forests and moist forests.—s.— Wood pale-brown or brown, rather heavy, close-grained, brittle.
604	Mæsa Indica, *DC.*	E. small tree. (C Ps[3] — T ∠ 3000′). SS = Metam., Si S., &c. Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
605	Mæsa verrucosa, *Scheff.*	E. small tree. (An^{s} — 0′). SS = Si S. Moister upper mixed forests.—s.—
606	Myrsine semiserrata, *Wall.*	E. $\frac{20 - 25}{? + 1 - 2}$ (M^{s} 6000-7200′). SS = Metam. Drier hill and pine-forests. —l.—
607	Myrsine avenis, *DC.*	E. $\frac{20 - 25}{? + 1 - 2}$ (M 4000-7000′). SS = Metam. Drier hill-forests.—l.—
608	Myrsine lucida, *Wall.*	E ? $\frac{15 - 20}{8 - 10 + 1 - 2}$ (A Pr^{s} — 500′). SS = Ca S., Lat. Eng forests.—l.—
609	Ardisia anceps, *Wall.*	E. $\frac{20 - 25}{? + \frac{1}{2} - 1}$ (M^{s} — T ∠ 3000′). SS = Metam. Evergreen tropical forests. —s.—
610	Ardisia humilis, *Vhl.* ဂျင်မအုပ် J*i*n m*á* op.	E. $\frac{12 - 25}{6 - 12 + \frac{1}{2} - 1\frac{1}{2}}$ (P^{s} Ar^{s} — 1000′). SS = Si S. Evergreen tropical forests. —s.— Wood reddish.
611	Ægiceras corniculata, *Blanco.* ဘူတရက် B*u* t*á* y*a*k.	E. $\frac{15}{3 - 5 + \frac{1}{2} - 1}$ (C A^{s} — T An^{s} — 0′). SS = Sal. Littoral forests.—l.—
	SAPOTACEÆ.	
612	Chrysophyllum Roxburghii, *G. Don.* Fl. Sylv. Madr. t. 236. သံကျပင် Th*á*n k*i* *á* pin.	E. $\frac{60 - 70}{40 - 50 + 4 - 7}$ (Ps^{s} — 0′). SS = Lat. p. Evergreen tropical forests.—l.—

Current No.	Names.	Remarks.
613	Achras Sapota, *L.* ထွတ်တပတ် Twot *tá* p*á*t.	E. $\frac{40 - 60}{15 - 30 + 3 - 4}$ (P cult.) Cultivated only. Wood uniformly-brown, close-grained, rather light, hard. Valued in South America for the shingles of corn-houses. Bark said to be a good substitute for chinine.
614	Sideroxylon tomentosum, *Roxb.* သစ်ချို Th*i*t ch*o*.	E ? small tree. (Pr³ — 500′). SS = Ca S.; Lat. Eng and dry forests.—l.— Wood brown, loose-grained, fibrous, rather heavy.
615	Sideroxylon attenuatum, *DC.*	E. (T.)
616	Sideroxylon grandifolium, *Wall.* တောသပွတ်ပင် T*a*n th*á* pot p*i*n. ထွတ်တပတ်ပင် T*u*t t*a* p*á*t p*i*n.	E. large tree. (P — M.)
617	Bassia villosa, *Wall.*	E ? (A).
618	Isonandra caloneura, *Kurz.*	E. $\frac{50 - 60}{30 - 40 + 3 - 5}$ (An³ — 0′). SS = Chloritic and Serpentine rocks. Evergreen tropical forests.—s.—
619	Isonandra obovata, *Griff.*	E. (T.) Yields Gutta percha.
620	Isonandra polyantha, *Kurz.*	E. $\frac{30 - 40}{?}$ (Ar² ∠ 1200′). SS = Si S. Evergreen tropical forests.—s.— Yields gutta percha probably not inferior to that of Singapore.
621	Payena lucida, *DC.*	E. (T ?).
622	Payena paralleloneura, *Kurz.*	E. $\frac{70 - 80}{40 - 50 + 5 - 7}$ (M³ — T — 1000′). SS = Metam. Evergreen tropical forests.—s : l.

Current No.	Names.	Remarks.
623	Mimusops Indica, *Kurz* (*non DC.*) ကပ်ပလိ Káp pá lí. (Kappali thit) S. K.	E. $\frac{50 - 80}{30 - 60 + 12 - 15}$ (T An^4 — 0′). SS = Si S. Coast-forests.—s.— Wood reddish or pinkish-brown, the sap-wood lighter-coloured, rather narrow-streaked, very close-grained, very hard and durable, heavy. The so-called Andaman bullet-wood, used especially for gun-stocks, &c.
624	Mimusops ? parvifolia, *Kurz.*	E. small tree ? (A.)
625	Mimusops Elengi, L. Fl. Sylv. Madr. t. 40. ခရေး Khá yá.	E. $\frac{40 - 50}{15 - 30 + 4 - 7}$ (M—T An^4—1000′). SS = Si S. Evergreen tropical forests; often cultiv.—s.— Wood reddish-brown, close-grained, heavy, very hard and durable, takes a beautiful polish. □′ = 61 pd. Good for house-building and furniture and said to last 50 years. Yields the pagoda-gum of Madras.
	Ebenaceæ.	
626	Gunisanthus pilosulus, *DC.*	E. $\frac{15 - 25}{8 - 10 + 1}$ (P An^3 500′). SS = Si S. ?, Chloritic and Serpentine rocks. Evergreen tropical forests.—s.—
627	Gunisanthus mollis, *Kurz.*	E. $\frac{20 - 30}{8 - 10 + 1\frac{1}{2} - 2}$ (M^3 — 500′). SS = Metam. Evergreen tropical forests. —s.— Wood red-brown, rather heavy, of a short fibre, close-grained, rather soft, soon attacked by xylophages.
628	Diospyros kaki, *L. f.*	L? $\frac{25 - 30}{? + 2 - 7}$ (M^3 2000-4000′). SS = Metam. Drier hill-forests.—l.—
629	Diospyros cordifolia, *DC.* ချုပ်ပင် Chop pin. တောပုတ် Tau bot.	L^h $\frac{50}{15 + 4 - 6}$ (P^3 — 500′). SS = Si S., Arg. Mixed, and low forests.—l.— Wood pale-brown, rather heavy, close-grained, the heart-wood small, blackish, takes fine polish. □′ = 49 pd.

Current No.	Names.	Remarks.
630	Diospyros heterophylla, *Wall.* ချုပ်ပင် Chop pin.	$L^h \frac{30-50}{6-15+3-4}$ (A Pr^3 — 500′). SS = Ca S., Lat. Dry and Eng forests. —l.—
631	Diospyros ehretioides, *Wall.* အောက်ချင်းဇာ။ Ouk-chin-za.	E. $\frac{60-70}{25-40+5-6}$ (A Pr^3 P^4 — M^3 ∠ 3000′). SS = ∞. Si S. Leaf-shedding forests.—l.— Sapwood yellowish-white, of a very coarse granular appearance, rather hard, the heartwood rather heavy, brittle, close-grained, brown or beautifully white and black mottled. □′ = 41 pd. Used for house posts.
632	Diospyros stricta, *Roxb.*	Large tree (C.)
633	Diospyros chartacea, *Wall.*	E small tree (M^3 — T— 1000′). SS = Metam. Evergreen tropical forests.—s.— Sapwood whitish, rather heavy, fibrous and tough, soon attacked by xylophages.
634	Diospyros sapotoides, *Kurz.*	E. $\frac{40-50}{15-25+3-4}$ (Ps^3 — 1000′). SS = Si S. Evergreen tropical forests.—s.—
635	Diospyros undulata, *Wall.*	E. large tree (M T An — 1000′). SS = Metam., chloritic rocks. Evergreen tropical forests.—s.—
636	Diospyros lanceæfolia, *Roxb.*	E. middling sized tree (T.)
637	Diospyros densiflora, *Wall.*	E ? small tree (Ar^1 M — T ∠ 500′). SS = Metam. Evergreen tropical forests. —s.—
638	Diospyros dasyphylla, *Kurz.*	Tree (M 4000′).
639	Diospyros Brandisiana, *Kurz.*	Tree (T.)

Current No.	Names.	Remarks.
640	Diospyros oleifolia, *Wall.* ချုပ်ပင် Ch*o*p p*i*n.	E. $\frac{40-60}{?+3-4}$ (M^s — T — 1000′). SS = Metam. Evergreen tropical forests. —s.— Sapwood white or yellowish white, heavy, fibrous, close-grained, soft.
641	Diospyros variegata, *Kurz.*	L^h $\frac{60-70}{30-40+4-6}$ (P — M — 1000′). SS = Si S., *Metam.* Moister upper mixed and evergreen tropical forests.—l.— Sapwood white, turning-greyish, heavy, fibrous but close-grained, soft.
642	Diospyros ramiflora, *Roxb.*	E. $\frac{40-50}{15-20+4-5}$ (C. Ar^2 ∠ 1500′). SS = Si S.—Evergreen tropical forests. —s.—
643	Diospyros Embryopteris, *Pers.* Fl. Sylv. Madr. t. 69.	E. $\frac{40-60}{?}$ (M — T).
644	Diospyros Toposia, *Ham.*	Tree (C.)
645	Diospyros Kurzii, *Hiern.* မောင် M*ou*ng.	E. $\frac{50-60}{25-30+3-4}$ (An^s — 1000′). SS = Si S., &c. Evergreen tropical forests. —s.— Wood greyish, the heartwood small, ebony-like, close-grained, heavy black, or the grey wood interlaid with black wood layers and then called marble wood.
646	Diospyros Birmanica, *Kurz.* တယ်ပင် T*e* p*i*n.	L^h $\frac{50-60}{20-30+4-6}$ (Pr^4 P^s — M^s —500′). SS = Dil., Ca S. Dry and open forests. —l.—
647	Diospyros flavicans, *Hiern.*	Small tree (T.)
648	Diospyros pyrrhocarpa, *Miq.*	E. $\frac{50-60}{?+6-8}$ (An^2 — 0′). SS = Si S., chloritic rocks, &c. Evergreen tropical forests.—s.—
649	Maba buxifolia, *Pers.* မှဲ့ပြောင် M*e* p*i* *ou*ng.	E. Little tree (T.) Wood dark-coloured, hard and durable.
650	Maba Merguensis, *Hiern.*	Small tree (T.)

Current No.	Names.	Remarks.
	STYRACEÆ.	
651	Symplocos spicata, *Roxb.*	E. (T.) Wood close-grained, light, perishable.
652	Symplocos lucida, *Wall.*	E. small tree. (M^3 5000-7000′). SS = Metam. Drier hill-forests.—l.—
653	Symplocos polycarpa, *Wall.*	E. small tree. (M^3 — T 4000-5000′) SS = Metam. Drier hill-forests.—l.—
654	Symplocos racemosa, *Roxb.*	E ? $\frac{20 - 25}{? + 1 - 1\frac{1}{2}}$ (Pr^3 P^2 M^3 ∠ 2000′). SS = Metam., Lat., Argyll. Open and dry forests.—l.— Wood yellowish, strong and compact. Used for furniture. Bark yields red-dye.
655	Symplocos pedicellata, *Kurz.*	E. $\frac{30 - 40}{10 - 15 + 3 - 4}$ (M^2 — 1000′). SS = Metam. Evergreen tropical forests. —s.— Wood very pale brown, rather light, close-grained, soft.
656	Symplocos sulcata, *Kurz.*	E. $\frac{15 - 25}{?}$ (M^3 — T 3000-6000′). SS = Metam. Drier hill-forests.—l.—
657	Symplocos ferruginea, *Roxb.*	E. small tree (T.)
658	Symplocos leiostachya, *Kurz.*	E. small tree (T.)
659	Symplocos caudata, *Wall.*	E. tree (C. T.)
660	Symplocos cratægoides, *D. Don.*	E. ? (M.)
661	Symplocos leucantha, *Kurz.* ထလဲ *Thá le.*	E. $\frac{20 - 25}{? + \frac{3}{4} - 1}$ (P — 0′). SS = All. Swamp-forests.—s.—
662	Styrax rugosum, *Kurz.*	E. (T.)

Current No.	Names.	Remarks.
663	Styrax serrulatum, *Roxb.*	E. small tree (C. T.) Yields gum benjamin or benzoin of inferior quality.
664	Styrax virgatum, *Wall.*	E. (A ?). Yields gum benjamin or benzoin of inferior quality.
	JASMINEÆ.	
665	Nyctanthes Arbor-tristis, *L.* Fl. Sylv. Madr. t. 240. ဆိတ်ဘလူး *Sait bá lu.*	E ? $\frac{15 - 20}{?}$ (A P' — 500′). SS = Ca S. Lat. Eng and dry forests.—l.—
666	Schrebera swietenioides, *Roxb.* Fl. Sylv. Madr. t. 248. ဟင်ဂုပ် H*in* g*o*p. သစ်ဆွဲလွဲ Th*i*t sw*e* l*u* *e*.	L^h $\frac{40 - 60}{10 - 30 + 3 - 5}$ (P^3 — M^2 — 1000′). SS = *Si S.*, All. Mixed forests.—s × l.— Wood grey or brown, very close-grained, heavy, hard and durable. Said not to warp or bend.
667	Ligustrum robustum (*Phillyrea robusta, Roxb.*)	Large tree. (C. A. P. T.)
668	Olea dentata, *Wall.*	E ? $\frac{40 - 60}{? + 3 - 4}$ (Ps M^4 — T ∠ 3000′). SS = *Metam.*, Lat. p. Evergreen tropical and hill eng-forests, also drier hill-forests. —l.— Wood pale brown or white, turning darker-brown, very heavy, rather coarse fibrous but close-grained.
669	Olea dioica, *Roxb.*	Rather large tree (C.)
670	Olea terniflora (*Linociera terniflora, Wall.*)	E. $\frac{30 - 40}{? + 3 - 4}$ (C P^3 M^2 — T ∠ 1500′). SS = Metam., Si-S. Evergreen tropical and moister upper mixed forests.—s.— Wood pale brown, rather heavy, close-grained, of an unequal fibre, but soft.

Current No.	Names.	Remarks.
671	Chionanthus ramiflorus, *Roxb.*	E. $\frac{20 - 25}{? + 1 - 1\frac{1}{2}}$ (An[s] — 0′). SS = Si S. Coast-forests.—s.—
672	Chionanthus macrophyllus, (*Linociera macrophylla, Wall.*)	Small tree. (A. T.)
673	Chionanthus insignis, *Miq.*	E. small tree. (M. T. 1500-2500′). SS = Metam. Hill Eng forests.
	APOCYNEÆ.	
674	Thevetia neriifolia, *Juss.* ပရောင်းပန်း *Pá young pán.*	E. $\frac{15 - 20}{6 - 10 + 1 - 1\frac{1}{2}}$ (A — T An. cult.) Cultivated only.
675	Cerbera Odallam, *Gærtn.* ကလွာ *Ká lu á.*	E. $\frac{40 - 50}{10 - 15 + 3 - 4}$ (C Ar. — T An[s] —0′). SS = Sal. Littoral forests.—l.— Wood white, very soft and spongy. Seeds yielding an oil for lamps.
676	Ochrosia salubris, *Bl.*	E. $\frac{20 - 25}{15 - 20 + 3 - 4}$ (An[s] — 0′). SS = Sal. Tidal forests.—l.—
677	Plumeria acutifolia, *Poir.* တရုပ်စကား *Tá yop sá ká.*	L. $\frac{15 - 25}{4 - 5 + 2 - 3}$ (A — T). Cult. only Yields an inferior sort of caoutchouc.
678	Alstonia scholaris, *RBr.* Fl. Sylv. Madr. t. 242. တောင်မဲအုပ် *Toung me op.* တောင်စကား *Toung sá ká.* လက်ထုပ် *Lak top.*	E. $\frac{50 - 60}{15 - 20 + 4 - 6}$ (Pr[s] M — T —1000′). SS = Ca S., Lat., Metam. Open, dry and upper mixed forests. Wood white or pale-coloured, light, close-grained but rather coarse, very perishable and soon attacked by xylophages. Used for light work, such as boxes, trunks, scabbards, writing boards, &c. It is as bitter as gentian and the bark is said to be a powerful tonic.

Current No.	Names.	Remarks.
679	Holarrhena Codaga, *G. Don.* လက်ထုပ်သိန် L*a*t to*p* th*e*in. (Let-kop dein) S. K.	L. $\frac{15 - 20}{8 - 12 + 2 - 3}$ (C A Pr^4 — P^2 ∠ 1000′). SS = Si S. Upper drier mixed forests.—s + l.—
680	Holarrhena antidysenterica, *Wall.* လက်ထုပ်ကြီး L*á*k top k*í*. (Let-kop gyí) S. K.	L. $\frac{25 - 30}{4 - 6 + 2 - 3}$ (C Pr P — T — 1000′). SS = Ca S., Lat., Argyll. Dry and open forests.—l.— Yields the conessi bark of commerce.
681	Wrightia mollissima, *Wall.* လက်ထုပ်သိန် L*a*k top th*ai*n. လက်ထုပ်သိန် L*a*t top th*ei*n. တောင်စလပ် T*ou*ng z*á* l*á*p.	L^h $\frac{40}{10 - 12 + 3 - 5}$ (C A P^4 — T ∠ 2000′). SS = Si S. Lower and upper mixed forests.—s + l.— Wood yellowish, rather light, close-grained, soft. □′ = 55 pd.
682	Wrightia tinctoria, *RBr.* Fl. Sylv. Madr. t. 241.	E? $\frac{40}{10 - 15 + 3 - 4}$ (Burma). Wood beautifully white, close-grained, hard, resembling ivory. Good for turning. Leaves said to yield an inferior kind of indigo.
683	Wrightia coccinea, *Sims.*	E? $\frac{40 - 50}{10 - 20 + 3 - 5}$ (C.) Wood white, very light, but firm. Much used by turners for making palkees.
	LOGANIACEÆ.	
684	Buddleia Asiatica, *Lour.* ကြောင်မိကူ K*i* *ou*ng m*í* k*u*.	E. $\frac{15}{?}$ (A Pr^5 — T An — 2000′). SS = ∞. *Si S.* Deserted toungyas and savanah forests chiefly.—l.—

Current No.	Names.	Remarks.
685	Fagraea fragrans, *Roxb.* အနန်း *A* nán.	E ? $\frac{25 - 30}{10 - 12 + 3 - 4}$ (T^4). Eng and Hill Eng forests. Wood yellow or light-brown, white streaked. W = $\frac{400\text{-}500}{?}$ pd. Said to be imperishable if exposed to water and *Teredo navalis* will not attack it. Used for house-building, posts, piles for bridges and wharves. Recommended for railway sleepers.
686	Fagraea obovata, *Wall.* သကြားလက်ဝါး Th*á* ki *á* l*a*k w*á*. ညောင်ကြပ် N*i* *ou*ng ki *á*p.	E. $\frac{30 - 35}{? + 3 - 4}$ stem-clasping. (C P^2 M^3 — T — 1000′). SS = Metam., Si S. Evergreen tropical forests.
687	Fagraea racemosa, *Jack.*	E. $\frac{40 - 50}{10 - 15 + 3 - 4}$ stem-clasping (An^3 — 1000′). SS = Si S. Evergreen tropical forests.—s : l.—
688	Strychnos nux-vomica, *L.* ခပေါင်း K*i* p*ou*ng.	L^h $\frac{30 - 40}{12 - 15 + 3 - 4}$ (A Pr^3 P^5 — T ∠ 2000′). SS = ∞. Si S. Leaf-shedding forests.—l.— Wood white or grey, close-grained and hard. □′ = 52 pd. Used for plough-shares, cart-wheels, also for making cots and fancy cabinet work. The tree produces the poison nut or nux vomica of commerce.
689	Strychnos potatorum, *L. f.*	L^h $\frac{25 - 30}{10 - 12 + 3 - 4}$ (Pr^3. — 500′). SS = Ca S., Dil. Open and dry forests.—l—. Wood greyish pale-brown, very heavy, close-grained, hard and durable, takes a beautiful polish. Good for plough-shares, wheels, &c. The seeds possess the quality of purifying muddy water.
690	Strychnos Wallichiana, *Steud.*	E. $\frac{25 - 30}{10 - 12 + 1\frac{1}{2} - 2\frac{1}{2}}$ (Ps^2 — 1000′). SS = Si S. Evergreen tropical forests—s.—

Current No.	Names.	Remarks.
	BORAGINEÆ.	
691	Cordia fragrantissima, *Kurz*. ကလားမက် K*á lá* m*a*k.	L. tree (M — T). Wood very fragrant and might possibly be used as a perfume, like the wood of *C. sebestena*.
692	Cordia polygama, *Roxb.*	Small tree. (M^3 1000-2000′). SS=Metam? Hill Eng forests.—l.—
693	Cordia brunnea, *Kurz*.	$L^h \frac{30 - 40}{10 - 15 + 3 - 4}$ (Pr^3 ∠ 1500′). SS = Ca S. Dry forests.—l.—
694	Cordia myxa, *L.* တောင်သနှပ် T*ou*ng th*á* n*á*t. သနှပ် Th*á* n*á*t. သနှပ် Th*á* n*á*p.	$L^h \frac{25 - 35}{10 - 15 + 3 - 4}$ (C. A. $Pr.^2$ P^3 — T ∠ 2000′). SS = ∞. *Si S.* Leaf-shedding forests.—s × l.— Wood white, turning greyish-yellow, light, fibrous but close-grained, soft. □′ = 33 pd. Of little use except for fuel.
695	Cordia grandis, *Roxb.* သနှပ် Th*á* n*á*p.	L. large tree. (C A P). Wood uniformily pale-brown, rather light, coarse fibrous, takes an indifferent polish.
696	Ehretia lævis, *Roxb.* Fl. Sylv. Madr. t. 246.	$L^h \frac{40 - 50}{15 - 20 + 3 - 4}$ (Pr^3 P^2 M^2 An^3 — 1000′). SS = Ca S., Dil., Metam., chloritic and serpentine rocks. Open and dry forests—l.— Wood pale-brown, heavy, fibrous but rather close-grained, the sapwood lighter coloured and soft, soon attacked by xylophages.
697	Ehretia serrata, *Roxb.*	E? $\frac{30 - 40}{15 - 20 + 3 - 4}$ (C A). Wood tough, rather light, durable, greyish, streaked, fibrous but close-grained, takes fine polish. Used for handles.

Current No.	Names.	Remarks.
	BIGNONIACEÆ.	
698	Millingtonia hortensis, *L. f.* Fl. Sylv. Madr. t. 249. ဧကရာဇ် *E ká rit.*	E. $\frac{70 - 80}{20 - 40 + 6 - 12}$ (A M^1 — 500′). SS = Metam. Evergreen tropical forests. Wood white or pale-yellow, rather heavy, coarse fibrous, but rather close-grained, takes fine polish. Bark used as an inferior substitute for cork.
699	Calosanthes Indica, *L.* ကြောင်ရပင် K*i oung yá* p*i*n.	L^h $\frac{25 - 40}{10 - 15 + 2 - 4}$ (C A Pr^4 — T An^3 — 2000′). SS = ∞. *Si S.* Chiefly mixed forests.—l.— Wood yellowish white, light, coarse-grained, takes indifferent polish. □′ = 23 pd.
700	Payanelia multijuga, *DC.* ကြောင်တောက် K*i oung* to*u*k.	E. $\frac{60 - 80}{20 - 50 + 4 - 7}$ (P^4 M^3 — T An^3 ∠ 1000′). SS = *Si S.*, Metam. Evergreen tropical and moister upper mixed forests. —s : l.— Sapwood yellowish white; heartwood brown, coarse, fibrous, somewhat heavy, rather close-grained.
701	Heterophragma adenophylla, *Seem.* ပက်သမ်း P*a*k th*á*m.	L^h $\frac{30 - 50}{10 - 25 + 3 - 6}$ (A P^3 — T An^3 ∠ 1000′). SS = *Si S.*, Metam. Upper mixed forests.—l.—
702	Heterophragma sulfurea, *Kurz.* ကြောင်ရလက်တို K*i oung yá* l*a*k t*o*. သစ်လင်းဓ Th*i*t l*i*n d*á*.	L^h $\frac{25 - 40}{10 - 25 + 3 - 5}$ (Pr^3 — P^3 — 500′). SS = Dil., *Ca S.* Open and dry forests. —l.—
703	Spathodea stipulata, *Seem.* မလွ M*á* l*u á*. မြားလွ M*i á* l*u á*.	L^h $\frac{30 - 40}{20 - 25 + 4 - 6}$ (A P^2 — M ∠ 1000′). SS = Metam., Lat., Si S.? Open and drier upper mixed forests.—l.— Wood pale brown, heavy, fibrous, close-grained. Used for bows and spear-handles, also for paddles and oars.

Current No.	Names.	Remarks.
704	Spathodea velutina, *Kurz.*	Tree. (A Pi).
705	Spathodea Rheedei, *Wall.* သခွတ်မ Th*a* kwot m*á*.	L? $\frac{40 - 50}{12 - 30 + 4 - 7}$ (Pr P^s — T An^s ∠ 1000′). SS = Si S., All., Metam. Lower and upper mixed forests.—l.—
706	Mayodendron igneum (*Spathodea ignea, Kurz.*)	E? $\frac{30 - 40}{10 - 18 + 4 - 6}$ (M^s 1000-3000′). = Metam. Evergreen tropical forests. —s.— Wood white turning pale greyish brown, soft, fibrous but close-grained.
707	Radermachera amœna, *Seem.*	Tree. (A).
708	Stereospermum chelonioides, *DC.* Fl. Sylv. Madr. t. 72. သခွတ်ဖို Th*á* kot po. သပွတ်ဖို Th*á* bot po.	L^h $\frac{40 - 60}{15 - 30 + 4 - 5}$ (C A — P^s — 1000′). SS = Si S., All. Mixed forests, especially lower ones.—l.— Wood highly orange yellow coloured, close and even grained, elastic and durable, soft, takes good polish. Used in house-building.
709	Stereospermum serrulatum, *DC.*	Tree. (A).
710	Stereospermum neuranthum, *Kurz.* သန္ဒေ သံဒေ Th*á*n d*e*. သဒေ Th*á* d*e*.	L^h $\frac{40 - 60}{12 - 30 + 3 - 6}$ (P^s ∠ 1500′). SS = *Si S.*, All. Lower and upper mixed forests.—l.— Wood pale greyish or reddish-brown, very close-grained, fibrous, rather heavy, tolerably soft. □′ = 33-36 pd.
711	Stereospermum suaveolens, *DC.*	L^h $\frac{30 - 40}{6 - 12 + 3 - 5}$ (M^s ∠ 500′). SS = Metam., Lat. Eng forests.—l.— Wood dark coloured and strong.

Current No.	Names.	Remarks.
712	Stereospermum fimbriatum, *DC.* သံသတ် Thán thát.	$L^h \frac{70-80}{30-50+6-8}$ (M^s — T ∠ 3000′). SS = Metam. Evergreen tropical forests. —s : l.—
	Acanthaceæ.	
713	Strobilanthes flava, *Kurz.* မျက်နှာပန်း M*i* *a*k ná pán. မြက်နှာဘန် M*i* ák ná bán.	E. $\frac{8-12}{1-2+\frac{1}{2}}$ (P^s — M^4 — 1000′). SS = Si S., Metam. Evergreen tropical forests. —s.— Wood very pale brown, rather heavy, close-grained.
714	Strobilanthes Simonsii, *T. And.*	E. $\frac{8-12}{3-4+\frac{1}{2}}$ (P^2 M^s — T 1000-3000′). SS = Si S., *Metam.* Evergreen tropical forests.—s.— Wood white (the heartwood medullary), rather light, very soft but close-grained, of a fine silky fibre.
	Verbenaceæ.	
715	Tectona grandis, *L.* Fl. Sylv. Madr. t. 250. ကျွန်းပင် K*i* *u*n pin.	$L^h \frac{70-100}{60-70+12-15}$ (A Pr^4 P^5 — T ∠ 3000′). SS = ∞ *Si S.* All leaf-shedding forests, especially the upper mixed ones.—l.— Wood pale brown, the heartwood darker coloured, rather light, rather close-grained, very hard but easy to work, strong and durable, while fresh rather oily, takes fine polish. W = $\frac{\square' = 40-50}{190-289}$. The teak is the best timber for ship and house-building, house-carpentry, &c. A good oil is obtained in Hindustan, used as a substitute of linseed oil in paints, yields also varnish. The leaves have been used and strongly recommended for dyeing silk yellow, olive, &c. (See Burt, Journ. of Asiat. Soc. Beng., Vol. VI. 242).
716	Tectona Hamiltoniana, *Wall.* တနပ် Tá Náp.	$L^h \frac{30-40}{8-15+3-4}$ (A P^s — 500′). SS = Ca S. Dry forests.—l.— Wood uniformly pale brown, heavy, streaked, close-grained and fine fibrous, takes fine polish.

Current No.	Names.	Remarks.
717	Promna tomentosa, *Willd.* Fl. Sylv. Madr. t. 251. ကျုံမလင်း K*i* *o*ng m*a* l*i*n. ကျွမ်နုလျင် K*i* *u* *a*m n*a* l*i* *i*n. ကျွန်းပို K*i* *u*n po. (Kyún-nalín) S. K.	$E^h \frac{30-50}{15-30+3-5}$ (A Pr⁴ P³ — T ∠ 2000′). SS = Ca S, *Si S.*, Metam. Dry and upper mixed forests.—l.— Wood yellowish, hard, close-grained, rather heavy and strong, the annual rings obsolete. Used for weaving shuttles and recommended as good for fancy work.
718	Premna viburnoides, *Wall.*	L^h ? $\frac{30-40}{10-15+3-4}$ (A P³ — 500′). SS = Ca S. Dry forests.—l.—
719	Premna racemosa, *Wall.*	E. $\frac{25-30}{?+2-3}$ (T.)
720	Premna sambucina, *Wall.*	E ? $\frac{20-30}{6-15+2-3}$ (Ar³ — 500′). SS = Si S. Moister upper mixed forests. —s + l.—
721	Callicarpa arborea, *Roxb.* ဒေါင်ဆပ်ပျှာ D*ou*ng sap p*i* *á*.	L ? $\frac{25-35}{10-15+3-4}$ (C A P² M³ — T ∠ 4000′). SS = Metam., &c. Upper mixed forests, entering the drier hill forests.—l.— Wood white, rather light and soft, loose-grained, takes good polish.
722	Clerodendron infortunatum, *L.* ခအောင်ကြီး K*á* *ou*ng k*i*.	E. $\frac{12-15}{4-9+\frac{1}{2}-1}$ (C A P³ M⁴ — T An⁴ ∠ 3000′). SS = Metam., Si S., &c. Evergreen tropical and moister mixed forests.—s × l.— Wood yellowish white turning brownish, rather heavy, coarse fibrous, rather loose-grained, soft, soon attacked by xylophages.
723	Clerodendron villosum, *Bl.*	E. $\frac{15-20}{8-12+\frac{1}{2}-\frac{3}{4}}$ (M³ 2000-4000′). SS = Metam. Drier hill forests, and hill toungyas.—l.—

Current No.	Names.	Remarks.
724	Gmelina arborea, *Roxb.* Fl. Sylv. Madr. t. 253. ရမနဲ Yá má ne.	$L^h \frac{50-60}{12-30+6-12}$ (C A Pr^4 — T An^3 ∠ 3000′). SS = *Metam.*, *Si S.*, Ca S., &c. Upper mixed forests and evergreen tropical forests.—l.— Wood white, light, resembling mutchi wood. □′ = 35 pd. Used often for making canoes and boats, also for house-posts, planks, clogs and for carving images. Recommended for furniture.
725	Gmelina Asiatica, *L.*	L ? $\frac{25-30}{3-6+1-3}$ (Ps^3 — 0′). SS=All., Lat. p. Swamp forests and evergreen tropical forests,—s.—
726	Vitex canescens, *Kurz.*	L? $\frac{25-35}{10-12+1-3}$ (Pr^3 ∠ 1000′). SS = Dil., *Ca S.* Open and dry forests. —l.—
727	Vitex heterophylla, *Roxb.*	E? $\frac{30-50}{12-30+3-5}$ (Ps^3 M^3 — T — 1000′). SS = *Metam.*, Si S. Evergreen tropical forests.—s.—
728	Vitex pubescens, *Vhl.* ကြက်ယို Ki *ak* yo. (Kyet-yo.) S. K.	E. $\frac{30-40}{12-20+3-4}$ (P^2 M^3 — T An^3 — 1000′). SS = Metam., Si S., &c. Evergreen tropical and upper mixed forests. —s × l.—
729	Vitex limonifolia, *Wall.*	L? $\frac{30-50}{10-20+3-4}$ (A — Pr^3 — 1000′). SS = Ca S., Lat. Eng and dry forests. —l.—
730	Vitex alata, Rottl. (*non Heyne*). ကြက်ရိုး Ki *ak* yo. ကြက်ရိုး Ki *ak* yo. (Kyet-yo) S. K.	L & E? $\frac{40-80}{15-50+6-8}$ (Pr^3 P^1 M^4 — T — 2000′). SS = *Metam.*, &c. Upper mixed and evergreen tropical forests chiefly.—s : l.— Wood yellowish or light-brown, clouded, close-grained, rather heavy, soft but strong. □′ = 45 pd. Used chiefly for wooden bells for cattle and handles.

Current No.	Names.	Remarks.
731	Vitex vestita, *Wall.*	Tree (A.)
732	Vitex Leucoxylon, *L. f.* ထောက်ရှာ T*o*uk shá.	$L^h \frac{30-60}{15-30+3-12}$ (C P^4 — T ∠ 1000′). SS = *Si S.*, All. Mixed forests, especially savannah forests.—l.— Wood uniformly pale-greyish-brown, rather heavy and close-grained, soft, durable, takes fine polish, the annual rings obsolete. W = $\frac{\square' = 42}{142}$ pd. Used for cart-wheels and recommended for furniture.
733	Avicennia officinalis, *L.* သမဲ့ Th*á* m*e*.	E. $\frac{25-40}{10-15+3-4}$ (C Ar^3—T An^4—0′). SS = Sal. Tidal forests.—l.—
734	Avicennia tomentosa, *Roxb.*	E. $\frac{20-35}{10-15+3-4}$ (C Ar^4 — T — 0′). SS = Sal. Tidal forests.—l.—
	NYCTAGINEÆ.	
735	Pisonia umbellifera, *Seem.*	E ? $\frac{30-50}{15-20+4-6}$ (An^3 — 0′). SS = Aren. Sal? Beach and coast-forests.—s.—
736	Pisonia alba, *Span.*	E ? $\frac{30-40}{15-20+2-4}$ (An^3 — 0′). SS = Aren. Beach forests.—s.—
	PHYTOLACACEÆ.	
737	Coriaria Nepalensis, *Wall.*	E. $\frac{10-16}{?}$ (A).
	MYRISTICACEÆ.	
738	Myristica longifolia. *Wall.* ဇါဒိပ်ဖို Z*a* d*a*ip po. မးတော်ဘို M*a* to bo.	E. $\frac{60-70}{25-30+4-5}$ (C P^2 M^3 — T ∠ 1000′). SS = Si S., Metam. Evergreen tropical forests.—s.— Wood whitish turning pale-brown, rather heavy, fibrous, soon attacked by xylophages. Exudes red resin.
739	Myristica corticosa, *Hf. et Th.* Fl. Sylv. Madr. t. 271. သစ်တန် Th*i*t tán.	E. $\frac{40-50}{?+3-4}$ (C P^3 M^2 — T ∠ 1000′). SS = Si S., Metam. Evergreen tropical forests.—s.— Wood brown or red, rather light, coarse fibrous, rather close-grained, soon attacked by xylophages. Yields red resin.

Current No.	Names.	Remarks.
740	Myristica Irya, *Gærtn.*	E. $\frac{30 - 40}{? + 2 - 3}$ (T An^{s} — 1000′). SS Chloritic and serpentine rocks. Evergreen tropical forests.—s.—
741	Myristica amygdalina, *Wall.*	E. $\frac{40 - 50}{? + 2 - 4}$ (Ps M^{s} — T — 1500′). SS = Lat. p., *Metam.* Evergreen tropical forests.—s.— Wood white, coarse fibrous, light, very perishable, soon attacked by xylophages.
	LAURINEÆ.	
742	Cinnamomum Zeylanicum, *Breyne.* Fl. Sylv. Madr. t. 262. လုလင်ကြော် *Lu* lin k*i o.*	E. (T.) Yields the true cinnamom of commerce, the root yields camphor, the liber oil of cinnamom, the leaves oil of clove and the fruit a peculiar terebintaceous ethereal oil.
743	Cinnamomum iners, *Rwdt.* လုလင်ကြော် *Lu* lin k*i o.* လင်ကြို L*i*n g*i o.*	E. $\frac{40 - 60}{? + 3 - 4}$ (T.) Evergreen tropical forests.—s × 1.—
744	Cinnamomum obtusifolium, *NE.* အင်တိုင်စိရာ *In tain sí yá.* လုလင်ကြော် *Lu* lin k*i o.*	E. $\frac{30 - 50}{? + 3 - 4}$ (C A P^{s} — T An^{s} ∠ 2500′). SS = Lat. p., Si S., *Metam.* Evergreen tropical and moister upper mixed forests. —s.— Wood whitish, turning pale-brown or brown on exposure, rather heavy, fibrous but close-grained. The bark of the roots is a good substitute for genuine cinnamom.
745	Cinnamomum sulphuratum, *NE.*	E. (T.)
746	Cinnamomum Parthenoxylon, *Meissn.*	L? (T.) This is the so-called Martaban camphor-wood.
747	Cinnamomum inunctum, *Meissn.*	Tree (T.)

Current No.	Names.	Remarks.
748	Phoebe lanceolata, *NE.*	E. middling-sized tree. (M^s — T ∠ 3000′). SS = Metam. Evergreen tropical and drier hill forests.—s.—
749	Phoebe pubescens, *NE.* တောင်ကညင် Toung ká ni in.	E. $\frac{30-40}{?+2-3}$ (C A P^4 — T — 1000′). SS = Si S., Metam., &c. Evergreen tropical forests.—s.— Wood yellowish, turning pale-brown, rather heavy, close-grained, soft, soon attacked by xylophages.
750	Phoebe villosa, *Wight.*	E. large tree. $\frac{?}{?+4-5}$ (C.)
751	Machilus Indica, *Kurz.* (*M. odoratissima, NE.*)	E? $\frac{80-120}{?+6-9}$ (M^s 3000-7000′). SS = Metam. Damp hill-forests.—s.—
752	Machilus Tavoyana, *Meissn.*	E? (T.)
753	Machilus rimosa, *Bl.*	Tree (T.)
754	Alseodaphne grandis, *NE.*	E? $\frac{60-90}{30-40+4-10}$ (Ps^s M^s — T ∠ 1000′). SS = Lat. p., *Metam.* Evergreen tropical forests.—s.— Wood yellowish, turning brown on exposure to air, heavy, fibrous, rather loose-grained.
755	Beilschmiedia Roxburghiana, *NE.* ရှော်ထူပင်း Sho tu pin.	L^h $\frac{50-120}{25-60+4-9}$ (P^s M^s An^s ∠ 2000′). SS = Metam., Si S., &c. Evergreen tropical and moister upper mixed forests. —s : l.—
756	Beilschmiedia globularia, *Kurz.*	L? $\frac{40-50}{15-30+3-4}$ (M^s 3000-4000′). SS = Metam. Drier hill-forests.—l.—
757	Beilschmiedia macrophylla, *Meissn.*	Tree (T.)

Current No.	Names.	Remarks.
758	Cryptocarya ferrea, *Bl.*	E. $\frac{20 - 35}{?}$ (T.)
759	Cryptocarya Griffithiana, *Wight.*	E ? small tree (T.)
760	Endiandra ? Candolleana (*Dictyodaphne ? —Meissn.*)	Tree (T.)
761	Tetranthera tomentosa, *Roxb.*	Tree (A.)
762	Tetranthera laurifolia, *Jacq.* အုံဒုံ *Ong Dong.*	E. $\frac{40 - 60}{? + 3 - 5}$ (A Pr^3 P^3 — T An^2 ∠ 1000′). SS = ∞. Metam. Lat. Moister evergreen forests, and (a var.) eng-forests. —l. × s.—
763	Tetranthera Rangoonensis, *Meissn.*	Tree (P.)
764	Tetranthera longifolia, *NE.*	Tree (T.)
765	Tetranthera grandis, *Wall.*	E. $\frac{30 - 40}{12 - 15 + 2 - 3}$ (P^2 M^3 — T 1000′). SS = *Metam.*, Si S., &c. Evergreen tropical forests.—s.— Wood yellow with a beautiful lustre, rather heavy, close-grained, very soft. A fine fancy wood.
766	Tetranthera monopetala, *Roxb.* အုံတုံ *Ong tong.*	L^h $\frac{40 - 50}{10 - 25 + 3 - 6}$ (P^4 M^3 — T An^3 ∠ 1000′). SS = *Si S.*, Metam., &c. Chiefly evergreen tropical and mixed forests.—s × l.— Wood white, rather light, fibrous, soon attacked by xylophages.
767	Tetranthera amara, *NE.*	E. $\frac{20 - 30}{? + 1\frac{1}{2} - 2}$ (P^2 M^3 — T An^3 — 1000′). SS = Metam., Si S., &c. Evergreen tropical forests.—s.— Wood very pale-brown, turning darker on exposure to air, rather heavy, fibrous but close-grained, rather soft, soon attacked by xylophages.

Current No.	Names.	Remarks.
768	Tetranthera Panamonja, *NE.*	E. large tree (T.)
769	Tetranthera nitida, *Roxb.*	L. (P M^2). SS = Lat. p. Evergreen tropical forests..
770	Tetranthera calophylla, *Kurz.*	E. $\frac{25-35}{?}$ (M — T 4000-6000′). SS = Metam. Drier hill-forests.—l.—
771	Tetranthera albicans, *Kurz.*	E. $\frac{20-25}{?+1}$ (P^2 — 1000′). SS = Si S. Evergreen tropical forests.—s.— Wood white, soft.
772	Tetranthera semecarpifolia, *Wall.*	E. $\frac{25-30}{?}$ (P^2 M^3 — 1000′). SS = *Metam.*, Si S. Evergreen tropical forests. —s.— Wood yellowish or pale-brown, soft.
773	Tetranthera myristicaefolia, *Wall.*	E. small tree. (P M — T ∠ 1000′). SS = *Metam.*, Lat. p. Evergreen tropical forests.—s.—
774	Litsaea angustifolia (*Actinodaphne—NE*) ဆေသုံသက် Se thong thak.	E. large tree. (P^2 M^3 — T — 1000′). SS = Si S., Metam. Evergreen tropical forests.—s.—
775	Litsaea concolor (*Actinodaphne—NE.*)	Tree (T.)
776	Litsaea macrophylla, *Bl.*	Tree (T.)
777	Litsaea leiophylla, *Kurz.*	Tree (T.)
778	Litsaea foliosa, *NE.*	E. $\frac{40-50}{?+3-4}$ (C M^3 3000-7000′). SS = Metam. Damp hill-forests.—s.—

Current No.	Names.	Remarks.
779	Daphnidium pulcherrimum, *NE.*	E. (M[3] ∠ 6000′). SS = Metam. Drier hill-forests.—l.—
780	Daphnidium caudatum, *NE.*	E. $\frac{25-30}{?+2-3}$ (M[4] — T ∠ 4000′). SS = Metam. Drier hill-forests.—l.—
781	Daphnidium argenteum, *Kurz.*	L[h] $\frac{30-40}{10-15+3-5}$ (P — M — 500′). SS = Lat., Metam., Arg. Low and Eng-forests.—l.— Wood yellowish turning pale greyish-brown, rather heavy, fibrous, rather close-grained, tolerably soft, soon attacked by xylophages.
782	Lindera Assamica, (*Aperula—Meissn.*)	Tree (M.)
783	Lindera nervosa, Kurz. (*Tetranthera chartacea β. nervosa, Meissn.*)	Tree (Ar. T. — 1000′). Evergreen tropical forests. Yields sassafras.
784	Lindera Neesiana (*Aperula—Bl.*)	L? $\frac{25-30}{?+1\frac{1}{2}-2\frac{1}{2}}$ (M[3] — T 4000-5000′). SS = Metam. Drier hill forests.—l.— Yields excellent sassafras.
785	Hernandia peltata, *Meissn.* Fl. Sylv. Madr. t. 300.	E. $\frac{40-50}{25-20+5-12}$ (An[4] — 0′). SS = Aren. Beach and coast-forests. Wood so very light and takes fire so readily, that it might be used for tinder.
	PROTEACEÆ.	
786	Helicia robusta, *Wall.* Fl. Sylv. Madr. t. 301. ေတာက်ရပ်ပင် Douk *yap pin.*	E. $\frac{30}{?+3}$ (M[3] — T 2000-4000′). SS = Metam. Hill-forests.—l.—
787	Helicia pyrrhobotrya, *Kurz.*	E. (M 4000′). SS = Metam. Damp hill-forests.
788	Helica excelsa, *Bl.*	E. $\frac{?}{?+4}$ (C T).

Current No.	Names.	Remarks.
789	Helicia salicifolia, *Presl.*	Tree (T.)
790	Helicia Cochinchinensis, *Lour.*	E. $\frac{40}{? + 3 - 4}$ (M^4 5000-7000′). SS = Metam. Hill-forests.—1.—
	THYMELAEACEÆ.	
791	Gyrinops Walla, *Gaertn.*	E. $\frac{70}{?}$ (An.)
792	Aquilaria Malaccensis, *Lank.*	E. small tree (T ?)
793	Aquilaria Agallocha, *Roxb.*	E. (M.) Wood very light, yellowish white, coarse-fibrous but close-grained, takes a pale-brown polish. Used by the Karens for bows. Furnishes that sort of commercial Eagle wood called by the Malays *Kayu garu.*
	ELAEAGNACEÆ.	
794	Elaeagnus arborea, *Roxb.* မင်းဂုဝ် M*i*n gok.	E ? $\frac{20 - 35}{2 - 4 + 2 - 3}$ (A — P^3 — 1000′). SS = Si S., Lat. p., &c. Evergreen tropical forests chiefly.—s.— Wood white, soft.
	SANTALACEÆ.	
795	Santalum album, *L.* Fl. Sylv. Madr. t. 256. စန္ဒကူး S*á*n t*á* k*u*.	E. $\frac{30 - 40}{8 - 15 + 3 - 4}$ (C. cult. ?). Wood white or yellowish. The young trees furnish the white, the old ones the yellow sandal wood, burnt as a perfume. Ground into powder it forms a favorite cosmetic with Burmese ladies. A valuable oil used as perfume is distilled from the wood. In Hindoostan it is also employed for trunks, cabinets, work-boxes and walking sticks.
	EUPHORBIACEÆ.	
796	Glochidion multiloculare, *Muell. Arg.*	E. $\frac{20}{6 - 8 + \frac{3}{4} - 1}$ (A.)
797	Glochidion coccineum, *Muell. Arg.* ထမင်းစုပ် T*á* m*á* zop.	E. $\frac{25 - 30}{2 - 3 + 2 - 3}$ (Pr^3 P^3 M^3 — T ∠ 1000′). SS = ∞. *Si S. All.* Deciduous forests, especially the mixed ones. —1.—

Current No.	Names.	Remarks.
798	Glochidion lanceolarium, *Dalz.*	E. $\frac{25 - 30}{8 - 12 + 2 - 3}$ (C M² — 0). SS = Metam. Evergreen tropical forests. Wood hard and durable, used in native house-building.
799	Glochidion dasystylum, *Kurz.*	E. $\frac{15 - 20}{\text{short} + 1 - 1\frac{1}{2}}$ (M⁸ ∠ 3500′). SS = Metam. Evergreen tropical and hill-forests.—s.—
800	Glochidion leiostylum, *Kurz.*	E. small tree. (Ps⁸ M⁸ — T ∠ 4000′). SS = *Metam.* Si S. Evergreen tropical and hill-forests.—s.—
801	Glochidion fagifolium, (*Phyllanthus—Muell. Arg.*) ထယင်းဆုပ်ကြီး Tá min sop ki.	E. $\frac{20 - 25}{\text{short} + 1 - 1\frac{1}{2}}$ (C Ps⁸ — M ∠ 1000′). SS = Si S., Metam. Evergreen tropical forests.—s.—
802	Glochidion Andamanicum, *Kurz.*	E. $\frac{25}{8 - 10 + 1 - 1\frac{1}{2}}$ (An² — 0). SS = Si S. Evergreen tropical forests.—s.—
803	Glochidion glaucifolium, *Muell. Arg.*	E. small tree (T).
804	Glochidion Bancanum, *Miq.*	E. $\frac{20 - 25}{8 - 10 + 1 - 1\frac{1}{2}}$ (An² — 0). SS = Chloritic rocks. Bamboo-jungles.—s.—
805	Glochidion sphaerogynus, (*Phyllanthus—Muell. Arg.*)	E. $\frac{25 - 30}{8 - 10 + 2 - 3}$ (Ps⁸ M⁸ — T ∠ 2000′). SS = Metam. Si S. Evergreen tropical forests.—s.— Wood brown, heavy, fibrous but close-grained, soft, perishable.
806	Glochidion Daltoni, (*Phyllanthus—Muell. Arg.*)	Lʰ small tree (Pr² M — 1000′). SS = *Aren. Dil.*, Metam. Low and dry forests. —l.—

Current No.	Names.	Remarks.
807	Phyllanthus columnaris, *Muell. Arg.* ကလုံလက်သဲ (K*á* l*o*ng l*a* th*e*) S. K.	$L^h \frac{20-25}{10-12+1-2\frac{1}{2}}$ ($P^s M^s$ — T ∠ 1000′). SS = All. Si S. *Arg. Lat. Dil.* Mixed, low and Eng-forests.—l.—
808	Phyllanthus baeobotryoides, *Muell. Arg.*	Small tree (T).
809	Breynia rhamnoides, *Muell. Arg.*	L^h small tree (Ar^s — An^s — 0). SS = *Si S.* All. Savannah-forests.—l.—
810	Cicca disticha, *L.* သင်္ဘောဇီးဖြူ Th*i*n b*o* z*í* p*i* *u*.	$L^h \frac{25-30}{8-10+2-3}$ (C $P^s M^s$ — T cult. ∠ 1000′). SS = *All.*
811	Cicca albizzioides, (*Emblica—Kurz.*) ရှားမ၊ ရှစ်ရှား Sh*á* m*á* or sh*i*t sh*á*.	$L^h \frac{25-30}{short+1-1\frac{1}{2}}$ (Pi^s ∠ 2000′). SS = Si S. Upper mixed forests.—l.—
812	Cicca macrocarpa, (*Emblica—Kurz.*) ဇီးဖြူ Z*í* p*i* *u*.	$L^h \frac{20-25}{small+\frac{1}{2}-1}$ (Pr^s — Pi^s ∠ 1000′). SS = Lat. Ca S. Dry and Eng forests. —l.—
813	Cicca Emblica, (*Emblica officinalis, Gaertn.* Phyllanthus Emblica; Fl. Sylv. Madr. t. 258.) တရှားပင် T*á* sh*á* p*i*n.	$L^h \frac{30-40}{10-15+3-4}$ (C A Pr^s — T ∠ 3000′). SS = ∞. Deciduous forests, chiefly dry and open ones, entering the hill Eng and dry hill-forests.—l.— Wood brown, rather heavy, rather close-grained, the annual rings narrow, takes fine polish. W. = □′ = 35 pd. Bark and fruits used for tanning.
814	Securinega Leucopyrus, *Muell. Arg.*	Small tree (A ?).
815	Securinega obovata, *Muell. Arg.*	$L^h \frac{12-15}{short+\frac{2}{3}-1}$ (C A Pr^s — T — 0). SS = All. Savannah forests.—l.—

Current No.	Names.	Remarks.
816	Bischoffia Javanica, *Bl.* Fl. Sylv. t. 259.	L[h] $\frac{30 - 40}{12 - 18 + 2 - 4}$ (Ar[s] P[s] M[s] A — T ∠ 2500′). SS = All., Si S., Metam. Evergreen tropical forests and savannahs along hill-streams.—l.— Wood rather light, brown, coarse fibrous, but close-grained, takes fine polish. $W = \frac{\square' = 35}{153 - 170}$ pd.
817	Antidesma velutinosum, *Bl.*	E. $\frac{15 - 20}{8 - 10 + 1 - 2}$ (T).
818	Antidesma Ghaesembilla, *Gaertn.* ပြည့်စင် Pí sin.	L[h] $\frac{20 - 25}{4 - 8 + 1 - 2}$ (P[4] — M[s] — 0). SS = All. Savannah forests and tidal savannahs.—l.— Wood rather heavy, fibrous but close-grained, brittle, white or pale-coloured.
819	Antidesma velutinum, *Tul.* ကင်ပလင်း Kin pá lin.	E. $\frac{25 - 30}{8 - 15 + 2 - 3}$ (Ps[s] M[4]—T—1000′). SS = Si S., Metam. Evergreen tropical forests.—s.—
820	Antidesma Menasu, *Muell. Arg.* ကင်ပလင်း Kin pá lin.	L[h] $\frac{25 - 30}{8 - 12 + 2 - 3}$ (Ps[s] M[s] An[s] ∠ 1000′). SS = *Si S.* ∞. Evergreen tropical forests—s.— Wood brown, rather heavy, soft, of a fine and close grain.
821	Antidesma diandrum, *Roth.* ကင်ပလင်း Kin pá lin.	L[h] $\frac{12 - 20}{6 - 8 + 1 - 2}$ (C Pr[4] P[5] M[s] — T ∠ 2000′). SS = ∞ *All.* *Si S.* Mixed forests, especially lower ones.—l.— Wood rather heavy, red-brown or pale-brown, close-grained, takes fine polish. Adapted for cabinet work.
822	Antidesma Bunias, *Spreng.*	E. Small tree (T).
823	Aporosa macrophylla, *Muell. Arg.* အင်ကြင် *In jin.* အင်ကြင်း *In ki in.*	L[h] $\frac{20 - 25}{6 - 8 + 1 - 2}$ (Pr[s] P[s] — M[s] — T ∠ 1000′). SS = Lat. Eng forests. —l.—

Current No.	Names.	Remarks.
824	Aporosa villosa, *Baill.* ရေမိန် *Ye mein.*	Lʰ $\frac{25 - 30}{8 - 15 + 1 - 2}$ (P¹ M¹ — T ∠ 1000′). SS = Lat. Arg. Open forests, especially Eng-forests.—l.— Exudes red resin.
825	Aporosa villosula, *Kurz.* သစ်ဆပ် Th*it* s*á*p.	E. $\frac{25 - 30}{8 - 12 + 2 - 2\frac{1}{2}}$ (Ps³ M³ — T An ∠ 1000′). SS = Lat. p. Evergreen tropical forests.—s.—
826	Aporosa Roxburghii, *Baill.*	E. $\frac{25 - 30}{8 - 12 + 2 - 3}$ (C P³ — T ∠ 1000′). SS = Si S., Metam. Evergreen tropical forests.—s.—
827	Aporosa lanceolata, *Thw.*	E. tree (T).
828	Aporosa microstachya, *Muell. Arg.*	E. $\frac{25 - 30}{8 - 12 + 2 - 3}$ (C A M — T ∠ 4000′). SS = Metam. Lat. p. Evergreen tropical forests.—s.—
829	Baccaurea sapida, *Muell. Arg.* Fl. Sylv. Madr. t. 280. ကနစို K*á* n*á* so.	E. $\frac{40 - 50}{15 - 25 + 3 - 5}$ (C A P³ — T An³ ∠ 1000′). SS = *Si S.*, Metam. Evergreen tropical forests, entering also the moister upper mixed forests.—s.— Wood very pale-brown, rather heavy, of a short fibre, rather coarse-grained, rather hard, perishable. W = □′ = 61 pd. Not used.
830	Baccaurea parviflora, *Muell. Arg.* ကနစိုး K*á* n*á* zo.	E. (T.)
831	Cyclostemon eglandulosum (*Hopea eglandulosa, Roxb.*)	E. $\frac{40 - 50}{15 - 20 + 3 - 4}$ (Ar¹ — 1000′). SS = Si S. Evergreen tropical forests.—s.—
832	Cyclostemon macrophyllum, *Bl.* Fl. Sylv. Madr. t. 278.	E. $\frac{30 - 36}{15 - 20 + 2 - 3}$ (An³ — 1000′). SS = Si S., Chloritic rocks. Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
833	Cyclostemon subsessilis, *Kurz.*	E. $\frac{25-30}{15-18+1\frac{1}{2}-2}$ (M^3 — 1000′). SS = Metam. Evergreen tropical forests. —s.— Wood brown, heavy, close-grained. A good wood.
834	Hemicyclia Sumatrana, *Muell. Arg.*	E. (Pi^2 — M^3 — 0′). SS = *All.* Swamp-forests.—s.— Wood heavy, pale-greyish-brown, coarse fibrous but close-grained, soft. A fine wood.
835	Putranjiva Roxburghii, *Wall.* Fl. Sylv. Madr. t. 275. တောက်ရပ် T*ou*k yáp.	E. (P). Wood heavy, white or greyish, black-spotted, close-grained, hard, strong and durable, takes good polish. Good for turning.
836	Briedelia retusa, *Spreng. Fl.* Sylv. Madr. t. 260. ဆိပ်ချေး T*s*eip ch*e*.	L^h $\frac{50-60}{20-30+5-6}$ (A — P^3 ∠ 2000′). SS = *Si S.*, All. Mixed forests, especially upper ones, entering savannah forests.—l.— Wood grey, with a beautiful mottled grain, heavy, rather close-grained. W = 66 pd. Priced for house-posts, ploughs, &c.
837	Briedelia ovata, *Dcne.*	E. small tree (T — An).
838	Briedelia tomentosa, *Bl.* ဘောင်ဘင်။ကြက်တရော် B*ou*ng b*i*n or K*ia*k *tá* *yo*. Also called le-ga-ní (S. K.)	E. $\frac{20-30}{\text{small}+\frac{1}{2}-\frac{3}{4}}$ (Ar^2 Pr^2 P^3 — T ∠ 2000′). SS = Ca S., Arg., Lat., Metam., All. Open and upper mixed forests. —l × s.— Wood pale-greyish-brown, heavy, close-grained, soft.
839	Briedelia amoena, *Wall.*	L^h $\frac{15-25}{\text{small}+1-2}$ (Pi).
840	Briedelia pubescens, *Kurz.* ကြက်တရော် K*i* *a*k t*a* *yo*.	E. $\frac{20-30}{8-12+2-3}$ (Ps^3 ∠ 1000′). SS = Si S. Evergreen tropical forests along choungs.—s.—

Current No.	Names.	Remarks.
841	Cleistanthus myrianthus (*Nanopetalum, Hassk.*)	E. $\frac{40-50}{12-20+3-4}$ ($P^s M^s - T \angle 1000'$). SS = Si S., Metam. Evergreen tropical forests.—s.— Wood rather heavy, pale-brown, soft, rather coarse fibrous.
842	Croton Joufra, *Roxb.*	L^h $\frac{30-40}{12-15+3-4}$ ($P^1 - M - 1000'$). SS = *Arg.* All. Low and lower mixed forests.—l.—
843	Croton Wallichii, *Muell Arg.*	L^h $\frac{30-40}{18-25+3-4}$ ($Ps^2 M^2 - T - 1000'$). SS = Si S. Metam. Evergreen tropical forests.—s.—
844	Croton oblongifolium, *Roxb.* သစ်ရင်း Th*i*t y*i*n.	L^h $\frac{30-40}{15-20+2-3}$ ($A\ Pr^2\ P^s - M^s \angle 2000'$). SS = *Si S., Metam.* Mixed forests, especially the upper ones.—l.— Wood yellowish white, rather heavy, fibrous but close-grained, soft, rather perishable.
845	Croton argyratus, *Bl.*	E. $\frac{25-30}{15-20+2-3}$ ($M^s - T$). SS = Metam. Evergreen tropical forests. —s.— Wood rather heavy, close-grained, of a fine silvery fibre, yellowish white, soft.
846	Croton robustus, *Kurz.*	E. $\frac{15-25}{\text{short}+2-3}$ ($Ps^s - T - 0'$). SS = Arg. Lat. p. Low forests.—l.—
847	Croton flocculosus, *Kurz.* သလဲပင် (Th*a*-la-p*i*n) S. K.	E? $\frac{20-25}{8-10+2-3}$ ($Pr^s\ Pi^2 - 0$). SS = All. Swamp-forests.—s.—
848	Croton Tiglium, *L.* ကနကို K*á* n*á* ko.	E. $\frac{15-20}{?+1\frac{1}{2}-2\frac{1}{2}}$ (C A — T cult.) SS = *All.* Wood white, hard.

Current No.	Names.	Remarks.
849	Sumbavia macrophylla, *Muell. Arg.*	E. $\frac{25 - 35}{8 - 15 + 2 - 3}$ (Ps³ M² — T — 1000′). SS = Si S., Metam. Evergreen tropical forests.—s.—
850	Agrostistachys longifolia, (*A. Indica β. longifoliá, Muell. Arg.*)	E. (T ?).
851	Aleurites Moluccana, *Willd.* Fl. Sylv. Madr. t. 276.	E. $\frac{40 - 60}{20 - 30 + 5 - 6}$ (P² T³ — 0′ cult.) Exudes gum, especially from the fruits. Seeds produce about 50 p/c. of a lamp-oil called Kekuna in Hindustan, and plenty of oil-cake.
852	Trewia nudiflora, *L.* Fl. Sylv. Madr. t. 281. ရေမြိုတ် Ye *mi ot.*	Lʰ $\frac{60 - 70}{30 - 40 + 9 - 10}$ (C P³ — M³ — 1000′). SS = ∞. *Si S.* Evergreen tropical and moist upper mixed forests.—s × l.— Wood white, turning yellowish, rather heavy, coarse fibrous but close-grained, soft.
853	Mallotus Roxburghianus, *Muell. Arg.*	E. $\frac{20 - 25}{8 - 10 + 2 - 3}$ (C M² — 1000′). SS = *Metam.* Evergreen tropical forests. —s.—
854	Mallotus tetracoccus, *Kurz.*	E. $\frac{30 - 40}{15 - 20 + 3 - 4}$ (C.)
855	Mallotus paniculatus, *Muell. Arg.*	E. $\frac{30 - 40}{12 - 20 + 4 - 5}$ (Ps² M — T — 1000′). SS = *Si S.* Metam. Evergreen tropical forests.—s.—
856	Mallotus Helferi, *Muell. Arg.*	E. $\frac{20 - 25}{8 - 10 + 1\frac{1}{2} - 2}$ (P³ M⁴ — T An³ ∠ 1000′). SS = Si S., *Metam.* Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
857	Mallotus Philippinensis, *Muell. Arg.* Fl. Sylv. Madr. t. 289. တောဝတိတင်း Tou *tí* tín.	E. $\frac{25 - 30}{8 - 15 + 3 - 4}$ (C A P^s — T An^2 — 2000′). SS = *Dil.* Si S. Metam. Deciduous forests generally, especially the open ones.—l.— Bark used for tanning; root a red dye; the crimson powder of the capsules (kapli or kamila-powder) form a scarlet dye chiefly for silk.
858	Macaranga denticulata, *Muell. Arg.* တောင်ဘက်ဝမ်း T*aung* p*ak* wám. ရွက်ဝမ် Y*u* *ak* wám. ပက်လကြီ P*ak* lá k*í*.	E. $\frac{40 - 60}{15 - 30 + 5 - 8}$ (Ar^s P^s M^s — T ∠ 2000′). SS = *Metam.*, Si S. Evergreen tropical forests.—s.— Wood red-brown, adapted for cabinet work. Exudes red resin.
859	Macaranga Indica, *Wight.* Fl. Sylv. Madr. t. 287/A.	E. $\frac{50 - 60}{20 - 30 + 6 - 11}$ (An^s — 1000′). SS = Si S., chloritic rocks. Evergreen tropical forests.—s.— Exudes red resin.
860	Macaranga molliuscula, *Kurz.*	E. middling sized. (An^2 — 1000′). SS = Metam. *Si S.* Evergreen tropical forests. —s.— Exudes reddish resin.
861	Cleidion Javanicum, *Bl.* Fl. Sylv. Madr. t. 272.	E. $\frac{30 - 40}{12 - 20 + 3 - 4}$ (C M^s — T An. ∠ 1000′). SS = *Metam.* Si S. Evergreen tropical forests.—s.— Wood uniformly white or yellowish, rather heavy, fibrous but close-grained, soft, takes good polish, but is perishable.
862	Cleidion lucidum *Thw.*	E. small tree (An^2 — 1000′). SS = Si S. Evergreen tropical forests.—s.—
863	Blumeodendron Tokbrai, *Kurz.*	E. $\frac{50 - 60}{?}$ (An^s ∠ 1000′). SS = Si S. Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
864	Hymenocardia plicata, *Kurz.* ယေကင်း Y*e* k*i*n.	$L^h \frac{40-50}{8-12+4-6}$ ($P^3 M^3$ — T — 0′). SS = All. Swamp-forests, entering savannah-forests.—s + l.— Wood, W = $\frac{\square' = 35}{153-170}$ pd.
865	Hymenocardia Wallichii, *Tul.* ရေခြင်း Y*e* ch*i*n.	$L^h \frac{15-25}{3-6+1-3}$ ($P^3 M^3$ — T — 0′). SS = All. Swamp-forests, entering also swampy savannahs.—s × l.— Wood rather heavy, of unequal fibre, pale-brown then red-brown, close-grained, rather hard and brittle.
866	Ricinus communis, *L.* ကြက်ဆူပင် K*i* *a*k s*u* p*i*n. ကြက်ဆူနီပင် K*i* ak s*u* n*í* p*i*n.	E. $\frac{15-20}{8-12+1-1\frac{1}{2}}$ (A C^3 M^3 — T An^3 cult.). SS = ∞. Yields white resin, the seeds castor-oil, and valuable oil-cakes.
867	Jatropha Curcas, *L.* သင်ဘောကြက်ဆူ Th*i*n b*o* Ki*a*k s*u*.	E. $\frac{20}{?}$ (A C^3 — T^3 An. cult. ∠ 2000′). SS = ∞. *All.* Wood soft, spongy, white. Yields resin.
868	Jatropha glandulifera, *Roxb.*	E. $\frac{4-8}{1-2+\frac{3}{4}-1}$ (A C Pr^2 P^2 Ar^3 ∠ 1000′). SS = ∞. *All., Ca S.* Waste places.—l.— Yields resin.
869	Ostodes paniculata, *Bl.*	E. $\frac{50-60}{15-25+4-6}$ (M^2 2000-3000′). SS = Metam. Damp hill and evergreen tropical forests.—s.— Wood rather heavy, of an unequal fibre, but close-grained, white, turning yellowish, rather soft.
870	Galearia Wallichii, (*Bennettia—R. Br.*)	E. little tree (T). Evergreen tropical forests.

Current No.	Names.	Remarks.
871	Microdesmis caseariaefolia, *Planch.*	E. little tree (T).
872	Chaetocarpus castaneaecarpa, *Thw.* Fl. Sylv. Madr. t. 284.	E. $\frac{30 - 40}{12 - 20 + 3 - 4}$ (C P^2 M^3 — T An^3 — 1000′). SS = Metam. Si S., Lat. p. Evergreen tropical forests.—s.—
873	Gelonium multiflorum, *A. Juss.* ဆေးသံပြာ Se thán pi *a.*	E. $\frac{30 - 40}{12 - 20 + 3 - 4}$ (Ar. P^2 M^3 — T ∠ 1000′). SS = Si S., Metam. Evergreen tropical forests.—s.— Wood white, only fit for house-posts and similar purposes. Exudes yellow resin from the buds.
874	Gelonium bifarium, *Roxb.*	E. $\frac{25 - 30}{8 - 12 + 2 - 3}$ (An^2 — 0′). SS = Chloritic rocks. Bamboo jungles.—s.—
875	Carumbium sebiferum, (*Excoecaria—Muell. Arg.*)	L. $\frac{30 - 40}{12 - 20 + 3 - 4}$ (P^1 cult.) The Chinese tallow-tree, the white pulp round the seeds used as tallow, &c.
876	Carumbium baccatum, (*Excoecaria—Muell. Arg.* လေးလွန်းပင် L*e* l*u*n pin.	E. $\frac{30 - 40}{12 - 20 + 3 - 5}$ (C P^2 M^3 — T ∠ 1000′). SS = Lat. p., *Si S.*, Metam. Evergreen tropical forests.—s.— Wood white, rather light, coarse fibrous, perishable.
877	Carumbium insigne, (*Excoecaria—Muell. Arg.*)	L^h $\frac{40 - 50}{20 - 25 + 4 - 6}$ (C P^2 — 1000′). SS = *Si S.* Evergreen tropical forests and along choungs in upper mixed forests. —l.—
878	Excoecaria Indica, *Muell. Arg.*	E. $\frac{20 - 25}{? + 3 - 4}$ (T — 0′). SS = Sal. Tidal forests.—l.—
879	Excoecaria oppositifolia, *Jack.*	E. $\frac{20 - 25}{?}$ (T).
880	Excoecaria holophylla, *Kurz.*	E. (M — T). Evergreen tropical forests.

Current No.	Names.	Remarks.
881	Excoecaria Agallocha, *L.* တရှော၊ကရယော *Tá yo ká yo.* တရှော်ပင် *Tá yo pin.*	E. $\frac{15-20}{?}$ (C^4 Ar^4 — T — 0′). SS = Sal. Tidal forests.—l.— Wood white, soft, juice of the whole tree very venenous.
882	Euphorbia neriifolia, *L.* တဆောင် *Tá soung.* ရှားဆောင် *Shá soung.*	L^c $\frac{15-20}{8-12+2-3}$ (P cult.) Tho copious white milk hardens into a sort of Euphorbium.
883	Euphorbia Nivulia, *Ham.* ရှားဆောင်း *Shá soung.*	L^c $\frac{20-25}{10-15+2-3}$ (Pr^3 — P^2 ∠ 2000′). SS = *Ca S.* Si S. Aren. Dry and upper mixed forests.—l.— Wood very light, fibrous and loose-grained, yellowish, while fresh quite milky. Yields a sort of Euphorbium.
884	Euphorbia epiphylloides, *Kurz.*	L^c $\frac{12-15}{4-8+1-2}$ (An^3 — 0′). SS = Serpentine. Coast-jungles.—l.— The milky juice hardens into Euphorbium.
885	Euphorbia antiquorum, *L.* ရှားဆောင်ပြသာဒ် *Shá soung pi á thát.*	L^c $\frac{20-25}{8-12+1\frac{1}{2}-3}$ (A Pr^3 P^3 — Ar^2 An^2 ∠ 2000′). SS = Si S., *Ca S.*, Serpentine. Dry and upper mixed forests. —l.— The copious milky juice hardens into Euphorbium.
886	Euphorbia Tirucalli, *L.* ရှားဆောင်းလက်ညှိုး *Shá soung lak ni o.*	E. $\frac{20}{4 \div 1-2}$ (A Pr^3 P cult.) Wood said to be strong and durable, pale-coloured. The copious milky juice yields a sort of Euphorbium.

Current No.	Names.	Remarks.
	URTICACEÆ.	
887	Holoptelea integrifolia, *Planch.* မျှောံဆိတ် M*i* o*u*k se*i*t. ဂွန်းရှုပင် Gün g*u* p*i*n.	$L^h \frac{50-60}{15-30+5-12}$ ($Pr^3 P^2 M^2$—1000′). SS=*Ca S.*, Metam., &c. Along choungs in dry and upper mixed forests.—l.— Wood white or pale-coloured turning pale-brown, rather heavy, coarse fibrous, but rather close-grained, strong. It takes fine polish, but the sap-wood is soon attacked by xylophages. Good for carts, &c.
888	Ulmus lancifolia, *Roxb.* သလဲ Th*á* l*e*.	$L^h \frac{70-80}{40-60+6-8}$ (Pr^3 — P^2 — 1000′). SS = Si S., *Ca S.* Evergreen tropical forests and along choungs in dry forests. —s : l.— Wood red-coloured, strong. Adapted for house-building.
889	Celtis mollis, *Wall.*	Tree (A).
890	Celtis Hamiltonii, *Planch.*	Tree (A T).
891	Celtis cinnamomea, *Ldl.*	E. $\frac{30-40}{15-18+2\frac{1}{2}-3}$ (C P^2 — M^3 — 1000′). SS = Metam., Si S. Evergreen tropical forests.—s.—
892	Solenostigma Wightii, *Bl.*	E. $\frac{30-40}{10-20+2\frac{1}{2}-3}$ (An^3 — 1000′). SS = Serpentine rocks. Evergreen tropical forests.—s.—
893	Gironniera nervosa, *Planch.*	E. (Burma, T ?).
894	Gironniera lucida, *Kurz.*	E. $\frac{30-40}{10-15+3-4}$ (An^3 — 1000′). SS = Chloritic rocks. Evergreen tropical forests.—s.—
895	Gironniera (*Galumpita—Bl.*)	E. $\frac{30-40}{10-15+3-4}$ (P^2 — 500′). SS = Si S. Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
896	Trema orientalis, *Bl.* ရှစ်ရှာပင် Sh*i*t sh*á* p*i*n. ဆပ်ရှားပင် S*a*p sh*á* p*i*n.	E. $\frac{25-30}{10-12+1\frac{1}{2}-2\frac{1}{2}}$ (C A P^4 — T — 2000′). SS = Si S., Metam., &c. Evergreen tropical forests, profusely springing up in deserted toungyas.—l.—
897	Trema Timorensis, *Bl.*	E ? (T.)
898	Böhmeria Malabarica, *Wedd.* ဆပ်ရှာပင် S*á*p sh*á* p*i*n. (Sat sha) S. K.	E ? $\frac{15-20}{?+\frac{1}{3}-\frac{1}{2}}$ (Ar^3 P^4 — T ∠ 3000′). SS = Si S., Metam., Ca S., &c. Evergreen tropical and upper mixed forests.—s.— Liber a strong cordage.
899	Böhmeria Hamiltoniana, *Wedd.* ဆပ်ရှာ S*á*p sh*á*	E. $\frac{15-20}{?+\frac{1}{3}-\frac{1}{2}}$ (P^2 — M^3 — 1000′). SS = *Si S.*, Metam. Evergreen tropical forests. —s.— Strong cordage may be obtained from liber.
900	Sarcochlamys pulcherrima, *Gaud.* ဆပ်ရှာပင် S*a*p sh*á* p*i*n.	E. $\frac{20-25}{?+\frac{1}{2}-1}$ (C P^2 M^3 — T — 1000′). SS = Si S., Metam. Evergreen tropical and upper mixed forests.—s.— Wood pale-reddish-brown, rather light, of a fine silvery fibre, soft. Liber a good fibre for cordage.
901	Oreocnide acuminata, (*Urtica—Roxb.*)	E. $\frac{20-25}{?+1-1\frac{1}{2}}$ (C). The *bun rhea* (jungle rhea) of the Assamese yielding the China grass-cloth fibre.
902	Oreocnide sylvatica, *Miq.*	E. $\frac{18-25}{?}$ (M 2000′).
903	Morocarpus longifolius, *Bl.* ဖွတ်ချောပင် Pw*o*t ch*o* p*i*n.	E ? $\frac{15-25}{?+1-1\frac{1}{2}}$ (C A P). Yields fibre for cordage.

Current No.	Names.	Remarks.
904	Morocarpus Wallichianus, *Miq.*	L^{c} $\frac{25 - 35}{10 - 15 + 2\frac{1}{2} - 3}$ (P^{2} 1000-2000′). SS = Si S. Moister upper mixed forests. —s.— Liber a good fibre for cordage.
905	Balanostreblus ilicifolius, *Kurz.*	E. small tree (A. C.)
906	Streblus aspera, *Lour.* အုပ်နီး *Op ne.*	E. $\frac{30 - 40}{4 - 10 + 2\frac{1}{2} - 3}$ (A Pr^{4} — T An^{2} ∠ 2000′). SS = ∞ *All.* Mixed and evergreen tropical forests, chiefly savannah forests.—l.— Wood red-brown, coarse. Yields a white resin.
907	Streblus Zeylanica, (*Epicarpurus—Thw.*)	E. $\frac{12 - 18}{?}$ (Burmah, T ?).
908	Streblus taxoides, (*Trophis—Roth.*)	E. $\frac{15 - 25}{?}$ (An^{4} — 0′). SS = Serpentine and cloritic rocks. Evergreen tropical forests.
909	Streblus microphylla, *Kurz.*	E ? $\frac{15 - 20}{?}$ (P — 0′). SS = All. Swamp-forests.—s.—
910	Antiaris toxicaria, *Lesh.* A. innoxia, Bl. Fl. Sylv. Madr. t. 307. မှျားဆိတ် Hmi *á sait.* မှျားဆိတ် Hmi *á sait.*	E ? $\frac{100 - 120}{60 - 80 + 10 - 12}$ (P^{2} M^{3} — T ∠ 1000′). SS = *Si S.*, Metam. Evergreen tropical forests.—s : l— Wood pale-brown, very coarse fibrous. Exudes a white venenous resin, used for poisoning arrows, &c. In Hindustan the inner bark is carefully removed entire from proportionally long portions of the trunk and used as sacks for rice and other articles. The renowned "upas tree" of Malays.
911	Ficus Bengalensis, *L.* ပြည်ညောင် P*í ni oung.*	E. & L^{h} $\frac{50 - 70}{10 - 20 + 8 - 12}$ (P^{2} cult.) Wood white, very soft, porous and coarse-fibrous, very light and perishable. Exudes inferior caoutchouc.

Current No.	Names.	Remarks.
912	Ficus Mysurensis, *Roth.*	E ? $\frac{50 - 60}{10 - 25 + 4 - 5}$ (A M² — 500′). SS = Lat., Dil. Eng and low forests.—l.—
913	Ficus pilosa, *Rwdt.*	E ? large tree (T.)
914	Ficus onusta, *Wall.*	Tree (T.)
915	Ficus laccifera, *Roxb.* ညောင်ပင် N*i* o*u*ng p*i*n.	L[h] $\frac{80 - 100}{40 - 60 + 6 - 15}$ (P³ M³ — T An⁴ — 1000′). SS = Metam., Si S., &c. Evergreen tropical forests.—s : l.— Wood white, coarse and soft, perishable. Yields a very good sort of caoutchouc, equal to that of *F. elastica.*
916	Ficus altissima, *Bl.*	E ? (T.) Yields caoutchouc of inferior quality.
917	Ficus Indica, *L.*	E ? large tree (P³ M³ — T — 1000′). SS = Si S., Metam., &c. Evergreen tropical forests.—s.— Yields inferior caoutchouc.
918	Ficus obtusifolia, *Raxb.* ညောင်ကြပ် N*i* o*u*ng k*i* *a*p. ညောင်ကျပ် N*i* o*u*ng ky*a*p.	E. $\frac{50 - 70}{15 - 40 + 6 - 12}$ (C A M³ — T — 1000′). SS = Si S., Metam., &c. Evergreen tropical forests.—s × l.— Wood white, coarse fibrous. Exudes rather good quality of caoutchouc.
919	Ficus annulata, *Bl.*	E ? $\frac{60 - 70}{12 - 30 + 8 - 12}$ (P³ M³ — T — 1000′). SS = Si S., Metam., &c. Evergreen tropical forests.—s.— Wood yellowish turning pale-brown, rather heavy, soft and perishable. Yields a rather good quality of caoutchouc.
920	Ficus Thomsoni, *Miq.*	E ? (T.)

Current No.	Names.	Remarks.
921	Ficus elastica, *Bl.*	E. $\frac{50-60}{20-30+5-10}$ (A.) Yields the Indian caoutchouc of commerce.
922	Ficus retusa, *L.* ညောင်အုပ် N*i oung op.* ညောင်ခြင် N*i oung* ch*in.*	E. $\frac{50-60}{12-30+6-12}$ (A C P^3 — T An^3 ∠ 1000′). SS = ∞ *Metam.* Chiefly evergreen tropical forests; but entering the leaf-shedding forests.—s × l.— Yields very inferior caoutchouc.
923	Ficus affinis, *Wall.*	E? $\frac{40-50}{10-15+4-6}$ (P^3 T ? An^3 — 1000′). SS = Si S. Evergreen tropical forests. —s.— Exudes caoutchouc in very small quantities.
924	Ficus nuda, *Miq.*	E. $\frac{40-50}{10-12+5-6}$ (P^3 T — 1000′). SS = Si S. Evergreen tropical forests. —s.— Yields inferior caoutchouc.
925	Ficus rhododendrifolia, *Miq.*	E. $\frac{40-50}{10-12+4-5}$ (P — 1000′). SS = Si S. Evergreen tropical forests.—s.— Yields inferior caoutchouc.
926	Ficus benjamina, *L.* ညောင်သပြေ N*i oung* th*á* p*i e.*	E? $\frac{50-60}{12-20+6-8}$ (A P^3 M^3 — T An^3 — 1000′). SS = Si S., Metam., &c. Evergreen tropical forests. Yields very inferior caoutchouc.
927	Ficus infectoria, *Willd.* ညောင်ခြင် N*i oung* ch*in.*	L? $\frac{50-60}{15-20+5-9}$ (M^3 — 2000′). SS = Metam. Upper mixed forests.—l.—

Current No.	Names.	Remarks.
928	Ficus geniculata, *Kurz.* ညောင်သပြေ N*i* *ou*ng th*á* p*i* *e*.	$L^h \frac{30-60}{20-40+3-6}$ ($P^3 M^3$ — T — 2000′). SS = ∞. Mixed forests and low forests. —l.— Yields inferior caoutchouc.
929	Ficus insignis, *Kurz.*	E? $\frac{30-40}{8-12+3-4}$ (Pr^2 — 500′). SS = Ca S. Dry forests..—l.—
930	Ficus Rumphii, *Bl.* ညောင်ပြူ N*i* *ou*ng p*i* *u*. ညောင်သပြေ N*i* *ou*ng th*a* p*i* *e*.	$L^h \frac{50-60}{15-20+6-8}$ (C A Pr^3 P^4 — T — 500′). SS = *All.* Savannah and lower mixed forests, also entering the tidal forests.—l.— Wood pale-coloured, soft and useless.
931	Ficus caloneura, *Kurz.*	Tree (Burmah).
932	Ficus religiosa, *L.* Fl. Sylv. Madr. t. 314. ညောင်ဗောဓိ N*i* *ou*ng b*o* d*í*.	$L^h \frac{50-60}{15-20+4-6}$ (P^1 — 1000′). SS = Si S. Moister upper mixed forests. Wood uniformly yellowish white, very light, coarse, fibrous, perishable, takes an inferior polish.
933	Ficus triloba, *Ham.*	E. $\frac{20-30}{8-12+2-3}$ (M^3 3000-5000′). SS = Metam. Damp hill-forests.—s.— Yields inferior caoutchouc.
934	Ficus hirta, *Vhl.*	E. $\frac{15-20}{6-10+1-2}$ (M^3 3000-4000′). SS = Metam. Drier and damp hill-forests. —s × l.— Yields inferior caoutchouc.
935	Ficus chrysocarpa, *Rwdt.*	E. $\frac{30-40}{12-20+3-5}$ (M^2 1000′). SS = Metam. Damp hill-forests.—s.— Yields inferior caoutchouc.

Current No.	Names.	Remarks.
936	Ficus lepidosa, *Wall.*	E? $\frac{30-40}{12-20+3-4}$ (Ps² — 500′). SS = Lat. p. Evergreen tropical forests.—s.— Yields an inferior caoutchouc.
937	Ficus pubigera, *Wall.*	E? (M. 4000′).
938	Ficus excelsa, *Vhl.* ညောင်သဖြည် Ni *oung* thá bí.	E. $\frac{30-40}{10-15+3-5}$ (C P³ — M³ — 1000′). SS = Metam., Si S. Mixed and evergreen tropical forests. Wood yellowish, rather light, coarse, fibrous, rather close-grained. Yields very inferior caoutchouc.
939	Ficus vasculosa, *Wall.*	E? $\frac{30-35}{?}$ (T.)
940	Ficus nervosa, *Heyne.* ညောင်ပိန္နဲပင် Ni *oung* peing *ne* pin.	E? $\frac{40-60}{20-25+8-10}$ (C P³ — T ∠ 1000′). SS = Metam., Si S. Evergreen tropical forests.—s.— Wood yellowish or white, with darker coloured annular rings, turning brownish, rather light, of a coarse fibre, rather close-grained, soft, soon attacked by xylophages. Yields inferior caoutchouc.
941	Ficus callosa, *Willd.*	E. $\frac{40-60}{20-30+5-8}$ (P² M³ — T An³ — 1000′). SS = Metam., Si S., &c. Evergreen tropical forests.—s.— Wood yellowish-grey, light, coarsely fibrous, rather close-grained, takes a tolerably good mottled polish. Yields inferior caoutchouc.
942	Ficus Ribes, *Rwdt.*	E. $\frac{25-30}{6-12+1-3}$ (T.)
943	Ficus glomerata, *Willd.* သဖန်း Thá *pan.* ရေသဖန်း Y*e* thá p*án.*	E. $\frac{50-60}{10-25+4-12}$ (A Pr P³ — T — 1000′) SS = Si S., Metam., &c. Evergreen tropical and moister upper mixed forests.—s × l.— Wood pale-brown, coarse, fibrous, light and perishable. □′ = 27 pd.

Current No.	Names.	Remarks.
944	Ficus Chittagonga, *Miq.* သဖန်းပင် Th*a* p*á*n p*i*n.	E ? $\frac{40 - 50}{10 - 15 + 4 - 6}$ (C P^2 — 0′). SS = All. Savannah forests.—l.—
945	Ficus fistulosa, *Rwdt.*	E ? $\frac{25 - 35}{8 - 10 + 2 - 3}$ (P^2M^2 — T — 1000′). SS = Si S., *Metam.* Evergreen tropical forests.—s.— Wood greyish pale-brown, heavy, of a coarse but close-fibre. Yields inferior caoutchouc.
946	Ficus macropoda, *Kurz.*	E. $\frac{30 - 40}{12 - 15 + 3 - 4}$ (An^8 — 500′). SS = Si S., &c. Evergreen tropical forests. —s.— Wood white, soft. Yields inferior caoutchouc.
947	Ficus regia, *Miq.* ဆင်သဖန်း S*i*n th*á* p*á*n.	E. $\frac{30 - 40}{10 - 12 + 3 - 5}$ (M^3 — T ∠ 1000′). SS = Metam. Evergreen tropical forests. —s.— Wood brown, rather light, coarse fibrous, perishable. Yields inferior caoutchouc.
948	Ficus Roxburghii, *Wall.* ဆင်သဖန်း S*i*n th*á* p*á*n.	E. $\frac{25 - 35}{4 - 6 + 3 - 5}$ (C M^3 — 1000′). SS = Metam. Evergreen tropical forests. —s.— Wood white, coarse. Yields inferior caoutchouc.
949	Ficus hispida, *L. f.* ကဒွပ် K*á* dop. ကဒွတ် K*á* dot.	E. $\frac{20 - 30}{5 - 12 + 3 - 4}$ (C A Pr^4 — T An. ∠ 1000′). SS = ∞. *Si S.* Mixed forests, especially upper mixed forests. —l.—
950	Ficus cunia, *Buch.* ရေခေါင်း Y*e* k*á* *o*ng.	E ? $\frac{30 - 50}{10 - 15 + 3 - 4}$ (C A Pr P^2 — T — 1000′). SS = Si S., Metam., &c. Mixed, especially upper mixed forests.—l.— Yields inferior caoutchouc.

Current No.	Names.	Remarks.
951	Ficus conglomerata, *Roxb.* ခအောင်းပင် Ká *ou*ng p*i*n.	E. $\frac{30-50}{10-15+3-4}$ (C A Pr P — T ∠ 1000/) SS = Si S., Metam., &c. Mixed, especially upper mixed forests. Yields inferior caoutchouc.
952	Artocarpus calophylla, *Kurz.*	Middling sized tree (T.)
953	Artocarpus rigida, *Bl.*	E? $\frac{40-50}{?+3-4}$ (T.) Wood white, very light, soft, coarse fibrous, takes very bad polish. Yields a sort of tenacious caoutchouc.
954	Artocarpus rufescens, *Miq.*	E? middling sized tree (T.)
955	Artocarpus Chaplasha, *Roxb.* တောင်ပိန္နဲ T*ou*ng peing n*e*.	L^h $\frac{100-150}{80-90+10-12}$ (C M^4 — T An^3 ∠ 1000/). SS = *Metam.*, Si S., &c. Evergreen tropical forests.—s : l.— Wood yellowish white turning pale brown, the heartwood darker coloured, rather loose-grained, rather heavy, soon attacked by sylophages. □′ = 30 pd. Used for canoes and cart-wheels. Yields a tenacious milky caoutchouc.
956	Artocarpus integrifolia, *Willd.* ပိန္နဲ P*e*it n*e*. (Paing-nay) S. K.	E. $\frac{40-60}{10-25+6-7}$ (A^4 — T^4 An). Cult. only. Wood yellow when fresh, changing into various shades of brown, the sapwood small, coarse fibrous and rather loose-grained, the heartwood close-grained, mottled and takes a fine polish, like Mahogany. □′ = 42 pd. Said to last 25 to 80 years. It is a very brittle wood which does not bear great alternations of dry and wet, used also to dye yellow clothes for poongyees. Also in use for building boats and for all kinds of furniture, building purposes, carpentry. Used in England for cabinet-work, marquetry and turning, also for brush-backs. The best bird-lime is prepared from the milky tenacious juice, which abundantly flows from recent wounds. The fruit is generally known as Jack-fruit, the seeds roasted are considered not inferior to the best chestnuts.
957	Artocarpus Gomeziana, *Wall.*	Middling sized tree (T.)

Current No.	Names.	Remarks.
958	Artocarpus Lacoocha, *Roxb.* မြောက်လှပ် M*i* o*u*k Hlop. (Myouk loke) S. K.	L^h $\frac{40 - 60}{10 - 30 + 6 - 10}$ (P^3 — M^3 — 1000′). SS = *Si S.*, Metam. Evergreen tropical forests; and frequently cultivated. —s : l.— Wood pale-brown, light, rather coarse, with a dark ebony-like heart-wood. □′ = 40 pd. Used for canoes. Roots used in dyeing yellow.
959	Morus laevigata, *Wall.* မလှိုင်ပင် M*á* l*a*in p*i*n.	L ? (T.) Evergreen tropical forests.
960	Morus Indica, *L.* ပိုးစါ P*o* s*á*.	L ? $\frac{30 - 35}{? + 2 - 2\frac{1}{2}}$ (A — T cult.) Cultivated generally for feeding the silk-worms.
961	Broussonetia papyrifera, *Vent.* မလှိုင် M*á* l*a*ing.	E ? $\frac{20 - 30}{?}$ (A. M.) The fibrous bark is made into a kind of cloth, from which the palabeiks of the Karens are made. The inner bark is used in China and Japan for the manufacture of a kind of paper.
	JUGLANDACEÆ.	
962	Juglans regia, *L.*	Large tree (A.) Wood of young trees white and comparatively soft, that of full-grown trees compact, dark-brown, beautifully veined and shaded with light-brown and black. Good for cabinet-making, gun-stocks, &c.
963	Engelhardtia spicata, *Bl.* တောင်ထမင်းဇြုပ်ထမင်းဇြုပ် To*u*ng t*á* m*i*n z*o*p or T*á* m*i*n z*o*p.	L^h $\frac{60 - 70}{30 - 40 + 6 - 8}$ (C Ps^3 M^3 — T ∠ 1000′). SS = *Si S.*, Metam. Evergreen tropical forests.—s.— Wood white, soft. Good for furniture, turning, &c. Bark can be used for tanning.
964	Engelhardtia serrata, *Bl.*	L^h $\frac{25 - 30}{? + 2\frac{1}{2} - 3}$ (M^3 — T 1000-3000′). SS = Lat., Metam. Hill-eng-forests.—l.—

Current No.	Names.	Remarks.
965	Engelhardtia aceriflora, *Bl.*	$L^h\ \frac{25-30}{12-20+2-3}$ (M[2] 2000-3000′). SS = Metam., Lat. Hill-eng-forests.—l.—
	SALICINEÆ.	
966	Salix tetrasperma, *Roxb.* Fl. Sylv. Madr. t. 302. မိုးမခ Mo má ká.	E. $\frac{25-30}{4-10+3}$ (A P[3] M[3] — T — 500′). SS = ∞. Along streams and choungs.— Wood yellowish white, soft. □′ = 37 pd. Bark used for tanning.
	AMENTACEÆ.	
967	Myrica Nagi, *Thbg.*	E. $\frac{30-40}{?+3-4}$ (M[4] 4000-6000′). SS = Metam. Drier hill-forests.—l.—
968	Betula cylindrostachya, *Wall.*	L? (M[3] 5000-6000′). SS = Metam. Drier hill and pine-forests.—l.—
969	Carpinus viminea, *Wall.*	L? $\frac{30-40}{?}$ (M[3] 5000-6000′). SS = Metam. Drier hill and pine-forests. —l.—
970	Castanea Indica, *Roxb.*	E? $\frac{25-30}{?}$ (C.)
971	Castanea diversifolia, *Kurz.* ကျန့်ဈါ K*i* án zá.	E? $\frac{40-60}{?+3-4}$ (M[5] 3500-5000′). SS = Metam. Drier hill and pine-forests. —l.—
972	Castanea argentea, *Bl.* သစ်ခြ Th*i*t chá. သစ်ကြား Th*i*t k*i* á.	E. $\frac{50-60}{20-25+9-10}$ (P[3] M[3] — T ∠ 3000′). SS = Metam., Si S., &c. Evergreen tropical forests.—s.— Wood brown with a silvery lustre, heavy, fibrous but close-grained, strong.
973	Castanea Roxburghii, *Ldl.*	Large tree (C.)

Current No.	Names.	Remarks.
974	Castanea tribuloides, *Sm.* ကျံနံစါ Ki *á*n s*á*.	E ? $\frac{40-50}{20-25+3-4}$ (M³—T 2500-4000′). SS = Metam. Drier hill 'and pine-forests.—l.— Wood greyish, turning brown on exposure to air, rather heavy, of a coarse grain, bony-fibrous, brittle, soon attacked by xylophages.
975	Castanea rhamnifolia, (*Castanopsis—Miq.*)	E. $\frac{50-60}{20-25+4-6}$ (Ps² — T — 1000′). SS = Si S., Lat. p. Evergreen tropical forests.—s.—
976	Castanea inermis, *Ldl.*	E. $\frac{40-50}{?+4-6}$ (M² 4000-5000′). SS = Metam. Damp hill forests.—s.—
977	Castanea lanceifolia, (*Quercus—Roxb.*)	E ? Large tree (C.) Wood light coloured, very durable.
978	Quercus Amherstiana, *Wall.*	E. (T.) Wood used for boat-building.
979	Quercus fenestrata, *Roxb.* သစ်ကြ Th*i*t k*i* *á*.	E. large tree (T.)
980	Quercus lappacea, *Roxb.* သစ်ခြ Th*i*t ch*á*.	E. (T.) Wood hard, close-grained, in colour like the European oak.
981	Quercus polystachya, *Wall.*	E. (A.)
982	Quercus Thomsoni, *Miq.*	E. (C.)
983	Quercus Bancana, *Scheff.*	E ? $\frac{25-30}{10-15+1\frac{1}{2}-3}$ (M² 3000-5000′). SS = Lat., Metam. Hill-eng-forests and drier hill-forests.—l.—

Current No.	Names.	Remarks.
984	Quercus eumorpha, *Kurz.*	E? $\frac{20-30}{?+3-4}$ (M^2 6000-7000′). SS = Metam. Drier hill-forests.—l.—
985	Quercus Lindleyana, *Wall.*	Tree (A.)
986	Quercus spicata, *Sm.* သစ်ချ Thit chá.	E. $\frac{30-60}{10-30+4-5}$ (C M^4 — T 3000-6000′). SS = Metam. Drier hill-forests. —l.—
987	Quercus acuminata, *Roxb.*	Large tree (C.)
988	Quercus mespilifolia, *Wall.*	E. (Ar A Pr 3000-5000′).
989	Quercus semiserrata, *Roxb.* သစ်ချ Thit chá. သစ်ဖဂံ Thit pá gán.	E. $\frac{40-50}{15-20+3-4}$ (A Ps^2 M^2 — T ∠ 2000′). SS = Lat., Metam., Arg. Open forests.—l.— Wood □′ 48 pd. Used for plugs or pins to join together the three pieces that compose the body of a Burmese cart-wheel.
990	Quercus velutina, *Ldl.* သစ်ပဂံ Thit pá gán.	E. $\frac{40-60}{?+4-5}$ (Ps M^2 — T — 2000′). SS = Lat. p., Metam. Evergreen tropical forests.—s.—
991	Quercus Brandisiana, *Kurz.* သစ်ကြား Thit ki á. နတ်သမိတံဖူး Nat thá mi tong pu.	E? $\frac{35-50}{?+3-4}$ (M^3 1000-4000′). SS = Metam. Hill-eng-forests and drier hill-forests.—l.— Wood whitish.
	CASUARINEÆ.	
992	Casuarina equisetifolia, *Forst.* ထင်းရှူး Tin i u.	E. $\frac{50-60}{20-30+4-8}$ (C T — 0′). SS = Aren. Beach-jungles.—l.— Wood reddish, very hard and durable. Well adapted for posts, &c.

Current No.	Names.	Remarks.
	CONIFERÆ.	
993	Pinus Kasya, *Royle*. ထင်ရှူးပင် Tin yu pin. (Tín yú ben) S. K.	E. $\frac{60-100}{30-40+9-10}$ (M[5] 3000-7000′). SS = Metam. Drier hill and pine-forests. —l.— Wood white, fibrous, but rather close-grained.
994	Pinus Merkusii, *Jungh. et De Vries*.	E. $\frac{50-60}{?+6}$ (M — T[a] 500-2500′). SS = ? Hill eng-forests.—l.—
995	Dacrydium elatum, *Wall*. တောကြက်ဝငလေးအပွင် Tau Ki ak ká le á pwín.	E. $\frac{30-60}{?+3-4}$ (T ?).
996	Podocarpus latifolia, *Wall*. Fl. Sylv. Madr. t. 257. သစ်မင် Thit min.	E. $\frac{60-80}{?}$ (M[s] — T ∠ 4000′). SS = Metam. Evergreen tropical and damp hill-forests.—s.—
997	Podocarpus bracteata, *Bl*. သစ်မင် Thit min.	E. $\frac{40-50}{15-20+4-6}$ (M[s] — T An[2] ∠ 4000′). SS = Metam. Evergreen tropical and damp hill-forests.—s.— Wood pale-brown, rather heavy, close-grained. □′ = 50 pd. May prove a substitute for box-wood.
	GNETACEÆ.	
998	Gnetum Gnemon, *L*.	E. $\frac{20-25}{10-15+?}$ or shrub. (T.)
	CYCADEÆ.	
999	Cycas Rumphii, *Miq*. မုံတိုင် Mong Taing. (Mún deing) S. K.	E. $\frac{20-25}{8-10+3-4}$ (T An[s] — 0′). SS = Aren. Beach jungles.—l.— Wood coarse, medullary-fibrous. The wood yields a good quantity of sago or starch, the seeds are in Ceylon made into flour. Exudes a good sort of resin.
1000	Cycas pectinata, *Griff*.	E. $\frac{8-10}{?}$ (C T ∠ 500′). SS = Lat. ?

Current No.	Names.	Remarks.
1001	Cycas Siamensis, *Miq.*	E. $\frac{4-5}{2-3+2-3}$ trunk subteranneau. (Pr.^{2} — 500′). SS = Lat., Aren., Ca S. Eng and dry forests.—l.— Exudes a peculiar whitish resin like tragacanth.
	Palmæ.	
1002	Calamus arborescens, *Griff.* ဒနိုင် Dá *no*ung.	E. $\frac{15-20}{8-12+\frac{1}{2}-1}$ (P^4 — 0′). SS = *Si S.* All. Evergreen tropical forests. —s.—
1003	Calamus erectus, *Rxb.* Theing, Burm. Rong in Chittagong.	E. $\frac{12-18}{\text{tufted ?}}$ (C — P^2 — 0′). SS = Si S. Evergreen tropical forests.—s.—
1004	Corypha umbraculifera, *L.* ပေပင် P*e* p*i*n.	E. $\frac{30-80}{20-60+4-7}$ (A — T — 0′ cult.) Only cultivated in villages. Fans of enormous size are made of its leaves in Ceylon. The pith yields a sort of sago.
1005	Corypha Gebanga, *Bl.*	E. $\frac{70-80}{60-70+5-7}$ (P — 0′cult.) Rarely seen in villages. Its pith furnishes a sort of sago. Yields also fibre for fishing-nets and ropes.
1006	Corypha macropoda, *Kurz.*	E. $\frac{30-40}{0'}$ (An^1 — 0′). SS = Choritic rocks. Evergreen tropical forests.—s.—
1007	Livistona speciosa, *Kurz.* တောင်ထန် T*o*u t*á*m. (Tau htan) S. K.	E. $\frac{50-70}{40-60+3-5}$ (P^3 — 1000′). SS = Si S. Evergreen tropical forests. —s.—
1008	Chamaerops Khasyana, *Griff.*	E. $\frac{12-25}{9-20+1\frac{1}{2}-2\frac{1}{2}}$ (A — M^2 4000-6500′). SS = Metam. Drier hill and pine-forests. —l.—

Current No.	Names.	Remarks.
1009	Licuala peltata, *Roxb.* စလူ *Sá lu.* စလူ *Tsá lu.*	E. $\frac{8-15}{5-7+\frac{1}{2}-\frac{2}{3}}$ (C P^4 M^2 — T An^4 — 1000′). SS = *Si S.*, Metam. Evergreen tropical forests.—s.—
1010	Licuala paludosa, *Griff.*	E. $\frac{12-15}{4-8+\frac{1}{2}-1}$ (An^2 — 0′). SS = Sal. Tidal forests.—l.—
1011	Licuala longipes, *Griff.*	E. almost stemless (T.)
1012	Areca Catechu, *L.* ကွမ်းသီးပင် Kwán thé pin.	E. $\frac{40-50}{30-40+1\frac{1}{2}-3}$ (P^2 Ar^2 M^4 — T An^1 $\angle$ 2000′). Cultivated only.—s.— Yields the well-known betelnuts chewed by natives. The trunks are good for spear-handles and bows.
1013	Areca triandra, *Roxb.* တောကွမ်းသီးပင် *Tau* kwain thí pin.	E. simple and stoloniferous $\frac{15-25}{8-20+1}$ (C M — T An^4 — 1000′). SS = *Si* S. Metam. Evergreen tropical forests.—s.—
1014	Areca costata (*Pinanga—Bl*)	E. $\frac{20-30}{?+\frac{1}{3}-\frac{1}{2}}$ (An^2 $\angle$ 1000′). SS = Si S. Evergreen tropical forests.—s.—
1015	Areca gracilis, *Roxb.* တောကွမ်းသီးပင် *Tau* kwám thí pin.	E. $\frac{6-20}{3-15+\frac{1}{4}-\frac{1}{3}}$ (C P^3 M^3 — T — 1000′). SS = *Si S.*, Metam. Evergreen tropical forests.—s.—
1016	Areca hexasticha, *Kurz.*	E. $\frac{25-30}{15-25+1-1\frac{1}{3}}$ (Ps^1 — 0′). SS = Si S. Evergreen tropical forests, in marshes.—s.—

Current No.	Names.	Remarks.
1017	Caryota urens, *L.* (Minbo) S. K.	E. $\frac{30 - 40}{20 - 30 + 2 - 3}$ (A Pr — $P^3 \angle$ 2000′). SS = Si S., Ca S. Upper mixed forests. —l.— Wood very fibrous and hard, silicious. Trunks well adapted for water-buckets and water-trains. The pith yields sago. Yields also toddy. The leaves yield the kittul fibre of commerce.
1018	Caryota sobolifera, *Wall.* (Minbo-bo) S. K.	E. soboliferous, rarely simple stemmed $\frac{15 - 25}{12 - 15 + 1 - 1\frac{1}{2}}$ (Ar^3 — An^3 M^3 — T — 1000′). SS = Si S., Metam. Evergreen tropical forests.—s.— Yields fibre similar to the above.
1019	Arenga saccharifera, *Lab.* တောင်အုံး T*oung* o*ung*.	E. $\frac{20 - 30 - 40}{5 - 10 + 3 - 5}$ (Ps^2 M^3 — T — 1000′). SS = *Metam.*, Si S. Evergreen tropical forests:—s.— The trunk of the dead palm becomes soon hollow and furnishes very durable underground water-pipes; also good for troughs or channels for water. The pith yields sago. The black fibre used for cordage is renowned for its power of resisting wet. Each leaf yields from 8 to 16 ounces of clean fibre. The sap yields toddy and sugar.
1020	Wallichia disticha, *T. And.* (Minbo or zanong) S. K.	E. $\frac{8 - 15}{3 - 4 + 2 - 3}$ (P^3 2500′). SS = Si S. Evergreen tropical and moist upper mixed forests.—s × l.— Yields strong but coarse fibre.
1021	Nipa fruticans, *Wurmb.* ဓနိ (*Dá-né*) S. K.	E. simple or soboliferous $\frac{15 - 30}{\text{short and thick}}$ (C^3 Ar^3 P^3 — T An^3 — 0′). SS = Sal. Tidal forests —s.— The leaves are used extensively for thatching.

Current No.	Names.	Remarks.
1022	Cocos nucifera, *L.* အုန်းပင် *O*ug p*i*n.	E. $\frac{40 - 80}{30 - 60 + 3 - 6}$ (Cocos isl. wild. C^4 P^4 — T. An^2 cult.) SS = *Aren. Sal.* All. Sandy seashores.—s × l.— Frequently cultivated, especially within the influence of the sea. Wood strong and durable, very fibrous, heavy, said to last for 20 to 50 years. □′ = 70 pd. Good for small boats, ridge poles, house-posts and rafters, &c. The pith furnishes a substitute for sago. Each tree produces annually from 30 to 60 cocoa-nuts. The husk of the nuts yields fibre, while the shells are susceptible of a high polish and fit for fancy work, like cups, &c. The hollow albumen yields the well-known cocoa-oil, while the oil-cakes furnish a valuable manure. Palm-wine, too, is obtained from the spadices. The uses of the cocoa palm are too various as to be all enumerated here.
1023	Borassus flabelliformis, *L.* ထန်းပင် T*á*m p*i*n. ထန်းပင် T*á*m pin. (htan) S. K.	E. $\frac{60 - 70}{50 - 60 + 5 - 6}$ (A Pr^4 C^2 P^3 — T — 0′). SS = *All.* Ca ? Cultivated only, especially in Prome District.—l.— Wood black, very hard and heavy, durable, very fibrous. □′ = 65 pd. Used chiefly for rafters, reapers, &c. Leaves yield a coarse fibre. Jagery and Toddy are extensively extracted from its spadices.
1024	Phoenix sylvestris, *Rxb.*	E. $\frac{25 - 30 - 40}{15 - 30 + 3 - 5}$ (C Pr^1 cult.) Cultivated only. Yields much palm-wine, which is converted into sugar.
1025	Phoenix acaulis, *Roxb.* သင်ဘောင်း (Thin-boung.) S. K.	E. stemless or nearly so. (Pr^4 — P^3 M^2 ∠ 500′). SS = Ca S. *Lat.* Eng-forests. —l.— The heart of these palms is by preference eaten by the Burmans as a sort of cabbage.
1026	Phoenix paludosa, *Roxb.* သင်ဘောင်း (Thin-boung.) S. K.	E. $\frac{6 - 25}{3 - 15 + 1 - 1\frac{1}{2}}$ (C Ar^3 P^3 — T An^3 — 0′). SS = Sal. Tidal forests.—l.—

Current No.	Names.	Remarks.
1027	Zalacca Wallichiana, *Mart.* ရင်ဂနှး (Yin-gan) S. K. (also Yengan Khyen) S. K.	E. $\frac{12 - 20}{\text{0 or caulescent}}$ (P² M² — T ∠ 500′). SS = *Si S.* Metam. Evergreen tropical forests.—s.—
	PANDANEÆ.	
1028	Pandanus furcatus, *Roxb.* ဆပ်သွား S*á*p thw*á*.	E. $\frac{10 - 30}{4 - 20 + 1 - 1\frac{1}{2}}$ (C P²M²—T ∠2000′). SS = Si S. Metam. Evergreen tropical forests.—s.—
1029	Pandanus Leram, *Jones.*	E. $\frac{60 - 70}{?}$ (An — 0).
1030	Pandanus Andamanensium, *Kurz.*	E. $\frac{40 - 50}{30 - 40 + 2 - 3\frac{1}{2}}$ (An² — 0′). SS = Si S. Chloritic rocks, &c. Evergreen tropical and coast-forests.—s.—
1031	Pandanus odoratissimus, *L. f.* သက္ကြာပိ Th*a*k k*i* *á* po. (tsat a pu) S. K.	E. $\frac{15 - 25}{5 - 10 + 2 - 3}$ (C² Ar² — T An⁴ — 0′). SS = Aren. Beach jungles. —l.—
1032	Pandanus laevis, *Rumph.*	E. $\frac{20 - 25}{5 - 10 + 2 - 3}$ (P² cult. only).
	LILIACEÆ.	
1033	Dracaena angustifolia, *Roxb.* ကွမ်လင်နှက် Kw*á*m l*i*u n*a*k.	E. $\frac{20 - 30}{5 - 12 + 2 - 3}$ (An² ∠ 500′). SS = Chloritic rocks. Evergreen tropical forests. —s.—
1034	Dracaena spicata, *Roxb.*	E. $\frac{10 - 15}{5 - 10 + \frac{1}{2} - 1}$ (C An² — 500′). SS = Si S. Evergreen tropical forests. —s.—

Current No.	Names.	Remarks.
	MUSACEÆ.	
1035	Ravenala Madagascariensis, *Ad.*	E. $\frac{12 - 30}{6 - 20 + 2 - 3}$ (C P^1 T cult. only).
	GRAMINEÆ. (*Bambuseæ : all tufted.*)	
1036	Arundinaria elegans, *Kurz.*	E. $\frac{12 - 20}{? + \frac{1}{10} - \frac{1}{5}}$ (A — M^4 6000-7200′). SS = Metam. Hill-forests.—s.—
1037	Bambusa nana, *Roxb.* ပလောပီနံဝါး *Pá lo pí nán wá.*	E. $\frac{6 - 10}{? + \frac{1}{10} - \frac{1}{5}}$ (P^1 cult. only).
1038	Bambusa Tulda, *Roxb.* သိုက်ဝါး Th*a*ik w*á*.	E. & L^h $\frac{40 - 60}{? + \frac{2}{3} - 1}$ (Ar^3 P^4 M^4 — T ∠ 1000′). SS = Arg. *Dil.* Open, especially Eng-forests.—l.— Also much cultivated.
1039	Bambusa arundinacea, *Willd.* ကြခပ်ဝါး K*i* *á* Kap w*á*. ကြခတ်ဝါး K*i* *á* kat w*á*.	L^h $\frac{30 - 70}{0 + \frac{1}{2} - 1}$ (C P^4 M^3 — T — 0). SS = All. Savannah forests. and bamboo jungles.—l.—
1040	Bambusa polymorpha, *Munro.* ကြသောင်းဝါး K*i* *á* thoung w*á*.	E. & L^h $\frac{50 - 70}{? + 1\frac{1}{2}}$ (P^5 — M^5 ∠ 2500′). SS = *Si S.*, Metam. Upper mixed forests. —l.—
1041	Bambusa affinis, *Munro.* သိုက်ဝါ Th*a*ik w*á*.	E. $\frac{15 - 20}{0 + \frac{1}{3} - \frac{1}{4}}$ (M^2 ∠ 1000′). SS = Lat. Eng and low forests.—l.—

Current No.	Names.	Remarks.
1042	Bambusa Brandisii, *Munro.* ကြအိုဝါး *Ki á lo wá.* ဝါး။ဘို *Wá bo.*	E. $\frac{60-120}{?+2\frac{1}{2}}$ (Ps[2] — M[4] ∠ 3500′). SS = Metam., Si S. Evergreen tropical forests.—s.—
1043	Bambusa stricta, *Roxb.* မြင်ဝါ *Mi in wá.*	L^h $\frac{30-50}{0+\frac{1}{4}-\frac{1}{2}}$ (A Pr[5] P[4] M[2] — T ∠ 3000′). SS = *Ca S.*, *Si S.*, Dil. Dry and open forests, and upper mixed forests.—l.—
1044	Bambusa regia, *T. Thoms.* ဝရဲ *Wá ye.*	E. $\frac{40-50}{?+\frac{1}{3}-\frac{1}{4}}$ (M[2] ∠ 3000′). SS = Metam. Evergreen tropical forests.—s + l.—
1045	Bambusa Griffithiana, *Munro.*	E ? (A.)
1046	Bambusa longispatha, *Kurz.* ဝရား *Wá yá.*	E. $\frac{40-60}{0+\frac{1}{3}-\frac{1}{4}}$ (Ar P[4] — M[2] ∠ 2000′). SS = *Si S.*, Metam. Evegreen tropical and moister upper mixed forests.—s.—
1047	Bambusa calostachya, *Kurz.*	E ? (A.)
1048	Bambusa critica, *Kurz.*	E. $\frac{15-30}{0+\frac{1}{3}-\frac{2}{3}}$ (Pr[1] 2500-3000′). SS = Ca S. Evergreen tropical forests on Kambala toung only.—s.—
1049	Gigantochloa albo-ciliata. (*Oxytenanthera* —*Munro.* ဝါးဖြူခလေ *Wá pi u ká le.*	E. & L^h $\frac{20-30}{0+\frac{1}{3}-\frac{1}{2}}$ (P[5] M[5] — T ∠ 3000′). SS = Si S., Metam., All. Mixed forests generally, but not in the savannah forests.—l + s.—

Current No.	Names.	Remarks.
1050	Gigantochloa Andamanica, (*Bambusa—Kurz.*)	E. $\frac{20 - 30}{0 + \frac{1}{3} - \frac{1}{4}}$ ($An^5 \angle 500'$). SS = *Chloritic and Serpentine rocks;* Si S. Mixed forests.—l + s.—
1051	Gigantochloa auriculata, (*Bambusa—Kurz.*) တလကျူဝါး *Tá lá ku wá.*	E. $\frac{30 - 40}{? + \frac{1}{2} - 1}$ ($Ps^2 - 0'$). SS = Dil. *Arg.* Low forests.—s + l.—
1052	Gigantochloa macrostachya, (*Bambusa—Kurz.*) ဝါးနက် *Wá nak.* *Wá net* (S. K.)	E. $\frac{30 - 50}{0 + \frac{1}{3} - \frac{1}{4}}$ ($M^3 - T \angle 1000$ [$P^2 - Ar^3$ cult.] SS = Metam., Si S., &c. Evergreen tropical forests.—s.—
1053	Melocanna bambusaeoides, *Trin.*	E. $\frac{50 - 70}{? + \frac{1}{3} - 1}$ (C. T.)
1054	Melocana humilis, *Kurz.* တပင်တိုင်ဝါး *Tá pin taing wá.*	E. $\frac{8 - 15}{0 + \frac{1}{6} - \frac{1}{4}}$ (Ar^5 $P^1 \angle 1000'$). SS = Si S. Upper mixed forests.—s.—
1055	Cephalostachyum pergracile, *Munro.* တင်းဝါး *Tin wá.*	L^h $\frac{30 - 50}{? + \frac{1}{3} - \frac{3}{4}}$ ($P^5 - M^4$ T $\angle 3000'$). SS = *Si S.*, Metam. Lower and upper mixed forests.—l.—
1056	Cephalostachyum flavescens, *Kurz.*	E. $\frac{10 - 15}{0 + \frac{1}{4}}$ (P.)
1057	Cephalostachyum virgatum, (*Melocana—Munro.*)	Arboreous ? (A.)
1058	Cephalostachyum pallidum, *Munro.*	Arboreous ? (A.)
1059	Cephalostachyum schizostachyoides, *Kurz.*	E. $\frac{20 - 30}{? + \frac{3}{4} - 1}$ ($An^2 - 0$). SS = Chloritic and Serpentine rocks. Evergreen tropical forests.—s.—

Current No.	Names.	Remarks.
1060	Cephalostachyum Griffithii, (*Teinostachyum —Munro.*)	E? arboreous? (A.)
1061	Pseudostachyum compactiflorum, *Kurz.*	E. $\frac{15-25}{0+\frac{1}{4}-\frac{1}{2}}$ (M^4 3500-6000′). SS = Metam. Hill-forests, especially the drier ones.—l.—
1062	Pseudostachyum Helferi, *Kurz.* W*a* t*a* b*u*t (S. K.)	E. $\frac{20-25}{0+\frac{1}{4}}$ (P^4 M^4 ∠ 3000′). SS = Metam. Si S. Evergreen tropical and moister upper mixed forests.—l—
	Filices.	
1063	Cyathea spinulosa, *Wall.*	E. small tree (T.)
1064	Alsophila contaminans, *Wall.*	E. $\frac{8-15}{3-6+1-1\frac{1}{2}}$ (Ps^1 M^2 — T ∠ 1000′). SS = *Metam.* Si S. Evergreen tropical forests.—s.—
1065	Alsophila glabra, *Hook.*	E. $\frac{10-20}{4-12+1}$ (C M^2 — T ∠ 3000′). SS = Metam. Evergreen tropical forests. —s.—
1066	Alsophila latebrosa, *Hook.*	E. $\frac{20-30}{15-25+2-3}$ (M^2 2000-6000′). SS = Metam. Evergreen tropical and damp hill-forests.—s.—
1067	Brainea insignis, *Hook.*	E. $\frac{3-5}{2-4+\frac{1}{2}-1\frac{1}{2}}$ (M^2 4000-6000′). SS = Metam. Pine and drier hill-forests. —l.—

APPENDIX B.

GENERAL KEY TO THE BURMESE TREES.

As I shall not be able to submit my book on the Forest-Flora of Pegu so soon as I originally intended doing I feel sure that the foresters in British Barma will accept in the meantime this general conspectus of the trees alone (from which have been omitted all other woody and herbaceous plants.) I hope that the same may prove useful to them, and I do not doubt that those of them who have mastered the characteristics of the various natural orders, will find little difficulty. in determining the trees of their district. The species of some larger genera, as *Eugenia*, *Memecylon*, *Ficus*, etc. are difficult to understand, and the study of them is of such an intricate nature that even qualified botanists would undertake the work with great diffidence. If mistakes in the determination of such occur, no one can be blamed. In such cases autopsy of correctly-named specimens is the only safe guide for obtaining a fair knowledge of them. The analytical table of the families (chiefly taken from Bentham's writings) is provisional only and necessarily not very reliable. Those who wish to study the natural orders of the vegetable kingdom, will find the following works most useful.

Lindley, Vegetable Kingdom.

Le Monat et Th. Decaisne, Traité général de Botanique. Paris 1868, (of which a translation into English by Mrs. Hooker has passed the press.*) Others desirous of making themselves acquainted only with the natural orders of the Indian Flora, may use Oliver, First book of Indian Botany.

However, every one has to recollect the proverb *nulla regula sine exceptione* and probably nowhere do so many exceptions and doubtfully placed or abnormal genera occur as in our botanical systems which necessarily must puzzle the beginner until he has mastered the greater bulk of the task before him.

CONSPECTUS OF THE PRINCIPAL DIVISIONS

OF THE

VEGETABLE KINGDOM.

A.—Spermophytes or Phanerogams.—(Seed-bearing or flowering plants.)

Plants bearing more or less complete flowers and producing perfect seeds, in which an embryo rests.

Class I.—Dicotyledons or Exogens. Stem, when woody, consisting of pith, of one or more concentric circles of fibrous tissue, and of bark on the outside. Embryo with 2 or rarely more cotyledons, the young stem in germination proceeding from between the cotyledons or from a notch at its summit. Flowers often 4·5 or 6 merous. Leaves net-veined. By far the greatest number of Burmese trees belong to this class.

Division 1.—*Angiosperms.* Ovules enclosed in an ovary with a stigma. Seeds contained in a seed-vessel. Cotyledons usually 2 only.

Division 2.—*Gymnosperms.* Ovules naked, without ovary or stigma. Seeds naked. Cotyledons sometimes several. Here belong only conifers, like pines, Cycas (*mundein*) and Gnetum *(jut-noë.)*

Class II.—Monocotyledons or Endogens. Stem, when woody, uniformly consisting of bundles of fibres irregularly imbedded in cellular tissue with a firmly adherent bark on the outside. Embryo with one undivided cotyledon, the young stem being developed from a sheath-like cavity on one side. Floral parts usually 3 merous, the calyx and corolla, if present, usually almost conform in structure forming often a 6-parted perianth. Leaves usually (except in *Scitamineæ*, *Dioscorideæ*, *Smilax* and some *Aroideæ*) simply parallel-veined. Of Burmese trees belong here palms, screw-pines, *Dracaena* and bamboo ; some people call also the plantain a tree.

* A General System of Botany, descriptive and analytial. Translated by Mrs. Hooker; edited and arranged by Dr. J. D. Hooker. London: Longmans and Co., 1873.

B.—Sporophytes or Cryptogams (Spore-bearing or flowerless plants.)

Plants bearing no real flowers, that is, neither stamens, nor pistils, nor true seeds ; the fructification consisting of minute, often highly microscopic cells called *spores* variously enclosed in *spore-cases*. Of trees belong here only a few tree ferns, such as *Alsophila*, and *Brainea*.

A. PHANEROGAMS.

Division 1. *Angiosperms.*

Class I.—DICOTYLEDONS.

Subclass I.—Polypetalæ.—*Petals several, distinct (wanting in a few genera, very rarely united.)*

A.—Thalamifloræ.—*Torus small or elongated, rarely expanded in a disk. Ovary superior. Stamens indefinite or rarely definite, usually hypogynous.*

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

* *Petals and sepals in a single series.*

Ranunculaceæ.—Sepals deciduous. Arillus none. Herbs or scandent shrubs with alternate or opposite leaves. Stipules none.

Dilleniaceæ.—Sepals persistent. Seeds with arillus. Trees or shrubs, sometimes scandent, with alternate simple often scabrous leaves. Stipules none.

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

Not Aquatic Plants.

Magnoliaceæ.—Sepals and petals forming 3 or more series and imbricate in each series. Carpels definite. Shrubs or trees with alternate leaves.

Anonaceae.—Sepals 3, Petals 6, in 2 series of three each. Carpels usually indefinite, rarely definite or solitary, distinct or rarely (in Anona) connate. Albumen ruminate.—Trees or shrubs, often scandent, with alternate simple leaves. Stipules none.

Menispermaceæ.—Flowers small or minute, deciduous. Sepals in 2 or more series of 3 or 2 each. Petals usually smaller than the inner sepals or wanting. Stamens 6, or 3 to 9, free or connate, opposite the petal. Seeds often horse-shoe shaped. Carpels 6 or fewer. Twiners or shrubs usually scandent with alternate leaves. No stipules.

Berberideae.—Sepals, petals and stamens each in 2 or 3 series of 3 each. Anthers dehiscing by valves. Carpel solitary. Trees or shrubs, sometimes scandent, with simple or compound leaves.

Aquatic Plants.

Nymphaeaceae.—Carpels free or consolidated. Stamens indefinite. Floating herbs with radical, orbicular or elliptic leaves.

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

Papaveraceae.—Corolla regular. Sepals 2. Petals 4 to 6. Stamens indefinite. Albumen copious. Embryo small. Herbs with alternate leaves.

Fumariaceae.—Corolla irregular. Sepals 2. Petals 4. Stamens definite, diadelphous. Albumen copious. Embryo small. Herbs with alternate compound leaves.

Violaceae.—Flowers irregular or regular. Petals and Stamens 5, the connective produced beyond the anther-cells. Herbs, shrubs or rarely trees with simple alternate leaves. Stipules present.

Moringaceae.—Flowers irregular. Sepals and Petals 5. Stamens 5 or 10. Capsule pod-like, 3-valved. Albumen none. Trees with compound alternate leaves.

Capparideae.—Flowers regular or irregular. Petals 4. Stamens indefinite rarely definite. Ovary and fruit often stalked. Seeds often kidney-shaped. Albumen none. Trees or shrubs often scandent, or herbs with alternate simple or digitately compound leaves. Stipules often reduced to thorns.

Cruciferae.—Flowers regular. Sepals 4. Petals 4. Stamens usually 6, 4 longer. Albumen none.—Herbs with alternate simple or compound leaves. Stipules none.

Bixineae.—Flowers regular. Sepals 5 or fewer. Petals various, often none, not seldom scaled at base. Stamens indefinite, free or connate. Placentas 2 or more. Albumen fleshy. Embryo rather large. Trees or shrubs, with alternate simple leaves. Stipules usually none, rarely minute or conspicuous.

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

Pittosporeae.—Flowers regular or nearly so. Stamens as many as petals. Embryo minute. Seeds albuminous. Trees or shrubs, rarely twining, with simple alternate leaves. Stipules none.

Polygaleae.—Flowers irregular. Stamens monadelphous. Albumen none or almost none. Embryo rather large. Herbs or perennials, rarely shrubs or trees, with simple alternate leaves. Stipules none.

4. Caryophyllineæ.—*Sepals* 5, 4 *or* 2, *free or connate. Petals* 5, *rarely fewer or none, sometimes minute. Stamens* 5 *or* 10, *or numerous. Ovary* 1-*celled, with usually a free central placenta. Albumen mealy. Embryo curved, rarely straight.*

Caryophyllaceae.—Calyx toothed or sepals free. Petals as many as calyx-segments, rarely wanting. Stamens definite. Placenta free, central. Herbs sometimes woody or wiry below, with simple opposite leaves. Stipules scarious or wanting.

Portulaceae.—Sepals 2. Petals twice that number or more. Stamens indefinite or rarely definite. Placenta basal, or free and central. Herbs, often succulent, with alternate or opposite leaves. Stipules scarious or hair-like.

Tamariscineae.—Sepals and petals each 4 to 6. Stamens as many or twice as many Placentas 3-4, free, basal. Seeds comose. Small trees or shrubs with rudimentary or minute scale-like alternate leaves.

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

Elatineae.—Flowers small, usually hermaphrodite. Stamens definite. Herbs or under shrubs, with small opposite leaves. Stipules small.

Hypericineae.—Flowers hermaphrodite. Stamens indefinite, often polyadelphous. Trees, shrubs or herbs with opposite or rarely alternate leaves. Stipules none.

Guttiferae.—Flowers usually dioecious or polygamous. Stamens indefinite, free or variously connate. Trees or shrubs, often abounding in a yellow or greenish resinous juice, with opposite leaves. Stipules none.

Ternstroemiaceae.—Flowers hermaphrodite. Petals imbricate. Stamens indefinite, free or connate at base. Trees or shrubs, with alternate leaves. Stipules sometimes wanting.

Dipterocarpeae.—Flowers hermaphrodite. Calyx-lobes usually enlarged in fruit. Petals contorted. Trees, rarely shrubs, sometimes scandent, with alternate leaves. Stipules often large.

6. Malvales.—*Sepals or calyx-lobes valvate in bud. Petals as many as sepals, or none, Stamens monadelphous or free. Ovary syncarpous with axile placentation.*

* *Anthers* 1-*celled.*

Malvaceae.—Stamens monadelphous. Herbs, trees or shrubs, sometimes scandent, with alternate leaves. Stipules present.

* * *Anthers* 2-*celled.*

Sterculiaceae.—Stamens monadelphous, indefinite or definite, with or without alternating staminods. Trees, shrubs or herbs with alternate leaves. Stipules usually present.

Tiliaceae.—Stamens indefinite, free or shortly connate at base. Trees or shrubs, rarely herbs, with alternate leaves. Stipules usually present.

B. Disciflorææ.—*Torus usually thickened or expanded into a disk, either free or adnate to the ovary, or to the calyx, or to both, rarely reduced to glands, or wanting. Stamens as many or twice as many as petals, or fewer. Ovary superior, or partially immersed in the disk, divided into cells with axile placentas, or the carpels distinct.*

7. Geraniales.—*Disk within the stamens, or confluent with the staminal tube, or reduced to glands, or obsolete. Gynoecium lobed or apocarpous, or sometimes entire. Ovules usually* 1 *or* 2 *in each cell, one or both pendulous with a ventral raphe.*

Lineae.—Disk small glandular or none. Ovary entire, styles free or connate. Ovules usually 2 in each cell. Albumen fleshy, rarely wanting. Herbs or shrubs, rarely trees with alternate leaves. Stipules usually present.

Malpighiaceae.—Sepals often with glands on their back. Disk not large. Ovary lobed or apocarpous. Ovules solitary. Fruit-carpels winged ; albumen none. Shrubs, often scandent, rarely trees, with usually opposite leaves. Stipules present.

Zygophylleae.—Disk fleshy, Filaments often with a minute scale at base. Ovary angular or lobed. Ovules 1, 2 or more in each cell. Albumen fleshy or none. Herbs or shrubs, with usually opposite 1- to 2-foliolate or pinnate, rarely simple leaves. Stipules present.

Geraniaceae.—Disk reduced to 5 glands or obsolete. Stamens 5 or a multiple of 5, all or only part anther-bearing. Ovary angular or lobed. Ovules 1 or 2, rarely more, in each cell. Albumen none or rarely fleshy. Herbs or shrubs, rarely trees, with alternate or opposite simple or compound not glandular dotted leaves. Stipules usually present.

Rutaceae.—Disk within the stamens. Ovary entire or lobed, or the carpels distinct, with the styles connate. Ovules 1 or 2 in each cell. Trees, shrubs sometimes scandent, rarely herbs with opposite or alternate simple or compound glandular-dotted leaves. Stipules none.

Simarubeae.—Filaments usually pilose or with an adnate scale. Ovary lobed. Ovules usually solitary (rarely 2,), in each cell. Trees or shrubs, bitter to the taste, with alternate gland-less simple or compound leaves.

Ochnaceae.—Stamens 10 or indefinite; anthers linear, often elongate. Ovary deeply lobed. Fruit-carpels distinct, drupaceous. Trees or shrubs, with alternate simple leaves. Stipules present.

Burseraceae.—Disk free or adnate to the calyx-tube. Ovary entire. Ovules 2 or 1 in each cell. Albumen none, or fleshy. Trees or shrubs, with balsamic juice and alternate 3-to 1-foliolate or compound gland-less leaves. Stipules none.

Meliaceae.—Stamens 8-10, usually connate in a staminal tube and the anthers sessile or nearly so, rarely free or nearly so. Ovary entire. Ovules 2, 4 to 10 in each cell. Trees or shrubs, with compound or very rarely simple gland-less leaves. Stipules none.

Chailletiaceae.—Petals 2 cleft. Ovary entire. Ovules 2 in each cell. Trees or shrubs, with simple alternate leaves. Stipules present.

8. OLACALES.—*Disk various or none. Ovary entire. Ovules 1 to 3 in a solitary cell, or 1 in each cell, pendulous with a dorsal raphe, the integuments not distinct from the nucleus. Seeds solitary in the fruit or in the cells, Albumen copious.*

Olacineae.—Petals free or connate, usually valvate. Ovary 1 or imperfectly 3 to 5-celled. Ovules usually solitary in the cells. Fruit 1-seeded. Albumen rarely wanting. Trees or shrubs, sometimes climbing, with alternate simple leaves. Stipules none.

Ilicineae.—Petals free, imbricate, rarely wanting. Ovary 3 to 6-celled. Albumen copious. Trees or shrubs, with alternate simple leaves. Stipules none.

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

Celastraceae.—Calyx-lobes and petals imbricate in bud. Stamens usually 5 and alternating with the petals, or only 3. Ovary entire or angular. Trees or shrubs, with simple opposite or alternate leaves. Stipules none, or minute and caducous.

Rhamnaceae.—Calyx-lobes valvate in bud. Petals small, or none. Stamens opposite the petals. Ovary entire, often inferior. Trees or shrubs, often scandent, with simple alternate or opposite leaves. Stipules usually present.

Ampelideae.—Calyx-lobes imbricate. Petals valvate. Stamens opposite the petals. Ovary entire. Albumen cartilaginous. Embryo small. Shrubs, or herbs, often scandent, with jointed stems and alternate compound or simple leaves, the petiole usually expanded into a stipule.

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

Sapindaceae.—Style 1. Ovules ascending or horizontal. Trees or shrubs, rarely herbs, with alternate usually compound leaves.

Sabiaceae.—Stamens often unequal in size and some imperfect, opposite the petals. Trees or shrubs with alternate simple or compound leaves.

Anacardiaceae.—Styles 1 to 4, or the stigmas almost sessile. Stamens alternate with the petals. Ovules solitary, suspended or laterally attached. Trees or shrubs, usually abounding in resinous juice, with alternate or often crowded simple or compound leaves.

C. CALYCIFLORÆ.—*Stamens and petals usually inserted on the margin of a thin disk lining the base or the whole of the calyx-tube, and free from the ovary unless the calyx-tube is also adnate to it. Stamens definite or indefinite. Ovary either free and superior, or enclosed in the calyx-tube, or inferior and adnate to the calyx-tube.*

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

Connaraceae.—Flowers regular. Stamens definite. Carpels free, 1 to 5. Ovules 2, ascending, orthotropous. Trees or shrubs, often scandent, with 1-to 5-foliolate or pinnate leaves.

Leguminosae.—Ovary free, composed of a single excentrical carpel with a terminal style, the ovules inserted along the upper or inner angle of the cavity. Albumen often scanty or none. Trees, shrubs or herbs, climbing or erect, with alternate or rarely opposite often compound leaves. Stipules rarely wanting.

Rosaceae.—Flowers usually regular. Stamens often definite. Ovary consisting of 1 or more free or afterwards combining carpels, rarely entire; styles usually distinct. Ovules usually 2, anatropous. Albumen usually none. Trees shrubs or trees, with simple or compound alternate leaves. Stipules present.

Saxifrageae.—Flowers regular or nearly so. Stamens definite or rarely indefinite. Carpels usually united into a 1-or several-celled ovary, at least at the base, free or more or less adnate or inferior. Styles usually distinct or readily separable. Albumen usually copious Shrubs or herbs with simple or compound variously arranged leaves and with or without stipules.

Crassulaceae.—Flowers isomerous and regular. Stamens in 1 or 2 series. Gynoecium superior with distinct carpels. Seeds albuminous. Usually fleshy herbs.

Droseraceae.—Glandular pilose herbs. Flowers regular, hermaphrodite. Ovary 1-celled with 2 to 5 simple or 2-cleft styles.

Hamamelideae.—Trees or shrubs. Leaves opposite. Flowers often achlamydeous, and usually in heads. Ovaries and carpels fewer than floral parts. Ovules often 1 or 2 in each cell, suspended.

Halorageae.—Herbs or rarely shrubs. Leaves opposite or alternate, without stipules. Flowers small, regular. Stamens definite. Ovary inferior, with as many cells and ovules as styles or rarely fewer, the ovule suspended from the apex. Styles or sessile stigmas, 1 to 4, distinct. Seeds albuminous.

12. Myrtales.—*Flowers regular or almost so, usually hermaphrodite. Pistil syncarpous, inferior (or free in some Rhizophoreae) ; style* 1 *to* 5. *Leaves simple.*

Rhizophoreae.—Trees or shrubs, often maritime, with opposite leaves. Stipules deciduous. Flowers regular. Calyx-lobes valvate. Petals often notched or jagged. Stamens twice as many as petals or more. Ovary usually inferior, several-celled, with 2 or more ovules suspended from the apex. Style undivided. Seeds usually solitary, with or without albumen, often germinating while still on the tree.

Combretaceae.—Flowers regular or nearly so. Stamens definite or rarely indefinite. Ovary inferior, 1-celled, with 2 or more (rarely 1) ovules suspended from the apex of the cell. Style undivided. Seed solitary, without albumen. Cotyledons convolute. Trees or shrubs, sometimes climbing. Leaves opposite or alternate, without stipules.

Myrtaceae.—Flowers regular or nearly so. Calyx-lobes and petals usually imbricate. Stamens indefinite or rarely definite; anthers opening by longitudinal slits or rarely by terminal pores. Ovary inferior, 2- or more-celled, with 2 or more ovules in each cell, or rarely 1-celled with a single placenta. Style undivided. Seeds without albumen. Cotyledons flat or folded, not convolute. Trees or shrubs, with opposite or alternate often dotted leaves. Stipules none.

Melastomaceae.—Flowers regular or nearly so. Petals twisted. Stamens definite ; anthers opening in terminal pores, very rarely in longitudinal slits. Ovary inferior or enclosed in the calyx, 2- or more-celled, with 2 or more ovules in each cell, or rarely 1-celled with a central placenta. Style undivided. Seeds without albumen. Cotyledons flat or folded, not convolute. Shrubs or rarely trees or herbs with opposite not dotted leaves. No stipules.

Lythrarieae.—Flowers regular or nearly so. Calyx-lobes valvate. Petals usually crumpled in the bud, or none. Stamens definite or rarely indefinite. Ovary usually enclosed in the calyx-tube, 2 or more celled, with few or many ovules in each cell. Style undivided. Seeds without albumen. Cotyledons not convolute. Trees, shrubs or herbs with opposite or alternate leaves. Stipules none.

Onagrarieae.—Flowers regular or nearly so, usually 4-merous. Calyx-lobes valvate, Petals imbricate. Stamens definite. Ovary inferior, 2 or more celled, very rarely 1-celled. Style undivided. Seeds without albumen. Usually herbs with opposite or alternate leaves. Stipules none.

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

Samydaceae.—Flowers regular or nearly so. Petals and sepals almost conform. Stamens indefinite, or alternating with small scales or glands. Ovary 1-celled with parietal placentas. Style entire or branched. Seeds albuminous. Trees or shrubs. Leaves alternate. Stipules small or none.

Passifloreae.—Flowers regular.· Petals persistent with the calyx-lobes and often resembling them. Stamens definite. Ovary stalked, 1-celled, with parietal placentas. Style branched. Seeds albuminous. Climbers with alternate leaves and stipules.

Cucurbitaceae.—Flowers unisexual, regular. Stamens 3 or 5. Ovary inferior, at first 1-celled, the (3) parietal placentas soon meeting in the axis and dividing the cavity into 3 or 6 cells or remaining 1-celled with a single placenta. Style entire or branched. Seeds without albumen. Prostrate or climbing tendril-bearing herbs with alternate leaves. No stipules.

Turneraceae.—Flowers hermaphrodite. Petals different shaped from sepals. Stamens definite. Ovary free. Styles free from the base, often 2-cleft. Seeds albuminous. Herbs or shrubs with alternate leaves. Stipules minute or none.

Begoniaceae.—Flowers unsymmetrical, unisexual. Perianth consisting of 2 or more leaves, the 2 outer ones opposite, valvate. Stamens numerous. Ovary inferior, 2-4-celled. Ovules numerous on the projecting single or 2-cleft axile placentas. Stigmas often spirally papillose. Usually succulent herb with oblique alternate or scattered leaves.

Datisceae.—Flowers unisexual or polygamous. Perianth-segments small. Stamens 4 or indefinite ; anthers dorsifix. Ovary inferior, often open at the apex. Placentas parietal. Styles free, simple or 2-parted. Seeds albuminous. Trees, rarely herbs with alternate leaves. Stipules none.

14. FICOIDALES.—*Flowers regular or nearly so. Ovary syncarpous, free or wholly or partially adnate ; placentation various. Embryo usually curved.*

Cacteae.—Calyx-lobes petals and stamens usually numerous. Ovary inferior, 1-celled, with parietal placentas. Style radiately cleft at apex. Usually fleshy variously shaped perennials or trees, often spiny. Leaves none or minute, rarely developed.

Ficoideae.—Calyx-lobes usually 4 or 5. Petals many, or small, or none. Stamens numerous or few. Ovary inferior to superior, 2-many-celled. Styles free or high up united. Herbs with opposite or whorled leaves.

15. UMBELLALES.—*Flowers regular. Ovary inferior, 2-many-rarely 1-celled, with a solitary suspended ovule in each cell. Styles distinct or connate at base, on or surrounded by an epigynous disk. Stamens often definite. Albumen copious. Embryo minute or longer and straight.*

Umbelliferae.—Calyx-teeth small or obsolete. Corolla usually imbricate in bud. Fruit dry, separating from the axis into 2 seed-like carpels. Usually herbs with alternate often dissected leaves. Stipules none. Flowers in simple or compound umbels.

Araliaceae.—Corolla usually valvate in bud. Fruit succulent, not separating. Cells usually more than 2. Trees shrubs or rarely herbs with alternate leaves. Stipules none.

Cornaceae.—Fruit succulent, 2-celled. Corolla usually valvate in bud. Seeds albuminous. Trees or shrubs with usually opposite leaves. Stipules none.

SUBCLASS II.—GAMOPETALÆ.

(Petals united into a single lobed corolla.)

§. 1.—*Corolla epigynous, bearing the stamens.*

Caprifoliaceae.—Anthers free. Ovary 2-many-celled with 2 to many ovules. Flowers regular or irregular ; stamens usually as many as corolla-lobes. Shrubs or herbs, often climbing, rarely trees, without real stipules. Leaves opposite.

Rubiaceae.—Flowers usually regular ; stamens isomerous ; anthers free. Ovary 2-many-celled with a solitary, 2 or many ovules. Trees, shrubs, or herbs, with opposite leaves and free or connate stipules.

Dipsaceae.—Anthers free. Ovary 1-celled. with a single suspended ovule. Seeds albuminous. Each flower surrounded or enclosed in a tubular calyx-shaped involucel, often capitate. Usually tall herbs with opposite leaves. Stipules none.

Compositae.—Anthers united in a tube round the style. Ovary 1-celled, with a single erect ovule. Seeds without albumen. Flowers in heads, at base surrounded by a scaly reptacle. Calyx-limb none or reduced to feathery or simple hairs.

§. 2.—*Stamens free from the corolla.*

* *Flowers irregular.*

Stylidieae.—Stamens 2, connate with the style ; otherwise as in *Campanulaceae.* Herbs or perennials, with tufted or alternate leaves.

Campanulaceae.—Stamens as many as corolla-lobes, free from the style. Anthers opening longitudinally. Ovary inferior, many-ovuled. Herbs with alternate or radical leaves.

Goodenovieae.—An indusium under the stigma; otherwise as in *Campanulaceae.* Herbs or shrubs, rarely trees, with alternate or radical leaves.

* * *Flowers regular.*

Ericaceae.—Stamens twice as many as corolla-lobes. Anthers 2-celled, opening in terminal pores, free or connate. Ovary inferior or superior, with as many cells as corolla-lobes. Seeds albuminous. Shrubs or trees with alternate leaves.

Epacrideae.—Stamens as many as corolla-lobes and alternate with them, or rarely fewer. Anthers 1-celled. Ovary superior with 5 or fewer cells. Seeds albuminous.

§. 3.—*Corolla hypogynous or rarely perigynous bearing the stamens.*

* *Flowers regular.*

O *Stamens either opposite the corolla-lobes, or more than their number.*

Plumbagineae.—Calyx tubular. Stamens 5. Ovary 1-celled, with a single ovule suspended from a free filiform placenta; styles or style-branches 5. Seeds rarely albuminous. Herbs or rarely shrubs with radical or alternate leaves.

Primulaceae.—Stamens as many as corolla-lobes. Ovary 1-celled, with peltate ovules attacked to a free central placenta. Fruit usually capsular. Seeds albuminous. Herbs with alternate or radical, rarely whorled leaves.

Myrsineae.—Stamens as many as corolla-lobes. Ovary 1-celled, with peltate ovules attacked to a free central placenta. Fruit succulent or hard, usually indehiscent. Seeds rarely without albumen. Trees or shrubs with alternate usually dotted leaves.

Sapotaceae.—Corolla-lobes as many or twice or thrice as many as calyx-segments. Stamens as many or twice as many as corolla-lobes. Ovary 2- or more-celled with a solitary ovule in each cell. Fruit succulent or hard, usually indehiscent. Seeds with or without albumen. Trees or shrubs, the juice often milky. Leaves alternate.

Ebenaceae.—Flowers often dioecious. Corolla-lobes 3 to 5. Stamens few or many, indefinite. Ovary superior 3 or more celled, with 1 or 2 ovules in each cell. Fruit succulent, usually indehiscent. Seeds albuminous. Trees or shrubs, not milky, with alternate leaves.

Styracaceae.—Flowers hermaphrodite. Corolla-lobes as many or twice as many as calyx-lobes. Stamens usually more than twice as many, rarely twice as many, as corolla-lobes, or fewer. Ovary (at least the fruit) more or less inferior, 2-5-celled, with 2 or more ovules in each cell. Fruit usually succulent and indehiscent. Seeds albuminous. Trees or shrubs with alternate leaves.

O O *Stamens alternating with the corolla-lobes and equal to them in number.*

Jasmineae.—Corolla with 4, 5 or more lobes, rarely 2-petaled or none. Stamens 2 rarely 4, alternating with the carpels. Ovary 2-celled, with one or 2 ovules in each cell. Fruit succulent or capsular. Seeds with or without albumen. Trees or shrubs, often scandent, with opposite or very rarely alternate leaves.

Apocyneae.—Stamens 5. Anthers more or less connivent round the stigma. Ovary of 2 distinct carpels, the styles connected upwards, or rarely the carpels united from the base. Fruits of 1 or 2 follicles, drupes or berries. Seeds usually albuminous. Trees, shrubs or perennial, sometimes climbing, with opposite or rarely scattered leaves; juice often milky.

Asclepiadeae.—Stamens 5; anthers connate round the stigma, 2 or 4-celled; pollen consolidated in 1 or 2 masses in each cell. Ovary of 2 distinct carpels; the styles united upwards. Follicles solitary or twine. Albumen scanty. Shrubs or herbs, often climbing, with opposite leaves, juice often milky.

Loganiaceae.—Anthers free. Ovary usually 2-celled. Style single. Fruit a capsule or berry. Seeds albuminous. Trees, shrubs or herbs, sometimes climbing, with opposite leaves often connected by stipules or raised lines.

Gentianeae.—Anthers free. Ovary 1-celled with 2 or rarely more parietal placentas rarely completely dividing it into 2 cells; ovules numerous and minute. Style single. Fruit a capsule rarely indehiscent. Seeds albuminous. Herbs with a bitter taste, sometimes climbing. Leaves opposite or rarely alternate.

Hydrophyllaceae.—Flowers in one-sided racemes or cymes. Anthers free. Ovary 1-celled with 2 parietal placentas or rarely 2-celled. Styles or style-branches 2. Fruit a capsule. Seeds albuminous. Herbs or rarely undershrubs, the leaves alternate or lowers opposite.

Borragineae.—Flowers in cymes or one-sided racemes or spikes. Ovary 2 or or 4-celled with a solitary ovule in each cell; or 2-celled with 2 parallel ovules in each cell. Style single, entire or rarely forked. Fruit a drupe, or dry and separating into 2 or 4 nuts. Albumen none or scanty. Trees or shrubs, or hispid herbs with usually alternate leaves.

Convolvulaceae.—Corolla-limb folded in the bud. Ovary of 2 to 4 cells or carpels, with 1 or 2 erect ovules in each. Style simple or 2-branched, or 2 distinct styles. Fruit capsular or succulent and indehiscent. Seeds with little or no albumen. Cotyledons much folded (or inconspicuous in *Cuscuta*). Herbs or shrubs, often climbing, rarely trees or leafless parasitic twiners. Leaves alternate.

Solaneae.—Corolla-lobes folded or rarely imbricate in bud. Ovary 2-celled or spuriously 4-celled (rarely 3- or 4-celled), with several ovules in each cell. Style single. Fruit a berry or a capsule. Seeds albuminous. Embryo usually curved or annular. Herbs or shrubs, rarely small trees, with alternate leaves.

* * *Flowers irregular. Of the stamens usually* 1 *or* 3 *wholly or partially aborted.*

Scrophularineae.—Corolla-lobes 2-lipped or imbricate, or rarely almost regular and folded in the bud. Perfect stamens 4, in pairs, or 2, the fifth rudimentary or wanting or rarely all 5 stamens perfected. Ovary 2-celled with several ovules in each cell. Fruit a capsule or very rarely a berry. Seeds albuminous. Embryo usually straight, Herbs or rarely shrubs with alternate or opposite leaves.

Lentibularieae.—Corolla 2-lipped. Stamens 2, anthers 1-celled. Ovary one-celled, with peltate ovules inserted on a free central placenta. Fruit a capsule. Seeds small. Albumen none. Herbs either aquatic with floating capillary, divided leaves, or terrestrial with radical leaves or leafless.

Orobanchaceae.—Stamens 4, in pairs ; anthers 2-celled. Ovary 1-celled, with 2 or 4 parietal placentas and very numerous ovules. Fruit capsular. Seeds albuminous. Leafless parasites of yellowish brown or other colours, never green.

Gesneriaceae.—Perfect stamens 4 in pairs or rarely 2 only. Ovary 1-celled with 2 parietal placentas and numerous ovules. Fruit capsular or a berry. Seeds often with hair like appendages. Albumen none or present. Herbs or shrubs, often epiphytical, rarely climbing. Leaves opposite.

Bignoniaceae.—Perfect stamens 4 in pairs or 2 only. Ovary 2-celled with 2 distinct and sometimes distant placentas on the dissepiment in each cell; ovules usually numerous. Fruit capsular, often very elongated. Seeds often winged. Albumen none. Trees, rarely climbing or erect shrubs, with opposite often compound leaves.

Acanthaceae.—Perfect stamens 4 in pairs, or 2 only, with or without a pair of rudimentary ones. Ovary 2-celled with 2 or more superposed ovules in each cell. Fruit a capsule opening elastically in 2 valves. Seeds usually supported by hooked or rarely cup-shaped or minute seed-bearers. Albumen none. Herbs or shrubs, rarely climbing, with opposite leaves.

Pedalineae.—Perfect stamens 4 in pairs or rarely 2 only. Ovary composed of 2, rarely 3 or 4 carpels, but often divided (at least after flowering) into twice as many cells by spurious dissepiments. Ovules 2 or more, or rarely 1 only in each spurious cell (half-carpel). Fruit hard and indehiscent or capsular. Testa of seed usually facetted. Albumen none. Herbs with opposite leaves.

Verbenaceae.—Stamens 2 or 4, in pairs, or rarely equal and isomerous (in teak) with the corolla-lobes; anthers 2-celled. Ovary not at all or scarcely lobed, the style terminal. Micropyle and radicle inferior. Trees shrubs or herbs, sometimes scandent. Leaves opposite or rarely alternate.

Labiatae.—Stamens 2 or 4, in pairs; anthers 2-celled or 1-celled by abortion or by confluence. Ovary deeply lobed, the style nearly basal between the lobes. Micropyle and radicle inferior. Herbs or shrubs with opposite leaves.

Subclass III.—Monochlamydeae.

(Perianth really or apparently simple, the lobes or segments all calycine or herbaceous, or all petal-like or scarious or entirely wanting.)

* *Embryo more or less curved, or excentrical.*

Chenopodiaceae.—Perianth usually herbaceous. Stamens inserted on the perianth. Ovary (of 2 or 3 carpels) only 1-celled, with 2 or 3 styles or styles branched and only a single ovule. Herbs or undershrubs, often succulent or scaly tomentose, with alternate or rarely opposite leaves and no stipules.

Amarantaceae.—Perianth usually more or less scarious or coloured. Stamens inserted on the torus. Ovary (of 2 or 3 carpels) only 1-celled, with 2 or 3 styles or style-branches and only a single ovule or rarely a cluster of ovules, bearing no relation in number to that of the carpels. Herbs or undershrubs, rarely shrubs, with alternate or opposite leaves and no stipules.

Polygonaceae.—Perianth often coloured or variously swollen on the back. Stamens opposite to or alternating with the perianth-segments. Ovary (of 2 or 3 carpels) 1-celled, with 2 or 3 styles or style-branches and only a single ovule. Embryo little curved, lateral. Herbs and shrubs with alternate leaves, the stipules usually thin and conspicuous, forming a sheath or ring round the stem.

Nyctagineae.—Lower portion of the perianth persistent and enclosing the ovary and fruit, the upper portion deciduous and withering. Stamens inserted on the torus. Ovary 1-celled with a single ovule and a single style. Trees, shrubs, or herbs, with usually opposite leaves. Stipules none.

* * *Embryo straight.*

Monimiaceae.—Perianth-lobes in 2 or more rows. Stamens opposite the perianth-lobes or indefinite. Carpels usually several. Embryo very small, in a fleshy albumen. Trees or shrubs with opposite leaves.

Laurineae.—Flowers hermaphrodite. Perianth-segments usually in 2 rows. Stamens opposite the perianth-segments; anther-cells opening in deciduous valves. Carpel solitary. Fruit succulent. Albumen none. Radicle superior. Trees or shrubs with alternate or rarely opposite leaves or (in Cuscuta) a leafless parasitic twiner.

Proteaceae.—Flowers hermaphrodite; perianth-segments 4, valvate. Stamens opposite the perianth-segments and inserted on them. Carpel solitary. Albumen none. Radicle inferior. Trees or shrubs with alternate or rarely opposite leaves.

Loranthaceae.—Flowers hermaphrodite. Perianth often brightly coloured, of 4 to 6 or rarely more valvate segments. Stamens as many as perianth-segments and opposite and adnate to the same. Carpel solitary with a single erect or suspended ovule. Albumen green, fleshy. Parasitical shrubs.

Santalaceae.—Flowers hermaphrodite. Perianth wholly or partially superior, the lobes valvate. Stamens opposite the lobes. Ovary 1-celled, with 1 to 5 ovules suspended from a central placenta. Albumen fleshy. Trees, shrubs, or herbs, often parasitic, with alternate or opposite leaves.

Elaeagnaceae.—Flowers hermaphrodite. Perianth 2-or 4-lobed, contracted beyond the otherwise free ovary. Style 1; ovule 1, erect. Albumen fleshy. Trees or shrubs, often scandent, and covered with silvery or rusty scales.

Thymelaeaceae.—Flowers hermaphrodite. Perianth-lobes imbricate. Stamens as many or twice as many, inserted in the tube. Ovary 1-or 2-celled, with a solitary pendulous ovule in each cell. Style 1 or 2. Albumen none. Trees or shrubs with a peculiar stringy bark and alternate or opposite leaves.

Aristolochieae.—Flowers hermaphrodite. Perianth superior, valvate. Ovary 3-celled with several ovules in each cell. Herbs or shrubs, often climbing, with alternate leaves.

Myristicaceae.—Flowers dioecious. Perianth-lobes in a single series, valvate in bud. Stamens united in a central column. Carpel solitary. Embryo very small, at the base of a ruminate albumen. Trees or rarely shrubs with alternate leaves.

Cytinaceae.—Flowers hermaphrodite or dioecious. Perianth 5-parted, valvate. Anthers opening by pores. Ovules numerous, on parietal placentas. Stemless sessile fleshy flowers, parasitic.

Balanophoreae.—Flowers dioecious, rarely monoecious. Perianth valvate. Stamens in a column or more or less free. Ovules solitary, suspended. Fruit one-seeded. Fungus-like fleshy parasites, the peduncles scaly, the flowers in spikes or heads.

Nepenthaceae.—Flowers dioecious. Perianth 4-parted, imbricate in bud. Stamens in a column. Ovary 4-celled, with numerous ascending ovules along the sides of the dissepiments. Stigma sessile, simple. Fruit capsular, with numerous scobiform minute seeds. Undershrubs, more or less twining, with alternate leaves, the dilated foliaceous petiole terminating in a pitcher-like expansion furnished with an articulate lid-like lamina.

Euphorbiaceae.—Flowers unisexual. Perianth calyx-like or often consisting of true corolla and calyx. Ovary of 3, rarely 2 or more than 3, united carpels, with 1 or 2 suspended ovules, and usually separating into cocci. Seeds usually albuminous. Naturally allied to none of the monochlamydeous orders. Trees shrubs or herbs with alternate or opposite leaves.

Piperaceae.—Flowers hermaphrodite or unisexual, in spikes or racemes. Perianth none. Stamens 1 to 3, free from the ovary. Ovule 1, erect. Jointed herbs or shrubs, often climbing or scrambling, with alternate or opposite leaves.

Chloranthaceae.—As former, but stamens epigynous and the ovule suspended. Erect undershrubs or herbs with opposite or alternate leaves.

Podostemmaceae.—Flowers usually hermaphrodite. Perianth none or incomplete. Stamens 1 or more, round or on one side of the ovary, free or connate. Ovary 2-or 3-celled, with numerous ascending ovules on a central placenta. Styles or stigmas 2 or 3. Fruit capsular. Seeds without albumen. Small floating or submerged herbs, looking like scalemosses, with entire or lacerated or scale-like leaves.

Urticaceae.—Flowers unisexual, the males small and green. Stamens opposite the perianth-segments. Ovary superior, free or connate, with 1 (rarely 2) ovules Fruit various, 1-seeded. Seeds albuminous. Trees, shrubs, or herbs, with usually alternate leaves. Stipules present.

Amentaceae.—Flowers monoecious. Ovary inferior, surmounted by a rudimentary toothed perianth-limb, 2- or more-celled. Fruit 1-celled, 1- rarely few-seeded. Albumen none. Seeds naked. Trees with alternate leaves and with stipules.

Juglandeae.—As in Amentaceae, but leaves pinnate.

Salicineae.—Flowers dioecious, in catkins. Perianth none or rudimentary. Ovary free, 1-celled; ovules indefinite, basal or parietal. Seeds with a tuft of hairs. Trees or shrubs with alternate leaves.

Casuarineae.—Flowers monoecious, in spikes. Perianth in male flowers 2-phyllous in females none. Stamen 1. Ovary 1-celled with 1 or 2 ovules; styles 2. Cones woody, the woody bracts valvately opening. Caryopsis winged. Leafless trees with jointed branchlets furnished with toothed sheaths like in *Equisetum.*

Division 2. *Gymnosperms.*

Gnetaceae.—Stamens in the males, ovules in the females, enclosed in an ovoid or tubular bract. Shrubs or rarely little trees, usually scandent, with jointed stems and opposite leaves, rarely leafless.

Coniferae.—Anthers in the males, ovules in the females, inserted on scales, often forming spurious catkins or cones. Trees or shrubs, with a branched not jointed stem and simple often scale-like or needle-shaped leaves.

Cycadeae.—Anthers numerous on the under surface of scales arranged in a cone; ovules from separate reduced fronds. Small but robust trees, often stemless, the stem not or sparingly branched. Leaves pinnate.

Class II.—MONOCOTYLEDONS.

* *Ovary inferior.*

Bromeliaceae.—Flowers regular or nearly so. Perianth of 6 segments, the 3 inner ones free and petal-like, the outer ones forming a calyx. Stamens 6, anthers opening inwards. Seeds albuminous. Harsh often succulent stemless or short-stemmed plants, the leaves longitudinally veined, often spiny along the edges.

Musaceae.—Flowers irregular Perianth of 6 segments, petaloid, in 2 distinct rows, the posterior inner segment often free and labellum-like. Stamens 6, or usually only 5, anthers 2-celled. Seeds albuminous. Tall herbs with a spurious stem formed by the leaf-sheathes, with large leaves transversely veined from the midrib.

Marantaceae.—Flowers irregular. Perianth of 6 segments, the outer 3 segments more or less calyx-like, the inner tubular, in 2 rows, the outer 3-parted and nearly equal. Stamens 6, 3 of them petaloid-transformed, one or 2 barren or abortive, the other fertile with an one-celled anther. Seeds albuminous. Herbs much of the habit of the following and similar leaves.

Scitamineae.—Flowers irregular. Perianth of 6 segments, the outer 3 segments short and calyx-like, the inner composed of a labellum-like expanded central lobe with 2 lateral segments united with the petal-like staminods. Stamen 1, anthers 2-celled, the upper part of filament enclosed within the 2 anther-cells. Seeds albuminous. Herbs with a spurious sheath-stem and often large 1-ribbed leaves transversely-veined.

Orchideae.—Flowers irregular. Perianth corolla-like, the 6 segments in 2 rows, the posterior inner segment labellum-like. The pistill united with the stamens in a solid column. Placentas parietal. Perennial plants, bulbous tuberous or forming stems, often fleshy, the leaves veined parallelly with the midrib.

Burmanniaceae.—Flowers regular. Perianth of usually 6 segments, corolla-like. Stamens 6 or 3, free, perigynous. Ovary 1- to 3-celled, the placentas parietal or axile. Little herbs with tufted parallel-veined leaves, rarely leafless parasites.

Taccaceae.—Flowers regular. Perianth of 6 segments, corolla-like. Stamens 6, inserted into the base of the perianth-segments, filaments petaloid, hooded at the apex. Ovary 1-or half 3-celled, placentas parietal, with numerous ovules. Albumen fleshy. Tuberous herbs with parallel or irregularly branched veined simple or divided leaves. Flowers forming umbels on the long scapes.

Dioscoreaceae.—Flowers regular, unisexual. Perianth 6-lobed. Stamens 6, free, anthers turned inwards. Ovary 3-celled, with only 1 or 2 ovules. Seeds albuminous, Usually twining plants, with tubers above or below the ground. Leaves simple or digitate, net-veined.

Irideae.—Flowers regular or nearly so. Perianth of 6 segments, corolla-like. Stamens 3, the anthers turned outwards. Ovary 3-celled, the ovules axile. Stigmas often petaloid. Seeds albuminous. Tuberous or fibrous rooted herbs with equitant parallel-veined leaves.

Amaryllideae.—Flowers regular. Perianth of 6 segments, corolla-like. Stamens 6, anthers turned inwards. Ovary 3-celled, the ovules axile. Seeds albuminous. Usually bulbous herbs, stemless or with a short spurious stem, the leaves uniform, parallel-veined.

Hydrocharideae.—Flowers regular, usually unisexual. Perianth of 6 segments, the 3 outer ones calyx-like, the 3 inner ones petal-like or sometimes wanting. Stamens definite or indefinite, epigynous. Ovary 1- to 9-celled, the ovules numerous, often parietal. Albumen none. Submerged or floating-herbs, the leaves parallel-veined.

* * *Ovary superior.*

○ *Ovaries apocarpous, i. e., free, (rarely solitary).*

Alismaceae.—Flowers usually hermaphrodite. Perianth of 6 segments, the 3 outer ones calyx-like, the inner ones petal-like. Stamens definite or indefinite, perigynous. Ovary of several free carpels, the carpels 1-or 2-ovuled. Albumen none. Floating or swamp-plants, with parallel-veined leaves. Flowers in umbels, racemes or panicles.

Najadaceae.—Flowers often unisexual, minute. Perianth of 2 or 4 segments, or wanting. Stamens definite, perigynous, or sessile. Ovary of several free carpels, or unicarpellary; ovules 1 or more, pendulous or erect. Albumen none. Aquatic herbs, floating or submerged, with parallel veined leaves.

⊖ ○ *Ovary syncarpous.*

△ *Flower corolla-like or furnished with a true calyx and corolla or absolutely naked.*

× *Flowers often unisexual. Inflorescences often furnished with 1 or more spathes.*

Aroideae.—Flowers several or many, naked or the perianth incomplete, on a solitary spadix protected by a single spathe. Anthers sessile. Ovory 1-rarely 3-or more-celled, with 1 or 2 rarely more parietal or erect ovules in each cell. Fruit fleshy. Albumen rarely wanting. Herbs, usually succulent, stemless or caulescent, the leaves usually net-veined.

Pistiaceae.—Flowers only 1 to 3, of which one only is female, protected by a more or less incomplete spathe, but wanting a true free spadix. Ovary 1-celled, with 1 or several erect or ascending ovules. Usually floating small herbs, with parallel-veined leaves, or reduced to minute leafless fronds.

Typhaceae.—Flowers minute, numerous on a naked spadix; perianth scaly or hairy, filaments long. Ovary 1-celled, stalked or sessile, with a solitary pendulous ovule. Fruit an 1-seeded nut. Marsh-plants with linear parallel-veined leaves. Flowers in dense spikes or heads.

Pandanaceae. Flowers usually naked, numerous, the males in branched, the females often in simple spadices furnished with many spathes at the base. Ovary 1-celled, with a solitary or rarely several erect or numerous ovules along parietal placentas. Albumen fleshy. Trees or shrubs, sometimes climbing, with spirally or distichously arranged linear often spiny-bordered leaves, or rarely (in Cyclantheæ) the leaves flabellate. Drupes forming a syncarp.

Palmae.—Flowers more or less perfect, with or without bracts, seated on a branched rarely simple spadix protected by 1 or more spathes. Perianth of 6 segments, often very rigid or coriaceous, the inner segments often corolla-like, imbricate or valvate in bud. Ovary usually of 3 carpels either completely syncarpous, or more or less apocarpous. Ovules solitary or by 2 in each carpel, usually erect. Albumen horny. Stemmed or stemless trees, often very lofty, or climbers, the leaves usually pinnate or flabellate, plaited, parallel-veined.

× × *Flowers usually hermaphrodite and often gaily coloured.*

† *All the 6 perianth-segments petaloid.*

Liliaceae.—Perianth of 6 segments, all the segments petaloid, regular. Stamens 6; anthers turned inwards. Styles consolidated. Ovary 3-celled. Albumen fleshy, Rarely trees or shrubs, usually tuberous or simply-rooted herbs with parallel-veined leaves.

Melanthaceae.—Perianth of 6 segments, all the segments petaloid, regular. Stamens 6; anthers turned outwards. Ovary 3-celled. Albumen fleshy. Bulbous, tuberous or fibrous rooted plants with parallel-veined leaves. Flowers scapous, in racemes or spikes.

Pontederaceae.—Perianth more or less irregular, of 6 petaloid segments, the latter circinnate when withering. Stamens 6, or 3 aborted, the anthers turned inwards. Ovary 3-celled. Albumen mealy. Aquatic or marsh-plants with parallel-veined leaves. Flowers in spikes or umbels, rarely solitary.

† † *Only the 2 or 3 inner perianth-segments more or less petaloid, the outer 3 sepal-like or glumaceous, or rarely wanting.*

Commelynaceae.—Flowers almost regular, often blue. Sepals 3. Petals 3. Stamens 6, 3 of them often reduced to staminods. Ovary 3-rarely 2-celled. Albumen fleshy. Embryo on the edge of the albumen. Herbs or perennials, rarely trailing, the parallel-veined leaves usually sheathing at base.

Xyrideae.—Flowers regular, usually yellow, in scaly heads. Sepals irregular, 3 or 4, glumaceous. Petals 3, united at base in a gamopetalous corolla. Fertile stamens 3. Ovary 1-celled, with parietal placentas. Embryo on the outside of the fleshy albumen. Sedge-like fibrous-rooted plants with narrow radical leaves.

Juncaceae.—Flowers regular, hermaphrodite. Perianth 6-leaved, scarious or calyx-like. Stamens 6, rarely 3. Ovary 1- or 3-celled, the cells 1- or several ovuled. Fruit capsular. Albumen fleshy or cartilagineous. Embryo minute, immersed. Sedgy perennials or annuals, with fistulose or narrow parallelly nerved leaves. Flowers often in corymbs or heads.

Restiaceae.—Flowers regular, usually unisexual, often in bracted or scaly heads. Perianth consisting of 6 to 2 glumaceous or hyaline segments or the inner 3 ones united in a 3-toothed cup or tube. Ovary 1-3-celled; ovules solitary, pendulous. Aquatic or marsh plants with setaceous or linear parallel-veined leaves.

△ △ *Flowers sessile, within imbricated glumes. Perianth rudimentary or none. Ovary always 1-celled with a single erect or nearly erect ovule.*

Cyperaceae.—Perianth none, or consisting of bristles or minute scales. Anthers basifix. Embryo at the base of the albumen. Grass- or rush-like herbs or perennials, with narrow parallel-nerved leaves. Culms not truly jointed.* Sheaths entire. Each flower usually in the axil of one glume, without a palea.

Gramineae.—Perianth none, or of 1-3 minute scales. Anthers versatile. Embryo at the side of the base of the mealy albumen. Annual or perennial grasses, rarely (in bamboos) soboliferous trees or shrubs, with parallel-nerved leaves. Culms jointed and nodded. Sheaths of the leaves usually split to the base. Each flower usually in a secondary bract (palea) within the glume.

B. CRYPTOGAMS.

SUBCLASS I.—CRYPTOGAMAE FOLIOSAE.—*Usually furnished with distinct stem and leaves, the stems sometimes reduced to simple leaf-like fronds or membranous green expansions and furnished with a midrib. Fructification various.*

* VASCULARES.—*Stems traversed with vascular vessels.*

Filices.—Fructification of very minute capsules (sporangia), full of microscopic spores situated on the undersurface or along the margins of the frond, or on separate branches of the frond; rarely of larger capsules, which are more or less confluent on the under surface of the frond or collected in simple or branched spikes. Terrestrial, rarely (Ceratopteris) marsh-plants, sometimes furnished with a short trunk, or trees. Vernation usually circinnate.

Lycopodiaceae.—Fructification of capsules, which are axillary in the upper leaves or in the scales of a cone, sessile, 1- to 3-celled, bursting by 2 or 3 valves, full of spores marked by 3 radiating lines. Terrestrial plants, with elongate erect creeping or pendulous stems.

* Hence the old phrase: Nodum in scirpo quaerere.

Hydropterides.—Capsules of 2 kinds indehiscent, coriaceous, very various in form and structure, situated on the roots, or leaves or stems of the frond, 1-or many-celled. Aquatic or marsh plants, of various habit, creeping or floating.

Equisetaceae.—Fructification terminal; cone-like, consisting of peltate scales, bearing on the under surface membranous sacs in which the spores are contained. Spores surrounded by 2 elastic elaters crossing each other. Perennials with creeping rhizomes and erect simple or branched jointed stems, each joint embraced by a toothed sheath.

* * CELLULARES. *Cellular small plants, with only few or no vessels.*

Musci.—Fructification of two kinds, viz., more or less coriaceous sessile or stalked urn-like capsules opening, 1st, by a terminal lid, or rarely by 4 lateral slits, or not at all and containing the minute spores, at the same time bearing at the top a various shaped calyptra; or 2nd, minute cylindric membranous sacs (antheridia), either axillary or crowded at the tips of the branchlets, containing spermatozoa. Erect or creeping elegant small annual or perennial plants with distinct leaves variously arranged.

Jungermanniaceae.—Fructification of two kinds, as in Musci, but the capsules are split from the top to the base into 4 diverging valves, and the spores are mixed with spiral filaments (elaters). Mosslike, creeping or erect herbs, the stems often dilated in a 1-ribbed frond. Leaves cellular, usually distichous or secund, entire or 2- or more-lobed.

Marchantiaceae.—Fructification of two kinds, viz., 1st capsules, usually symmetrically disposed on the underside of a peduncled peltate receptacle, which rises from the edge of the frond (rarely solitary and sessile) and contains spores mixed with spiral filaments; 2nd, antheridia, contained in sessile or peduncled peltate or discoid receptacles. Leafless small plants, consisting of green flat variously lobed fronds, emitting rootlets from the undersurface.

Characeae.—Fructification of two kinds, viz., 1st, lateral red globules composed of 8 tri-angular scales enclosing a mass of jointed filaments; 2nd, axillary little nuts, surrounded by 5 spiral filaments, and filled with starch granules. Aquatic plants, with tabular dichotomously branched and articulate stems, the branchlets often whorled, and sometimes incrustated.

SUBCLASS II.—THALLOPHYTA.—*Cellular plants without a distinct stem, forming variously shaped organisms, thread-like, flat and expanded thalluses, mushrooms, etc. Fructification imbedded in the substance of the thallus, very various.*

Lichenes.—Texture of thallus consisting of hyaline fungoid and coloured confervoid cells. Fructification of two kinds, viz., 1st, septate spores contained in tubes (*asci*) usually collected into hard peltate disks or shields on the surface of the thallus or immersed; 2nd, *spermagones*, or small sacs containing *spermatia*; 3rd, *pycnides*, obscure organs giving origin to spore-like bodies at their tips; 4th, *gonidia*, or globose spore-like bodies, imbedded in the thallus and sometimes breaking through the vertical substance, and forming powdery masses called *soredia* and *cyphella.* Crustaceous or foliaceous aërial plants, growing on rocks, earth and bark, &c.

Fungi.—Fructification of minute spores attached to the outer cellular surface, or seated on the top of peculiar cells, or enclosed in asci or variously shaped closed receptacles. Terrestrial, epiphytic or parasitic plants, destitute of chlorophyll, of infinite shape and form, usually soft and succulent, and deriving nourishment mostly from decayed or morbose plant-rests.

Algae.—Fructification of four kinds, free or imbedded in the tissue of the frond, either promiscuously or in separate sacs or vesicles, viz., 1st, *zoospores*, or microscopical bodies moving through the water by the medium of fine cilia; 2nd, spores of various forms, which are fertilized by antheridia; 3rd, *antheridia*, containing *spermatozoa*: 4th, *gonidia*, or minute organs corresponding to the buds of higher plants. Cellular aquatic plants, foliaceous, filamentous or simple or congregated cells, variously coloured green, red, black, &c.

ARTIFICIAL KEY* TO THE NATURAL ORDERS.

(Extracted from Lindley's Vegetable Kingdom.)

A. DICOTYLEDONS OR EXOGENS.

I. Angiosperms.

* *Polypetalous, i. e. with several or many free petals.*
† *Polyandrous. Stamens more than 20.*
§ *Ovary inferior or partially so.*
O *Leaves furnished with stipules.*
× Carpels more or less distinct (at least as to the styles), or solitary, *Rosaceae (Pomaceae).*
× × Carpels wholly combined into a solid pistil, with more placentas than one.
Placentas central. Leaves opposite,, ... *Rhizophoraceae.*
Placentas parietal, ... *Samydaceae.*
OO *Leaves without stipules.*
× Carpels more or less distinct (at least as to the styles), usually numerous on a torus, quite inferior, ... *Anonaceae.*
× × Carpels wholly combined into a solid pistil.
Placentas spread over the surface of the dissepiments, ... *Nymphaeaceae.*
Placentas parietal. Petals indefinite in number, confused with the calyx, ... *Cactaceae.*
Placentas in the axis.
Leaves marked with little transparent dots. Ovary with more than one cell; cotyledons distinct, ... *Myrtaceae.*
Leaves dotless. Petals definite in number, imbricate in bud, round and concave, style 1.. *Myrtaceae. (Barringtonieae).*
As former, but petals narrow and strap-shaped, valvate in bud, ... *Cornaceae (Alangieae).*
§ § *Ovary wholly superior.*
O *Leaves furnished with stipules.*
× Carpels more or less distinct (at least as to the styles), or solitary.
|| Stamens hypogynous.
Carpel solitary, ... *Leguminosae.*
Carpels several, ... *Magnoliaceae.*
|| || Stamens perigynous.
Styles from the apex of the solitary or several carpels, ... *Rosaceae.*
Styles from the base of the carpels,...................................... *Chrysobalaneae.*
× × Carpels wholly combined into a solid pistil, with more placentas than one.
|| Placentas parietal.
Leaves marked with round transparent dots, ... *Bixaceae(Flacourtieae).*
Leaves marked with round and linear dots intermixed, ... *Samydaceae.*
|| || Placentas in the axis.
† Calyx imbricated in the bud.
* Flowers unisexual, ... *Euphorbiaceae.*
* * Flowers hermaphrodite.
Ovary 1-celled, sepals 2, ... *Portulacaceae.*
† † Calyx valvate in bud.
* Stamens monadelphous.
Anthers 2-celled, ... *Sterculiaceae.*
Anthers 1-celled, ... *Malvaceae.*
* * Stamens free, anthers 2-celled.
Corolla twisted in bud; calyx usually enlarged in fruit, ... *Dipterocarpeae.*
Corolla valvate in bud, ... *Tiliaceae.*
O O *Leaves without stipules.*
× Carpels more or less distinct (at least as to the styles), or solitary.
|| Carpels immersed in a fleshy table-shaped disk; waterplants, ... *Nelumbiaceae.*
|| || Carpels not immersed in a disk.
† Stamens perigynous.
Carpel solitary or more than one, ... *Rosaceae.*
† † Stamens hypogynous.
* Embryo minute.

* The characters of the principal divisions are the same as in the preceding conspectus of natural orders according to natural arrangement.

Seeds with an arillus, ... *Dilleniaceae.*
Seeds without an arillus. Albumen fleshy and even, ... *Ranunculaceae.*
Seeds without an arillus. Albumen ruminate, ... *Anonaceae.*

* * Embryo nearly as long as the seed.

× Fruit a pod, ... *Leguminosae.*

× × Fruit not a pod.

Drupes 1-seeded, ... *Anacardiaceae.*
Capsules many seeded, ... *Hypericineae.*

× ×. Carpels wholly combined into a solid pistil, with usually more placentas than one.

Placentas parietal, in distinct lines.
Anthers versatile, juice watery, ... *Capparideae.*
Anthers innate, juice milky, ... *Papaveraceae.*
Placentas parietal, spread over the lining of the fruit, ... *Bixaceae.*
Placentas spread over the dissepiments ; waterplants, ... *Nymphaeaceae.*
Placentas in the axis.
Ovary 1-celled, with free central placenta, ... *Portulaceaceae.*
Ovary many-celled.
Calyx much imbricated. Petals equal in number to the sepals; seeds few, ... *Guttiferae.*
Calyx but little, or not, imbricated, tubular. Stamens perigynous, ... *Lythrarieae.*

† † *Oligandrous. Stamens fewer than 20.*

§ *Ovary inferior, or partially so.*

O *Leaves furnished with stipules.*

|| Placentas parietal, ... *Samydeae.*
|| || Placentas in the axis.
Flowers completely unisexual. Herbs, ... *Begoniaceae.*
Flowers hermaphrodite or polygamous.
Stamens equal to the petals and opposite to them, ... *Rhamnaceae.*
Stamens, if equal to the petals, alternating with them.
Leaves opposite, ... *Rhizophoreae.*
Leaves alternate, ... *Hamamelideae.*

O *Leaves destitute of stipules.*

|| Placentas parietal ; flowers completely unisexual .... *Cucurbitaceae.*
|| || Placentas in the axis.

Δ Flowers in umbels.

Corolla valvate in the bud, ... *Araliaceae.*
Corolla imbricate in the bud, ... *Umbelliferae.*

Δ Δ Flowers not in umbels.

═ Carpel solitary.

Petals strap-shaped. Stamens distinct, ... *Cornaceae* (*Alangieae.*)
Petals very narrow. Stamens adnate to them, ... *Loranthaceae.*
Petals oblong. Leaves insipid.
Cotyledons convolute, ... *Combretaceae.*
Cotyledons flat, ... *Halorageae.*
Petals oblong. Leaves balsamic, ... *Anacardiaceae.*

≡ Carpels divaricating at the apex.

Leaves alternate. Herbs, ... *Saxifrageae.*

≡ Carpels parallel, combined.

Calyx valvate. Petals opposite the stamens, ... *Rhamnaceae.*
Calyx valvate. Petals alternate with the stamens or isomerous.
Albumen none, ... *Onagrarieae.*
Albumen copious, ... *Cornaceae.*
Calyx not valvate.
Stamens doubled downwards. Leaves ribbed, ... *Melastomaceae.*
Stamens only curved. Anthers short.
Leaves dotted, ... *Myrtaceae.*
Leaves not dotted.
Flowers 4-merous.
Ovules horizontal or ascending, ... *Onagrarieae.*
Ovules pendulous, ... *Halorageae.*
Flowers not 4-merous. Seeds many, ... *Saxifrageae* (*Escallonieae.*)

§ § *Ovary wholly superior.*

O *Leaves furnished with stipules.*

+ Carpels distinct or solitary.

Anthers with recurved valves, ... *Berberideae.*

Anthers with longitudinal valves.
  Style from the base of carpel, ... *Chrysobalaneae.*
  Style from the apex of carpel. Fruit a pod, ... *Leguminosae.*
  Style from the apex of carpel. Fruit a drupe or capsule, ... *Rosaceae.*

× × Carpels wholly combined; with more placentas than one.

Placentas parietal.
  Flowers with a ring of appendages, ... *Passifloreae.*
  Flowers without any ring of appendages.
    Leaves with round and oblong transparent dots, ... *Samydeae.*
    Leaves dotless, circinnate when young, ... *Droseraceae.*
    Leaves dotless, straight when young. Fruit capsular, ... *Violarieae.*
    Leaves dotless, straight when young. Fruit siliquose, ... *Moringaceae.*

Placentas in the axis.
  Styles distinct to the base.
    Calyx in a broken whorl, much imbricated, ... *Elatineae.*
    Calyx but little imbricated, in a complete whorl.
      Flowers unisexual, ... *Euphorbiaceae.*
      Flowers hermaphrodite or polygamous.
        Petals conspicuous. Stamens hypogynous, ... *Malpighiaceae.*
        Petals conspicuous. Stamens perigynous, ... *Saxifrageae.*
    Calyx valvate, ... *Tiliaceae.*
  Styles more or less combined. Gynobasic.
    Gynobase fleshy, ... *Ochnaceae.*
    Gynobase dry. Leaves regularly opposite, ... *Zygophylleae.*
    Gynobase dry. Leaves more or less alternate.
      Fruit beaked, ... *Geraniaceae.*
      Fruit not beaked, ... *Geraniaceae (Oxalideae).*
  Styles more or less combined. Not gynobasic.
    Calyx much imbricated, in a broken whorl, ... *Sapindaceae.*
    Calyx but little imbricated, in a complete whorl.
      Leaves simple. Sepals more than 2, ... *Malpighiaceae.*
      Leaves simple. Sepals only 2, ... *Portulacaceae.*
    Calyx valvate or open.
    Stamens columnar, ... *Sterculiaceae.*
    Stamens not columnar.
      Stamens opposite to the petals if equal to them in number.
        Perigynous, ... *Rhamnaceae.*
        Hypogynous, ... *Ampelideae.*
      Stamens alternate with petals if equal to them in number.
        Anthers opening by pores, ... *Tiliaceae.*
        Anthers opening by slits. Petals split, ... *Chailletiaceae.*
        Anthers opening by slits. Petals entire, ... *Burseraceae.*

O O *Leaves destitute of stipules.*

× Carpels more, or less distinct or solitary.

Anthers with recurved valves, ... *Berberideae.*
Anthers with longitudinal valves.
    Fruit a pod. Radicle next hilum, ... *Leguminosae.*
    Fruit a pod. Radicle remote from hilum, ... *Connaraceae.*
    Fruit not a pod.
      Carpels each with an hypogynous scale, ... *Crassulaceae.*
      Carpels without hypogynous scales.
        Albumen very abundant. Embryo minute.
          Herbs. Albumen solid, ... *Ranunculaceae.*
          Shrubs or trees. Albumen ruminate, ... *Anonaceae.*
        Albumen in small quantity or wholly wanting.
          Carpels several, all perfect. Flowers unisexual, ... *Menispermaceae.*
          Carpels solitary, or all but one imperfect.
            Leaves dotted, ... *Burseraceae.*
            Leaves dotless, ... *Anacardiaceae.*

× × Carpels combined into a solid pistil.

Placentas parietal.
    Stamens tetradynamous, ... *Cruciferae.*
    Stamens not tetradynamous.
      Flowers with a ring or crown of sterile stamens.
        Sexes distinct.
          Female flowers with a crown, ... *Bixineae (Pangiaceae).*

Female flowers without crown, ... *Papayaceae.*
Sexes distinct. Placentae lining the fruit,............ *Bixineae* (*Flacourtieae*).
Flowers without sterile stamens.
Hypogynous disk large. Stamens indefinite,................... *Capparideae.*
Hypogynous disk small or wanting.
Albumen very abundant. Embryo minute, ... *Papaveraceae.*
Albumen in small quantity or wholly wanting, ... *Turneraceae.*
Placentas covering the dissepiments, ... *Nymphaeaceae.*
Placentas axile.
Styles distinct to the base.
Calyx in a broken whorl, much imbricated.
Stamens polyadelphous, ... *Hypericineae.*
Stamens monadelphous or free, ... *Linaceae.*
Calyx but little imbricated, in a complete whorl.
Carpels each with an hypogynous scale, ... *Crassulaceae.*
Carpels destitute of hypogynous scales.
Carpels 2, divaricating at apex,.................................. *Saxifrageae.*
Carpels not divaricating at apex, ... *Caryophylleae.*
Styles more or less combined. Gynobasic.
Stamens arising from scales, ... *Simarubeae.*
Stamens not arising from scales.
Styles wholly combined. Flowers hermaphrodite,................. *Rutaceae.*
Styles wholly combined. Flowers unisexual,...... *Rutaceae* (*Xanthoxyleae*).
Styles divided at apex. Flowers irregular, ...*Geraniaceae* (*Balsamineae*).
Styles more or less combined, not gynobasic.
Calyx much imbricated, in a broken whorl.
Flowers symmetrical,.. *Guttiferae.*
Flowers not symmetrical.
Flowers regular.
Petals without appendages............ *Sapindaceae* (*Acerineae*).
Petals with appendages, ... *Sapindaceae.*
Flowers papilionaceous, ... *Polygaleae.*
Calyx but little imbricated, in a complete whorl.
Carpels 4 or more. Anthers opening by pores, ... *Ericaceae.*
Carpels 4 or more. Anthers opening by slits.
Seeds winged. Leaves pinnate.............. *Meliaceae* (*Cedreleae*).
Seeds wingless.
Stamens united in a long tube,................... *Meliaceae.*
Stamens free or nearly so. Leaves dotted, ... *Rutaceae.*
Carpels fewer than 4.
Sepals 2, ... *Portulacaceae.*
Sepals more than 2.
Stamens hypogynous.
Seeds comose, ... *Tamariscineae.*
Seeds naked, ... *Pittosporeae.*
Stamens perigynous, ... *Celastrineae.*
Calyx valvate or open.
Stamens equal in number to the petals and opposite to them, *Rhamnaceae.*
Stamens equal in number to the petals, alternate with them.
Leaves pinnate, ... *Burseraceae.*
Leaves simple. Calyx tubular. Stamens hypogynous,...... *Olacineae.*
Leaves simple. Calyx tubular. Stamens perigynous, ..*Lythrarieae.*

* * *Gamopetalous, i. e., the petals combined in an entire corolla.*

+ *Ovary superior.*

§ *Flowers regular.*

○ *Ovary* 3-, 4-, 5-*lobed.*

Leaves dotted, ... *Rutaceae.*
Leaves dotless. Inflorescence gyrate, ... *Boragineae.*

○ ○ *Ovary not lobed.*

Carpels from 4 to 5, or none.
Anthers opening by pores.
Anthers 2-celled, ... *Ericaceae.*
Anthers 1-celled, ... *Epacrideae.*
Anthers opening by slits.

Stamens equal in number to the petals and opposite.
Shrubs, ... *Myrsineae.*
Herbs, ... *Primulaceae.*
Stamens not opposite to the petals if of the same number.
Seeds indefinite.
Carpels distinct, ... *Crassulaceae.*
Seeds definite.
Carpels distinct, ... *Anonaceae.*
Carpels combined.
Ovules erect.
Corolla imbricate in bud, ... *Sapotaceae.*
Corolla plaited in bud, ... *Convolvulaceae.*
Ovules pendulous.
Stamens twice as many as petals, ... *Ebenaceae.*
Stamens the same number as petals, ... *Jlicineae.*
Carpels usually 3.
Flowers dioecious, ... *Papayaceae.*
Flowers hermaphrodite. An hypogynous disk, ... *Polemoniaceae.*
Carpels only 2.
Diandrous. Corolla valvate, ... *Oleaceae.*
Diandrous. Corolla imbricate, ... *Jasminaceae.*
Stamens 4 or more. Inflorescence gyrate.
Fruit 1-celled, ... *Hydrophyllaceae.*
Fruit 2-celled. Styles 2-cleft, ... *Boragineae. (Ehretiaceae).*
Fruit 2-celled. Styles dichotomous, ... *Boragineae (Cordiaceae).*
Stamens 4 or more. Inflorescence straight.
Flowers symmetrical.
Leaves alternate, ... *Solanaceae.*
Leaves opposite.
Anthers grown to the stigma, ... *Asclepiadeae.*
Anthers free from stigma.
Corolla imbricate in the bud, ... *Gentianeae.*
Corolla valvate in bud, ... *Loganiaceae.*
Corolla contorted, ... *Apocyneae.*
Flowers not symmetrical.
Leaves with stipules, ... *Loganiaceae.*
Carpel solitary.
Style single.
Fruit spuriously 2-celled, ... *Plantagineae.*
Fruit 1-celled, 1-seeded, ... *Jasmineae (Salvadoraceae).*
Styles 5, ... *Plumbagineae.*
§ § *Flowers irregular.*
O *Ovary 4-lobed,* .... *Labiatae.*
O O *Ovary undivided. Carpels* 2.
Fruit nucamentaceous, 4-celled. Radicle inferior, ... *Verbenaceae.*
Fruit capsular or succulent.
Placentae parietal.
Seeds amygdaloid. Fruit bony or capsular, few-seeded, ... *Pedaliaceae.*
Seeds not amygdaloid.
Leafy.
Seeds winged, ... *Bignoniaceae.*
Seeds not winged, ... *Cyrtandraceae.*
Scaly brown parasites, ... *Orobanchaceae.*
Placentae axile.
Seeds albuminous, ... *Scrophulariaceae.*
Seeds without albumen.
Seeds winged, ... *Bignoniaceae.*
Seeds not winged, usually attached to bony hooked placentas, *Acanthaceae.*
Placenta free, central, ... *Lentibularieae.*
† † Ovary inferior.
O Carpels solitary.
Anthers syngenesious. Ovule erect, ... *Compositae.*
Anthers free.
Carpel quite solitary. Flowers in heads, ... *Dipsaceae.*

Carpel with 2 additional abortive ones. Flowers not in heads, ...*Valerianaceae.*

O O Carpels more than one.

Anthers opening by pores,..*Vacciniaceae.*

Anthers opening by slits.

Stamens adnate to the corolla.

With stipules. Leaves opposite, ...*Rubiaceae*

Without stipules. Leaves opposite, ...*Caprifoliaceae.*

Without stipules. Leaves alternate, ...*Ebenaceae.*

Stamens free from the corolla.

Stigma with an indusium, ...*Goodeniaceae.*

Stigma without an indusium.

Stamens 2, connate with the style, ...*Stylidieae.*

Stamens as many as corolla-lobes, free from the style, *Campanulaceae.*

* * * *Apetalous.*

*† *Achlamydous.*

O *Leaves furnished with stipules.*

Ovules very numerous.

Seeds winged,..*Hamamelideae* (*Altingieae*).

Seeds comose...*Salicineae.*

Ovules solitary or very few.

Flowers hermaphrodite. Stamens unilateral,..............................*Chloranthaceae.*

Flowers unisexual.

Carpels solitary. Ovule erect, ...*Myricaceae.*

Carpels triple, ...*Euphorbiaceae.*

O O *Leaves destitute of stipules.*

Ovules very numerous, ...*Podostemaceae,*

Ovules solitary or very few.

Flower hermaphrodite.

Embryo in vitellus, ...*Piperaceae.*

Embryo without vitellus,...*Oleaceae.*

Flowers unisexual.

Flowers naked. Carpels single,...................................*Myricaceae.*

Flowers in an involucre. Anther-valves slit,.................*Monimiaceae.*

†.† *Monochlamydeous.*

§. *Ovary inferior, or partially so.*

O *Leaves furnished with stipules.*

Flowers hermaphrodite, ...*Aristolochiaceae.*

Flowers unisexual. Fruit in a cup, ...*Cupuliferae.*

Flowers unisexual. Fruit naked.

Fruit many-seeded,..*Begoniaceae.*

Fruit one-seeded, ...*Artocarpeae.*

O O *Leaves without stipules.*

Flowers unisexual, amentaceous.

Leaves simple, ...*Myricaceae.*

Leaves compound, ...*Juglandaceae.*

Flowers unisexual, not amentaceous.

Seeds immersed in pulp, ...*Cucurbitaceae.*

Seeds dry, numerous, parietal, ...*Datiscaceae.*

Flowers hermaphrodite or polygamous.

Leaves with transparent dots. ....*Myrtaceae.*

Leaves without dots.

Ovary 3-6-celled, polyspermous, ...*Aristolochieae.*

Ovary 1-celled. Anther-valves slit.

Embryo straight, cotyledons convolute, ...*Combretaceae.*

Embryo straight, cotyledons flat.

Albumen none,..*Halorageae.*

Albumen fleshy, ...*Santalaceae.*

Embryo curved ; cotyledons flat,.................................*Salsolaceae.*

Ovary 1-celled, ...*Loranthaceae.*

Ovary with more cells than one, but neither 3 nor 6. Embryo straight, *Halorageae.*

§ § *Ovary superior.*

O *Leaves furnished with stipules.*

Flowers hermaphrodite.

Sepals 2, ...*Portulacaceae.*

Sepals more than 2.

Carpels more than one, combined into a solid pistil.
Stamens hypogynous. Placentas parietal, ...*Bixineae* (*Flacourtieae*).
Stamens hypogynous. Placentas in the axis.
Calyx valvate.
Stamens monadelphous, ...*Sterculiaceae*.
Stamens distinct, ...*Tiliaceae*.
Calyx imbricate.
Fruit beaked, ...*Geraniaceae*.
Fruit not beaked,..........................*Malpighiaceae*.
Stamens perigynous. Placentas parietal,...............*Passifloraceae*.
Stamens perigynous. Placentas in the axis.
Leaves opposite. Stamens more than sepals, *Saxifrageae* (*Cunonieae*).
Leaves alternate. Stamens alternate with sepals, ...*Rhamnaceae*.
Leaves alternate. Calyx membranous and ragged, *Celtideae* (*Ulmeae*).
Carpels solitary, or quite separate.
Styles from the base of the carpels,.....................*Chrysobalaneae*.
Styles terminal, one to each ovary. Fruit a pod, ...*Leguminosae*.
Styles terminal, 3 to each ovary.
Stipules ochreate, ...*Polygonaceae*.
Stipules simple, ...*Phytolaccaceae*.

Flowers unisexual.
Carpels more than 1, combined into a solid pistil.
Flowers amentaceous. Seeds arillate,..............*Euphorbiaceae* (*Scepeae*).
Flowers amentaceous. Seeds not arillate,............................*Betulaceae*.
Flowers not amentaceous, ...*Euphorbiaceae*.
Carpels solitary.
Cells of anthers perpendicular to the filament, ...*Euphorbiaceae* (*Stilagineae*).
Cells of anthers parallel with the filament.
Embryo straight.
Seed albuminous. Stipules often small,...............*Urticaceae*.
Seed exalbuminous. Stipules large, ...*Urticaceae* (*Artocarpeae*).
Embryo hooked.
Seed exalbuminous, ...*Urticaceae* (*Cannabineae*).
Seed albuminous, ...*Urticaceae* (*Moreae*).
O O *Leaves destitute of stipules.*

Flowers hermaphrodite.
Sepals 2, ...*Portulacaceae*.
Sepals more than 2.
Carpels more than 1, combined into a solid pistil.
Placentas parietal, in lines, ...*Papaveraceae*.
Placentas parietal, lining the pericarp, ...*Bixineae* (*Flacourtieae*).
Placentas in the axis.
Ovary with a very small number of ovules.
Calyx short, herbaceous. Gynobasic, ...*Rutaceae*.
Calyx short, herbaceous. Not gynobasic.
Embryo curved round mealy albumen, ...*Phytolaccaceae*.
Embryo straight, ...*Celastrineae*.
Ovary with numerous ovules.
Two divaricating carpels, ...*Saxifrageae*.
Carpels not divaricating. Stamens hypogynous.
Leaves opposite, ...*Caryophylleae*.
Leaves alternate,.........................*Podostemaceae*.
Carpels not divaricating. Stamens perigynous.
Fruit 1-celled, ...*Primulaceae*.
Fruit many-celled, ...*Lythrarieae*.
Carpels solitary or quite separate.
Carpels several. Stamens hypogynous, ...*Ranunculaceae*.
Carpel single.
Anther-valves recurved. Leafy,......................*Laurineae*.
Anther-valves recurved. Leafless parasites, *Laurineae* (*Cassytheae*).
Anther-valves slit.
Fruit a pod, ...*Leguminosae*.
Fruit not a pod.
Calyx long or tubular, with a hardened base, ...*Nyctagineae*.
Calyx long and tubular, nowhere hardened.

Stamens in the points of the sepals, ...*Proteaceae.*
Stamens not in the points of the sepals.
Ovules erect,....................*Elaeagnaceae.*
Ovules pendulous, ...*Thymelaeaceae.*
Calyx short, not tubular, or but little so.
Leaves lepidote, ...*Elaeagnaceae.*
Leaves dotted, not lepidote, ...*Burseraceae.*
Leaves neither dotted nor lepidote.
Flowers in involucels, ...*Polygonaceae.*
Flowers naked.
Calyx dry and coloured,......*Amarantaceae.*
Calyx herbaceous or succulent, ...*Salsolaceae.*
Flowers unisexual.
Carpels more than 1, combined into a solid pistil.
Ovules indefinite in numbers. Stamens columnar, ...*Nepenthaceae.*
Ovules definite in number.
Leaves dotted,..............................*Rutaceae (Xanthoxyleae).*
Leaves not dotted, ...*Euphorbiaceae.*
Carpels solitary or quite separate.
Calyx tubular, 3-cleft,...*Myristicaceae.*
Calyx open ; carpels several,...........................*Menispermaceae.*
Calyx open ; carpel solitary.
Embryo straight (without albumen) ; trees, ...*Casuarineae.*
Embryo curled (round a mealy albumen) ; herbs,...........*Salsolaceae.*

II. GYMNOSPERMS.

Stem jointed, ...*Gnetaceae.*
Stem continuous.
Leaves pinnate, ...*Cycadeae.*
Leaves simple.
Females in cones,.....................................*Coniferae (Pineae).*
Females solitary, ...*Coniferae (Taxaceae).*

B. MONOCOTYLEDONS OR ENDOGENS.

** Leaves netveined, often deciduous ; wood of the stem when perennial, arranged in a circle with a central pith.*

Ovary inferior, ...*Dioscoreaceae.*
Ovary superior.
Placentae axile.
Perianth of 6 parts, ...*Smilaceae.*
Perianth of 3 parts, ...*Trilliaceae.*
Placentae at the summit, ovules pendulous, ...*Roxburghiaceae.*

** * Leaves parallel-veined, persistent ; wood of the stem always confused.*

§ Flowers complete (having distinct coloured floral envelopes).

O *Ovary inferior.*

† Flowers gynandrous, viz. the stamens with the pistil consolidated.

Ovary 1-celled. Seed-coat loose, ...*Orchideae.*
Ovary 3-celled, ...*Apostasiaceae.*

†† Flowers not gynandrous, viz. the stamens and pistils free.

Veins of leaves diverging from the midrib.
Anther 1, with one cell,..*Marantaceae.*
Anther 1, with two cells,.......................................*Scitamineae.*
Anthers 5 or 6,...*Musaceae.*
Veins of leaves parallel with the midrib.
Stamens 3.
Anthers turned outwards, ...*Iridaceae.*
Anthers turned inwards, (fruit winged), ...*Burmanniaceae.*
Stamens 6.
Fruit 3-celled ; sepals petal-like, ...*Amaryllideae.*
Fruit 3-celled ; sepals green,.....................................*Bromeliaceae.*
Fruit one-celled, ...*Taccaceae.*
Stamens more than 6, ...*Hydrocharideae.*

O O *Ovary superior.*

Sepals herbaceous or glumaceous.
Carpels separate, more or less.
Placentæ spread over the dissepiments, ... *Butomaceae.*
Placentæ narrow, ... *Alismaceae.*
Carpels combined in a solid pistil.
Petals quite distinct from the calyx, ... *Commelynaceae.*
Petals undistinguishable from the calyx.
Flowers scattered, ... *Juncaceae.*
Flowers on a spadix, ... *Aroideae.*
Sepals petal-like.
Carpels more or less separate.
Seeds solitary, ... *Palmae.*
Seeds numerous.
Anthers turned outwards, ... *Melanthaceae.*
Anthers turned inwards.
Floral envelopes 6, ... *Butomaceae.*
Floral envelopes 2, ... *Philydraceae.*
Carpels combined in a solid pistil.
Petals rolled inwards after flowering, ... *Pontederaceae.*
Petals not rolled inwards after flowering, ... *Liliaceae.*
§ §—*Flower incomplete (having no distinct floral envelopes except leaves).*
O *Flowers glumaceous.*
Stems hollow, with nodes, ... *Gramineae.*
Stems more or less solid, usually without nodes.
Carpel solitary.
Seed and ovule erect, ... *Cyperaceae.*
Seed and ovule pendulous, ... *Restiaceae.*
Carpels several.
Carpels distinct, ... *Eriocauloneae.*
Carpels combined.
Placentæ parietal, ... *Xyrideae.*
Placentæ central, ... *Restiaceae.*
O O—*Flowers naked ; or with a few whorled leaves.*
† *Flowers on a spadix.*
Spathes several. Fruit woody or drupaceous, ... *Pandaneae.*
Spathe solitary. Fruit a berry, ... *Aroideae.*
No spathe. Fruit a nut, ... *Typhaceae.*
† † *Flowers not on a spadix.*
Ovules pendulous. Floating plants, ... *Najadeae.*
Ovules erect. Floating herbs, ... *Pistiaceae.*

C.—CRYPTOGAMS.

* *Stems and leaves distinguishable.*
O *Spores without elaters.*
Spore-cases seated on leaves or enclosed within the edge of a contracted leaf, ... *Filices.*
Spore-cases enclosed within an involucre. Water-plants, ... *Hydropterides.*
Spore-cases naked.
Spore-cases sessile in the axil of leaves or bracts, ... *Lycopodiaceae.*
Spore-cases stalked.
Spore-cases valve-less, ... ***Musci.***
Spore-cases opening into valves.
With a distinct axis of growth, ... *Hepaticae.*
Without a distinct axis of growth, ... *Ricciaceae.*
O O *Spores furnished with elaters.*
Spores naked, collected in cones, ... *Equisetaceae.*
Spores enclosed in cases.
Spore-cases valve-less, ... *Marchantiaceae.*
Spore-cases opening into valves, ... *Hepaticae.*
* * *Stems and leaves not distinguishable.*
(Here belong all mushrooms, moulds, sea-weeds and Algae, lichens.)

A—DICOTYLEDONS.*

DILLENIACEÆ.

Conspectus of genera.

DILLENIA.—Filaments equal; anther-cells parallel. Trees.

DILLENIA.

* *Seeds hairy along the borders; flowers large, white,* .... *D. Indica.*

** *Seeds smooth; flowers yellow.*

† *Peduncles and calyx shortly tomentose or pubescent outside.*

O *Petals about 2 in. long.*

Peduncles very long and straight; styles 12, ... *D. pulcherrima.*

Peduncles short and nodding; styles 10, ... *D. aurea.*

Peduncles very long and slender; styles 6, ... *D. pilosa.*

O O *Petals an inch long or shorter.*

Peduncles and calyx densely tomentose; styles 5-7, ... *D. parviflora.*

† † *Peduncles and calyx perfectly smooth.*

Peduncles with bracts, ... *D. scabrella.*

Peduncles without bracts, ... *D. pentagyna.*

MAGNOLIACEAE.

Conspectus of genera.

* Stipules none. Perianth double. Carpels in a single whorl.

ILLICIUM.—Only genus.

** Stipules conspicuous, convolute and sheathing the young foliage, deciduous.

O Ripe carpels indehiscent.

TALAUMA.—Ovary sessile. Carpels 2-ovuled, ripe ones falling from the gynophore.

O O Ripe carpels opening by a longitudinal slit.

MAGNOLIA.—Ovary sessile. Carpels 2-ovuled, ripe ones persistent.

MANGLIETIA.—Ovary sessile. Carpels 6- or more-ovuled, ripe ones persistent.

MICHELIA.—Ovary stalked. Carpels usually ∞, rarely 2-ovuled, ripe ones persistent.

TALAUMA.

Fruits 4-6 inch long, ... *T. Rabaniana.*

Fruits 2 inch long, ... *T. Candollei.*

MAGNOLIA. Only species, ... *M. sphenocarpa.*

MANGLIETIA. Only species, ... *M. insignis.*

MICHELIA. Only species, ... *M. Champaca.*

ANONACEAE.

Conspectus of genera.

* Petals valvate or open in the bud, flat, or concave at the base only, the inner ones almost conform or none. Stamens many, closely packed, their anther-cells concealed by the overlapping connectives. Ovaries indefinite.

O Petals conniving at the concave base and covering the sexual organs.

CYATHOCALYX.—Ovaries 1-3, many-ovuled. Trees.

O O Petals flat, spreading from the base.

CANANGA.—Ovules many, in 2 rows; petals lanceolate.

UNONA.—Ovules 2-6, in a single row on the ventral suture.

POLYALTHIA.—Ovules 1 or 2, basal or nearly so.

O O O Inner petals valvate with their tips incurved.

POPOWIA.—Only genus.

** Petals valvate in the bud, outer ones spreading, the inner ones dissimilar, concave, connivent, arching over the sexual organs. Stamens many, closely packed, the anther-cells concealed by the overlapping connectives. Ovaries indefinite.

O Inner petals not clawed.

PHAEANTHUS.—Inner petals much larger than the outer ones.

OO Inner petals clawed, usually smaller than the outer ones.

GONIOTHALAMUS.—Ovules 1 or 2, near the base of the ovary.

MITREPHORA.—Ovules many.

* The appearance of Hooker's Flora of British India and my subsequent own investigations have since brought about some changes not only in the nomenclature but also in the analytical keys of the species. However it is not possible to introduce these here fully, but altered names or minor corrections in the keys are made in the sequel as far as possible; the former will be found in foot-notes.

* * * Petals valvate in the bud, thick and rigid, connivent, the inner ones similar but smaller rarely wanting. Stamens many, closely packed, the anther-cells concealed by the produced connectives. Ovaries indefinite.

ANONA.—Ovules solitary; fruit fleshy, of many connate carpels.

* * * * Petals imbricate or valvate in the bud. Stamens often definite, loosely imbricate, the anther-cells not concealed by the overlapping connectives. Ovaries solitary or indefinite.

MILIUSA.—Petals valvate, the inner ones largest; ovules definite.

ALPHONSEA.—Petals valvate, almost equal; ovules 4-8.

OROPHEA.—Petals valvate, the inner ones shortest; ovules 2-4.

BOCAGEA.—Petals imbricate, almost equal; ovules 2-4.

CYATHOCALYX.

Calyx sharply 3-lobed to the middle, carpels oval, ...*C. Martabanicus.*

CANANGA.—Only species, ...*C. odorata.*

UNONA.

Young parts tomentose; leaves blunt or mucronate; petals 6, ...*U. latifolia.*

POLYALTHIA.

* *Flowers hermaphrodite. Petals flat. Ovule solitary, basal, erect.*

† *Petals linear.*

Leaves pubescent beneath, acuminate; carpels ovoid, ...*P. lifaria.*

Leaves glabrous, one-coloured, apiculate or shortly acuminate; carpels ovoid, ...*P. lateriflora.*

Leaves glabrous, glaucous or whitish beneath, shortly acuminate,..................*P. Sumatrana.*

† † *Petals ovate or ovate-lanceolate or elliptic.*

+ *Carpels elongate-oblong.*

Branchlets rusty-tomentose; leaves (except nerves) glabrous, much net-veined; petals an inch long, ...*P. Jenkinsii.*

+ + *Carpels more or less globular.*

Branchlets tomentose; leaves (except the nerves) glabrous, blunt or nearly so; petals 3-4 lin. long, ...*P. suberosa.*

Branchlets tomentose; leaves pubescent beneath, acuminate, ...*P. cerasoides.*

Branchlets puberulous; leaves glabrous, blunt or acute; carpels, ...*P. nitida.*

Leaves glabrous, the nerves puberulous; carpels velvety, ...*P. membranacea.*

* * *Flowers not hermaphrodite. Petals flat. Ovules 2, superposed, almost basal.*

Flowers small, sessile or nearly so, clustered, ...*P. dubia.*[1]

* * * *Inner petals very concave or vaulted.*

Branchlets tomentose; petals broadly-ovate to oblong-lanceolate, imbricated in the bud,............ ....*P. costata.*

POPOWIA.

Branchlets coarsely hairy; flowers extra-axillary? ....*P. Helferi.*

GONIOTHALAMUS.

Flowers about 9 lin. long, ...*G. sesquipedalis.*

Flowers about 2 in. long, ...*G. Griffithii.*

MITREPHORA.

* *Flowers small, about 3 lin. long, dioecious.*

Leaves (except the nerves beneath) glabrous; inflorescence and petals tomentose,*M. reticulata.*

* * *Flowers conspicuous, 1-2 in. in diameter.*

Leaves coriaceous, softly tomentose beneath; flowers 2 in. in diameter, on short and thick pedicels,. ....*M. tomentosa.*

Leaves chartaceous, minutely puberulous, opaque; flowers about 1 inch in diamenter, on long slender pedicels,...*M. vandaeflora.*

ANONA.

* *Fruits areolate.*

Leaves usually blunt; fruits with prominent convex areoles, ...*A. squamosa.*

Leaves acuminate, larger; areoles of the fruits not or hardly prominent, ...*A. reticulata.*

* * *Fruits muricate.*

Fruits very large, ...*A. muricata.*

MILIUSA.

Tomentose; pedicels 2-4 inch long, ... *M. velutina.*

Almost glabrous; pedicels 6 lin. long, without bractlet, ...*M. sclerocarpa.*

Leaves rusty pubescent beneath; pedicels 6 lin. long, with bractlet,..........*M. Roxburghiana.*[2]

ALPHONSEA.

Stalk of berry about an inch long, ...*A. ventricosa.*

Stalk of berry very short,... ....*A. lutea.*

OROPHEA.

Leaves rather large, pubescent beneath; flowers about an inch in diameter, ...*O. Brandisii.*

BOCAGEA.

All parts glabrous, glossy, ...*B. elliptica.*

Note.—1 = *P. macrophylla*, Hf. and Th., not Bl., of App. A.; 2 = *Phaeanthus dioicus* of App. A.

CAPPARIDEÆ.

Conspectus of genera.

CAPPARIS.—Fruit berry-like or drupaceous. Leaves simple. Corolla imbricate.
CRATAEVA.—As former. Leaves 3-5-foliolate. Corolla open in bud.

CAPPARIS.
All softer part tomentose while young; flowers corymbose; calyx and pedicels densely tomentose,......*C. grandis.*

CRATAEVA.
Flowers corymbose; fruits globose, ...*C. Roxburghii.*[1]

VIOLACEÆ.

Conspectus of genera.

ALSODEIA.—Corolla regular; staminodes none.

ALSODEIA.
Flowers in erect pubescent racemes, ...*A. longiracemosa.*

BIXINEÆ.

Conspectus of genera.

* Petals broad, contorted, without a scale or basal appendage. Anthers opening by pores or short slits.
COCHLOSPERMUM.—Capsule almost 3-5-valved. Seeds pilose or lanato.
BIXA.—Capsule 2-valved. Seeds glabrous.
* * Petals small, imbricate, or none. Anthers short, opening by slits.
SCOLOPIA.—Flowers bisexual. Petals 4-6.
FLACOURTIA.—Flowers usually dioecious. Petals none.
* * * Flowers dioecious. Petals with an adnate scale or basal appendage.
GYNOCARDIA.—Sepals connate. Stamens free.
HYDNOCARPUS.—Sepals free.
RYPARIA.—Sepals connate. Stamens united in a column.

COCHLOSPERMUM.—Only species, ...*C. Gossypium.*
BIXA.—Only species, ...*B. Orellana.*
SCOLOPIA.
Berries oblong, the size of an olive,......*S. Roxburghii.*
FLACOURTIA.

* *Stigma simple, subulate (not thickened at the ends).*

Berries as large as a pepper-kernel; seeds smooth, convex on back, ...*F. Sumatrana.*

* * *Styles short, or nearly wanting, thickened and truncate at apex, or more or less bluntish 2-lobed.*

† *Leaves acuminate. Seeds compressed and quite flat.*

Armed glabrous or nearly so; berries as large as a cherry, ...*F. cataphracta.*
As former, but unarmed, ...*F. inermis.*
Branchlets and leaves tawny pubescent, unarmed. (Seeds unknown), ...*F. mollis.*

† † *Leaves blunt or nearly so. Berries of the size of a pea; seeds convex on the back.*

Leaves coriaceous, 3—4 in long. Armed, ...*F. sapida.*
Unarmed or only with few short axillary spines; leaves membranous, 1-1½ in. long, ...*F. rotundifolia.*
GYNOCARDIA.—Only species, ...*G. odorata.*
HYDNOCARPUS.
Male flowers apparently solitary; petals glabrous, ...*H. castaneus.*
Male flowers shortly racemed; petals pubescent and villous-fringed, ...*H. heterophyllus.*
RYPARIA.—Only species, ...*R. caesia.*

Note: 1 = C. religiosa of App. A.

PITTOSPOREÆ.

Conspectus of genera.

PITTOSPORUM.—Capsule thick-coriaceous, opening loculicidally.

PITTOSPORUM.

Young shoots rusty pubescent, ovary rusty tomentose; sepals narrow, much accuminate, ... *P. ferrugineum.*

POLYGALEÆ.

Conspectus of genera.

XANTHOPHYLLUM.—Petals and stamens free. Fruit globular, indehiscent.

XANTHOPHYLLUM.

Leaves glossy on both sides; calyx puberulous; ovary glabrous,............ *X. flavescens.*
Leaves somewhat glaucous beneath; panicles and calyx quite glabrous, ovary villous, *X. virens.*
Leaves glaucous beneath; panicles calyx and ovary densely puberulous,............ *X. glaucum.*

TAMARISCINEÆ.

Conspectus of genera.

TAMARIX.—Petals and stamens free or only at base connate. Seeds comose.

TAMARIX.

Flowers rose-coloured, in dense short terminal spikes, ... *T. dioica.*
Flowers white, in loose slender terminal and lateral racemes,............ *T. Gallica.*

HYPERICINEÆ.

Conspectus of genera.

TRIDESMIS.—Capsules opening loculicidally. Petals with a scale above the base.
CRATOXYLON.—As former, but petals naked.

TRIDESMIS.

All parts glabrous, ... *T. formosa.*
Sepals, pedicels and leaves beneath shortly tomentose, ... *T. pruniflora.*

CRATOXYLON.

* *Flowers in terminal panicles.*

Leaves narrowed and almost sagittate at base,............ *C. neriifolium.*

* * *Flowers in axillary cymes or solitary.*

No hypogynous glands,............ *C. carneum.*

GUTTIFERÆ.

Conspectus of genera.

* Stigma sessile or nearly so, peltate entire or lobed. Radicle of embryo large, filling the whole seed, cotyledons very minute or none.

GARCINIA.—Sepals and petals 4 or 5, decussate.
OCHROCARPUS.—Calyx in bud closed, afterwards valvate-2-parted.

* * Style elongated with a peltate or 4-parted stigma. Radicle of embryo very short, the cotyledons thick and fleshy.

CALOPHYLLUM.—Ovary with a single 1-ovuled cell. Panicles trichotomous or raceme-like.
MESUA.—Ovary with 2-ovuled cells. Flowers solitary.

GARCINIA.

Subg. I. Garcinia. Anthers oblong or ovate, opening by longitudinal slits or pores.

* *Stamens of male flowers in 4 bundles. Stigma radiate-lobed, smooth or almost so. Ovary 4-10-celled.*

Female flowers with stamens surrounding the ovary; berries short-peduncled, large, globose, ... *G. Mangostana.*
Female flowers without stamens; berries sessile, small, tapering towards the large stigma, ... *G. cornea.*

Flowers on long pedicels, nearly 2 inch in diameter, ...*G. speciosa.*

* * *Stamens of male flowers in 4 polyandrous bundles; stigma peltate, discoid and entire, more or less rough from wrinkles or radiating veins. Ovary 2-celled.*

Peduncles rather long, bearing 2 or seldom a solitary leaf-like bract, ...*G. anomala.*

Peduncles short or wanting, without bracts, ...*G. Merguiensis.*

* * * *Anthers almost sessile on a column or 4-sided fleshy rarely somewhat lobed mass. Stamens of female flowers united at base in a complete or interrupted ring. Stigmas tubercled-toothed. Ovary 4-12-celled.*

O *Berries and ovary obsoletely angular.*

Berry convex at summit, the stigma sessile, ...*G. cowa.*

Berry deeply depressed at top, the stigma on a nipple-shaped protuberance in the depression, ...*G. Kydiana*

O O *Berries and ovaries terete.*

Leaves acute, succulent when fresh; flowers whitish, pedicelled, ...*G. succifolia.*

Subg. II. Hebradendron. Anthers peltate, opening by a circular slit. Flowers 4-merous.

Leaves large, coriaceous; flowers solitary, pedicelled, ...*G. elliptica.*

Subg. III. Xanthochymus. Flowers usually 5-merous. Staminal bundles of the male flowers slender.

Berries spherical or oblong, blunt; pedicels 3-4 lin. long; flowers almost closed,......*G. dulcis.*

Berries ovate, apiculate; pedicels about an inch long; flowers expanded, ...*G. Xanthochymus.*[1]

OCHROCARPUS.—Only species, ...*O. Siamensis.*

CALOPHYLLUM.

* *Calyx 4-sepaled, often the 2 inner sepals, or all, petal-like. Petals none.*

Racemes short and strong, few-flowered; flowers small, ...*C. amoenum.*

Flowers about 8 lin. across, in peduncled or almost sessile umbel-like cymes,....*C. spectabile.*

* * *Calyx 4 sepaled. Petals 4 to 8.*

Leaves at both ends acuminate, ...*C. polyanthum.*

Leaves elliptic, rounded or retuse, ...*C. Jnophyllum.*

MESUA.

Leaves coriaceous, usually white beneath, nerves almost invisible; petiole c. 2-3 lin. long, ...*M. ferra.*

Leaves chartaceous, the lateral nerves remote and strongly prominent; petiole about a line long, ...*M. nervosa.*

TERNSTROEMIACEÆ.

Conspectus of genera.

* Anthers basifix. Fruits succulent or hard, indehiscent. Embryo folded or much curved.

O Calyx tube or torus enlarged, afterwards embracing the fruit or adhering to it.

Anneslea.—Ovary half immersed in the torus. Fruit inferior.

O O Sepals free, inferior.

Ternstroemia.—Petals united at base. Anthers glabrous. Seeds 2-4 in each cell, rather large.

Adinandra.—Seeds numerous, small.

Cleyera.—Petals free or nearly so. Anthers pilose. Ovules many.

Eurya.—Petals united at base. Anthers glabrous. Ovules many. Flowers dioecious, small.

* * Anthers versatile. Fruit indehiscent or nearly so, usually pulpy within. Embryo straight.

Saurauja.—Flowers 5-merous, usually hermaphrodite. Sepals very imbricate. Styles 3-5, free or connate at base.

* * * Anthers versatile. Fruits woody, or fleshy, dehiscing loculicidally or indehiscent. Embryo straight or curved, the cotyledons large.

O Fruits dry, dehiscent. Radicle inferior.

Schima.—Sepals somewhat unequal. Ovules few, attached laterally. Seeds flat, winged on the back.

O O Fruits fleshy, indehiscent. Radicle inferior.

Pyrenaria.—Sepals very unequal. Ovules few, attached laterally. Drupes globular or pyriform. Seeds large, not winged.

O O O Fruit dry, dehiscent. Radicle superior,

Gordonia.—Sepals very unequal. Style elongate. Ovules many, suspended. Seeds winged above.

Laplacea.—As former, but styles short, free from the base and spreading, or the stigmas sessile.

Camellia.—Sepals very unequal. The outer stamens monadelphous. Ovules few, suspended. Seeds large, not winged.

ANNESLEA.

Leaves less leathery, bluntish, nerves distinct; peduncles slender, ...*A. fragrans.*

Leaves very thick, leathery, acute, beneath obsoletely nerved, peduncles thick,..*A. monticola.*

TERNSTROEMIA.

Fruiting calyx smooth; berries about $\frac{1}{2}$ inch in diameter,........................*T. Japonica.*

Fruiting calyx thick and wrinkled; berries about 1-$1\frac{1}{2}$ inch in diameter, ...*T. Penangiana.*

ADINANDRA.

Young shoots and leaves beneath, as also the calyx and petals, silky pubescent, ...*A. villosa.*[2]

EURYA.

Note: 1 = Garcinia Roxburghii of App. A.; 2 = A. dasyantha of App. A.

O *Leaf-buds pubescent or hirsute; branchlets terete.*

Leaves beneath puberulous, acuminate, very shortly petioled, ...*E. acuminata.*[1]

Leaves membranous, glabrous or nearly so, bluntish caudate, on short but slender petioles, ...*E. serrata.*

O O *Leaf-buds quite smooth; branchlets with decurrent lines.*

Quite glabrous, ...*E. Japonica.*

SAURAUJA.

* *Calyx densely setose.*

Flowers large, on short peduncles, clustered; leaves spiny-serrate,......................*S. armata.*

* * *Calyx glabrous.*

Leaves beneath pale, tawny or mealy puberulous; peduncles long and slender, scaly; styles 5,..*S. Punduana.*

Adult leaves glabrous except the puberulous midrib; peduncles short, scaly-puberulous; styles 3, seldom 4, ...*S. Roxburghii.*

All parts except the upper side of the leaves covered by long tawny spreading hairs; peduncles short but slender, rusty hirsute, ...*S. macrotricha.*

SCHIMA.

O *Peduncles very short, usually half the length of the petioles.*

Leaves entire, glabrous beneath, ...*S. Noronhae.*

O O *Peduncles long, often very elongate and slender, flowers axillary and, at the same time, racemose at the ends of the branchlets.*

Leaves crenate and entire on the same tree, glaucous beneath, ...*S. oblata.*

PYRENARIA.

O *Bracts large, leafy.*

Leaves in a dried state yellowish, shortly tomentose beneath, ...*P. diospyricarpa.*

O O *Bracts small, much shorter than the sepals and almost conform with them.*

Leaves glabrous, in a dried state yellowish; petioles hardly 2 lin. long, ...*P. camelliaeflora.*

Leaves glabrous, in a dried state liver-coloured; petioles 6—8 lin. long, ...*P. serrata.*

CAMELLIA.

O *Stamens of inner row equal in number to the petals and free.*

All parts quite glabrous; leaves coriaceous; flowers large, ...*C. Japonica.*

O O *Stamens of inner row twice as many as petals and free.*

Young parts and midrib of the membranous leaves pilose; flowers nodding, on scaly a line long pedicels; filaments villous,...*C. caudata.*[2]

All parts glabrous; leaves coriaceous; pedicels not scaly and longer; filaments glabrous, ...*C. Thea.*

DIPTEROCARPEÆ.

Conspectus of genera.

* Ovary inferior or nearly so, or with a broad base adnate to the calyx-tube; nuts for ½ to ⅔ of their length adnate to the enlarged calyx tube.

Anisoptera.—Stamens many, the connectivum terminating in a long bristle; 2 of the 5 calyx-lobes enlarged into long wings.

Synaptea.—Stamens 15-18, connectivum terminated by a minute acute gland; 2 of the 5 calyx-lobes enlarging into long wings.

* * Ovary superior; nuts free, either enclosed in the enlarged calyx-tube, or the latter almost not changed.

O Calyx-tube in fruit very enlarged, completely enclosing the nut.

Dipterocarpus.—Two of the calyx-lobes enlarging into long wings.

O O Calyx-tube in fruit not or very little enlarged, the nuts either quite exposed, or closely embraced by the enlarged wing-like calyx-lobes.

× Calyx-lobes valvate in the bud.

Parashorea.—Stamens 12-15; connectivum mucronulate; calyx-lobes 5; all nearly equally enlarging into wings.

×× Calyx-lobes imbricated in the bud, and often twisted.

† The 3 outer calyx-lobes longer than the 2 inner ones.

Shorea.—Corolla-lobes spreading. Stamens 35 to 50 or more; anther-cells blunt; connectivum terminating in a bristle or penicillate sharp point.

Pentacme.—Corolla-lobes forming a hemispherical closed cup round the ovary. Stamens 15, anther-cells 2, cleft at top, diverging from the subulate-pointed connectivum.

† † The 2 outer calyx-lobes in fruit wing-like enlarged, the 3 inner ones small.

Hopea.—Stamens 15; anther-cells entire at top, adnate to the more or less prolonged connectivum.

† † † All the 5 calyx-lobes in fruit equally enlarged, but not longer than the nut itself.

Vatica.—Stamens 15; capsules by abortion 1-, rarely 2-seeded.

ANISOPTERA.

Subg. I. Synaptea. Stamens only 15-18, the connectivum terminated by an acute gland; style filiform; nuts only to about ⅓ of their length adnate to the calyx.

Note: 1 = E. Chinensis of App. A. 2 = C. assimilis of App. A.

Young shoots covered by a mealy or scurvy tomentum, ... *A. odorata.*
Subg. II. Anisoptera. Stamens numerous, the connectivum produced in a bristle; style thick and ovoid; nuts inferior or nearly so.
Quite glabrous, ... *A. glabra.*

DIPTEROCARPUS.

* *Calyx-tube of fruit more or less globose or turbinate, without any ribs or longitudinal wings on its belly.*

O *Calyx-tube in fruit towards the top produced into 5 compressed knobs each situated between 2 lobes.*

Leaves glabrous, or puberulous beneath, ... *D. tuberculatus.*

O O *Calyx-tube in fruit perfectly terete.*

× *Leaves glabrous and glossy.*

Stipules velvety; calyx in fruit smooth and more or less pruinous, ... *D. laevis.*
Stipules glabrous, calyx in fruit sprinkled with minute stellate hairs, ... *D. Hasseltii.*

× × *Leaves beneath or on both sides variously hairy.*

Leaves acuminate, beneath together with the petioles pubescent, ... *D. turbinatus.*
Leaves blunt, hirsute; all softer parts greyish pubescent, ... *D. obtusifolius.*
Leaves acuminate, often very large; petioles, young branchlets and the long stipules strigose from short tawny brush-like clustered hairs, ... *D. pilosus.*

* * *Calyx-tube in fruit marked with 5 ribs or with as many longitudinal wings.*

O *Wings along the belly of fruiting calyx broad.*

Calyx greyish tomentose, when in fruit sparingly stellate, puberulous; petioles long, ... *D. alatus.*
Calyx pruinous, quite glabrous; petioles only half an inch long, ... *D. Griffithii.*[1]

O O *Wings along the belly of fruiting calyx very narrow or reduced to ribs.*

× *Leaves blunt.*

All softer parts greyish-villous, ... *D. incanus.*

× × *Leaves acuminate.*

Branchlets tomentose, fruiting calyx tube narrowly 5-winged and sparingly hairy, *D. costatus.*[2]

PARASHOREA.

Nut ovoid, velvety, ... *P. stellata.*

SHOREA.

× *Inflorescence tomentose or velvety.*

Leaves oblong to elliptical; the shorter calyx-lobes acuminate, ... *S. obtusa.*
Leaves broadly oval; all calyx-lobes blunt, ... *S. robusta.*

× *Inflorescence quite glabrous.*

Calyx quite glabrous, ... *S. floribunda.*

PENTACME.—Only species, ... *P. Siamensis.*

HOPEA.

× *Connectivum terminated by a short point.*

Calyx greyish tomentose; leaves bluntish acuminate, ... *H. odorata.*
Leaves oblong, blunt, ... *H. Scaphula.*

× × *Connectivum terminated by a bristle exceeding the anther-cells.*

Calyx greyish tomentose; flowers somewhat larger, ... *H. gratissima.*
Calyx glabrous, flowers very small, ... *H. Griffithii.*

VATICA. Only species, ... *V. lanceaefolia.*

MALVACEÆ.

Conspectus of genera.

* Staminal column bearing filaments up to the summit. Style branches as many as carpels or cells. Mature carpels separating more or less readily from the axis.

KYDIA.—Bracteoles 4-6. Carpels in a single row, 2-3, united in a capsule, opening loculicidally.

* * Staminal column truncate or 5-toothed at the summit, bearing the anthers or filaments on the outside, rarely also at the summit. Style-branches as many as ovary-cells. Carpels united in a several-celled loculicidal or indehiscent capsule.

O Style branched at the summit, the branches spreading or the stigmas radiating. Seeds usually reniform.

1. Dipterocarpus insignis of App. A. 2. D. gonopterus of App. A. is merged in D. costatus.

HIBISCUS.—Bracteoles 5 or more, free or connate, sometimes very deciduous, tooth-like or wanting.

OO Style clavate at the summit, entire or somewhat divided in short erect branches. Seeds obovoid or angled.

THESPESIA.—Bracteoles 3 to 5, narrow and usually small. Calyx truncate, seldom 5-cleft.

GOSSYPIUM.—Bracteoles 3, broadly cordate. Calyx truncate or shortly toothed.

* * * Staminal column divided at the summit, or rarely down to the base, into numerous filaments or 5 to 8 branches bearing 2 or more anthers, or rarely entire nearly to the top. Anthers either free and reniform, or adnate and variously shaped. Style entire or with very short stigmatic lobes of the number of ovary-cells. Carpels united in a loculicidal or indehiscent capsule.

O Leaves digitate. Bracteoles distinct or none.

× Staminal column divided towards the summit into numerous filaments.

BOMBAX.—Calyx truncate or irregularly 3 to 5-lobed. Capsule 5-valved, densely woolly inside.

×× Staminal column 5-cleft or 5-toothed, with 2 to 3 anther-bearing branches.

ERIODENDRON.—Calyx and capsule as in Bombax. Staminal column not annular.

OO Leaves simple, entire, beneath metallic lepidote in the same way as inflorescence.

DURIO.—Calyx campanulate. Staminal column divided into numerous filaments collected in 4 to 5 bundles anther-bearing on the capitate summit.

KYDIA.—Only species, ... *K. calycina.*

HIBISCUS.

O *Seeds glabrous.*

Leaves undivided, entire or crenulate, ... *H. tiliaceus.*

OO *Seeds woolly.*

All parts tawny-setose; leaves entire, tawny tomentose; involucre-leaflets 10, hirsute, ... *H. macrophyllus.*[1]

THESPESIA.

All younger parts and unripe capsules with rusty coloured scales; leaves glabrous, *Th. populnea.*

BOMBAX.

Branches spiny-armed; leaflets on 10-12 lin. long petiolules; staminal phalanges consisting of 15-20 strong filaments, ... *B. Malabarica.*

Branches unarmed?; leaflets decurrent on the 2-3 lin. long petiolule; staminal phalanges consisting of 50 and more filiform filaments, ... *B. insignis.*

ERIODENDRON.—Only species, ... *E. orientale.*

DURIO.—Only species, ... *D. zibethinus.*

STERCULIACEÆ.

Conspectus of genera.

* Flowers unisexual or polygamous. Calyx usually coloured. No petals. Anthers 5-15, sessile. Mature carpels distinct, sessile or stalked.

O Anthers irregularly clustered. Seeds with albumen.

STERCULIA.—Ovules 2 or more in each cell. Carpels follicular or opening along the inner edge.

OO Anthers 5, in a ring. No albumen.

HERITIERA.—Ovules solitary. Carpels more or less bony or coriaceous, indehiscent.

* * Flowers hermaphrodite. Petals 5, deciduous. Anthers 5-15, sessile or on short filaments alternating by 1 to 3 with the 5 teeth of the column or with as many linear or ligulate staminodes.

PTEROSPERMUM.—Anthers on filaments, the cells parallel. Fruit woody or nearly so, terete or 5-angular, 5-valved. Seeds winged.

* * * Flowers hermaphrodite. Petals deciduous. Anthers indefinite, on filaments, in several rows on the outside of the column from the middle to the top. Staminodes none.

ERIOLAENA.—Fruit almost woody, 5-valved.

* * * * Flowers hermaphrodite. Petals marcescent, flat. Stamens 5, shortly united at the base or seldom forming a column. Staminodes none, or rarely teeth-like.

MELOCHIA.—Calyx bell-shaped or inflated-globular. Staminodes none or broadly teeth-like. Ovary 5-celled, the cells 2-ovuled.

* * * * * Flowers hermaphrodite. Petals with a short, broad, very concave base and a sessile or clawed lamina. Anthers 5-15, seldom more and definite, sessile or on filaments, by 1 to 5 opposite to the petals and inserted between the teeth-or lobe-like staminodes of the staminal cup.

O Anthers by 2 or more between the staminodes.

GUAZUMA.—Petals at the base clawed and cucullate-inflexed, the linear lamina deeply 2-cleft. Stamens by 2 or 3 between the staminodes. Fruits globular, muricate.

LEPTONYCHIA.—Petals very short, concave. Anthers on elongate filaments, by 2 between the short staminodes, augmented on the back by short bristle-like staminodes. Capsules not muricate.

OO Anthers solitary between the staminodes.

BUETTNERIA.—Petals cucullate at the clawed base, inflexed and at the summit adnate to the staminal cup, on the back nacked or glandular.

STERCULIA.

* *Seeds without wings, 2 or more along the suture of the coriaceous carpels, never inserted at the base.*

O *Leaves digitate.*

1 = H. vulpinus of App. A.

Leaves glabrous; calyx rather large, the purple lobes spreading, ... *S. foetida.*
Leaves canescent tomentose beneath; calyx small, the lobes connivent, short, .. *S. versicolor.*

OO *Leaves palmately lobed or cut. Deciduous lofty trees.*

Carpels densely covered by stiff fragile pungent hairs; flowers small, ... *S. urens.*
Carpels shortly tomentose with stellate hairs, ... *S. villosa.*
Carpels densely covered with stiff pungent hairs, glabrescent; flowers nearly $\frac{2}{3}$ inch in diameter, ... *S. ornata.*

OOO *Leaves all entire. Small evergreen trees.*

Leaves quite glabrous; calyx shortly tubular, the lobes of the length of the tube, little spreading, ... *S. longifolia.*
Leaves tomentose; calyx-lobes free and spreading; flowers long-pedicelled, .. *S. angustifolia.*
Leaves minutely stellate-puberulous beneath; calyx-lobes short and connivent, flowers shortly pedicelled, ... *S. parviflora.*

* * *Calyx tubular. Seeds without wings. Carpels chartaceous and almost leaf-like expanded, bearing one or two seeds along the marginal sutures from almost $\frac{1}{2}$ of their length.*

Leaves more or less lobed, occasionally entire; calyx about 8 to 9 lin. long, ... *S. colorata.*
Leaves more lobed and larger than in former; calyx about 1-1$\frac{1}{4}$ inch long, ... *S. fulgens.*

* * * *Calyx more or less bell-shaped. Seeds without wings, solitary, laterally adnate to the base of the boat-shaped chartaceous or membranous follicles.*

O *Follicles produced below at about their middle into an additional bluntish sack-like lobe.*

Leaves more or less tomentose or puberulous beneath; calyx bell-shaped, green, *S. campanulata.*

OO *Follicles not produced into a sack-like lobe.*

Leaves coriaceous, glabrous, glossy; calyx almost rotate, yellowish, ... *S. scaphigera.*

* * * * *Seeds numerous, enclosed in a woody large follicle, winged along their upper end.*

Leaves entire, glabrous, 5-nerved at the base, follicle as large as a fist, ... *S. alata.*

HERITIERA.

O *Carpels glossy, or at least smooth, brown; leaves shortly petioled.*

Leaves at base usually cordate or rounded; carpels obliquely ovate, with a sharp keel pointed at the top, ... *H. littoralis.*
Leaves usually attenuate at the base; carpels obliquely depressed and rounded, the keel at the summit broad and almost wing-like, ... *H. minor.*

OO *Carpels woody, rough, covered with little corky tubercles, grey; leaves on very long petioles.*

Carpels obliquely oblong, keel indistinct, at the summit produced in a long narrow wing-like appendage, ... *H. macrophylla.*

PTEROSPERMUM.

O *Leaves large, lanceolate, semisagittate at base; stipules pinnatifid; flowers 4 in. long; capsules almost terete*

Bracteoles large, forming an involucre, divided into several many-cleft and jagged lobes, ... *P. semisagittatum.*

OO *Leaves large, broadly oblong, peltate or cordate at base, while young usually palmately lobed; stipules 1 or 2 cleft (or entire); capsules 5-angled. Flowers 4 to 5 in. long.*

Style towards the base villous; bracteoles pinatifid, ... *P. acerifolium.*
Style glabrous; bracteoles oblong-lanceolate, entire, ... *P. aceroides,*

OOO *Leaves usually small, entire or shortly lobed towards the apex; stipules small, entire or 2-3 cleft; flowers not exceeding 2 in. in length; capsules terete or nearly so.*

× *Flowers on pedicels longer than the petioles. Leaves entire, acuminate.*

Leaves usually tawny or rusty tomentose beneath; stipules and bracteoles linear-lanceolate, with a cucullate appendage; capsules obsoletely 5-angled, ... *P. cinnamomeum.*[1]
Leaves usually greyish tomentose beneath; stipules and bracteoles 2-to 3-rarely 5-cleft. capsules terete, usually acuminate, ... *P. lanceaefolium.*

×× *Leaves usually angular towards the apex. Flowers on short pedicels of the length of the petioles or seldom somewhat longer.*

Stipules and bracteoles entire, lanceolate; terete, usually obtuse,... ...... *P. Blumeanum.*[2]

1 = Pterospermum fuscum of App. A.; 2 = Pterosp. suberosum of App. A.

ERIOLAENA.—Only species, ... *E. Candollei.*

MELOCHIA.

All softer parts tomentose; flowers rose-coloured or white, ... *M. Indica.*

GUAZUMA.—Only species, ... *G. tomentosa.*

LEPTONYCHIA.—Only species, ... *L. heteroclita.*

TILIACEÆ.

Conspectus of genera.

* Petals glabrous or rarely puberulous outside at the base, entire or rarely emarginate.

O Sepals united in a bell-shaped 3- to 5-cleft calyx. Anthers short, usually globular or didymous.

× The 5 inner stamens reduced to staminodes.

Brownlowia.—Carpels distinct, globular, 2-valved.

Pentace.—Fruit indehiscent, one-seeded, 5-winged.

×× All stamens fertile and anther-bearing.

Berrya.—Capsule 3-valved, 6-winged. Styles 1-3, filiform.

OO Sepals distinct. Petals hollowed at base, inserted round a more or less raised torus, bearing the stamens at the summit. Anthers short.

Grewia.—Fruit indehiscent, globular, obovoid or lobed.

* * Petals none or sepal-like, very seldom petal-like and much cut or jagged, usually pubescent.

O Anthers linear, dehiscent at summit. Staminal disk flat or cushion-like, the petals inserted immediately round the stamens.

Echinocarpus.—Sepals 4, imbricate in 2 rows. Petals 4, cut. Disk thick and broad. Fruit echinate, bristly or velvety, usually 4-valved.

OO Anthers linear, dehiscing at top. Petals inserted round the base of the raised glandular disk bearing the stamens at the top.

Elaeocarpus.—Sepals 4 or 5. Petals induplicate-valvate, cut or seldom entire. Drupes indehiscent.

BROWNLOWIA.

Leaves peltate, oblong or rotundate, ... *B. peltata.*

Leaves not peltate.

Leaves cordate oblong, ... *B. elata.*

Leaves lanceolate, ... *B. lanceolata.*

PENTACE.—Only species, ... *P. Birmanica.*

BERRYA.—Only species, ... *B. mollis.*

GREWIA.—

* *Stigma shortly toothed. Flowers forming terminal panicles, involucred while in bud.*

Leaves more or less crenate-serrate, thin chartaceous, glabrous or puberulous beneath; ovary and torus glabrous, ... *G. Microcos.*

Leaves entire, almost coriaceous, glabrous; ovary and torus velvety tomentose, *G. calophylla.*

* * *Stigma dilated and fringed, radiating. Flowers in axillary cymes.*

× *Leaves 3-nerved at base, seldom with an additional lateral nerve.*

Cymes sprinkled with stiff hairs, glabrescent; sepals velvety; leaves glabrous, or sprinkled with simple short hair, rarely puberulous beneath, ... *G. laevigata.*

×× *Leaves 5-7-nerved at base, but the upper ones often only 3-nerved, or 3- and 5-nerved.*

Leaves obliquely lanceolate, greyish tomentose beneath, especially while young; peduncles slender, much longer than petioles, ... *G. elastica.*

Leaves broadly obovate or almost rotundate, sprinkled on both sides with stellate hairs, or pubescent beneath; peduncles as in former, ... *G. Asiatica.*

ECHINOCARPUS.

Leaves entire, glabrous; prickles on the fruit thick, usually thickened at base, ...*E. Sigun.*

Leaves crenate-serrate or toothed, while young puberulous beneath; the prickles of fruit all thin and subulate, ... *E. sterculiaceus.*

ELAEOCARPUS.

* *Anthers cuspidate or bristled. Flowers comparatively large.*

O *Petals entire, or with a few short teeth at apex, usually silk-hairy; anthers silk-hairy.*

Glabrous; inflorescences silvery pubescent, ... *E. Griffithii.*

OO *Petals 2-3-cleft, jagged and fringed; anthers minutely puberulous or glabrous.*

× *Racemes glabrous.*

Pedicels supported by leaf-like large bracteoles; putamen tubercled-pitted, ...*E. bracteatus.*
Bracteoles minute, fugaceous; putamen ? ....*E. simplex.*
Bracteoles deciduous; putamen armed with reflexed woody thorns,..........*E. grandiflorus.*

× × *Racemes puberulous or tomentose. Putamen wrinkled.*

Leaves 1½-1 ft. long; drupes puberulous, the putamen somewhat compressed, *E. grandifolius.*
Leaves ½-1 ft. long; drupes glabrous, the putamen terete, ...*E. rugosus.*

* * *Anthers blunt, or the longer valve sharply produced; flowers small; petals glabrous.*

O *Leaves glabrous, or puberulous along the nerves beneath.*

× *Putamen smooth and usually slightly rimose or obsoletely wrinkled. Calyx and pedicels glabrous.*

Petioles long, thickened at summit, ...*E. floribundus.*
Petioles short, not thickened, ...*E. hygrophilus.*[1]

×× *Putamen wrinkled or tubercled. Calyx and pedicels puberulous.*

Leaves and the short not thickened petioles glabrous; style long exserted, the longer anther-cell acute,...*E. Ganitrus.*
Leaves along the nerves beneath and the not thickened petioles densely puberulous; style short; anther-cells equal, blunt, ...*E. lacunosus.*
Leaves and the long at end thickened petioles glabrous, ...*E. robustus.*

OO *Leaves at least beneath puberulous or pubescent; putamen pitted and tubercled or wrinkled.*

Leaves 4 to 6 in. long on both sides pubescent, on longer or shorter slender at both ends thickened petioles,...*E. stipularis.*
Leaves beneath only and petioles densely pubescent,.......................*E. Wallichii.*

LINEÆ.

Conspectus of genera.

ERYTHROXYLON.—Stamens twice as many as petals, the latter furnished with a double scale inside. Drupes indehiscent.

ERYTHROXYLON.

* *Styles free from the base.*

Leaves oblong-lanceolate, shortly acuminate; pedicels about ½ inch long, ..*E. Kunthianum.*

* * *Styles united for half their length.*

Leaves obovate or oblong, blunt; pedicels usually 3 lin. long, rarely longer, ..*E. monogynum.*
Leaves broadly obovate or oblong, retuse, pedicels short, ...*E. cuneatum.*

MALPIGHIACEÆ.

Conspectus of genera.

HIPTAGE.—Styles 1, rarely 2. Gland single and adnate to calyx and pedicel. Carpels 3-winged.

HIPTAGE.

A tree, the young shoots and calices whitish-woolly, ...*H. candicans.*[2]

GERANIACEÆ.

Conspectus of genera.

AVERRHOA.—Flowers regular. No glands. Stamens 10, 5 of them usually without anthers. Berry indehiscent. Leaves pinnate.

AVERRHOA.

Fruit sharply angled; seeds with an arillus, ...*A. Carambola.*
Fruit obsoletely angled; seeds without arillus, ...*A. Bilimbi.*

Note: 1 = E. photiniæfolius of App. A.; 2 = H. arborea of App. A.

RUTACEÆ.

Conspectus of genera.

* Ovary deeply 2-5-lobed. Fruits carpellar or 3-4-coccous.

EVODIA.—Leaves opposite or nearly so. Petals 4-5, valvate. Stamens as many. Cocci dehiscent. Unarmed trees.

ZANTHOXYLON.—Leaves all alternate. Petals 3-5, seldom none. Stamens 3-5. Cocci 1-5, almost globular, usually 2-valved. Usually armed.

** Ovary not or almost not lobed. Fruit coriaceous, drupaceous or a berry, indehiscent.

O Seeds with albumen.

ACRONYCHIA.—Petals 4. Stamens 8. Leaves 1-foliolate.

OO Seeds without albumen.

× Cells with 1 or 2 ovules.

† Style very short, not jointed at base, persistent.

GLYCOSMIS.—Calyx 5-parted. Stamens 10, free. Leaves simple or compound.

†† Style jointed at base, caducous.

§ Leaves 3-foliolate or pinnate.

MICROMELUM.—Calyx 5-lobed or entire. Petals valvate. Stamens 10. Ovules by pairs in each cell, superposed. Unarmed. Leaves pinnate. Corymbs terminal.

LIMONIA.—Calyx 4-5-lobed or-parted. Petals valvate. Stamens 8-10. Spiny. Leaves pinnate or 3-foliolate.

MURRAYA.—Calyx 5-cleft or-parted. Petals imbricate. Stamens 10, the filaments linear-subulate. Unarmed. Cymes terminal.

CLAUSENA.—Calyx 4-5-lobed or-parted. Petals imbricate. Stamens 8-10, the filaments dilated below. Unarmed. Panicles or racemes.

§§ Leaves 1-foliolate.

ATALANTIA.—Calyx 2-5-lobed, entire or irregularly cleft. Stamens 8-10, free or united. Torus cup-shaped or simply raised. Berry terete pulpy.

GONOCITRUS.—Calyx minute. Berry angular, not pulpy.

×× Cells with numerous ovules.

† Leaves 1-foliolate. Rind of berry coriaceous.

CITRUS.—Stamens 20-60, rarely only 4-5, often connate. Ovary many-celled.

†† Leaves compound. Rind of berry woody.

FERONIA.—Leaves pinnate. Stamens 10-12. Ovary imperfectly 5-6-celled.

AEGLE.—Leaves 3-foliolate. Stamens 30-60. Ovary 8- or more-celled.

EVODIA.

Panicles corymbose, longer than the petioles. Branchlets terete, thick. Leaflets petioluled, ... *E. triphylla.*

ZANTHOXYLON.—Only tree, ... *Z. Budrunga.*

ACRONYCHIA.—Only species, ... *A. pedunculata.*

GLYCOSMIS.

Leaflets entire; panicles cyme-like and short; branches grey, ... *G. citrifolia.*

MICROMELUM.

Petals 2½ lin. long; ovary slightly adpressed-pubescent; young berries glabrous, *M. pubescens.*

LIMONIA.

Armed. Leaflets opposite. Inflorescence puberulous, ... *L. acidissima.*

MURRAYA.

Leaflets 3-8; petals nearly ½ an inch long, ... *M. exotica.*

Leaflets 10-20; petals about 2 lin. long, ... *M. Koenigii.*

CLAUSENA.

Panicles terminal. Ovary hirsute. Young berries densely tomentose with clustered short hairs, ... *C. Wampi.*

GONOCITRUS.

Filaments free. Torus 1-1½ inch long, straight; calyx glabrous, the lobes triangular; pedicels very short, glabrous, ... *G. angulatus.*[1]

ATALANTIA.

Filaments united in a tube; leaves emarginate, ... *A. monophylla.*

CITRUS.

× *Young shoots and nerves of leaves beneath pubescent or puberulous.*

Flowers large, ... *C. decumana.*

× × *All parts glabrous.*

Style very short; flowers small; stamens 4-5, free, petioles leaf-like and almost as long and broad as the lamina, ... *C. Hystrix.*

Style as long as the ovary or longer.

‖ *Petals* 8-10 *lin. long.*

Leaves acuminate or acute; berries globular, without a knob; filaments cohering by 3 or 4, ... *C. Aurantium.*

Leaves blunt or nearly so; berries oblong, seldom globular, with a knob, the rind usually thick; filaments free or polyadelphous, ... *C. Medica.*

‖‖ *Petals* 4 *lin. long; calyx small.*

Note: 1 = Atalantia longispina of App. A.

Berries globular, sweet or acid, the rind usually thin, ... *C. nobilis.*
FERONIA.—Only species, ... *F. elephantum.*
AEGLE.—Only species, ... *A. Marmelos.*

SIMARUBACEÆ.

Conspectus of genera.

* Ovary deeply divided, the carpels or lobes entirely distinct or connected by the styles or stigmas.
× Stamens double the number of petals, or rarely indefinite.
SAMADERA.—Calyx 3-5-parted, glandular at base. Disk large. Stamens 8-10. Leaves simple.
AILANTHUS.—Calyx 5-cleft. Disk 10-lobed. Leaves pinnate.
×× Stamens as many as petals.
PICRASMA.—Disk thick. Stamens pilose. Styles connate. Leaves pinnate.
** Ovary entire or nearly so, 2-5-celled.
HARRISONIA.—Calyx 4-5-cleft. Stamens 8-10. Ovary 4-5-celled. Leaves 1-3-foliolate or pinnate.
BALANITES.—Sepals 5. Stamens 10. Ovary 5-celled. Leaves 2-foliolate.

SAMADERA.—Only species, ... *S. Indica.*
AILANTHUS.—Only species, ... *A. Malabaricus.*[1]
PICRASMA.—Only species, ... *P. Javanica.*
HARRISONIA.—Only species, ... *H. Bennettii.*
BALANITES.—Only species, ... *B. Roxburghii.*

OCHNACEÆ.

Conspectus of genera.

OCHNA.—Stamens indefinite, ovary-cells 1-ovuled. No albumen. Inflorescences lateral.
GOMPHIA.—As former, but stamens 10; panicle terminal.

OCHNA.

× *Styles free at the summit.*

Fruiting sepals erect-connivent, ... *O. Andamanica.*

× × *Styles united along their whole length.*

Petals usually 7 to 8; filaments almost 4 times shorter than the anthers; fruiting sepals erect-connivent, ... *O. squarrosa.*[2]
Petals 5, filaments as long or longer than the anthers; fruiting sepals reflexed, .. *O. Wallichii.*
GOMPHIA.—Only species, ... *G. Sumatrana.*

BURSERACEÆ.

Conspectus of genera.

GARUGA.—Calyx 5-lobed, the thin disk lining the calyx-tube; stamens on the margin of the disk.
BURSERA.—Calyx small, 4-6-parted. Stamens 8-12, inserted at the base of the annular disk.
CANARIUM.—Calyx 3-rarely 2-5-cleft. Disk annular, very thick and fleshy. Stamens 6-10, inserted below the disk or round its border.

GARUGA.—Only species, ... *G. pinnata.*
BURSERA.—Only species, ... *B. serrata.*
CANARIUM.

× *Stipules subulate, entire, very deciduous.*

Leaflets serrulate; disk-glands smooth, free, cohering by pairs, ... *C. euphyllum.*
Leaflets entire; disk-lobes hairy, united in a cup, ... *C. Bengalense.*

× × *Stipules 2-cleft and pectinately cut, persistent,* .... *C. coccineo-bracteatum.*

MELIACEÆ.

Conspectus of genera.

* Stamens united in a tube. Ovules 2 in each cell. Seeds not winged, albuminous.
MELIA.—Calyx 5-6-parted. Petals free, elongate. Disk annular. Drupes containing a single 1-5-celled bony putamen.

Note: 1 = A. excelsus of App. A.; 2 = O. lucida of App. A.

CIPADESSA.—Calyx 5-toothed. Petals free, short. Disk cup-shaped. Drupes with 5 cartilaginous pyrenes.

** Stamens united in a tube. Ovules 1 or 2, rarely more in each cell. Seeds not winged, without albumen.

× Disk free, tubular or cylindrical. Style usually elongate.

DYSOXYLON.—Calyx small, 4-or 5-toothed, opened while still in bud. Petals valvate, free. Anthers 8-10, included in the more or less distinctly toothed staminal tube. Ovary 3-5-celled. Capsule pyriform, loculicidally 3-5-valved. Seeds without arillus. Leaves pinnate.

SCHIZOCHITON.—Calyx usually bell-shaped, obsoletely 4- or rarely 5-toothed, opened while still in bud Petals valvate or imbricate, up to the middle connate and tubular. Ovary 3-4-celled. Capsule usually pyriform, loculicidally 3-4-valved. Seeds with a complete or incomplete arillus. Leaves pinnate.

SANDORICUM.—Calyx tubular, adnate to the base of the ovary. Petals imbricate. Anthers 10, included in the tube. Berry globular, indehiscent Leaves 3-foliolate.

×× Disk none or globular, stalk-like or confluent with the staminal tube. Style usually short or none.

O Anthers more or less included in the staminal tube.

AGLAIA.—Petals 5, imbricate. Anthers 5 or 10. Ovary 1- to 3-celled. Seeds with an arillus.

AMOORA.—Petals 3 to 5, imbricate. Anthers 6-10. Ovary 3-5-celled. Capsule leathery, opening loculicidally. Seeds arillate.

OO Anthers exserted, or the filaments free.

WALSURA.—Petals 5, imbricate. Filaments united at the base or free. Disk annular. Fruit coriaceous, 1-seeded. Seeds arillate.

CARAPA.—Petals 4 or 5, twisted in the bud. Disk thick. Capsules opening loculicidally, several-seeded. Seeds large, without arillus.

*** Stamens united in a tube. Ovary-cells many-ovuled. Capsule 3-5-valved. Seeds numerous, with or without albumen, winged.

SOYMIDA.—Petals 5. Staminal tube cup-shaped with 10 two-toothed lobes. Disk rather broad. Seeds winged at both ends, without albumen.

CHICKRASSIA.—Petals 4 or 5. Staminal tube cylindrical, 16-crenate. Disk none. Seeds winged downwards, without albumen.

**** Filaments free, inserted on the outside of the disk. Ovary-cells with many ovules. Capsule septicidally or loculicidally 3- to 5-valved, the valves separating from the axis. Seeds many, compressed.

CEDRELA.—Petals erect or converging. Stamens 4-6. Disk raised or thick. Ovary 5-celled. Capsule septicidally opening.

MELIA.

* *Drupes by abortion 1-celled and 1-seeded. Leaves pinnate.*

All parts quite glabrous ; flowers minute, 1—½ lin. long, ...*M. Azadirachta.*

** *Drupes 5-celled, all or some of the cells 1-seeded. Leaves bipinnate.*

Drupes about ½ inch long, oblong ; staminal tube slender, glabrous outside, about 3 lin. long ; leaflets serrate,..*M. Azedarach.*

Drupes about an inch long, ovoid or oblong ; staminal tube short, white, glabrous outside, about 1½—2 lin. long ; leaflets crenate or entire, ...*M. robusta.*

Drupes about an inch in diameter or more, almost globular ; staminal tube 2-3 lin. long, white, glabrous, or woolly at summit ; leaflets entire, ...*M. Birmanica.*[1]

CIPADESSA.—Only species,..*C. baccifera.*

DYSOXYLUM.

Panicles, calyx, petals all glabrous ; staminal tube glabrous, truncate ; petals short, oblong, ...*D binectariferum.*

Panicles glabrous ; calyx, petals, ovary and the truncate staminal tube minutely pubescent ; petals short, oblong, ...*D. alliaceum.*

SCHIZOCHITON.

Leaves quite glabrous,..*Sch. dysoxylifolium.*

Leaves softly pubescent beneath,.................................*Sch. grandiflorum.*

SANDORICUM.—Only species,..*S. Indicum.*

AGLAIA.

× *Calyx, pedicels and often also all other parts more or less lepidote.*

Leaflets in 4-5 pairs beneath ; usually sprinkled with minute metallic scales ; panicles lepidote ; anthers 10,...*A. Chittagonga.*

Leaflets 1-4 pairs, usually quite glabrous ; panicles lepidote ; anthers 6,..........*A. edulis.*

Leaflets in 5-8 or more pairs, beneath as also the panicles densely silvery lepidote, *A. argentea.*

×× *Calyx, pedicels and usually the whole inflorescence rusty puberulous or tomentose.*

Leaves very large, leaflets in 8 or more pairs, the lateral nerves all sharply prominent ; panicles etc. rusty puberulous,.................................*A. crassinervia.*

Leaflets in 6 or 7 pairs, the petioles and inflorescences together with the berries rusty tomentose,...*A. elliptica.*

××× *Calyx and pedicels glabrous.*

Leaflets in 1 or 2 pairs, sometimes solitary ; panicles pilose, soon glabrescent, *A. oligophylla.*

Note: 1 = M. Toozendan of App. A.

AMOORA.

Leaflets shortly acuminate; fertile spikes many-flowered, male flowers about 4 lin. in diameter, sessile; staminal tube entire at summit, ... *A. Rohituka.*

Leaflets blunt; fertile spikes few-flowered; male flowers about 2 lin. across, on short pedicels; staminal tube slightly 3-toothed, ... *A. cucullata.*

WALSURA.

* *Fruits indehiscent.*

Inflorescence densely pubescent; the petioles of the younger leaves and often the nerves beneath puberulous; fruits oblong, densely tomentose, ... *W. villosa.*

Inflorescence minutely puberulous; leaves and petioles glabrous.

Leaflets beneath white-spotted on the areoles of the net-veination; filaments broadly lanceolate, sprinkled with minute hairs, ... *W. robusta.*

Leaflets beneath uniformly glaucous; filaments linear, densely pubescent; flowers larger, ... *W. hypoleuca.*

** *Fruits follicle-like dehiscing.*

All parts and inflorescence glabrous; leaflets in 3-6 pairs, ... *W. quinquejuga.*

All softer parts, inflorescence and leaflets softly pubescent, ... *W. pubescens.*

CARAPA.

Leaflets ovate or ovate-oblong, bluntish and shortly acuminate, ... *C. Moluccensis.*

Leaflets obovate, blunt or retuse, ... *C. obovata.*

SOYMIDA.—Only species, ... *S. febrifuga.*

CHICKRASSIA.

Leaves and panicles glabrous; capsules wrinkled and rough, ... *C. tabularis.*

All softer parts, leaves etc. softly pubescent; panicles rusty tomentose; capsules almost smooth, ... *C. velutina.*

CEDRELA.

× *Leaflets entire, on both sides green. Seeds winged at both ends.*

Leaflets usually on long slender petiolules; calyx minute, the sepals rounded, ... *C. Toona.*

Leaflets usually on shorter petiolules; calyx large, the sepals 1½-2 lin. long, rather acute, more than half as long as the petals, ... *C. multijuga.*

×× *Leaflets serrate or serrulate, glaucous beneath. Seeds winged at one extremity only.*

Calyx minute, the lobes rounded, ... *C. serrata.*

OLACINEÆ.

Conspectus of genera.

* Stamens mixed with staminodia.

OLAX.—Calyx enlarged and enclosing the fruit. Perfect stamens 3, rarely 5.

** Stamens all fertile, as many as petals and opposite to them.

STROMBOSIA.—Fruiting calyx much enlarged, closely adnate to the drupe.

ANACALOSA.—Fruiting calyx unchanged. Disk in fruit much enlarged and closely adnate to the drupe, resembling an adnate calyx.

*** Stamens all fertile, as many as petals and alternate with them.

STEMONURUS.—Petals free. Anthers suspended.

APODYTES.—Petals free. Anthers dorsifix. Putamen at one side fleshy, appendaged.

GONOCARYUM.—Petals connate at base. Fruit dry.

STROMBOSIA.—Only species, ... *S. Javanica.*

ANACOLOSA.

Pedicels and calyx puberulous, ... *A. puberula.*

Pedicels and calyx glabrous, ... *A. Griffithii.*

STEMONURUS.

Glabrous; leaves shortly petioled; cymes glabrous; drupes obovoid, terminated by the large thickened acuminate disk, ... *S. crassipes.*

Younger branchlets tawny tomentose; petioles and leaves beneath together with the inflorescence puberulous or tomentose, ... *S. tomentellus.*

APODYTES.—Only species, ... *A. Andamanica.*

GONOCARYUM.

Leaves glossy; drupes terete, ... *G. Lobbianum.*

ILICINEÆ.

Conspectus of genera.

* Petals. Stamens hypogynous.

ILEX.—Ovary 4-8-celled.

** No petals. Stamens on a convex torus.

DAPHNEPHYLLUM.—Flowers dioecious. Ovary 2-celled.

ILEX.

Leaves cuneate-lanceolate, serrate, ... *I. gaultheriaefolia.*

Leaves ovate or oblong, entire.

Flowers pentandrous, on slender pedicels, forming long-peduncled umbel-like cymes, ... *I. Godayam.*

Flowers decandrous, on short thick pedicels, forming more or less compact heads on a thick but rather long peduncle, ... *I. daphnephylloides.*

DAPHNEPHYLLUM.

Calyx deciduous; pedicels about 1-2 lin. long, ... *D. Himalayense.*

CELASTRINEÆ.

Conspectus of genera.

* Stamens as many as petals, inserted round the disk or on the borders. Seeds with albumen.

× Capsule or follicle dehiscing.

O Ovules 1 or 2, attached to the inner angle of cell.

EVONYMUS.—Calyx-lobes and free petals spreading or reflexed. Ovary confluent with the broad fleshy disk. Capsules 3-5-lobed and-celled. Seeds arillate.

MICROTROPIS.—Sepals broadly imbricate, not spreading. Petals united in a ring at the very base, erect or nearly so. Disk none or annular. Capsule oblong, 1-celled and 1-seeded, 2-valved. Seeds without an arillus?

OO Ovules 2, rarely solitary in each cell, erect.

KURRIMIA.—Ovary free, bearded at apex. Ovules 2 in each cell. Styles 2. Capsule terete, entire or 2-lobed, 1-2-celled, follicle-like dehiscing into 1 or 2 valves. Seeds arillate.

×× Fruit indehiscent.

SIPHONODON.—Flowers 5-merous, hermaphrodite. Ovary half inferior, 5-celled. Fruits large, containing many pyrenes.

** Stamens inserted on the disk. Albumen none.

O Fruit an indehiscent berry. Seeds not winged.

SALACIA.—Only genus.

OO Capsules or carpels dehiscing. Seeds winged.

HIPPOCRATEA.—Ripe carpels 3, united at the base, flat, 2-valved.

LOPHOPETALUM.—Capsule 3-4-celled, angular, loculicidal.

EVONYMUS.

× *Branchlets terete or slightly 4-cornered.*

O *Petals entire.*

Flowers small, in dichotomous cymes; capsules angular; leaves towards the apex serrate, ... *E. glaber.*

Flowers about 3 lin. across, in dichotomous cymes; petals obsoletely fringed; leaves quite entire, ... *E. garcinioides.*

OO *Petals fringed.*

Flowers nearly 5—6 lin. across, in clusters or almost solitary; capsules obovate, sharply angular, on ½—1 inch long peduncles; leaves entire or obsoletely serrate, .. *E. Javanicus.*

Flowers unknown; capsules globular with the lobes rounded, on very short peduncles or almost sessile; leaves entire, ... *E. calocarpus.*

×× *Branchlets 4-angled and almost winged.*

Leaves petioled or almost sessile; flowers small, in slender cymes (capsules small, smooth, globular, lobed), ... *E. vagans.*

MICROTROPIS.

Cymes dichotomous, on 1—1½ inch long peduncles; leaves smooth, glossy above, .. *M. bivalvis.*

KURRIMIA.

Flowers in simple racemes; capsules entire, ... *K. robusta.*

SIPHONODON.—Only species, ... *S. celastrinus.*

LOPHOPETALUM.

* *Petals lamellate or crested on the lamina with the borders entire or fringed.*

Crest of petals fringed; leaves oblong, entire, ...*L. fimbriatum.*

** *Petals naked and entire.*

Leaves oblong, petioles usually an inch or longer; panicles white, quite glabrous,*L. Wallichii.*

Leaves lanceolate or oblong-lanceolate, petioles 3-4 lin. long, panicles while young covered by a fugaceous rusty tomentum, ...*L. floribundum.*

RHAMNEÆ.

Conspectus of genera.

ZIZYPHUS.—Drupes with a 1 to 3-celled putamen, fleshy or dry.

ZIZYPHUS.

Cymes long peduncled, forming large terminal or lateral tomentose panicles; drupes woody, 1-celled and one-seeded,..*Z. rugosa.*

Drupes sappy and quite smooth, the putamen 2-celled, ...*Z. Jujuba.*

AMPELIDEÆ.

Conspectus of genera.

LEEA.—Petals and stamens united with the disk. Ovary 3-6-celled, with a solitary ovule in each cell.

LEEA.

O *All parts glabrous.*

† *Inflorescence with persistent and conspicuous bracts and bracteoles.*

Floral bracts ovate, acute; flowers sessile or nearly so, crowded, ...*L. compactiflora.*

†† *Floral bracts and bracteoles minute, usually dropped before the flowerbuds are properly developed.*

Lobes of staminal tube emarginate, erect; seeds smooth and convex on back,..*L. sambucina.*

Lobes of staminal tube acuminate, reflexed; seeds keeled and tubercled-ribbed, ..*L. gigantea.*

OO *More or less pubescent or setulose, at least the leaflets beneath along the nerves.*

Leaves usually bipinnate, leaflets coarsely serrate, acuminate, scabrously pubescent along the nerves beneath, nerves all parallel, ...*L. Staphylea.*

SAPINDACEÆ.

Conspectus of genera.

§ Stamens inserted within the disk at the base of the ovary, or unilateral. Seeds without albumen.

* Fruit a dehiscing capsule, dry.

O Ovules solitary in each cell.

× Flowers irregular.

CARDIOSPERMUM.—Capsules pyriform with the lobes inflated, membranous. Leaves biternate; climbing herbs.

×× Flowers regular.

ZOLLINGERIA.—Sepals distinct, imbricated. Stamens included or nearly so. Capsule membranous. Cotyledons folded.

CUPANIA.—Sepals distinct, in 2 series, broadly imbricate. Stamens included or nearly so. Capsule coriaceous. Cotyledons flat.

RATONIA.—Calyx small, toothed, or the lobes valvate or slightly imbricate. Stamens often slender and long exserted. Capsule coriaceous.

MILDEA.—Calyx cupshaped, nearly valvate. Stamens 10, short. Capsule woody.

OO Ovules 2 or more in each cell.

× Flowers irregular.

AESCULUS.—Calyx campanulate or tubular. Petals 4-5. Leaves palmately 5-9-foliolate.

×× Flowers regular.

HARPULLIA.—Petals 4-5. Disk obsolete. Capsule 2-valved.

** Fruit indehiscent, sappy, fleshy or rarely crustaceous.

† Fruit divided to the base into several (or by abortion a single) indehiscent lobes.

× Calyx 4- or 5-toothed or-parted, the lobes slightly imbricate or valvate. Seeds arillate.

NEPHELIUM.—Calyx small, cupshaped. Petals none or various. Stamens long-exserted.

EUPHORIA.—Calyx 5-parted, with the lobes imbricate or nearly valvate. Petals none or various. Stamens enclosed or nearly so.

POMETIA.—Calyx cupshaped, 4-5-cleft. Petals 4-5, without a scale. Stamens 4-8, long-exserted

×× Sepals in 2 series, broadly imbricate, the 2 outer ones smaller. No arillus.

SCHMIDELIA.—Sepals 4. Leaves 1-3-foliolate,
XEROSPERMUM.—Sepals 4. Petals 4, without scales. Stigma thick. Carpels tubercled, dry. Leaves pinnate.
SAPINDUS.—Sepals and petals 4-5, the latter with or without scales. Stamens 8-10. Leaves pinnate. Carpels smooth, sappy.

†† Fruit entire, 1-3-4-celled.

× With petals. Sepals in 2 series, broadly imbricate, the 2 outer ones smaller.

HEMIGYROSA.—Sepals 5. Petals 4-5, with the scale on the back crested. Disk unilateral.
LEPISANTHES.—Sepals 4-5. Petals as many, with the scales cucullate.

×× Without petals. Calyx small, the lobes valvate or slightly imbricate.

SCHLEICHERA.—Calyx 4-5-cleft. Fruits ovoid. Seeds arillate.
§§ Flowers regular. Stamens inserted on the disk. Seeds without albumen.
ACER.—Petals none or 4—5. Disk annular. Fruit consisting of 2 samaras.
§§§ Flowers regular. Disk none, or annular or cupshaped. Stamens inserted outside the disk.
DODONAEA.—Petals none. Male flowers without disk; stamens 5-8, in a single series. Capsule septicidal.
§§§§ Stamens inserted outwards at the base of the disk. Seeds with albumen.
TURPINIA.—Ovary 3-lobed. Fruit indehiscent.

ZOLLINGERIA.—Only species. .... *Z. macrocarpa.*

CUPANIA.

× *Leaves and inflorescence glabrous.*

Leaflets coriaceous, opaque, ... *C. regularis.*
Leaflets chartaceous, netveined, glossy, ... *C. glabrata.*

×× *Leaves and inflorescence puberulous,* .... *C. fuscidula.*

RATONIA.

× *Capsules pyriform, 3-lobed or 3-angled, much narrowed at base.*

Filaments glabrous, ... *R. Lessertiana.*
Filaments pubescent, ... *R. Sumatrana.*

×× *Capsules 2-lobed, with the lobes spreading,* .... *R. adenophylla.*

MILDEA.—Only species, ... *M. xestophylla.*
AESCULUS.—Only species, ... *A. Assamica.*
HARPULLIA.—Only species, ... *H. cupanioides.*

NEPHELIUM.

× *Fruit obsoletely tubercled.*

Leaves coriaceous, the netveination not visible, ... *N. Litchi.*
Leaves stiff, chartaceous, the elegant netveination strongly prominent on both sides, ... *M. hypoleucum.**

×× *Fruit covered by soft subulate or angular conical prickles.*

Leaves glaucous beneath; fruit with long strong conical angular prickles, ... *N. Griffithii.*
Fruit with subulate long soft prickles, ... *N. lappaceum ?*

EUPHORIA.—Only species, ... *E. Longana.*
POMETIA.—Only species, ... *P. tomentosa.*

SCHMIEDELIA.

Bracteoles minute and short, the whole plant leaves and inflorescence pubescent or villous-pubescent, ... *S. serrata.*

XEROSPERMUM. Only species, ... *X. Noronhianum.*

SAPINDUS.

× *Flowers regular, glabrous.*

Leaves simple, ... *S. verticillatus.*

×× *Flowers more or less irregular, pubescent. Leaves pinnate.*

Leaves glabrous, ... *S. Rarak.*
Leaves pubescent, ... *S. rubiginosus.*

HEMIGYROSA. Only species, ... *H. canescens.*
LEPISANTHES. Only species, ... *L. montana.*
SCHLEICHERA. Only species, ... *S. trijuga.*

TURPINIA.

Leaves apiculate. Flowers small, about 3 lin. across, ... *T. pomifera.*
Leaves almost caudate. Flowers minute, hardly 2 lin. across, ... *T. Nepalensis.*

ACER.

Leaves oblong, entire, ... *A. laurinum.*
Leaves deeply 3-lobed, ... *A. isolobum.*

* In the Journal Asiatic Society of Bengal, 1871, p. 50, the fruits are described as softly muricate, but these fruits belong probably to *N. lappaceum* and were attached by mistake to the flower-specimens.

SABIACEÆ.

Conspectus of genera.

MELIOSMA.—Ovary 2-3 celled, usually not lobed, the style erect.

MELIOSMA. Only species...*M. simplicifolia.*

ANACARDIACEÆ.

Conspectus of genera.

* Ovary one celled.

× Leaves simple.

O Petals or sepals or the calyx-tube remaining unchanged in fruit. Fruit superior.

MANGIFERA.—Calyx 4-5 parted. Petals as many, the nerve usually thickened. Stamens 1-5 antheriferous. Style filiform. Leaves alternate.

BOUEA.—Calyx 3-to 5-parted, valvate. Stamens 3-8, all bearing anthers. Style short. Leaves opposite.

GLUTA.—Calyx spathaceous. Stamens inserted on the stalk-like torus. Style filiform.

BUCHANANIA.—Calyx 3-to 5-toothed. Stamens 10. Carpels 5 or 6, only a single of them fertile. Styles short.

OO Petals and sepals unchanged, but the calyx-tube or its base much enlarged.

† Fruit superior.

ANACARDIUM.—Petals imbricate. Stamens 8—10, all or few bearing anthers. Torus stalk-like. Style filiform. Nut seated on the enlarged succulent base of calyx.

SEMECARPUS.—Petals imbricate or valvate. Stamens 5. Disk annular, rather broad. Styles 3. Nut seated on the enlarged succulent base of calyx.

†† Fruit inferior.

DRIMYCARPUS.—Petals imbricate. Stamens 5. Style 1, with a capitate stigma.

HOLIGARNA.—Petals valvate. Stamens 5. Styles 3. Disk annular or obsolete.

OOO Petals or sepals much enlarging after flowering and often wing-like and leafy. Calyx tube not or very little changed.

SWINTONIA.—Sepals 5, unchanged. Petals enlarging, wing-like in fruit. Stamens 5. Drupe sessile.

MELANORRHOEA.—Sepals 5, unchanged. Petals much enlarging, wing-like in fruit. Stamens numerous. Drupes stalked.

×× Leaves 3-foliolate or pinnate (rarely simple).

O Calyx after flowering much enlarged, the lobes becoming wing-like.

PARISHIA.—Petals 4. Stamens 4. Style 3-cleft at apex.

OO Calyx remaining unchanged.

RHUS.—Petals 4 to 6, imbricate. Stamens 4-10. Ovule suspended from a free erect basilar funicle.

ODINA.—Petals 4-5, imbricate. Styles in female flowers 3-4, in the males the ovary 4-5-parted. Ovule pendulous near the summit of the cavity.

** Ovary 2-5-celled. Ovules pendulous. Leaves pinnate.

SPONDIAS.—Flowers polygamous. Stamens 8-10. Styles 4 or 5, free at the summit.

DRACONTOMELUM.—Flowers hermaphrodite. Stamens 10. Styles 5, thick, connate at summit and resembling ovaries.

MANGIFERA.

* *Petals and stamens free, the former inserted at the base of the cushion or cup-shaped disk.*

× *Pedicels 3 to 6 lin. long, very slender.*

Panicles and calyx puberulous or almost glabrous, the former usually very slender; net-veination of leaves lax and thin,...*M. longipes.*

× × *Pedicels very short and thick. Fertile stamen 1.*

Panicles and calyx all glabrous, petals white, c. 3 lin. long; disk cupular; drupes 2-3 in. long, acuminate; net-veination very lax and thin,.............................*M. sylvatica.*

Panicles and calyx more or less puberulous; petals with yellowish red stripes, hardly 2 lin. long; disk fleshy, 5-lobed; drupes 3-4 in. long, obtuse, net-veination lax and thin,...*M. Indica.*

Panicles and calyx densely pubescent; petals hardly 2 lin. long, yellowish; disk fleshy, 5-lobed; drupes 1-2 in. long, blunt; net-veination on both sides strongly prominent, minute and elegant,...*M. caloneura.*

** *Petals and stamens connate with the base of the stalk-like torus, or rarely the latter wanting.*

Leaves very coriaceous and glossy, almost polished beneath,..................*M. foetida.*

BOUEA.

Panicles small, sessile or nearly so, quite glabrous; petals ½ lin. long, ...*B. oppositifolia.*

Panicles large, long-peduncled, puberulous; petals a line long or longer,......*B. Burmanica.*

GLUTA.

Panicles and leaf-buds together with the calyx puberulous; petioles thick, often short,...*G. Renghas.*

All parts quite glabrous; petioles slender,..................................*G. elegans.*

BUCHANANIA.

× *Panicles and leaves glabrous.*

Leaves oblong-lanceolate, bluntish acuminate, quite glabrous, ... *B. lancifolia.*

× × *Panicles and leaves tomentose or pubescent.*

Panicles slender lax ; flowers hardly a line in diameter, pedicelled, ... *B. laxiflora.*
Panicles robust and stiff ; flowers 2 lin. across, sessile, crowded, ... *B. latifolia.*

ANACARDIUM—Only species, ... *A. occidentale.*

SEMECARPUS.

× *Leaves more or less tomentose or puberulous beneath, those of the young shoots often cuneate.*

Adult leaves rather coriaceous, obovate or nearly so, blunt, beneath densely greyish tomentose and strongly net-veined ; nuts not or almost not oblique, ... *S. Anacardium.*
Adult leaves chartaceous, cuneate-obovate, acuminate, beneath especially on the nerves puberulous or pilose ; net-veination faint ; nut very oblique, ... *S. cuneifolia.*
Adult leaves cuneate-oblong, coriaceous, bluntish-acuminate, beneath glaucous and shortly pubescent all over, nerves puberulous, ... *S. albescens.*

× × *Leaves quite glabrous, more or less glaucous beneath.*

Leaves oblong or nearly so, firmly coriaceous ; ovary densely hispid-tomentose ; panicles shortly and densely tomentose or puberulous, ... *S. heterophylla*
Leaves membranous, cuneate-obovate, acuminate ; ovary glabrous ; panicles quite glabrous, ... *S. acuminata.*
Leaves chartaceous, oblong ; panicles racemiform, pubescent or puberulous ; ovary glabrous, ... S. *subracemosa.*

DRIMYCARPUS.—Only species, ... *D. racemosus.*

HOLIGARNA.

Leaves glabrous ; nut entirely enclosed in the calyx, ... *H. longifolia.*
Leaves softly pubescent or puberulous beneath ; apex of nut exposed, resembling a convex disk, ... *H. Grahamii.*

SWINTONIA.

Leaves uniformly green and glossy ; pedicels 3-5 lin. long : drupes obovate, ... *S. Griffithii.*
Leaves glaucous and opaque beneath ; pedicels ½-1 lin. long ; petals hardly a line long, drupes oblong, ... *S. Schwenckii.*

MELANORRHOEA.

Leaves and panicles glabrous, or the latter puberulous ; stalk of fruit nearly 1½ inch long, ... *M. glabra.*
Leaves pubescent beneath ; panicles densely villous ; stalk of fruit short and thick, *M. usitata.*

PARISHIA.—Only species, ... *P. insignis.*

RHUS.

Leaves glabrous, 3-foliolate, leaflets entire ; panicles glabrous, ... *R. paniculata.*
Leaves pinnate, tomentose ; leaflets serrate-toothed ; panicles tomentose or puberulous, ... *R. Javanica.*

ODINA.—Only species, ... *O. Wodier.*

SPONDIAS.—Only species, ... *S. pinnata.*

DRACONTOMELUM.—Only species, ... *D. sylvestre.*

MORINGEÆ.

Conspectus of genera.

MORINGA.—Only genus.

MORINGA.—Only species, ... *M. pterygosperma.*

CONNARACEÆ.

Conspectus of genera.

ELLIPANTHUS.—Calyx 5-parted, erect, valvate. Stamens 10, alternately sterile. Carpel solitary, glabrous within.

ELLIPANTHUS.

Leaves and petioles glabrous, ...*E. calophyllus.*
Petioles densely puberulous; leaves glabrous, the midrib puberulous beneath, ...*E. Helferi.*
Leaves tomentose beneath, ...*E. tomentosus.*

LEGUMINOSÆ.

Conspectus of genera.

SUBORD. I. PAPILIONACEÆ.—Corolla very irregular, the petals imbricate with the upper one (standard) always outside in bud.

* Leaves pinnate (rarely reduced to 3 or 1 leaflets), stipulets none or setaceous. Upper stamen usually free, at least at base, the others united into a sheath, or very rarely all united. Pod not jointed, 2-valved and dehiscing.

MILLETTIA.—Anthers without gland. Pods not chambered inside, usually woody or coriaceous.
SESBANIA.—Anthers without gland. Pods transversely chambered inside, usually thin coriaceous and narrow.

* * Leaves pinnately 3-foliolate or 1-foliolate, rarely 5-7-foliolate, usually with stipulets. Upper stamen usually free, at least at the base or all but the base; anthers uniform or nearly so. Pod jointed, 2-valved, dehiscent or not.

O Pods dehiscing.

ERYTHRINA.—Standard large or elongate, the wings and keel much shorter. Calyx various, truncate, spathaceous or toothed. Armed trees.

OO Pods indehiscent.

BUTEA.—Standard acute, nearly as long as the acute keel. Calyx toothed. Unarmed trees and shrubs.

* * * Leaves pinnate, stipulets none or small and subulate. Stamens all united into a sheath or tube, or into 2 half-sheaths, rarely the upper one free. Pods indehiscent, usually not chambered inside.

O Leaflets usually alternate.

DALBERGIA.—Pods oblong or linear, extended into a flat chartaceous or coriaceous wing all round.
DREPANOCARPUS.—Pods reniform or moniliform, coriaceous or drupaceous, not winged.
PTEROCARPUS.—Calyx acute or turbinate at base. Pods almost orbicular or broadly oblong, in the centre seed-bearing and surrounded by a complete broad wing.

OO Leaflets usually opposite.

DERRIS.—Pods flat, chartaceous or coriaceous, at the upper suture or both sutures extended into a narrow wing.
PONGAMIA.—Pod short, thick, coriaceous, with rounded sutures, not winged.

* * * * Leaves pinnate, with or without stipulets. Stamens all free or scarcely united at base. Pods dehiscent or not.

SOPHORA.—Pods moniliform, terete or winged, usually indehiscent. Seeds without arillus. Leaves without stipulets.
ABILLARIA.—Pods short, fleshy-coriaceous, dehiscent. Seeds with a complete arillus. Leaves with stipulets.

SUBORD. II. CAESALPINIEÆ.—Flowers irregular, the petals often absent, imbricate in the bud with the upper petal inside.

* Leaves usually bipinnate. Sepals free from the disk. Anthers versatile. Ovary or its stalk free.

O Sepals much imbricate. Seeds without albumen.

X Pods not winged.

CAESALPINIA.—Pods compressed, coriaceous or thick, dehiscent or not.

XX Pods winged or wing-like extended, indehiscent.

PELTOPHORUM.—Stigma peltate. Pods flat, the margins wing-like extended.
MEZONEURUM.—Stigma minute. Pod flat, thin, the upper margin winged.

OO Sepals valvate or slightly imbricate. Seeds with albumen.

POINCIANA.—Pods coriaceous, rigid, flat, dehiscing. Unarmed trees.
PARKINSONIA.—Pods thin coriaceous, linear torulose or almost moniliform, indehiscent. Armed trees.

* * Leaves pinnate. Sepals free from the disk. Anthers usually basifix. Ovary or its stalk free.

CASSIA.—Petals 5. Stamens 5-10. Leaves abruptly pinnate.

* * * Leaves simple or 2-lobed, or rarely 2-foliolate. Calyx gamosepalous, or the sepals valvate. Ovary-stalk free or adnate to the calyx-tube. Seeds with albumen.

BAUHINIA.—Leaves or leaflets palmately nerved. Pods not winged.

* * * * Leaves usually abruptly pinnate, very rarely unpaired-pinnate or 1-foliolate. Sepals free from the disk, imbricate or valvate. Petals 5, or fewer, or none. Anthers versatile. Albumen none. Ovary-stalk adnate or not.

O Pods coriaceous, or crustaceous, dry.

X Bracteoles persistent, enclosing the flower-bud.

† Petals 5, equally long, or rarely 3 equally long, and the lower 2 rudimentary.

AMHERSTIA.—Bracteoles free, spreading. Petals unequal, the lower 2 minute and rudimentary. Of the stamens 9 connate, the 10th free.

† † Of the petals one large and developed, the remainder rudimentary or wanting.

MACROLOBIUM.—Bracteoles free, spreading. Sepals 4. Leaflets in one or several pairs.

XX Bracteoles minute or very caducous.

† Of the petals one very large or long-clawed, the others rudimentary or wanting.

AFZELIA.—Petal clawed. Stamens 3-8, free, with or without a few minute staminods. Leaflets in one or more pairs.

† † Petals 5, or rarely 3 or 2 of them almost equally long or wanting.

TAMARINDUS.—Sepals 4. Perfect petals 3, rudimentary ones 2. Stamens monadelphous, 3 of them perfect. Pods thick, indehiscent with pulpy acid mesocarp.

† † † Petals none.

SARACA.—Sepals 4. Stamens 3-9. Leaves abruptly pinnate. Panicles lateral.

OO Pods thick, fleshy.

CYNOMETRA.—Sepals 4-5. Petals 5. Stamens 10 or more. Leaflets in 1 or several pairs. Flowers very small.

SUBORD. III. MIMOSEÆ.—Flowers regular. Sepals and petals valvate and often united. Stamens definite (5 or 10) or very numerous.

* Stamens 5. Petals free.

ACROCARPUS.—Petals free. Pods wing-like extended on the upper margin. Leaves bipinnate.

* * Stamens 10. Petals free or connate.

O Flowers in globular or pyriform heads.

PARKIA.—Flower-heads large, the lower flowers neuter, with 10 long coloured monadelphous staminods. Pod indehiscent, coriaceous.

XYLIA.—Flower-head small. Pods elastically dehiscing, woody.

OO Flowers in spikes or racemes.

ENTADA.—Flowers sessile. Pods often very large, woody with thick sutures, the valves transversely articulate within the sutures.

ADENANTHERA.—Flowers shortly pedicelled. Pods thin coriaceous, elongate, turgid, inside transversely septate between the seeds, dehiscing.

* * * Stamens indefinite, often very numerous.

ACACIA.—Stamens free or rarely united at the base. Pods various.

ALBIZZIA.—Stamens united in a tube. Pods various.

MILLETTIA.

* *Stamens monadelphous. Pods more or lees woody or rigidly coriaceous. Seeds much compressed.*

O *The valves of pod flat or somewhat convex, without prominent ledges.*

Young parts and leaves beneath slightly pubescent; corolla glabrous, lilac; pods appressed puberulous, ... *M. pulchra.*

Young parts slightly pubescent; corolla pubescent, lilac; pods glabrous, ... *M. Brandisiana.*

Young shoots silky pubescent; corolla glabrous, white; pods thick, lenticellate-rough, ... *M. leucantha.*

Glabrous; corolla glabrous, blue; pods thick, warted, ... *M. ovalifolia.*

OO *The valves of pod extended into prominent ledges or wings.*

Young shoots slightly pubescent; leaflets bluntish acuminate; racemes almost glabrous, flowers steel blue; pods sharply edged, ... *M. glaucescens.*

As former, but racemes pubescent, flowers white, ... *M. pubinervis.*

Shortly tomentose especially while young; leaflets rounded; flowers pale blue; pods undulate winged, ... *M. tetraptera.*

** *Stamens diadelphous. Pods leathery, the valves very convex and smooth. Seeds not compressed.*

Glabrous; corolla purple, glabrous, ... *M. atropurpurea.*

SESBANIA.

× *Flowers 2-3 inch long. Standard acute or bluntish.*

Glabrous; flowers white, scarlet or variegated, ... *S. grandiflora.*

× × *Flowers less than an inch long. Standard broad, more or less notched.*

Glabrous; racemes drooping already from the base, ... *S. Aegyptiaca.*

ERYTHRINA.

* *Wings much longer than the calyx. Pods torose or almost moniliform, the valves opening at both sutures and exposing the continuous pithy chartaceous indehiscent endocarp enclosing the seeds.*

Glabrous; leaves membranous or chartaceous; pods glabrous, ... *E. Indica.*

* * *Wings minute, as long or shorter than the calyx. Pods follicle-like opening along the ventral suture, continuous. Seeds free.*

Leaflets glabrous, acuminate; calyx spathaceous, ... *E. stricta.*

Leaflets more or less shortly tomentose or puberulous beneath, blunt; calyx spathaceous, 2-lobed, ... *E. suberosa.*

* * * *Wings much longer than the calyx. Pods flat, torose, opening along the sinuate outer suture, the dorsal suture straight and prominent. Seeds free, but usually separated by spurious spongy septa.*

Glabrous, glaucous. Standard broad, notched; pods minutely greyish-velvety, *E. ovalifolia.*

* * * * *Wings much longer than the calyx. Pods on a 1-2 inch long stalk, butea-like dilated at base and flat, opening at both sutures bearing the 1-3 free seeds at or towards the narrowed end. Flowers almost sessile.*

Standard minutely velvety, keel-petals free at summit and at base, ... *E. holosericea.*

Standard glabrous; keel-petals connate, obcordate and shortly acuminate in the sinus, ... *E. lithosperma.*

BUTEA.—Only tree, ... *B. frondosa.*

DALBERGIA.

* *Stamens united in a single slit sheath. Flowers white.*

O *Bracteoles deciduous, wanting at the time of expansion of flowers.*

All parts glabrous. Leaflets 3-7, almost orbicular to obovate, notched or blunt, .. *D. latifolia.*

Young shoots appressed puberulous; leaflets 7-11, more or less oblong, notched or blunt, ... *D. cultrata.*

O O *Bracteoles black, short and broad, present during flowering.*

Leaflets blunt or more or less notched with a mucro, ... *D. glauca.*
Leaflets acuminate, ... *D. ovata.*

* * *Stamens united into 2 separate sheaths. Flowers white or purple.*
O *Pods velvety.*

Leaves bluntish acuminate; panicle lax, puberulous; flowers purple, ... *D. cana.*

O O *Pods quite glabrous.*
× *Leaflets apiculate, acute or acuminate, rather large.*

Leaflets retuse-apiculate; panicles lax, puberulous; flowers white or purplish, .. *D. purpurea.*
Leaflets acute or shortly acuminate; panicles tomentose, conglomerate; calyx glabrous; flowers white, ... *D. glomeriflora.*

× × *Leaflets blunt or retuse, rather small.*

Panicle rather lax; pedicels short or very short; flowers purple ?; leaves drying black, ... *D. nigrescens.*
Panicles lax; pedicels slender; flowers, white, or purplish outside, leaves not nigrescent, ... *D. paniculata.*

DREPANOCARPUS.
Panicles rusty pubescent; corolla glabrous, ripe pods thick and fleshy, ... *D. reniformis.*

PTEROCARPUS.
Pods about an inch across, also when young almost glabrous; calyx more glabrous; leaflets thin chartaceous, ... *P. Indicus.*
Pods about 1½ to 2 in. across, when young densely velvety-pubescent; calyx rusty-pubescent; leaflets coriaceous, ... *P. macrocarpus.*

DERRIS.
Only tree; leaflets almost acute with a mucro, ... *D. robusta.*

PONGAMIA.—Only tree, ... *P. mitis.*

SOPHORA.
All parts shortly and softly pubescent, ... *S. tomentosa.*

ARILLARIA.—Only species, ... *A. robusta.*

CAESALPINIA.
Leaflets unequally oblong, retuse. Seeds hardly compressed, ... *C. sappan.*

PELTOPHORUM.
Pedicels only 2-3 lin. long; pods with coriaceous wings, ... *P. ferrugineum.*

POINCIANA.
Calyx smooth; petals very large, waved, usually crimson, ... *P. regia.*

PARKINSONIA.—Only species, ... *P. aculeata.*

CASSIA.

* *Filaments of the lower 3 stamens very long and arcuate, the others short or imperfect. Pods terete, long, indehiscent. Seeds horizontal, transverse.*
O *Racemes drooping, during flowering destitute of bracts.*

All fullgrown parts glabrous; flowers yellow, ... *C. Fistula.*

O O *Racemes more or less erect the bracts persistent. Flowers pale or intensely pink-coloured. (Longer filaments node-like thickened at middle.)*

Leaflets shortly acuminate, ... *C. nodosa.*
Leaflets pubescent, retuse or blunt, ... *C. renigera.*

* * *Perfect anthers 7 or 10, opening by terminal pores or slits. Pods compressed or more or less terete, opening along the one or both sutures.*
O *Pods compressed and often flat, not elastically opening. Seeds with a filiform funicle.*

All fullgrown parts glabrous, ... *C. Siamea.*
All parts pubescent; stipules large, lunate-reniform, rather persistent, ... *C. auriculata.*
All parts pubescent; stipules deciduous, ... *C. Timoriensis.*

BAUHINIA.

* *Calyx spathaceous. Stamens 10, 7 or more of them sterile.*

Young shoots pubescent; leaves puberulous; pods almost sessile, ...*B. brachycarpa.*
Young shoots puberulous, leaves glabrous; pods long-stalked,..................*B. variegata.*

** *Calyx valvate, with the segments reflexed and free, or only slightly cohering.*

× *Stamens 10, 5 or more of them sterile. Calyx in bud angular.*

Leaves glabrous; flowers white or purple, the broader petal usually yellow at base,*B. purpurea.*
Leaves velvety; flower yellow, turning orange, ...*B. elongata.*

× × *All the 10 stamens fertile. Style very short or wanting, the stigma peltate. Flowers small.*

O *Calyx spathaceous.*

Young shoots and underside of young leaves pubescent, ...*B. racemosa.*

O O *Calyx valvate, with the segments or lobes all free.*

Glabrous, ...*B. Malabarica.*

AMHERSTIA.—Only species, ...*A. nobilis.*

AFZELIA.

Inflorescence and calyx puberulous; pods ½—1 ft. long, woody; leaves usually bluntish, ...*A. bijuga.*
Inflorescence and calyx smooth; pod 3-4 in. long, thin coriaceous; leaves emarginate, ...*A. retusa.*

TAMARINDUS.—Only species, ...*T. Indica.*

SARACA.—Only species, ...*S. Indica.*

CYNOMETRA.

Flowers in short umbel-like puberulous racemes; ovary villous, ...*C. ramiflora.*
Flowers in longer or shorter bracted racemes; pedicels glabrous or puberulous,..*C. cauliflora.*

ACROCARPUS.

Petals green, 3-4 lin. long; pods 17-18-seeded,.............................*A. combretiflorus.*
Petals dirty purple or brown, 2 lin. long; pods 8-12 seeded, ...*A. grandis.*

PARKIA.

× *Receptacle irregular.*

Leaflets only ⅓ inch long, quite smooth, 1-nerved with a lateral basal nerve; calyx-lobes short, rounded, ...*P. leiophylla.*

× × *Receptacle regular.*

O *Calyx-lobes obovate-cuneate.*

Leaflets 1 inch long, pubescent beneath, penni-nerved,........................*P. insignis.*

O O *Calyx-lobes short, rounded.*

Leaflets ½-⅓ inch long, sparingly pubescent beneath, 1-nerved without lateral nerves, ...*P. Roxburghii.*

XYLIA.—Only species, ...*X. dolabriformis.*

ADENANTHERA.—Only species, ...*A. pavonina.*

ACACIA.

(*Trees, branches armed only with paired stipulary or infra-stipulary spines*).

× *Flowers in globular heads.*

O *Pods thick,* ....*A. Farnesiana.*

O O *Pods flat, dry.*

Bark whitish; flower-heads arranged in terminal more or less ample panicles,...*A. leucophloea.*

× × *Flowers in spikes.*

Spikes white, tomentose; young leaves greyish pubescent; bark white,..................*A. Suma.*
Spikes yellow, glabrous or pubescent; leaves glabrous or nearly so; bark dark-brown,*A. Catechu.*

ALBIZZIA.

* *Pods very flat and straight, the sutures slightly raised; seeds free without pulp.*

× *Pinnae numerous, 10-18; leaflets linear, 1-6 lin. long, in very numerous pairs.*

O *Leaflets bluntish, the nerve central or nearly so.*

Leaflets glabrous; flower-heads small, in terminal panicles,..................*A. myriophylla.*

O O *Leaflets more or less acute, the nerve marginal or nearly so.*

Stipules very large, obliquely ovate, acuminate; all parts more or less shortly pubescent; corolla nearly 4 times longer than the calyx, ...*A. stipulata.*

Stipules none or obsolete; flowers unknown; full-grown parts glabrous or nearly so, *A. elegans.*[1]

× × *Pinnae in 2-6 pairs; leaflets ovate to oblong, ½-1½ in. long, in several pairs.*

O *Leaflets sessile.*

Flowers small, calyx minute, corolla 1½ lin. long,.. *A. odoratissima.*
Flowers rather conspicuous; calyx 1⅓ lin. long, corolla 4 lin. long,.......................*A. Lebbek.*

O O *Leaflets on short petiolules,* ....*A. procera.*

× × × *Pinnae in a single pair; leaflets few only, large, acuminate.*

All parts glabrous; pods broad, very flat, ...*A. lucida.*

* * *Pods circinately or screw-like twisted or curved, the seeds often imbedded in a spongy pulp.*

× *Unarmed. Seeds without pulp or arillus.*

O *Flowers pedicelled, in head-like umbels or racemes.*

† *Branchlets terete.*

Leaves with a single pair of pinnae; leaflets in 2-3 pairs, smooth and glossy; seedbearing lobes of pod about an inch broad and long, ...*A. Jiringa.*

† † *Branchlets sharply angular.*

Leaves with about 12 pairs of pinnae; leaflets in 4-8 pairs while young (along with all softer parts) shortly and softly pubescent, acuminate, ...*A. angulata.*

O O *Flowers sessile, in small heads.*

Leaves with a single pair of pinnae; leaflets in 3 or 2 pairs, almost glabrous, glaucous beneath, ...*A. glomeriflora.*

× × *Stipules all or some of them spiny-indurated. Seeds with a fleshy white arillus.*

Flower-heads small, sessile or nearly so,..*A. dulcis.*

ROSACEÆ.

Conspectus of genera.

* Ovary superior. Ripe carpels not enclosed in the calyx-tube. (Fruit a drupe.)

× Flowers usually not symmetrical. Style basilar. Ovules 2, ascending Radicle inferior.

PARINARIUM.—Petals 5 or 4. Stamens perigynous with filiform filaments and small anthers. Ovary and drupe 2-celled.

× × Flowers symmetrical. Style nearly terminal. Ovules 2, suspended. Radicle superior.

PRUNUS.—Calyx 5-lobed. Petals 5, usually conspicuous. Drupe straight with a bony putamen.
PYGEUM.—Calyx 5-15-toothed. Petals 5-10, minute, or none. Drupe often transversely oblong, coriaceous.

* * Ovary inferior or enclosed in the calyx-tube. Ripe carpels within the persistent calyx-tube and forming a compound fruit.

× Carpels many, 1-ovuled. Achens dry, enclosed in the fleshy calyx-tube.

ROSA.—Only genus.

× × Carpels 1-5, with 2 ovules in each. Fruit an apple with a 2-5-celled putamen, or an 1-5-pyrenous drupe or berry.

PIRUS.—Calyx-limb deciduous or persistent. Ovary and fruit 2-5-celled, the cells separate, the endocarp usually cartilaginous. Leaves deciduous.
ERIOBOTRYA.—Calyx-limb persistent. Ovary and berry 1-5-celled, the endocarp and septa thin. Leaves evergreen.

PARINARIUM.—Only species, ...*P. Sumatranum.*
PRUNUS.—Only species,...*P. Javanica.*
PYGEUM.
Ovary and underside of leaves more or less tawny-villous, ...*P. arboreum.*
Ovary glabrous or sparingly hirsute.
All parts glabrous; nerves and veins conspicuous, immersed; leaves almost rugose, ...*P. acuminatum.*
Younger branchlets, petioles and leaves beneath pubescent; nerves and veins thin, little visible, ...*P. latifolium.*
PIRUS.
Flowers and fruits on slender 1-2 in. long pedicels, ...*P. Pashia.*
(Flowers and) fruits on very short thick pedicels, ...*P. granulosa.*
ERIOBOTRYA.

× *Leaves entire.*

Note: 1 = A. lebbekoides of App. A.

Calyx and inflorescence puberulous ; berries the size of a pea, ...*E. Notoniana.*
Inflorescence glabrous ; fruit an apple of the size of a bullet,......................*E. macrocarpa.*

× × *Leaves coarsely crenate-serrate ; inflorescence rusty woolly-tomentose.*

Leaves glabrous ; calyx about a line long, ...*E. tinctoria.*
Leaves woolly tomentose beneath ; calyx 3-4-lin. long,...............................*E. Japonica.*

HAMAMELIDEÆ.

Conspectus of genera.

BUCKLANDIA.—Flowers polygamous. Male flowers with linear petals. Evergreen trees.
ALTINGIA.—Flower-heads 1-bracted. Flowers unisexual. Petals none. Deciduous trees.

BUCKLANDIA.—Only species, ...*B. populnea.*
ALTINGIA.—Only species, ...*A. excelsa.*

RHIZOPHOREÆ.

Conspectus of genera.

* Ovary inferior. Style single. Seeds without albumen, germinating while still on the tree, the thick radicle enlarging rapidly and protruding to a great length from the summit of the capsule.

RHIZOPHORA.—Calyx 4-cleft. Petals entire. Ovary 2-celled.
CERIOPS.—Calyx 5-6-cleft. Petals emarginate, appendaged. Ovary 3-celled.
KANDELIA.—Calyx 5-6-cleft. Petals lacerate. Ovary 1-celled, with 6 ovules in each cell.
BRUGUIERA.—Calyx 8-14-cleft. Petals 2 cleft, appendaged. Ovary 2-4-celled, with a solitary ovule in each cell.

* * Ovary inferior, nearly superior or free. Style single. Embryo immersed in a fleshy albumen, the seeds not germinating, until shed.

CARALLIA.—Calyx bell-shaped beyond the inferior ovary the lobes short erect. Stamens 10-16. Flowers cymose.

RHIZOPHORA.

Flowers pedicelled, petals villous along the margins, ...*R. mucronata.*
Flowers sessile, petals glabrous,..*R. conjugata.*

CERIOPS.

Flowers forming compact cymes on very short peduncles; petals setose, ciliate towards apex,..*C. Roxburghiana.*
Flowers in rather loose cymes ; petals terminated by 2 or 3 clavate appendages,*C. Candolleana.*

BRUGUIERA.

* *Flowers small ; calyx-tube nearly clavate, the limb* 8-*cleft. Petals* 8.

Calyx-tube at base tapering, ribbed, with the lobes very short and rigid, ...*B. parviflora.*
Calyx-tube blunt at base, not ribbed, the lobes nearly as long as the tube, *B. caryophylloides.*

* * *Flowers rather large ; calyx-tube almost campanulate, the limb* 10-14-*cleft. Petals* 10-14,..*B. gymnorhiza.*

CARALLIA.

Leaves usually entire ; petals not embracing the filaments, ...*C. integerrima.*
Leaves serrulate ; petals embracing the filaments, ...*C. lanceæfolia.*

COMBRETACEÆ.

Conspectus of genera.

* Stamens without glands at base ; anthers opening by slits. Ovules 2 or more. Flowers in racemes, spikes or heads.

O Calyx-limb caducous.

× Calyx-tube short, constricted but not produced beyond the ovary.

TERMINALIA.—No petals. Stamens inflexed. Usually trees. Flowers spicate.
COMBRETUM.—Petals very rarely wanting. Stamens straight. Usually climbers. Flowers usually racemose.

× × Calyx-tube long produced beyond the ovary.

ANOGEISSUS.—Calyx-tube 2-winged at base. Stamens 10, exserted. Leaves alternate. Flowers in dense heads.

O O Calyx-limb persistent.

LUMNITZERA.—Calyx-tube elongate, narrowed above the ovary. Stamens 5 or 10, exserted. Leaves alternate. Flowers racemose.

* * Stamens alternating with as many glands or staminodes ; anthers opening by a slit along the inner edge or by 2-valves. Ovules solitary. Flowers in cymes.

GYROCARPUS.—Calyx-lobes imbriate, 2 of them persistent and much enlarging. Fruit 2-winged at apex.

TERMINALIA.

* *Fruit a fleshy drupe, with a bony putamen, compressed or obsoletely angular.*

O *Inflorescence quite glabrous.*

All parts quite glabrous; petioles very short; racemes simple; drupes compressed, *T. Catappa.*
As former, but drupes obsoletely 5-angular, red inside, ... *T. procera.*

O O *Inflorescence puberulous or tomentose.*

Leaf-buds rusty villous; leaves obovate, petioles 2-3 in. long; drupes obovate, usually silky pubescent, ... *T. Bellerica.*
Young shoots and underside of short-petioled oblong leaves rusty villous; ovary villous; drupes oval, glabrous, ... *T. Chebula.*
As former, but ovary quite glabrous, the flowers aud fruits much smaller, ... *T. tomentella.*
Very young shoots rusty-villous; leaves smooth, on short petioles, acuminate. Drupes oblong-lanceolate, obsoletely 5-cornered, ... *T. citrina.*

** *Fruit a dry nut with a chartaceous or fibrous-coriaceous pericarp, compressed or 3-5-cornered, 1-5-winged.*

O *Nuts usually 3-cornered, the angles expanded into 2 equal, or 1-3 unequal wings.*

All parts glabrous; leaves obovate, petiole 2-3 in. long; nut 2-winged, about 3—3½ in. across, ... *T. bialata.*
As former, leaves smaller and shorter petioled; nuts 2-winged, only ½—¾ in. across, ... *T. pyrifolia.*

O O *Nuts 4-or 5-cornered, all angles equally produced into wings.*

All parts more or less greyish tomentose; leaves prominently net-veined; petioles short, with 2 stalked turbinate glands, ... *T. alata.*
All parts glabrous; net-veination of leaves not prominent; petioles short, with 2 stalked turbinate glands; inflorescence glabrous to almost tomentose, ... *T. crenulata.*

COMBRETUM.

Flowers 5-merous; petals none; calyx infundibuliform-cupshaped; inflorescence greyish velvety, ... *C. apetalum.*

ANOGEISSUS.

Leaves obovate, retuse or blunt, glabrous; flower-heads several together on branched peduncles, ... *A. latifolius.*
Leaves acuminate, at least while young pubescent; flower-heads solitary, ... *A. acuminatus.*

LUMNITZERA.

Flowers white; stamens 10, about as long as the petals, ... *L. racemosa.*
Flowers crimson, stamens 5 or 10, twice as long as the petals, ... *L. coccinea.*

GYROCARPUS.—Only species, ... *G. Jacquini.*

MYRTACEÆ.

Conspectus of genera.

* Fruit a capsule, opening at top into as many valves as cells to the ovary, very rarely indehiscent.

MELALEUCA.—Stamens united in 5 free phalanges alternating with the petals. Flowers in heads or spikes.
TRISTANIA.—Stamens united in 5 bundles opposite to the petals. Flowers in cymes.

* * Fruit an indehiscent berry or rarely a drupe. Leaves opposite, dotted.

O Calyx-limb closed or almost imbricate-lobed in bud, in the expanded flower deeper valvately divided.

PSIDIUM.—Ovary 2- or more-celled. Ovules in many series. Embryo circinate.

O O Calyx-limb 4-or 5-lobed in bud, closed, in expanding often falling off in an entire calyptra.

NELITRIS.—Ovary 5- or rarely 4-celled, with 2 to 6-ovules in each cell. Embryo long and narrow, curved circular or spiral, with small cotyledons.
EUGENIA.—Ovary 2- or 3-celled, with several ovules in each cell, without spurious dissepiments. Embryo thick and fleshy, either indivisible or with 2 thick fleshy cotyledons and a short radicle.

* * * Fruit woody, fibrous or fleshy, indehiscent. Leaves alternate, not dotted.

BARRINGTONIA.—Stamens all perfect. Fruit angular, fibrous, 1-seeded.
CAREYA.—Outer or inner stamens, or both, without anthers. Fruit ovoid or globular, fleshy, with several seeds imbedded in pulp.

MELALEUCA.—Only species, ... *M. leucadendron.*

TRISTANIA.

O *Calyx-lobes blunt or nearly so.*

Leaves sessile or nearly so, rigidly coriaceous, glossy on both sides; flowers sessile or nearly so; calyx about 3 lin. across,..*T. affinis.*
Leaves petioled, thin coriaceous, opaque beneath; flowers pedicelled; calyx only $1\frac{1}{4}$ lin. across; capsule exserted,..*T. Birmanica.*

O O *Calyx-lobes subulate-acuminate.*

Capsule hardly exserted,..*T. Griffithii.*

PSIDIUM.—Only species,..*P. Guajava.*

NELITRIS.—Only species,..*N. paniculata.*

EUGENIA.

* *Calyx smooth inside, without an intra-staminal thickened ring; flowers usually small, the calyx-limb often obsolete and turning truncate after flowering. Berries often small, globular to ovoid, more or less sappy,* 1- *rarely* 2-*seeded.*

O *Calyx elongate or shorter, more or less obversely conical.*

× *Flowers in simple or almost simple axillary racemes. Berries ovoid. Calyx very elongate.*

Calyx tubular-narrowed, 1—$\frac{1}{2}$ in. long, the lobes broad and rounded; berry about an in. long ovoid-oblong, crowned with the calyx-lobes, ...*E. claviflora.*
Calyx clavate, $\frac{1}{3}$—$\frac{1}{2}$ in. long, the limb truncate; berry clavate-oblong, only $\frac{1}{3}$ in. long, crowned with the cup-shaped truncate calyx-limb, ...*E. leptantha.*

× × *Flowers in more or less corymb-like axillary and terminal panicles Calyx shorter.*

\+ *Calyx contracted in a pedicel-like base.*

Calyx smooth; leaves somewhat glaucous beneath; berries black, ...*E. grata.*
Calyx in a dried state granular-rough; berries white; leaves rather glossy beneath,*E. Zeylanica.*

\+ + *Calyx sessile, not pedicel-like narrowed. Flowers in terminal (and sometimes also axillary) corymb-like panicles.*

Leaves more or less linear, netveined between the remote indistinct irregular lateral nerves; a shrub, ...*E. contracta.*
Leaves more or less oblong, somewhat glaucescent beneath, not net-veined between the approximate parallel lateral nerves. A tree, ...*E. bracteolata.*

O O *Calyx hemispherical to funnel-shaped, sessile or pedicel-like contracted at base.*

× *Leaves usually opaque; ordinarily green, the lateral nerves more or less distant, somewhat irregular and netveined between. Inflorescence usually lateral from the older branches.*

\+ *Calyx sessile, without a pedicel-like tapering base.*

† *Leaves not glaucous beneath.*

Petiole $\frac{1}{2}$—$\frac{2}{3}$ in. long; leaves not decurrent, broader; flowers more than 3 together; panicle longer peduncled, the last ramifications very short, ...*E. operculata.*
As former but leaves more obovate; panicle very short peduncled or almost sessile, more lax; flowers often by threes,..*E. obovata.*
Leaves acuminate decurrent in a short petiole, more acuminate, ...*E. Paniala.*

‡ ‡ *Leaves glaucous or glaucescent beneath.*

Branchlets terete or nearly so; panicles more or less peduncled; calyx-lobes obsolete, soon truncate,..*E. cinerea.*
As former but calyx-lobes rotundate, nearly $\frac{1}{3}$ inch long, ...*E. praecox.*
Branchlets (often wingedly) 4-cornered; panicles short, sessile, ...*E. tetragona.*

\+ + *Calyx narrowed in a longer or shorter pedicel-like base; panicles short, sessile or nearly so, usually branched already from the base.*

† *Lobes of calyx-limb distinct, up to $\frac{1}{2}$ lin. long.*

Branchlets brownish; cyme-like panicles slender, short, ...*E. cerasoides.*

† † *Lobes of calyx-limb obsolete, soon truncate.*

Branchlets greyish; panicles cyme-like, short, ...*E. balsamea.*

× × *Leaves usually glossy, often drying blackish or brownish, the lateral nerves all thin and vein-like, more or less narrowly parallel-running.*

\+ *Calyx narrowed in a longer or shorter pedicel-like base.*

† *Inflorescence lateral from the older branchlets.*

Calyx a line long, almost sessile ; ramifications of panicle sharply 4-cornered, berries ovoid, the size of a pea ; branchlets brownish, ... *E. fruticosa.*
Calyx 2 lin. long, tapering in a thick pedicel-like base ; ramifications of the panicle obsoletely 4-cornered ; berries ovoid-oblong, ½ inch long ; branchlets white,........ *E. Jambolana.*

† † *Inflorescence terminal (and often on the same branch also axillary).*

Δ *Branchlets brown.*

‖ *Leaves bluntish acuminate to blunt.*

Leaves thin coriaceous, the lateral nerves thin but distinct ; petiole 3 lin. long, slender,.. *E. cymosa.*
Leaves firmly coriaceous, the lateral nerves obsolete ; petiole thick, not above a line long, ... *E. myrtifolia.*

‖ ‖ *Leaves long and sharply acuminate.*

Leaves almost chartaceous, pale coloured beneath ; petiole about 2 lin. long, *E. acuminatissima.*

Δ Δ *Branchlets white.*

Leaves bluntish acuminate, almost chartaceous, elegantly transversely veined,.... *E. venusta.*

+ + *Calyx not or almost not contracted at the base, sessile.*

† *Branchlets white. Leaves drying black or reddish.*

Leaves chartaceous ; calyx-lobes about a line long ; petals 2 lin. long or longer ; filaments 4-5 lin. long,.. *E. rubens.*
Leaves of a thicker texture, the lateral nerves strong and prominent ; calyx-lobes and petals shorter ; filaments 2-3 lin. long ; berries obovoid,...................... *E. Thumra.*

† † *Branchlets red-brown. Leaves drying blackish or reddish.*

Habit of former, but lateral nerves thin and vein-like ; berries almost globular, the size of a large cherry,.. *E. oblata.*

* * *Calyx usually with circular or 4-angular intra-staminal ring or the stamens on the thickened ring itself ; flowers often conspicuous ; calyx-limb conspicuously 4-lobed, the lobes persistent. Berries usually large, more or less turbinate or ovoid, the endocarp thick, fleshy. Seeds large.*

O *Calyx-lobes in fruit spreading.*

× *Calyx less than ½ an in. long.*

+ *Flowers sessile.*

† *Leaves firmly coriaceous, glossy, the lateral nerves thin, parallel. Flowers in terminal and often also in axillary panicles.*

Leaves 5-6 in. long, blunt or nearly so ; panicle corymb-like, peduncled ; berry obovoid-pear-shaped, about an in. long,.. *E. grandis.*
Leaves only 2-3 in. long, decurrent at base, bluntish apiculate,.............. *E. lepidocarpa.*
Leaves cuneate at base ; flowers in sessile reduced cluster-like panicles ; ramifications very short and thick, joint-like,.. *E. pachyphylla.*

† † *Leaves coriaceous, opaque, the lateral nerves curved and distant.*

Leaves long-petioled ; panicle terminal, corymb-like,.... .... *E. tristis.*

+ + *Flowers pedicelled. Leaves more or less chartaceous, the lateral nerves curved.*

Flowers in axillary and terminal panicles ; calyx-base thick, pedicel-like, the true pedicel very short or almost none, ... *E. lanceaefolia.*
Flowers in simple slender lateral or axillary racemes ; calyx-base filiform and pedicel-like ; pedicels filiform, long, ... *E. cerasiflora.*

× × *Calyx an in. long or longer.*

Leaves large, almost sessile, cordate or rounded at base ; corymbs lateral and terminal, ... *E. formosa.*

O O *Calyx-lobes in fruit incurved or inflexed.*

× *Flowers sessile or nearly so.*

Leaves cordate or rounded at base, the petiole very short and thick, corymbs terminal, ... *E. macrocarpa.*
Leaves sessile with a cordate base, blunt ; branchlets white, terete ; corymbs small, lateral, ... *E. amplexicaulis.*

Leaves petioled, acuminate at both ends ; panicles cluster-like reduced, lateral, *E. Malaccensis.*

× × *Flowers truly or spuriously pedicelled.*

+ *Leaves whorled by threes, narrow, obtuse at base.*

Leaves linear-lanceolate, almost sessile or very shortly petioled ; petals 4-16, . . *E. polypetala.*

+ + *Leaves opposite.*

† *Leaves rounded at base. Fruits obversely turbinate, waxy, white or rose-coloured.*

Branchlets usually 4-cornered and often wingedly so, white or pale-coloured ; leaves acuminate, the marginal nerves as strong as the nerves themselves, ...*E. aquea.*
Branchlets terete, brown ; leaves bluntish, the marginal nerve faint, ...*E. Javanica.*

† † *Leaves acute at base, narrow, petioled.*

Berries almost globular or ovoid, dull-yellow, ...*E. Jambos.*

BARRINGTONIA.

* *Calyx in bud closed, entire, valvately rupturing in 2-4 lobes. Flowers pedicelled.*

× *Fruit with appendages, angular.*

Flowers about 3 in. in diameter or larger, in corymb-like short erect racemes ; leaves entire, sessile, ...*B. Asiatica.*
Flowers about an in. in diameter, in long slender pendulous racemes ; leaves crenulate, very short petioled,...*B. racemosa.*

× × *Fruit conically pyramidal, with short wing-like appendages at the base.*

Leaves crenulate ; racemes rather erect, puberulous, ...*B. conoidea.*

* * *Calyx already in bud 3-4-cleft, the lobes imbricate.*

× *Flower pedicelled ; rachis of raceme slender ; fruits sharply 4-cornered.*

Glabrous or slightly pubescent ; flowers red, rather small ; leaves crenulate, short-petioled, ...*B. acutangula.*

× × *Flowers sessile, the rachis of the raceme very thick and almost fleshy.*

+ *Calyx-tube winged ; fruit narrowly winged along the corners.*

Leaves blunt or acute at the base, not decurrent ; calyx-lobes rounded, 2 lin. long,*B. angusta.*
Leaves long-decurrent and acuminate at the base ; calyx-lobes 3-angular-ovate, more or less acute, more than 3 lin. long, ...*B. pterocarpa.*

+ + *Calyx-tube angular, not winged (fruit unknown).*

Leaves entire, elongate, long-petioled, ...*E. macrostachya.*

CAREYA.

× *Flowers on long pedicels.*

Undershrub ; berry only an in. thick ; seeds about 3 lin. long, ...*C. herbacea.*

× × *Flowers sessile. Trees.*

Petals blunt or rounded at apex, concave. Ovules in 2 rows in each cell,........*C. arborea.*
Petals acute, the borders revolute ; ovules in 6 rows in each celll, ...*C. sphaerica.*

PLANCHONIA.—Only species, ...*P. valida.*

MELASTOMACEÆ.

Conspectus of genera.

* Anthers opening by 1 or 2 apical pores.
MELASTOMA.—Ovary adnate to the calyx. Anthers unequal, 10-14. Fruit a berry.
* * Anthers opening by longitudinal slits.
MEMECYLON.—Anthers 8. Ovary 1-celled, the placenta central and free. Berry 1-seeded.

MELASTOMA.

Leaves more or less adpressed bristly-hairy or pubescent, calyx covered with closely appressed chaffy scale-like bristles of 1 lin. length, ...*M. normale.*

MEMECYLON.

* *Calyx radiately nerved within, the nerves raised and lamellate like the gills of a mushroom.*

O *Leaves more or less thick coriaceous without visible lateral veins.*

† *Leaves with cordate or rounded base, sessile or on very short thick petioles. Flowers conspicuous. Branchlets terete.*

Cymes and pedicels very short and robust ; berries ovoid-oblong, rather large,. .*M. coeruleum.*
Cymes lax, peduncled, rather slender ; pedicels slender, 2-3 lin. long, ...*M. pulchrum.*

† † *Leaves petioled, more or less tapering at base, when rounded contracted in a moderately long petiole.*

Δ *Branchlets terete without or only with very faintly raised lines. Flowers small, calyx up to a line in diameter, smooth, not tubercled.*

Leaves rounded at base, smooth and shining ; petiole 3-4 lin. long ; pedicels 2-3 lin. long, cymes simple or compound, peduncled, ...*M. edule.*
Leaves attenuate at base, sharply acuminate ; pedicels 1-1½ lin. long ; umbel-like cymes short-peduncled, ...*M. plebejum.*
Leaves attenuate at base, very acuminate, glossy ; petiole 1-2 lin. long ; pedicels hardly a line long, thick ; cymes very short, almost sessile, ...*M. laevigatum.*

Δ Δ *Branchlets more or less terete, marked with 4 blunt lines. Calyx about 1½ lin. wide.*

Pedicels thick and short ; calyx undulate-truncate with a hemispherical tubercled base, leaves bluntish or retuse, shortly acuminate, ... *M. punctatum.*

Δ Δ Δ *Branchlets 4-angular or almost 4-winged.*

As former, but calyx-base smooth ; cymes short-peduncled or almost sessile ; leaves turning dark-coloured in drying, ...*M. scutellatum.*
Cymes rather short peduncled ; leaves 3-4 in. long, turning yellowish in drying, *M. elegans.*
Calyx about ½ lin. wide, sharply 4-toothed ; leaves only ½-1½ lin. long, pedicels about a line long ; cymes small, poor, almost sessile, ...*M, pauciflorum.*

O O *Leaves thin coriaceous, with the lateral nerves and often also the veins more or less conspicuous, the nerves arcuate-anastomosing towards the margins.*

Umbellets in thyrsoid cymes, pedicels 1-2 lin. long ; calyx ⅔ lin. wide, the limb sinuate-4-angular, ...*M. Griffithianum.*
As former, but pedicels more slender ; cymes simple ; calyx 1-1½ lin. wide, . .*M. celastrinum.*

* * *Calyx not radiate-lamellate veined within, or the nerves very faint.*

Leaves sessile or nearly so, turning yellowish and opaque in drying ; cymes sessile, umbel-like ; calyx conspicuously 4-toothed,....................................*M. umbellatum.*

LYTHRARIEÆ.

Conspectus of genera.

* Ovary superior.

O Leaves blackish-dotted beneath.

WOODFORDIA.—Calyx tubular, curved. Stamens declinate, inserted at the base of the calyx-tube. Capsule elongate, sessile. Seeds pilose.

O O Leaves without or with pellucid dots beneath.

× Ovary and capsule totally enclosed in the calyx-tube.

PEMPHIS.—Calyx 12-toothed, ribbed. Petals 6. Stamens twice as many. Capsule 1-celled, transversely circumsciss.

× × Capsule more or less protruding from the calyx-tube.

LAWSONIA.—Calyx 4-parted. Petals 4. Stamens twice as many. Capsule globular, 4-celled, irregularly bursting.
CRYPTERONIA.—Calyx 4-5-cleft. Petals none. Stamens 4-5. Capsule 2-celled, 2-valved. Seeds minute.
LAGERSTROEMIA.—Calyx campanulate, 4-6-occasionally 7-cleft. Petals 4-6, or none. Stamens indefinite. Capsule 3-6-celled and valved. Seeds large, expanded in a lateral wing.
DUABANGA.—Calyx spreading, 4-7-parted, the segments thick. Petals 4-7. Stamens indefinite, in a single row. Capsule 4-8-celled and valved. Seeds appendaged on both ends, scobiform.
SONNERATIA.—Calyx campanulate, 4-8-lobed. Petals 4-8, or none. Stamens indefinite. Berry many-celled.

* Ovary inferior.

PUNICA.—Calyx-lobes 5-7, thick. Petals 5-7. Stamens indefinite. Ovary many-celled, the cells superposed in 2 rows. Seeds with a pulpy testa.

WOODFORDIA.—Only species, ...*W. fruticosa.*
LAWSONIA.—Only species, ...*L. inermis.*

CRYPTERONIA.

Flowering calyx about ½ lin. wide ; leaves usually puberulous beneath, ...*C. pubescens.*
Flowering calyx about 1-1½ lin. wide ; leaves quite glabrous,....................*C. paniculata.*

LAGERSTROEMIA.

* *Calyx terete, without ribs or furrows.*

O *Calyx and all other parts glabrous.*

Leaves whitish-glaucous beneath ; flowers hardly ½ an inch in diameter, ...*L. parviflora.*
Leaves uniformily green ; flowers 1½-2 in. in diameter,........................*L. Indica.*

O O *Calyx and inflorescence covered with a rusty-coloured tomentum.*

Flowers almost racemose, in panicles ; calyx ½-⅔ shorter than the capsule, ...*L. calyculata.*

* * *Calyx furrowed, plicate-sulcate or angular, with the angles acute or almost winged.*

O *Ribs or angles twice as many as calyx-lobes, the alternating shorter ones terminating at the sinuses of the lobes, the others running throughout the lobes.*

× *Calyx and inflorescence covered with a rusty-coloured, tawny or white floccose tomentum ; calyx-lobes terminating in a subulate or short mucro.*

Fullgrown leaves glabrous, acuminate ; tomentum rusty coloured ; petals on short claws, not fringed,..*L. floribunda.*
Adult leaves puberulous beneath, acuminate ; tomentum whitish or yellowish ; petals on long slender claws, ciliolate, ...*L. tomentosa.*
As former ; leaves mucronate or acute ; flowers twice as large ; petals conspicuously fringed,..*L. Loudoni.*

× × *Calyx and inflorescence pruinose or minutely whitish or greyish puberulous. All other parts glabrous.*

Leaves whitish glaucous beneath ; calyx 10-12-angled, the angles acute, ...*L. hypoleuca.*
Leaves green ; calyx plicately-sulcate, the ribs very blunt and broader than the furrows,...*L. flos-reginae.*
Leaves green ; calyx longitudinally-furrowed without ribs, ...*L. macrocarpa.*

O O *Angles of calyx as many as lobes, alternating with the lobes, the latter without ribs.*

All softer parts almost greyish from short soft pubescence ; angles of calyx almost winged ; petals none, ...*L. villosa.*

DUABANGA.—Only species, ...*D. grandiflora.*

SONNERATIA.

* *Stigma funnel-shaped-capitate, small. Calyx 6-8-lobed.*

O *Petals present.*

Leaves obovate, broad ; petals linear-lanceolate, dark-purple ; calyx terete, ...*S. acida.*

O O *No petals.*

Calyx in bud elliptically oblong, acute, the tube in bud obsoletely, afterwards strongly, 6-8-angled, ...*S. alba.*
Calyx in bud ovoid, obtuse, the tube remaining terete,........................*S. Griffithii.*

* * *Stigma large, nearly 3 lin. in diameter, conically umbrella-like. Calyx 4-lobed, terete.*

Leaves oblong to lanceolate ; no petals, ...*S. apetala.*

PUNICA.—Only species, ...*P. Granatum.*

SAMYDACEÆ.

Conspectus of genera.

* Petals none Stamens 6-30, in a single row, often alternating with as many staminodes.

CASEARIA.—Stamens 6-15, alternating with as many short ciliate staminodes. Style simple, entire or at top 3-lobed or cleft. Flowers clustered or in corymbs.

* * Petals 4-15. Stamens as many as petals singly or, if more, collected in clusters, opposite to the petals.

HOMALIUM.—Petals as many as sepals. Ovary more or less adnate to the calyx and inferior.

CASEARIA.

* *Filaments very slender, many times longer than the anthers.*

× *Stamens and staminodes 8 each, distinctly inserted.*

All parts glabrous ; leaves coarsely crenate ; flowers about 2 lin. in diameter, pedicels and calyx glabrous, ...*C. Canziala.*
Young shoots, calyx, pedicels and often also the nerves of underside of the serrulate leaves puberulous ; flowers only a line in diameter,..........................*C. glomerata.*

× × *Stamens and staminodes 8 each, united at the base and forming a broad disk round the ovary.*

All parts, also the flowers and pedicels more or less tomentose or puberulous, ..*C. tomentosa.*

* * *Filaments short, only as long as the anthers.*

All parts, also the flowers and pedicels more or less tomentose or puberulous, ...*C. Vareca.*

HOMALIUM.

* *Stamens solitary and opposite the petals.*

O *Flowers about 2 lines in diameter.*

Ovary villous; leaves coriaceous, tomentose or puberulous beneath; flowers tomentose, sessile; racemes robust, tomentose, ...*H. tomentosum.*

Ovary villous; leaves thin chartaceous, pubescent along the nerves; flowers tomentose, shortly pedicelled; racemes pubescent, slender, ...*H. Griffithianum.*

O O *Flowers about a line in diameter.*

All parts also the inflorescences quite glabrous, ...*H. minutiflorum.*

* * *Stamens by 2 or more opposite to the petals.*

Ovary glabrous. All parts quite glabrous; racemes slender, glabrous, ...*H. foetidum.*

PASSIFLORACEÆ.

Conspectus of genera.

CARICA.—Flowers unisexual, or polygamous, the male and female perianths dissimilar. Calyx minute. Male corolla tubular, female one 5-petalled. Stamens in 2 rows, the filaments free.

CARICA.—Only species. ....*C. Papaya.*

DATISCACEÆ.

Conspectus of genera.

TETRAMELES.—Only genus.

TETRAMELES.—Only species, ...*T. nudiflora.*

ARALIACEÆ.

Conspectus of genera.

* Petals more or less imbricate in bud, inserted with a broad base.

ARALIA.—Gynoecium 2-5-merous. Styles free. Fruit in a dried state angular. Pedicels jointed. Leaves usually pinnate or decompound.

* * Petals valvate in the bud. Stamens as many as petals. Albumen homogeneous.

O Ovary 2-rarely 1-,3-, or 4-celled. Styles united in a cone or column.

BRASSAIOPSIS.—Flowers 5-merous. Fruit terete. Ovary 2-1-celled. Pedicels not jointed. Umbels forming large terminal racemes. Leaves usually palmatifid.

O O Ovary 5- or more, rarely by abortion 3-4-celled.

× Pedicels jointed below the calyx.

POLYSCIAS.—Flowers 5-more-parted. Petals free or cohering at summit. Leaves pinnate.

× × Pedicels not jointed.

HEPTAPLEURUM.—Flowers 5-6-merous, seldom 4-or 7-8-merous. Drupes in a dried state ribbed and angular. Leaves usually digitate.

TREVESIA.—Flowers 8-12-merous. Drupes globular, sulcate or ribbed. Leaves palmatifid, digitate or pinnate.

* * * Petals valvate in bud. Stamens as many as petals. Albumen ruminate. (Ovary 2-occasionally 3-celled.)

× Pedicels not jointed.

HETEROPANAX.—Styles distinct, filiform. Leaves pinnately-decompound.

× × Pedicels jointed below the calyx.

MACROPANAX.—Styles united in a cone or column. Leaves digitate.

* * * * Petals valvate or valvately cohering. Stamens numerous. Styles none, connate in a cone or column.

TUPIDANTHUS.—Petals firmly cohering, thick. Gynoecium poly-(nearly 100-) merous. Leaves digitate.

ARALIA.

Leaves decompound, sparingly hirsute; petiole and rachis glabrous sparingly, aculeate, ...*A. armata.*

BRASSAIOPSIS.

Young shoots rusty-scurvy-pubescent, ...*B. palmata.*

POLYSCIAS.—Only species, ...*P. nodosa.*

HEPTAPLEURUM.
Styles united in an elongated cone ; leaflets glaucous beneath, ...*H. glaucum.*

TREVESIA.—Only species, ...*T. palmata.*
HETEROPANAX.—Only species, ...*H. fragrans.*
MACROPANAX.—Only species, ...*M. oreophilum.*
TUPIDANTHUS.—Only species, ...*T. calyptratus.*

CORNACEÆ.

Conspectus of genera.

† Petals narrow-linear, valvate in the bud. Anthers elongate, basifix. Style elongate.
ALANGIUM.—Stamens usually 2 to 4 times more than petals. Ovary 1-celled. Albumen ruminate. Flowers in clusters.
MARLEA.—Stamens as many as petals. Ovary 1- to 3-celled. Albumen homogeneous. Flowers cymose-panicled.
† † Petals short, valvate. Anthers short, dorsifix. Style short.
CORNUS.—Petals 4. Ovary 2-celled, with a simple stigma. Leaves usually opposite.

ALANGIUM.—Only species, ...*A. decapetalum.*
MARLEA.
Petals about ½ inch long or shorter ; anthers with a glabrous connectivum ; leaves glabrous, ...*M. begoniaefolia*
Petals nearly an inch long ; anthers with a pilose and bearded connectivum ; leaves puberulous beneath, ...*M. tomentosa.*
CORNUS.—Only species, ...*C. oblonga*·

RUBIACEÆ.

Conspectus of genera.

Trib.—I. Coffeaceae. Fruit a more or less fleshy or sappy drupe or berry, indehiscent, 1-several-celled, with one or more seeds in each cell. Seeds never winged or appendaged.
* Ovary 2- or more-celled, the cells with a solitary erect ovule. Berry with 2 or more (or by abortion only a solitary) one-seeded thin crustaceous or rarely membranous pyrenes. Leaves opposite, with true interpetiolar stipules.
O Ovary 2-celled.
× Corolla-lobes valvate. Albumen usually fleshy.
PSYCHOTRIA.—Corolla-tube short, bearded at throat ; pyrenes flat and entire on the inner face. Flowers in terminal or axillary cymes or cymose panicles.
× × Corolla-lobes imbricate. Albumen usually horny.
IXORA.—Corolla hypocraterimorph, the limb 4- or 5-parted. Flowers in terminal corymbs or panicles. Stipules connate.
COFFEA.—Corolla funnel-shaped, glabrous, the limb 4-7-parted. Berries 2- or rarely 1-seeded, seeds enclosed in a chartaceous pyrene. Flowers terminal and axillary. Stipules free.
SERISSA.—Corolla funnel-shaped, velvety, often along with the calyx somewhat oblique. Berries 1- rarely 2-seeded. Flowers terminal or axillary. Stipules free.
O O Ovary 4-9-celled.
LASIANTHUS.—Calyx more or less toothed. Styles and ovary-cells 4-9. Flowers clustered or cymose, axillary.
* * Ovary 1- several-celled or rarely (in Polyphragmon) numerous ; ovules attached laterally or suspended from the middle or summit of each cell. Pyrenes hard and bony, either connate in a hard bony putamen, or loosely arranged. Albumen usually fleshy.
O Corolla-lobes valvate. Ovules laterally attached at or near the top.
VANGUERIA.—Ovary usually 5-celled Stigma discoid.
CANTHIUM.—Ovary 2-celled. Drupe didymous, or by abortion more or less 1-celled.
O O Corolla-lobes imbricate. Ovules suspended from the summit of the normal or spurious cells.
× Drupes containing a single several-celled putamen, with a single seed in each cell.
SCYPHIPHORA.—Ovary consisting of 2 cells transversely separated by a spurious septum and appearing 4-celled, the upper spurious cells with a solitary erect, the lower ones with a suspended ovule. Styles 2. Drupes angular-sulcate.
GUETTARDA.—Ovary 4- or more-celled, with a solitary pendulous ovule in each cell. Stigma thick, simple. Drupes globular, rather large. Putamen 4- or more-celled.
× × Drupes berry-like, several-celled, each cell containing several or numerous collateral or superposed free bony 1-seeded spurious pyrenes.
POLYPHRAGMON.—Stigmatic styles as many as cells to the ovary.
* * * Ovary 1-celled with parietal placentas or more usually 2- or more-celled, with numerous ovules in each cell. Seeds free, not enclosed in pyrenes.
O Ovary 1-celled with 4-5 parietal placentas. Corolla-lobes imbricate.
GARDENIA.—Flowers usually showy. Stigma entire, furrowed-twisted. Berry large, the numerous seeds imbedded in pulp.
O O Ovary 2-celled Corolla-lobes imbricate.
× Placenta simple.
RANDIA.—Stigma 2-lobed, style spindle-like thickened. Berry large, the seeds imbedded in pulp.
GRIFFITHIA.—Stigma 2-lobed ; style equal, not thickened. Berry small, not pulpy.
WEBERA.—Stigma undivided, style equally filiform. Berry small, the seeds without pulp.
DIPLOSPORA.—Style 2-cleft. Berry rather large, not pulpy. Seeds in a double row in each cell.

HYPOBATHRUM.—Style 2-lobed. Berry small, stalked or sessile, not pulpy. Seeds in a single row in each cell.

× × Placenta 2-cleft.

MUSSAENDA.—Connective of anthers not produced in a mucro. The one or other calycine lobe of outer flowers usually growing out in a discoloured leaf or leaf-like appendage.

O O O Ovary usually 5-6-, rarely 2-3-celled. Corolla-lobes valvate.

ADENOSACME.—Calyx 5-4-cleft. Corolla-throat naked. Flowers in terminal or almost terminal rarely lateral cymes or corymbs.

UROPHYLLUM.—Calyx entire or minutely toothed. Corolla-throat bearded. Flowers in axillary clusters or cymes.

Trib. II. Cinchonaceae. Fruit a more or less dry capsule, variously dehiscing or rarely indehiscent [very rarely turning fleshy or a real berry, the seeds in these cases always winged or appendaged.] Ovary 2-or several-celled with several or a solitary ovule in each cell. Seeds winged or not. Leaves opposite with true interpetiolar stipules.

* Ovary-cells 2-4, many (or in *Cephalanthus* 1-) ovuled. Capsules variously dehiscing, dry (or rarely fleshy and berry-like and indehiscent). Seeds more or less winged or appendaged.

O Flowers in dense heads. Fruit a berry or berry-like drupe, indehiscent, usually closely packed on a thickened receptacle and syncarpous. Ovary 2- or more-celled with a solitary erect, or numerous pendulous ovules.

× Ovules and seeds numerous in each cell, imbricate, suspended.

PSILOBIUM.—Berries long and pod-like, not connate. Seeds appendaged.

× × Ovules and seeds solitary in each cell, erect.

MORINDA.—Berries often connate and syncarpous, rarely free.

O O Flowers collected in a more or less dense head round a thickened receptacle. Capsules dehiscing from the base or otherwise, dry, or rarely (in *Sarcocephalus*) baccate.

× Capsules berry-like, dehiscing from the base.

SARCOCEPHALUS.—Berry-like capsules 2-celled, or augmented with 2 superposed sterile cells, collected in a syncarp.

× × Capsules dry, dehiscing loculicidally or septicidally into 2 or 4 many- or rarely 1-seeded cocci.

† Capsules dehiscing into 2 many-seeded cocci. Corolla- and calyx-lobes without interjected teeth in their sinuses.

NAUCLEA.—Flowers without floral bracteoles. Trees or shrubs.

STEPHEGYNE.—Flowers surrounded by angular-clavate bracteoles. Trees.

† † Capsules 2-4-celled, with a solitary seed in each cell. Calyx- and corolla-lobes bearing a minute tooth in their sinuses.

CEPHALANTHUS.—Flowers 4-merous, surrounded by linear-clavate bracteoles. Small trees or shrubs.

† † † Capsules 2-celled, opening by longitudinal slits. Hook-climbers.

UNCARIA.—Flowers sessile or pedicelled, without bracteoles

O O O Flowers in loose inflorescences, never in heads. Capsules 2-celled, septicidally dehiscing into 2 valves, or opening at apex by 4 valves.

† Capsule septicidally dehiscing into 2 woody valves.

HYMENODICTYON.—Trees.

† † Capsule opening at apex by 4 valves.

HYMENOPOGON.—Epiphytical shrubs.

* * Ovary-cells 2-4, 1- or more-celled. Capsules variously dehiscing at apex or along their whole length, or separating into 2 or 4 cocci, rarely indehiscent. Seeds never winged or appendaged, numerous or solitary. (Ovules and seeds several or numerous in each cell, laterally attached.)

WENDLANDIA.—Corolla imbricate-twisted, tubular. Capsules opening at top by 2 valves. Trees or shrubs.

IXORA.

* *Flowers 5-merous. Panicles long-peduncled.*

Leaves membranous, glabrous, ... *I. Helferi.*

Leaves almost coriaceous, more or less shortly pubescent beneath, ... *I. longifolia.*

* * *Flowers 4-merous; the style exserted to the same or nearly the same length of the tube, the stigma simple and thick, spindle-like.*

O *Corolla-tube only 3 lin. long; flowers sessile or nearly so.*

Glabrous, turning black in drying; flowers in a dense head, ... *I. compactiflora.*

O O *Corolla-tube* $\frac{1}{2}$-$\frac{3}{4}$ *in. long; flowers pedicelled.*

All parts and inflorescences glabrous, not turning black in drying, ... *I. Pavetta.*

All parts more or less puberulous to tomentose, in drying usually turning black; inflorescence shortly puberulous, ... *I. tomentosa.*

All parts villous-pubescent, in drying not turning black; inflorescence villous from spreading hairs, ... *I. naucleiflora.*

* * * *Flowers 4-merous, the style shorter or longer exserted, never exceeding the tube by more than* $\frac{1}{2}$-$\frac{2}{3}$ *of its length; stigmatic lobes usually spreading, rarely longer cohering. (Flowers white.)*

O *Panicle thyrsoid, brachiate-trichotomous, more or less long-peduncled.*

× *Panicle without sessile floral leaves at or above the base of the peduncle.*

All parts glabrous; flowers sessile; corolla-tube only 2-2$\frac{1}{2}$ lin. long; style hairy, *I. parviflora.*

× × *Panicle furnished with a pair of sessile more or less cordate or oval floral leaves at or above the base of the peduncle. (Throat of corolla naked.)*

Leaves coriaceous, pale beneath ; panicle puberulous ; flowers sessile, ...*I. spectabilis*
Leaves thin, in drying turning black ; panicle glabrous ; pedicels 1-2 lin-long, ...*I. nigricans*

O O *Trichotomous corymbs short-peduncled or sessile, so as to make them appearing to consist of 3 or more terminal peduncled cymes. Flowers and fruits, as in true Pavetta, conspicuously (1-3 lin.) pedicelled.*

† *Leaves tapering or acute at base, on a ½ to 1 in. long petiole.*

Leaves uniformly green ; corolla-tube 4 lin. long,...............................*I. coriacea.*

† † *Leaves sessile or nearly so, with a rounded or cordate base.*

Glabrous ; corymbs on a 1-1½ inch long peduncle, ...*I. brunnescens.*

O O O *Cymes or corymbs small, short-peduncled or sessile.*

Flowers sessile ; leaves petioled with acute or obtuse base ; cyme puberulous, ...*I. rugosula.*

COFFEA.

× *All parts glabrous and glossy. Berries peduncled.*

Flowers in axillary clusters, on very short pedicels,...........................*C. Arabica.*
Flowers usually terminal, rarely axillary, on ½ to 1 inch long pedicels, ...*C. tetrandra.*

× × *Young shoots and nerves beneath sparingly pubescent. Berries sessile.*

Flowers terminal and axillary, sessile, ...*C. Benghalensis.*

VANGUERIA.

× *Unarmed.*

All parts glabrous ; stigma mitre-shaped, ...*V. edulis.*

× × *Armed with opposite sharp spines.*

All parts and also the corolla glabrous ; berries about an inch thick, ...*V. spinosa.*
All softer parts and also the corolla pubescent ; berries up to ½ inch in diameter, *V. pubescens.*

CANTHIUM.

* *Unarmed.*

O *Pyrenes quite smooth, 3-angular and almost keeled.*

All parts quite glabrous ; flowers in dichotomous elongate-branched cymes,......*C. glabrum.*

O O *Pyrenes more or less wrinkled and tubercled, rounded on back.*

All parts glabrous and glossy ; flowers cymose, ...*C. didymum.*
Branchlets and nerves beneath pubescent ; flowers on capillary pedicels, solitary or by pairs, ...*C. gracilipes.*

* * *Armed with opposite or rarely sharp spines usually decussately crossed. Pyrenes more or less wrinkled or tubercled, rounded on back.*

O *Branchlets more or less rusty or tawny pubescent.*

Leaves pubescent on both sides or hispid above ; drupes the size of a pea, ...*C. parvifolium.*
Leaves glabrous or the midrib beneath slightly pubescent; drupes the size of a small cherry, ...*C. horridum.*

O O *All parts perfectly glabrous.*

Leaves glossy, caudate-acuminate ; flowers clustered, ...*C. angustifolium.*
Leaves more or less blunt ; flowers in peduncled cymes,...................*C. parviflorum.*

SCYPHIPHORA.—Only species, ...*S. hydrophyllacea.*

GUETTARDA.—Only species, ...*G. speciosa.*

POLYPHRAGMON.—Only species,.......................................*P. sericeum.*

GARDENIA.

* *Randia-looking trees or shrubs, armed with opposite sharp thorns (abortive branchlets). Stipules free, very deciduous. Flowers small.*

× *All parts and leaves glabrous. Calyx-lobes herbaceous or leafy.*

Leaves more or less lanceolate ; flowers pedicelled, by 3 or more in clusters ; calyx about 2 lin. long,..*G. campanulata.*

× × *All parts more or less pubescent, villous or tomentose.*

O *Fertile flowers sessile, the hermaphrodite-sterile ones in cymes. Calyx-lobes herbaceous or leafy.*

Bark grey ; fertile and sterile flowers on the same plant ; berries plumply beaked, terete,..*G. sessiliflora.*

Bark red ; fertile and sterile flowers usually on separate plants ; berries not beaked, slightly ribbed, ... *G. erythroclada*,

O O *All flowers fertile, or at least perfectly hermaphrodite. Calyx truncate or minutely toothed.*

Calyx minutely pubescent ; berry roughish, glabrous ; bark red,........................ *G. turgida*.
Calyx and berry glabrous ; bark white, ... *G. cuneata*.
Calyx velvety-tomentose ; berry the size of small apple covered with a brown dense velvety tomentum, ... *G. dasycarpa*.

* * *Unarmed ; stipules more or less connate in a sort of sheath. Flowers showy, hypocraterimorph, with a long tube. Calyx various.*

O *Berries and flowers sessile or nearly so.*

Leaves almost sessile, scabrous ; berries globular, in the forks of the branchings, *G. obtusifolia*.

O O *Berries and flowers on short (3-5 lin-long) pedicels.*

Leaves glabrous, with a tuft of hair in the nerve-axils beneath ; calyx deeply 5-cleft ; berry oblong, terete, ... *G. resinifera*.
Leaves glabrous ; calyx laterally cleft and more or less spathaceous ; berry oblong, more or less distinctly ribbed, ... *G. coronaria*.

* * * *Unarmed. Stipules connate or almost free. Corolla campanulate-funnel-shaped with a ventricose inflated tube. Leaves glossy.*

Leaves coriaceous, with a gland in the nerve-axils beneath ; flowers large and showy, ... *G. pulcherrima*.

RANDIA.

Leaves large and glossy, smooth ; corolla almost rotate, about 2 in. in diameter ; berries large, sessile, ... *R. uliginosa*.
Leaves small, often more or less sparingly hirsute ; corolla less than 4 lin. in diameter, with a white tube ; berries sessile,.. *R. longispina*.

WEBERA.

× *Cymes or corymbs leaf-opposed.*

All parts except the inflorescence glabrous, ... *W. oppositifolia*.

× × *Cymes terminal or in the forks of the branchings.*

All parts, also the inflorescence, quite glabrous, ... *W. Asiatica*.
Inflorescence pubescent,.. *W. glomeriflora*.

DIPLOSPORA.—Only species,.. *D. singularis*.

HYPOBATHRUM.

* *Flowers 4-merous. Berry stalked.*

Only species, ... *H. racemosum*.

* * *Flowers 5-merous. Berry sessile.*

Only species, ... *H. strictum*.

MUSSAENDA.

* *Calyx-limb deciduous, leaving an annular disk at the top of berry.*

O *Calyx-teeth ½-1 lin. long.*

Calyx-teeth erect, lanceolate ; branchlets puberulous or velvety, ... *M. glabra*.
Calyx-teeth as in former but reflexed ; branchlets hirsute,........................ *M. variolosa*.

O O *Calyx from 2 to 6 lin. long.*

Calyx-lobes linear, 2-3 lin. long ; corolla-lobes nearly half as long as the corolla-tube, ... *M. macrophylla*.
Calyx-lobes lanceolate, about ½ inch long ; corolla-lobes about ¼ so long as the corolla-tube, ... *M. calycina*.

* * *Calyx-limbs persistent, crowning the berry.*

Calyx-teeth linear-subulate, about 4 lin. long ; corymbs rather compact, ... *M. corymbosa*.

UROPHYLLUM.

* *Ovary and berries 5-6-celled. Flowers in shorter or longer simple or decompound umbellets or cymes.*

Leaves and shoots glabrous ; calyx about 2 lin. wide, ... *U. glabrum*.
Leaves beneath and shoots more or less pubescent ; calyx a line wide, ... *U. strigosum*.

* * *Ovary and berry 2-celled. Flowers minute, in sessile clusters.*

All parts glabrous,.. *U. biloculare*.

PSILOBIUM.—Only species, ...P. *capillare.*

MORINDA.

* *Corolla-limb 5-rarely 6-lobed. Stamens as many. Erect shrubs or trees.*

O *Stamens exserted.*

All parts glabrous; flower-heads on short leaf-opposed peduncles, ...*M. exserta.*

O O *Stamens included in the tube.*

× *All parts more or less tomentose or pubescent.*

All parts shortly and scabrously pubescent; corolla glabrous, ...*M. leiantha.*
All parts, also the corolla, softly and shortly tomentose, ...*M. tomentosa.*

× × *All parts, also the corolla, glabrous.*

† *Flower-heads longer or shorter peduncled, solitary and leaf-opposed.*

Stipules rounded or blunt; corolla-throat hairy; berries connate, whitish, ...*M. citrifolia.*
Stipules acute or acuminate; corolla-throat smooth; berries purplish-black, only few developed on the thick torus,..*M. angustifolia.*

† † *Flower-heads sessile or nearly so, leaf-opposed.*

Low shrub, quite glabrous or minutely scabrous, ...*M. persicaefolia.*

† † † *Flower-heads in a peduncled terminal cyme.*

Corolla-tube only ¼ inch-long, lobes as long, ...*M. Wallichii.*

* * *Corolla-limb 4-parted. Stamens 4. Scandent shrubs.*

O *Calyx truncate.*

Flower-heads peduncled, in terminal umbels; peduncles sparingly pubescent, other parts glabrous, ...*M. umbellata.*

O O *Calyx 4-toothed. All parts glabrous.*

Calyx sulcate; flower-heads by 3 in a peduncled terminal brachiate cyme, ...*M. speciosa.*

SARCOCEPHALUS.

* *Capsules connate, 2-celled throughout their length.*

All parts glabrous; young branchlets pruinous; leaves more or less acuminate,...*S. Cadamba.*

* * *Capsules not connate, spuriously 4-celled the 2 lower cells fertile with numerous winged seeds, the 2 spurious superposed cells sterile.*

Young shoot glabrous or pubescent; leaves more or less blunt, ...*S. cordatus.*

NAUCLEA.

* *Flower-heads small, panicled.*

All parts glabrous; leaves petioled, ...*N. polycephala.*

* * *Flower-heads solitary or by 3, terminal.*

× *All parts glabrous, at least the leaves.*

Leaves on a ½-1 inch long petiole, acuminate; flower-heads often by threes, ...*N. excelsa.*
Leaves almost sessile, blunt; flower-heads solitary, ...*N. sessilifolia.*

× × *All parts more or less pubescent.*

Leaves cordate, petioled; flower-heads by 1-3, axillary, ...*N. cordifolia.*

STEPHEGYNE.

O *Petioles very slender and thin; leaves thin membranous, acute at base.*

Bracteoles only half so long as the calyx; corolla-lobes about ¼ the length of the corolla-tube flower-heads more constantly solitary between 2 floral leaves, ...*N. parvifolia.*
Bracteoles as long as the calyx; corolla-lobes about ½ the length of the tube; floral leaves very deciduous and the flower-heads in dichotomous divaricate panicles, ... *S. diversifolia.*

O O *Petioles very thick and pubescent; leaves large, cordate at base.*

Flower-heads dichotomously panicled; leaves rugate above; corolla-lobes as long as the short tube,..*S. rotundifolia.*

CEPHALANTHUS.—Only species,...*C. naucleoides.*

HYMENODICTYON.—Only species, ...*H. thyrsiflorum.*

WENDLANDIA.

* *Flowers 5-merous sessile or shortly pedicelled, in short spickelets, racemes or clusters, forming a thyrsoid panicle.*

× *Calyx-teeth short, triangular-acute.*

All parts and leaves on both sides harshly and shortly pubescent, ... *W. scabra.*
Leaves more or less shortly pubescent beneath or almost glabrous ; panicles pubescent or tomentose,.. *W. tinctoria*
All parts, also the panicle, quite glabrous ; flowers minutely pedicelled,........ *W. glabrata*

× × *Calyx-teeth subulate acuminate, as long or longer than calyx-tube.*

Leaves coriaceous, glabrous,... *W. ligustrina.*
Leaves lanceolate, membranous, along the rib beneath appressed pubescent,... *W. glomerulata.*

* * *Flowers 4- or 5-merous, in one-sided spikes, forming a divaricate corymbose panicle.*

All parts glabrous ; flowers 5- and 4-merous, ... *W. secunda.*
All parts more or less tawny pubescent, flowers 4-merous,..................... *W. corymbosa.*

COMPOSITÆ.

Conspectus of genera.

* Flower-heads homogamous, discoid, the florets all tubular, hermaphrodite, regular or nearly so. Anthers usually fringed or tailed at base. Style usually slightly thickened at the base of the narrow and blunt or slightly pointed often erect branches.

LEUCOMERIS.—Pappus long, capillary. Involucre scarious, simple.

* * Flower-heads homogamous, discoid, the florets all tubular, hermaphrodite, regular or nearly so. Anthers usually obtuse at base, without tails. Style-branches subulate and acute, not swollen at the base.

VERNONIA.—Involucre ovoid, without leafy bracts. Pappus of capillary bristles with a few, or a ring of, short ones outside.

* * * Flower-heads either heterogamous or dioecious, the female florets ligulate or filiform, the hermaphrodite or males tubular. Anthers various. Style-branches in the hermaphrodite florets usually more or less flattened, produced beyond the stigmatic lines into tips or appendages, papillose on the outside.

CONYZA.—Female florets filiform. Pappus of simple capillary bristles. Anthers without tails.
BLUMEA.—As former, but anthers with fine tails. Involucral bracts herbaceous or soft. Style of the disk-florets branched.
PLUCHEA.—Anthers with fine tails. Involucral-bracts rigid. Style of disk-florets simple.

LEUCOMERIS.
Leaves membranous, glabrous, flower-heads on densely scaled very short peduncles, *L. decora.*
VERNONIA.
Tawny-puberulous; petioles long and slender ; pappus brownish white, ... *V. arborea.*
Greyish-pubescent ; petioles short and thick ; pappus pure white, ... *V. volkameriaefolia.*
BLUMEA.
All parts appressed silky-pubescent ; flowers yellow, ... *B. balsamifera.*

CAMPANULACEÆ.

Conspectus of genera.

SCAEVOLA.—Corolla irregular, 1-or 2-lipped, posteriorly split to the base. Anthers free. Ovary 1- or 2-celled.

SCAEVOLA.—Only species, ... *S. Koenigii.*

ERICACEÆ.

Conspectus of genera.

* Ovary inferior ; fruit indehiscent, succulent.

VACCINIUM.—Calyx 4-5-toothed or-lobed or-cleft. Corolla tubular, campanulate or urceolate. Anther-cells produced in a shorter or longer tube. Ovary-cells as many as corolla-lobes.

* * Ovary capsule dry, loculicidally opening superior.

ANDROMEDA.—Corolla globular- to tubular-urceolate with a 5-toothed reflexed limb. Stamens 10, enclosed, the anthers shortly one-awned. Stigma truncate. Calyx dry in fruit.
GAULTHERIA.—Calyx 2-bracted at base. Corolla ovate-urceolate, with a 5-cleft revolute limb. Stamens 10, the anthers 2-cleft, the cells terminating in 2 awns. Hypogynous scales 10, usually united at base. Calyx fleshy and berry-like.

× × Capsule dry, septicidally opening.

RHODODENDRON.—Corolla funnel- or bell-shaped, 5-cleft. Stamens 5 or 10, declinate ; anthers opening by terminal pores. Hypogynous disk nectariferous.

VACCINIUM.

All parts glabrous; racemes axillary, along with the corolla, calyx etc., glabrous, *V. Donianum.*
Young shoots and racemes, sometimes also the calyces, pubescent; corolla glabrous, ... *V. exaristatum.*

ANDROMEDA.—Only species, ... *A. ovalifolia.*

GAULTHERIA.—Only species, ... *G. punctata.*

RHODODENDRON.

O *Leaves shortly appressed tomentose or lepidote beneath. Calyx inconspicuous.*

Leaves silvery and shortly tomentose beneath. Ovary rusty puberulous; bracts of leaf-buds villous; tree, ... *R. arboreum.*
Leaves rusty lepidote beneath; ovary and style rusty lepidote; bracts of leaf-buds only silky ciliate; shrub, ... *R. formosum.*

O O *Leaves glabrous and smooth.*

Ovary and style quite glabrous; bracts of leaf-buds minutely ciliate, ... *R. Moulmeinense.*

PLUMBAGINEÆ.

Conspectus of genera.

Aegialitis.—Styles free, glabrous, the stigmas capitate. Petals coriaceous, articulate above the connate base. Fruit narrow and elongate, exserted. Seeds without albumen.

AEGIALITIS.—Only species, ... *A. annulata.*

MYRSINEACEÆ.

Conspectus of genera.

* Fruit an indehiscent berry or drupe. Seeds with albumen.
O Ovary inferior or nearly so, at least in fruit.
Maesa.—Corolla bell-shaped or nearly so. Drupe crowned by the calyx-limb, globular..
O O Ovary superior. Drupes globular.
× Anther-cells opening by longitudinal slits, not chambered.
Embelia.—Corolla consisting of 5 or 4 free petals. Anthers as long or shorter than the filaments. Ovules few. Flowers racemose-or spicate-panicled.
Myrsine.—Corolla gamopetalous, more or less deeply divided into 4 or 5 lobes. Anthers longer than the filaments. Ovules few. Flowers in sessile clusters or umbels.
Ardisia.—Corolla gamopetalous, usually rotate. Anthers longer than the filaments, free. Ovules numerous.
× × Anther-cells transversely chambered inside.
Climacandra.—Characters and habit of Ardisia; anthers cohering in a cone.
** Anther-cells transversely chambered. Fruit a dry cylindrical follicle-like curved drupe, irregularly rupturing. Seed elongate, germinating while still enclosed in the pericarp. No albumen.
Aegiceras.—Only genus.

MAESA.

(*Inflorescence and all other parts quite glabrous.*)

|| *Inflorescence hardly so long as the petiole.*

Leaves inconspicuously and remotely callose-toothed; branchlets verrucose, ... *M. verrucosa.*

|| || *Inflorescence very much longer than the petioles.*

Leaves entire; compound racemes shorter than the leaves, ... *M. ramentacea.*
Leaves coarsely serrate; racemes as in former; calyx only $\frac{1}{3}$ lin. long, ... *M. Indica.*

MYRSINE.

Leaves serrate-toothed, the nerves prominent beneath; stigma 3-lobed, the lobes large and fringed, ... *M. semiserrata.*
Leaves entire, nerves thin or almost invisible, stigma simple capitate or obscurely 2-lobed, ... *M. avenis.*

ARDISIA.

O *Flower in compound terminal panicles, or the same accompanied by smaller ones in the axils of the upper-leaves.*

Leaves rather chartaceous, not decurrent, the nerves almost horizontally diverging, numerous; panicles slightly puberulous; pedicels 1-2 lin. long; peduncles compressed, ... *A. anceps.*

O O *Flowers in axillary more or less umbel-like peduncled or sessile racemes, rarely the racemes spuriously terminal ; i. e. arising from the summit of the branchlets beside the leaf.*

Glabrous ; inflorescence robust ; calyx-lobes rounded, 2 lin. long ; corolla-lobes 4 lin. long, ... *A. humilis.*

AEGICERAS.—Only species, ... *A. corniculata.*

SAPOTACEÆ.

Conspectus of genera.

* Calyx-and corolla-lobes of the same number.

CHYSOPHYLLUM.—Flowers 5-8-merous. Stamens as many. Staminodes none. Ovary-cells as many as calyx-lobes.

SIDEROXYLON.—Flowers 5-merous. Stamens 5. Staminodes 5. Ovary-cells 5, or by abortion fewer.

ACHRAS.—Flowers 6-merous. Stamens 6. Staminodes 6. Ovary-cells twice as many as calyx-lobes.

ISONANDRA.—Flowers 4-or 6-merous. Stamens twice as many as lobes, in a single row. Ovary-cells as many as calyx-lobes.

* * Calyx-and corolla-lobes of unequal number, the latter usually a multiple of the calyx-lobos.

O Ovary-cells twice as many as calyx-lobes.

BASSIA.—Calyx-lobes 4 or 6. Corolla-lobes 8-14. Stamens about 2 or 3 times as many as corolla-lobes, in 1-3 rows. No staminodes.

O O Ovary-cells as many as calyx-lobes.

PAYENA.—Calyx-lobes 4 or 6. Corolla-lobes 8 or 12. Stamens twice as many as corolla-lobes, in 2 rows. No staminodes.

MIMUSOPS.—Calyx-lobes 6 or 8; corolla-lobes 2 or 3 times as many as calyx-lobes. Stamens 6 or 8. Staminodes as many.

CHRYSOPHYLLUM.—Only species, ... *Ch. Roxburghii.*

ACHRAS.—Only species, ... *A. Sapota.*

SIDEROXYLON.

* *Calyx-lobes acuminate or acute. Young shoots and leaves beneath more or less villous-tomentose.*

Unarmed or armed ; calyx-lobes acuminate, ... *S. tomentosum.*

* * *Calyx-lobes rounded or blunt.*

Glabrous ; leaves chartaceous,.. *S. grandifolium.*

Younger parts coppery or rusty silky-hairy ; leaves coriaceous, ... *S. attenuatum.*

ISONANDRA.

* *Calyx 4-lobed, the lobes decussate.*

Leaves chartaceous, strongly nerved, ... *J. coloneura.*

* * *Calyx 6-parted, the 3 outer lobes valvate.*

Leaves coriaceous, with obsolete nerves, glaucous beneath ; filaments as long as the anthers, densely villous, ... *J. polyantha.*

Leaves coriaceous, with strong parallel nerves, glaucous beneath ; filaments long and slender, glabrous, ... *J. obovata.*

BASSIA.

O *Anthers aristate, enclosed.*

Corolla-lobes only ⅓ so long as the tube ; anthers on very short filaments or almost sessile, in 3 rows, Berries obovate-oblong, ... *B. latifolia.*

Corolla-lobes as long as the tube ; anthers almost sessile, in 2 rows,.................. *B. villosa.*

O O *Anthers blunt, exserted.*

Corolla-lobes as long as the tube ; anthers on long slender filaments, in a single row at the throat ; berries ovate, acuminate,.. *B. butyracea.*

PAYENA.

* *Calyx 6-parted ; corolla-lobes and stamens twice as many as calyx-lobes.*

Filaments very short, villous ; anthers glabrous, mucronate-acuminate. .... *P. Griffithii.*

* * *Calyx 4-parted ; corolla-lobes and stamens twice as many. (Anthers glabrous.)*

Connective produced in a broad blunt beak ; sepals blunt or nearly so ; nerves somewhat irregular ; petioles about ¼-½ inch long, ... *P. lucida.*

Connective terminating in a bristle ; sepals acute ; nerves thin, parallel ; petioles about an inch long, slender, ... *P. paralleloneura.*

MIMUSOPS.

Leaves rounded or retuse at apex; flowers solitary, small; berries large, depressed globular, ... *M. Indica.*

Leaves bluntish acuminate or apiculate; flowers clustered, conspicuous; anthers very acuminate; berries oval, ... *M. Elengi.*

EBENACEÆ.

Conspectus of genera.

GUNISANTHUS.—Calyx 4-parted to nearly the base. Corolla 4-lobed. Ovary-cells as many as corolla-lobes. Male and female flowers all solitary.

DIOSPYROS. Calyx 4-6 toothed or-lobed. Corolla-lobes 4 to 6. Ovary-cells twice as many as lobes, with a solitary ovule in each cell. Male flowers clustered or cymose, the females solitary.

MABA.—Calyx-and corolla-lobes 3. Ovary-cells as many, with 2 ovules in each cell.

GUNISANTHUS.

Not flowering branchlets sparingly pubescent, along with the leaves glabrescent; calyx-tube doubly shorter than the corolla-lobes, ... *G. pilosulus.*

Not flowering branchlets densely villous, leaves permanently softly pubescent beneath; calyx tube a little shorter than the corolla-lobes, ... *G. mollis.*

DIOSPYROS.

* *Calyx in bud globular and closed, the lobes connate, afterwards irregularly bursting into 2 or 3 lobes. Corolla tubular, 5-lobed. Stamens 16 or more.*

Glabrous; leaves coriaceous and elegantly net-veined; flowers conspicuous, about 4 lin. long, very coriaceous, ... *D. Toposia.*

* * *Calyx in males short and truncate-toothed, in females large, deeply lobed. Corolla urceolate, the lobes notched. Anthers 30-50.*

Glabrous; leaves coriaceous, ... *D. Embryopteris.*

* * * *Calyx toothed or lobed. Corolla-lobes not notched; anthers about 20 or fewer.*

O *Corolla urceolate, in bud short, globular or conical, the tube short and swollen, the lobes usually rounded and short.*

× *Flower-buds globular. Corolla quite glabrous. Flowers small, hardly a line long.*

Leaves thin chartaceous, with strong prominent nerves, the net-veination distinct, lax; ovary glabrous, ... *D. chartacea.*

Leaves thin coriaceous, the nerves strong, the net-veination inconspicuous; ovary tawny-villous, ... *D. ehretioides.*

× × *Flower-buds conical, acute, but never elongate.*

† *Leaves, at least while young, more or less puberulous or pubescent.*

Flowers about 3-4 lin. long, in short bracted cymes; leaves tapering at base, pubescent (at least beneath), ... *D. Kaki.*

Flowers 1-2 lin. long; peduncles thin and slender; leaves rounded or cordate at base, densely puberulous at least beneath, ... *D. cordifolia.*

† † *Leaves quite glabrous and glossy.*

Leaves drying blackish the nerves thin but prominent; peduncles ½ to a line long, few-flowered axillary, ... *D. Kurzii.*

Leaves not drying blackish, the nerves and veination thin but conspicuous; flowers very shortly pedicelled, clustered from the older branches, ... *D. ramiflora.*

Leaves in a dried state glaucous green, almost polished and the nerves very inconspicuous and impressed, without net-veination; peduncles 4 to 5 lin. long few-flowered, axillary, ... *D. oleifolia.*

O O *Corolla hypocraterimorph, in bud elongate, very seldom short (in D. Birmanica), the tube not or almost not widened, the lobes as long or nearly as long as the tube.*

× *Calyx-lobes at least at their bases, with their borders reflexed or revolute and, therefore, often appearing somewhat auricled.*

‖ *Flowers 5-merous, along with the short peduncles tawny tomentose; leaves coriaceous, afterwards shortly pubescent beneath; berry globular,* .... *D. Birmanica.*

‖ ‖ *Flowers 4-merous, 4-angular in bud. Leaves glabrous.*

Peduncles long, the cymes often compound; leaves with obsolete net-veination; berries globular, ... *D. densiflora.*
Flowers short-peduncled, clustered; leaves indistinctly net-veined; berries elliptical, *D. flavicans.*
Flowers sessile or nearly so; leaves with lax but distinct net-veination; berries globular, rusty-pubescent, ... *D. undulata.*
As former, but ovary glabrous, ... *D. sapotoides.*

+ + *Calyx-lobes plain, i. e. the borders not reflexed nor revolute.*

† *All parts except the very young shoots quite glabrous. Flowers almost sessile.*

Flowers rusty tomentose; calyx short, with acute lobes; leaves strongly net-veined; berries tawny-tomentose; corolla 4-gonous in bud, ... *D. lanceaefolia.*
Male calyx campanulate, with rounded short lobes, tomentose; leaves strongly net-veined (berries rusty tomentose); corolla terete in bud, ... *D. pyrrhocarpa.*
Calyx ample, puberulous, with rounded lobes; male cymes very short and robust; leaves strongly net-veined; (berries glabrous?) corolla terete in bud, ... *D. variegata.*

† † *All parts, especially the leaves, more or less pubescent or otherwise hairy. Male flowers in cymes. Berries glabrous.*

Leaves not cordate, softly pubescent beneath; calyx lobes and bracts acute; flowers 4-merous, ... *D. stricta.*
Leaves not cordate, when full grown almost glabrous and chartaceous; calyx-lobes linear-lanceolate; cymes branched, arising from the stem or older branches; flowers 5-merous, ... *D. Brandisiana.*
Leaves with cordate base, softly pubescent, calyx-lobes and bracts rounded; cymes short, robust; flowers 4-merous, ... *D. dasyphylla.*

MABA.

Ovary glabrous, 6-celled, ... *M. Merguensis.*
Ovary densely pubescent, 3-celled, ... *M. buxifolia.*

STYRACEÆ.

Conspectus of genera.

* Calyx tubular with a truncate or minutely toothed border, somewhat enlarging and enclosing the fruit halfways. Corolla usually somewhat twisted or almost valvate in the bud. Anthers elongate-linear. Drupe dry, opening sometimes in valves.

STYRAX.—Only genus.

* * Calyx wholly or nearly wholly adnate to the ovary. Corolla-lobes imbricate in the bud. Anthers oval, short. Fruit a more or less succulent drupe.

SYMPLOCOS.—Only genus.

STYRAX.

× *All parts more or less tomentose, the underside of the leaves particularly so.*

Leaves white-tomentose beneath; calyx spathaceous-slit, conspicuously subulate-toothed, ... *S. rugosum.*

× × *Younger parts more or less tomentose; leaves sparingly and minutely stellate-puberulous, glabrescent and green.*

Calyx 5- or 6-toothed; corolla-lobes narrow-oblong, about 4 lin. long; leaves serrulate, ... *S. serrulatum.*
Calyx truncate and minutely toothed; corolla-lobes ovate, nearly ¾ inch long; leaves remotely and minutely toothed, ... *S. virgatum.*

SYMPLOCOS.

* *Ovary 3-celled. Drupes oblong or elliptical, 3-celled. Embryo straight.*

Glabrous; flowers sessile, in compound puberulous spikes; drupes terete, ... *S. lucida.*
Young shoots more or less pubescent; flowers shortly pedicelled, in simple or branched villous-tomentose racemes; drupes terete, ... *S. racemosa.*
Young shoots more or less rusty-pubescent; flowers sessile or nearly so, in simple tomentose spikes; drupes sulcate-ribbed, ... *S. sulcata.*

* * *Ovary 2-rarely 3-celled. Drupes ovoid with contracted top or turbinate, by abortion usually 1-seeded, the mass of the endocarp often protruding inwards so as to cause the seed turning more or less horseshoe-shaped. Embryo curved.*

O *Flowers sessile, in simple or compound spikes; stamens in 2 or more series.*

Young shoots, spikes and leaves beneath more or less rusty pubescent or tomentose; drupes turbinate, ribbed, ... *S. Javanica.*

Glabrous ; drupes turbinate, torulose-ribbed ; spikes glabrous,..................S. *spicata.*
Glabrous ; drupes ovoid-turbinate, terete ; spikes glabrous,..................S. *polycarpa.*

O O *Flowers pedicelled, in simple or compound racemes ; stamens in 2 or more series.*

Glabrous ; drupes ovoid-turbinate, terete ; racemes compound, minutely appressed-pubescent, robust, ...S. *pedicellata.*
Glabrous ; leaves caudate-acuminate; drupes ovoid-turbinate, terete ; racemes simple, slender, pubescent, ...S. *caudata,*
Glabrous ; petioles and rib beneath sparingly hairy ; racemes quite glabrous, slender, ...S. *leiostachya.*

O O O *Flowers white, pedicelled, in racemes or poor panicles. Stamens collected in 5 bundles.*

Racemes appressed pubescent, forming slender panicles at the ends of the young pubescent branchlets ; pedicels long, filiform, ...S. *crataegoides.*
Racemes short, shortly tomentose ; pedicels very short and thick, ...S. *leucantha.*

JASMINEÆ.

Conspectus of genera.

* Corolla-limb 5-12-lobed. Ovules erect. Stamens 2.

× Fruit a 2- or by abortion 1-lobed drupe.

JASMINUM.—Corolla twisted in bud. Albumen none.

× × Capsule dry, compressed.

NYCTANTHES.—Corolla twisted in the bud. Albumen none.

* * Corolla 4-lobed, rarely 6-8-cleft or wanting, with or without a tube. Stamens 2, situated between a pair of corolla-lobes. Ovules pendulous.

× Fruit drupaceous or berry-like. Corolla-lobes valvate or nearly so.

CHIONANTHUS.—Ovary 2-celled, with 2 ovules in each cell. Albumen none.
OLEA.—Ovary 2-celled, with 2 ovules in each cell. Seeds albuminous. Flowers in axillary panicles.
LIGUSTRUM.—Ovary 2-celled with 2 ovules in each cell Seeds albuminous Flowers in terminal panicles.

× × Fruit a dry 2-valved capsule. Corolla-lobes twisted in bud.

SCHREBERA.—Ovary 2-celled, with 4 ovules in each cell. Corolla hypocraterimorph. Seeds winged. Albumen none. Leaves usually pinnate.

NYCTANTHES.—Only species,..N. *arbor tristis.*

CHIONANTHUS.

O *Leaves 3 to 6 in. long, veins visible between the strong lateral nerves.*

Nerves immersed on the upperside of the leaves ; panicles ample, leafy bracted, *Ch. ramiflora.*
Nerves prominent on both sides ; panicles rather small, with minute bracts, *Ch. macrophylla.*

O O *Leaves 6 to 10 in. long, without visible veins between the nerves.*

Leaves elongate-obovate-lanceolate ; petals linear, ...*Ch. insignis.*

OLEA.

× *Petals only a line or thereabouts long.*

Leaves rigidly coriaceous, the nerves immersed ; inflorescence puberulous, ...*O. dentata.*
Leaves thin coriaceous, the nerves prominent; inflorescence glabrous, ...*O. dioica.*

× × *Petals about 3 lin. long.*

Leaves without veins between the nerves, ...*O. terniflora.*

LIGUSTRUM.—Only species, ...*L. robustum.*

SCHREBERA.—Only species, ...*Sch. swietenioides.*

APOCYNEÆ.

Conspectus of genera.

* Seeds naked or narrowly winged, never comose, free or embedded in pulp. Anthers usually free.

O Fruit an indehiscent drupe.

× Throat of corolla furnished with scales.

THEVETIA.—Drupes unequally 2-celled. Seeds winged. Flowers large, yellow.

× × Throat of corolla without scales.

CERBERA.—Drupe large, by abortion solitary, woody-fibrous. Calyx-lobes free, reflexed.
OCHROSIA.—Drupes usually paired, fleshy-fibrous. Calyx gamosepalous, the teeth or lobes erect.

O O Fruit an indehiscent several- or many-seeded berry. Throat of corolla without scales.

CARISSA.—Corolla hairy within, berry 3- to 1-seeded, sappy. Style short. Seeds albuminous.

O O O Fruit a coriaceous more or less readily dehiscing follicle, solitary or paired. Throat of corolla without scales.

CALPICARPUM.—Follicle obliquely truncate, 1-seeded. No albumen. Seeds wingless.
PLUMERIA.—Follicle acuminate. Seeds membranously winged. Albumen none.
** Seeds furnished with a coma of hairs at the apex, hilum or both, rarely fringed all along the borders. Anthers usually cohering in a cone round the stigma. Fruit a woody or coriaceous follicle.
O Throat of corolla without scales.
× Seeds comose at apex only.
HOLARRHENA.—Corolla hypocraterimorph. Follicles linear, terete, woody. Albumen none.
× × Seeds comose at both ends and fringed.
ALSTONIA.—Follicles linear, terete, coriaceous. Albumen none. Leaves usually whorled.
O O Throat of corolla scaled at throat, the scales usually united in a corona.
× Anthers included.
NERIUM.—Hypogynous scales none. Seeds with albumen. Follicle coriaceous.
× × Anthers exserted.
WRIGHTIA.—Hypogynous scales none. Follicle woody.

THEVETIA.—Only species, ... *Th. neriifolia.*
CERBERA.—Only species, ... *C. Odallam.*
OCHROSIA.—Only species, ... *O. salubris.*
CARISSA.

O *All parts glabrous.*

Ovary-cells 4-ovuled ; berry the size of a prune ; leaves usually blunt or retuse, *C. Carandas.*
Ovary-cells 2-ovuled ; berry the size of a pea or somewhat larger ; leaves usually acute, ... *C. diffusa.*

O O *All parts, especially while young, shortly and softly puberulous.*

Ovary-cells 2-ovuled ; berry the size of a pea, ... *C. hirsuta.*
PLUMERIA.—Only species, ... *P. acutifolia.*
HOLARRHENA.
All parts along with the inflorescences shortly velvety pubescent, ... *H. Codaya.*
All parts, also the inflorescence, glabrous, ... *H. antidysenterica.*
ALSTONIA.—Only species, ... *A. scholaris.*
WRIGTHIA.

O *All parts, more especially the leaves, shortly and densely pubescent.*

Corolla-lobes broad ; scales of throat cuneate, 2-3-lobulate, ... *W. mollissima.*

O O *All parts glabrous.*

Corolla white, the lobes linear-oblong, the throat fringed by a ring of branched long filiform scales, ... *W. tinctoria.*
Corolla red, the lobes broad, scales of throat large, rounded, obsoletely crenate, .. *W. coccinea.*

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*LOGANIACEÆ.**

Conspectus of genera.

* Ovules numerous. Fruit a capsule. Seeds winged or not.
BUDDLEIA —Corolla imbricated. Capsule septicidally dehiscing. Seeds not winged.
* * Ovules numerous. Fruit an indehiscent berry.
O Corolla imbricate or twisted in bud.
FAGRAEA.—Corolla 5-rarely 6-or 7-lobed. Ovary 2 celled.
O O Corolla valvate in bud.
STRYCHNOS.—Stamens inserted above the middle of the corolla-tube. Ovary 2-celled.

BUDDLEIA.—Only species, ... *B. Asiatica.*
FAGRAEA.

O *Flowers large, more than an inch long, solitary or by 3 or 5 in a short-peduncled terminal corymb. Shrubs, often epiphytical or scandent, or arboreous climbers.*

† *Corolla-tube long-exserted, above the middle or at summit dilated into the limb,* .... *F. carnosa.*

† † *Corolla-tube short, or from the base funnel-shaped dilated.*

* I have kept up this family much against my will and I feel sure that it will be broken up by future botanists. Of the Burmese genera, *Buddleia* (along with *Brandisia* and *Wightia*) will go into Sesameae; *Fagraea*, usually compared with Gentianeae, appears to me an anomalous Convolvulacea with Apocynaceous ovary; *Mitreola*, *Mitrosacme* and *Gelsemium* appear Gentianaceous; *Strychnos* hardly deviates from Melodineae in Apocyneae; *Gardneria* is a Solanea; and *Gaertnera*, in spite of its curious ochreate stipules, finds its nearest ally in *Clerodendron*.

Calyx about an inch long or longer, the lateral nerves of leaves beneath distinct, but thin and immersed, ... *F. auricularia.*
Calyx only about ⅓ inch long, the nerves of the leaves beneath not or almost not visible, ... *F. obovata.*

O O *Flowers clustered in small cymes, forming a terminal peduncled raceme. Arboreous climbers.*

Leaves very ample, penninerved, ... *F. racemosa.*

O O O *Flowers small, in terminal or axillary long-peduncled many-flowered corymbs. Erect trees.*

Nerves of leaves beneath very obsolete and immersed, ... *F. fragrans.*

STRYCHNOS.—(Erect trees, without tendrils.)

O *Corolla not villous at throat, the tube long.*

Corymbs peduncled, terminal or on axillary shoots. Berries as large as an orange or smaller with a thick corky-granular rind, several-seeded, ... *S. Nux vomica.*

O O *Corolla villous at throat.*

Panicles very short, axillary ; corolla-tube about 2 lin. long ; berries 1-seeded, with a thin coriaceous rind, ... *S. potatorum.*
Panicles large, brachiate, terminal ; corolla-tube 4-5 lin. long, ... *S. Wallichiana*

BORRAGINEÆ.

Conspectus of genera.

(Fruit a drupe, indehiscent or separable into pyrenes.)
CORDIA.—Style twice forked ; calyx more or less tubular, forming a cup under the fruit.
EHRETIA.—Style 2-lobed, the lobes entire. Calyx deeply cleft.

CORDIA.

† *Leaves beneath and calyx densely tomentose.*

Calyx c. 4 lin-long ; fullgrown leaves smooth above and white dotted, ...*C. fragrantissima.*
Calyx c. 2½ lin. long ; leaves above very scabrous from short hairs, ... *C. polygama.*

† † *Leaves glabrous or pubescent beneath ; the calyx glabrous or puberulous.*

Glabrous; leaves without white dots on the upperside ; drupes from the size of a cherry to that of a prune, acuminate, ... *C. Myxa.*
As former, but young shoots brown-pubescent ; leaves puberulous beneath, ... *C. brunnea.*
Leaves white-dotted above ; drupe the size of a pea, blunt with a mucro, ... *C. grandis.*

EHRETIA.

× *Leaves entire.*

Leaves, especially beneath, pubescent, ... *E. aspera.*
Leaves glabrous, ... *E. laevis.*

× × *Leaves sharply serrate.*

Calyx- and corolla-lobes very blunt, ... *E. serrata.*

BIGNONIACEÆ.

Conspectus of genera.

* Seeds in a single row along the edges of the septum.

O Septum continuous, flat.

STENOLOBIUM.—Calyx more or less distinctly 5-ribbed and 5-toothed, marcescent-persistent. Leaves unpaired pinnate with serrately cut leaflets.

O O Septum more or less corky-medullary, jointed.

STEREOSPERMUM.—Calyx not ribbed, marcescent-persistent. Seeds spuriously 2-celled Leaves pinnate.

* * Seeds in 2 or more imbricated rows along the edges of the continuous septum.

O Calyx more or less circumsciss-deciduous.

× Leaves ternately bipinnate or decompound.

RADERMACHERA.—Calyx urceolate, obsoletely 5-toothed. Filaments inserted at the constriction of the tube. Anther-cells divaricate.

MAYODENDRON.—Calyx spathaceous, slit to about its middle. Filaments adnate up to the middle of the corolla ; anthers parallel.

× × Leaves unpaired-pinnate.

SPATHODEA.—Calyx spathaceous, slit to the base. Filaments inserted at the constriction of the tube ; anther-cells divaricate.

O O Calyx persistent or marcescent-persistent.

× Leaves unpaired-pinnate.

HETEROPHRAGMA.—Calyx 2-3-lobed, without ribs. Capsule rather flat, not winged.
PAYANELIA.—Calyx 5-winged, 5-toothed. Capsule flat, winged.

× × Leaves ternately 2-pinnate or decompound. Capsules flat.

CALOSANTHES.—Calyx truncate. Corolla campanulate-funnel shaped. Fertile stamens 5.
MILLINGTONIA.—Calyx obsoletely 5-toothed. Corolla hypocraterimorph. Fertile stamens 4, one of the anther-cells spurred.

STEREOSPERMUM.

× *All parts, also the inflorescences, quite glabrous.*

Flowers yellow, rather small ; septum of capsule terete, ...*S. chelonioides.*
Leaflets only about an inch long, serrulate ; septum of capsule compressed,.....*S. crenulatum.*

× × *Younger parts and inflorescences variously pubescent.*

Flowers pale-lilac or bluish white with dark-purple veins ; inflorescence and calyx simply pubescent, ...*S. neuranthum.*
Flowers 2-lipped, uniformly lilac or purple, the lobes crenulate-undulate ; inflorescence viscid-pubescent, ...*S. suaveolens.*
Flowers funnelshaped, uniformly pale-lilac, the lobes long—fimbriate ; inflorescence glandular-pubescent,..*S. fimbriatum.*

RADERMACHERA.—Only species, ...*R. amoena.*

MAYODENDRON.—Only species,..*M. igneum.*

SPATHODEA.

* *Corolla white, tubular-funnelshaped, gradually narrowed in the long tube. Seeds corky winged.*

All parts, also the calyx, glabrous, ...*S. Rheedei.*

* * *Corolla yellow or brownish yellow, campanulate-funnelshaped, abruptly constricted in a rather short tube. Seeds membranously winged.*

Leaves entire ; calyx and inflorescence generally tawny villous, ...*S. stipulata.*
Leaves serrulate ; calyx tawny velvety, ...*S. velutina.*

HETEROPHRAGMA.

Corolla funnelshaped, yellow ; pods rather flat, without ribs, villous-tomentose, ..*H. sulfurea.*
Corolla campanulate-infundibuliform, dull-brown ; pods rather cylindrical, ribbed, scurvy-tomentose, ...*H. adenophylla.*

PAJANELIA.—Only species, ...*P. multijuga.*

CALOSANTHES.—Only species, ...*C. Indica*

MILLINGTONIA.—Only species, ...*M. hortensis.*

ACANTHACEÆ.

Conspectus of genera.

STROBILANTHES.—Calyx unequal. Anther-cells parallel. Corolla-tube usually curved. Capsule 4-rarely 6-8-seeded, contracted in a sterile base.

STROBILANTHES.—

Flowers yellow ; leaves harsh, glabrous ; capsules 8-seeded, ...*S. flava.*
Flowers blue ; leaves membranous, glandular-puberulous ; flower-heads often by 2 or 3 in the leaf-axils, on longer or shorter peduncles, ...*S. Simonsii.*

VERBENACEÆ.

Conspectus of genera.

§ Seeds with integument, not germinating while on the plant.

* Ovules ascending from the base of the cells. Flowers solitary within each bract without bracteoles, in racemes or spikes sometimes contracted into heads. (Fruit a drupe containing two 1-celled pyrenes).

LANTANA.—Flowers in heads or cymes. Calyx membranous, short. Stamens 4.

* * Ovules laterally attached above the base or near the top. Flowers in cymes, or panicles, or, if solitary or in spikes, usually accompanied by 2 bracteoles besides the subtending bract or leaflet.

(Cymes without an involucre. Fruit a dry nut or more or less succulent fleshy drupe, rarely nut-like).

O Nut dry, spongy-villous, enclosed in the enlarged often bladdery calyx.

TECTONA.—Corolla almost equally rotate, the tube as long as the calyx. Stigma 2-cleft. Drupes bony, 4-celled. Flowers in dichotomous cymes or panicles.

O O Fruit a more or less sappy drupe, containing a single 4-celled or two or four 1-celled nuts.

× Drupe containing a single 4- or by abortion a fewer-celled nut.

VITEX.—Corolla 2-lipped, the upper lip 2-, the lower 3-cleft. Stamens more or less exserted. Flowers panicled, rarely cymose. Leaves often digitately compound, rarely simple.

GMELINA.—Corolla showy, funnelshaped-campannlate, almost 2-lipped, the limb 4- or 5-lobed, the upper lip entire or short and 2-cleft. Stamens not or hardly exserted. Racemes or rarely panicle. Leaves simple.

PREMNA.—Corolla small, the limb nearly regular or almost 2-lipped, 4-lobed. Stamens not or hardly exserted. Style long and filiform with a 2-lobed stigma. Cymes or rarely panicles, usually terminal. Leaves simple.

× × Drupes containing 2-4 separate 1-celled nuts or kernels.

CALLICARPA.—Corolla more or less funnelshaped, short, with an equal 4-5-lobed limb. Style filiform, with a capitate stigma. Drupe berry-like, globular, containing four 1-celled kernels.

VOLKAMERIA.—Corolla hypocraterimorph with a long tube and an almost unequal 5-cleft limb. Drupe almost dry, the nut separating in 2 or 4 valve-shaped woody nuts.

CLERODENDRON.—Corolla more or less tubular-hypocraterimorph, the limb equal or unequal and oblique, 5-lobed. Drupes sappy, 4- or by abortion 3-1-lobed.

§ § Fruit a 2-valved capsule. Seed solitary, without integuments, germinating on the plant. Embryo with large folded cotyledons.

AVICENNIA.—Leaves simple, leathery. Flowers imbricately 3-bracted at base. Calyx imbricate in bud.

TECTONA.

Young branchlets 4-angular; fruiting calyx bladdery, inflated, ... *T. grandis.*

Young branchlets 6-8 angular or rather furrowed; fruiting calyx ovoid, tightly embracing the nut, ... *T. Hamiltoniana.*

VITEX.

* *Flowers in panicles.*

O *Panicle terminal with minute subulate bracts.*

All parts minutely white or greyish mealy; leaves at least beneath white; leaflets sessile; flowers sessile or nearly so, ... *V. Agnus Castus.*

As former, but the median leaflets petioluled; flowers smaller, ... *V. Negundo.*

All parts softly and shortly pubescent; flowers on slender pedicels; median leaflets petioluled, ... *V. canescens.*

All fullgrown parts and leaves (at least above) glabrous; leaflets petioluled, *V. heterophylla.*

O O *Panicles terminal with numerous conspicuous leafy bracts. All parts more or less pubescent; leaves digitately 3-foliolate, leaflets sessile.*

Petiole not or only slightly and narrowly winged at apex; panicle cymose-branched; flowers blue, ... *V. pubescens.*

Petiole broadly and leafy winged. Flowers interrupted cymose and forming spike-like panicles, ... *V. limonifolia.*

O O O *Panicles axillary, elongate, lax. Leaves 3-foliolate, leaflets sessile.*

Glabrous; petioles winged or not, ... *V. alata.*

* * *Flowers in axillary dichotomous cymes. Petioles not winged.*

All softer parts pubescent; cymes pubescent or tomentose, much shorter than the petiole, ... *V. vestita.*

All parts, at least the adult ones, quite glabrous; cymes glabrous, repeatedly dichotomous, longer than the petiole, ... *V. leucoxylon.*

GMELINA.

Flowers 5-merous; corolla 2-lipped, the upper-lip short, 2-lobed, straight, ... *G. arborea.*

Flowers 4-merous; the 4 corolla-lobes almost equal, the upper one reflexed, ... *G. Asiatica.*

PREMNA.

* *Flowers in cymes or cymose corymbs or cymose panicles. Trees or erect shrubs.*

× *Tomentose or velvety pubescent trees. Calyx 5-toothed.*

All parts stellate-tomentose; flowers in panicles, ... *P. tomentosa.*

All parts velvety pubescent; flowers cymose forming corymbs, ... *P. viburnoides.*

× × *Almost glabrous tress. Calyx 4-toothed.*

Leaves (except the pubescent nerves) glabrous; flowers cymose in corymbs, ... *P. sambucina.*

* * *Flowers clustered or in little cymes, arranged on a more or less interrupted raceme or spike.*

Leaves glabrous or nearly so; flower-clusters sessile or nearly so, ... *P. racemosa.*

CALLICARPA.

Leaves entire or nearly so, mealy tomentose beneath, ...*C. arborea.*

CLERODENDRON.

Corolla-tube 5-6 lin. long; panicles conspicuously and crowdedly bracted; leaves serrate, along with the other parts appressed pubescent, ...*C. infortunatum.*

Corolla-tube only so long as the calyx; panicles with only small bracts; leave entire, and like all other parts softly pubescent-tomentose, ...*C. villosum.*

AVICENNIA.

Leaves usually lanceolate, indistinctly white-tomentose beneath; flowers shortly spiked, calyx-lobes a line long; style very short, ...*A. officinalis.*

Leaves more or less obovate and usually indistinctly tawny tomentose beneath; flowers capitate; calyx-lobes 2 lin. long; style long and slender, ...*A. tomentosa.*

PHYTOLACCACEÆ.

Conspectus of genera.

CORIARIA.—Sepals and petals 5 or 6 each, the latter wanting in the males. Stamens 10-12. Embryo nearly straight. Leaves opposite or nearly so.

CORIARIA.—Only species, ...*C. Nepalensis.*

NYCTAGINEÆ.

Conspectus of genera.

PISONIA.—Floral involucre wanting. Flowers by abortion usually dioecious. Stamens 6 to 10. Embryo straight.

PISONIA.

Leaves 1-3 in. long, bluntish. Fruits with a double row of glandular-headed short prickles along the 5 corners, ...*P. aculeata.*

Leaves 7 to 10 in. long. Fruits with a single row of simple short irregular acute prickles along the 5 corners, ...*P. alba.*

Leaves 6-12 in. long, acuminate. Fruits unarmed, with a broad blackish viscose line along the 5 bluntish corners, ...*P. umbellifera.*

SANTALACEÆ.

Conspectus of genera.

SANTALUM.—Perianth campanulate, lobes and stamens 4 or rarely 5. Disk conspicuously 5-lobed. Drupes globular. Placenta spindle-shaped, bearing the ovules near the base. Trees, parasitic in youth.

SANTALUM.—Only species, ...*S. album.*

MYRISTICACEÆ.

Conspectus of genera.

MYRISTICA.—Only genus.

MYRISTICA.

* *Staminal column cylindrical or spindle-shaped; anthers linear. Flowers in simple racemes.*

Arillus lacerate and lobed, aromatic, crimson; flowers on very long slender pedicels, ... *M. moschata.*

* * *Staminal column pyriform or globular, covered with anthers all over or only along the depressed apex. Perigon globular or nearly so, 2-3-cleft. Flowers minute, forming larger or smaller compound panicles.*

Fruits oblong, the size of a cherry, the inflorescences rusty scurvy-tomentose, ... *M. Irya.*
Fruits oblong, the size of a prune, the inflorescences glabrous or nearly so, ..*M. amygdalina.*

* * *Staminal column clavate, at apex dilated into a concave or convex disk, bearing the anthers along its border. Perigon of females globular, of the males turbinate, often lengthened in a stalk. Flowers clustered or almost umbellate on axillary tubercle-like or elongate thick peduncles.*

Leaves large, often 1-1¼ ft. long, petioles thick, scurvy-tomentose; fruits tomentose, nearly 2 in. long, ... *M. longifolia.*
Leaves up to 7-9 in. long; petiole ½ an inch long, rather slender, glabrescent; fruits glabrescent, only an inch long, ... *M. corticosa.*

LAURINEÆ.

Conspectus of genera.

* Anther-cells opening by upwards-turning valves.

O Flowers in naked inflorescences, not surrounded by a proper involucre or imbricate bracts.

× Anthers 4-locellate.

† Fruits superior and free, not enclosed in the pericarp.

CINNAMOMUM.—Perianth-segments breaking off at their middle, leaving a persistent 6-lobed cup or disk under the fruit.

PHŒBE.—Perianth wholly persistent and indurating, the segments erect and adpressed to the fruit, resting on a more or less thickened pedicel.

MACHILUS.—Perianth wholly persistent, not indurating, the segments in fruit reflexed or spreading; pedicels usually not thickened.

ALSEODAPHNE.—Perianth nearly wholly deciduous, the fruit (large) resting on the thickened often fleshy pedicel.

† † Fruit entirely enclosed in the enlarged perianth.

EUSIDEROXYLON.—Fertile stamens only 3, free, the outer 6 reduced to petaloid, the 3 innermost to subulate, staminodes. Fruit very large.

× × Anthers 2-celled.

† Fruit superior and quite free, not adnate.

BEILSCHMIEDIA.—Perianth wholly deciduous, the segments nearly equal, or (in Haasia) the outer lobes minute. Ovary 1- or imperfectly 2-celled. Berry resting on a thickened often fleshy pedicel.

† † Fruit wholly enclosed in the enlarged perianth, but rarely adnate to it, only the apex sometimes exserted.

CRYPTOCARYA.—Fertile stamens 9, free. Fruits free, not adnate to the perianth. Flowers in racemes or panicles.

ENDIANDRA.—Fertile stamens only 3, free, the 6 outer stamens reduced to glands or to a glandular ring. Fruit enclosed in the truncate perianth-tube. Flowers in panicles.

O O Flowers in umbels or clusters, either surrounded by a 4- to 6-leaved persistent or more or less deciduous involucre or covered by several rows of imbricate bracts and, while in bud, entirely enclosed by them.

† Flowers in longer or shorter peduncled umbels, subtended by a 4-to 6-phyllous involucre.

× Anthers 4-locellate.

TETRANTHERA.—Perianth 6-cleft or truncate. Fertile stamens 9-12, rarely 15-30, the inner 3-6 bearing glands at base. Fruit resting on a flat or concave often large and thick cup, or half-immersed in the same.

× × Anthers 2-locellate.

LINDERA.—Perianth 4-6-cleft, deciduous. Fertile stamens 6-9, the inner 2-6 bearing glands at base. Fruit resting on a small entire or 6-cleft disk. Usually aromatic trees.

† † Flowers in bud enclosed in an imbricate-scaled globular sessile bud, after expansion surrounded by several rows of imbricate bracts.

× Anthers 4-locellate.

DODECADENIA.—Flowers solitary. Perianth 6-9-cleft.

LITSAEA.—Flowers several together. Perianth 4-6-cleft, the segments deciduous. Stamens 4-6 or 9, the innermost ones 2-glanded at base. Berry seated on the more or less thickened pedicel or perianth-base.

× × Anthers 2-locellate.

DAPHNIDIUM.—Flowers several together. Perianth 6-9-cleft with the segments deciduous. Stamens 9 (rarely more), the 3 innermost ones 2-glanded at base. Berry seated on the more or less thickened pedicel on the entire or 6-lobed perianth-base.

* * Anthers opening laterally, the valves separating laterally from the inner to the outer edge.

HERNANDIA.—Flowers monoecious, the females with an involucel enlarging and enclosing the fruit. Seeds without albumen.

CINNAMOMUM.

× *Perianth-segments deciduous along a horizontal line above their base. Leaves 3-5-nerved.*

Calyx in fruit somewhat enlarged and cupshaped, the segments deciduous; nuts dry, ... *C. Zeylanicum and C. iners.*
Calyx in fruit small and not cupshaped, with persistent segments; nut half so large, drupaceous, ... *C. obtusifolium.*

× × *Perianth-segments wholly deciduous.*

Leaves long-petioled, penninerved, ... *C. Parthenoxylon.*

PHOEBE.

‖ *All parts, also the inflorescence, quite glabrous,* .... *P. lanceolata.*

‖ ‖ *Younger parts and inflorescence more or less tomentose or pubescent.*

Pedicels as long or longer than the perianth; fruit oval, ... *P. pubescens.*
Pedicels rather thick, shorter than the perianth; fruit globular, ... *P. villosa.*

MACHILUS.

‖ *Leaves bluntish acuminate, coriaceous, glaucous beneath.*

Perianth-segments about 2½ lin. long, ... *M. Indica.*
The same only a line long, ... *M. rimosa.*

‖ ‖ *Leaves one-coloured.*

Leaves acuminate, hardly chartaceous, ... *M. Tavoyana.*
Leaves blunt, oval, with reflexed borders, ... *M. fruticosa.*

ALSEODAPHNE.—Only species, ... *A. grandis.*

BEILSCHMIEDIA.

Fruits oblong, 1½ inch long or longer, ... *B. Roxburghiana.*
Fruits globular, an inch in diameter, ... *B. globularia.*

CRYPTOCARYA.

All softer parts and inflorescence minutely tawny puberulous; adult leaves glabrous, ... *C. ferrea.*
All parts, also inflorescence, more or less covered by a dense rusty-coloured velvety tomentum; leaves pubescent beneath, ... *C. Griffithii.*

ENDIANDRA.—Only species, ... *E. (?) Candolleana.*

TETRANTHERA.

* *Perianth-tube slightly enlarged under the fruit, flat or slightly concave.*

O *Limb of perianth wanting and truncate, or very imperfect and all its lobes or part of them transmuted into stamens. Stamens 15-30.*

Tomentose-pubescent; umbels solitary in the axils of the leaves, ... *T. tomentosa.*
Almost glabrous or slightly pubescent; umbels clustered or in short racemes, ... *T. laurifolia.*

O O *Perianth-limb developed, 6-cleft. Stamens 9-12.*

× *Leaves coriaceous (all these doubtfully referred here).*

Leaves oblong-lanceolate, very acuminate, glabrous, ... *T. Rangoonensis.*
Leaves oblong or oval, acute, densely fulvous pubescent beneath, ... *T. longifolia.*
Leaves broadly oval, rounded or almost retuse at apex, puberulous beneath, ... *T. grandis.*

× × *Leaves chartaceous or membranous.*

Leaves from oval to obovate, blunt; petiole ½-1 inch long, ... *T. monopetala.*
Leaves alternate, lanceolate, usually acute or shortly acuminate; petiole usually less than ½ an inch long, ... *T. amara.*
As former, but a shrub; leaves more or less opposite, usually bluntish-acuminate, *T. lancifolia.*

* * *Perianth-tube enlarged to a large fleshy entire or lobed cup tapering in a longer or shorter thick stalk.*

O *Umbels solitary, clustered or forming a reduced umbel-like corymb in the axils of the leaves.*

× *Leaves not glaucous beneath.*

Leaves shortly tomentose beneath and very prominently net-veined, ... *T. eatophylla.*

× × *Leaves more or less glaucous beneath.*

Branchlets tomentose; leaves puberulous beneath, thick chartaceous, ... *T. nuculanea.*
Quite glabrous; leaves rigidly coriaceous, ... *T. myristicaefolia.*

O O *Umbels disposed in longer or shorter axillary racemes.*

† *Inflorescence and all other parts quite glabrous.*

Leaves uniformly green ; branchlets sharply angular, ...*T. nitida.*

† † *Inflorescence puberulous to tomentose.*

Leaves slightly glaucous beneath, shortly acuminate ; racemes elongate, tawny tomentose ; fruiting cup entire ; berry oblong, ...*T. Panamonya.*

Leaves whitish or glaucous beneath and strongly net-veined, shortly acuminate ; racemes shortened, tawny puberulous ; fruiting cup lobed ; berry oblong,.. ....*T. albicans.*

Leaves not glaucous beneath, blunt or nearly so ; racemes short and tomentose ; fruiting cup entire ; berry obovate-globular, ...*T. semecarpifolia.*

LITSAEA.

* *Leaves whorled by 3 to 5, penninerved from the very base ; the female flowers in small clustered umbels, the males simply clustered.*

Branchlets tomentose ; leaves 4-4½ in. long (doubtful species), ...*L. concolor.*

Branchlets and shoots densely tawny villous ; leaves 6-8 in. long, very soon turning glabrous, ...*L. angustifolia.*

As former, but leaves 1-1½ ft. long, elongate, also when adult pubescent beneath, ...*L. macrophylla.*

* * *Leaves scattered, alternate, triplinerved above the base and penninerved further up.*

Leaves etc. quite glabrous ; flowers in short tawny tomentose racemes, ...*L. leiophylla.*

Leaves etc quite glabrous, glaucous beneath ; flowers in sessile involucred umbels, *L. foliosa.*

DAPHNIDIUM.

× *Leaves triplinerved.*

Leaves glabrous, glaucous beneath, ...*D. pulcherrimum.*

Leaves densely and shortly tawny pubescent beneath, ...*D. caudatum.*

× × *Leaves penninerved.*

Leaves beautifully appressed silvery pubescent beneath; flowers in very short racemes,..*D. argenteum.*

|| *Leaves chartaceous or almost coriaceous, elegantly and prominently netveined, the reticulations narrow.*

Peduncles slightly pubescent, nearly an inch long ; perianth pubescent, ...*L. Assamica.*

Peduncles quite glabrous, 3-4 lin long ; perianth glabrous, ...*L. nervosa,*

|| || *Leaves membranous, very laxly reticulate ; all parts glabrous,* ....*L. Neesiana*

HERNANDIA.—Only species, ...*H. peltata.*

PROTEACEÆ.

Conspectus of genera.

Helicia.—Only genus.

HELICIA.

* *Inflorescence glabrous.*

Leaves serrulate or entire, acuminate at base and almost decurrent on the ½-¾ inch long petiole ; scales distinct, smooth, ...*H. Cochinchinensis.*

Leaves serrate, on a thick 2-3 lin. long petiole ; scales united in a 4-toothed cup, *H. robusta.*

* * *Inflorescence rusty tomentose or villous.*

Young branchlets rusty-villous ; leaves serrate ; ovary smooth,.....................*H. pyrrhobotrya.*

Young branchlets rusty-villous ; leaves serrate ; ovary rusty hirsute ; scales distinct, smooth, ...*H. excelsa.*

Young branchlets smooth ; leaves entire ; ovary hirsute ; scales distinct, puberulous, ...*H. salicifolia.*

THYMELÆACEÆ.

Conspectus of genera.

Aquilaria.—Perianth 5-merous, of a leathery texture. Perianth-scales 10, at the base or wholly united in a crown. Capsule 2-valved, the putamen woody, with a thin (somewhat fleshy ?) pericarp.

AQUILARIA.

Capsules wrinkled, softly and densely tomentose,..*A. Agallocha.*

Capsules smooth and glabrous, ...*A. Malaccensis.*

ELAEAGNACEÆ.

Conspectus of genera.

ELAEAGNUS.—Only genus.

ELAEAGNUS.

Drupes 1½ inch long, the compressed putamen sulcate with rounded ribs,............*E. arborea.*
Drupes 4 to 6 lin. long ; the putamen slightly and bluntish sulcate ribbed,......*E. conferta.*
Drupes about ½ inch long ; the putamen sharply 8-ribbed,....................*E. latifolia.*
Drupes about ⅓ inch long, very slender peduncled ; the putamen 4-ribbed or rather sharply 4-sided, ...*E. ferruginea.*

EUPHORBIACEÆ.

Conspectus of genera.

* Ovules 2 in each cell.
× Calyx imbricate in bud.
O Fruit more or less readily capsular-dehiscing, dry or with a fleshy or sappy epicarp. Petals none.
† Capsule dry.
+ Stamens round an ovary-rudiment.
ACTEPHILA.—Styles free. Seeds naked. Capsule woody or dry-coriaceous,
+ + Stamens central; no ovary-rudiment.
GLOCHIDION.—Capsule 20-3-coccous. Styles simple, more or less connate. Hypogynous glands or disk none. Testa of seeds arillus-like, fleshy or sappy, usually scarlet.
PHYLLANTHUS.—Capsules usually 3-coccous. Styles 2-cleft. Hypogynous glands or disk present. Testa of seeds dry.
† † Capsules fleshy-coriaceous or more usually crustaceous with a fleshy or sappy epicarp.
+ Stamens central ; no ovary rudiment.
† Seeds with arillus.
MELANTHESOPSIS —Style 2-cleft. Calyx of both sexes turbinate, high up connate.
† † Seeds without arillus.
SAUROPUS.—Capsules fleshy-leathery. Male calyx deeply 6-cleft.
BREYNIA.—Male calyx turbinate, high up connate. Style entire.
CICCA.—Capsule drupaceous, the capsular putamen woody or crustaceous, 6-3-coccous. Stamens free or connate.
+ + Stamens round on ovary-rudiment.
Δ Flowers in axillary clusters.
SECURINGA —Flowers 5-merous. Stamens 5, free. Disk 5-angular-annular. Capsule with a (usually white) fleshy epicarp, 3-or by abortion 2-coccous.
Δ Δ Flowers racemose-panicled.
BISCHOFFIA.—Stamens 5, free. Albumen scanty. Trees with 3-foliolate leaves.
O O Fruit indehiscent, drupaceous or berry-like, when over-ripe sometimes irregularly bursting but not truly dehiscent.
+ Flowers in racemes or spikes, the males often amentaceous. Stamens free, round an ovary-rudiment.
Δ Seeds with an arillus.
BACCAUREA.—Ovary 3-celled. Capsule fleshy-coriaceous, sometimes irregularly bursting when overripe.
Δ Δ Seeds without arillus.
ANTIDESMA.—Ovary 1-celled. Drupe sappy, the long putamen 1-seeded.
APOROSA.—Ovary 2-celled. Drupe fleshy coriaceous, by abortion usually 1-or rarely 2-seeded.
+ + Flowers solitary or clustered in the axils of the leaves.
CYCLOSTEMON,—Ovary 4-2-celled. Stamens 4-40, free. Drupe fleshy, with a thin 4-2-celled endocarp.
HEMICYCLIA.—Ovary 1-celled. Stamens free, 8-25. Drupe fleshy, with a bony 1-celled endocarp.
PUTRANJIVA —Ovary 3-or 2-celled. Stamens 3-2, free or connate. Drupe, with a long 1-seeded putamen.
× × Calyx valvate in bud. Fruit capsular, fleshy or dry. Flowers in axillary clusters, the clusters arranged sometimes in spurious racemes or spikes.
BRIEDELIA.—Capsules with a fleshy epicarp, sessile, the cocci separating. Testa of seeds dry.
CLEISTANTHUS.—Capsules dry, sessile or stalked.
* * Ovules solitary in each cell.
× Calyx valvate in bud (rarely the sepals very slightly imbricate at their tips).
+ Petals present, more or less developed, or if suppressed, the hypogynous glands opposite the calyx-segments.
O Stamens in bud infracted or incurved.
CROTON.—Flowers in racemes or spikes. Seeds with spermophore.
O O Stamens in bud erect.
† Petals in males as many as calyx-segments. Ovary-rudiment none. Stamens central.
CROZOPHORA.—Anthers longitudinally adnate. Arillus none. Flowers in racemes or spikes.
SUMBAVIA.—Anthers basifix. Seeds arillate. Flowers racemose.
† † Calyx regularly valvate in bud. Male flowers with twice as many petals. Ovary-rudiment none. Stamens central.
AGROSTISTACHYS.—Flowers in bracted amentaceous spikes.
† † † Calyx irregularly bursting in 2 or 3 lobes. Petals (at least in the males) more than calyx-segments. Ovary-rudiment none. Stamens central.
ALEURITES.—Flowers in terminal panicles. Seeds arillate. Capsule drupaceous.
+ + No petals.
O Stamens round an ovary-rudiment.

SYMPHYLLIA.—Flowers in terminal panicles.

O O Ovary-rudiment none. Stamens central or round a central disk, not polyadelphous.

‡ Flower dioecious.

§ Capsule drupaceous.

TREWIA.—Flowers in axillary racemes. Seeds with arillus.

§ § Capsule dry.

|| Seeds without arillus or spermophore.

MALLOTUS.—Calyx flask-shaped, irregularly bursting. Anthers 2-celled. Flowers racemose.
ALCHORNEA.—Calyx deeply divided. Anthers 2-celled. Flowers racemose.
MACARANGA.—Calyx deeply divided. Anthers 3-4-celled. Flowers panicled or racemose.
CLEIDION.—Calyx deeply divided. Anthers 4-celled. Male flowers racemose, females solitary.

|| || Seeds with an arillus or spermophore.

BLUMEODENDRON.—Seeds arillate. Capsules large, woody. Flowers in racemes.
COELODISCUS.—Seeds arillate. Stamens numerous. Flower-buds usually apiculate. Flowers in short bracted racemes or spikes, or clustered. Capsules not compressed or appendaged.
HYMENOCARDIA.—Seeds with spermophore. Capsules 2-celled and samaroid-compressed. Male flowers amentaceous, females in short racemes or solitary.
CLAOXYLON.—Seeds arillate. Capsules not compressed or appendaged. Flowers in spikes.

‡ ‡ Flowers monoecious.

ACALYPHA.—Seeds with spermaphore. Anther-cells almost serpentine, the connective not produced. Flowers racemose or spicate. Erect herbs or shrubs.
TRAGIA.—Seeds without spermaphore or arillus. Connective of anthers not produced. Flowers racemose. Erect or twining shrubs.
CNESMONE.—Seeds arillate. Connective long produced beyond the cells. Flowers racemose. Twining shrubs.
DALECHAMPIA.—Seeds without spermaphore or arillus. Flower-heads enclosed in a large 2-leafed involucre. Twining shrubs.

O O O Ovary-rudiment none. Stamens central, polyadelphous.

RICINUS.—Monoecious. Seeds with spermaphore. Flowers racemose.
HOMONOYA.—Dioecious. Seeds with a fleshy sappy testa. Flowers racemose or spicate, or the females solitary.

× × Calyx imbricate in bud (or sometimes wanting).

O Petals present, or if suppressed, the hypogynous glands opposite the calyx-segments.

+ Fruit capsular dry.

† Flowers in terminal or axillary panicles.

MANIHOT.—Stamens inserted round an intrastaminal disk. Seeds with spermaphore.
JATROPHA.—Stamens central. Seeds with spermaphore.
OSTODES.—Stamens numerous, on a convex central receptacle. Capsule woody. Seeds naked.

† † Flowers in elongate or umbel-like racemes.

CODIAEUM.—Seeds with spermaphore. Stamens central, on an elevated receptacle.
TRIGONOSTEMON.—Seeds without spermaphore. Stamens central, on a flat receptacle.

+ + Fruit a drupe, indehiscent.

† Flowers in racemes.

GALEARIA.—Petals indaplicate, almost valvate. Stamens round an ovary-rudiment.

† † Flowers clustered.

MICRODESMIS.—Petals flat, imbricate. Stamens round an ovary-rudiment.

O O Petals absent.

+ Flowers not enclosed in an involucre.

† Flowers clustered, or the cluster arranged in racemes or rarely panicled.

CHAETOCARPUS.—Stamens round an ovary-rudiment. Seeds arillate at base. Capsules woody-coriaceous.
GELONIUM.—Stamens central. No ovary rudiment. Seeds naked. Capsules fleshy-leathery.
BALIOSPERMUM.—Stamens central, no ovary-rudiment. Seeds arillate at base. Capsules dry, crustaceous.

† † Flowers in racemes or spikes, sometimes amentaceous.

CARUMBIUM.—Capsule with a more or less fleshy or sappy epicarp, dehiscent. Seeds arillate. Trees or shrubs.
EXCOECARIA.—Capsule dry, woody or crustaceous.—Seed naked. Trees or shrubs.
SAPIUM.—Capsules dry. Seeds with a spermaphore or spurious arillus. All American.
SEBASTIANIA.—Capsule dry-crustaceous. Seeds with a thick fleshy spermaphore. An undershrub.

+ + Flowers clustered, enclosed in a calyx-like more or less turbinate, bell-shaped or slipper-shaped involucre.

EUPHORBIA.—Involucre bell-shaped or turbinate, bearing glands between the lobes.
PEDILANTHUS.—Involucre regularly slipper-shaped and 2-lipped, or irregularly so with an appendage on the back, the glands situated on the bottom of the upper-lip, or altogether wanting.

GLOCHIDION.

* *Stamens* 5 (*rarely* 8-4).

O *Ovary, and often also the capsule, pubescent, or villous. Female flowers sessile or nearly so.*

Young branchlets calyx and pedicels puberulous or pubescent; style-column conical. Capsule 8-12-celled, fleshy-coriaceous, white, or with scarlet hue, ...*G. coccineum.*
All parts, also calyx and pedicels, quite glabrous; style-column cylindrically-conical, at top 6-8-toothed; capsules glabrous, 6-8-celled, ...*G. lanceolarium.*

O O *Ovary and capsule glabrous. Female flowers more or less pedicelled.*

Style-column minute, deplanate-conical with a broad base. Capsule 10-15-celled, fleshy-coriaceous, ...*G. multiloculare.*
Style long, funnel-shaped-clavate. Capsules 4-3-coccous,..................*G. subscandens.*

* * *Stamens* 3.

× *Styles more or less funnel-shaped or at least tapering at base, the stigmas short and tubercle-like.*

All parts, also the calyx, quite glabrous; flowers of both sexes sessile; capsule glabrous, ... *G. Daltoni.*
Young parts and leaves beneath as also the flowers more or less puberulous; flowers of both sexes pedicelled; capsules puberulous, ... *G. Nepalense.*

× × *Style equal, shorter or longer, the stigmas linear, more or less spreading. Capsules usually 3-6-coccous.*

Young shoots and also the flowers pubescent; capsules on capillary up to ½ an in. long peduncles, pubescent; stigmas pubescent, ... *G. dasystylum.*
As former but peduncle of capsule very short or almost wanting; styles glabrous, ... *G. leiostylum.*

× × × *Style thick, conical, sometimes minute or hemispherical.*
O *Ovary and capsule glabrous.*

All parts glabrous; capsules flat, depressed at top, 3-4-coccous, smooth, almost pruinous, very short-peduncled; style-column minute, ... *G. glaucifolium.*
All parts glabrous; capsules sessile, 6-4-coccous, depressed, globular but not flattened at top, ... *G. fagifolium.*
All parts quite glabrous; style-column almost spherical and minute, constricted at base; capsules very short-peduncled, glabrous, depressed-globular, ... *G. sphaerogynum.*

O O *Ovary and capsule more or less puberulous to tomentose.*

All parts quite glabrous, leaves glaucous beneath; capsules almost sessile, velvety, 6-4-coccous, ... *G. Andamanicum.*
All softer parts and leaves beneath shortly tomentose; capsules peduncled, 5-4-coccous, puberulous, ... *G. Bancanum.*

PHYLLANTHUS.

Young shoots shortly rusty-pubescent; flowers in axillary clusters, ... *P. columnaris.*
Quite glabrous; flowers clustered forming elongate slender glabrous racemes in the axils of the adult leaves, ... *P. baeobotryoides.*

BREYNIA.—Only species, ... *B. rhamnoides.*

CICCA.

* *Flowers 4-merous. Stamens 4, free. Glands in males and hermaphrodites distinct. Capsule drupaceous, large, fleshy, usually 4-coccous.*

Quite glabrous; flowers red; capsular drupes yellow, ... *C. disticha.*

* * *Flowers 5-6-merous. Stamens 2-adelphous, the 3 inner ones wholly, the outer at base only, united. Glands in females distinct. Capsules berry-like, 12-6-coccous, succulent, purple or purplish-black.*

Leaves small, ½-1 in. long; capsules depressed-globular; adult branchlets smooth, *C. reticulata.*
Leaves 1-2 in. long, capsules globular; adult branchlets lenticellate-rough, ..*C. microcarpa.*

* * * *Flowers usually 6-merous. Stamens connate in a column. Ovary 3-celled. Glands in females urceolate-connate. Fruit drupaceous, large, white, containing a 3-celled stony slowly dehiscing capsule.*

Leaves up to 1 in. by ½ broad; drupes about an in. in diameter, ... *C. albizzioides.*
Leaves narrow, linear to linear-oblong; bark wrinkled and fissured; styles 2-cleft, the lobes broad and short, 3-crenate; drupes about an in. in diameter, ... *C. macrocarpa.*
Leaves as in former; bark smooth and conchoid peeling off; styles doubled-2-cleft, the end-lobes subulate; drupes only ½ in. thick, ... *C. Emblica.*

SECURINEGA.

Armed with abortive spinescent branchlets; flowering branchlets terete, ... *S. Leucopyrus.*
Unarmed; flowing branchlets compressed-4-gonous, ... *S. obovata.*

BISCHOFFIA.—Only species, ... *B. Javanica.*

ANTIDESMA.

* *Flowers sessile or nearly so. Stigmas terminal.*
× *Spike quite glabrous.*

All parts glabrous, the rachis of spike rather stong; leaves glossy, ... *A. Bunias.*

× × *Spike more or less pubescent.*
O *Leaves rounded or retuse.*

More or less puberulous; spike rather robust, tomentose, ... *A. Ghaesembilla.*

O O *Leaves more or less acuminate.*
† *Calyx 3-lobed.*

Young shoots and leaves along the nerves pubescent, ...*A. Martabanicum.*

† † *Calyx 4-parted.*

Leaves small, 1-2½ in. long, hirsute above, densely pubescent beneath,......*A. fruticulosum.*
Leaves 4-5 in. long, like all other softer parts shortly and softly pubescent, ...*A. velutinum.*

* * *Flowers pedicelled.*

× *Stigmas lateral ; all parts pubescent. Bracts linear-lanceolate.*

× × *Stigmas terminal.*

Young parts slightly pubescent ; racemes puberulous ; stamens usually 4, ...*A. Menasu.*
Young parts slightly pilose ; racemes glabrous ; stamens usually 2, ...*A. diandrum.*

APOROSA.

* *Ovary villous, tomentose or pubescent.*

× *Leaves shortly and softly pubescent beneath.*

Berries densely velvety-tomentose, ...*A. villosa.*

× × *Adult leaves quite glabrous.*

Leaves very large, deeply cordate at base ; fruits velvety-tomentose,........*A. macrophylla.*
Leaves not cordate at base.
Style-lobes 2-lobulate. Ovary densely tawny-villous, ...*A. villosula.*
Style-lobes simple, short. Ovary thinly appressed pubescent, glabrescent, ...*A. Roxburghii.*

* * *Ovary quite glabrous. Leaves etc. all glabrous.*

Styles minute, tooth-like ; leaves small,....................................*A. lanceolata.*
Styles long, lacerate-fimbriate ; leaves large, drying yellow, ...*A. microstachya.*

BACCAUREA.

Calyx-lobes of male flowers and bracts a line long ; calyx-lobes of females nearly 3 lin. long,..*B. sapida.*
Above named parts all only half the size, the female calyx-lobes only a line long,..*B. parviflora.*

CYCLOSTEMON.

* *Flowers on about ½ an in. long pedicels. Stigmas sessile, large, obversely broad-triangular.*

Female flowers arising from the stem and branches ; leaves large, laxly veined,*C. macrophyllum.*
Female flowers in the axils of the leaves ; leaves small, elegantly net-veined, *C. eglandulosum.*

* * *Flowers on hardly up to ½ lin. long pedicels. Stigmas sessile, minute, 3-angular.*

Flowers greyish pubescent ; drupes obsoletely 4-lobed, puberulous, ...*C. subsessilis.*

HEMICYCLIA.

* *Putamen of drupe irregular, obliquely truncate on both sides on top, usually slightly keeled.*

All parts glabrous ; leaves repand-serrate, ...*H. Sumatrana.*

* * *Putamen regular, globose to obovoid, terete.*

All parts glabrous ; putamen obovoid ; leaves repand-serrate, ...*H. Andamanica.*

PUTRANJIVA.—Only species, ...*P. Roxburghii.*

BRIEDELIA.

O *Young branchlets and shoots pubescent or tomentose.*

\+ *Flowers sessile.*

Leaves small, glaucous, sparingly and minutely pubescent beneath ; flowers glabrous or nearly so,..*B. tomentosa.*

\+ \+ *Flowers pedicelled.*

Leaves thin chartaceous, one-coloured, pubescent beneath ; flowers axillary, greyish-tomentose,...*B. pubescens.*
Leaves thin coriaceous, glaucescent and minutely puberulous beneath, strongly net-veined ; flowers glabrous, the clusters in axillary simple or panicled racemes, ...*B. retusa.*

O O *All parts glabrous.*

Leaves blunt or rounded ; bracts of flower-clusters glabrous ; shortly pedicelled, ...*B. amoena.*
Leaves abruptly and shortly acuminate or apiculate ; bracts of flower-clusters greyish-pubescent ; flowers glabrous, the females almost sessile, ...*B. ovata.*

CLEISTANTHUS.

* *Capsule stalked.*

Young parts and leaves beneath tawny lepidote-pubescent, ...*C. myrianthus.*

† † *Capsule sessile.*

All parts quite glabrous, ...*C. stenophyllus.*

CROTON.

× *Indument of young shoots silvery or coppery scaly.*

O *Pedicels of female flowers very short and thick, sulcate.*

Leaves chartaceous, densely silvery or coppery scaly beneath, acuminate, ...*C. argyratus.*

Leaves coriaceous, bluntish to almost retuse, adult almost glabrous, lateral nerves faint, ...*C. robustus.*

O O *Pedicels terete and often slender.*

Adult leaves glabrous or nearly so, coarsely repand-serrate; capsule about the size of a cherry-stone, lepidote; seeds about 3 lin. long, ...*C. oblongifolius.*

Adult leaves glabrous or nearly so; capsule the size of a pigeon's egg, scaly-stellate puberulous; seed ⅜ in. long,..*C. Joufra.*

× × *Indument of young shoots consisting of sessile and tubercled-stalked stellate hairs.*

O *Leaves penninerved, or indistinctly 3-nerved at base.*

Young leaves all over and adult ones beneath shortly pubescent; capsule the size of a pea, minutely puberulous; seeds about 2 lin. long, ...*C. Wallichii.*

O O *Leaves 5-or 3-plinerved at base.*

+ *Capsule obsoletely 3-lobed or almost terete. Leaves 5-plinerved at base.*

† *Inflorescence glabrous or nearly so.*

Adult parts glabrous or nearly so, female pedicels thick, silvery-scaly, male pedicels slender and glabrous; capsules almost oblong, almost glabrous,..................*C. Tiglium.*

† † *Inflorescence more or less stellately pubescent. Leaves often with a stalked gland on the crenatures along the margin.*

Young shoots minutely tubercled-stellate-hispid; basal glands of leaves stalked; capsules minutely tubercled-stellate-rough, ...*C. caudatum.*

Young shoots softly floccose-stellate; basal glands of leaves sessile; capsules densely and softly stellate-tomentose, ...*C. flocculosum.*

SUMBAVIA.—Only species, ...*S. macrophylla.*

AGROSTISTACHYS.—Only species,.....................................*A. longifolia.*

ALEURITES.—Only species,..*A. Moluccana.*

SYMPHYLLIA.—Only species, ...*S. Silhetiana.*

TREWIA.—Only species,...*T. nudiflora.*

MALLOTUS.

* *Capsules unarmed, but covered with various tomentum from tomentose to glandular.*

O *Capsules 2-coccous, velvety-tomentose.*

Scandent shrub; softer parts stellately pubescent,..........................*M. repandus.*

O O *Capsules 3-coccous.*

Leaves beneath glaucescent and crimson-resinous; capsules densely covered with crimson resinose powder,..*M. Philippinensis.*

Ovary silky-pubescent, ...*M. decipiens.*

* * *Capsules armed with longer or shorter, lax or crowded prickles, the indument various.*

O *Racemes or spikes collected in terminal ample rarely contracted panicles.*

+ *Leaves peltate, more or less orbicular-ovate.*

Leaves broadly peltate, usually 3-lobed; capsules short-peduncled, globular, covered with a thick dense stratum of scurvy pubescent soft short bristles, ...*M. barbatus.*

Leaves usually narrow peltate, not lobed; capsules sessile, densely covered with loose soft pubescent bristles nearly as long as the diameter of the capsule itself,......*M. ricinoides.*

+ + *Leaves not or indistinctly peltate, shortly white or rarely tawny tomentose beneath, often rhomboid-ovate. Capsule shortly and laxly muricate.*

Capsules sessile or nearly so, 4- or 5-coccous, almost globular, scurvy whitish tomentose, ...*M. tetracoccus.*

Capsules 3-coccous and 3-lobed, tawny-tomentose,..........................*M. paniculatus.*

O O *Racemes or spikes terminal or axillary, simple or at least not panicled. Capsule lobed 3-coccous, shortly and laxly muricate.*

+ *Capsules with hairy indument.*

Leaves broadly peltate, densely pubescent, orbicular-ovate ; capsules peduncled, tomentose and glandular, ... *M. Roxburghii.*

+ + *Capsules densely yellowish glandular, otherwise glabrous. Leaves more or less narrowed towards the base.*

† *Leaves peltate.*

Young parts and leaves beneath puberulous, ... *M. acuminatus.*

† † *Leaves not peltate.*

Young parts and leaves beneath puberulous ; petioles long and slender, ... *M. Helferi.*
All parts quite glabrous ; petioles proportionally short, ... *M. muricatus.*

MACARANGA.

* *Leaves ample, broadly peltate at base. Capsule unarmed.*

× *Female flowers and capsules shorter or longer pedicelled. Inflorescence a panicle.*

Bracts minute, broadly ovate, acute, shorter than the flower-clusters ; capsules usually 2-coccous, ... *M. denticulata.*
Bracts linear, in the males with a fleshy diskoid gland terminated in a subulate appendage, in the females the gland often wanting ; capsules 1-coccous, ... *M. Indica.*

× × *Male flowers in panicles, females in simple spikes, sessile.*

Bracts leafy, toothed or pectinate, acuminate, 2-4 lin. long, without gland, in females larger ; ovary 2-celled, appressed hirsute, ... *M. molliuscula.*

* * *Leaves not peltate.*

× *Male flowers in bract-less panicles, females forming a terminal long-peduncled bracted head.*

Branchlets glabrous ; styles ½ an in. long ; capsules 2-coccous, red-glandular and laxly subulate-muricate, ... *M. membranacea.*

× × *Male flowers in leafy but small-bracted slender panicles ; females unknown.*

Branchlets densely puberulous ; flowers 2-androus, ... *M. minutiflora.*
CLEIDION.—Only species, ... *C. Javanicum.*
BLUMEODENDRON.—Only species, ... *B. Tokbrai.*
HYMENOCARDIA.
Leaves 1-1½ in. long, male spikes up to ½ in. long ; stamens 5, ... *H. Wallichii.*
Leaves 3-5 in. long ; male racemes up to 6 in. long ; stamens numerous, ... *H. plicata.*

CLAOXYLON.

* *Capsule minutely or conspicuously puberulous or velvety, rarely glabrous.*

Capsules peduncled, contracted in a short stalk, greyish puberulous, ... *C. longifolium.*

* * *Capsule densely covered with soft pubescent or hirsute prickles.*

Leaves penninerved, scabrous but not hairy, ... *C. longipetiolatus.*
Leaves ample ; 3- or almost 5-nerved at base and strongly veined, hispid-rough above, stellate-pubescent beneath, ... *C. leucocarpum.*
RICINUS.—Only species, ... *R. communis.*
JATROPHA.—(*Leaves not peltate*).

Leaves angular-lobed, the lobes and stipules entire, ... *J. Curcas.*
Leaves palmately lobed, the lobes glandular-toothed, the stipules long glandular-bristly, ... *J. glandulifera.*
Leaves digitately multifid, the lobes entire or lobed ; stipules long hair-like lacerate without glands, ... *J. multifida.*

OSTODES.
Leaves not distichous ; flowers panicled, ... *O. paniculata.*
Leaves distichous ; flowers in axillary clusters, ... *O. Helferi.*

GALEARIA.—Only species, ... *G. Wallichii.*

MICRODESMIS.—Only species, ... *M. caseariaefolia.*

CHAETOCARPUS.—Only species, ... *A. castaneaecarpa.*

GELONIUM.

Stigmas large, 2-cleft, the lobes toothed ; capsules the size of a cherry, 3-coccous ; pedicels glabrous, ... *G. multiflorum.*
Stigmas minute, sessile, 2-cleft ; capsules usually didymous, the size of a pea ; pedicels puberulous, ... *G. bifarium.*

CARUMBIUM.

* *Petioles bearing a gland at summit on each side.*

Leaves rhomboid-ovate, entire ; capsules 3-4-coccous; seeds enveloped in a white soapy substance, ...*C. sebiferum.*
Leaves more or less elliptical or obovate, serrulate ; drupes usually 2- or 1-coccous, berry-like, sessile, ...*C. insigne.*

* * *Petioles gland-less.*

Leaves quite entire, more or less glaucescent beneath, ...*C. baccatum.*

EXCOECARIA.

* *Male flowers pedicelled. Capsule large, woody.*

All parts glabrous; leaves crenate-serrate, ...*E. Indica.*

* * *Male flowers sessile or nearly so. Capsule crustaceous, the valves opening elastically-twisting.*

× *Leaves more or less repand-toothed or serrate. All parts glabrous.*

Leaves alternate ; capsules the size of a pea, ...*E. Agallocha.*
Leaves opposite ; capsules the size of a cherry, ...*E. oppositifolia.*

× × *Leaves quite entire, alternate. All parts glabrous,* ....*E. holophylla.*

EUPHORBIA.—(*Fleshy trees or tuberous shrubs*).

× *Flowers in dichotomous cymes or rarely solitary, above the scars of the fallen leaves or supra-axillary. Floral leaves absent.*

O *Unarmed.*

\+ *Flower-heads sessile or nearly so, solitary or rarely almost ternary.*

A tuberous simple-stemmed shrub, the stem terete, ...*E. sessiliflora.*

\+ + *Flower-heads in peduncled dichotomous cymes.*

Branches flattened and winged-dilated, crenate-sinuate, ...*E. epiphylloides.*

O O *Armed with paired short stipulary thorns.*

† † *Styles 2-cleft.*

Branches angular 3- occasionally 4- or 5-winged, the wings fleshy, sinuately repand, ...*E. antiquorum.*

† † *Styles simple, thickened at base.*

Branches more or less regularly 5-angular, the large protuberances placed serrately in sinuate repand longitudinal rows, ...*E. neriifolia.*
Branches terete, short, fleshy tubercled, ...*E. Nivulia.*

× × *Cymes sessile or nearly so, clustered, terminal or in the forks of the branch-whorls. Floral leaves none.*

Branches terete, elongate ; leaves very small, linear, ...*E. Tirucalli.*

× × × *Cymes several, terminal, furnished with bright-coloured (white or crimson) floral leaves.*

Unarmed ; leaves herbaceous, long-petioled, ...*E. pulcherrima.*

URTICACEÆ.

Conspectus of genera.

* Style 1, simple. Ovule solitary, erect. Seeds albuminous. Leaves various.

O Perianth free, the female one usually 4-rarely 2-parted or -lobed. Often urent. Leaves decussately opposite or spirally alternate.

LAPORTEA.—Female perianth 4-parted or -lobed, dry after defloration. Stigma often filiform. Achene discoid, smooth. Urent perennials or shrubs, often growing out into trees.

O O Female perianth free or more or less adhering or adnate to the ovary, tubular, very short or wholly wanting. Leaves opposite or alternate. Not urent.

× Female perianth tubular, free or only adhering to the ovary, in fruit dry or membranous, the mouth conspicuously 2-4-toothed.

BOEHMERIA.—Stigma in fruit persistent, linear. Perianth in fruit neither winged nor ribbed.

× × Female perianth free, variously toothed or lobed at the mouth, in fruit fleshy or succulent.

SARCOCHLAMYS.—Fruiting perianth ventricose, laterally contracted at mouth. Stigma capitate, persistent in fruit. Flowers spicate, the spikes simply branched.

× × × Female perianth adnate to the ovary, the limb minute, toothed or almost entire.

OREOCNIDE.—Fruit dry, resting in a fleshy cup. Stigma almost peltate with long-fringed borders, persistent in fruit.

MOROCARPUS.—Fruit berry-like. Stigma penicillate-capitate, persistent in fruit.

* * Style usually simple, rarely 2-3-cleft,-lobed or-toothed. Ovules solitary, parietal or suspended. Seeds with or without albumen. Pericarp enclosed in the fleshy or dry perianth, indehiscent or rarely 2-valved. Leaves alternate or distichous.

O Filaments straight or nearly so in bud, never inflexed.

× Female flowers numerous, in heads or on a fleshy receptacle; the males in separate inflorescences.

ARTOCARPUS.—Stamen 1. Syncarp usually large. Unarmed trees.

× × Female flowers numerous, along with the males arranged within a hollow, or on an explanate, fleshy receptacle.

FICUS.—Receptacle closed or at the bracted apex perforated; achens not immersed.

DORSTENIA.—Receptacle explanate; achens immersed, with ripening elastically ejected.

× × × Female and male flowers separate, the former solitary within a many-bracted involucre.

ANTIARIS.—Male flowers densely packed within an imbricately bracted involucre expanding afterwards. Fruit drupaceous.

O O Filaments inflexed in bud.

× Flowers in dense heads or spikes.

BROUSSONETIA.—Ovary shortly stalked. Style simple. The female flowers mixed with scale-like sterile flowers. Milky juice. Fruits sappy.

MORUS.—Ovary sessile, 2-celled. Styles 2. No scale-like sterile flowers. Juice watery. Perianth in fruit sappy.

× × Female flowers solitary or in poor racemes.

BALANOSTREBLUS.—Perianth entire, enclosing the fruit, fleshy.

STREBLUS.—Perianth 4-parted in fruit enlarged, fleshy.

TAXOTROPHIS.—As former, but perianth in fruit leafy.

* * * Stigmas 2. Ovule solitary, suspended. No albumen. Embryo flat, spirally coiled or genuflex. Fruit a crustaceous achene. Twining or erect herbs.

CANNABIS.—Erect herbs.

* * * * Style simple or 2. Ovule solitary, suspended. No albumen. Leaves alternate. Fruit a drupe or samara. Trees or shrubs.

O Anthers introrse; filaments inflexed in bud. Fruit a drupe.

TREMA.—Perianth persistent. Stigmas 2, persistent, linear, free or connate at base. Evergreen trees with penninerved or at base 3-7-nerved leaves.

SOLENOSTIGMA.—Perianth deciduous. Stigmas 2, persistent, at apex dilated-emarginate or 2-lobed. Evergreen trees with 3-nerved leaves.

CELTIS.—Perianth deciduous. Stigma simple, filiform, deciduous. Deciduous trees or shrubs with 3-nerved leaves.

O O Anthers extrorse. Fruit a samara. Leaves penninerved.

ULMUS.—Filaments straight in bud. Perianth marcescent or caducous.

LAPORTEA.—Only tree, ... *E. crenulata.*

BOEHMERIA.

× *Flowers in sessile heads or clusters, axillary or above the scars of the fallen leaves.*

|| *Leaves glabrous above,* .... *B. Malabarica.*

|| || *Leaves sparingly hairy above.*

Leaves cordate-ovate; flower-bracts numerous, large, scarious, brown; perianth 2-toothed with a solitary ovary and style, ... *B. Helferi.*

As former but perianth with usually 2 ovaries, and styles, ... *B. didymogyne.*

Leaves usually ovate to oblong-lanceolate; flower-bracts minute; perianth 2-4-toothed, ... *B. diffusa.*

× × *Flower-heads globular, sessile, forming more or less slender often interrupted spikes in the axils of the leaves, these spikes sometimes collected along short leafless shoots in a spiked raceme or panicle.*

Leaves lanceolate, pustulate-rugate above, the pustules terminated by a perforated gland, ... *B. macrophylla.*

Leaves broadly ovate, even or rugate, without glands, more or less hairy on both sides, coarsely serrate, ... *B. caudata.*

All adult parts, also the leaves, quite glabrous, minutely serrate or entire, usually 2 glanded at the base of the midrib, ... *B. Hamiltoniana.*

SARCOCHLAMYS.—Only species, ... *S. pulcherrima.*

OREOCNIDE.—(Leaves penninerved).

Leaves entire, softly pubescent beneath, ... *O. acuminata.*

Leaves crenate-serrate towards apex, usually pubescent along the nerves beneath, *O. sylvatica.*

MOROCARPUS.

Branchlets pubescent or tomentose; leaves lanceolate to oblong-lanceolate, ... *M. longifolius.*

Branchlets robust and smooth; leaves ovate to broadly ovate, ... *M. Wallichianus.*

ARTOCARPUS.

* *Syncarps prickly-echinate.*

× *The prickles of syncarp bristly-setose.*

Leaves bristly scabrous above, softly pubescent beneath, ... *A. calophylla.*

Leaves glabrous above, slightly appressed pubescent along the nerves beneath, ... *A. rigida.*

× × *The prickles of syncarp smooth.*

Leaves velvety-tomentose beneath, minutely pubescent above, ...*A. rufescens.*

* * *Syncarp tubercled, the tubercles usually scabrously setulose.*

Leaves, especially beneath, scabrous-pubescent; syncarp as large as a fist, globular, pendulous on a slender peduncle, ... *A. Chaplasha.*
All parts quite glabrous; syncarp clavate to oblong, 1-1½ ft. long, ...*A. integrifolia.*

* * * *Syncarp smooth or nearly so, usually velvety or velvety tomentose.*

All parts quite glabrous, ... *A. Gomeziana.*
Shoots densely rusty or tawny pubescent; leaves shortly scabrously pubescent, *A. Lacoocha.*

FICUS.

* *Receptacles by pairs or solitary from the axils of the leaves or from above the scars of the fallen ones (never from the stem or root-shoots).*

O *Leaves more or less thick coriaceous to almost chartaceous, glabrous or rarely puberulous or floccose-villous beneath; petioles strong and continuous, or slender and jointed at apex. Receptacles various, usually smooth, rarely villous or pubescent, not hispid or hairy within, the mouth closed by 3 to 4 blunt closely appressed bracts. Male flowers monandrous. Stigma filiform-elongate, very rarely 2-cleft. Trees or arboreous stem-clasping climbers.*

□ *Petioles usually thick and short, rarely slender, not jointed and thickened at the insertion of the blade.*

‡ *Leaves more or less firmly coriaceous, 4-10 in. long, rarely shorter, the petiole strong and thick, and usually short in comparison with the blade. Receptacles sessile, the size of a large or small cherry.*

× *Leaves 3-5-plinerved, shortly pubescent or, while young, floccose-villous beneath or on both sides; receptacles puberulous, floccose or tomentose, more or less glabrescent.*

Leaves shortly pubescent beneath, blunt or apiculate; young shoots and stipules puberulous, ... *F. Bengalensis.*
Leaves glabrous, shortly acuminate; young receptacles floccose; stipules rusty or tawny villous-pubescent, ... *F. Mysurensis.*
Leaves and receptacles while young covered with a floccose rusty-coloured dawn; stipules rusty or tawny villous-pubescent, ... *F. pilosa.*

× × *Leaves quite glabrous.*

Branchlets roughish from rusty coloured asperities; leaves penninerved, shortly acuminate; bracts deciduous, ... *F. onusta.*
Glabrous; leaves triplinerved, blunt or blunt apiculate; bracts glabrous, persistent, ... *F. laccifera.*
As former, but young shoots, stipules and bracts puberulous, the last falling off already in bud, ... *F. altissima.*
Glabrous; leaves triplinerved, acuminate, in a dried state brownish beneath; bracts glabrous, persistent, ... *F. Indica.*
Glabrous, leaves very thick coriaceous, rounded or apex at base, the lateral nerves very thin and inconspicuous; petiole short, ... *F. obtusifolia.*

‡ ‡ *Leaves as in former, but receptacles on a shorter or longer peduncle, the size of a cherry to that of a plum.*

Glabrous; leaves penninerved, pale coloured beneath; peduncles very short and thick, villous-pubescent, ... *F. annulata.*
Glabrous; leaves penninerved, acuminate; the peduncles 3-5 lin. long, glabrous, . . *F. Thomsoni.*

‡ ‡ ‡ *Leaves large, coriaceous, the lateral nerves all thin and parallel-running, very close together.*

Glabrous; petiole short and thick; stipules up to 6 in. long, red, ... *F. elastica.*

Leaves rather small, 2-3 in. long, rarely longer, thin coriaceous to almost chartaceous, the nerves thin, more or less crowded and parallel running, with a more or less distinct transverse veination or netveination between.

× *Receptacles sessile or shortly peduncled, the size and shape of a pea or smaller. All parts glabrous.*

Leaves more or less narrowed at base, coriaceous, blunt to blunt-apiculate, ...*F. retusa.*
Leaves chartaceous, long but bluntish acuminate, the nerves and netveination prominent on both sides ; receptacles very shortly peduncled, the size of a pepperkernel, ...*F. affinis.*
As former, but receptacles sessile, as large as a pea,............................*F. rhododendrifolia.*

× × *Receptacles the size of a cherry or plum. All parts glabrous.*

Receptacles contracted in a slender stalk ; nerves inconspicuous, almost immersed and rather distant, ...*F. nuda.*
Receptacles sessile or slightly tapering in a very thick base ; nerves crowded and along with the transverse veination strongly prominent on both sides, ...*F. benjamina.*

□ □ *Petioles longer or shorter, slender, jointed and thickened at the insertion of the blade ; leaves chartaceous to thin coriaceous.*

× *Receptacle sessile or nearly so, the size and shape of a pea. Leaves elliptical or nearly so.*

† *Receptacles glabrous.*

Leaves almost chartaceous, penninerved, the nerves and veination prominent on both sides ; petiole 1-2 in. long, ...*F. infectoria.*
Leaves coriaceous and often rigid, penninerved, the nerves rather obsolete, the petiole as long or longer than the blade, ...*F. geniculata.*

† † *Receptacles villous-tomentose.*

A tree, in foliage quite resembling the former,...*F. insignis.*

× × *Receptacles usually the size of a small cherry, glabrous ; leaves cordate or nearly so, the petiole very long and slender.*

Leaves opaque, white-dotted on the upperside, rather shortly acuminate, undulate, *F. Rumphii.*
As former, but the leaves not white-dotted, repand-toothed and the nerves crowded, conspicuous and almost rectangularly diverging, ...*F. caloneura.*
Leaves very glossy, not white-dotted, undulate, abruptly and very long caudate-acumidate, ...*F. religiosa.*

O O *Leaves membranous to chartaceous, rarely rigidly coriaceous, glabrous or usually more or less hairy. Receptacles various, sessile or peduncled, often narrowed or constricted in a stalk, the mouth usually furnished with more than 3 scales, variously arranged and somewhat spreading or erect (never closely appressed), so as to shew also the inner scales, occasionally additional scales arising from the circumference of the receptacle itself. Male flowers with 2 to 6 (rarely 1) stamens. Stigma various, usually funnel-shaped or laterally produced in one or two short lobes, rarely simple.*

△ *Receptacles not stalked or tapering at base.*

† *Receptacles globular to turbinate, sessile, more or less appressed hispid or pubescent.*

Tawny-or brown-hispid ; leaves at base 5-7-nerved, usually lobed ; bracts of receptacles 3-4 lin. long, ...*F. triloba.*
Tawny or greyish hispid ; leaves at base usually 3-nerved, often lobed ; bracts of receptacles only about a line long, ...*F. hirta.*
Tawny or brown-tomentose and pubescent ; leaves simple, at base 3-nerved, almost entire, ...*F. chrysocarpa.*

† † *Receptacles globular to turbinate, peduncled, the peduncle usually short, sometimes very short. Young shoots pubescent, adult leaves more or less glabrescent.*

× *Receptacles the size of a cherry, pubescent.*

Leaves glabrous; petioles $\frac{1}{4}$-$\frac{1}{2}$ in. long ; peduncle usually less than a line long,...*F. pubigera.*
Leaves slightly pubescent beneath ; petioles 1-1$\frac{1}{2}$ inch long ; peduncles 2-3 lin. long*F. lepidosa.*

× × *Receptacle the size of a pea, glabrous.*

Leaves thin membranous, glabrous or pubescent along the nerves beneath, ...*F. Lamponga.*

△ △ *Receptacles stipitate i. e. at base contracted or tapering in a longer or shorter stalk.*

† *Stipitate receptacles sessile or nearly so. Leaves glabrous or nearly so.*

× *Leaves rigidly but thin coriaceous, yellow and brown variegated beneath.*

Receptacles glabrous or somewhat scabrous ; leaves acute or apiculate, ...*F. excelsa.*

× × *Leaves thin but rigidly chartaceous, prominently netveined on both sides.*

Receptacles hispid-scabrous; leaves long caudate-acuminate,........................*F. radicans.*

× × × *Leaves thick membranous, long-acuminate, the netveination not prominent, at least not above.*

Leaves entire; receptacles usually with a few scales on their circumference; stalk of receptacle scaled, ...*F. subulata.*
Leaves crenate-serrate towards apex; receptacles and their stalk not scaled, *F. uniglandulosa.*

† † *Stalked receptacles longer or shorter peduncled.*

× *Glabrous or almost glabrous trees. Receptacles abruptly stalked. Leaves not tessellate-netveined beneath.*

§ *Receptacles the size of a pea or thereabouts, smooth; petiole* $\frac{1}{4}$—$\frac{1}{2}$ *inch long.*

Leaves rigidly chartaceous, bluntish or blunt-acuminate, vividly green, ...*F. vasculosa.*
Leaves thin but rigidly chartaceous, sharply acuminate, brownish beneath, ...*F. nervosa.*

§ § *Receptacles the size of a plum, along with the long peduncle scabrous puberulous.*

Leaves large, glaucous-green, more or less rounded at apex; petiole 1-2 in. long, ..*F. callosa.*

× × *Glabrous or almost glabrous often rooting climbers. Receptacles abruptly and shortly peduncled. Leaves rigidly coriaceous, usually tessellate-netveined beneath.*

§ *Leaves not tessellate-netveined beneath. Receptacles the size of a pea to that of a small cherry, the flowers mixed with bristles.*

Receptacles quite smooth, ...*F. ramentacea.*

§ § *Leaves tessellate-netveined beneath. Flowers not mixed with bristles.*

|| *Receptacles large, the size of a pigeon's or hen's egg.*

Glabrous; leaves blunt; receptacles smooth, apple-shaped, ...*F. pomifera.*

|| || *Receptacles the size of a pea or larger.*

Receptacles scabrous, ...*F. scandens.*

× × × *Roughly puberulous low shrubs, creeping or ascending, receptacles more or less abruptly stalked.*

Leaves serrate; receptacles the size of a cherry, white-tubercled, ...*F. scabrella.*
Leaves coarsely sinuate and almost lobed; receptacles the size of a pepper kernel, scabrously pubescent, ...*F. anastomozans.*

× × × × *Glabrous or pubescent erect or creeping shrubs. Receptacles gradually narrowed in a stalk and therefore more or less pear-shaped; peduncle usually long and conspicuous.*

§ *Creeping low shrub. Leaves serrate.*

Leaves variously shaped from cordate and palmately lobed to cordate-lanceolate and undivided, especially beneath, scabrous-pubescent, ...*F. heterophylla.*

§ § *Erect shrubs. Leaves entire, more or less lanceolate to linear-lanceolate.*

Leaves and receptacles glabrous, ...*F. ischnopoda.*
Leaves greyish pubescent beneath; receptacles and peduncles pubescent, ..*F. subpyriformis.*

* * *Receptacles in clusters or by pairs, forming racemes or spikes arising from tubercle-like or reduced leafless ramose branchlets or from bracted shoots from the roots or stems (in a few species arising at the same time from the axils of the leaves).*

O *Leaves more or less membranous, never coriaceous, glabrous or variously pubescent. Receptacles more or less depressed-pyriform to pyriform and turbinate, often more or less scaled on their circumference; mouth strongly umbilicate by numerous more or less erect bracts; male flowers often monandrous. Stigma usually thickened and papillose.*

× *Leaves glabrous, or pubescent beneath, entire.*

† *Leaves more or less oblong-lanceolate, penninerved; receptacles the size of a pea or thereabouts, scaly. Trees.*

Receptacles obsoletely ribbed, glabrous, long-peduncled,........................*F. Ribes.*

† † *Leaves lanceolate to linear, penninerved. Receptacles the size of a cherry or larger. Shrubs.*

Receptacles ribbed, along with the peduncle rusty-hirsute ; leaves thinly seabrous-pubescent beneath, ... *F. pyrrhocarpa.*

Glabrous ; receptacles ribbed, smooth, pustulate, ... *F. lanceolata.*

† † † *Leaves more or less broadly oblong to oblong-lanceolate, 3-nerved at base. Receptacles the size of a plum to that of an apple. Trees.*

Receptacles on long glabrous peduncles; young shoots glabrous; receptacles glabrous,.. *F. glomerata.*

Receptacles on very short pubescent peduncles; young shoots pubescent; receptacles glabrous, ... *F. Chittagonga.*

As former, but receptacles whitish-silky-pubescent, ... *F. leucocarpa.*

† † † † *As former, but leaves penninerved, glabrous.*

Leaves thick membranous, acute at base; receptacles long-peduncled, usually roughish-brown, ... *F. fistulosa.*

Leaves thin chartaceous, rounded at the somewhat narrowed base; receptacles long-peduncled, smooth, ... *F. macropoda.*

× × *Leaves glabrous or only beneath pubescent, more or less crenate-serrate, more or less rounded or cordate at base.*

† *Leaves glabrous, 3-5-nerved at base. Receplacles very large.*

Receptacles long-peduncled, glabrous, not ribbed, ... *F. pedunculata.*

Receptacles shortly and densely pubescent, indistinctly ribbed, ... *F. regia.*

† † *Leaves pubescent beneath, 3-5-nerved at base. Receptacles very large.*

Peduncles and receptacles densely hispid-tomentose, ... *F. Roxburghii.*

× × × *Leaves on both sides more or less roughish pubescent, serrate. Receptacles usually more scaly round their circumference.*

† *Leaves not oblique. Receptacles arising from radical shoots and at the same time from the axils of the leaves, pyriform.*

Leaves usually opposite; receptacles and peduncles greyish-pubescent,.......... *F. hispida.*

† † *Leaves oblique, base on one side produced in a large half-cordate lobe. Receptacles scaly, roughish pubescent.*

Receptacles on longer or shorter peduncles, more or less pyriform,................ *F. cunia.*

Receptacles sessile or nearly so, more or less turbinate, ... *F. conglomerata.*

ANTIARIS.—Only species, ... *A. toxicaria.*

BROUSSONETIA.—Only species, ... *B. papyrifera.*

MORUS.

Female and male spikes 4 to 5 in. long, the males villous,.................. *M. lævigata.*

Male spikes ½ an inch long; syncarps 3-4 lin. long, oblong, purplish, glabrous, ..*M. Indica.*

STREBLUS.

* *Male flowers in short peduncled heads, the heads sometimes androgynous; the females solitary peduncled. The broad perianth-segments enlarging and turning fleshy, entirely enclosing the achene.*

All parts scabrously pubescent; fruiting perianth fleshy, scabrous, ... *S. aspera.*

* * *Male flowers in short-peduncled small racemes; the females in very loose racemes; perianth-segments narrow, little enlarging and embracing only the base of the achene.*

All parts glabrous or nearly so; fruiting perianth-segments smooth, ... *S. Zeylanica.*

* * * *Male flowers in sessile bracted-involucred clusters; the females solitary on slender peduncles; perianth-segments leafy, much longer than the achene and involucre-like.*

All parts glabrous, ... *S. taxoides.*

Spines and young shoots puberulous; leaves 1-1½ in. long, ... *S. microphylla.*

TREMA.

Leaves serrulate; all parts more or less pubescent,.......................... *T. orientalis.*

Leaves serrulate; all parts minutely puberulous, ... *T. Timoriensis.*

SIRRONIERA.

O *Female flowers in cymes; drupes more or less compressed.*

Leaves pubescent beneath ; stigmatic styles sessile, ... *S. nervosa.*

O O *Female flowers solitary, on a longer or shorter axillary peduncle.*

Leaves 5-8 inch. long, very glossy and almost polished, ... *S. lucida.*
Leaves 3-4 inch. long, opaque on both sides, serrulate, ... *S. cuspidata.*

SOLENOSTIGMA.—Only species, ... *S. Wightii.*

CELTIS.

Leaves tomentose, especially beneath, entire, fruiting peduncles solitary in the leaf axils, ... *C. mollis.*
Leaves glabrous, serrate; fruiting peduncles solitary or by 2-3 in the leaf axils, simple, ... *C. Hamiltonii.*
Leaves glabrous, remote serrulate ; fruiting peduncles forming a tomentose loose poor cyme in the axils of the leaves, ... *C. cinnamomea.*

ULMUS.

* *Perianth-segments deciduous, free to near the base.*

Leaves entire, ... *U. integrifolia.*

* * *Perianth campanulate or turbinate-campanulate, marcescent-persistent.*

Leaves serrulate, ... *U. lancifolia.*

JUGLANDACEÆ.

Conspectus of genera.

JUGLANS.—Fruit a large drupe with a fleshy pericarp.
ENGELHARDTIA.—Drupe small, dry, seated on the enlarged winglike-3-lobed bract.

JUGLANS.—Only species with lacunose-wrinkled nuts, ... *J. regia.*

ENGELHARDTIA.

Leaves entire, without netvenation, glabrous ; base of female bracts hispid, ... *E. spicata.*
Leaves serrate, with strong netvenation and pubescent beneath ; base of female bracts glabrous, ... *E. serrata.*
As former, but leaves entire, ... *E. aceriflora.*

SALICINEÆ.

Conspectus of genera.

SALIX.—Bracts of catkins entire. Torus gland-like.

SALIX.—Only species, ... *S. tetrasperma.*

AMENTACEÆ.

Conspectus of genera.

* Ovary 1-celled with a solitary erect ovule. Fruit drupaceous, covered with resinous secretions.

MYRICA.—Male and female catkins sessile, erect. Scales of the male catkins broad, imbricate. Anther longer than the filaments.

* * Ovary 2-celled, with a solitary suspended ovule in each cell. Nuts small, often winged, one-celled, combined with the scales in a sort of cone

BETULA.—Scales of the male catkins stalked. Female catkins cylindrical, compact. Nuts not connate with the involucre.

CARPINUS.—Scales of the catkins sessile. Female catkins loose, spike-like. Bracts solitary, each in a 3-lobed leafy involucre.

* * * Ovary 3-9-celled, with 2 suspended ovules in each cell, most of the ovules abortive. Nuts solitary or several, rather large, bony or coriaceous, more or less enclosed in the enlarged wingless dry spiny, scaly or smooth involucre, or the involucre reduced to a scaly or annular cup, in which the solitary nut rests (acorns).

QUERCUS.—Nuts solitary, resting on a scaled or lamellate-annular cup, exserted or at least with a circular opening at the apex of the cup.

CASTANEA.—Nuts solitary or by 2-3 wholly enclosed in the enlarged spiny or zonate involucre.

MYRICA.—Only species, ...M. *Nagi.*
BETULA.—Only species, ...*C. cylindrostachya.*
CARPINUS.—Only species, ...*C. viminea.*
CASTANEA.

* *Fruits armed with simple or compound sharp spines.*
† *Leaves sharply serrate.*

All softer parts and leaves beneath tawny tomentose, ...*C. Indica.*

† † *Leaves entire, or remotely and obsoletely serrate towards the apex.*
O *Fruit more than an inch in diameter, the spines long and much crowded.*

Adult leaves thick and rigidly coriaceous, with very strong nerves, ...*C. diversifolia.*
Leaves chartaceous, more or less silvery beneath,............................*C. argentea.*
Leaves very large, about a foot long by 3-5 in. broad, glossy on both sides, ..*C. Roxburghii.*

O O *Fruits less than an inch thick, usually the size of a cherry, the spines often recurved and distant.*

Leaves entire, or remotely serrate towards apex, glabrous or minutely brownish tomentose beneath, ...*C. tribuloides.*

* * *Fruits armed with very short pointed or blunt cones, or caducous tubercles, and then afterwards unarmed and zonate.*
† *The fruiting involucre of a very thick coriaceous texture.*

Fruits armed with short cones; leaves uniformly green, ...*C. rhamnifolia.*
Adult fruits unarmed, zonate, grey; leaves more or less silvery or coppery beneath, ...*C. inermis.*

† † *Fruiting involucre of a very thin texture.*

Fruits blackish, smooth, with 4 or 5 scared annular rings; leaves more or less silvery or coppery beneath, ...*C. lanceæfolia.*

QUERCUS.

* *The cup beset with more or less crowded imbricate scales, the scales sometimes becoming obsolete with ripening of the fruit and appearing as concentric thickened zones.*
× *Scales linear or subulate, more or less spreading. Cup velvety, brown.*

Leaves almost glabrous; cup almost wholly enclosing the nut, only at top with a circular opening, ...*Q. fenestrata.*
As former, but nut far exserted, ...*Q. acuminata.*
Leaves more or less pubescent beneath; nut exserted,........................*Q. lappacea.*

× × *Scales broad and short, appressed to the cup.*
O *Fruiting peduncle several inches long, the fruits numerous and more or less spicate. Cups (usually greyish) velvety; nut exserted.*
† *Leaves glabrous.*

Shoots glabrous; cup about an inch in diameter, the borders often reflexed; leaves glossy, uniformly green, ...*Q. Amherstiana.*
Shoots greyish puberulous; cup only about ½ an inch in diameter; leaves rather opaque and somewhat glaucous, ...*Q. polystachya.*
As former, but the reticulation and venation of leaves wanting,................*Q. Bancana.*
Shoots greyish-puberulous; cup about 5-8 lin. across; leaves glaucous beneath, ..*Q. Thomsoni.*
Shoots smooth; leaves glossy, one-coloured; cup about 5-8 lin. across; flowers in densely whitish-tomentose appressed oblong clusters, ...*Q. spicata.*

† † *Leaves pubescent beneath.*

Cups usually connate, thickened-zonate, about ½ inch or less across; leaves coarsely and obsoletely repand towards apex, ...*Q. Lindleyana.*

O O *Fruiting peduncle short, 1 rarely up to 2 inch. long. Cup wrinkled-rough, but glabrous, brown.*

Cup obsoletely scaly-zonate, about 7-8 lin. across, almost resinous; leaves smooth, repand-serrate at apex, ...*Q. eumorpha.*

* * *Cup consisting of lamellate, entire, crenate or toothed, concentric rings. Fruiting peduncle 1-2 in. long, rarely somewhat longer, usually few-fruited. Leaves repand-serrate, at least towards apex.*
O *Nut depressed, hardly exserted.*

Cup about an inch in diameter, softly tawny or fulvous villous; petioles usually tawny or fulvous pubescent or villous; the nerves curved, ... *Q. velutina.*

O O *Nuts ovoid, exserted.*

Cup about an inch across, softly tawny or fulvous villous; petioles smooth; leaves somewhat glaucous beneath, the nerves rather straight, ... *Q. semiserrata.*

Cup only ½ an inch across, greyish velvety; petioles slender, glabrous; leaves somewhat rugate, glaucous beneath, ... *Q. Brandisiana.*

Cup more than an inch wide and deep, greyish-velvety; leaves smooth, one-coloured, ... *Q. mespilifolia.*

CASUARINEÆ.

Conspectus of genera.

CASUARINA.—Only genus.

CASUARINA.—Only species, ... *C. equisetifolia.*

CONIFERÆ.

Conspectus of genera.

* Females in cones, consisting of numerous imbricate woody or coriaceous scales. Ovary without a surrounding receptacle.

PINUS.—Cones dry, the scales free, usually woody. Leaves acicular, solitary or by 2-5, in a short sheath.

* * Females solitary, the ovary and nut surrounded by a single or double often fleshy receptacle, enclosed in the enlarged scales and often resembling a fleshy or dry drupe.

DACRYDIUM.—Bracts in males dilated at apex. Fruits seated within the bracts and surrounded by the outer loose somewhat fleshy or coriaceous involucre. Leaves usually dimorphous, scale-like and acerose.

PODOCARPUS.—Bracts in males not or little dilated. Fruit fleshy, inversed, seated on a fleshy thick receptacle. Leaves many or 1-nerved, often broad.

PINUS.

Leaves by 3 in the sheath; opercle of scales not zonate, ... *P. Kasya.*

Leaves by pairs in the sheath; opercle zonate, ... *P. Merkusii.*

DACRYDIUM.—Only species, ... *D. elatum.*

PODOCARPUS

* *Leaves opposite or nearly so, many nerved.*

Leaves oblong-lanceolate, glabrous, ... *P. latifolia.*

* * *Leaves scattered,* 1-*nerved.*

Glabrous; leaves linear to linear-lanceolate, ... *P. bracteata.*

GNETACEÆ.

Conspectus of genera.

GNETUM.—Only genus.

GNETUM.

Ovary and fruits sessile; erect shrub or treelet, ... *G. gnemon.*

CYCADEÆ.

Conspectus of genera.

CYCAS.—Only genus.

CYCAS.

* *Fruits densely tomentose,* .... *C. revoluta.*

* * *Fruits, at least when ripe, glabrous.*

O *Trunk* 6 *to* 30 *ft. high, epigæous. Ovules from* 2 *to* 5 *on each side of the frond-stalk.*

Female spadices with a pectinate-toothed sterile lamina tapering in a pectinate-serrate acumen, ... *C. circinalis.*
Female spadices with a sparingly toothed or almost entire sterile lamina, the acumen quite entire, ... *C. Rumphii.*
Female spadices with a very broad deeply pectinate lacerate sterile lamina, the acumen entire, ... *C. pectinata.*

O O *Trunk subterranean or shortly protruding from the ground. Ovules solitary on each side of the frond-stalk.*

Female spadices with a very broad deeply pectinate lacerate sterile lamina, the acumen broad and as long as the lamina itself, with a few spiny serratures,........*C. Siamensis.*

B. MONOCOTYLEDONS.

PALMAE.

Conspectus of genera.

* Fruit covered with retrorsely imbricate scales or bristles. Seeds often arillate.

× Flowers spirally arranged, forming a more or less dense cylindric spike.

ZALACCA.—Spathes elongate, cleft to the base. Stem-less or almost stem-less erect palms, more or less armed.

× × Flowers distichous.

CALAMUS.—Spathes tubular, persistent. Scandent, rarely erect palms, more or less armed.

* * Fruits not scaly, smooth or variously tubercled reticulate or roughish. Seeds without arillus.

× Leaves fan-shaped. Perianth in both sexes complete.

+ Carpels apocarpous or united at the apex or with their styles, usually one only of them coming to perfection.

O Inflorescence terminal. Corolla consisting of 3 free petals.

CORYPHA.—Flowers hermaphrodite, clustered. Stamens hypogynous. Drupe corticate. Pinnae united into a blade. Erect palms dying off after flowering.

O O Inflorescence axillary. Corolla 3-parted. Drupe sappy.

LIVISTONA.—Flowers hermaphrodite, clustered. Stamens perigynous. Albumen with a cavity filled with the intruding integuments. Pinnae connate in a blade.

CHAMEROPS.—Flowers polygamous, several together. Stamens hypogynous. Albumen with a longitudinal furrow. Pinnae united into a blade. Erect palms.

LICUALA.—Flowers hermaphrodite, solitary or by 2 or 3. Stamens perigynous, the filaments inserted at the throat and united in a ring. Pinnae free or by 2 or more united into broader or narrower flabellate segments.

+ + Carpels syncarpous, the ovary 2-4 celled with as many ovules. Drupes 2-4-celled with as many seeds.

BORASSUS.—Spathes incomplete, several. Corolla imbricate in bud. Drupe large, fleshy-fibrous. Seeds pomaceous with an apical pore. Pinnae united into a blade. Erect palms.

× × Leaves pinnate, twice pinnate or pinnatisect, rarely almost entire. Perianth complete in both sexes.

+ Carpels 3, distinct.

PHOENIX.—Diœcious, spathes 1 or 2, boat-shaped. Corolla in males valvate, in the females imbricate. Drupes sappy, singly. Albumen homogeneous. Lower pinnae spiny reduced. Erect palms.

+ + Ovary syncarpous, 1-3 celled, with as many ovules.

O Spathes several, tubular or sheathing, persistent. Pinnae of leaves often fascicled, jagged or erose-toothed. Erect palms.

† Leaves bipinnate.

CARYOTA.—Flowers monoecious on the same spadix. Stamens indefinite. Petals in females imbricate in bud. Drupe sappy. Albumen ruminate.

† † Leaves simply pinnate. Petals in females valvate.

WALLICHIA.—Flowers monoecious on different spadices, rarely dioecious. Ovary 2-celled. Stamens often definite. Drupe sappy. Albumen homogeneous.

ARENGA.—Flowers monoecious on different spadices. Stamens indefinite. Ovary 3-celled. Drupe depressed 3 angular, rather dry. Albumen homogeneous.

O O Spathes 1 or 2, boat- or spindle-shaped, deciduous. Leaves simply pinnate, the pinnae solitary, never fascicled. Erect palms.

† Spathes boat-shaped. Putamen not perforated. Albumen solid, homogeneous or ruminate.

ARECA.—Flowers monoecious, immersed in the cavities of the rachis. Stamens definite or indefinite. Albumen ruminate. Pinnae irregularly united into broader or narrower segments, rarely all united into a 2-cleft blade.

† † Spathe spindle-shaped or clavate. Putamen at the base 3-porous. Albumen hollow.

COCOS.—Monoecious on the same spadix. Petals in females imbricate-convolute. Ovary 3-celled, only one of the cells ovule-bearing. Drupe large, woody. Albumen homogeneous.

× × × Perianth of females reduced to a few scales. Carpels 3, apocarpous. Male flowers in separate spadices surrounding the central solitary female-head. Leaves pinnate.

NIPA.—Spathes many, sheating, persistent. Male perianth 6-parted, valvate in bud. Stamens united by threes. Drupes woody, angular-turbinate, in a large dense head. Albumen homogeneous, hollow.

CALAMUS.

Erect, tufted; leaves white beneath. No tendrils whatever, ...*C. arborescens.*
Erect or nearly so, tufted; leaves uniformly green, without tendril; the sheaths and spathes with tendrils,.. *C. erectus.*

CORYPHA.

× *Trunk* 30 *feet and upwards. Petioles comparatively short.*

Trunk annular or smooth ; drupes the size of a wood apple, ...*C. umbraculifera*

Trunk spirally-groved from the scars of the fallen spirally disposed leaves ; drupes the size of a cherry, ...*C. elata.*

× × *Stem-less.*

Petioles 18 to 25 feet long ; drupes the size of a cherry,..............*C. macropoda.*

LIVISTONA.

Trunk 20-30 feet high ; spathes scurvy ; drupes globular,..............*L. Jenkinsiana.*

Trunk 40 to 60 feet high ; spathes smooth ; drupes elliptically obovoid,..............*L. speciosa.*

CHAMÆROPS. Only species, ...*Ch. Khasyana.*

LICUALA.

× *Calyx about* $\frac{1}{4}$ *to* $\frac{1}{3}$ *in. long.*

Flowers large. Leaves peltately-flabellate,..............*L. peltata.*

× × *Calyx* 1-2 *lin. long. Leaves palmately-flabellate.*

Trunk 4-8 feet long ; petioles aculeate-bordered all their length ; calyx about a line long ; flowers small,..............*L. paludosa*

Almost stem-less ; petioles at the upper third part unarmed ; calyx $1\frac{1}{2}$ lin. long ; flowers small, ...*L. longipes.*

BORASSUS.—Only species, ...*B. flabelliformis.*

PHOENIX.

× *Spathes smooth ; flowers supported by a small subulate bract.*

Stemless ; petioles rather long and slender, spiny-armed, ...*Ph. acaulis.*

× × *Spathes covered by a brown scurf ; flowers without a bract.*

Robust, simple-stemmed ; petioles very short and dilated ; drupes about an inch long or longer,..............*Ph. sylvestris.*

Soboliferous, slender ; petioles long and slender ; drupes about $\frac{1}{2}$ an inch long,...*Ph. paludosa.*

CORYOTA.

Simple-stemmed ; male petals about $\frac{1}{2}$ an inch long by 3-4 lin. broad, ...*C. urens.*

Usually soboliferous ; male petals about 4 lin. long and only $1\frac{1}{2}$ lin. broad ; anthers mucronate to emarginate, ...*C. sobolifera.*

WALLICHIA.

Spadices smaller, the male spikes almost filiform ; male flowers yellowish : calyx tubular, about a line long, ...*W. caryotoides.*

Spadices very ample, the male spikes thick and rigid ; male flowers purplish or green : calyx minute, only $\frac{1}{3}$ lin. long, cupular, ...*W. disticha.*

ARENGA.—Only species,..............*A. saccharifera.*

ARECA.

* *Stamens* 6 *or* 3. *Stigmas* 9. *Female flowers lateral between the branchings, rarely axillary. Spadix often twice ramified, the extremities of the branchings often more or less filiform and covered with male flowers only.*

× *Stamens* 6. *Female flowers without a bract.*

Glabrous, simple-stemmed ; drupes as large as a hen's egg,..............*A. Catechu.*

× × *Stamens* 3. *Female flowers without a bract.*

Glabrous, simple-stemmed or stoloniferous, ...*A. triandra.*

* * *Stamens numerous. Stigma* 1. *Female flowers in grooved rows. Spadix simply ramified, rarely a simple spike.*

× *Flowers distichous.*

Tufted ; spadix branched ; sheathes etc. slightly scurvy, ...*A. costata.*

× × *Flowers* 3-*stichous.*

Simple-stemmed ; spadix slender, ramified or simple ; sheaths etc. scurvy,..............*A. gracilis.*

× × × *Flowers* 5- *or* 6-*stichous.*

Simple-stemmed ; sheaths etc. scurvy ; spadix simple, fleshy, as thick as the finger, *A. hexasticha.*

COCOS.—Only species, ...*C. nucifera.*

NIPA.—Only species,..............*N. fruticans.*

PANDANEÆ.

Conspectus of genera.

PANDANUS.—Only genus.

PANDANUS.

* *Drupes simple.*

× *Stigmas simple, spiny-acuminate, continuous with the apex of the drupe Stamens free ; anthers acuminate.*

Shrubby, soboliferous ; drupes quite smooth, ...*P. foetidus.*

× × *Stigmas spinescent and often depressed, usually 2-3-forked, horny and deciduous. Stamens palmately-connate ; anthers aristate or apiculate.*

Large robust tree ; leaves 2-4 in. broad, spiny-armed ; stigmas forkedly 2-3 spinous,..*P. furcatus.*
Slender and thin-stemmed ; leaves only 3-4 lin. broad, minutely spinulose ; stigmas very short, blunt, ...*P. graminifolius.*

* * *Drupes united into phalanges (rarely the one or other simple.) Stigmas sessile or nearly so, reniform or peltate. Stamens racemose-united ; anthers aristate.*

× *Leaves spiny along the margins and midrib.*

Leaves dark-green, 4—5 in broad, 15—18 feet long ; phalanges the size of the fist, *P. Leram.*
As former, but drupes only 2 in. long ; leaves gradually acuminate, ...*P. Andamanensium.*
Leaves glaucous or whitish, 3—5 feet long, ...*P. odoratissimus.*

× × *Leaves with smooth margins.*

As former, but all parts without spines, ...*P. laevis.*

LILIACEÆ.

Conspectus of genera.

DRACAENA.—Fruit a succulent berry. Ovary-cells with a solitary ovule.
CORDYLINE.—As former, but ovary-cells with several ovules.

DRACÆNA.

Panicle erect, rather stiff ; leaves sessile with a narrowed stem-clasping base,...*D. angustifolia.*
Racemes simple, peduncled ; perianth twisted ; leaves narrowed into a complicate shorter or longer petiole,..................... ....*D. spicata.*

MUSACEÆ.

Conspectus of genera.

MUSA —Large tree-like herbs. Berries pulpy, indehiscent. Seeds not arrillate.
RAVENALA.—Woody palm-like trees. Capsules woody, 3-valved. Seeds with a lazuli-blue arillus.

RAVENALA.—Only species, ...*R. Madagascariensis.*

GRAMINEÆ.

(Bamboos with articulate-inserted usually petioled leaves ; stems in all species woody.)

Conspectus of species.

* Stamens 3. More or less shrubby bamboos.

ARUNDINARIA.—Inner palea bi-carinate. Caryopsis with a membranous closely adnate pericarp. Style caducous.

** Stamens 6 or more, free or connate.

× Caryopsis small, wheat-like, with a membranous pericarp closely adnate to the seed, the style caducous.

O Filaments free.

BAMBUSA.—Inner palea boat-shaped and 2-carinate. Arboreous bamboos, rarely shrubby.

O O Filaments connate in a tube.

GIGANTOCHLOA.—Inner palea boat-shaped and 2-carinate. Arboreous bamboos.

OXYTENANTHERA. (Kurz, non Munro.)—Inner palea compressed-concave. Arboreous bamboos.

× × Caryopsis often rather large, the pericarp separating already before full ripeness into an outer firmly coriaceous or thick-fleshy wall (epicarp,) the inner cellular tissue in a dried state more or less closely embracing the seed, the style* persistent or rarely caducous.

O Inner palea boat-shaped and 2-carinate, or more or less deplanate with a 2-keeled apex.

† Caryopsis rather small.

DENDROCALAMUS.—Style collapsing in fruit. Caryopsis more or less terete. Inner palea boat-shaped, 2-carinate.

CEPHALOSTACHYUM.—Style long, stiff and persistent. Caryopsis somewhat compressed. Inner palea more or less deplanate or complicate on the back, or at least towards the apex 2-carinate.

† † Caryopsis the size of a wood-apple and irregular globular.

PSEUDOSTACHYUM.—Inner palea deplanate and boat-shaped. Large semi-scandent bamboos.

O O Inner palea concave or convolute.

+ Caryopsis very large, thick-fleshy, acuminate-beaked.

MELOCANNA.—Inner palea convolute. Stamens 6. Arboreous, rarely shrubby bamboos.

+ + Caryopsis rather small, dry and rigidly coriaceous.

† Stamens 6.

SCHIZOSTACHYUM.—Inner palea convolute, long. Caryopsis somewhat compressed, very long-beaked. Erect arboreous bamboos, rarely shrubby.

DINOCHLOA.—Inner palea concave, short. Caryopsis terete, ovate, acuminate. Climbing bamboos.

† † Stamens numerous (7-30.)

BEESHA.—Inner palea concave, twisted-convolute at the apex. Lodiculae 6-9. Caryopsis long-beaked. Arboreous bamboos.

ARUNDINARIA.—Only species,..*A. elegans.*

BAMBUSA.

O *Stigmas white.*

× *Shoot-sheaths not or obscurely auricled at the mouth.*

Small bamboo; Leaves small, glabrous, whitish pruinous beneath,......................*B. nana.*

× × *Shoot-sheaths conspicuously auricled or the blade decurrent into an auricle-shaped appendage.*

+ *Auricles polished and smooth, without fringes.*

Mouth of leaf-sheaths long-produced, the ligule as much produced and as long as the petiole,..*B. affinis.*

+ + *Auricles large, strongly fringed. Unarmed bamboos.*

Shoot-sheaths green and striped, appressed bristles brown; anthers purple or brown-purple, angles of inner palea white-ciliate,......................................*B. vulgaris.*

Shoot-sheaths white-powdered or almost pruinose, appressed bristles scanty, brown; anthers yellow; angles of inner palea ciliate,......................................*B. Tulda.*

Shoot-sheaths green and yellow, appressed bristles white; anthers purple; angles of inner palea quite smooth,......................................*B. polymorpha.*

O O *Stigmas purple. Spiny bamboos.*

Shoot-sheaths glossy-smooth, purple to scarlet; leaves small; angles of inner palea tomentose-ciliate; anthers yellow,......................................*B. arundinacea.*

GIGANTOCHLOA.

× *Spikelets white-hairy. Stigmas white.*

Shoot-sheaths almost 4 times shorter than the internodes, spreadingly tawny hispid, ligule nearly ½ in. long, erose-toothed; angles of inner palea white-pilose; anthers yellow,......................................*G. albo-ciliata.*

× × *Spikelets black or brown hairy.*

Spikelets ⅔—1 in. long; shoot-sheaths densely appressed black-setose on the sides; auricle smooth and polished, nude,......................................*G. Andamanica.*

* What Munro supposes to be the style is the conducting continuation of the inner cellular tissue which always remains closely connate with the mouth of the beak. I have studied the developement of the ovary of *Schizostachyum*, *Leleba* and *Bambusa*, and I have found that at a very early stage the structure of the ovary of these genera is quite the same. The whole ovary consists of minute oblong or elliptical closely packed and uniform cells which form also the plumose stigmas. Long before the anthers become developed the outer somewhat closer packed but not abruptly distinct wall indurates and the pollen-tubes have to pass for fecundation through the looser cellular inner tissue. This inner cellular mass becomes drier and drier but remains attached to the outer coat until the seed is perfectly ripe or the fruits are dried artificially. *Dendrocalamus* and *Pseudostachyum* form a transition from the so-called berry-bearing to the true bamboos. Munro's figures 7 (plate 4) and 5-6 (plate 3) are incorrect.

As former, but sheaths sparingly tawny setose, ...*G. auriculata.*

Spikelets 1½—2 in. long ; shoot-sheaths densely appressed black setose, auricles large, strongly tawny-fringed ; anthers purple ; stigmas white, ...*G. macrostachya.*

DENDROCALAMUS.

× *Outer paleas terminated by a longer or shorter pungent bristle or point. Anthers yellow. Stigmas purple.*

Shoot-sheaths more or less pruinose, slightly tawny appressed setose, the mouth truncate ; angles of inner palea fringed ; bristle of outer palea nearly 2 lin. long ; spikelets hairy or smooth, ...*D. strictus*[1].

Shoot-sheaths minutely appressed-silvery-setose, auricles large, bristly-fringed, one turned upwards, the other downwards, ...*D. criticus*[2].

Shoot-sheaths appressed dark-brown-setose, auricle waved decurrent, stuppose-setose inside ; angles of inner palea ciliate ; outer palea pungent-pointed,..........*D. membranaceus*[3].

× × *Outer paleas cucullate-mucronate, but not pungent ; spikelets green, membranous.*

O *Spikelets only 2½—4 lin. long. Anthers yellow. Stigmas purple.*

Shoot-sheaths appressed-tawny-setose, auricles waved-decurrent, stuppose-fringed inside ; ligule narrow, angles of inner palea minutely ciliate,....................*D. Brandisii*[4].

Shoot-sheaths narrow and nearly as long as the internodes, appressed dark brown setose, only at one side of the mouth with a small nude auricle ; ligule conspicuous, bristly-fimbriate ; angles of inner palea slightly pilose, ...*D. longispathus*[5].

O O *Spikelets rather large, 6-7 lin. long or longer ; leaves very large. Shoot-sheaths not known.*

Mouth of leaf-sheaths not produced in an auricle, the ligule conspicuous, entire or fimbriate ; angles of inner palea white-fringed ; anthers yellow ; stigma purple,....*D. calostachyus*[6].

Mouth of leaf-sheaths with large lunate strong fimbriate auricles, ligule large, usually ruptured ; angles of inner palea smooth, lodicules long fimbriate,..........*D. Griffithianus*[7].

CEPHALOSTACHYUM.

* *Spikelets very densely flowered, the rachillae very short or reduced.*

O *Spikelets 12—14 lin. long, in dense terminal heads.*

Spikelets glabrous (lodicules 5 lin. long ?) ....*C. pallidum.*

O O *Spikelets ½ an inch long, more or less white pilose, rarely glabrescent, in dense clusters, forming interrupted spikes or panicles.*

× *Stigmas white.*

Shoot-sheaths very short, black from dense appressed bristles, auricles large, stuppose-fringed ; anthers purple, ...*C. pergracile.*

Shoot-sheaths appressed white-setose, auricles large, long-fringed, one bent downwards, the other upwards ; anthers pale yellow,..................................*C. flavescens.*

× × *Stigmas purple.*

Spikelets pilose, glabrescent ; anthers yellow, ...*C. virgatum.*

* * *Spikelets glabrous, laxly and sometimes almost remotely-flowered, the rachillae more or less elongate, (auricles of leaf-sheaths more or less elongate, long-white-fringed.)*

Spikelets cylindrical, ½ inch long ; inner palea smooth ; anthers purple ; stigmas white, ...*C. schizostachyoides.*

Spikelets almost pedicelled, 2-3 lin. long, almost remotely 7-3-flowered ; inner palea on the keels at apex whitish-ciliate ; anthers yellow, ...*C. Griffithii.*

PSEUDOSTACHYUM.

Culms very strong ; shoot-sheaths quite smooth ; auricles lunate, reflexed, stiff-fringed ; ligule very narrow, entire ; spikelets 2-2½ lin. long, clustered ; caryopsis irregular globose, the size of a wood-apple ; anthers yellow ; stigmas white, ...*P. compactiflorum.*

Culms very hollow and weak ; shoot-sheaths minutely white-setose ; auricles very small, long-fringed ; ligule conspicuously (2-4 lin. long) fringed, ...*P. Helferi.*

MELOCANNA.

Low, 15—20 feet high ; leaves scabrously pubescent beneath, ...*M. humilis.*

50—70 feet high ; leaves quite glabrous, ...*M. baccifera.*

Note : 1 = Bambusa stricta of App. A. ; 2 = Bambusa critica of App. A. ; 3 = Bambusa regia of App. A. ; 4 = Bambusa Brandisii of App. A. ; 5 = Bambusa longispatha of App. A. ; 6 = Bambusa calostachya of App. A. ; 7 = Bambusa Griffithiana of App. A.

DINOCHLOA.

Spikelets in a dried state straw-coloured, hardly a line long; shoot-sheaths fugaceously white-setulose, not auricled and narrowed towards the mouth, ...*D. Andamanica.*

Shoot-sheaths fugaceously silvery, not narrowed upwards, at the mouth thickened and polished green, ...*D. Maclellandii.*

C. CRYPTOGAMS.

FILICES.

Conspectus of genera.

CYATHEA.—Sori hemispherical, on a vein, or in the axil of a forking of a vein. Receptacle elevated. Involucre globose, inferior, complete, afterwards bursting and forming a more or less persistent cup. Arboreous ferns with usually decompound fronds.

ALSOPHILA.—As former, but without an involucre. Fronds decompound.

BRAINEA.—Sori continuous along the transverse veins near the midrib and also along the veins towards the margin of the frond. Involucre none.—Low simple-stemmed tree-ferns, with simply pinnate fronds.

CYATHEA.—Only species, ...*C. spinulosa.*

ALSOPHILA.

* *Pinnules glaucous beneath, segments entire.*

Stipes and rachises (in Burmese plant) quite smooth, pruinous,....................*A. contaminans.*

* * *Pinnules uniformly green; segments crenulate (at least at the apex.)*

Sori placed in 2 diverging rows forming the letter V; stipes and rachises glossy dark-brown, smooth; pinnules petioled, ...*A. glabra.*

Sori placed in 2 parallel dense rows; stipes and lower part of rachis prickly tubercled; the secondary rachises above densely villous; pinnules sessile, ...*A. latebrosa.*

BRAINEA.—Only species, ...*B. insignis*

CORRECTIONS.

Page 46, lin. 26 from above, read *Acrocarpus fraxinifolius* for *A. combretiflorus* (= A. combretiflorus of App. A.)

The genus should be placed in Caesalpinieae, having the petals in bud unequal and imbricate.

Page 50, in the conspectus the characters of the species *E. praecox* to *E. balsamea* should be corrected thus:

+ + *Calyx narrowed in a longer or shorter pedicel like &c. &c.*

† *Lobes of calyx-limb distinct, up to ½ a line long.*

Similar to *E. cinerea*, the branchlets greyish,....................*E. praecox.*

Branchlets brownish; racemes sometimes corymb-like, slender, short,..........*E. cerasoides.*

† † *Lobes of calyx-limb obsolete, the limb soon truncate.*

Branchlets brown, at least while young (often wingedly) 4-cornered, ...*E. tetragona.*

Branchlets white, terete; panicles cyme-like, short, ...*E. balsamea.*

Page 60, lin. 1, from above, for *Psilobium* read *Morindopsis* and for *P. capillare* read *Morindopsis capillaris* (= Psilobium capillare of App. A).

Page 60, *Sarcocephalus.* The species are here misplaced, *S. Cadamba* belongs in division * * and *S. cordatus* in *

Page 64, line 17, from below read *Diospyros mollis, Griff.* for *D. Kaki.* (= D. Kaki of App. A.)

APPENDIX C.*

LIST OF OTHER NOT ARBOREOUS PLANTS, FOR WHICH BURMESE NAMES HAVE BEEN OBTAINED.

I append this list here, chiefly for the purpose of attracting the attention of foresters, and with the hope that by their aid I shall obtain some hints regarding the numerous incorrect native names which have necessarily crept in for reasons which I have already explained in Appendix A. The arrangement is systematic, but owing to the impossibility of determining all the plants, the scientific names in certain families (marked by an asterisk) are provisional only.

RANUNCULACEÆ.

Naravelia zeylanica.
ဆတ်ကြိုရစ်
Sát jo y*i*t.

Nigella sativa.
စမုန်နက်
S*á* mong net.

ANONACEÆ.

Unona discolor.
တနတ်စာ
T*a* nát s*á*.

Uvaria ptychocalyx.
သပွတ်
Th*á* bwot.

Uvaria macrophylla.
သပွတ်
Th*á* bwot.

MENISPERMACEÆ.

Tinospora nudiflora.
ဆင်ဒုံးမနွယ်
Sin-dong ma-nway.

Stephania hernandifolia.
ရှာနာဆေးနွယ်
Sha-nah-say-nway.

Pachygone odorifera.
ငဖြူ
Nga-phyoo.

NYMPHAEACEÆ.

Nelumbo nucifera.
ပဒုမ္မာ
Padommah.

Nymphaea Lotus.
ကြာဖြူ
Kyah-phyoo.

Nymphaea rubra.
ကြာနီ
Kyah-nee.

Nymphaea stellata.
ကြာညို
Kyah-nyo.

Barclaya longifolia.
ကြာခေါင်းလောင်း
Kyah-khoung-loung.

* The Hunterian transliteration of vernacular names in this List is abandoned, and the usual mode of spelling has been followed, in accordance with Dr. Brandis' Memo. on the English spelling of Burmese names in this Report, which was forwarded to me with Government letter No. 968, dated 18th August, 1874.

CRUCIFERÆ.

Lepidium sativum.
မုံညင်း
Mong-nyin.

Brassica juncea.
စမုံနီ
Sa-mong-nee.

Raphanus sativus.
မုံလာ
Mong-lah.

CAPPARIDEÆ.

Crataeva hygrophila.
ရေခတက်
Yay-kha-tet.

Capparis horrida.
နှာမနီသံလျက်
Nah-manee-than-lyet.

Roydsia obtusifolia.
ငဖြူ
Ngá phyoo.

PORTULACACEÆ.

Portulaca oleracea.
မြေပြစ်
Myay-pyit.

DIPTEROCARPEÆ.

Ancistrocladus Griffithii.
ပန်းပင်
Pan-ben.

MALVACEÆ.

Sida generally.
ကပ်စေးနဲ့
Kat Say-nai.

Abutilon Indicum.
သားမခြုပ်
Thá má chyop.

Hibiscus Surrattensis.
ဝက်မခြင်ပေါင်
Wet má chin poung.

Hibiscus Abelmoschus.
ဘလူဝါ
Baloo-wah.

Hibiscus tetraphyllus.
အုံးကတိုး
Ong ká to.

Hibiscus Rosa Sinensis.
ခေါင်ရမ်း
Khoung yán.

Hibiscus esculentus.
ရုံးမဒီ
Yong má dee.
ရုံးပတီ
Yong padee.

Hibiscus Sabdariffa.
ခြင်ပေါင်နီ
Chin poung nee.

Urena lobata.
ကပ်စေနဲ
Kát say nai.

Gossypium herbaceum.
ဝါး
Wah.

Gossypium Barbadense.
နုဝါး
Noo-wah.

STERCULIACEÆ.

Helicteres Isora.
သူငယ်ချေး
Thoo-gnai-chay.

Buettneria pilosa.
ထတ်တရာနွယ်
Tat-taya-nway.

TILIACEÆ.

Grewia hirsuta.
ကြက်တရော်
Kyek-ta-yaw.

Grewia hirsuta.
ဆေးခါ
Say-hkah.

Grewia retusifolia.
သုံးနှစ်သရက်
Thong-nhit-thayet.

Grewia abutilifolia.
ဆင်မနို့ပြင်း
Sin-ma-no-pyin.

Triumfetta generally.
ကပ်စေးနဲ့
Kát-say-nai.

Corchorus capsularis.
ချိုဗိလော
Cho-pee-law.

Corchorus acutangulus.
ဗိလော
Pee-law.

Corchorus olitorius.
ဗိလခါး
Pee *lá ká*.

OXALIDEÆ.

Oxalis sensitiva.
ဒီးဝေါက်
De-wouk.

Oxalis corniculata.
မနှာဒေါ
Ma-nah-daw.

Impatiens Balsamina.
ပန်းရှစ်။ဒန်းဓလက်
Pan shit or D*á*n *dá* let.

RUTACEÆ.

Toddalia aculeata.
ကြို့ဇါ
Kyau-zah.

Clausena heptaphylla.
ပြင်တော်သိန်
Pyin daw the*i*n.

Glycosmis pentaphylla.
တောရှောက်
Taw-shouk.

Citrus Medica.
ရှောက်တခွါး
Sho*u*k *tá* kwah.

OLACINEÆ.

Ximenia Americana.
ပင်လယ်ဆီ
P*i*n lai-see.

ပင်လယ်ကူရင်
Pin-laí-koo-yin.

Olax scandens.
တောင်လဲလု လဲလူ
T*ou*ng lai loo or Lai loo.

Cardiopteris lobata.
ဂန့်ဂေါ်
Gán *gaw*.

CELASTRINEÆ.

Celastrus paniculatus.
မြင်းခေါင်းနားရောင်
My*in* kh*oung* *ná young*.

RHAMNEÆ.

Zizyphus oenoplia, the climbing variety.
တောဇီးနွယ်
Tau-zee-nway.

Zizyphus oenoplia, the erect shrubby variety.
ဆူးတောက်ပင်
Soo-touk-ben.

Colubrina Asiatica.
ကျွဲနွယ်
Kuay-nway.

Colubrina Asiatica.
ကျွက်နွယ်
Kuek-nway.

Gouania leptostachya.
တရော်ညိုနွယ်
T*a* yaw-nyo-nway.

AMPELIDEÆ.

Vitis vinifera.
စပျစ်
Sa-pyit.

Vitis lanceolaria.
ကြီးနီနွယ်
Kyee-nee-nway.
ကြီးခြီနွယ်
Kyee-chee-nway.

Vitis auriculata.
ရင်းနောင်းပိန်းနွယ်
Y*in* n*oung* pe*i*ng nway.

Vitis Linnaei.
ရင်းနောင်းနွယ်
Y*in* n*oung* nway.

Vitis latifolia.
ချင်ဒေါက်နွယ်ဇောက်
Ch*in* d*ou*k nway *zouk*.

Vitis rhodoclada.
ဝန်ဥူနွယ်
Woon-oo-nway.
မြေဈူနွယ်
Myae-zoo-nway.

Leea macrophylla.
ကြာဘက်ကြီး
Kyah-bet-kyee.
ကြာဖက်ကြီ
Kyah-phet-kyee.

Leea aequata.
နဂါးမောက်
N*á* g*á* m*ou*k.

Leea crispa.
ကဖက်သိန်
Kaphet theing.

SAPINDACEÆ.

Cardiospermum Halicacabum.
မလမဲ
M*á* l*á* mai.

CONNARACEÆ.

Cnestis platantha.
တောကြက်လောက်
Taw-kyet-louk.
ကြက်မောက်နီ
Kyet-mouk-nee.

Connarus monocarpus.
ကရတ်ကတက်
Ka dot ká tet.
အဝ်ကတက်
Āt ká tet.
တလိတိ
Tá lí tí.

LEGUMINOSÆ.
Crotalaria juncea.
ပန်းပိုက်ဆံ
Pan paik sán.
ပိုက်ပွင်
Paik pwin (paik hsan) S. K.

Crotalaria sericea.
တောပိုက်ဆန်
Taw paik sán ချူ Chu.

Crotalaria tetragona.
ချူရိုင်း
Chu Yain.

Indigofera tinctoria.
မဲနယ်။ရှမ်မဲ
Mai nai or shán mai.

Indigofera trita.
မဲကုပ်
Mai kop.

Indigofera galegoides.
တောမဲရိုင်းပင်
Taw mai yain ben.

Indigofera Brunoniana.
တောင်မဲစိန်း
Toung mai sein.

Indigofera pulchella.
တောမဲရိုင်း
Taw mai yain.

Millettia extensa.
ဓမ္မငယ်
Dá má gnai.

Sesbania paludosa.
ညပေါက်
Nyah pouk.
ညံပင်
Nyan ben.

Arachis hypogaea.
မြေပဲ
Myay pai.

Desmodium triquetrum.
မုတ်ဆိုးလှမ်မ
Mot so lam má.

Desmodium pulchellum.
တောင်ထမင်
Toung tá min.

Desmodium lasiocarpum.
ကြိုးပန်းပင်
Kio pán ben.
ကြို့ပင်
Kio ben.

Cicer arietinum.
ကုလားပဲ
Ku lá pai.

Pisum sativum.
ပဲး
Pai.

Abrus precatorius.
ခွဲခြင်။ခြင်ပြင်
Bwai-jin or chin pyin.
ရွေးငယ်
Yuay gnai.

Clitoria ternatea.
ဘူကြီး
Boo Kyee.
ပဲနောင်နီ။အောင်မဲဖြူ။
Pai n*ou*ng n*i* or *ou*ng mai phyoo.

Mucuna prurita.
ခွေးလေး
Quay lay.

Butea superba.
ပေါက်နွယ်
P*ou*k nway.

Spatholobus Roxburghii.
ပေါက်နွယ်
P*ou*k nway.

Canavalia gladiata.
ပဲနောင်နီ
Pai n*ou*ng n*i*.
ပဲခလေ
Pai k*á* lay.

Phaseolus grandis.
ခွေးလဘွတ်နွယ်
Kway l*á* bwot nway.
ခွေလေဘွေနွယ်
Kway la bway nway.

Phaseolus mungos.
ပဲနောက်
Pai n*ouk*.

Dolichos cultratus?
ပဲဒါးမ
Pai d*á* m*á*.

Dolichos pilosus.
တောပဲ
T*au* pai.

Dolichos Lablab.
ပဲ
Pai.

Psophocarpus tetragonolobus.
ပဲဇွန်ကြား
Pai zoon ky*á*.
ပဲမြစ်။ပဲစောင်ရား
Pai myit or Pai s*ou*ng *yá*.

Cyamopsis psoralioides.
ပဲပဇွန်
Pai p*á* zoon.

Cajanus Indicus.
ပဲစိငုံ
Pai *si* gnong.
ပဲရင်ခြုံ
Pai y*i*n chong.

Flemingia lineata.
ကျေးနီ
Kyay nee.

Flemingia semialata.
သကြားနဲ့
Th*á* ky*á* nai.

Flemingia strobilifera.
ဖလံဖြူ
Ph*á* l*á*n phyoo.

Flemingia cordifolia.
ဖလံဖြူ
Ph*á* l*á*n phyoo.

Dalbergia stipulacea.
ဒေါက်တလောင်
D*ou*k t*a* l*ou*ng.
ဒေါက်ဓလောင်နွယ်
D*ou*k d*á* l*ou*ng nway.

Dalbergia spinosa.
ရေခြင်းရား
Yay chin yá.

Derris scandens.
မိကြောင်းနွယ်
Mee kyoung nway.

Derris sinuata.
မြောက်ဂုံညင်း
Myouk gong nyin.

Sophora tomentosa.
သင်းဘောမကျည်း
Thin bo má jee.
သင်းဘော်မကျည်း
Thin bo má jee.

Caesalpinia pulcherrima.
ဒေါင်းစုပ်
Doung sop.

Caesalpinia sepiaria.
ဆူးကျမ်းပိုး
Soo kyám po.
ဆူးကြင်ဘိုး
Soo kyin bo.

Caesalpinia sappan.
တိန်းညက်
Teing nyet.
ထနိညက်
Tá ní nyet.

Caesalpinia bonducella.
ကလိမ်
Ká lein.

Caesalpinia nuga.
ဆူးကောက်
Soo Kouk.

Caesalpinia digyna.
စွန်လက်သဲ
Soon let thai.

Mezoneuron cucullatum.
ကြောင်ခြက်
Kyoung chet.

Pterolobium macropterum.
ကလိမ်
Ká lein.
ကျောင်ဂျက်နွယ်
Kyoung gyet nway.

Cassia occidentalis.
ကလော
Ká law.

Cassia alata.
သင်ဘောမဲဇလီ
Thin baw mai zá lee.
မဲဇလီကြီး
Mai zá lee kyee.

Cassia Thora.
ဒန့်ကွဲပွင့်
Dán kway pwin.
ဒန်ကွဲ
Dán kwai.

Bauhinia acuminata.
မဟာလှေကားဖြူ
Má há hlay ká phyoo.

Bauhinia tomentosa.
မဟာလှေကားဝါ
Má ha hlay ká wá.

Bauhinia monandra.
စွယ်တော်
Swaí tau.

Bauhinia ornata.
မြောက်လှေခါး
My*ou*k hlay K*á*.

Entada scandens.
ကုံညင်းနွယ်
K*o*ng ny*i*n nway.
ဂုံညင်း
G*o*ng ny*i*n.

Mimosa pudica.
ထိကရုံး
Tee k*á* yong.

Acacia pennata.
ဆူးရစ်
Soo y*i*t.

Acacia rugata.
ကင်မွန်ခြင်
K*i*n mwon ch*i*n.
ဆူးပုတ်နွယ်
Soo pwot nway.

Acacia pennata var.
ဆူးပုတ်ခလေးနွယ်
Soo pwot k*á* lay nway.

Acacia laevis.
ရိုပိန့်နွယ်
Yo pe*i*ng nway.

ROSACEÆ.
Rosa centifolia.
နှင်းဆီ
Hn*i*n see.

Rosa damascena.
မဲဆီ
Mai see.

RHIZOPHOREÆ.
Ceriops Roxburghiana.
ကပြိုင်
K*á* py*ai*ng.

COMBRETACEÆ.
Combretum apetalum.
ကြက်တက်နွယ်
Kyet tet nway.

Combretum decandrum.
သမားကနွယ်
Th*á* m*á* k*á* nway.

Combretum extensum.
မောင်မခ
M*ou*ng m*á* k*á*.
မနနွယ်
M*á* n*á* nway.

Combretum ovale.
ကြက်တက်နွယ်
Kyet tet nway.

Combretum trifoliolatum.
ဆောက်ပင်
S*ou*k p*i*n.

Calycopteris Roxburghii.
ကျွတ်နေနွယ်
Kywot nay nway.

Quisqualis Indica.
ဒါဝယ်မှိုင်း
D*á* wai hm*i*ne.

MELASTOMACEÆ.
Memecylon oleaefolium?
တောင်ဇင်ဖက်
T*ou*ng z*i*n hpet.

Melastoma Malabathricum.
မြက်ပြေ။ဒိုပုတ်
Myet pyai or Ohboke.
မျက်ပြေ
Myet pyai.

Sonerila secunda.
လင်လေတအောင်ပွင်
L*i*n lay tá *ou*ng pw*i*n.

CRASSULACEÆ.

Bryophyllum pinnatum.
ရွက်ကျပင်ပေါက်
Ywet kya p*i*n p*o*uk.

PASSIFLOREÆ.

Passiflora laurifolia.
အသာဝဒီ
Á thá w*á* dee.

Passiflora foetida.
သကြားပင်
Thá ky*á* p*i*n.

Modecca trilobata.
ကင်းပုံ
K*i*n pong.

CUCURBITACEÆ.

Hodgsonia heteroclita.
ဝက်သခေါက်
Wet th*á* k*o*uk.

Trichosanthes integrifolia.
စသခွါး
S*á* th*a* kw*á*.

Trichosanthes cucumerina.
သပွတ်ခါး
Th*á* pw*o*t kh*a*.
ကြက်မာခေါး
Kyet ma khaw.

Trichosanthes anguina.
ပဲလင်းမွေ
Pai l*i*n mway.

Luffa acutangula.
သပွတ်
Th*á* pw*o*t.

Luffa cylindrica (small fruit).
သပွတ်ခါး။သပွတ်
Th*á* pw*o*t kh*á* or Th*á* pw*o*t.

Luffa id. (long large fruit).
သပွတ်ချော။သပွတ်နွယ်
Th*á* pw*o*t chaw or Th*á* pw*o*t nway.

Luffa id. (oval fruit).
သပွတ်နွယ်
Th*á* pw*o*t nway.

Momordica Cochinchinensis.
စမုံနွယ်
S*á* mong nway.

Momordica dioica.
စပြစ်
S*á* py*i*t.

Momordica charantia.
ကြက်ဟင်းခါး
Kyet h*i*n kh*á*.

Momordica muricata.
ရင်ခတ်
Y*i*n kh*á*t.

Benincasa cerifera.
ကျောက်ဖရုံ
Ky*o*uk p*á* yong.

Cucurbita moschata.
ရွှေဖရုံ
Shway p*á* yong.

Lagenaria vulgaris.
ဘူး
Boo.
ဘူးဆင်ဗွယ်
Boo *si*n swai.

Cucumis melo *β*. culta.
သခွါးမွှေး
Th*á* khw*á* hmway.

Cucumis sativus.
သခွါးသီး
Th*á* khw*á* thee.

Citrullus vulgaris.
ဖရဲသီး
Ph*á* yai thee.

Muckia Maderaspatana.
စသခွါး
S*á* th*á* khw*á*.

Bryonia laciniosa.
အညာကင်းပုံနီ
Á ny*á* k*i*n pong nee.

Zehneria umbellata.
ကြက်ရှာ
Kyet sh*a*.

Alsomitra sarcophylla.
ကျီးအာ
Kyee ah.
ကျီးအာသီး
Kyee ah-thee.

BEGONIACEÆ.
Begonia generally.
ကြောက်ချင်ပေါင်
Ky*ou*k ch*i*n p*ou*ng.

CACTEÆ.
Opuntia Dillenii.
ရှားစောင်းလက်ဝါ
Sh*á* s*ou*ng let w*á*.
ကလာဇော
K*á* l*á* zaw.

Opuntia cochinillifera.
ကုလားစောင်းလက်ဝါး
K*á* l*á* s*ou*ng let-w*á*.

FICOIDEÆ.
Mollugo spergula.
ဂျင်ဂါး
J*i*n g*á*.

UMBELLIFERÆ.
Pimpinella Heyneana.
တောင်စမြိတ်
T*ou*ng s*á* my*ei*t.

Carum Roxburghianum.
ကန့်ပလူ
K*á*n p*á* loo.

Peucedanum Sowa.
စမြိတ်
S*á* my*ei*t.

Opium graveolens.
စမွတ်
S*á* mwot.

ARALIACEÆ.
Heptapleurum venulosum.
ဘလူးလက်ဝါး
B*á* loo let w*á*.
ဘီလူးလက်ဝါး
Bee loo let w*á*.
တာကြားလဲဝါး
T*á* ky*á* lai w*á*.

LORANTHACEÆ.

Loranthus generally.
ကျီးပေါင်း
Kyee poung.

Viscum articulatum.
သစ်လုံး
Thit long.

RUBIACEÆ.

Ixora generally.
ပန်စကွယ်
Pán sá kwai.

Ixora coccinea.
ပန်းစရိပ်
Pán sá yeip.

Psychotria viridiflora.
နီပဆေးပင်
Nee pá say pin.

Mussaenda calycina.
ဂျီရေ
Gyee yay.

Morinda persicaefolia.
နီပဆေးခလေး
Nee pá say ká lay.

Gardenia florida.
သုံးဆင့်ပန်း
Thong sin pán.

Ophiorrhiza generally.
ရမဆေးကြီး
Yá má say kyee.

Paederia lanuginosa.
နွယ်အုပ်
Nwai ope.

COMPOSTÆ.

Elephantopus scaber.
ကတူးပင်
Ká too pin.
မတူးပင်
Má too pin.

Adenostemma viscosum.
ဆင်ဘီးစပ်ကြီး
Sin bee sap kyee.

Cyathocline lyrata.
မရဂံ
Má yá gán.
မရဂံပင်
Má yá gán pin.

Spilanthes acmella.
ဟင်းကလာ
Hin ká lá.

Spilanthes paniculata.
အိမ်ဘီးစပ်
Eng bee sáp.

Sphaeranthus hirtus.
ကတူးပင်
Ká too pin.
ဒနုံးပင်
Dá noung pin.

Blumea pterodonta.
ကတူး
Ká too.

Blumea flava.
ကတူးကြွက်နား
Ka too kuet ná.

Adenolepisfulva.
မော်လမြိုင်ဒေါင်းဖဝါပန်း။
Mau lá myain doung pán wá pan.

Pluchea Indica.
ခရူ
Karoo or kayoo.

Gnaphalium multiceps.
ဗြိုင်းချေးပင်
Byaing che pin.

Carthamus tinctorius.
ဆူ
Soo.

Xanthium strumarium.
ချိုးစကောက်ပင်
Cho *sa* kouk pin.

Microrhynchus glaber.
ကတူးခလေးပင်
Ká too ká lay pin.

CAMPANULACEÆ.
Cephalostigma paniculatum.
ရုလါနဖာ
Soo lá ná phá.

PLUMBAGINEÆ.
Plumbago rosea.
ကန်ချုပ်နီ
Kán chop nee.

Plumbago zeylanica.
ကန်ချုပ်ဖြူ
Kán chop phyoo.

MYRSINEÆ.
Ardisia Wallichii.
ကြက်မအုပ်ပင်
Kyet má ouk pin.

Embelia robusta.
အိပ်မွေ့နွယ်
Aip mway nway.

JASMINEÆ.
Jasminum sambac.
စပယ်။မလိ။
Sá pai or Má lee.

Jasminum grandiflorum.
မြတ်လေး
Myat lay.

Jasminum scandens.
တောစပယ်
Tau sá pai.

APOCYNEÆ.
Tabernaemontana recurva ?
တောစလပ်
Tau sá láp.

Vinca rosea.
သင်းဘောမညိုးပန်း
Thin baw Má nyo pán.

Calpicarpum Roxburghii.
စလပ်
Sá lap.

Ophioxylon serpentinum.
ပုန်မဲဇာ
Bong mai zá.

Willughbeia Martabanica.
သစ်ကျောက်နွယ်
Thit kyouk nway.

Ichnocarpus frutescens.
တောစပယ်
Tau sá pai.

Aganosma acuminatum.
ကြက်မောက်ဖို
Kyet mouk pho.

Anodendron paniculatum.
ထွင်းနက်
Tw*i*n nek.

ASCLEPIADEÆ.*

Calotropis gigantea.
မရိုးပင်
M*á* y*o* p*i*n.

Ceropegia Arnottiana?
ဥတာလုံး
U t*á* long.

Hoya viridiflora.
ခွေးတောက်ပင်
Gway t*ou*k p*i*n.

GENTIANEÆ.

Exacum stylosum.
ပထိန်ငို
P*á* te*i*ng gn*o*.

Canscora Schultesii.
ချိုးစလုပ်
Ch*o* s*á* lop.

Canscora diffusa.
ကျောက်ပန်း
Ky*ou*k p*á*n.

CONVOLVULACEÆ.*

Argyreia capitata.
နွယ်နီ
Nway Nee.

Argyreia populifolia.
အိုနကုပ်နွယ်
O n*á* kop Nway.

Argyreia sp. 1087, purpl. fl.
တောင်ကဇွန်း
T*ou*ng k*á* z*u*n.

Argyreia barbigera?
အုပ်မှုန်းနွယ်
Ope mhon nway.

မင်းကိုကာ
M*i*n k*o* k*á*.

Ipomoea vitifolia.
ကြာဟင်းခလေးနွယ်
Ky*á* h*i*n k*á* la*e* nway.

Ipomoea pes capræ.
ပင်လယ်ကဇွန်း
P*i*n lai k*á* z*u*n.

Ipomoea petaloidea?
ဥမင်း
U m*i*n.

Ipomoea, sp.
တောင်ကဇွန်းကြီး
T*ou*ng k*á* z*u*n kyee.

Calonyction Roxburghii.
နွယ်ကဇွန်းအဖြူ
Nway k*á* z*u*n *á* phyoo.

Batatas edulis.
ကဇွန်း
K*á* z*u*n.

Quamoclit pinnatum.
မြတ်လေးနီ
My*á*t la*e* nee.

SOLANEÆ.

Solanum melongena.
ခရမ်း
K*á* y*á*m.

ဆင်ခရမ်း
S*i*n k*á* y*á*m.

Solanum Trongum.
ဆင်ခရမ်း
S*i*n k*á* y*á*m.

Solanum ferox.
ဆင်ကဒိ
S*i*n ká d*é*.

Solanum pubescens.
ခယန်းဂဇော
K*a*y*á*n gá zau.

Capsicum minimum.
ငရုပ်
N*á* yop.

Capsicum annuum.
နရုပ်
N*á* y*o*p.

Lycopersicum esculentum.
ခရမ်းမြေပုံ
K*á* yám myay p*o*ng.

Physalis Peruviana.
ပုံးပင်
P*o*ng p*i*n.

Datura alba.
ပတိုင်းခတ္တာ
P*á* d*ai*ng kh*á*t t*á*.

Nicotiana Tabacum.
ဆေး
Sa*e*.

ဆေးပင်
Sae p*i*n.

OROBANCHACEÆ.
Aeginetia Indica.
ပေါက်ဆိမ်ပင်
P*ou*k se*i*ng p*i*n.

SESAMEÆ.
Sesamum Indicum.
နှမ်း
Hn*á*m.

ACANTHACEÆ.
Thunbergia laurifolia.
နွယ်ချို
Nway ch*o*.

Hygrophila salicifolia.
လယ်ဘင်းခါး
Laí p*i*n kh*á*.

Acanthus ilicifolius.
ခရား
Kh*á* y*á*.

Barleria ciliata (white var.)
လိပ်စရွေ
L*ai*p s*á* yway.

Strobilanthes auriculata.
ဆိုင်နန်းပွင့်
S*ai*ng n*á*n pw*i*n.

Strobilanthes rufescens.
မြောက်ရိုး
My*ou*k y*o*.
ဆိုင်နန်း
S*ai*ng n*á*n.

Strobilanthes phyllostachya.
ရေမကြီး
Ya*e* m*á* kyee.
ရမဇီ
Y*á* m*á* zee.

Strobilanthes flaccidifolius.
မါန်ကျည်း
M*á*n kyee·
မာန်ဂျည်း
M*á*n gyee.

Gendarussa vulgaris.
ဗဝါးနက်
Bá wá nek.

Justicia decussata.
နတ်ပန်း
Nát pán.

Graptophyllum pictum.
နွယ်ပင်
Nway pin.

ဇလပ်နီ
Zá láp nee.

VERBENACEÆ.

Vitex trifolia.
ကြောင်ပန်း
Kyoung pán.

Premna amplectens.
ယင်းဖျားပင်
Yin pyá pin.

Premna integrifolia.
တောင်သံကြီ
Toung than kyee.

Clerodendron Siphonanthus.
ငရမ့်ပတူ
Ná yam pá tu.

Clerodendron serratum.
ဘိဖြား ဘဲ့ကြို
Be bya or Baí Kyo.

Clerodendron nutans.
ငရမ့်ပဒူ
Ná yam pa du.

Clerodendron viscosum.
ဘုကြီးဖြူ
Bu jí phyoo.

Clerodendron squamatum.
ဘုကြီးနီ
Bu jí nee.

Clerodendron inerme.
ပင်လယ်ကြောက်ပန်း
Pin laí kyouk pán.

Hymenopyramis brachiata.
ခြင်သေလက်နွယ်
Chin thae lek nway.

Symphorema unguiculata.
ကနွယ်
Ka nway.

Symphorema involucratum.
နွယ်စတ်
Nway sát.

နွယ်စပ်
Nway sáp.

သမက
Thá má ká.

Congea tomentosa.
သမကနွယ်
Thá má ká nway.

ကနမောင်း
Kana moung.

ကယော
Ká yau.

LABIATÆ.*

Ocymum generally.
ပင်စိမ်း
Pin seing.

Anisomeles pallida.
တောပင်စိန်း
T*au* p*i*n se*i*ng.

Elscholtzia blanda.
ရောင်ဘွေ
Y*o*ng bwae.

ရုံးပဘို
Y*o*ngpa b*o*.

Gomphostemma strobilinum.
ဆိုင်နန့်ဖို
S*ai*n n*á*n ph*o*.

Gomphostemma oblongum.
ခိုင်မင်ပင်
Kh*ai*n m*i*n p*i*n.

Gomphostemma parviflorum.
ခိုင်နံ့ပျားပင်
Kh*ai*n n*a*n pya p*i*n.

SALSOLACEÆ.

Basella alba.
ဂျင်းဘိုင်
J*i*n bine.

AMARANTACEÆ.

Gomphrena globosa.
မညှို့ပန်း
M*á* nhyo p*á*n.

Celosia cristata (purple var.)
ကျက်မေါက်
Kyet m*ou*k.

Celosia cristata (yellow var.)
ကြက်မောက်ဝါး
Kyet m*ou*k w*á*.

Aerva scandens.
မိုကျီးပွင့်
M*o* kyee pw*i*n.

Amarantus spinosus.
ဟင်နုနွယ်ပင်
H*i*n nu nai p*i*n.

NYCTAGINEÆ.

Mirabilis Jalappa.
မည်ဇု
Mye z*u*.

POLYGONACEÆ.

Polygonum plebejum.
ငယိုပင်
Na yo pin.

ARISTOLOCHIACEÆ.

Aristolochia Indica.
ငဖုံးဆေး
N*á* phong sa*e*.

LAURINEÆ.

Cassytha filiformis.
ရွှေနွယ်ပန်း
Shway nway p*á*n.

EUPHORBIACEÆ.

Sauropus macrocarpus.
ရိုးမဟင်းရိုး
Y*o* m*á* h*i*n yo.

Glochidion multiloculare.
ထမင်းဆုပ်
T*á* m*i*n sop.

Securinega obovata.
ရေခြင်ရား
Y*ae* ch*i*n y*á*.

Breynia rhamnoides.
ဂုံညင်းရှား
Gong nyin yá.

Briedelia macrophylla.
ဘောင်ဘောင်နွယ်
Boung boung nway.

Briedelia stipularis.
ဆင်မနို့ပြင်း
Sin má no pyín.

Mallotus repandus.
ငလျှင်ဘို
Ná lyin bo.

ငလှိုင်ဘို
Ná laing bo.

Homonoya riparia.
မှိုးမခ
Mo má khá.

ရေတကြီ
Yae tá kyee.

Jatropha manihot.
ပလောပီနံမြောက်
Pá lo pi nán myouk.

Baliospermum montanum.
နှပ်ချို
Hnáp cho.

နတ်ချို
Nat cho.

URTICACEÆ.

Fleurya interrupta.
ကျက်ဖက်ရှား
Kyet phet yá.

Laportea crenulata.
ဖက်ရှားကြီး
Phet yá kyee.

Böhmeria nivea.
ဂွမ်း
Gwám.

Maoutia Puya.
ဆပ်ရှာရွက်
Sat shá yuet.

Girardinia heterophylla.
ဘက်ရှား
Bek shá.

ဖက်ရှားကြီး
Phet yá kyee.

Cannabis sativa.
ဘင်း
Bin.

Ficus lanceolata.
ရေသဖန်း
Yae thá phán.

Cudranus pubescens.
ဒေါင်းကြက်တက်
Doung kyet tek.

PIPERACEÆ.*

Chavica Betle.
ကွမ်း
Kwám.

ကွမ်းရွက်
Kwam yuet.

Chavica Roxburghii.
ပိတ်ခြင်း
Peik chin.

Chavica ribesioides.
တောကွမ်း
T*au* kw*a*m.

တောကွမ်း
T*a*u Kw*a*m.

Piper nigrum.
စရိုမဲ
S*á* y*o* mai.

Piper white maculate 273.
သရို
Th*á* y*o*.

GNETACEÆ.

Gnetum scandens.
ဂျုတ်နွယ်
Gyoot nway.

PALMÆ.

Phœnix acaulis.
သင်ပေါင်းပင်
Th*i*n p*ou*ng p*i*n.

သင်ဘောပင်
Th*i*n b*o* p*i*n.

Wallichia oblongifolia.
မင်းပေါ
M*i*n pau.

Nipa fruticans.
ဒနီ
D*á* nee.

Zalacca Wallichiana.
ရင်ကမ်း
Y*i*n k*á*m.

ရင်ကန်းပင်
Y*i*n k*á*n p*i*n.

Calamus fasciculatus.
ကျိန်ခါး
Ky*ei*ng kh*a*.

Calamus Guruba.
ကျိမ်ခါး
Ky*ai*ng kha.

Calamus Guruba.
ကျိမ်နီ
Ky*ei*ng nee.

Calamus latifolius.
ရမထာ
Y*a* m*á* t*á*.

ရမထကျိမ်
Y*á* m*á* t*á* kyeing.

PANDANEÆ.

Pandanus fœtidus.
သကြက်။တောသကြက်
Th*á* kyet or T*au* th*á* kyet.

AROIDEÆ.*

Cryptocoryne spiralis?
ကြောက်တက်လင်လေ
Ky*ou*k tek l*i*n lae.

Amorphophallus, generally.
ဖြန်
Phy*á*n.

Colocasia antiquorum.
မဟူရာပိန်း
M*á* h*u* y*á* pe*i*n.

Colocasia cucullata.
စပ်တုံ
S*i*t t*o*ng.

Colocasia odora ?
ပိန်းမဟော်ရာ
Pein má hau yá.

Colocasia esculenta ?
ပိန်း
Peing.

Scindapsus officinalis.
ငရာကြီ
Ná yá kyee.

Pothos scandens.
ကျိုင်
Kyeing.

Lasia aculeata.
ဇရပ်
Zá yap.

Acorus Calamus.
လင်းဟော
Lin hae.

Pistia stratiotes.
မှော်
Hmau (Mhouk) S. K.

SCITAMINEÆ.*
Globba Careyana
ပတိန်ငို
Pá taing gno.

Zingiber officinale.
ခြင်းဇိန်း
Jin zein (Khyen seing) S. K.

Zingiber sp. (red).
ပွေးမြက်စိ
Pway myet sí.
မွေးမျက်စိ
Mway myet sí.

Zingiber squarrosum ?
တောက်တာ
Touk tá.

Amomum corynostachyum.
ဂုံမင်း
Gong min.

Amomum sp. caps. carn. coccin.
ကြက်ခြံ
Kyet chán.

Elettaria Cardamomum.
ဘာလါဖါလါ
Phá lá.

Elettaria sp. 1035 Hb. Brand.
ပတဲဂေါခလေ
Pá tai gau ká lae.

Hitchenia sp.
မါလါ
Má lá.

Curcuma longa.
နနွင်း
Ná nwin.

Curcuma Roscoeana.
မှန်သင်း
Mhán thin.

Monolophus elegans.
ကွမ်းကတိုး
Kwam ká to.

Kaempferia parviflora.
ကမုံးနီ
Ká mong nee.

Kaempferia Galanga.
ကမုံး
Ká mong.

Kaempferia candida.
ပန်ဥဖြူ။
Pán *u* phyoo.

Kaempferia rotunda.
မြေပတောက်
Myae pá douk.

Costus speciosus.
ပလံတောင်ဝေး
Pá lán toung wae.

Alpinia Allughas.
ဂုံမင်း
Gong min.

Alpinia nutans.
ပဂေါကြီး
Pá gau kyee.

MARANTACEÆ.*

Maranta dichotoma.
သင်ပင်
Thin pin.

ပင်ပွား
Pin pwá.

Phrynium macrostachyum.
ဝါသိုင်
Wá thaing.

Canna Indica.
ဗုဒ္ဓသရဏာ
Bod dá thá rá ná.

MUSACEÆ.*
Musa rubra.
တောငှက်ပြော
Tau hnek pyau.

Musa glauca.
နတ်ငှက်ပြော
Nát hnek pyau.

Musa sp. with seeds.
တောငှက်ပျောဆိပ်ချို
Tau hnek pyau saip cho.

Musa sapientum.
ရခိုင်
Yá khaing.

Musa id. var. with long fruits.
ရေသီလံ
Yae thí lán.

Musa id. var.
ရေသီလံ။ရခိုင်
Yae thí lan yá khaing.

BROMELIACEÆ.
Ananassa sativa.
နာနတ်
Ná nát.

နာနပ်
Ná náp.

IRIDEÆ.
Pardanthus Chinensis.
သစ်စာ
Thit sá.

ORCHIDEÆ.*
Dendrobium anceps.
သစ်ကပ်ပန်ပင်
Thit káp pán pin.

Sunipia.
တဇင်ပန်
Tá zin pán.

Geodorum appendiculatum.
ဆင်ကါလါကန်ဒီ
Sin ká lá kán dee.

Goodyera procera.
တောလင်းနေပင်
Tau lin nae pin.

AMARYLLIDEÆ.

Eurycles Amboinensis.
လမင်း။နေမင်း
Lá min nae min.

Crinum generally.
ပတိုင်း
Pá taing.

LILIACEÆ.*

Asparagus acerosus.
ရှင့်မတက်
Shin má tek.

ကညွတ်
Ka nyut.

Stemona tuberosa.
ဆီမီးတောက်
Sí mí touk.

Stemona Griffithiana.
ဆီမီးတောက်
Sí mí touk.

Allium sativum.
ကြက်သွန်ဖြူ။
Kyet thun phyoo.

Allium porrum.
တောကြက်သွန်
Tau kyet thun.

Allium cepa.
ကြက်သွန်နီ
Kyet thun nee.

Scilla Indica.
ပတိုင်းကြက်သွန်
Pá taing kyet thun.

Peliosanthes Teta.
ကမုံးပြံ
Ká mong pyán.

Smilax prolifera ?
ဆိန်တပေါ်
Sein tá pau.

ဆိန်နဖော်
Seing ná phau.

Aloe.
မှတ်
Moke.

DIOSCOREACEÆ.*

Dioscorea glabra.
မြောက်နွယ်
Myouk nway.

ခတက်
Ká tek.

Dioscorea pentaphylla.
ပွစအို
Pwá sá o.

ဖိုစအို
Pho sá o.

Dioscorea crispata.
မျောက်ကြား
My*ou*k kya.

ခဘူနွယ်
K*á* b*u* nway.

Dioscorea tomentosa.
ကျွေးပင်
Kyway p*i*n.

Dioscorea daemonum.
ကြွေး
Kyway.

ကျွေးနွယ်ကျွေပင်
Kyway nway or Kyway pín

Dioscorea fasciculata.
တတွေးဥ
T*á* tway *u*.

Dioscorea globosa.
မျောက်ဖြူ
My*ou*k phyoo.

Dioscorea atropurpurea.
မျောက်နီ
My*ou*k nee.

Dioscorea spinosa?
သဒုတ်နီ
Th*á* doot nee.

Dioscorea sp.
ဗိန်းမြောက်ခေါင်း
Peín my*ou*k kh*ou*ng.

PONTEDERACEÆ.
Monochoria vaginalis.
လယ်ပဒေါက်
Lai pá d*ou*k.

COMMELYNACEÆ.
Commelyna communis.
ဝက်ကျွပ်
Wek ky*u*p.

Flagellaria Indica.
မျောက်ကျိမ်
My*ou*k ky*ei*ng.

TACCACEÆ.
Tacca integrifolia.
ရေကြာ
Ya*e* ky*á*.

CYPERACEÆ.
Cyperus moestus.
ဝက်ခြံ
Wek chan.

Cyperus compressus.
ဝက်လါမြက်
Wek l*á* myet.

Fimbristylis and other Cyperaceæ.
ဝက်လါ
Wek l*á*.

GRAMINEÆ.*
Oryza sativa.
စပါး
S*á* p*á*.

Zea Mays.
ပြောင်းဖြူ
Py*ou*ng phyoo.

မျောင်
My*ou*ng.

Coix Lacryma.
ကလိန့်သိး
K*á* le*i*ng th*é*.

Coix Koenigii ? ?
ကျိပ်
Ky*ai*p.

Polytoca heteroclita.
မြက်ရာ
Myet y*á*.

Eleusine Indica.
ဆင်ငိုမြက်
S*i*n gn*o* myet.

Panicum acariferum.
တမင်းဇိုင်းပင်
T*á* m*i*n z*ai*ng p*i*n.

တမင်းဆိုင်းပင်
T*á* m*i*n s*ai*n p*i*n.

ထမဇိုင်း
T*á* m*á* z*ai*ng.

Hymenachne myurus.
ဘော့မြက်
B*o* myet.

Hordeum hexastichum.
မယော
M*á* yau.

Triticum vulgare.
ဂျုံစပါး
Gy*o*ng s*á* p*á*.

Arundo (solid stems).
ကျူ
*K*yoo.

Arundo sp. (hollow stems).
ကျူနှားပင်း
Kyoo n*á* p*i*n.

Saccharum spontaneum.
သက်ကယ်ကြီး
Thet kai kyee.

Saccharum procerum ?
ဖေါင်ဂါး
Ph*ou*ng g*á*.

Saccharum officinarum.
ကျံ
Kyan.

Imperata cylindrica.
သက်ကယ်ညင်း
Thet kai nyin.

Andropogon Sorghum.
ပြောင်
Py*ou*ng.

ပြောင်းကျံ
Py*ou*ng ky*á*n.

Andropogon esculentum ?
စပါးလင်
S*á* p*á* l*i*n.

Andropogon muricatum.
ပန်းရင်း
P*á*n y*i*n.

Andropogon aciculatum.
နုံးမြက်
N*o*ng myet.

Andropogon sp. (brownish grey).
မြက်မီးပွါး
Myet mee p*wá*.

Ischaemum sp. 1201.
ပြောင်စါ
Py*ou*ng s*á*.

Rottboellia sp.? 1195.
မြက်ကြိမ်
Myet ky*e*ing.

Pollinia micrantha.
ပြောင်စါ
Py*o*ung s*á*.
(teak-grass).

Anthistyria sp. 1193.
တက်ကားမြက်
Tek k*á* myet.

HYDROPTERIDES.

Marsilea erosa.
မှိုနှတို
Mh*o* n*á* t*o*.

Salvinia cucullata.
မှော်
Hmau (Monk) S. K.

EQUISETACEÆ.

Equisetum debile.
မြက်ဆက်
Myet sek.

LYCOPODIACEÆ.

Lycopodium cernuum.
ကြောက်ပန်
Ky*ou*k p*á*n

Selaginella generally.
ရေညှိပန်း
Ya*e* hnyee p*á*n.

FILICES.

Lygodium scandens.
ကြိုးသိုက်နွယ်
Gyo th*ái*k nway.

Platycerium generally.
ဇေါ်ဂျီအုပ်တုပ်
*Zau ji o*p t*o*p.

Polypodium quercifolium.
ဆေးမြွေပါ
Sa*e* mway p*á*.

Stenochlaena scandens.
သစ်တက်လင်နေ့
Th*i*t tek l*i*n nae.

LICHENES AND MUSCI.

Cortical lichens and small mosses:
သစ်ပွေး၊အပွေး
Th*i*t pway or *á* pway.

FUNGI.

Polyporus generally.
တုံးမှို
Tong mh*o*.

Agaricus generally.
မှို
Hmo.

Exidia.
ကျွက်နှရွက်မှို
Kyuet n*á* yuet mh*o*.

ALGÆ.

Sweet water algæ.
ရေညှိ
Yae hnyee.

Sea weeds.
ကြောက်ပွင့်
Ky*ou*k pw*i*n.

APPENDIX D.

LORD MAYO'S TREE (MAYODENDRON), A NEW GENUS FROM MARTABAN.

Mayodendron, nov. gen.

Calyx spathaceous, slit to about its middle, circumsciss-deciduous. Corolla tubular-funnel-shaped, the tube short, the lobes of the limb very short, almost equal. Fertile stamens 4, almost equally long, up to their middle adnate to the corolla; the fifth minute, rudimentary; anther-cells almost parallel. Disk annular. Ovary 2-celled, with 2 series of ovules at each side of the placentas; stigma 2-lobed. Capsule podlike, linear-cylindrical and slender, the valves thin coriaceous, smooth, longitudinally nerved, the septum narrow, contrary to the valves, with a prominent broad ledge along its middle on both sides. Seeds in 2 rows along the borders of the septum, small, elongate-winged, the wings very thin and pellucid.

A leaf-shedding tree with ternately decompound leaves. Flowers conspicuous, crimson orange, in short racemes at the ends of the branchlets or arising from short shoots above the scar of the fallen leaves and appearing lateral.

1. M. igneum (Spathodea ignea, Kurz in Journ. As. Soc. Beng. LX. 77).

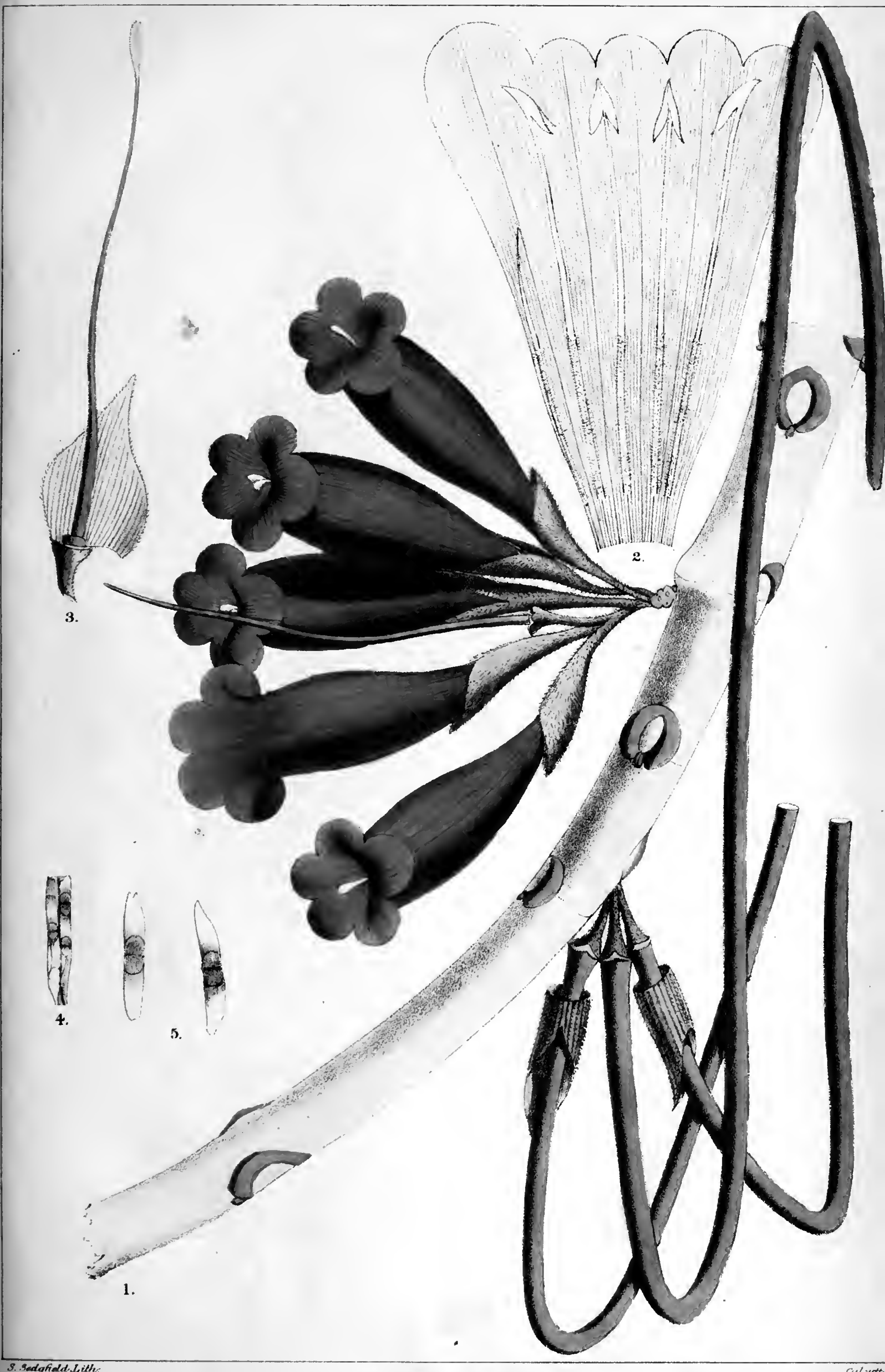
A middle-sized tree, 30-40 ft. high with a clear stem of 10 to 18 feet by 4-6 ft. girth, the very young shoots minutely puberulous; bark about $\frac{1}{3}$ inch thick, grey, longitudinally wrinkled; cut pale-coloured; wood white, soft; leaves ample, resembling those of *Acrocarpus*, ternately decompound, the lower pinnæ bipinnate, the upper ones gradually simply-pinnate, the rachis and petiole glabrous; leaflets from obliquely oblong-lanceolate to falcate ovate-lanceolate, 3-4 in. long, on very short petiolules, bluntish, acuminate, entire, chartaceous, glabrous and glossy; flowers showy, orange-crimson, on $\frac{1}{2}$-$\frac{3}{4}$ in. long puberulous pedicels, forming a short cluster- or corymb-like puberulous raceme at the end of the branches or arising from the young shoots above the scars of the fallen leaves; calyx spathaceous, about 6-7 lines long, shortly puberulous, green or purplish green; corolla glabrous, puberulous within, the tube 2 in. long or somewhat longer, the lobes only $\frac{1}{4}$-$\frac{1}{3}$ inch. long, rounded; pods thin and slender, cylindrical, about $1\frac{1}{2}$ ft. long, glabrous, with thin coriaceous valves; seeds, including their thin elongate pellucid wings, narrow linear, about $\frac{1}{3}$ inch. long.

Hab. Not unfrequent in the evergreen tropical forests, especially along choungs of the Martaban hills, E. of Tonghoo, up to 2000 ft. elevation, chiefly on metamorphic rocks, (first found by Dr. Brandis, occurs also in the Kakhyen hills, E. of Bhamo (Dr. J. Anderson). H. March, Apr.; Fr. Apr. May.

Dedicated to the memory of Lord Mayo, late Governor-General of India, under whose reign the first impulse was given to spreading Botanical knowledge amongst our foresters.

Explanation of figures.

Tab. I. Fig. 1. A flowering and fruiting branch, natural size.
Fig. 2. Corolla laid open, somewhat magnified.
Fig. 3. Calyx cut open, shewing the pistil, somewhat magnified.
Fig. 4. A portion of the septum, bearing the series of seeds, natural size.
Fig. 5. Seeds, somewhat magnified.
Tab. II. A branch with young leaves, and a pinna of adult leaflets, all natural size.



S. Sedgfield, Lith. Calcutta

LORD MAYO'S TREE. Pl. I.

APPENDIX E.

EXTRACTS FROM MR. KURZ'S JOURNAL OF HIS TOURS IN B. BURMA.

I have not thought it advisable to enlarge this Journal by introducing scientifically and *in specie* botanically interesting matters. It is drawn up chiefly for the purpose of describing the route I pursued and of mentioning the flora I met with. Having specialized, or rather generalized, the various varieties of forests, etc., in the first part of this report, I have now been able to simplifiy matters considerably by using the terms adopted in that report for such vegetative combinations, only occasionally mentioning the trees themselves in cases where I thought it necessary or useful to do so. All matters not directly connected with the progress of my work, such as remarks on the habits of people, their trade, etc. are omitted; by doing which the Journal has become a very dry narrative; but I felt it my duty to stick to my subject and to introduce as little superfluous matter as possible.

I have arranged both the tours of 1867-68 and 1870-71 into one continuous narrative, so as to bring the various topics under the same head. Those routes, which I made in company with the Inspector-General and Conservator of Forests, are already given in the Journal of these gentlemen. (See the Appendix to Capt. W. T. Seaton's Progress Report of the Forest Department, B. Burma for 1867-68). I have therefore omitted them from this narrative, and as it is chiefly drawn up for the use of forest officers in Burma, I have used the Burmese names of trees, etc., as far as they appeared to me reliable.

The maps* used by me are the following:

1. Capt. F. Fitzroy's British Burmah, Pegu Division. 1862. (Scale 4 miles = 1 inch).
2. District Akyab, 1853-61. Surveyor General's Office, (Scale: 4 miles = 1 inch).
3. Lt. A. H. Bagges, Map of Tenasserim and the adjacent provinces of Siam. (Scale 8 miles = 1 inch).
4. D. Brandis, Sketch map of the teak localities in the Tenasserim and Martaban Provinces. Rangoon 1861. (Scale: 8 miles = 1 inch).
5. Eastern Bengal, Burma and parts of China and Siam. Surveyor General's Office. 1870. (Scale 32 miles = 1 inch).
6. District Chittagong. 1835-66. Surveyor General's Office. (Scale: 4 miles=1 inch).
7. Stanford's Map of India. Lond. 1870. (Scale: 68.9 miles = 1 inch) and the same, portable map (scale: 100 miles = 1 inch).

I left the Botanic gardens, Calcutta, on the 1st Dec. 1870, and embarked for Rangoon the following day on board the Steamer "Asia." Arrived at Akyab on the 4th December, and made a short excursion on the environs of that station. The sandstone ranges opposite Akyab are covered by upper mixed forests with plenty of pyenkadu, *Xylia dolabriformis*, but no teak. The formation on which they grow is soft permeable sandstone (the same as that of the Andamans and the Pegu Yomah). The little berry-bearing bamboo (*Melocanna baccifera)* is plentiful in some localities. Evergreen tropical forests occur on favourably exposed slopes, and more especially on Boronga Island, where numerous wood-oil trees are seen. The lands around the station itself consist chiefly of rice cultivation alternating with wastelands and shrubberies in more sandy localities. Along the western shores, mangrove-swamps of small extent border the sea, in which *Brownlowia lanceolata* and a few *Salsolaceæ* were observed.

Wednesday, 7th Dec. 1870. Landed at Rangoon. The first days were spent, as might be expected, in making the necessary preparations and arrangements for my tour up-country. The only difficulty I experienced was the engagement of men and elephants, for which purpose I had to prolong my stay much against my expectation.

* Col. Yule's Map of Burmah proper is out of print, and I did not, therefore, succeed in procuring it. It would have been of great service to me for studying the details of the country and deducing the climatological connection with the Prome and Tonghoo districts.

The environs of Rangoon belong partially to the tidal, partially to the Irrawaddi zone and the vegetation is therefore in accordance with them. The surrounding spurs and hillocks are, or have been, covered by low forests on the exposed ridges, while relics of moist forest may be still be observed in protected valleys and ravines. A small but beautiful lake spreads out behind the Dagon pagoda, and the lands around it will no doubt in time become one of the most beautiful parks that British Burma can boast of. In fact a piece of land more favourable for a Botanic garden could not be imagined, having laterite, fresh-water and saline alluvium at command, and it is, in this respect, second to none except Singapore and perhaps to Moulmein, which I have not visited. The lake is remarkably poor in water plants, which are only seen in a few places and more especially in the adjacent tanks. As a consequence of this, the waters are muddy. There are also many thorny shrubs and climbers (especially *Zizyphus oenoplia* and *Caesalpinia*) which make it disagreeable to walk under the trees.

On the alluvium along the tidal choungs and river grow tidal jungles in profusion, extending into the lower quarters of the town.

16th Dec. 1870. Having no hope for the next 5 or 6 days of getting my camp together, I undertook an excursion to Elephant-point, at the mouth of the Rangoon River. I went down the Rangoon River in a boat and arrived in the evening at my destination. The borders of the river are all occupied by tidal forests while the higher grounds behind them are generally cultivated.

The following three days, I explored the forests all round. The sea-shore was formerly bordered by mangrove swamps, but the trees have now been cut away to a distance of 2 miles westwards, where fair but almost impenetrable mangrove forests commence. These partake, however, more of the character of tidal forests in which the Kambala (*Sonneratia apetala*) abounds. This tree, when growing in the sea as is the case here, sends out most curious straight horizontal roots of immense length (I measured some of 70 feet in length) which look not unlike strained cables. Conical erect stumps (young shoots) 1 to 3 feet in height grow out from them at intervals sending numerous roots into the mud. I never observed this elsewhere in the drier and true tidal forests.

Cable-like roots of Sonneratia apetala.

The above sketch will give some idea of this curious growth. The tree is here a prevailing type. Of others only piu *(Rhizophora conjugata)* and *Avicennia tomentosa* grow here. *Bu-tayat (Aegiceras corniculata)* and *Aegialitis* form the chief undergrowth.

Eastward of the settlement appears a sort of beach jungle, gradually passing into tidal forests. Here grow mynga *(Cynometra bijuga)*, Myouk ganyin (*Derris sinuata*), kathit (*Erythrina Indica*) Thimban (*Paritium tiliaceum*), *Pluchea Indica*, etc., etc.

18th Dec. 1870. Started at 6 P. M. for Rangoon, where I arrived in the night at 1 A. M. I succeeded during the following days in securing 2 elephants, and a few Burmans to follow me.

24th Dec 1870. I started with carts for Sang-ye-wa, to await there the arrival of the elephants I had engaged. The road leads chiefly through low forests growing here on lateritic substrata, but they have been much denuded, and are in many cases reduced to mere shrubbery. A fine patch of open evergreen forest is passed a few miles before San-ye-wa, but it is being destroyed in a very reckless manner and will soon be transformed into fields.

26th. Decb. 1870. The elephants having arrived the previous night, I started early this morning on my tour, but to my great disappointment the whole of my luggage fell down, owing to the bad manner in which it had been packed on the animal, and having only Burman mahouts to deal with, was obliged myself to teach them how to pack an elephant. This took up all my time, but it proved useful hereafter during my whole tour.

The forests are the same as those of yesterday. I encamped at Ton-kyan.

27th Decb. 1870. The march to-day was over a large tract of ricefields on the alluvial grounds of the Pazwun-doung valley. Approaching the opposite borders of the alluvium, jungles reappeared and after crossing a belt of diluvial strata on which long-grassed jungle pastures predominated, I came upon low forests with plenty of Andropogonous grasses, alternating with lower mixed forests of low and bad growth. I encamped at Kya Eng, and spent the next two days in exploring the surrounding forests with a view of studying the relations between the low and lower mixed forests and their substrata. The latter consisted chiefly of binga (*Nauclea* (*Stephegyne*) *rotundifolia*) ; yamein (*Aporosa villosa*), thim-byun (*Dillenia pentagyna*) Ka-boung (*Strychnos nux romica*), pyen kadu (*Xylia dolabriformis*) let-kop (*Holarrhena pubescens*) thit-po (*Dalbergia purpurea*) ; pangah (*Terminalia chebula*), mani (*Gardenia erythroclada*), na-be (*Odina wodier*), nagyi (*Pterospermum semisagittatum*) thit-sein (*Terminalia belerica*), pyen ma (*Lagerstroemia flos reginae*) Kun-pyen-ma (*L. macrocarpa*), nyoung-pyu (*Ficus Rumphii*), *Cinnamomum obtusifolium* locally, Thit yin (*Croton oblongifolium*,), Kim-ba-lin (*Antidesma Bunias*) thi pyu (*Emblica officinalis*), ban-bwe (*Careya arborea*), yin-dike (*Dalbergia cultrata*), my-a ya (*Grewia microcos*), ta-bwot-gyi (*Miliusa tomentosa*) and others. The forests enclose on drier grounds patches of low forests, in which a few young Eng trees were also observed. Of climbers there are baup no-e. (*Butea superba and B. parviflora*), no-e-sat (*Symphorema involucratum*) Kwe-no-e (*S. unguiculatum*), tama ka-no-e (*Congea tomentosa*), one or two *Combreta*, dama gne (*Millettia extensa*), and such like. A white powdered erect *Calamus* (Kieing-Ka) is often seen along with *Ardisia Wallichii*, *Zizyphus*, *Limonia alternifolia*, *Flemingia*, *etc.*

The little Kya-Eng is properly a jungle swamp densely overgrown with *Hymenachne myurus*, interwoven with *Hygrorhiza aristata*, *Panicum crus galli*, *Anosporum cephalotes*, *Jussiaea repens*, *Ceratophyllum*, *Myriophyllum*, *Polygonum* etc. The trees that surround it partake of the character of a swamp-forest ; they are thit-pyu (*Xanthophyllum glaucum*) and a peculiar mango-tree (*Mangifera longipes*).

30th Decb. 1870. Started for Pounggyi. Passed through lower mixed forests and also came upon the large Kya-Eng, where I had encamped in 1867. At that time it was overgrown with waterplants and the water was clear, but now it is a *rendezvous* for buffaloes from the newly settled Karen villages, and has no vegetation but mough (*Pistia*, *Salvinia*, *Azolla*). The forests around are moister and, therefore, of a somewhat better growth. Here also ye me ne (*Gmelina arborea*), lynggyow (*Dillenia parviflora*), tabye (*Eugenia Jambolana*), salung (*Licuala peltata*), tan tat (*Albizzia lucida*), yung (*Anogeissus acuminatus*), myouk gno (*Duabanga grandiflora*) min-bo (*Caryota urens* and *Wallichia oblongifolia*) and Kana so (*Baccaurea sapida*) indicated the neighbourhood of evergreen forests. Of bamboos I observed the tinwa and waya. On crossing the outer southern spur of the low range, I fell in with the first true Eng-forest, growing on cavernous laterite, from whence we descended into the alluvium of the Pazwun doung river. Marching through lower mixed forests, I arrived at 4½ P. M. at Phounggi, where I encamped.

31st Decb. 1871. The alluvium here is overgrown with wild sugarcane, forming with ban-bwe (*Careya arborea*), pyenma, theing the (*Nauclea parvifolia*) and some other trees a sort of savannah-forest. After crossing parched ricefields and passing a large Eng densely covered with water plants, I again entered some lower mixed forests which changed in sheltered valleys into Evergreen forests characterized by a bamboo called wa-no-e. Halfway to Kyau zu, to the right of the path I reached a small jungle lake where I observed a curious *Riccia*, (most probably new) which forms dense masses nearly a quarter of a foot in thickness. In travelling through Burma, the rice fields form serious obstacles. All paths are lost or rather become so interwoven that nothing remains for the traveller to do but to keep a straight course towards the place he wishes to reach. In crossing the Pazwun doung choung at Khyau zu, my pony fell over a log, and I received several contusions which made it impossible for me to march on foot. I managed, however, to reach Wachoung, where I encamped on the same spot as in 1867.

Year 1871.

1st Jan. 1871. Halted and being an invalid, I examined my Algae. In doing so, I made a discovery which may be of some use to microscopists in the field. The deep blue sky in the dry season is a great drawback to microscopic work in India. Accidentally my white washing basin was placed in such a position in the sun that the beams were reflected upon the mirror of the microscope, and ever since I have by this contrivance obtained a most beautiful "white cloud" light for my work.

2nd Jan. 1871. Went up the Mapo choung, where I fell in with a few teak trees in the lower mixed forests with an unusually large quantity of Kimbalin (*Antidesma Bunias*) as undergrowth. Returned towards evening to camp.

3rd Jan. 1871. Moved on to Wanet. Forests did not differ from those of the previous days. Just opposite to the villages is a fine patch of a small bamboo very similar to the Arracan berry-bearing bamboo, but the villagers informed me that it only produces a very small fruit. They call it tabeendein, but it is different from the homonymous one in Tenasserim.

4th Jan. 1871. Had to stay in camp, as I experienced great difficulty in getting provisions and guides for crossing over the Yomah hills. Visited the forests bordering the Wanet choung as far up as the Thit-kouk choung where teak is tolerably plentiful, and returned to camp via Potta. These forests are all upper mixed forests, with an admixture of evergreens along the choungs themselves; those on the alluvial lands of the Paywun-doung are lower mixed forests.

5th Jan. 1871. I failed to obtain a guide, and had to start without one. The path led along the Wanet and Thit-Kouk choungs. Here tha-byu (*Dillenia Indica*) is not uncommon along one of the feeders. The forests on the ridges are all upper-mixed forests of the same character as those observed yesterday, but with well grown teak and Kyattaun-wa in it. The latter had flowered two years ago, and whole tracts of land appeared like meadows of seedlings. Along the shady slopes of the ridges the moister upper mixed forests now made their appearance, occasionally assuming the character of evergreen forests, being accompanied by such trees as *Turpinia pomifera*, *Randia longispina*, *Canarium Benghalense*, etc. Mayzali (*Cassia Siamea*) is a tree 60 to 70 ft. high which is especially plentiful along the Thit-Kouk. Encamped at a small feeder of the last named choung, about a mile from the usual camping place called after a large banyan tree "Nyoung ouk sakkhan."

6th Jan. 1871. Forests as yesterday. The rocks that compose these hills were up to date quite hidden, but in crossing the Thit-Kouk choung, I discovered a spot where soft sandstone rocks are well exposed dipping to S. W. about 35°. The decomposition of this rock has in this place everywhere greatly advanced. Passing the water shed between the Thit-Kouk and Mui oung choung plenty of fossiliferous (oosters) rocks were met with on the Mui oung side. Teak along with Kyattoun-wa grows plentifully here along the Thit Kouk slopes, but none were seen on the other side where tinwa prevails. Here I lost the path altogether having by mistake followed up a track of wild elephants, until I came back to the Thit Kouk, where I found that my elephants had preceded me over the ridges. Arrived at the Kalwa choung I entered extensive tracts of toungyas and having no guide had no little difficulty in tracing the Karen village to which the toungyas belonged.

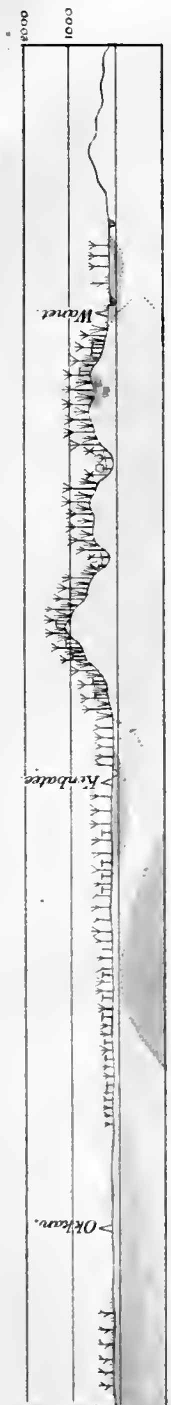
It was only about sunset that I heard the curious crackling noise caused by the disturbance of the Karen community in their large bamboo Tay, who all tried to get a glimpse at the elephants. This village, Myé oung, is the largest Karen Tay I ever saw in the Yomah being fully 200 feet long supported by bamboos 30 feet in length and occupied by upwards of 80 full grown men corresponding to nearly as many families. Here we encamped as well as we could; for the ground was so broken, that there was no spot sufficiently large and level on which to pitch the tents.

7th January, 1871. This morning a Karen offered me his services which I gladly accepted, and he proved afterwards the most reliable and active of my whole troop. Our route was over sandstone ridges covered by upper mixed forests with teak, Kyattoun-wa and tinwa, forming part of the Magayi forests of the foresters. Descending along one of the feeders of of the Kenbati choung we entered diluvial clay formations characterised by low forests with long meagre Ardropogonous grasses extending almost to the village Kenbati itself where we stayed. Our elephants only came in at 8 P. M.

8th January, 1871. Halted.

9th January, 1871. The way lay over clayey alluvium covered by lower mixed forests until I entered the higher grounds where low forests with Eng, teak, Engyin, (*Pentacme Siamensis*), Enjin (*Aporosa macrophylla*), Symplocos, mani (*Gardenia erythroclada*), etc, grow, curiously associated, on yellowish stiff plastic clay, most probably resting on laterite. The same sort of low forest with a sprinkling of teak continued all the way after reaching the Promo road, while to the west of it true lower mixed forests appeared which are, however, much cut up for cultivation. By some misunderstanding my camp followed the road and went to Allay yua, while I was waiting for their arrival at Oakkan. After having sent out some parties in search of them, they arrived the next morning at 4 A. M.

10th January, 1871. This morning two of my Burmans absconded, and I had to halt the camp to try to get others which I succeeded in doing after some trouble during the course of the day.



Section from Suay Pagan Choung (Irrawaddi) to Wanet (Pazwun doung choung).

11*th January*, 1871. Followed the cart-road to Bin-dau-eng. Although the alluvium round Oakkan is for a great part under cultivation, the forests which formerly existed could easily be made out from the trees left standing along the borders of the rice fields. These partook decidedly of the character of a lower mixed forest up to about a mile west of Oakkan when long wild sugarcane made its appearance along the borders of the fields while baup (*Butea frondosa*), yindyke (*Dalbergia cultrala*) and others appeared in their stead, thus indicating former savannah forests. As the fields ended I entered the real typical savannah forests almost entirely consisting of the small-leaved variety of thein-dé (*Stephegyne parvifolia*) and continuing so almost to the banks of the Lhein river, where bamboo jungles of yakatwa (*Bambusa spinosa*), then in full flower, locally interrupted them. The larger choungs in these savannahs are bordered usually by a peculiar vegetation, its constituents being derived chiefly from the swamp-forests, such as *Hymenocardia Wallichii*, *Gardenia hygrophila*, *Derris*, *Combretum trifoliolatum*, *etc.* After following the bank of the Lhein river upwards through savannahs nearly 12 feet high, I crossed this stream opposite Bin-dau-hsit, and continued my march through savannah forests, now chiefly composed of yindyke (*Dalbergia cultrata*) and thitpo (*Dalbergia purpurea*) while baup (*Butea frondosa*) appeared in less number along with bam bwe (*Careya arborea*), Kye ni (*Barringtonia acutangula*) and a few others. Arrived at the Bin-dau Eng we encamped in the swamp-forest which borders this lake opposite the village of the same name. *Carex Wallichiana* here forms very inviting patches for pasture, but is, like its congeners in Europe, not touched by cattle.

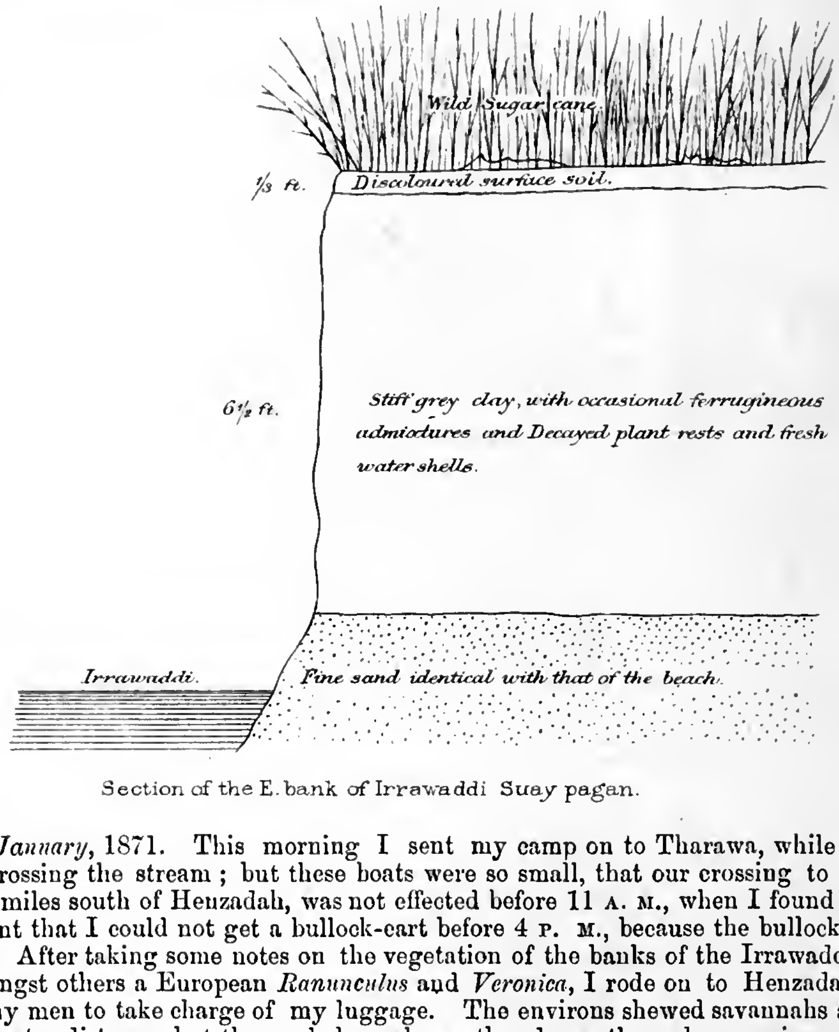
12*th January*, 1871. My elephants having ran away during the night, I could only start at 10 A. M. They had gone off with two wild elephants and were found with them in a swamp about three miles off. The savannah forests continued for a few miles on the other side of the lake, when to my surprise I entered a cool shady typical swamp-forest of large extent, full of novelty and interest to me. It extends to a distance of about a mile from the banks of the Irrawaddi, where savannahs are again met with. Having arrived at Suay Paghan, my botanical section from the Pazwun doung choung to the Irrawaddi was finished, and I now turned northwards along the Irrawaddi, encamping for the night at Khyoung gyi, a poor village buried in the high grown savannahs that enter it from all sides.

The accompanying section is a graphic representation of the results of the journey as above mentioned.

13*th January*, 1871. The elephants could not be found in the savannahs until 11 A. M. and therefore only a very short march to Balue-yua was accomplished. All the way nothing but savannahs intersected by rice fields and villages were met with.

14*th January*, 1871. Halted in order to send off my mails to Henzadah. The jack and mango trees grow here splendidly, although, like all other trees, they are rather short-stemmed.

15*th January*, 1871. Started for Nay-yua. While the elephants followed the cart-road, I turned to the right, crossing the extensive savannahs and savannah-forests, and it was only after having lost the true path several times that I arrived at the banks of a lake called Eng sue. Here I found a canoe, in which I managed to cross over with my followers to the village of the same name; but this occupied nearly two hours, for the canoe held but two persons at each trip. The trees bordering the lake are swamp forest trees, amongst which a species of *Aporosa* was especially conspicuous. The eng itself is destitute of waterplants and its waters are very muddy, but the scenery around is friendly and inviting. From here we had to go westwards and, passing a small Karen village at the Ngye-tsi-lah swamp, we again, after a few miles march, entered the rice fields where we joined the cart road. The further march was uninteresting in the extreme: only rice fields and villages were met with. Towards the evening I observed that my camp had put up in the savannahs near a half-rotten shed, and heard to my astonishment that this was Nay yua, the village itself having been swept away by the Irrawaddi some years ago. In fact I had observed all the way that the encroachment of the Irrawaddi was on this side, thus shewing a tendency to shifting eastward, just as the Ganges does. The earth-slips caused by the encroachment of the river are easily accounted for by the fact that the whole surface clay rests on fine sand and becomes thus quickly undermined by the force of the stream. Exposed escarpments of the Irrawaddi gave me the following section at Suay-pagan:



Section of the E. bank of Irrawaddi Suay pagan.

16th January, 1871. This morning I sent my camp on to Tharawa, while I engaged boats for crossing the stream; but these boats were so small, that our crossing to Ouk yua, about two miles south of Henzadah, was not effected before 11 A. M., when I found to my disappointment that I could not get a bullock-cart before 4 P. M., because the bullocks were in the fields. After taking some notes on the vegetation of the banks of the Irrawaddi, where I found amongst others a European *Ranunculus* and *Veronica*, I rode on to Henzadah, leaving a few of my men to take charge of my luggage. The environs shewed savannahs and savannah forests at a distance, but the road lay along the dams through a series of villages. After dark my luggage and followers arrived and we put up in the zyat. During the following days I was busy packing my collections, and replenishing my provisions for a long tour over the Yomah and with such other matters as suggest themselves after a long absence from a station. Mr. A. Hore, Deputy Post Master of the station, was good enough to take upon himself to put my plant-boxes on board the next steamer, and so I was able to start after a sojourn of only two days.

18th January, 1871. Crossed over to Tharawa with the usual delays and difficulties, and joined my camp there.

19th January, 1871. Camp stayed, as several of my men as well as my interpreter were laid up with fever.

20th January, 1871. Started for Thabie-gon on the Lhein river. After passing the cultivated lands we found ourselves again in savannah-forests where in a few places the trees grew so crowded together as to resemble in growth more those of a lower mixed forest. They were chiefly ouk-chin-za (*Diospyros ehretioides*), Kaboung (*Colubrina nux vomica*), binga (*Stephegyne rotundifolia*), manioga (*Carallia integerrima*) lein (*Terminalia pyrifolia*), thit (*Albizzia elata*), pyénma (*Lagerstroemia flos reginae*), banbue (*Careya arborea*), thimbyun (*Dillenia pentagyna*), nyoung pyu (*Ficus Rumphii*), thit-po (*Dalbergia purpurea*), yindyke (*D. cultrata*), the 2 last named forming for about 2 miles almost the sole tree-vegetation. To the left of the road are numerous little "engs" and swamps or dried up beds of choungs, along the borders of which swamp-forests spread themselves out. We encamped towards evening under the dense shade of these swamp-forests at the Puja eng. Here the swamp-vegetation is greatly developed, but for the greatest part impassable without boats. Kye ni (*Barringtonia acutangula*), yung (*Anogeissus acuminatus*) thayet (*Mangifera sp.*) along with thit-pyu (*Xanthophyllum glaucum*) were the principal trees. The curious ye-kadat (*Crataeva hygrophila*) was as in all other swamp-forests also here observed.

21*st January*, 1871. The scenery to-day remained the same, but owing to the abundance of choungs, the patches of swamp-forests were more numerous and became more and more conspicuous and interesting as we moved westward. For a distance of about 2 miles from the banks of the Lhein-river, the terrain is taken up by bamboo jungles (Yakatwa) which as usual, excludes almost all other tree growth. After fording the Lhein river we arrived at Thabie-gon, but the village was uninviting, and being perfectly bare of trees, I preferred to move on to the Kamon-gyi Eng, where I encamped in a forest of a description intermediate between a swamp, and a lower-mixed forest.

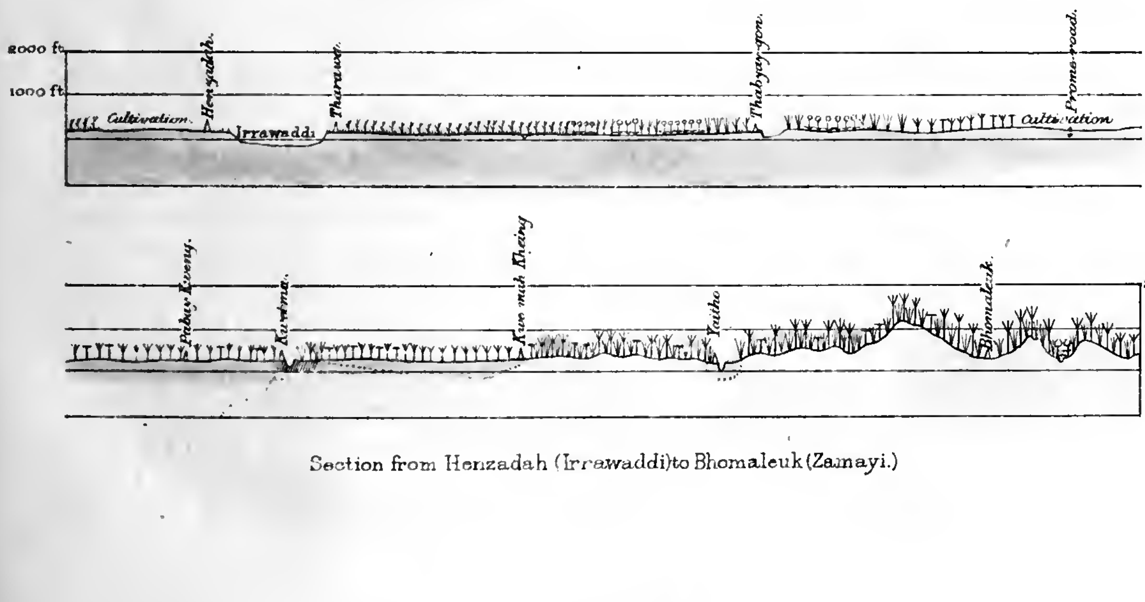
22*nd January*, 1871. Followed the cart road and after passing the Kanyéng tabié Eng we entered again savannah-forests. Before arriving at the Byi gyi choung, I met with another bamboo jungle of Yakatwa in which a species of *Cyperus* (allied to *C. moestus*) was conspicuous. I encamped near the Kyoung of Pyi-doung-dweng on the Thayet choung. Altough cultivation has removed the forest trees, the indications of lower mixed and the termination of savannah-forests were here as distinct as at Oakkan.

23*rd January*, 1871. Proceeded along the cart road through lower mixed forests intermingled with numerous but badly grown teak trees and through cultivated lands. Sha-trees (*Acacia catechu*) were not unfrequently met with, but most of them were felled and cut up into logs for building purposes. At Wetla we crossed the Prome road and encamped at Pa-le-kweng, a village surrounded by cultivation only.

24*th January*, 1871. Encamped at Kwe-mha-kheing. The cart road winds chiefly along or near choungs and the forests were, therefore, to-day nearly all lower mixed forests, while only a few patches of low forests were traversed on the higher grounds. At Nat-madi we entered undulating land and reached the Kadeng choung which forces its way over soft permeable sandstone excavating it in all directions. It is, however, only after ascending the lower spurs which are crossed on passing from Kyun gon and San-pot to Kwe-mha-Kheing that upper mixed forests of a rather dry character with plenty of teak, appear.

25*th January*, 1871. Halted. Here I tried to engage a third elephant and to get provisions for my tour over the hills. In the bed of the Biling Kadeng, just below the village, large rocks of laterite lying loosely on the sandstone layers attracted my attention. I heard to my surprise from the villagers that laterite "grows,' in the hills, and I therefore determined to pass the spot.

I subjoin here a botanical section of the country traversed from Henzada to Kwe-mha-kheing, including the Yoma hills as far as Bhomaleuk. The section is not an instructive one because a great part of the journey lay along choungs, and as I did not cut them at right angles I did not pass over the diluvial lands.



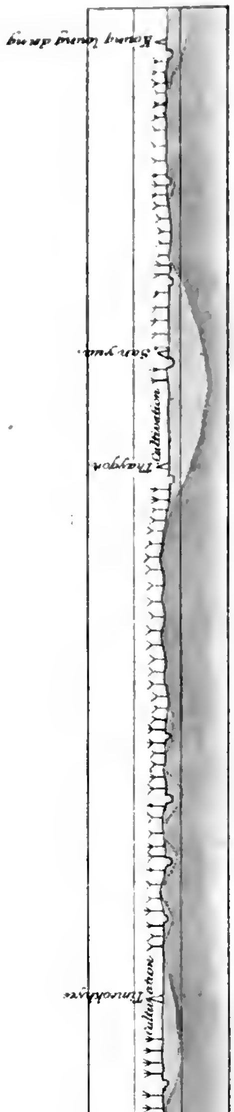
Section from Henzadah (Irrawaddi) to Bhomaleuk (Zamayi.)

Year 1868.

6th January, 1868. To-day it was resolved that I should separate from the Inspector-General's camp and should move towards Myo dweng where I was again to join the party. This route is interesting as it leads along the laterite belt that separates the sandstone hills from the alluvium and cuts it lengthwise, thus giving a clean longitudinal section.

7th January, 1868. Left Koung-long-deing and entered Eng forests on laterite grounds soon after leaving the alluvial deposits of the Kun-Biling-choung. Towards the Kadeng choung lower mixed forests with plenty of wapyu gelay in it re-appeared on alluvium. Encamped opposite to Thaya gon on the banks of the Mokha choung.

8th January, 1868. After leaving the alluvial lands of the Mokha choung, Eng forests with myin wa (*Bambusa stricta*), became the rule. For a short distance the laterite is covered by stiff clay, probably inundated during the rains, and here a coarse *Anthistyria* (*A. gigantea*) with Touk Kyan (*Terminalia crenata*) and occasional patches of Yin dike (*Dalbergia cultrata*) form a uniform low forest. The latter tree grows here very low surrounded by its young offspring, which the Javanese would call a *pohon anakanak* (a tree with its children) a sketch of which will be found in para. 2, of this report. The whole tract over which we wandered is laterite ground filled up with alluvial deposits along the courses of the choungs; and it is along these choungs that the eng-forests are separated by strips of lower mixed forests of the usual character. I encamped at Thin-myot-gyi situated on cultivated lands surrounded everywhere by Eng and low forests.



Section from Choung-wa. to Koung-loung-deing.

9th January, 1868. Started for Myodweng. The character of the country the same as yesterday. Extensive Eng and low forests observed on the laterite grounds which to-day appear on the higher situated lands between the choungs, while lower mixed forests regularly border the choungs themselves when flowing through alluvium. Fine silicious sand often covers the laterite and adds still more to the apparent sterility of the tracts. Arrived at Myodweng we put up in the forester's bungalow.

10th January, 1868. Remained at Myodweng. I explored to-day the Eng forests which extend from Myodweng to near the banks of the Thayet choung at Choungwa. They are typical Eng forests.

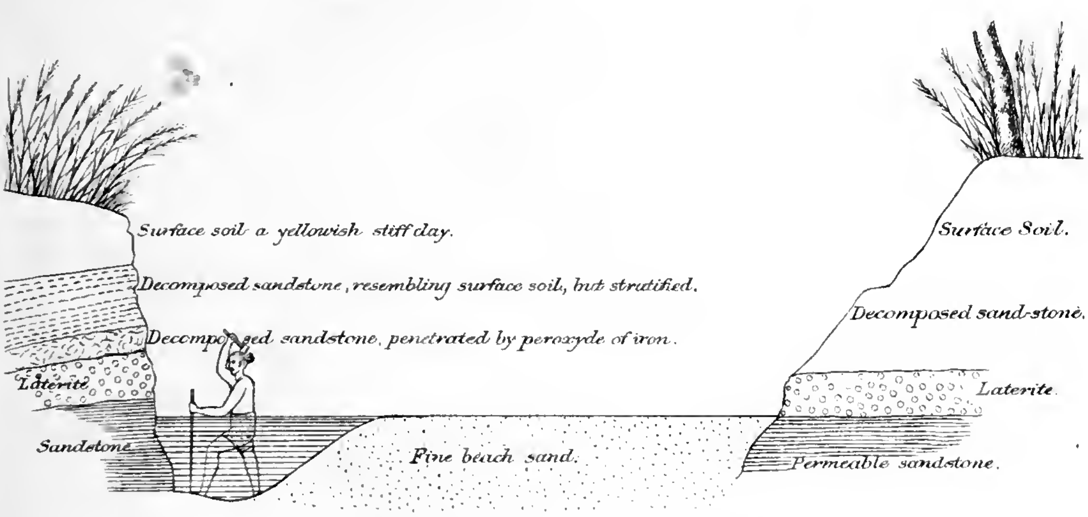
11th January, 1868. Camp stayed. Explored the undulating low hills at and around Doung mien pagoda. The relation of the Eng and lower mixed forests is the same, Eng forests covering all the undulating hilly country to the east of this pagoda. This pagoda is overgrown with vegetation along the favourably exposed sides and the following is a list of the plants I noted down: *Thyssanolaena acarifera, Crotalaria, Cheilanthes argentea, Adiantum lunulatum, Osbeckia Chinensis, Sonerila tenera, Blumea, 2 sp., Celosia argentea, Schizachyrium brevifolium, Eragrostis, Selaginella, Vandellia crustacea, Canscora diffusa, Lindenbergia, Ageratum, Sida. Gomphrena, Vernonia cinerea, Pteris longifolia, Campanula canescens, Rungia pectinata, etc.*

To-day the Inspector-General and party arrived.

The annexed section will give a graphic picture of the country traversed, but as I have no longer at my disposal the same map (Captain Seaton's sketch map) on which I marked the forests, the section can only be approximately correct.

Year 1871.

26th January, 1871. Waited in vain till 10 A. M. for the arrival of the promised elephant and started for Yaitho. Met Captain Plant, the Deputy Commissioner of Henzadah, and party, who had just arrived, at the other end of the village. The route was for several miles in the bed of the Kadeng choung. Here I passed the laterite stratum (from whence the big rocks at Kway-wa-Kheing came from) broken through by the choung. The following is a section of this remarkable occurrence of laterite.



Section of Kadeng Choung, above Kway-wa-Kheing.

This is the first instance that I met with true diluvial laterite within the Yomah sandstone hills. It is probably an ancient pebbly river-bed. The upper layers consist of so decomposed a mass, that it is not easy to say whether it is really decomposed sandstone or sand consolidating into sandstone. Any how it is stratified and the ferruginous matter has penetrated into the lower stratum.

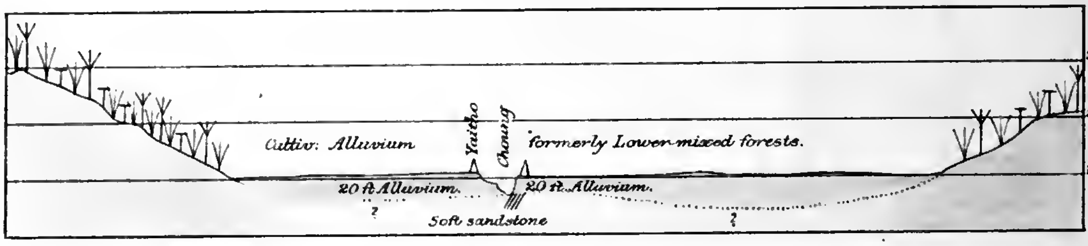
All the ridges were covered with upper mixed forests. while the alluvial deposits of the choung bore a sort of savannah forest of hilly-character, with coarse wild sugarcane and such riparian trees as didu (*Bombax Malabaricum*) Ye-Kathit (*Erythrina lithosperma*), *Bischoffia Javanica*, ma-u (*Sarcocephalus cordatus*), ye tapan (*Ficus glomerata* and *F. Chittagonga*) and others.

27th January, 1871. Camp halted at Yaitho. I made two excursions, one to the ridges to the right side of the Yaitho choung with upper-mixed forest; the other over high ridges on the opposite banks presenting the same kind of forest, in which, however, the bamboo trees had flowered a few years ago where now, on this account, the dead bamboos render an advance almost impossible. It took me fully 3 hours to cut a way of only 2 miles and of this distance half the way lay through deserted tounggyas.

The following is the list of trees, etc., I met with in the upper mixed forests on the ridges to the right, summed up just as they came into sight: *Lepisanthes montana*, a single treelet in a damp gorge, Kaboung (*Strychnos nux vomica*), pyenkadu (*Xylia dolabriformis*), Kyattoun wa (*Bambusa Brandisiana*), *Barleria polytricha*, Kyun na lin (*Premna tomentosa*) toung madama (*Dalbergia glauca*), a small *Phrynium*, *Uraria refracta*, *Smilax prolifera*, *Leucas sp.*, *Strobilanthes scabra*, *Acrocephalus capitatus*, *Blumea lacera?* a large *Flemingia*, *Desmodium triquetrum* with smooth pods, *Clerodendron serratum*, Kimba-lin (*Antidesma Bunias*) *Desmodium recurvatum?*, *Lygodium scandens*, *Limonia alternifolia*, baup noë (*Butea superba* and *Spatholobus Roxburghii*), damagne (*Millettia extensa*), *Crotalaria* sp., with simple leaves, *Helicteres plebeja*, tamakha noë (*Congea tomentosa*), *Centotheca lappacea*, *Lepidagathis hyalina*, Kway noë (*Symphorema unguiculatum* and *Calycopteris Roxburghii*), thit poh (*Dalbergia purpurea*), teak, (*Crotalaria filiformis*, nabé (*Odina wodier*) be bya (*Cratoxylon neriifolium*), a puberulous *Hitchenia*, called mala, *Grewia abutilifolia?*, paëthan (*Heterophragma adenophyllum*), *Cyclea peltata*, ouk chin za (*Diospyros ehretioides*), nagyi (*Pterospermum semisagittatum*), mayzeli (*Cassia Sumatrana*), *Rungia pectinata*, binga (*Stephegyne rotundi-*

folia), *Blumea flava*, an *Oplismenus* with purple stigmas, *Crotalaria alata*, *Triumfetta angulata* and *T. annua*, *Dimeria sp.*, thein gala (*Nauclea sessilifolia*), let-kop (*Holarrhena pubescens*), *Elephantopus scaber* (the usual yellowish flaccid form of these hills), *Crotalaria chinensis*, *Strobilanthes auriculata*, a small tiliaceous looking *Coelodiscus*, *Panicum montanum*, thein-byun (*Dillenia pentagyna*), piu da yo (*Grewia elastica*), tau napyo (*Musa rubra*) in ravines, *Strobilanthes flava* and *S. phyllostachya*, ban bwe (*Careya arborea*), sha neo (*Sterculia villosa*), Kyattoun wa-seedlings (*Bambusa Brandisiana*) in abundance, a short stemmed *Blumea*, the teak grass (*Pollinia tectonum*), *Scleria lithosperma*, *Urena lobata* (the hoary variety), tamin sa pyu (*Gardenia sessiliflora*), mani (*Gardenia erythroclada*), chloabo (*Kydia calycina*) doani (*Eriolaena Candollei*), thit pagan (*Millettia Brandisiana*), pilo (*Corchorus acutangulus*), ayk moi noë (*Embelia robusta*), myouk shaw (*Blackwellia tomentosa*), boaygyin (*Bauhinia Malabarica*), tseik chi (an arboreous *Briedelia*), nu e cho (*Thunbergia laurifolia*), yin dyke (*Dalbergia cultrata*), panga (*Terminalia tomentella*), tha kia ne than (*Leea staphylea*) ; gyo (*Schleichera trijuga*), che ben (*Semecarpus cuneifolius*), tadi (*Bursera serrata*), tasha (*Emblica albizzioides*), and zi pyu (*Emblica officinalis*), kyet yo (*Vitex alata*) nu e op (*Paederia lanuginosa*), naga mouk (*Leea aequata*) and kia bakki (*L. macrophylla*), didu (*Bombax insignis*), *Onychium auratum*, *Adiantum lunulatum*, tabwot gyi (*Milinsa velutina*).

A section across the Yaitho-choung (this is called the Biling-Kadeng by the Karens here) at the village gives the subjoined result.



Section across the Yaitho valley (at Yaitho village.)

28*th January*, 1871. The promised elephant with only one Burman attendant and without pads or gear had arrived during the night. My own men, however, managed to make from old gunny bags, etc., the necessary improvised year, and after some trouble I started at 2 P. M. The path over the hills was described to me by the Karens as very good and easy to find, and this rendered the employment of a guide unnecessary. I encamped about 6 miles up the Yaitho choung in a meagre evergreen forest, in which the ground was overgrown with *Strobilanthes rufescens*. The soft permeable sandstone dips here N. by E. at c. 60°.

29*th January*, 1871. One of my Burmans decamped during the night, making at the same time several mistakes in the selection of the *meum* and *tuum*. Following the bed of the choung we soon had to encamp at a small pool of brownish water, the last we would find on this side of the range and full of young toads. The choung is bordered by evergreens in sheltered places, while the sunny slopes and ridges bear the usual upper mixed forests with plenty of teak in it.

30*th January*, 1871. With the disappearance of water evergreens also disappeared. We crossed tolerably level lands along the Ye-gna-choung of a very dry nature, and covered with upper mixed forests. The surface-soil seems to be only 2 feet thick, resting on a layer of rolled sandstone-pebbles, possibly the bed of an ancient lake. Arrived at the foot of a short spur of the main range of the Yomah, we had an exceedingly steep ascent for more than 1000 feet. The trees were of gigantic size and straight growth, although specifically they were for the greatest part the same as those of the lower ranges. *Nauclea sessilifolia* (thein gala), a stunted tree in the alluvial plains, here reached a height of 70 or 80 feet by 8 to 9 feet in girth. The highest point on this pass is probably 1200 feet and the descent to the Zamayi is gradual along ridges covered by typical upper mixed forests with Kyattoun wa and tin-wa as undergrowth. Arrived at the bottom of a valley we fortunately met with two Burmans connected with the timber trade who shewed us the way which descended along another Ye-gna-choung ; and after ascending a feeder of this we reached the Karen tay Boma leuk, where we encamped.

31*st January*, 1871. As I did not wish to trust again to Karen tales about easy paths, I engaged regular guides. Along and over ridges full of knobs, descending to, and ascending from, small choungs we soon arrived at Gho bu gna Tay, situated on a prominent knob of a sandstone spur commanding a fine view over the Zamayi stream below it. The forests were all upper mixed forests and only a few evergreens were met with along the choungs but nowhere did I, as I expected, find close evergreen forests. Moving a mile further on, we descended to the Zamayi and encamped on loose sand the only level spot where to pitch a tent.

1*st February*, 1871. The aspect and configuration of the country is everywhere so similar, and the forests so alike, that it is better to simply sum up the route I took. Bamboos, more especially tinwa, had thoroughly shed their leaves and so had also most of the trees. A more disagreeable march to a botanist cannot be imagined than travelling through leaf-shedding forests at this period of the year when the shedding of leaves has just commenced; and for this reason neither flowers not fruits could be collected, as they all appear at a later period. Passing Gho myella Tay we crossed a toungya said to be only 2 years old (I estimated it at twice the age). This shewed the following vegetation. Má-ú letsha (*Sarcocephalus undulatus*) thit po (*Dalbergia purpurea*), binga (*Stephegyne rotundifolia*), Kyattoun wa (*Bambusa Brandisiana*), tasha (*Sponia orientalis*), Ka oung (*Ficus conglomerata*), poung ma theing (*Blumea balsamifera*), pyoung sa or teak grass plenty, plenty tek ke (*Saccharum spontaneum*), Kadu (*Conyza viscosa* and *Ageratum conyzoides*), plenty tamin sein (*Panicum* (*Thyssanolaena*) *acariferum*), Katsene (*Triumfetta annua*), *Buettneria aspera*, wa or cotton, a remnant of culture (*Gossypium herbaceum*), choung mi gu (*Buddleia Asiatica*), mot so lama (*Desmodium triquetrum*), *Strobilanthes auriculata* and *Str. glaucescens*, myouk gno (*Duabanga grandiflora*), maloa (*Spathodea stipulata*), thein gala (*Nauclea sessilifolia*), damagne noë (*Milletttia extensa*) and thamakba noë (*Congea tomentosa*); only a few teak-seedlings were observed towards the borders of the toungya.

Had to cross the little Legwa choung from whence we came to the Thay may choung and, going up the Kyet choung (a feeder of the Thay may) we reached Gho tho boung Tay where we stayed.

2*nd February*, 1871. There were great festivities at this Tay on account of a marriage, and we had to stay, being unable to get a guide before the next day.

3*rd February*, 1871. The path as on previous days lay over sandstone ridges covered by upper mixed forests with well grown teak and pyenkadu. After several sharp ascents and descents we came again to the Thay may choung, which perfectly confused me by its windings. Here on a small plain, the same choung runs in two opposite directions, hardly 100 paces from one another. After crossing a low ridge, we came to a Tay situated at the borders of extensive level rice-lands and encamped at the northern extremity of the plain opposite to a village, called Wa-tha-but yua, a new name I think for a village of Jabiues who had just commenced building near the Karen Tay.

4*th February*, 1871. The route to-day ran through a good deal of cultivated land and old toungyas along the Wa-tha-but choung, passing several villages of Jabines. It is interesting to see how these Jabines occupy everywhere in the hills the level lands, while the Karens do not avail themselves of lands easy to cultivate, but prefer to cut their toungyas on the hills themselves. A patch of lofty trees far ahead, ornamented with festoons of climbers soon led me to expect true evergreen tropical forests. Nor was I disappointed in my expectations; for the choung soon became narrower and overhung with Wa-tha but wa, a bamboo characteristic to evergreen forests in these hills. A large broad-leaved rattan (yamatha) turned up along with numerous ferns and other plants indicative of dampness such as *Goniopteris lineata*, *Nephrodium*, *Davallia speluncae*, *Angiopteris evecta*, *Bragantia tomentosa*, *Mussaenda*, *Trevesia palmata*, 2 species of *Elatostemma*, *Strobilanthes flava*, etc. etc. Of trees we came along *Bischoffia Javanica*, *Swintonia Schwenckii*, *Holigarna Grahamii*, *Acrocarpus fraxinifolius*, *Hibiscus macrophyllus*, *Pandanus furcatus*, *Myristica*, *Payanelia multijuga*, *Macaranga*, *Hydnocarpus heterophyllus*, *Semecarpus heterophyllus*, *Caryota urens*, *Sterculia scaphigera*, etc. etc. This was an agreeable change for me, and I soon filled the stock of paper which I had carried all over the hills without a chance of making many new additions. The ridges bordering the choung are as everywhere covered by upper mixed forests with teak. In ascending the headwaters of the Wa-tha-but we entered very dry hill-land covered by dry upper mixed forests with teak, but no water. At Didu Tay we changed our guides and crossed the principal watershed between the Zamayi and the Sittang rivers. The vegetation on the Sittang side is more varied and evergreens cover the bottom of the valleys. Passing over large tracts of deserted toungyas and descending over ridges covered by upper mixed forests we arrived rather late in the day at Jan gay Tay on a feeder of the Bheinda choung, a village said to be about 2 Burmese miles W. by N. from Gho-tha-may or Phosit Tay on the Bheinda itself.

5*th February*, 1871.—The path runs for the first half over the ridges and, therefore, was extremely uniform only upper mixed forests being met here with occasional poor evergreen forests when fording the few choungs. Black bears must be plentiful here judging from the manner in which the ground has been dug up by them. For a short distance we had to follow the Ye tsha choung and avoiding some large bends by crossing over adjoining ridges we arrived at the junction of the Ye tsha and Tahat choungs. A little further down from here commence level alluvial lands covered by toungyas, savannahs and savannah jungles of a hilly character. They presented no interest, and we hurried on in the bed of the Tahat choung to the Peanchoung, on the other side of which we pitched our camp at Yumein da yua, a Jabin village.

6th February, 1871.—As is usually the case when one reaches the plains after a tour on the hills all my men wanted to leave and I had no small difficulty to induce them to serve me for one month more. I started at 2 P. M. and crossed over the ridges that separate the Pean and Ye-noë choung. On the ridges grow the usual upper mixed forests with a sprinkling of evergreens along shady slopes. Teak was here still in full foliage, while all along the route over the hills the trees had long ago shed their leaves. The valley of the Ye noë is fine and open, bordered everywhere along the favourably exposed slopes with evergreens, (amongst which especially Ka-thit-ka, *Pentace Birmanica*) then in full fruit was conspicuous; but on the alluvium itself toungyas, in cultivation or abandoned, prevailed. At the confluence of the Ban-deo-choung and Ye noë grows, just in the fork of the two choungs, a pure teak forest on alluvium. I first thought it might be a teak-plantation, so regularly did the trees grow, and they all seemed to be of one age, but my jabine guides assured me that it was self-sown. The stems although straight, branch out low down. The only other trees I saw in passing were a few thein-gala *(Nauclea sessilifolia,)* a myouk zi *(Zizyphus rugosa)* and a single pangha (*Terminalia chebula.*) After leaving this forest, the toungyas continued all the way, several of them reverting again into savannah forests. Some of the trees got, in single species, the supremacy, as for instance the low may zali (*Cassia Timoriensis.*) at one place, while ma-u letsha (*Sarcocephalus undulatus*) formed a small forest by itself, the trees standing far from one another as is usual with savannah forests. I encamped at Tantabheng.

7th February, 1871.—Leaving the village I soon entered an evergreen tropical forest of a kind which I distinguished as an open forest, running into a closed forest along the choungs and shady valleys. The trees and shrubs were chiefly kathit-ka (*Pentace Birmanica,*) lyngyan (*Dillenia parviflora*), yagein (*Aporosa dioica,*) *Chaetocarpus castaneaecarpus,*) myaya (*Grewia microcos.*) zalun (*Licuala peltata,*) yinga and yamatha (*Calami sp.*) along with Kyein gyi (*Calamus fascicularis ?,*) several species of tabie (*Eugenia,*) tau zi (*Zizyphus oenoplia,*) Kyet noë (*Colubrina pubescens,*) tamaka (*Congea tomentosa*), nagyi (*Pterospermum semisagittatum,*) *Ancistrocladus extensus*, Kyattoun wa (*Bambusa Brandisii,*) tabot noë (*Uvaria macrophylla,*) *Engelhardtia spicata*, *Beilschmiedia Roxburghiana*, minbo (*Caryota urens,*) thingan (*Hopea odorata,*) *Swintonia Swenckii*, yemene (*Gmelina arborea,*) touk yama (*Turpinia pomifera,*) toung peing ne (*Artocarpus chaplasha,*) *Phoebe pubescens*, yuet won (*Hibiscus vulpinus,*) *Combretum decandrum*, *Ventilago calyculata*, *Toddalia aculeata*, *Sterculia scaphigera*, myouk gnu (*Duabanga grandiflora,*) etc. The further route was troublesome for a large tract was covered with the half climbing wa-tabut which forced us to creep under the very low arches which it forms, and which were again variously barricaded by other vegetable growth, while the mahouts had to cut a way for the elephants. Ascending the sandstone ridges, we found upper mixed forests with plenty of pyenkadu, but apparently no teak. The last part of the day's march was over sharp ridges along the Ye noë choung, which latter could be seen from time to time. After an almost vertical descent we reached the toungyas that surround Tatalu, a rather large village. It was 9 P. M. when numerous moving torch-lights on the hills and the usual cries, trumpetings and confusion in a dark night, indicated the arrival of my camp. The place which I selected for my encampment was soon filled with curious Karens, whom I made useful preparing the ground, and at 1 A. M. I got my " dinner."

8th February, 1871.—Started at 2 P. M. It was my intention to ascend the Ye noe choung and try to cross over to the Kambala toung, but the Karens assured me, that there were no villages further up and that it was impossible for me to undertake the journey. The guides for some reason or other, did not lead me through the usual path, but cut a new one through deserted toungyas. Passing Lue ni Tay, where we took other guides, we marched in the bed of the Ye noë choung, still full of running water 2 to 2½ feet in depth. Two Karens were met coming down the choung, one of whom became so terrified at seeing us that he repeatedly tried to scramble up the almost vertical walls of the bank, rolling back as many times, until he got hold of the root of a tree and succeeded in escaping. This of course amused my followers considerably, while I knew now that there must be several Karen villages up the stream in spite of the contradictory information. We had now to branch off from the Ye noë and ascending sharp ridges continued our march through upper mixed forests and deserted toungyas. Descending to the little Tshat choung flowing through poonzohs of wild sugarcane, we soon had to scramble over a still higher ridge from where we moved down to the large Tshat choung and encamped on its bank. The upper mixed forests to-day shewed no teak but plenty of pyenkadu, pyenma and Kyun nalin.

9th February, 1871.—On our journey to-day to Hsa-beng, 4 Burmese miles N. E., we had to traverse a very dry broken tract of low ridges forming the water-shed between the Ye noë and Pyit choungs, and we had to carry our drinking water in bamboos. The forests as might be expected were of the same character as observed on the previous day *viz.* upper-mixed forests with plenty of pyenkadu, but very little teak. The chief bamboo was tinwa. Coming down after midday from the very tiresome ridges, we crossed the Pyit choung. Here another pure teak forest was met with under almost the same conditions as on the 6th inst. *viz.* in a fork of a choung uniting with the Pyit. Very few other trees were found in it, *viz.* tabwot gyi (*Miliusa tomentosa,*) Kimbalin (*Antidesma Bunias,*) tamin sa pyu (*Gardenia sessiliflora,*) gnu (*Cassia fistula,*) and nyoung pyu (*Ficus Rumphii.*) And from the presence of these trees, as well as from the fact of my having found a good deal of sugarcane here, I was led to infer that this forest had developed itself from former savannah forests. The low growth consists chiefly of *Leea, Scleria, Orthopogon, Andropogon, Calamus fasciculatus, Rungia, Blumea, Lygodium, Musa rubra, Sida rhombifolia, Lepidagathis hyalina, Desmodium gyroides, Vernonia cinerea, Acrocephalus capitatus.* And of climbers only the baup noë, were seen. The teak trees here were badly grown, and appeared to be all of the same age, but were apparently older than those of the Ye noë. We encamped at Hsa-byeng.

10th February, 1871.—To-day's march led northward. After leaving a patch of lower mixed forests we found a pure teiwa (*Bambusa Tulda*) jungle stretching as far as Moung gij Tay from here upper mixed forests with a few teak but plenty of pyenkadu and an undergrowth of Kyattoun wa and tinwa, alternated with numerous deserted toungyas, on which bamboos had chiefly sprung up. On entering upon the alluvium of the Kun choung, low forests reappeared. Only a single narrow strip of evergreen forest occurred along a small choung, in which 2 fine flowered Acanthaceous plants (*Phlogacanthus curviflorus* and *Justicia grandifolia*) surprised me. Passing Mobhu yua we encamped in a lower mixed forest opposite Lepan Kweng on the Kun choung.

11th February, 1871.—To-day we marched along the bed of the Kun choung which is very broad and well beaten. I could here, for the first time since leaving Kwe mha Kheing, avail myself of my pony. The choung was bordered all along by toungyas, either cultivated or deserted, and small patches of trees here and there led me to suspect that the original vegetation belonged to a savannah forest of a hill character, in which ye kathit (*Erythrina lithosperma,*) didu (*Bambax malabaricum,*) *Bischoffia Jananica*, thit (*Albizzia elata*) etc. formed a conspicuous feature. After passing 2 or 3 Jabin villages, cultivation ceased and the ridges partly bordered the banks while the forests changed accordingly from savannah-forests to upper mixed forests on the ridges and sunny slopes. At the debouchure of a small choung we ascended a very sharp narrow ridge of the left bank and found ourselves in the same kind of broken uniform but wild looking country that we came across on former occasions. The upper mixed forests with plenty of kyattoun wa but apparently no teak were interspersed by numerous wretched looking poonzohs while the N. and N. E. slopes shewed evergreen forests. Continuing our cross march over several ridges, we found ourselves opposite Taya Tay where we encamped on very rugged ground at the choung. Here I learnt that the whole male population, with the exception of two old men, had gone to a distant Tay to celebrate a marriage. I was therefore unable to make any arrangements for guides or to lay my route for the following day.

12th February, 1871.—Halted. Towards evening the trampling and humming in the bamboo Tay above our camp indicated the return of our friends, the Karens. I sent my interpreter at once to make arrangements for guides, but he soon came back with the news that the Karens were all drunk and talked nothing but nonsense.

13th February, 1871.—Against my expectations the Karens had slept out their joviality pretty well and came down still clad in their wedding garments of white and blue. Arrangements were then soon made, and we started at 8 A. M. Crossing several ridges of the same nature as those of yesterday we came back to the Kun choung in the bed of which we continued our march up to the junction of the Kayeng ma thay choung. The entrance to the latter choung is rather difficult, as it is barred by a stagnant pool so muddy that my pony continually sunk up to his belly. After clearing this difficulty the bed of the Khayeng mathay much resembled that of the Kun, but it is narrower and clothed with a greater amount of evergreen forest. I soon found it impossible to proceed further on horseback, on account of the loose sand I was riding over, and on dismounting and examining the ground, I found out that the sand layer was only about 2 feet deep while beneath it a stratum of water was traced something very like some streams in Africa. I had, therefore, to wade through the water often as deep as to my hips. Opposite a small alluvial flat covered by elephant-grass we encamped towards evening on a rather steep slope. The ridges here bore upper mixed forests with a little teak, but plenty of pyenkadu, pyenma and especially myouk gnu (*Duabanga*). The bamboos were the usual tinwa and Kyattounwa. The favourably exposed slopes and the sheltered bottom of the valley were covered by evergreen tropical forest.

14th February, 1871.—Proceeded along the bed of the choung through all its windings, and observed all those variations in the forests which are produced by exposure ; the alluvial borders contained principally elephant grass with here and there such trees as are characteristic of savannahs in these hills. The evergreen forests became splendid and the most conspicuous and prevalent trees were chiefly *Swintonia Schwenckii, Parkia,* plenty *Acrocarpus fraxinifolius Dipterocarpus turbinatus, Pentace Birmanica, Cedrela toona, Albizzia stipulata, Parashorea stellata* and *Payanelia.* A lofty palm* 100 feet high looking like a toddy palm and called so by the Burmans (tau htan) made the scenery more picturesque. In the upper mixed forests of the ridges and along sunny slopes, teak was found, but it was rather scarce, while pyenkadu was the prevailing tree.

My shoes had gone to pieces in the mud and water I had to wade through, and as I had only a single pair left which were also in a suspicious condition, but which I wished to preserve, I had no choice left but to adopt the Burmese fashion, tuck up my trowsers, dispense with stockings, and do the best of my journey barefoot..

The elephants were also harrassed here ; they were continually sinking into the mud, and finally two of them got so deep into a hole that I almost gave them up for lost. The terrified mahouts leaped off their seats, while the poor animals made the whole valley re-echo with their dismal trumpettings. With wonderful sagacity, however, the elephants threw themselves on their sides, and worked only their forelegs with half circular strokes until they reached firm ground; but my luggage did not fare well under such circumstances.

At about 4 P. M. we arrived at a narrow gorge which the river had cut through a sandstone ridge of about 300 feet, one section of which towered over the forests and exhibited the stratification most beautifully. It is the usual sakhan of the Karens ; but further progress seemed impossible as the clear and beautiful water was so deep that an elephant which was made to dive did not touch ground although only the tip of his uplifted trunk remained visible. Here we halted for the night, while my people cut down a large number of waya bamboos and constructed the same evening a double raft with railings, which did great credit to their skill.

15th February, 1871.—This morning we crossed the gorge and proceeded onwards along the bed of the choung. The valley remained much the same, being occupied by evergreen tropical forests with upper mixed forests along the sunny slopes and on the ridges. The footprints of wild beasts which yesterday were quite conspicuous became still more abundant especially at the junction of the lateral choungs where the mud was perfectly covered with them. The prints of at least 15 animals were distinguished, and were identified by my men as those of tigers, leopards, deer, wild elephants and, what I took for the foot-prints of young elephants, but which my men recognized as those of a rhinoceros.

We soon arrived at another gorge much more difficult and longer than the first one with vertical or rather overhanging rock walls along which we had to crawl. The luggage had again to be taken off the elephants and rafts were being constructed while we continued our march.

Being ahead while the guides remained with the elephants we followed the foot-prints of men which led up a small choung to the left. It was a beautiful valley for a botanist, and I found here the only tree ferns (*Alsophila glauca*) I had met with in the Pegu Yomah. After a mile or so, I sat down to lunch when Uday an energetic and clever Burman, came to lead us to the right track. He had seen muddy water flowing from the valley and at once suspected that we had gone the wrong way, and so it was.

After returning to the Khayeng mathay choung, and proceeding for a mile or so, I fell in with my camp which I found in perfect confusion. The elephants were without their mahouts who had scrambled up the tree. The cause of the disturbance was that a wild tusker had come down the choung but seeing himself confronted by 3 elephants had dashed into the dense jungles. It must have been a splendid animal, for the print of his foot measured, 1 foot 5 inches in length, while the prints of other elephants I had measured never exceeded a foot.

We encamped at a large bend of the choung about 5 miles from the Lay dhu dha choung. The Karens kept up fires all the night but the Burmese seemed to be quite indifferent to the roar of the wild beasts which was heard in rather too close proximity to be pleasant. All the game of the Yomah seems to have retreated into this valley and, (I am told) to the head waters of the Ye noë and Zamayi choungs.

16th February, 1871.—The first part of the march was identical with that of former days we met with fine rattans such as a Yamata and lémé, occasionally in large quantities, the canes measuring over 2 in. in diameter. A gorge nearly a quarter of a mile in length delayed us a good deal and it was almost impossible to get my pony over it on account of the rocks. Another still longer but less deep and fordable gorge followed. The scenery

* *Livistona spectabilis* differing from *L. Jenkensii,* chiefly by somewhat larger almost elliptical fruits, and scurvy spathes.

now changed considerably, the evergreen forests became more scarce and the ridges lower and more rounded until we were surrounded by dry upper mixed forests. The water in the choung was also considerably reduced, though it continued to appear from time to time in deep basins. The soft silica-sandstone alternated with seams of calcareous sandstone and slates, and where the latter prevailed, the trees were much reduced in size.

At Kyet ma net choung, we found about half a dozen fine teak-logs marked and numbered, which no doubt must have been cut somewhere on the water shed between the Pyu and this choung. On arriving at the junction of the Lay dhu dha choung we marched up the same to a Karen village called Khosoung Tay; but had to go back a good distance, encamping half way from the Murya choung (a feeder of the Lay dhu dha choung). I made fruitless enquiries for a path across to the Kambala toung viâ Hsenway and Kun choung, and was therefore compelled to follow a route indicated to me as the only one fitted for elephants, and which led along and through the Khayeng mathay choung.

17th February, 1871.—To-day we had to cross the ridges that form the watershed between the Kue muy and Lay dhu dha choung and had an open view of the main range of the Yomah, which appears quite near and very low and rounded. The forest on these ridges was upper mixed forest of good growth with teak. Descending to the Kue muy choung at its junction with the Kayeng mathay choung, and after passing the Wo pyu choung, on which Gha li Tay lies about a mile further up, we encamped half way between this and the Pa lay ma choung. The country round about looks dry, and the forests are rather low.

18th February, 1871.—Towards the Pay lay ma choung calcareous sandstones became more conspicuous, alternating conformably with soft sandstones and slates. The forests remained the same as yesterday but rather drier. Large pools of water were still met with in the choung, and this fact shews that water alone, even if abundant, is not a sufficient element to call Evergreen forests into existence, if the substratum is unfavourable. On arriving at the junction of the Kye ma lu choung we parted, and, I may say, with pleasure, from the Khayeng mathay, ascending a ridge containing toungyas. A tay stood here formerly, but now it was full of bamboos, half-burnt logs and rank vegetation, which rendered our progress very difficult. There was no path further on, but our guide had to lead us over the low hills covered by upper mixed forests of fine growth, in which pyenkadu, teak, toukkyan, tissein, sha, thimbyun, kway, thadi, etc. grow, with tinwa and Kyattounwa as undergrowth, while waya appeared lower down. We also came across a large poonzoh about a mile in length covered densely and almost exclusively by *Polytoca heteroclita*, a most disagreeable grass, which grew up to a height of 8 feet, the sheaths of which were covered with fragile irritating bristles. Our guide, after making some introductory but not very edifying remarks on our advance, went ahead, pulling aside the grass right and left and we followed as close as possible, the stiff prickly hairs raining down upon us and causing no little irritation. Emerging from this grass plain, I found myself on a well-beaten bridle path, the best I had seen since leaving Kway mha kheing. It is the usual traffic route of the Shans who come from Toungboo viâ the Pyu choung. The whole ridge shewed nothing but deserted tounggyas until we reached the main range of the Yomah, which is here the lowest of all the passes I crossed. The upper mixed forests on it partake somewhat of the character of dry forests, the trees are very low, and plenty of Khaboung is found amongst them. The bamboos were tinwa and kyattounwa. From a prominent peak on the other side of the range we could at last see the Kambala toung in cloudy distance to S. by W. A very sharp descent brought us down to Kossu Tay, and, at the advice of the Karens, we encamped further down the Way dho choung just in the fork of the junction of the little and large Way dho, which is, if I correctly understood the men, a feeder of the Panyo gyi choung.

19th February, 1871.—Halted. Evergreen trees border the banks of the choung and form a poor Evergreen forest, in which *Ulmus lancifolia* was most frequent as well as yemeneh (*Gmelina arborea*), toung peing ne (*Artocarpus chaplasha*), Kokko (*Albizzia Lebbek*), (*Beilschmiedia Roxburghiana*, *Bischoffia Javanica*, etc. Here I also met for the first time with a mango tree, that had shed all its leaves. Mango is a pertinaceous evergreen even in the Prome district, and I can only suspect that the root of the tree stood in a water hole which caused the tree to shed its leaves somewhat in the same manner as those observed in the swamp forests.

20th February, 1871.—Followed the downward course of the Way dho choung for about 2 or 3 miles, and from there crossed over the ridges that separate its feeders from the Tay Tay choung. We followed the latter up to where Kho sue Tay lies on a prominent ridge, and encamped about a mile further up the Tay Tay choung. The forests were all the way upper mixed forest with a sprinkling of evergreens at the bottom of the valleys, but a little higher up from my camp, evergreen forests bordered the choung. I nowhere in the Yomah met with such a variety of butterflies as here ; nearly all were different from those seen in the leaf-shedding forests, and there were about 26 or 27 different species.

21st February, 1871.—The Karens here remonstrated against my proceeding to Khosmoung Tay, the route being described to me as quite impracticable for elephants, and I should certainly again have believed them, had I not obtained information about the road while at Khossu Tay. This morning the cho gyi came again imploring me to desist from going to Khosmoung tay, for my elephants would all tumble down the hills, but I coolly told him that they could climb the trees like squirrels, the truth of which he seemed to doubt. At last we got our guides and ascended the bed of the Tay Tay choung, bordered by evergreens such as *Sumbaria macrophylla*, *Castanea argentea*, *Garcinia elliptica* and *Elaearpus grandifolius*, along with the never failing *Murraya exotica*. On arriving at the fork of the two last feeders or rather sources of the Tay Tay we ascended a short spur of the main range of the Yomah, and came down on the other side to the Ye gna choung, which is a feeder of the Chi wa choung, we went down a bed of this choung to a spot near where it effects a junction with the Muy gyi choung, a rather conspicuous hill stream with plenty of running water. Sha zoung (*Euphorbia trigona*), a small tree up to 25 feet high, offered a peculiar and curious sight along the declivities of the dry sandstone ridges, especially as all the other trees had shed their leaves. We ascended the Muy gyi only for a short distance, and then commenced the worst part of the day's journey when we branched off to the right, and ascended the watershed between the Muy gyi and Panyo choung. After a hot ascent up to 1200, if not 1500 feet, we finally reached the highest crest, on which a conical black looking peak covered with dry hill forests rose about a thousand paces off, I really entertained some fears about the practicability of getting the elephants over such passages ; but they managed it, and I can only concur in the praise and admiration which M. Maout in his travels in Siam bestowed upon the patience, prudence and obedience of these really useful animals. The forests up to this place were all of very uniform character, but the upper mixed forest of a dry character on this long ridge had a very dense clothing of teak grass, mixed with *Andropogon montanum*, *Panicum montanum* and a few other grasses, amongst which we found *Crotalaria Chinensis*, an erect *Pueraria*, a *Shuteria* (?), *Blumea glomerata* very villous, *Lepidagathis*, *Leea*, *Neuracanthus tetragonostachyus* and others. Teak grew here splendidly along with pyenkadu and yindyke, the latter attaining the unusual height of 80 to 90 feet by 6 to 8 feet in girth. The other trees found here were myouk gna (*Duabanga grandiflora*), tadi (*Bursera serrata*), thitpagan (*Millettia Brandisiana*), chinyouk (*Garuga pinnata*), panga (*Terminalia chebula*), Sha ni (*Sterculia villosa*) etc. Myinwa and Kyattounwa form the bamboo growth. Descending along a feeder of the Panyo gné choung which was very winding and led chiefly through toungyas, we arrived late in the evening at Kho sue Tay, where we encamped on the other side of the choung at some distance from a village in upper mixed forests.

22nd February, 1871.—Calcareous sandstones appeared here, but I neglected to attend to them, as I became aware of their calcareous nature only after my arrival in Calcutta.

All my men wanted to leave me this morning, and it required all my energy to keep them back, which I succeeded in doing, though I discharged one man who had made himself obnoxious from the time he first demanded leave.

Although separated from the Kambala toung only by a range forming the watershed between the Panyo gne and some other choung, possibly the Gyo gyo choung, the villagers assured me that it was impossible to ascend the mountain from here and I accordingly started for Gho mung Tay on the other side of the Yomah, the inhabitants of which Tay, they added, had "business" on the hill consisting chiefly in hunting.

The route lay over uninteresting spurs of the Yomah, covered by toungyas, until we came to the main range itself, where upper mixed forests of a dry character prevailed. The pass is here, as on the 19th instant, very low and rounded. In descending on the other side to the Opon choung (a feeder of the Kun choung) we fell in again with evergreens and encamped in the bed of the Opon, about half a mile off from Gho mung Tay. Here I also heard that a good path exists to Kho sue Tay on the Lay dhu da choung, from where we intended to cross over on the 16th inst. This tay is only 3 Burmese miles off !

23rd February, 1871.—The march to-day was a short one, only 2 Burmese miles, but it lay over the main range, which, strange to say, was here very precipitous and about 1200 to 1500 feet high. The upper part especially was nearly vertical and I had great difficulty in getting up to the crest. The elephants had to make a detour, but still the journey was as hard for them, as it was when they had to cross the Muy gyi watershed. Proceeding along the crest for some distance southwards and also passing the head waters of the Muy gyi, we descended to a feeder of the Gyo gyo choung, where the upper mixed forests were succeeded by evergreen tropical forests of a poor character. On arriving at the Gyo gyo itself, we encamped at the root of a spur of the Kambala. The forests were here distributed over the terrain in accordance with general laws, the ridges and sunny slopes bearing upper mixed forests with teak and pyenkadu and the deep ravines being sprinkled with evergreens, while the Gyo gyo is bordered by a narrow strip of evergreens. My geography was here altogether at fault ; for the Karens assured me that the Gyo gyo does not flow into the Muy gyi choung as marked in Fitzroy's map. Hence the Panyo gne choung, on which Kho-sue Tay lies, is probably a feeder only of the Muy gyi, which is separated by a range from the Gyo gyo choung.

24th February, 1871.—I moved my camp higher up on the Gyo gyo ridge of the Kambala, leaving behind all my unnecessary luggage and encamped on a small prominent ridge at an elevation of about 2000 feet. As there was no water here, the elephants had daily to bring our supplies of water in bamboos from the Gyo gyo choung. The whole ridge is covered with upper mixed forests with well grown but not numerous teak trees and the gorges contained evergreen forests. In continuing my ascent on the ridge over numerous knobs so characteristic to sandstone ridges, we emerged from the upper mixed forests rather suddenly, and found the highest peak of the Kambala toung before us covered with dwarfy crooked treelets and looking quite black and desolate, for the jungle fires had raged over it only a few days ago. A small sharp peak was climbed at once, and not a little to my surprise I saw hanging over me a beautiful vaccinium (a variety of *V. verticillatum*) along with other plants quite new to me. On the almost vertically sloping sandstone walls towards the Yan choung a variety of gaily flowering stunted leafless trees stretched out before me, amongst which white and orange variegated Bauhinia were most conspicuous, looking like Rhododendrons. Scrambling up the proper Kambala we soon had our hands and faces blackened by the coal and ashes of the burnt down vegetation. The rests of a *Didymocarpus* were all the trophies of the ascent. The prevailing tree was *Hiptage candicans*. These forests I have distinguished as upper dry forests. After exploring the ridge that extends N. N. E. and along which Dr. Brandis (? or some other gentleman) and party had come up from Yay-nouk many years ago, we returned the same way to our hill camp. The annexed sketch is an outline of the Kambala ridge as seen on the 21st February, from the Muy gyi range.

No. 9.

Upper part of Kambala range as seen from Muy-gyi-watershed.
Shewing the limits of upper mixed forests and the hill-dry-forests.

25th February, 1871.—This day was spent in a more careful exploration of the vegetation on the ridges and for this purpose I ascended the Kambala again, turning, however, to the S. S. W. ridge which connects the Kambala with the main range of the Yomah. Another but lower ridge, called the Dwa dwa toung, running in the same direction, is so sharp that it is considered inaccessible. The one we followed had similar sharp passages which often left us no ground to step upon with safety, and obliged us to cling for support to the little trees which grow here. While I was in such a precarious position as this, I observed a tiger crawling along a thousand feet below, who was doubtless retreating before the jungle fires which raged over the valley. The smoky-grey coarse sandstone, which forms these ridges appeared to me to be decomposed calcareous sandstone which in an undecomposed state, also forms large blocks on the top of the ridge. This rock dips to E. by N. at 60 to 70°, while on the N. N. E. ridge visited yesterday the angle was only 25° to 25°. On reaching the second highest peak I tried to ascertain the height by boiling point, but the water I had with me proved to be so full of silica sand that I gave up the plan. The Kambala seems, however, even after making allowance for the dense haze, somewhat lower than the Kyouk pyu to the South. Scrambling all over the accessible spurs and ridges, we returned to the top of the Kambala, where I took my thermometrical observations and came back to my hill camp at about 4 P. M.

26th February, 1871.—The evergreen forests of the gorges in this locality contain chiefly *Garcinia cowa*, *Parkia*, *Wallichia disticha* (fine large specimens), *Payanelia*, sha wa (*Sterculia ornata*), *Ardisia humilis ?*, *Xanthophyllum virescens*, *Eugenia*, *Mangifera*, *Garcinia elliptica*, *Polyalthia fasciculata*, Kanazu (*Pierardia sapida*), *Parashorea stellata*, *Linociera*, *Mitrephora vandaeflora*, *Semecarpus heterophyllus*, *Hopea odorata*, waya, *Sapindus rarak*, *Tetranthera*, etc. A new vine (*Vitis campylocarpa*), *Sphenodesma*, *Mezoneuron*, and *Calamus lotifolius* (ya mata) were the chief climbers. Of shrubs, etc. were chiefly found *Pteris cretica*, *Adiantum lunulatum*, *Trevesia palmata*, *Polybotrya vivipara*, *Aspidium siifolium ?*, *Phlogacanthus insignis* and *Ph. curviflorus*, *Cyclocodon lancifolium*, *Glycosmis*, *Macsa mollissima* and *M. Indica*, *Pteris 4-aurita*, etc. On the trees were observed a fine new *Aeschynanthus*, several orchids, *Davallia falcinella*, etc.

In excessive climes these evergreen tropical forests form during the dry season a natural reservoir of Malayan types, and the concomitant animal life finds a shelter here. If during the hot season one collected insects only in the tropical forests, and another did the same in the leaf-shedding forests, the collections of both would appear as if made in two different countries, but in the rainy season these insects as well as other animals spread themselves all over the forest-country, although the breeding of the Malayan types appeared to me to be restricted to the tropical forests alone.

At 12 A. M. we moved down to our old camp at the Gyo gyo choung. Our elephants had now made quite a respectable path up this ridge, where on ascending it no vestige of a path could be perceived. At the advice of our Karen guides we packed our elephants at once and moved upwards the Gyo gyo, where we encamped at the fork of the last two feeders, due west of the second highest peak of the Kambala. The choung is very winding and was bordered by evergreens up to a spot near which our camp was located. Here water ceased and dry upper mixed forests prevailed all over the terrain. *Euphorbia trigona* was plentiful.

27th February, 1871. My men had to start this morning without a meal, for their provisions were exhausted and for this reason they did not shrink from making the longest march I ever made in the hills, nearly 16 miles over the highest crests of the Yomah. We had to ascend the spur at the root of which our camp was pitched and after passing through upper mixed forest with teak we soon reached the crest of the main range of the Yomah at the junction of the Kambala ridge and found ourselves again in upper dry forests of the character of those on the Kambala itself. The rocks seemed to be decomposed calcareous sandstone. Our further route was S. S. W., following ths crest of the main range which is often very narrow and precipitous on both sides. Unfortunately these, like all the other ridges we had passed, had been swept by jungle fires, and I had therefore no opportunity of noticing the herbaceous vegetation of the locality. Below, in the valley of the Oghae myoung, destructive fires were raging, and the dense volumes of smoke prevented me from noticing the arrangement of the numerous spurs which run down from the main range, but the forests appeared to be a mixture of dry forests, and of very dry upper mixed forests with myin wa (*Bambusa stricta*). The E. or rather N. N. E. slopes had their trees in full foliage (at least those in the more sheltered valleys) and were succeeded by upper mixed forests. On an opposite spur we caught sight of the first Rhinoceros we had met in these hills. He stood unmoveable in spite of our shouts, but when our 3 elephants came up, and trumpetted at him, he went down into the burning valley. Passing the head waters of the Kun choung we soon branched off eastwards and descended on a very sharp ridge down to the Oghae myoung and Lhayga choung, a feeder of the Yan choung, which latter we soon reached. The bed of the Yan was broad and sandy without any water and looked almost like a well-kept *corso*. The forests surrounding it, were still drier, and were a mixture of dry and mixed forests, stunted and leafless with leafless myinwa as undergrowth. Engyin (*Pentacme Siamensis*), sha (*Acacia catechu*), *Woodfordia fruticosa*, *Holarrhena antidysenterica* and other limestone loving trees appeared. The formation was calcareous sandstone in a very decomposed state, which was thus transformed into a smoky-grey coarse permeable sandstone, variously interlaid with shales and siliceous sandstone making the demarcation of the forests obsolete. The country itself was very level with occasional flat spurs only 30 to 80 feet in height. Teak was not unfrequently met with, but like all other trees it was low and rather crooked. The Yan choung is very winding and shews a tendency to cut away its banks in an Eastern direction. We arrived in the evening at a place about a mile from Yan yua, a Karen village, where we encamped in the bed of the choung, near a pool of water.

28th February, 1871.—The vegetation assumed more and more the character of the Promo vegetation as we went in a S. E. direction. The hills and ranges we crossed were all low and covered with dry forests with myinwa (*Bambusa stricta*), teak, engyin (*Pentacme Siamensis*), sha (*Acacia catechu*), Kusan (*Hymenodictyon thyrsiflorum*) etc., while in some tracts of a more prevailing siliceous substratum, Kyattoun wa with the usual upper mixed forest-trees re-appeared. Passing Yan-yua our march led us through a great many deserted toungyas until we crossed the Poh choung, where a dry forest with Eng (*Dipterocarpus turbinatus*) occupied the terrain. Between the small Kyouk pyu choung and Gna toung myoung a small patch of Eng forest or rather dry forest with eng is met with on decomposed smoky-grey calcareous sandstone, while in the narrow gorge of the myoung itself evergreens made a scanty appearance. Crossing another ridge with upper mixed forests we soon came down to the Bhoben choung, a fine stream with plenty of running water, where we encamped opposite the village of Gna gyi. The upper mixed forests here offered some shade, and the formation seemed siliceous permeable sandstone.

1st March, 1871.—To-day only a very short march was made. Ascending the steep ridges on which Gna gyi lies, we marched over ridges covered by upper mixed forests and, descending suddenly, fell in with eng forests on laterite, where we encamped at Thekkay byeng, a village which I had passed in 1868 on my march from Choungwa to Taragyo.

2nd March, 1871.—The eng forests terminated shortly before arriving at Myouk loke choung, on the alluvium of which lower mixed forests with teak were found. These continued, with many interruptions caused by cultivation, till we came to Toukkyan gnu tu and here, although all the country was occupied by paddy cultivation, the wild sugarcane indicated to me the former existence of savannah forests. Encamped at Lethok dweng.

3rd March, 1871.—To-day's march was a very uniform and tiresome one, leading chiefly through savannahs, savannah forests and rice cultivation. The savannah forest behind Lethok dweng were chiefly formed of sha, intermixed with a few other papilionaceous trees, especially *Millettia ovalifolia*, but for a mile or so teak was the tree scattered all over the grassy plain until all trees disappeared and a savannah, *sensu stricto*, extended as far as the Prome road near Natalong. Following the Prome road through monotonous rice-fields we arrived at Poungday and encamped there under the shade of large tamarind trees.

4th March, 1871.—Here at Poungday I had to make arrangements for fresh men, as those who accompanied me all wished to leave, it being at present too hot for them to travel about. One of the elephants also, having a sore back, had to be discharged.

5th March, 1871.—Only wretched and rather dacoit-looking Shans offered themselves, whom I refused to engage, but two Burmese promised to join me at the next camp, and so I persuaded my men to remain for that day and started the same morning. The whole route was along the Prome road, running through cultivated paddy fields and the country was sprinkled so thickly with toddy palms that from a distance it looked like a palm-forest. Before reaching the Myit makha choung a small and rather pure teak forest to the right attracted my attention. Put up in the zyat of Gho tau on the Myitmakha.

The evening was spent in a visit to the little teak forest I had passed. Teak was the prevailing tree but other trees were seen, such as Kyi ni (*Barringtonia acutangula*), nyoung pyu (*Ficus Rumphii*), Khaboung (*Strychnos nux vomica*), palan (*Bauhinia parviflora*), nagyi (*Pterospermum semisagittatum*), yindyke (*Dalbergia cultrata*), thimbyun (*Dillenia pentagyna*), *yung* (*Anogeissus acuminatus*), pyenma (*Lagerstroemia flos reginæ*), Kembalin (*Antidesma Bunias*), chin youk (*Garuga pinnata*), madama (*Dalbergia ovalifolia*), thein (*Stephegyne parviflora*), thit magyi (*Albizzia odoratissima*) and a few others; thus a lower mixed forest was formed) of which most probably the associating trees had been cut away. Only a few species of low vegetation could be recognised, (the jungle fires having raged over the terrain), amongst these were *Phyllodium pulchellum*, *Cocculus Leæba*, *Saccharum spontaneum*, *Lygodium*, baup noë, momakha, *Congeo*, *Sida rhombifolia*, *Thespesia Lampas*, *Capparis horrida*, *Ardisia Wallichii*, and others. The alluvium here seems to rest on a gravelly substratum and the trees are small and ill-grown.

The vegetation along and near the choung was a modification of swamp forest consisting chiefly of *Barringtonia acutangula*, *Combretum trifoliatum* and *Roydsia obtusifolia*. The waters of the stream were covered with a dense stratum of *Salvinia cucullata*, *Ipomœa reptans*, *Azolla* and *Hymenachne myurus*.

6th March, 1871— Shortly after leaving the cultivated tracts of the Myitmaka I came upon gravelly ochraceous or pinkish grounds, on which Eng forests with a good admixture of Prome vegetation grew. A stemless Cycas (*C. Siamensis*) was plentiful. The more raised ridges (nowhere higher than 150 feet) and exposed slopes usually bore Eng forests of a tolerably pure type, with plenty of engyin (*Pentacme Siamensis*) and *phthya* (*Shorea obtusa*), while those covered with a deeper stratum of surface soil along the courses of the streamlets shewed mixed dry forests with plenty of yung, thitmagyi, nabbé, engyin, tantap (*Albizzia lucida*), *Emblica officinalis*, didu, chin youk, *Flacourtia*, tabie (*Eugenia Jambolana*), tay (*Diospyros Birmanica* and *D. cordifolius*), lambo (*Buchanania latifolia*), *Zizyphus jujuba*, sha, *Vitex canescens*, palan etc. Encamped at Shan gon, where we were warned by the policeman to take care of dacoits who infest the Prome road.

7th March, 1871.—To-day we branched off from the Prome road and marched directly eastwards towards Khyi thay on the Irrawaddi. The country remained the same as yesterday. The very shallow alluvium of the Kyun choung resting on diluvium changed the aspect of the mixed dry forests very little, and remained much the same until we reached the second low range which separates the Kynn alluvium from the Irrawaddi, when Eng forests were again met with. Descending to the Irrawaddi valley the soil was found to be gravelly and Eng forests, mixed dry forests and cultivation were curiously mingled according to the different substratum. Encamped at Magyi bouk gon, where we had to feed our elephants who were in need of other food, with a new and very distinct fig tree (*Ficus insignis*).

8th March, 1871.—This morning I sent my camp straight on to Myoma, while I continued my eastward march to Kyi-thay so as to finish the section across the Irrawaddi valley. Eng forests alternated with mixed dry forests over the slightly undulating gravelly terrain, while fallow rice fields occupied all the shallow alluvial deposits. Towards the Irrawaddi the depth of the alluvium and rice cultivation increased, and after crossing a swampy jheel like choung we soon found ourselves at the banks of the Irrawaddi itself, which shewed a section only of loose fine sand of 17 feet thickness. From here we followed the cart road along the Irrawaddi leading through an almost uninterrupted chain of villages with indications of savannahs, up to Myoma, where I found my camp after some difficulty pitched near, opposite the rocks in the Irrawaddi, opposite the telegraph station of Padoung.

9th March, 1871.—Proceeded along the Irrawaddi which is here marked everywhere by extensive land-slips and is full of sand-banks. The banks look friendly even at this season on account of the numerous crops of cucumbers, tobacco, hsu (*Carthamus*), fennel, sunn, maize etc. On the more fertile shoals of the river a second crop of rice stood in full verdure. We soon joined the Prome road along which village bordered village until we arrived again on rocky ground of laterite, calcareous sandstone, gravel, etc. The road here approached very near some low hills covered by small leafless trees which, on inspection, proved to be orchards of the auza (*Anona squamosa*). A patch of forest consisting chiefly of *Euphorbia neriifolia* was passed to the left; In spite of the dried up condition of the vegetation, I had a good harvest of plants, not previously found by me in Pegu. Arrived at Prome, I put up in the circuit-house, where I met Mr. Buchanan of the Forest Department.

10th to 18th March, 1871.—I was detained at Prome much longer than I expected, as my letters had miscarried, and as I had to pack and arrange my collections, engage other men, repair damages sustained during my journey over the hills, and more especially on account of a fall I had from my pony.

19th March, 1871 —As no messenger returned from Oshit-toung whereto I was informed my letters had been sent, I had to change my plan of operations and set out myself in the direction indicated. Burmans, when they come to a large station, usually degenerate to a certain degree, and become more or less unmanageable. For this reason I moved, although it was a Sunday, a few miles eastwards so as to get my camp again into marching order. The country consisted of shallow alluvial lands covered for the greater part with paddy cultivation, but patches of jungles occurred from time to time which were all mixed dry forests, in which I observed *Premna viburnoides, Azima, Congea*, plenty *Ixora parviflora*, 3 varieties of *Capparis horrida* or more probably 3 distinct species, oung-né (*Streblus aspera*), Kwe noë, *Grewia microcos*, etc. Encamped at Yay tha, only 3 or 4 miles east of Prome.

20th March, 1871.—Our route differed but little from that of yesterday; it led through rice cultivation on alluvial grounds of a fine yellowish grey clay, occasionally interspersed by wretched shrubberies, such as we find in Lower Bengal. *Ficus Rumphii, Posoqueria spinosa, Azima, Eugenia Jambotana, Dalbergia volubilis, Combretum pilosum* and *C. squamosum*, etc. were the principal shrubs and trees. *Zanonia sarcophylla* was not uncommon. The toddy palm forms a conspicuous feature in the landscape. Encamped at Yé ú, a village which lies just at the commencement of forest-lands.

The evening was spent in examining the adjoining forests, which belong to the class of mixed dry forests, growing here on shallow and rather stiff fine clay resting most probably on gravel. The trees chiefly observed were eng in 3 varieties (one quite glabrous, the other with hairy stipules but glabrous panicles, the third with the stipules, panicles and leaves beneath downy); engyin (*Pentacme Siamensis*), phthya (*Shorea obtusa*), yindyke (*Dalbergia cultrata*), Kyeo (*Vitex limonifolia*), gyo (*Schleichera trijuga*), lambo (*Buchanania latifolia*), ouk chin za (*Diospyros ehretioides*), be byu (*Ancistrocladus neriifolius*), bya (*Dillenia pulcherrima*), tabié (*Eugenia*), Khaboung (*Strychnos nux vomica*), n yúe (*Flacourtia cataphracta*), tay (*Diospyros Birmanica* and *D. cordifolia*), nabbé (*Odina wodier*), teak, toukkyan *Terminalia crenulata*),etc. Further *Capparis horrida* var., *Millettia extensa, Pergularia odoratissima, Phoenix acaulis Inula polygonata*, etc.

21st March, 1871.—To-day we marched through forest-lands of the same character as those visited yesterday. The stiff clay seems to rest on pinkish gravel, which latter was seen at the surface for a short distance, when Eng forests with *Cycas Siamensis* also made their appearance. We soon entered the narrow and dusty gorges in the low steep and curiously shaped hills and ranges which were 50 to 150 feet high. Laterite was seen croping out in several localities, while the hillocks themselves consisted chiefly of stiff diluvial clay, on which Eng forests grew. On the other side of these low ranges, calcareous sandstones and their decompositions alternated with laterite and alluvial deposits, and the distribution of forests became rather confused, although referable to mixed dry forests and eng forests. Crossing the Pouk koung and the Toung naweng choungs we again entered cultivated alluvium, on which Oshit toung is situated; here I met with Mr. Elsner of the forest Department. My camp, however, arrived past 7 P. M.

22nd March, 1871.—A section at the banks of the Toung naweng shewed the alluvial clay of about 20 feet resting on stiff plastic impermeable clay. Owing to the vicinity of the Gwe choung, the cart-road brought us only through lower mixed forests of the character seen in Prome and through cultivation, but after passing Kangyi and crossing the Gwe we entered Eng forests, containing the largest sized eng trees I met with in Pegu. It was an interesting forest, but unfortunately, like all others met with on the way, jungle fires had swept over the ground. *Cycas Siamensis* is plentiful here, as also *Leucomeris decora, Hiptage candicans* with rose-coloured flowers, *Rhus paniculata, Symplocos, Eugenia*, pyenkadu, Khusan, *Linostoma* etc. Myinwa forms the undergrowth and, having flowered, gave additional food to the destructive fire, which enveloped the low stunted trees perfectly to a height of 20 feet. *Micromelum pubescens*, 2 new species of *Neuracanthus* and an erect low Roxburghiacea (*Stemona erecta*, n. sp.) were some of the interesting species I saved from the flames. Encamped under a ma-u tree in the rice-fields below Ta Kwot dheing on the Myouk naweng choung.

Here the manufacture of cutch seems to occupy a good many people, whose large camps line the banks of the river.

23*rd March*, 1871.—The road was in the bed of the Myoung naweng choung, which seems for a distance to flow over soft siliceous sandstone. *Strobilanthes Birmanica* is a common weed here, while *Opilia amentacea* is a climber nearly quite as common. In crossing the ridges, mixed forests with teak and dry forests with sha were met with. We encamped soon, after passing the Kyen village Kyouk pya gu, in the bed of the Myoung naweng.

24*th March*, 1871.—We had to cross over the low rounded ridges which form the watershed between the Myoung naweng and the Paday choung. Water is scarce here, and the ground is chiefly composed of calcareous sandstone, harbouring mixed dry and sha-forests. A large tree of *Zollingeria macrocarpa* (wekho) was met with first, then followed tapu (*Harrisonia Bennetii*) sha (*Acacia Catechu*), na pu noë (*Combretum apetalum*), yung (*Anogeissus acuminatus*), nabbé (*Odina wodier*), teak, thein (*Nauclea parvifolia*), *Vitex canescens*, toukkyan (*Terminalia crenata*), binga (*Stephegyne rotundifolia*), danoung (*Acacia leucophloea.*), Kusan (*Hymenodictyon thyrsiflorum*), chloabo (*Kydia calycina*), a *Randia*, etc. But what struck me most were 1 or 2 trees of myouk shaw (*Homalium tomentosum*), a tree which is very rare in Prome, at least on calcareous strata. Myin wa is the usual bamboo. Most of the forests were wretched looking, and much mutilated by toungya cultivation. Encamped at Thayet san, a Kyen village on a feeder of the Paday choung, where a few trees of Cassia renigera gave me the only shade I could obtain. Although the temperature was only 101° in the most shady locality I could find, it was intolerably hot in my tent (110½°).

25*th March*, 1871.—The season being too far advanced, I could not carry out my original plan, viz. to march on to Thayet myo, and from thence to make a section across to the Sittang. The elephants suffered seriously from want of food and were reduced to skeletons. Under such circumstances I thought it hazardous to prolong my stay in this dry and barren district, the more so as Nemesis, in the garb of jungle fires, seemed to watch my movements with the eyes of an Argus. We thus turned eastwards to cross the Yomah at the headwaters of the Paday choung.

We marched over much broken ground and through forests similar to those we met with yesterday, viz. Sha forests, much denuded with such admixtures as tantap (*Albizzia lucida*), tamaka (*Melia Azadirachta*), *Ehretia lævis*, *Heterophragma sulfurea*, toung Kathit (*Erythrina suberosa*,) Kyun nalien (*Premna tomentosa*), Lekop (*Holarrhena pubescens*), baup (*Butea frondosa*) tadi, (*Bursera serrata*), *Morinda tomentosa*, *Zizyphus Jujuba*, etc., etc. A few trees of padouk (*Pterocarpus macrocarpus*) were also observed. Around Konoh toung (Khon-hnitloung of map) engyin became the prevailing tree which passed into true Eng forests before reaching Kyon lay beng. Byu gon, a village, pallisaded like all Kyen villages in these parts are, stands upon a brick red soil (no doubt ferruginous derived from decomposition of calcareous sandstone), but the same soil appears all over these low ranges in larger or smaller patches usually covered with Eng forests. From here we went north-eastwards over gravelly soil, and soon descended into the alluvium of the Paday choung and encamped under a scanty shade of tamarind in the village of Nah-moung.

26*th March*, 1871.—Crossed over the low ridges which separate the Tean lay (Eng-lay of map) choung from the Paday. The forests were mixed, dry and sha. *Cassia fistula* (gnu gyi), palan, laizah, lepan, thit po, *Diospyros cordifolius*, Koung Kwa (*Capparis grandis*), *Hymonopyramis*, *Harrisoia*, *Combretum apetalum*, etc. were frequent. At Myae ni gon the curious red soil from which the village derives its name, is again covered with Eng forests. The sha-forests commence at Nyay gna thah choung and continue until the alluvium of the Tean lay choung is reached. Encamped at Tean lay. The trees round this village were chiefly *Vitex canescens* and *limonifolia*, thin win (*Millettia leucantha*), *Millettia tetraptera*, tabou (*Acacia leucophloea*), *Gardenia erythroclada* and *G. turgida*, *Millettia ovalifolia*, *Dalbergia paniculata* , plenty tantap (*Albizzia lucida*), yung, *Ficus Rumphii*, *etc.*

27*th March*, 1871.—To-day we had to proceed along the watershed between the Tean lay and Paday choungs. The terrain was the same as that met with during the last few days. Myinwa was here, as every where else in this district, the only bamboo on the hills, while teiwa was restricted to the choungs. Encamped at Pyoung thay, a small Kyen village destitute of shade and water; the inhabitants have to fetch their drinking water from a place a mile distant.

28*th March*, 1871.—We wandered through country similar to that of yesterday. At Kadang tongsay a contorted bed of permeable siliceous sandstone crops out, which first attracted my attention by the sudden change in the tree vegetation, for there appeared thit pagan (*Milleltia Brandisiana*), myouk shaw (*Homalium tomentosum*), besides fine grown first class teak-trees. Some of the latter were standing dead and were said to have been gird led under the Burmese rule. To our left the high ridges of the watershed of the Kyoung Koung gyi (?) towered above us covered evidently by the same mixed dry forests with plenty of engyin in it. In descending towards the Paday choung we passed what in the rains must be a fine waterfall. Toungyas alternated now with dry forests, until we fell in with the proposed military road from Thayet myo to Tounghoo. From here we marched upwards in the bed of the Paday choung and encamped in the village of Nyoung beng Khyeng.

29th March, 1871.—Crossed the ridges and came down to the Subboh choung. Another cross march over a ridge brought us to the Allay choung, in the bed of which we continued our march upwards, and encamped a short distance from Ne bhu toung (Nee pa hsay Kyoung of map), a Karen village. The ridges which we crossed to-day were (as was the case with all those of former days) covered with fossiliferous rocks, these being mostly calcareous sandstones. The forests were mixed dry forests, in which were observed chiefly sha wa (*Sterculia colorata*), engyin, *Harrisonia*, yimma (*Chickrassia tabularis)*, teak, byu *(Dillenia pulcherrima)*, yindyke (*Dalbergia cultrata*), tadi (*Bursera serrata*), bebia (*Cratoxylon neriifolium*), a few padouk, *Stereospermum neuranthum*, palan, nagyi, didu, Khaboung, etc. Kyattoun wa now began to shew itself sparingly along the choung, but looked wretched and leafless. At this Tay I experienced some difficulty in procuring guides, but finally succeeded.

30th March, 1871.—After following up a small but very winding feeder of the Allay choung and forcing our way through deserted toungyas, covered chiefly with *Thyssanolaena acarifera*, we ascended the spur that divides the Allay and Paday choungs, and joined the proposed military road that runs along the ridge, now represented only by a narrow and often obsolete path. The ridges are still covered by fossiliferous boulders although the forests have passed into upper mixed forests, containing a strange mixture of engyin, Kinbalin, *Vitex canescens*, *Dillenia*, *parviflora*, a few eng trees, *Sterculia urens*, *S. colorata*, toukkyan, sha, good grown teak, thinwin, pyenkadu, yung, toung kathit, kway, *Zollingeria macrocarpa*, kaboung, tadi, myouk gna, myouk sha, nagyi, nabbé, yemené, thim byun, myaya, etc. Of bamboos there were kyattoun wa, myinwa and teiwa, but all leafless. The curious nodes on the ridges, so characteristic of the soft sandstone ridges reappear here. We soon descended to the Allay choung, where water was still procurable in a pool, and encamped here. A few evergreens were seen, such as *Ficus nitida*, *Pterospermum aceroides*, *Murraya*, *Wallichia oblongifolia* and a few waya bamboo.

31st March, 1871.—Reascended the ridge, and continued our march. The forests and the geological structure of the ground remained the same. Of trees, besides those of yesterday, we met with lein thein, *Heterophragma sulfurea*. *Millettia glancescens* became very frequent, and a few nat-napyo (*Musa glauca*) were also observed. After passing the Hso bu toung, a very precipitous passage, we reached the main range of the Yomah about 1200 feet high. Up to this, the forests had changed but little, and engyin was still frequent, but the bamboos were in full foliage, and we again enjoyed shade. Evergreen forests lay at our feet in the deep gorges and valleys extending in all directions, and I felt quite refreshed. Even my Burmans who sluggishly and depressedly followed me, became quite enlivened and burst out into their usual merriment. Water was, however, nowhere procurable, except in a few places far down the choungs, which flowed N. and S. to the Swa and the Kyet sha choung. We descended to a small feeder of the Swa, but had to follow it far down until we met with water and encamped in a spot surrounded by evergreen forests.

1st April, 1871.—This morning I sent away the Karen guides as they were perfectly ignorant of the country and could not help us in any way. Coming again on the ridge, we followed the wooden mark pins of the surveyed road. The Prome character of vegetation now disappeared completely and even myinwa was no more observed, but teak trees became of finer growth and tinwa and kyattounwa grew more luxuriantly. The forests were now typical upper mixed forests while evergreen tropical forests continued in the valleys. We encamped in one of Mr. Oates' old camps at a small feeder of the Swa.

2nd April, 1871.—Continued our march on the Ouk Khyeng tu Kyan (as this watershed is called) through upper mixed forests. Country the same as yesterday. Saw a teak tree which had been blown down, and which measured 71 feet to the first branch with a girth of only 10 feet. Encamped on the ridge at the surveyor's old camp (64 miles from Tayet myo).

3rd April, 1871.—Followed the ridge which now became rather crooked, and gave us much trouble in marching up and down, before we came to our next camp on a feeder of the Swa, at mile the 72nd. The forests remained the the same. An elegant new toon tree (*Cedrela multijuga*) appeared to be rather common in the evergreen forests along this choung. My people had no more stores and I myself did not know exactly where I was, so I sent two men in search of a village in order to obtain food.

4th April, 1871.—On our onward march along the ridges we met with our reconnoitering Burmans in company with a few Karens carrying bags of rice that spoke volumes in favour of a Burman's appetite. The forests were upper mixed forests and of a moister character, interspersed with evergreens which no doubt ascended from the damp valleys. The trees too, were fine grown and lofty. After a few miles march we branched off from the military road, and passing through hilly toungyas reached a Karen tay, which was called Moung ku Tay, if I remember correctly. However, we continued our march over ridges with upper-mixed forests containing teak, and over toungyas and came down to the Choungmenah choung, a feeder of the Khaboung choung and encamped in a narrow shady gorge overhung by evergreens. The country became botanically quite interesting, full of evergreen tropical forests with many rare species in it. The formation, the whole way since we left the main range of the Yomah was permeable soft sandstone. Our further route to Toungboo which we could have reached by a march of 2 or 3 days, lay in the bed of the choung, but I resolved to march only a few miles a day in order that I might have opportunities of scrutinizing more carefully the numerous trees growing in the Choungmenah valley.

5th April, 1871.—Went further down the choung and encamped in the vicinity of Wetcho muy Tay where—as on the preceding day—I found uppermixed forests with teak on the ridges, and evergreens along the choung.

6th April, 1871.—Continued our march in the choung and encamped after passing Nyoung beng way yua. The sandstone and slate strata are here only slightly undulating, dipping at 10° to 5°; only in one place was the dip 80° to E. by N. Forests the same as yesterday. The principal trees in the tropical forests here appeared to be *Sterculia campanulata*, *Acrocarpus*, *Payanelia*, *Tetrameles*, *Albizzia stipulata*, Kathit ka, thingan, *Parashorea stellata*, *Swintonia*, *Tetranthera Roxburghii*, *Holigarna Grahamii*, *Nanopetalum*, *Ficus Roxburghii* and *F. glomerata*, yemene, *Milletti glaucescens* very frequent, *Cedrela multijuga*, *Mangifera*, *Duabanga*, *Sterculia scaphigera*, *Albizzia lucida*, etc. Ye Kathit (*Erythrina lithosperma*) often formed small savannah-forests along the banks.

7th April, 1871.—Moved further downwards and encamped somewhere below the Khyeng ni choung after passing Dhu lu Tay. Met mostly with toungyas cut in evergreen forest, with patches of the latter left untouched. The low ridges (only 200 to 400 ft. high) bordering the choung bore upper mixed forests with teak, tinwa and kyattoun wa. Ye Kathit, ma-u, and thit form locally a sort of spurious small savannah forests in the long-grassed deserted toungyas. As it may be anticipated, the thermometer was in spite of the advanced season, all the way very low in this valley, ranging before sunrise between 64° and 66½° rising to 97° and 98½° at noon, but on the dry ridges it rose up to 101° to 102 degrees.

8th April, 1871.—After a 4 hours' march we encamped below the Zaha myoung choung. The evergreen forests disappear here rapidly by the help of the axe of the Karens, and become replaced by wretched looking poonzohs or deserted toungyas. With the exception of the unusually rapid thinning of evergreens, the forests remained the same.

9th April, 1871.—This morning we had a good deal of fog and dew, something quite unusual during the hot season, but not uncommon in these damp valleys. Moving further down the choung we encamped at the junction of the Tay myoung choung, a little below To-u (Twon-oo) Tay where we met with evergreen tropical forests, interrupted by numerous toungyas. Upper mixed forests, with teak which was plentiful here, covered the ridges. In moister localities along the choung, we also found teak still in foliage. The strata of soft sandstone flattened out more and more, shewing a dip of only about 5°, but occasionally rising to 20-30°.

10th April, 1871.—Toungyas became now more extended as the valley opened out leaving only small patches of evergreen forests along the favourably exposed ridges, while upper mixed forests with pyenma tadi, theing, binga, yemene, myaya and teak came down to the edges of the choung along sunny slopes. Encamped in a moister upper mixed forest a short distance from Gyo beng hsit. Towards evening I cut down one of the splendid palms (*Livistona speciosa*) that grew in a patch of evergreen forests half a mile up the choung in company with wa tabwot.

11th April, 1871.—After a short march in the Choungmenah choung we left this stream, and passing the village Gyo beng hsit at a distance entered more extensive evergreen forests of a drier character, in which oaks (*Quercus velutina*) appeared. A march of a few miles eastwards brought us as if by magic, to a low forest of byu (*Dillenia pulcherrima*), joe (*Walsura villosa*), yindyke (*Dalbergia cultrata*) etc., which finally changed into typical eng-forests. This change is natural, for we now moved on diluvial grounds, stiff loam and laterite, on which also the village Hsae lay doh is built. Arriving at the Pan bay choung, we encamped in the bed of this choung, a short distance from a village.

12th April, 1871.—Marched eastwards. After leaving the banks of the Pan bay choung and its low eng forests, cultivation commenced, but from the waste places and patches of jungles occasionally left standing, savannah forests were recognisable, here chiefly composed of baup. At 9 A. M. we arrived at Toungoo, where the merry folk celebrated their Burmese new-year, by reciprocally bestowing on each other their liquid salutations through large bamboo syringes.

YEAR 1868.

4th February, 1868.—Left Toungoo in company with Dr. Brandis and party and crossed the Sittang at Myo gyi, continuing our march through savannah forests on the alluvium of the Sittang. We soon entered low Eng forests growing on laterite on which formation also the so-called 7 Pagodas (Myatsonyinoung) are built. Here we encamped, and I remained for want of elephants till Sunday, while Dr. Brandis and party left for Rangoon.

5th—9th February, 1868.—Various excursions in different directions kept me fully at work, the forests being chiefly upper mixed forests on syenitic, schistose and other metamorphic strata; low Eng forests on laterite and detritus of metamorphic rocks. A few small patches of evergreen tropical forests, and a bordering swamp forest at the out-skirt of the Sittang alluvium fully employed me for some days.

10th February, 1868.—Moved on to Choungmenah, a Karen village, on a choung of the same name. The cart-road led chiefly through upper mixed forests, with wapyu gelay and occasionally tin wa and teiwa as undergrowth, with rather indifferently grown teak. Huge boulders of granite are strewn all over the terrain, which seems to rest on shistose substrata. Branching off to the right, and following a footpath we soon entered evergreen tropical forests, which were soon succeeded by eng forests. I put up at the zyat of Choung menah and prolonged my stay for the following week. The ranges all round were explored and these shewed regularly upper mixed forests with scanty teak along the slopes, while small patches of evergreens border the bottom of the valleys. Hill eng-forests appeared regularly on the higher crests and summits, in which especially oaks (*Quercus Brandisiana*) along with eng *Symplocos*, banbwe, yingat (*Gardenia obtusifolia*), lambo, etc. were conspicuous. Thursday was spent on an excursion eastwards across the ridges (over 1000 feet high) which extend in the direction of the Myitgnan choung. These were covered by typical hill eng forests growing on laterite.

14th February, 1868.—Rode back to Toungoo in order to make arrangements with Mr. Graham for a proposed tour to the Karen hills and returned to Choungmenah on the 16th.

17th February, 1868.—Started for Palawa Zeik and took the road along the Toukyeghat river. Upper mixed forests with Kyattounwa were the forests along sunny slopes, while evergreens usually occupied the lower grounds along the choungs. The crests of the ridges were all covered with hill-eng-forests. On arriving at the Samong we had to encamp, as it was found impracticable for the elephants to ascend the same day the very steep ridge before us.

18th February, 1868.—In order to cross the steep and almost vertical, ascent we had to unload our elephants, and get the baggage carried by men up the crest, which was covered by hill eng forests and in which beside eng grew two other interesting wood-oil trees (*Dipterocarpus costatus* and *D. obtusifolius*) and oaks. Descending to a narrow gorge with evergreens we soon joined again the Toukyeghat along which we proceeded chiefly through upper mixed forests with teak. About a mile from Palawa we crossed the Toukyeghat stream, which is rather deep here and followed the left bank over rocky ground, on which chiefly *Ajuga* with skyblue and *Lindenbergia* with golden flowers flourished. We put up at Palawa zeik, which consists of only a few bamboo sheds not inhabited. This place is situated rather romantically at the fork of the Palawa choung and the Toukyeghat, offering a fine opportunity for studying the influence of exposure, the shady slopes around being covered with evergreens, while the opposite sunny slopes have nothing but leaf-shedders. I made up my mind to stop here for several weeks, the country all round being exceedingly favourable for collecting a large variety of arboreous species.

19th February to 28th February, 1868.—These ten days were spent in making excursions in all directions, visiting the Bogelay ridges, and those that stretch out on the opposite bank of the Toukyeghat, and up the Palawa and other choungs. Another and very tiresome excursion up the Touhkyegoat stream was accomplished, when we had to construct rafts for crossing at several places as the slopes along the banks became vertical and impassable. The distribution of forests all over these tracts was regulated only by the factors of exposure and light, for the substratum consisted chiefly of syenitic and schistose rocks, both having a very similar influence upon tree-vegetation. Wapyu gyi and another gigantic bamboo, wabo or Kyellowa, is characteristic to the evergreen tropical forests on metamorphic rocks; only the latter (Kyellowa), is sparingly and only locally found also on the soft sandstone of the Pegu Yomah.

29th February, 1868.—Mr. W. Graham, Deputy Conservator of Forests, arrived at noon and brought with him the required number of Shan and Karen coolies, whom I engaged at Tounghoo for our trip into the hills. Everything was packed rather hurriedly, and leaving behind my camp at Palawa, we started at once for Bogelay. Ascending the watershed between the Palawa choung and another feeder of the Toukyeghat, through extensive hill poonzohs, on which chiefly Kyattoun and tinwa with *Sponia orientalis* were found, we soon reached the crest of the Bogelay ridges, here covered by debris of primary rocks and hill eng forests, in which two kinds of oaks (*Quercus Brandisiana* and *Q. Bancana*) appeared; but these forests, were soon replaced by hill-poonzohs which continued all along, leaving only a few patches of wretchedly cut out upper mixed forests, with a little teak along a slope, to our right. These no doubt are the remains of the teak-forests that existed here in former times. The whole country is as far as the eye can reach deprived of all its forests, and only in a few sheltered localities, or rather where the inaccessibility of rocks prevented a remunerative toungya cultivation, are patches of forests still to be seen. In the depths of the valleys plantations of betlenut palms interrupt the monotony of the poonzohs and toungyas, in which here and there a tree is left standing, the crown cropped for fuel in such a way as only to add to the ugliness of landscape, which otherwise is not without its romantic outlines. It was rather late when we arrived at Bogelay, a very large Christian Karen village.

1st March, 1868.—Remained in camp. Visited the Chinchona plantations which were planted out along a slope some years ago and drew up a report on their growth. The deserted Toungyas all round here consist chiefly of *Ageratum conyzoides*, *Blumea*, *Conyza balsamifera* and *C. absinthifolia*, *Saccharum*, *Imperata*, *Polygala glomerata*, teak grass, *Vernonia cinerea*, *Androscepia gigantea*, *Conyza viscida*, *Thyssanolæna acarifera*, *Sida rhombifolia*, *Clerodendron infortunatum*, *Solanum pubescens*, *Desmodium gyroides*, *Blumea pterodonta*, *Pteris aquilina*, *Melastoma*, *Hedyotis scandens*, etc. Amongst these, stragglers of former cultivation lingered, such as *Benincasa*, *Cajanus*, cotton, etc.

2nd March, 1868.—After leaving the Bogelay ridges we had to ascend on the other side the watershed between the feeders of the Myitgnan and another choung, flowing into the Toukyeghat to the north. The ridges here are all pretty well wooded, although they are much mutilated by toungya-cultivation. Evergreen tropical forests of the Toukyeghat character, but richer in variety, occupy the shady valleys and ascend nearly to the crest on the favourably exposed slopes, while on an isolated top of the ridge itself a patch of drier hill forests was found spared from toungya cultivation. I had but little time left for botanizing, as the distance to our next night camp was too far. Passing Yeddoh gelay to our right we followed the ridges until we arrived at Yeddoh gyi, a Karen village situated on a commanding ridge but deprived of all forests except along the slope down the Myitgnan né. The large bamboo, wabo, is a conspicuous feature in these villages of Christian Karens, and indicates of the presence of human habitations in the same way as the Cocoa palms do in low tropical regions. Having descended to the Myitgnau né after passing Kelló, we ascended a very precipitous ridge, which brought us round almost in a half-circle. Our elephants had, in the meantime arrived opposite to where we were, and we were obliged to send them back as we found it impossible to get them over such broken ground. Toungyas of all ages up to 10 years' standing began now to be very numerous, and passing over a small valley we had the pleasure, at 1 P. M. of ascending a steep slope upwards of 2000 feet high at an angle of 30°. The whole way was over toungya ground. A dry hill forest crowned the top of the hill, but we passed along it, about 500 feet lower down through endless toungyas descending gradually and obliquely towards a choung, bordered by evergreen forests, on which the village of Keloung lies, where we arrived at nightfall.

3rd March, 1868.—Our path led us along the slopes of the Tini choung and we soon entered drier hill forests when ascending the watershed of the Tini and Thayet chu choungs, in which I observed chiefly *Eurya Chinensis*, *Schima*, *Coffea tetrandra*, the *Cycas*-like looking *Breynia insignis* with black fibrous stems of 1 to 1½ feet in diameter, oaks, chestnuts, a wood oil tree, *Lantana arborea*, *Saurauja*, *Engelhardtia serrata*, *Ficus conglomerata*, *Glochidion*, *Garcinia anomala*, *Stereospermum fimbriatum*, *Aporosa*, *Vaccinium Donianum Turpini* & *Nepalensis*, *Caryota urens* of 30-40 feet in height by 3 feet girth *Dillenia aurea*, *Emblica officinalis*, *Helicia*, etc. Further as low growth *Gleichenia dichotoma*, *Rubus rugosus*, *Senecio albicans*, *Osbeckia*, a small *Rottlera*, *Scleria*, common, *Panicum montanum*, teak grass, etc. Of bamboos were chiefly the berry-bearing scandent bamboo, Kyellowa and Kyattounwa with wabo. We soon entered also pine forests (*Pinus Kasya*), but these had just been cut down to make place for toungya cultivation. This was a very painful sight to me, for since I left Europe 17 or 18 years ago, it was for the first time that I fell in with pine forests. Although Puki was our next station the night overtook us, and we had to camp as well as we could in a moister hill forest on the banks of the Tayet chu choung.

4th March, 1868.—Ascending the ridge to our right we found ourselves again in drier hill forests, now much interrupted by typical pine forests of the same character as those of yesterday. *Thyssanolæna acarifera* and Andropogonous grasses prevailed. *Tristania Burmanica*, in the plains a laterite tree, grew here in the pine forests on granitic substrata. After passing extensive old hill toungyas of about 10 to 12 years of age in which especially *Nelitris* had densely sprung up with *Ternstroemia*, we descended to the valley of a feeder of the Myitgnan choung where Puki at present lies, in a truly homely landscape, with rounded hillocks clad with pine forests at a distance, and similar ones towering above us on the high ridge on which the village leans. We arrived here at 10 A. M.; but I soon found that my Shan men, a boisterous set, had refused to go any further. While Mr. Graham was remonstrating with them about their conduct, I ascended the ridge that separates the waters of the Myitgnan from those of the Kye choung. The ascent was very steep, first through cut toungyas in which a sky blue *Lespedeza* abounded, then into the pine forests. The Karen guide who accompanied me, seeing the difficulty we had to overcome in passing over ground covered with slippery pine-needles, went a head and made a path by pushing the needles aside with his hands. Little undergrowth only could be seen, restricted almost to *Androscepia gigantea* which was plentiful and 2 species of *Lespedeza*, with occasionally a *Crotalaria Ferruginea* etc.

The crest of the ridge is about 4000 feet high and bears heavy damp hill-forests on the favorably exposed slopes of the opposite side, with lofty trees up to 120 feet in height. After having collected what I could reach with the aid of my gun, we descended towards evening to Puki, where I found Mr. Graham still busy with his diplomatic discussions which nearly ended in a regular row. However, only two of the worst of them left us, and the remainder agreed to go with us.

5th March, 1868.—The path was winding through hill-toungyas along the slopes of the Kye and Myitgnan watershed, and we had a good deal of marching up and down the numerous little choungs coming down from these ridges, until we finally ascended the ridge, and found ourselves again in pine forests, in which *Androscepia gigantea* formed the principal undergrowth. These pine forests were soon interrupted by drier hill forests, consisting chiefly of oaks, *Ternstroemia, Eurya, Engelhardtia, Garcinia elliptica, Turpinia nepalensis, Vaccinium* etc. Descending to the Laytlo choung, a feeder of the Yungzelin stream, majestic evergreens formed a dark forest of the kind I distinguished as moister hill forests, but it was impossible without spending several weeks to make out the lofty trees here. We passed several fine tree ferns 25 feet in height, and an *Arundinaria* formed locally a dense undergrowth, amongst which the curious fungus-like looking *Balanophora globosa* formed clumps as large as a child's head. We encamped at the usual resting-place near a huge overhanging rock, where we found the Rev. Mr. Parish's old camp.

6th March, 1868.—We had to go a little way down the Laytlo, along the banks of which I found the first violets. A path branches off to the left following which a very steep ascent through moister hill-forests soon brought us over rough ground to the narrow crest of the so-called Loko ridge. The slopes to our left were occupied by stunted hill-forests, while along the very precipitous slopes to our right, pine trees grew scattered over the grassy sides, chiefly composed of *Arundinella, Andropogon, Carex*, etc. Here and there a low palm (*Chamærops Khasyana*) could be seen amongst the pines. The vegetation here was of course quite temperate, although the elevation only varied between 5000 to 6000 feet. Oaks, *Myrica*, pines, *Rhododendron, Vaccinia*, etc. were common, while the grassy slopes shewed abundant species of the parsley family, *Gentiana, Senecio* etc. Some passing Karens had set fire to the grass which rapidly spread over the ridge much to my annoyance. The ridge is very sharp and narrow, and became at its highest point so precarious that I crawled on my hands and feet over the peak in preference to going along the precipitous slopes, about 4000 feet high, covered with slippery pine needles. A rapid descent brought us to the bottom of a dark valley with moister hill-forests, in which *Ophiopogon* with its beautiful blue berries formed a substitute for the missing grass. But we had soon to ascend nearly as high again as before and continued our march on the crest of a ridge lying between the Loko ridge and the Nattoung of which latter it is a spur. We had now a full view of this mountain on which a flagstaff has been erected. The forests became beautiful; the ridges were covered with drier hill-forests while the sides were occupied by moister hill-forests, resembling (especially those of the gorges) those in the Java hills. Along an almost vertical slope, densely overgrown with moister hill-forests, and through a dense growth of *Arundinaria* we soon got on the Nattoung itself, and finally emerged on the woodless plateau, behind which the flagstaff was visible sticking out from the low stunted hill forests. We encamped under an old pine, and a visit to the top of Nattoung closed our day's work.

7th March, 1868.—Halted. The day was spent in exploring the forests all round. European plants were chiefly conspicuous, 2 kinds of *Gentiana, Pteris aquilina, Vaccinia*, 2 or 3 species of *Pogonatum, Funaria*, 2 species of *Senecio, Hypericum, Lycopodium clavatum*. The grass was all burnt down and consisted chiefly of high-growing *Arundinella*, and a hairy *Andropogon*. In boggy places the remains could be seen of *Drosera lunata*, together with a few small European *Scirpeæ*, that spring up in the brown cushion like masses composed chiefly of *Campylopus*, intermixed with *Pogonatum*. *Cladonia*, and in some places *Bæomyces*, formed conspicuous patches on the ground. The forests were chiefly stunted hill forests gradually passing on favourably exposed slopes into moister hill forests. In the valley, where a choung glitters over the rocky bed, trees attained the height of 120 to 130 feet. A new kind of rattan, the underpart of whose leaves were white is the only representative of palms here. The Javanese *Rubus alpestris* and *R. rugosus* were plentiful together with *Sarcopyramis, Begonia* etc. The stems appeared densely clothed with mosses and *Hymenophylleæ*, amongst which a beautiful *Pleione* was plentiful and in full flower. Epiphytic *Vaccinia*, with crimson or scarlet flowers looked beautiful while the white flowered *Rhododendron Moulmeinense* stood in full blossom. Just below the top the *Rhododendron formosum* grows, which has unnecessarily been made into a new species (*Rh. Veitchianum*), a shrub, along with *Arundinaria* and a large flowered *Gentiana* struggle here against the influence of weather and exposure. We had all the day dense fog with a strong W. N. W. breeze which finally burst into a most disagreeable rain lowering the thermometer between 3 and 4 P. M., to between 51 and 53°. I could do little more than watch my thermometer, and hope for better weather the next day.

8th March, 1868.—Rained all night. At midnight my camp was alarmed by the uncalled-for visit of a tiger, who, however, went off without taking with him any booty. The weather was worse than yesterday, and during a break in the rain I went to the top of the hill but soon had to return on account of a heavy storm that commenced and continued the whole day, gradually swelling into a perfect gale. We were detained for the rest of the day, and fortunately for us our tent stood sheltered by the forest at our back, or it certainly would have been blown down, had it been pitched on the plateau itself. Our people were placed in a most distressing condition, being unable to fetch water to cook their food, or even to keep up the fires to warm themselves. Late in the night the Karens who had volunteered the previous day to go down to Kolodo for food, came back in a miserable plight, wet through and through. It is only steady, wiry men, like these Karens who could stand such a gale on the ridges without being blown off, and who could find their way in spite of rain and darkness up to the very top of Nattoung.

9th March, 1868.—During the night the sky cleared up to our great delight, for our men had spent the previous day without food, and were shivering with cold. The morning was very fine, and our camp was all alive, as the men lit the fires to cook their food, and spread out their best garments to dry. In the mean time I went over the the hill-ranges towards the Tegako toung, a hill some 200 to 300 feet higher than the Nattoung, covered apparently with stunted hill-forests, but inaccessible from our position. The view from the top of this hill was beautifully clear, and I could see the Salween winding its course through a deep valley, while hills, apparently more than 10,000 feet high, towered up in the Siamese territory. On my return from this excursion we did not think it advisable to prolong our stay on the top of the ridge on account of the scarcity of food and the general condition of our people; after all had therefore taken their meals, we made our retreat along the same route as that by which we had come up. Late in the evening we reached our old camp at Laytlo choung where I found to my dismay the bundles of plants which I left behind under the shelter of an overhanging rock, were perfectly drenched and spoiled.

10th March, 1868.—Went as far as Puki, along the same route.

11th March, 1868.—To-day we branched off from our former route, and ascended the ridges to our left, which seemed to be a continuation of the Chelsoko range. The highest point reached was about 5000 feet. The forests were chiefly pine forests with drier hill-forests, but in descending towards Plumadoe we again entered most beautiful moist hill-forests, which continued until we came in sight of the Myitgnan, where toungyas and upper mixed forests replaced them below an elevation of 3000 feet. A sharp descent brought us to Plumadoe itself, a large village of Christian Karens. The topography of the surrounding country presented the most inviting of the localities we passed for a Chinchona plantation, and was as such recommended by us to the authorities, although it stood at an elevation of only about 2,500 feet. The defect of elevation was, however, remedied by the surrounding shelter as well as degree of exposure, which the valley offered and which taken into consideration would probably afford the same advantages as a site 3,500 to 4000 in elevation with a free exposure.

12th March, 1868.—The early morning was occupied by me in going over the ground selected for Chinchona plantation and in taking a rough sketch of it. The substratum appeared to be composed of metamorphic rocks. Our men were sent on to Mundeing and we followed a few hours afterwards. It seemed as if we had left a paradise behind us, for the whole Myitgnan valley is almost perfectly denuded of its forests. Only a single small patch of evergreen forest was met with before we ascended the slopes of the water shed between the Myitgnan and the little Kye choung, along which the path wound up and down through endless toungyas. The monotony of these is only interrupted by a few Karen villages or betelnut gardens, the latter being especially refreshing on account of the beautiful shade and coolness they produce. The opposite water shed towards the Choungmenah choung also appeared to be woodless. What a destruction of forest must have gone on here since 1859! Dr. Brandis' sketch-map of the teak localities in the Tenasserim and Martaban provinces represented the whole valley as one teak-forest of 36 square miles, and now hardly a single teak tree can be seen, in fact only scattered trees which partake of the character of an upper mixed forest are left to indicate their former existence. Such destruction must sooner or later become the subject of serious consideration and it is strange that the Christian Karen inhabitants of the valley should not have learnt the undoubted value of the forests. After passing Mundeing gyi we fell in with a small upper mixed forest with a few teak trees in it; here we turned to our right and after passing a little choung soon reached Mundeing geley, situated on a commanding position opposite to Yedoh-gyi.

13th March, 1868.—At dawn of this morning we marched down the slopes through toungyas, and crossing the Tini loh, bordered by evergreens, we again ascended through toungyas, the low ridges on the other side joining at Kelloh the route, we had come by the previous week, and arrived at Bogelay about 3 P. M., where we found our elephants.

14th March, 1868.—Halted. Paid and discharged the coolies.

15th March, 1868.—Moved on to Palawa zeik, where I found my old camp, but the men in charge of it were laid up with fever.

16th March, 1868.—Mr. Graham left this morning for Toungoo while I recommenced my excursions into the surrounding forests, in which a good number of trees had in the meantime come into flower. These tropical forests afford new subjects of interest as often as one enters them, as every month produces a change in the general appearance of their constituents. It is difficult therefore in the course of a short journey through the forests, to describe them accurately, and it thus often happens that only their floral developement is described, and not their true character. My excursions occupied me for 4 successive days, during which time I made numerous additions to my lists of trees.

20th March, 1868.—Moved my camp to Nakawa choung half way between Palawa zeik and the seven pagodas and situated in the heart of tropical evergreen forests. Here I continued my excursions up to the 27th ; but suffered much from attacks of fever.

28th March, 1868.—Returned to Toungoo and remained there till the 8th, arranging and packing my collections, engaging new hands, etc. During my stay my interpreter left my service, having suffered a good deal from fever.

9th April, 1868.—Returned to the Toukyeghat and put up, as usual at the zyat of the seven pagodas. Here I visited the various leaf-shedding forests, and more especially the Eng forests, which had assumed quite another aspect on account of the numerous gay flowers that now adorned the trees. Both my elephants arrived with sore backs, and I had to wait for 12 days till I got others.

22nd April, 1868.—The fresh elephants arrived yesterday, and this morning I started again for my old camp at Nakawa choung, where much still remained to be done. Here I remained until the 27th. The days were hot and sultry, with heavy thunder-storms which usually commenced with such force as to bring down lofty trees. My camp was, however, pitched in the bottom of the Nakawa valley, and was thus sheltered, but in spite of this we were in frequent danger owing to the fall of heavy branches of trees. On one occasion, at midnight, a lofty tree which stood before my tent broke at its very root, and fell straight over the tent, but its descent was fortunately arrested by the thick entangled branches of a *Bauhinia* and thus my life was saved. My people soon became prostrated with fever one by one, and I myself had several severe attacks which necessitated my leaving the forests, much to my regret, for the storms had brought down such quantities of branches, that the collection of specimens of trees was rendered quite easy.

28th April, 1868.—I started this morning alone for the seven pagodas, leaving my sick people to follow on the elephants, but I soon found that I was weaker than I thought: I slipped from my saddle several times, almost helpless, but my pony seemed to understand my condition, for he remained by my side like a dog. On arriving at the zyat I stopped for the next three days, confined to my bed.

1st May, 1868.—Early this morning I moved to Toungoo, staying there for the next ten days until I had recovered. During that time I made my preparations for my trip down to Rangoon viâ Minlan and Pegu. I had however to change my plans at the advice of the civil surgeon of the station. and to take the route by boat down the Sittang.

Year 1871.

15th April, 1871.—Toungoo. After having packed my collections and arranged other little affairs during the preceding 2 days I started to-day for the Chinchona plantations on the Shan toung gyi hill, east of Toungoo, in order to report upon them, at the request of the Deputy Conservator of the division.

After crossing the Sittang river, we again came upon savannah forests intersected by small lakes and choungs, bordered by small patches of swamp forests. The laterite formation which here, as along the Yomah, borders the outskirt of the Martaban hills, soon replaced the alluvium, and the forests were accordingly Eng-forests with admixtures peculiar to this province, such as *Tristania*, *Anneslea*, *Quercus*, etc. Encamped at Allay myoung.

16th April, 1871.—Leaving the eng-forest on laterite ground we soon entered (on older formations strewn with granite boulders) one of those forests characteristic of Martaban, which combine in some degree the character of Evergreen and upper mixed forests, though still belonging to the latter class. Teak was only sparingly represented here. After passing over some low hills, on the top of one of which hill-laterite with a stunted eng-forest unexpectedly appeared, we descended into low lands covered by Evergreen tropical forests, and encamped at a small choung (Tabie chg. ?). The formation appeared to be schist dipping N. W. at 80° occasionally very ferruginous and decomposing into a kind of laterite. The forest itself is identical in vegetation with that of the Toukyeghat in which I spent so many weeks in 1868.

17th April, 1871.—After crossing numerous little choungs which traverse this Evergreen forest, we emerged finally at the commencement of a spur of the water-shed between the Toukyegat and Sittang rivers. Troublesome deserted toungyas continued on the same for several miles, until the ground became strewn with granitic boulders, when the upper mixed forests remained untouched. Having passed the ridge at the path to Kyettike, we encamped at a little choung quite conspicuous on account of the great number of yellow-flowered *Phrynium*, which grow here. The forests around this place are upper mixed forests.

18th April, 1871.—Continued our march on the ridge. The spur shews (as was to be expected) Evergreen tropical forests along its northern face, and at the bottom of the vallies, but on the sunny slopes upper mixed forests continued. These, however, were soon replaced by poonzohs about 10 to 11 years old, in which lynggyan (*Dillenia parviflora*) Kyun nalien, bambwe, *Rhus semialata*, *Lantana arborea*, etc. had sprung up. Ascending to an elevation of about 2000 feet, a change for the better occurred, and after a troublesome cut through a wapyu geley jungle, we descended to the Sway nyoung beng choung, amongst which *Saurauya Roxburghii* with its azure-blue blossoms was conspicuous. Ascending on the other side to an elevation above 3000 feet, patches of drier hill forests interrupted the monotony of the hill-poonzohs, in which *Sterculia ornata*, *Dillenia aurea*, *Pithecolobium*, etc. could be observed, indicating the former existence of drier hill forests. On arriving at the crest of the water shed, we met with fine typical drier hill-forests with oaks, *Schima*, *Pyrenaria camelliæflora*, *Helicia*, etc. and soon arrived at the Chinchona plantation on Shan toung gyi, beautifully situated, but unfortunately having a Western exposure. The soil is peculiar meagre brick red soil, full of angular quartzy korrels, and apparently a decomposed granite, although no substrata could be traced down to a depth of 15 feet. As is usual, these Martaban hills are full of rounded huge granite boulders, but they have no connection with the soil itself. The average height of the trees was between 50 to 60 feet, and along the choung itself they were 70 to 80 feet high. Here a sort of tea (*Camellia caudata ?*) a small tree, 15 feet high, is not uncommon. As my elephants had not come up, I sent down some of my men to fetch my bedding, etc. for the night, but they only returned at 1 A. M. in the morning.

19th April, 1871.—The forenoon was spent in exploring the environs round the plantation, the forests being chiefly drier hill forests replaced by damp ones in sheltered valleys. Wabo and Kyellowa were plentiful and still more so was a climbing bamboo (*Pseudostachyum compactiflorum*) of which the globular fruits, the size of a small apple, hung gracefully down, or were densely strewed on the ground. The following were the plants chiefly noted: *Schima oblata*, and *Sch. Wallichii*, *Myrica gale*, *Albizzia stipulata*, *Pandanus furcatus*, *Wallichia oblongifolia*, *Strobilanthes Brandisiana*, a *Phrynium* with large leaves but flowerless, *Helicia robusta*, *Quercus spicata*, *Eurya Chinensis* and *E. Japonica*, *Ternstœmia Japonica*, *Anneslea monticola*, *Rubus rugosus*, *Pithecolobium montanum*, *Bischoffia Javanica*, *Ampelopsis Himalayana*, *Vitis affinis* and another sp., *Smilax*, a tomentose *Bauhinia*, *Alpinia nutans ?* and another sp., *Dillenia aurea*, *Melastoma Malabathricum* as a little tree, *Pollinia*, *Dianella*, *Areca gracilis*, 2 species of *Symplocos*, a *Psychotria*, *Castanea diversifolia*, *Sonerila secunda*, *Chamaerops Khasyana*, *Xyris Wallichii*, *Niphobolus*, *Pleopeltis*, *Hymenophyllum*, *Pteris aquilina*, *Leea sambucina*, *Chavica*, *Vaccinium macrostemon*, *Tabernaemontana*, *Aporosa*, *Calophyllum spectabile*, *Begonia*, *Strobilanthes penstemonoides*, *Molineria recurvata*, *Osbeckia rostrata*, *Lepidagathis mucronata*, *Hoya*, *Turpinia Nepalensis*, a strigose *Argyreia*, *Ardisia* sp., *Orthopogon* sp. *Beilschmiedia globularia*, *Garcinia anomala*, *Saurauja Roxburghii*, *Pyrenaria camelliaeflora*, *Podocarpus neriifolia*, a new *Calamus* with the leaves white beneath, *Smilax lanceaefolia*, *Cnestis ignea*, *Lygodium polystachyum*, *Stenochlaena scandens*, *Maesa ramentacea*, *Wendlandia glabrata*, *Peliosanthes macrophylla*, *Tupistra nutans*, *Ophiopogon*, *Carex*, *Commelyna obliqua*, *Polygonum Chinense*, *Aspidium*, *Nephrodium*, *Gymnogramme decurrens*, *Asplenium laserpitiifolium*, *Didymocarpus mollis*, etc. It will be observed from this list that a good number of alkali plants are amongst the representatives; and also that not a few of the low level shade plants, ascend to this elevation, quite in unison with the dampness, as causal factors. Returning to my camp about noon I was startled to find a Karen deputation waiting for me, who claimed damages from me for having burnt down their toungyas to the amount of about 500 baskets of rice. I looked rather astonished, the more so as I could not see any fire around me, and was not aware that a jungle fire had raged over the ridges we passed yesterday. I of course declined to pay any damages, particularly as their separate statements were of a contradictory nature To bring the long discussion to a close I mounted my pony and rode with them to the scene of the fire, and told them there that the only redress they could obtain was by an appeal to the court at Toungoo. On returning to the plantation I looked over the nurseries which were well kept; the seedlings, though very young, had not suffered from the drought, though the ferns in another shed had all died.

The jungle fire approached nearer to the plantation and towards midnight it was only a little more than a mile of. It was one of the largest fires I ever saw in Burma. It raged chiefly amongst the gigantic wabo bamboos, and the tongues of fire reached a height of 70 feet, enveloping the trees and producing an alarming noise by the explosion of the bamboo-joints. I always wondered why Karens, especially those who live near pine forests, took so much care not to light jungle fires, but this present occasion explained the reason.

28th April, 1871.—I returned through the burning forest, which now offered a desolate aspect with its scorched leaves, smouldering trunks and dense smoke. On arriving at Tau pya, I met my elephants which I sent on at once. Here I made enquiries as to the direction from whence the fire was first seen coming, and it was unanimously pointed out to me to have come from the other side of the Suay myoung ben choung. This satisfied me that none of my men could be blamed for the occurrence and I marched on over the toungyas crossing the Palo choung and ascended the opposite ridge, where I fell in with our old route and encamped at a little choung behind the Suay nyoung ben choung.

21st April, 1871.—We went on to our old camp at Thabyi choung where we stayed for the night. The jungle fires had not touched the toungyas on the ridges we had passed, but reappeared along the outskirt and interior of the Evergreen forests; a sure sign that the fire had been caused by Karen honey-hunters, groups of whom had passed us.

22nd April, 1871.—Moved onwards to Sa-wa-yua, a Shan settlement and encamped in a bordering swamp-forest.

23rd April, 1871.—Returned to Toungoo and put up at Mr. Graham's, the zyat being occupied by other parties.

Year 1868.

11th May, 1868.—Toungoo. Started by boat for Rangoon, but did not come further than to the junction of Toukyeghat. Vegetation savannah and savannah forests on alluvium.

12th May, 1868.—Continued our journey to a village the name of which I do not remember. Along the banks (alluvium) grew chiefly *Amarantus spinosus*, *Chenopodium album*, *Mollugo sperguta* and *M. glinus*, *Portulaca oleracea*, *Bonnaya veronicaefolia*, *Vandellia crustacea* and *V. multiflora*, *Cyperus umbellatus*, *C. Haspan*, *C. pygmaeus*, *C. Irio* and *C. vulgaris*, etc. *Eclipta erecta*, *Pongatium*, *Conyza Aegyptiaca*, *Gnaphalium Indicum* and *G. multiceps*, *Physalis*, *Sphaeranthus*, *Colocasia virosa*, *Trichosanthes integrifolia*, *Grangea maderaspatana*, *Nicotiana Tabacum*, *Saccharum spontaneum*, *Eleusine*, *Nasturtium Bengalense*, *Heliotropium Indicum*, *Dentella*, *Hedyotis paniculata*, *H. biflora*, etc. *Ammannia Indica*, *Jussiaea*, *Blumea Wightiana* and other species, *Fimbristylis diphylla*, *F. miliacea*, etc., *Ageratum*, *Polycarpum depressum*, *Buddleia*, *Isolepis squarrosa*, *Thespis divaricata*, *Polygonum*, *Indigofera*, *Athroisma laciniatum*, etc. etc., in fact all the usual river-bank-weeds. Vegetation on the elevated alluvial lands savannah forests and savannahs.

13th May, 1868.—The uniformity and flatness of the country continued, as also the savannah forests and savannahs, but at Hmon lower mixed forests with teak interrupted the monotony somewhat. Slept somewhere before Gnatang-kweng.

14th May, 1868.—Country and vegetation the same as on former days. Our progress was but slow, the boat being a heavy one and the water in the Sittang very low. Slept at Mo-mha-ka.

15th May, 1868.—Country and vegetation unchanged. Arrived at dusk at Swaygyin.

16th May, 1868.—Remained at Shwaygyin.

17th May, 1868.—The hills at Shwaygyin approach the Sittang and small patches of lower mixed forests with a little teak stretch almost to the river's bank on the left side, while the alluvial land to the west remains covered with savannah forests, extending as far inland as the eye can reach. At Donzarit an almost pure, but stunted teak forest occupies the laterite ridge on which the pagoda stands. The base of the spur is skirted by teiwa, but the ridge itself further up is covered by an almost pure wapyu galey jungle. A heavy thunderstorm compelled us to remain at Thayet tamin.

18th May, 1868.—An almost pure baup (*Butea frondosa*) savannah forest was passed before reaching Karway, where I intended to visit the springs at Zalot-gyi, but soon found that the state of my health was not equal to the occasion. The laterite ridges, however, around the place gave me a good harvest. On returning to my boat, we dropped down as far as the Sittang station. The tidal vegetation commences about half way between Karway and this place, and the salt-loving plants which first appeared were *Hibiscus tiliaceus*, *Derris scandens* and *Wollastonia*. A willow (*Salix tetrandra*) was not unfrequently met with. After leaving this place the ranges retreated from the banks of the Sittang more and more and I soon found myself again in uniform alluvial lands, but now influenced by the sea. In consequence of this the vegetation gradually betook the character of tidal savannahs and tidal savannah forests, interspersed with *Tamarix*, *Thespesia populnea*, *Pluchea*, *Erythrina ovalifolia*, *Paritium tiliaceum*, etc. Slept at Guebin zeik.

20th May, 1868.—After leaving Guebin zeik the stream widens considerably, and becomes a vast mass of water from which the low savannah trees emerge along the horizon, just in the same way as we see the mangroves emerge one by one in approaching a low coast. The trees with their dense rounded heads appear like dense green balls, floating on the water, and as we approach nearer and nearer finally become consolidated into a forest. A good representation of such a landscape will be found in Griffith's Journal of Travels, p. 154, o. tab.

Baup (*Butea frondosa*) and didu (*Bombax Malabaricum*) were the principal trees which often exclusively formed the savannah forests. At Khaya su village we entered the Khaya su choung, but had to stop here waiting for the flood-tide. The muddy banks of these salt-water channels are often during ebb-tide quite covered with a white saline powder. We started in the afternoon, and proceeded until sunset when we halted for the night.

21st May, 1868.—The country remained the same, flat in the extreme and covered solely by savannahs of a tidal character, varied only occasionally by groups of tidal trees or shrubs, such as *Tamarix*, *Desmodium polycarpum*, and *D. triquetrum*, a *Glochidion*, *Fluggea*, *Zizyphus jujuba*, *Avicennia*, etc. Besides *Saccharum spontaneum*, *Andropogon*, *muricatum* and *Imperata*, which form the bulk of these savannahs, there were chiefly observed *Curcuma sp.*, *Blumea*, *Buchnera*, a terrestrial Orchid (dried up, *Habenaria ?*) , *Hygrophila*, *Argyreia*, *Ipomaea turpethum ?* , *Malacochaete pectinata*, *Cyperi*, etc., while along the muddy banks themselves *Salsola*, *Sesuvium* and *Wollastonia* indicated the presence of brackish water. Tigers seem to be not unfrequent in this locality, for I never missed their footprints when walking up some of the numerous small tidal channels here. The pagoda of Pegu, although about 10 miles distant, seemed to be only a short way off. Owing to the neap-tides we could not proceed, and remained on the mud bank for nearly 12 hours, which was exceedingly trying, for in addition to the annoyance of being unable to proceed, the boat abounded with bugs which came down upon me thickly whenever the boatmen walked over the bamboo cover under which I was sitting. However after all this misery, we managed the same day to proceed as far as Peing na beng, where we slept.

22nd May, 1868.—Like yesterday we were unable to make much progress on account of the neap-tides. We passed several villages as poor as those in the Sunderbuns, but I do not exactly remember where we stopped for the night.

23rd May, 1868.—Came sluggishly up to the junction of the channel with the Pegu river where I stopped for a few hours in order to explore the low laterite ranges that crop up from the alluvium. With the commencement of the ebb we dropped rapidly down the Pegu river, landing only at a few places to explore several other laterite ranges, and also the tidal forests which are fully developed in some places on alluvial grounds. *Phoenix paludosa* forms the most attractive object, while *Sonneratia apetala* and *Avicennia tomentosa* were the prevailing trees. Slept at Tha-byu.

24th May, 1868.—The gilded pagodas of Rangoon and Syriam soon became conspicuous objects in the landscape, and we arrived in the morning at the jetty. I remained at Rangoon up to the 5th June on which date I embarked on the S. S. "Coringa" for Calcutta, arriving there on the 11th of the same month.

Year 1871.

24th, *25th April*, 1871.—I remained these two days at Toungoo, during which time the complaint of the Karens at Tan pya were heard in court and dismissed. Made also the necessary preparations for my return to Rangoon along the usual Toungoo route viâ Menlan pyu and Pegu.

26th April, 1871.—Started for Otweng. The road led chiefly through rice cultivation. The patches of forests passed were of a peculiar nature, being savannah forests but mingled with (*Dillenia pulcherrima*) Kun pyenma (*Lagerstroemia macrocarpa*) and a few of the laterite-loving trees. *Eugenia Jambolana*, a tomentose *Dioscorea*, *Celastrus paniculatus* and *Pterolobium lacerans* were here represented in larger numbers than on the Irrawaddi side.

27th April, 1871.—Cultivation continued and the forests passed were of the same character as those of yesterday. Encamped at Thabie gon. From here I visited the lakes to the east that lie concealed in the savannah forests, but I was greatly disappointed in my expectations, as they were either dried up or covered by *Hymenachne myurus* only. In the savannah forests were chiefly represented : thit (*Albizzia elata*) baup (*Butea frondosa*) myouk zi (*Zizyphus rugosa*), thit poh (*Dalbergia purpurea*), Kun pyenma (*Lagerstroemia macrocarpa*), Gnu gyi (*Cassia fistula*) tasha (*Emblica officinalis*), Kwe (*Spondias pinnata*) etc. In addition to coarse grasses the little *Ardisia Wallichii* and 2 species of *Dioscorea* were the most prevailing undergrowth which, especially the latter, locally prevented our advance. I returned to the cattle-shed at Thabie gon, which is used here as a traveller's-bungalow, but not appreciating the cleanliness of the place I preferred to pitch my tents.

28th April, 1871.—The thermometer stood this morning at 76½ before sunrise, and though I expected a very hot day, marched over the country which wore much the same aspect as that of yesterday, the forests being an intermediate sort of savannah and low forest, but more properly referable to the former, in which grew chiefly nabbé (*Odina Wodier*), toukshа (*Vitex leucoxylon*), pyenma (*Lagerstroemia flos reginae*), nagyi (*Pterospermum semisagittatum*), banbwe (*Careya arborea*), didu (*Bombax Malabaricum*), tsim byun (*Dillenia pentagyna*), khaboung (*Strychnos nux vomica*), binga (*Stephegyne rotundifolia*), Kwe (*Spondias pinnata*), tabwoot gyi (*Miliusa velutina*), che ni (*Barringtonia acutangula*), baup (*Butea frondosa*) etc.

Emerging from the forests we had to cross over a long tract of fallow paddy-fields which was rather hard work, as by this time (about 9 A. M.) the thermometer had risen to 100° in the shade. Encamped at Kwé in poeh. This was the hottest day I remember in Burma, the thermometer being from 100° up to 108° in the best shade I could obtain, and at 4½ P. M. it was still as high as 100°. Whenever a breeze, however gentle, swept over the rice-fields, it resembled a Simoon, and caused the thermometer to rise 1 or 2 degrees. Heavy clouds, however, appeared on the horizon, and a thunderstorm, with a heavy downpour of rain succeeded which soon cooled the atmosphere.

29th April, 1871.—Marched as far as Pyoung thay. The forests passed were chiefly savannah forests, but before arriving at the Nyoung chyi douk eng trees were met with which indicates the probable existence of a laterite substratum below the shallow alluvium. *Phoenix acaulis*, another laterite-loving plant, was also often observed. At Pyoung thay there had been no rain the previous day, so the thermometer rose again to 103° in the shade.

30th April, 1871.—Marched as far as Menglan pyu. The forests were at the beginning the same as those of former days, but when we approached the sandstone spurs of the Yomah, they assumed the character of lower mixed forests. Along a few choungs patches of moist evergreen forests with Kanyin pyu (*Dipterocarpus alatus*), Kathitka (*Pentace Birmanica*), *Chaetocarpus castaneaecarpa*, *Sterculia campanulata*, and *St. scaphigera* and plenty of bummaiza (*Albizzia stipulata*) etc. were met with. The base of the Yomah is here not bordered by laterite as it is further to the north, and the alluvium seems, at least here, to rest directly on permeable sandstone. The laterite seems to disappear on this side about west of Nyoung kyi douk, although ferrugineous pebbly strata of small extent reappear again further south. The rainy season had fairly set in to-day, and the sky was overcast with heavy clouds.

1st May, 1871.—Made an excursion to a place in the Pyu choung in order to see the telu wa, a bamboo much spoken of by foresters. It was just in flower and proved to be the same as the Kyellowa of the Karens. The sandstone ridges were here, as every where in the Yomah, covered with upper mixed forests, with teak and pyenkadu. Small patches of evergreens grew at the bottom of a small choung which we passed as well as along the favourably exposed banks of the Pyu choung.

2nd May, 1871.—Rain fell now plentifully, but I pushed on and encamped for the night at Gyo-beng. The forests passed through were all lower mixed forests, with plenty of Kanyin pyu and ongdong (*Tetranthera Roxburghii*) in more sheltered places. The perennial plants which had been burnt during the hot season, began to appear and some of them stood in full blossom, but these flowering shoots look very different from the full grown plant when it is in fruit, so much so that it is impossible to identify them without being acquainted with the appearance of the plants under both conditions. Such for instance are *Premna macrophylla*, *Sauropus quadrangularis*, *Hemiorchis Birmanica*, *Aneilema scapiflorum*, 2 small sp. of *Croton*, etc. In addition to these there were numerous *Scitamineae* now laden with gaudy flowers in places where in the dry season nothing but the bare ground was to be seen. In fact half of the ground-vegetation in these leaf-shedding forests consists during the rainy season, of this order of plants mingled with some terrestrial orchids, *Crinum*, *Leea* and some other shrubby perennials and *Marantaceae*, *Curcuma*, *Amomum*, *Zingiber*, *Kaempferia*, *Phrynium*, *Maranta* and *Alpinia*.

3rd May, 1871.—Moved down as far as Thambaya gon on the Toukan choung, where we encamped westwards at a village, the name of which I omitted to note. The forests of to-day were all lower mixed forests. After crossing the Kun choung, several small eng forests, covered with the usual grasses, but almost destitute of water, were passed. On the grounds situated higher up between the numerous choungs which were now changed by the rains into rapid streams, several small tracts of low forests were met with of that curious intermixture of savannah and true low forests, the chief undergrowth of which were wild sugarcane, while byu (*Dillenia pulcherrima*) and the tomentose-leaved toukkyan (*Terminalia alata*) were the chief trees. A fine patch of moist tropical forest appeared on a low spur of the Yomah, covered by diluvial large siliceous pebbles, intermingled with yellow loam.

4th May, 1871.—Went as far as Theywa on the Ye noë choung, and encamped opposite a village on this side of the choung. The forests remained the same, but the low forests turned up more regularly on the gravelly high ground between the numerous choungs we passed. Evergreen moist forests appeared on a similar loam, full of large quartz pebbles, and after having passed a small eng forest we arrived at our camping ground.

5th May, 1871.—Continued our march to Bheingda yua on the banks of a choung of the same name, but I could do very little on account of the heavy rains which poured down nearly the whole day. Encamped a few hundred yards from the village in a lower mixed forest, in preference to living in a Burmese house which was offered to me. After leaving Thaywa we soon traversed a low forest of the character of a savannah but alternating with patches of paddy fields and lower mixed forests. After having passed the Thabyu choung these low forests on gravelly soil became almost the rule on the watersheds situated higher up.

6th May, 1871.—Heavy rains poured down uninterruptedly since midnight, my tent stood a few inches deep in water, but notwithstanding this it kept out the rain pretty well, allowing only a fine drizzle to penetrate, which, however, in time became quite as disagreeable as the rain itself.

7th May, 1871.—Started at 7 A.M. and arrived at 1 P.M. at Kyouk-la-long on the Kauleya choung. After leaving the Beingda lower mixed forests, a small savannah forest was traversed, followed again by lower mixed forests. A fine patch of evergreen tropical forest, growing on ferrugineous gravel, spread out along the choungs between the Ye le and Mayan choungs, but the rest of the path led through lower mixed forest. Between the Mayan and Kauleya choung a spur of the Yomah is laid down in Fitzroy's map, but nothing of the kind exists here.

8th May, 1871.—Went as far as Bhauni on the banks of the Bhau ni choung. Along the Kauleya choung lower mixed forests with teak prevailed, then followed a large tract of low forest with wild sugarcane as undergrowth in which the principal trees were the following: but they were all stunted mundeing (*Lophopetalum Wallichii)* Kaboung (*Strychnos nux vomica*), tabié (*Eugenia Jambolana*), banbwé (*Careya arborea*) mani (Gardenia *erythroclada*) Kun pyenma (*Lagerstroemia macrocarpa*), panga (*Terminalia tomentella*), byu (*Dillenia pulcherrima*), binga(*Stephegyne rotundifolia*), doaui (*Eriolaena Candollei*), tamin sapyu (*Gardenia sessiflora*), thit poh (*Dalbergia purpurea*), thit lynda (*Stereospermum neuranthum*), myouk zi (*Zizyphus rugosa*,) tasha (*Emblica officinalis*) gyo (*Schleichera trijuga*), nyoung pyu (*FicusRumphii*), nabbé (*Odina wodier*) etc. The tomentose *Dioscorea* is also here, as everywhere in the Sittang valley, very frequent. As in the Irrawaddi valley so here, the low alluvial borders of the choungs are occupied by lower mixed forests, but in more favourable and damp situations they are sometimes replaced by evergreens. Passing to the left of the village Pway ta mau, another patch of low forest of the character of savannahs, alternating with lower mixed forests, was traversed. A tropical evergreen forest surrounds the Gonyeng gan choung, in which I found on an open spot hardly one acre in extent, seven snakes. Moist evergreen forests, partaking rather of the character of a mixed forest was met with between this and Bhau ni.

9th May, 1871.—Proceeded on to Pyeng bon gyi, situated on the choung of the same name. To-day savannah forests on alluvium covered the country as far as the Bhu ni gelay choung, from whence lower mixed forests with an unusually large number of Kinbalin trees (*Antidesma diandrum*) stretched as far as Kyeik so gau Pagoda. After leaving the Bhau ni gyi choung lower mixed forests bordered the right side (west) of the cart-road, while to the east, extensive savannahs with hardly a tree upon them formed a monotonous plain on which the eye could fix upon nothing save a few prominent half-ruined pagodas. The horizon was, however, skirted by the romantic Martaban hills.

10th May, 1871.—Continued our march downwards as far as Paya gyi. The country remained flat and monotonous, but the cart-road itself led chiefly through paddy-fields. Towards the east there were endless savannahs, while towards the west, the cultivation was skirted by mixed forests. The soil (about a foot deep) was chiefly stiff clay, resting on fine loose silicious sand (about one inch in thickness), but the order frequently becomes reversed; the latter becomes exposed, forming sandy tracts, below which is found the same stiff clay which before formed the surface soil. It is possible that this thin layer of silicious sand is only found at Won bay choung, where I took the section. At Wonbay I procured a guide who promised to bring me to the Kyeik patanga pagoda, which like the Paya gyi pagoda, forms a conspicuous feature in the scenery. It is a ruined pagoda overgrown with trees, and resembles more a conical hillock than an architectural structure. Leaving the paddy-fields we entered lower mixed forests with banbwe, Kinbalien, *Walsura villosa*, *Heterophragma sulfurea*, nyoung pyu, tayet, kun pyenma, kwe, nabbé etc. *Cnestis ignea* also was frequently met with. *Kaempferia Parishii* and *K. candida* were the only conspicuous flowers on the ground. In Fitzroy's map a conspicuous range is laid down but, actually the ground here is only elevated 20 to 25 feet above the savannahs. On returning from the pagoda which we found inaccessible on account of the jungle growth, we again entered cultivated lands and encamped near the little zyat at Paya gyi in a patch of lower mixed forest of a peculiar character.

11th May, 1871.—Started at 6 A. M. and arrived at Pegu at 11 A. M.; the elephants came in at 2 P. M. The first half of our day's march was rather interesting. First we had to cross a choung (Ye ay choung ?) of very clear but deep water, the banks of which were bordered by swamp forest in which especially *Ancistrocladus Griffithii* now in flower and fruit, was plentiful.

Then followed savannah forests of a rather peculiar character. The following are about all the trees I found along a line of about a mile in length : *Glochidion multiloculare ? Miliusa tomentosa, Zizyphus rugosa, Careya, Nauclea sessilifolia, Antidesma Bunias, Eugenia jambolana, Emblica, Butea frondosa, byu, Randia uliginosa, Barringtonia acutangula, Ficus Rumphii, Lagerstroemia flos reginae* ; of shrubs and herbs chiefly met with were wild sugarcane *Hygrophila salicifolia, Clerodendron Siphonanthus, Leea, Eragrostis, Premna amplectens, Fluggea, Melastoma Malabaricum, Ardisia Wallichii*, a climbing *Acacia* (suiji), the tomentose *Dioscorea, Jasminum scandens, Argyreia* sp., *Posoqueria, Briedelia scandens.* Towards the Pegu river yakatwa (*Bambusa spinosa*) appeared, but at Aweing on the Pegu river itself we entered cultivation and the rest of the march was chiefly through paddy-fields and endless villages until we entered the station of Pegu through that portion which was burnt down during the present hot season. From this place I sent my elephants to Rangoon along the Pegu road, while I engaged 3 Kala boats in which I embarked in the evening for Rangoon and arrived there the following day at $5\frac{3}{4}$ P. M.

17*th May*, 1871.—Having had brought my affairs into order during the preceding four days I went on board the S. S. "Busheer," which was to start early the next day, and arrive d at Calcutta on the 21st May, 1871

ERRATA.

In Appendix A. a gross error has crept in with regard to the beach-forests, which are all marked in the List as Aren. (*viz.*, silicious), while they should be marked Aren. Ca. *i. e.* calcareous sand. Further the following correction in the naming should be made :

p. xxvii.	No. 190.	Evodia triphylla, = E. Roxburghiana, *Bth.*
p. xxxi.	No. 224.	Melia Toozendan = Melia Birmanica, *Kurz.*
	No. 226.	Dysoxylon alliaceum = Dysoxylum procerum, *Hiern.*
p. xxxii.	No. 232.	Aglaia edulis = Aglaia paniculata, *Kurz.*
	No. 235.	Aglaia elliptica = Aglaia Griffithii, *Kurz.*
p. xxxiv.	No. 256.	Platea crassipes = Anacolosa crassipes, *Kurz.*
p. xxxv.	No. 263.	Evonymus garcinioides = Evonymus glabra, *Roxb.*
p. xxxvi.	No. 275.	Leea staphylea = Leea aspera, *Wall.*
p. xlii.	No. 321.	Semecarpus albescens. With this should be connected No. 322. Semecarpus heterophyllus (not of Blume) as a glabrous variety.
p. liii.	No. 393.	Read Acrocarpus "fraxinifolius" for "A. combretiflorus."
p. lxv.	No. 481.	Eugenia cerasoides, *Roxb.* Omit the synonym Syzygium occlusum, Miq., which is a distinct species.
p. lxxi.	No. 526.	Polyscias nodosa, correct into Arthrophyllum sp. ; the tree is indeterminable without flower or fruit.
p. lxxviii.	No. 576.	Psilobium capillare = Morindopsis capillaris, *Kurz.*
p. lxxxiv.	No. 623.	Mimusops Indica. The name should be changed into Mimusops littoralis, *Kurz.*
p. cxii.	No. 860.	Macaranga molliuscula = Macaranga Tanaria, Muell. Arg.
	No. 862.	Read cleidion "nitidum" for C. "lucidum."
p. cxvi.	No. 887.	Holoptelea integrifolia, Planch. Add : Ulmus integrifolia ; *Roxb.;* Fl. Sylv. Madr. t. 310.
	No. 892.	Solenostigma Wightii, Bl. Add. Sponia Wightii. *Planch. ;* Fl. Sylv. Madr. t. 331.
	No. 893.	Gironniera nervosa. Add Gironniera inaequalis, Planch. ; Fl. Sylv. Madr. t. 313.
	No. 895.	Gironniera, add the specific name cuspidata, *Planch.*, and add also Gironniera reticulata, Thw. ; Fl. Sylv. Madr. t. 313.

N. B. The corresponding corrections should be made also in the Keys of Appendix B.—Numerous additions of trees to the list cannot be given here, but they are taken up in the Forest-Flora of British Burma.

In the first part of the Report, in recommending the planting of Mahogany I was not aware, that a book exists specially devoted to the mahogany-tree, viz. Chaloner and Fleming. The mahogany tree in the West Indies and Central America. Liverpool, 1850, with 7 plates and map.

The book has not yet reached me, and, therefore, I cannot speak as to its contents.

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