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I.—*On certain Spiders which mimic Ants.*—*By* Surgeon J. H. Tull Walsh, I. M. S.

[Received 25th February; read 4th March.]

Whoever has studied the structure and habits of the various genera of the *Formicidæ* must have been struck by the "fitness" which these little creatures possess for "the struggle for existence." Even in those individuals with a rudimentary and useless sting there are still the powerful biting mandibles, the acid poison which can be ejected, often to a considerable distance, on to the enemy and various protective odours, such as those secreted by the anal glands of most of the *Dolichoderidæ*. The pangolin and other ant-eaters certainly cause havoc among the ants who make their dwellings in the ground, but smaller animals and birds cannot attack ants with impunity, and it is noticeable that the ants most frequently mimicked live and feed on trees. Such being the case the ant is well protected, and any other creature that, by an accident of natural selection, resembled an ant in form and colour would have obtained an advantage through this resemblance, all unconscious as regards the individual but conscious, if one may use such an expression, in relation to the orderly complexity of nature. The advantageous resemblance would, according to generally accepted laws, be transmitted and strengthened until the mimic reaped the full benefit accruing from its likeness to the ants among which it lived. Such instances of mimicry are seen among a certain sub-family of spiders,

the *Attidæ*. These spiders, ant-like in form, and partially ant-like in habit, do not spin webs for the purpose of catching prey, but, wandering about in company with the ants they resemble, spring upon their victims from behind, (hence called by some Entomologists *Saltigradæ*). Their home is generally fixed to the under surface of a leaf and consists of a small oval, whitish, silky nest just big enough to accommodate the spider. Attention has been drawn to the presence of these spiders in America* and Africa† ; Mr. Wood-Mason collected two or three specimens in Assam some years ago and Mr. Rothney‡ notes the occurrence of a *Salticus* in company with *Sima rufo-nigra* in the neighbourhood of Barrackpur. I have found these spider mimics in Orissa, and also in and near Calcutta, and have, during the last eighteen months, collected or acquired some eight or ten species or varieties belonging to genera of the sub-family *Attidæ*. With one or two exceptions all these spiders were found hunting with the ants they so closely resemble. The two most common are a variety of *Salticus formicarius* Linn. which mimics *Sima rufo-nigra* Jerd. and a pretty *Salticus* (sp. ?) which may be found in company with *Ocophylla smaragdina* Fabr. whose nests are extremely common on the trees in the Royal Botanic Gardens at Sibpur.

The resemblance in form and colour is so great that collectors have been deceived, and indeed except with a lens it is difficult often to say which is the ant and which is the spider ; but at the same time it must be remembered that the likeness is greater when both are alive and moving than when the dead spider is compared with the dead ant. While the body in most sub-families of spiders is short and rounded with a constriction only between the cephalothorax and the abdomen, the mimic has a long thin body like that of an ant. There is a partial constriction marking off the cephalic from the thoracic portion of the cephalothorax, and that part of the spider's body which joins the cephalothorax to the abdomen is drawn out into a pedicle having on its upper surface nodes mimicking closely those on a ant's pedicle. The colouring of the spider is also a more or less correct imitation of that of the ant. A superficial resemblance could hardly go farther, but there is a still more wonderful point to notice. The spider has four pair of legs and no antennæ; the ant has three pair of legs and a pair of long an-

* Bates, Trans. Linn. Soc. Vol. XXIII.

Belt "Naturalist in Nicaragua," p. 314.

Peckham "Protective Resemblances in Spiders." I have not been able to read this in the original and know of it only from references found in Poulton's "The Colours of Animals."

† J. P. Mansel Weale Nature Vol iii. p. 508.

‡ Jour. Bomb. Nat. Hist. Soc. Vol. V, p, 44.

tennæ which are generally kept in motion as the little animal runs along. In adapting themselves to circumstances, the spiders have learned to use their first pair of legs to represent antennæ. In all the cases that I have noticed, the spider when moving holds its first pair of legs aloft to simulate antennæ, and certainly in the case of a *Salticus* (sp. ?) which mimics *Camponotus micans* Mayr these legs are kept in continual motion. On one of the bottles presented to me by Mr. J. Wood-Mason I find the following note made at the time the spiders were captured :—

"(Cachar, J. W.-M.) smaller one mimics and runs about with a little brown ant carrying its palpi like the open mandibles of the ants, and its first pair of legs off the ground and elbowed, as the ants do their antennæ."

This note draws attention to another curious resemblance which is produced by the flattening of the terminal joint of the palpi. In the spider found by Mr. Wood-Mason and in several other species, this formation occurs and the falces, which are small, are partly hidden by the palpi. In other species and notably in *Salticus formicarius* the palpi are small and the resemblance to mandibles is produced by the large flattened first joint of the falces ; thus the same end, as far as the resulting mimicry is concerned, is attained by two very different morphological variations. Belt (*l. c.*) notices the fact that in the Nicaraguan species the fore-legs are raised from the ground and J. P. Mansel Weale (*l. c.*) makes some interesting remarks which I will quote. He says :—

"The most perfect cases of mimicry I know of are two spiders (specific nature unknown to me) which have the closest resemblance to ants. They belong to the *Salticidæ* and are apparently related to *Salticus formicarius*. The one is smooth black and shining and runs rapidly on the ground and bark of trees, and resembles the ant which builds its nest in *Acacia horrida* and is used by the Kafirs for the purposes of torture. The other is larger and has its cephalothorax dull black and its abdomen covered with short yellowish hairs. It is generally found running on the stems of herbaceous plants and small bushes and closely resembles an ant found in similar situations. The fore-legs in both species are larger than the second pair are frequently held up when they closely resemble the antennæ of ants."

As a general rule therefore most observers agree that the first pair of legs is used to simulate antennæ, but an exception must be noted. E. G. Peckham (*l. c.*) records that an American species *Synageles picata* "holds up its second pair of legs to represent antennæ." This peculiarity of habit has apparently produced or been produced by a change in the relative length of the legs in this species. The general

formula for the *Attidæ* seems to be 4, 1, 3, 2; the fourth pair of legs being the longest and the second pair the shortest. In *Synageles picata* the formula, to judge from a figure (*l. c.*), is 4, 2, 3, 1. *Synemosyna formica*, another American spider observed by Peckham, has the usual formula, but is said to use its second pair of legs as antennæ!

I have mentioned that the spiders are probably protected from birds and other enemies by their resemblance to ants, but there can be no doubt that frequently they also thereby gain another very considerable advantage. The ants with which these spiders "most do congregate" are fairly omnivorous feeders, but shew a decided preference for sweet juices often to be found exuding from trees, fruit or flowers. To these juices come also flies, small beetles and other insects which form the natural prey of the spider, and which do not, under the circumstances, particularly fear the ants. Thus while the flies are sucking up sweetness in company with the ants, the spider is no doubt able, under cover of his disguise, to approach near enough to make a spring upon his unsuspecting victim and fix his sharp falces into its body. As regards the ants themselves, they do not seem to take any particular notice of the spiders, and do not apparently attack them. One spider, a mimic of *Ocophylla smaragdina* was found by me in a nest of these ants with its little silky shelter attached to one of the leaves which formed part of the abode of probably the most fierce of all the ants found in Bengal. It may also be supposed that the spider does not attack or annoy the ants.

II.—*A List of the Butterflies of Engano, with some Remarks on the* Danaidæ.—*By* William Doherty, *Cincinnati, U. S. A. Communicated by the* Natural History Secretary.

[Received 21st February, 1891, read 4th March, 1891.]

(With Plate I, figs. 1—4.)

The long parallel lines of upheaval which characterize Burma are continued far into the Malayan region in the form of three great chains of islands and mountains. The most eastern of these, and the oldest, being chiefly composed of primitive rocks, consists of the Malay Peninsula, itself built up of several parallel ranges, the Riouw and Lingga groups, Banka and Billiton. The most western includes the Andamans and Nicobars, and the line of islands which may be called the Nias group, lying west of Sumatra, extending perhaps to western Java. Between these two the large island of Sumatra has been formed, probably in times geologically recent. No doubt some parts of Sumatra are composed of older rocks, but till the great volcanic up-

heaval occurred, its place was probably occupied by a few isolated islets, and to this day its fauna is chiefly made up of immigrants from the Malay Peninsula, and in the extreme south-west from Java, the number of endemic species being small. To understand the faunal relations of the Nias Islands, one must eliminate all idea of Sumatra from the mind. Until quite recent times, their relations were, I think, wholly with Java on the one side and the Nicobars on the other.

The Nias Islands lie like a broken breakwater along the western coast of Sumatra, in a line between five and six hundred miles in length, from Pulo Babi to South Pageh. They are separated from Sumatra by a deep channel nearly a hundred miles in breadth, but in two places more or less bridged by islands. Their united area is now only about 6000 square miles, equal to that of Yorkshire. But they seem to be the remains of a much larger mass of land. The deep sea that surrounds them swallows up all the alluvium from their streams; the tremendous surf on their western shore steadily undermines their hills, and under this process the islands have long been wearing away.

Engano lies much further south, and is wholly surrounded by deep sea, in which it might long ago have disappeared but for the coral reefs that protect most of its coast. It is only eighty miles from Sumatra, to which it has no faunal resemblance whatever. On the other hand, it is 180 miles from South Pageh in the Nias group, and 210 from Java. But on the side of Java there is only open sea, while on that of Nias there are three or four reefs and islets, and as might be expected from this, Engano may be zoologically considered as as an outlying member of the Nias group, with certain Javan affinities.

An excellent description of the people and products of Engano has lately appeared in the *Tijdschrift van Nederlandsch Indië*, but so little is said of the island itself, that I may be permitted a few remarks on the subject. The area seems to be incorrectly stated; it is about a hundred and twenty square miles. The eastern coast is low and flat, bordered in places by mangrove swamps. The western, where the hills attain a height of nearly a thousand feet, descends precipitously into a narrow lagoon filled with branching corals and coral-haunting fishes, and on the reef beyond, the surf of one of the bluest and deepest of seas beats continually with such violence that the whole island seems to shake under it. Engano seems now to be sinking; it has formerly been more or less submerged. A shell of coral rock covers almost the whole of it, thick over the eastern lowlands, thinning gradually to the westward, so that the streams generally break through it there, and flow through deep gorges. In some places the crust has given way so as to form deep little round dells, with stalactite eaves piercing their sides,

and a subterranean stream roaring at the bottom, hidden by dense vegetation. The people believe these places to be haunted by evil spirits, and when I wanted to be lowered into one to look for shells in the caves, they all objected most vehemently.

Beneath the coral, the rock seems everywhere a coarse, friable sandstone. If the Nias islands consist generally of this soft rock, it will go far to explain their present fragmentary state.

Until the present generation, the population consisted of a number of hostile tribes, and the older men are still proficient in the use of the spear, and delight in mimic battles and dramatic representations of the surprise of a sleeping enemy. In recent times native vessels have taken to coming to Pulo Dua, two small islands a mile or two off the western coast, for cargoes of cocoa-nuts, and it is probably the growth of this trade that broke down the tribal system. At present Javanese and Malays have now settled in several villages, though Pulo Dua still remains their headquarters, the plague of sandflies making life unendurable to them on the main island. It is to the trading vessels that the Enganese also owe the introduction of diseases that are rapidly killing them off. An outbreak of small-pox carried off all the inhabitants of the two villages near the southern end of the island, and to this day this district is called the Land of Ghosts, and no Enganese will set foot on it. No alcoholic liquors have been brought to Engano; whether this is owing to the precautions of the Dutch, or the religious scruples of the Sumatran traders, I do not know. But syphilis was introduced many years ago, and through it the race has lost all reproductive power. In some of the villages there are hardly any children, and the area of cultivated land decreases every year. The Dutch government, I believe, now contemplates leasing the island to capitalists, and in another century it seems likely that the natives will be entirely replaced by Javanese coolies working under European supervision.

The islanders are of about the same degree of civilization as the Nicobarese. Till lately they are said to have gone about almost naked, and their island is always called Pulo Telanjang or the Naked Island by the Malays. They grow no rice, nor do they make use of the pandanus and cycas as food like the Nicobarese. They make little temporary clearings, surrounded by a stout fence to keep out wild pigs. Their staple food is the taro or *kaladi*,* which they call *ayudapa*. They also have plantains, papayas and pumpkins, and eat quantities of cocoa-nuts, and drink the water in the nuts, the springs near the coast being usually brackish. They also draw toddy from the tree, though its use is not

* Our word *Calladium*, though it looks Greek enough, is derived from this, the Malay name of the plant.

habitual as in the Nicobars. They keep fowls and a few pigs, feeding both on cocoa-nuts, and are expert in spearing fish and turtle. Thanks to this abundant diet and the rarity of famines, they have lost the woodman's instincts, and are little better acquainted with the forest and its vegetable and animal products, than are the rice-growing Malays of Borneo and Sumatra, who scarcely know the names of the commonest trees.

Their origin will perhaps puzzle future investigators. Though their physiognomy is odd and characteristic, they seem to be more or less allied to the Nicobarese, but without the negrito strain which seemed to me obvious in some members of that race. The theory has been advanced that the Nicobarese are of Shan or Siamese blood, no doubt on philological grounds, as there is no personal resemblance. On the other hand, the Malays are physically almost indistinguishable from the Siamese, and may roughly be defined as a Shan people, just touched with Polynesian blood in a few localities, and speaking a Polynesian language slightly mongolized.

A list of Enganese words is given in the article I have mentioned. The enunciation is curiously different from the Malay, and is difficult to follow, the vowels appearing to be uttered in several different tones, as in Shan or Chinese. As in Nicobarese, euphony is spoilt by the excessive number of imperfect k's and ng's (the French *n nasal*). These consonants, which rarely occur in Polynesian languages, except the Malay, are generally absent in the personal and place-names, which usually have a strikingly Polynesian air. I spent much of my time at Kayapu, where Pahakela (the *p* is always pronounced halfway between a *p* and an *f*) was chief: the names would be natural in New Zealand or Hawaii.

There seem to be no indigenous mammals on the island except bats, wild pigs and a *Paradoxurus*. This absence of four-footed enemies may have been one cause of the excessive multiplication of birds. One sees more birds in a day in Engano, than in a month in Borneo or Sumatra, and coming from the latter island I was struck with their exceeding tameness. I saw four sorts of parrots and three of pigeons; the latter are never out of sight, the former keep up a deafening noise all day. The species seem generally different from the Sumatran, and no doubt some are undescribed. I think an ornithologist could do good work in Engano.

I think I got nine or ten sorts of land shells of which the greater number must be new. My small collections of moths and beetles were sent to England. The striking features of the latter were the prevalence of *Elateridæ* and the extreme rarity of *Phyllophaga*. No *Cassida* was taken at all.

Frogs, toads, snakes and lizards all abounded, and it is evident that the island has been at one time connected with the mainland, especially as a true cyprinoid fish appears to occur in the streams of the highlands. The coral crust does not imply the entire submergence of the island, while the number of peculiar butterflies shows its long isolation.

The forest is finest on the western coast, where the coral crust is thin or broken. The vegetation is there nearly as grand as on the mountain slopes of Sumatra. This side of the island is evidently very rainy. Even the comparatively barren eastern coast seems well suited to some plants, and in some places the pandani, which do not form thickets by themselves, as in the Nicobars, but grow among other trees, reach a surprising height, one I saw being fully a hundred feet high.

I caught fifty-eight kinds of butterflies, and saw two or three more on the day I landed. Three days of heavy rain followed, after which insects were scarce, and I obtained good sets of only a few species. The heavy forests of the interior scarcely produced anything but *Cyrestis periander*, *Mycalesis mineus*, *Amathusia amythaon*, *Eoöxylides tharis*, and *Paragerydus unicolor*. Most of the peculiar *Danaidæ* occurred only close to the shore. Examination of the inland forest at another season may produce true endemic species, such as have been found in Nias. Should any future collector visit the island, I recommend Bua-bua, near the western coast, as the best collecting ground, and April or May as the best season. My own visit was in September, 1890, and lasted three weeks.

The species are mostly local forms of widely spread species. I have felt obliged to give names to thirteen of them, including nearly all of the *Danaidæ*, and these should in most cases rather be called subspecies than species, but as I always give the name of the parent form, this ought to cause no difficulty. My types will be placed in the collection of the Hon. L. W. Rothschild. I have endeavoured to make in the text such comparisons as I could with the species taken by Herr Kheil in Nias, but I find it difficult to sum up the results.

While I have a few criticisms to make on Mr. Moore's well-known monograph of the *Danaidæ*,* I do not wish to appear ungrateful for the help he has there given to all students of this group. Though some have objected, he seems to have done right in giving names to the numerous subdivisions he has made. At the same time, most of them seem scarcely worthy of a higher rank than that of subgenera, and some are founded on minute and unreliable characters.† His classification

* In the Proceedings of the Zoological Society for 1883.

† Such as the rudimentary recurrent vein in the cell of the forewing, a feature

is dubious, and some of his species worse than dubious. But in any case he has let a flood of light into one of the darkest corners of entomology, and all future work in this family must start from his as a base.

I do not see any reason for accepting his term *Euplœinæ*, instead of the commonly received *Danaidæ* or *Danainæ*. The name *Danaus* necessarily falls, having been used for *Pieridæ*. But *Danaida* and *Danais* are both older than *Limnas*, and there can be no similar objection to them. Mr. Scudder, with his usual conscientiousness, has adopted *Danaida*, the earlier of the two names. But I think his verdict may be reasonably traversed on the ground of the irregular formation of *Danaida* and the universal use of *Danais*. It can hardly be seriously maintained that the latter name cannot be used on account of its resemblance to *Danaus*. So the group obviously remains the *Danaidæ* (or *Danainæ*), the genus *Danais*, and its type *plexippus*,* *Anosia* falling before it.

Mr. Moore's primary division of the family is into two groups, the *Limnaina*, including *Danais* and *Hestia*, and the *Euplœina* including

which seems to vary in different specimens. *Mahintha* was founded on a local race of *Euplœa core*. *E. simulatrix* was placed first in *Vadebra* (*Crastia*) and then in *Menama*, though it obviously cannot come into either, or into the "section" in which both are placed.

* The name now applied to a butterfly known to every American farmer as *archippus*. These useless changes of name now so much insisted on, especially by American naturalists, are bringing scientific nomenclature into well-deserved disrepute among all outsiders. Surely there ought to be a statute of limitations; security that some one, turning over musty volumes of pre-scientific times, shall not make all existing works obsolete. At present we stop short at Linnæus. This is purely an arbitrary line. The next generation will perhaps go back to Ray and Swammerdam; with the aid of a little zeal and imagination quite a number of generic names can be found in their books. The first false step taken was the acceptation of Hübner's childish work as an authority. There was *Adolias*, a genus described by such a profound and discriminating writer as Boisduval, and accepted by all naturalists. Finally, some one discovered that a few years before the date of Boisduval's great work, Hübner, a contemporary, not of Linnæus, but of Latreille, had invented a genus *Euthalia*, described merely as "dark with white and red spots," containing *lubentina* and *adonia*, and placed in an imaginary family, prettily named *die Fröhliche* or The Joyful Ones. *E. aconthea*, and *E. evelina* (the latter along with an African *Aterica* and a European *Apatura*) were at the same time placed in different genera of another imaginary family called *die Muntere*, or The Lively Ones. And so, to the confusion of naturalists all over the world, *Euthalia* took the place of *Adolias*. Lepidopterists have yielded to an infinity of similar changes. It remains to be seen whether coleopterists will be equally submissive. Mr. Crotch now proposes to alter the names of a number of the best-known genera of beetles, names consecrated by a century of use. I cannot help wishing his opponents all success in the struggle against *ce malencontreux droit de priorité*, as M. Deyrolle calls it.

Euplœa and *Hamadryas*. The only difference mentioned, is that in the former there is usually a precostal cell in the hindwing, wanting in the latter. Now, it is true, an obscure rudiment of one is present in some species, but better distinctions can easily be found. *Hamadryas* probably does not belong to this family, but to the *Neotropidæ*.* *Hestia* has undoubted affinities with *Danais* in its neuration and markings, but in its anal tufts, its egg, and the structure of its feet, it is more like *Euplœa*, while its antennæ show how remote it is from either. So I would suggest the following classification instead of Mr. Moore's.

Tarsi with large paronychia and pulvillus. Anal tufts two or four.

Antennæ filiform, Hestia *Group.*

„ *clavate*, Euplœa *Group.*

Tarsi with rudimentary paronychia and pulvillus†. *Anal tufts two.*

Danais *Group.*

Mr. Butler, to whom we owe the classification of the *Euplœas* by the male marks, accepted, as all previous writers had done, Cramer's *core* as the type of the genus, and formed the genus *Macroplœa*, with *elisa* as its type, applying Hübner's name *Crastia* to *climena* and its allies. This arrangement has been generally adopted, and it is most unfortunate that Mr. Moore should alter all three names on what may be called archæological grounds. *Core* has been accepted for a century as the

* I do not know whether Schatz's name can stand, as it is not derived from that of any genus, and has no type. The name *Erycinidæ* has been dropped by some writers for this reason, the generic name *Erycina* having been superseded.

† The appendages of the last joint of the tarsi of butterflies are, 1st, the claws, 2nd, the paronychia, 3rd, the pulvillus with its shield. The *paronychia* are tactile organs, one on each side of the foot, slender and flexible (not jointed as some writers have said), covered with short sensitive hairs or *papillæ*. In most cases they are split into two long finger-like process, the longer following the course of the claws, the shorter curling round the edge of the pulvillus-sheath, obviously with the object of examining the surfaces touched by these two organs. The *pulvillus* is a soft, muscular projection, resembling an additional tarsal joint, but not armour-clad like the others. It is evidently intended to act as a buffer, to break the shock of alighting, and no doubt owes its name *pulvillus*, or cushion, to this function. Its lateral surface is sensitive, with papillæ like those on the paronychia. But its lower surface is covered with a round corneous plate, or shield, which no doubt acts as a *sucker*, flexible in life, slightly concave in the middle. This is easily detached in dried specimens.

Now in certain butterflies of aërial habits like *Danais*, the claws have been greatly lengthened, so that the pulvillus did not touch the surface on alighting. Thus losing all function, it has shrunk into a small, hard, inflexible mass. The paronychia have similarly lost their use, and remain in various stages of obsolescence. They are still distinct in *Ideopsis*, and retain their bifid shape, though too small to be of use.

type of *Euplœa*, and although it would be more pedantically accurate to follow Fabricius rather than Cramer, it seems a pity to confine the use of *Euplœa* to two or three species (with their local forms) forming a small aberrant genus, now well-known as *Macroplœa*, while hundreds of species cluster around *core* as their natural type and centre. *Macroplœa* (Mr. Moore's *Euplœa*) is a true genus, and must be ultimately recognized as such. But unless we accept M. Moore's little groups as genera, we must find some general name for the large mass of species remaining. It is unlikely that naturalists will consent to call them all *Crastia*. Surely they had better keep the name of *Euplœa* as before, with *Crastia* (= *Vadebra*,* Moore) as a subgenus under it.

As to the position of the family as a whole, I understand that Mr. Scudder now gives it a low one, below the *Apaturidæ*, *Nymphalidæ* and *Satyridæ*. Much, however, may be said in favour of retaining it at the head of butterflies. The shoulder plates are in most butterflies shaped more or less like a human foot as seen from the side, having a long posterior process. It is only in the *Danaidæ* and the *Acræidæ* that they are simply semicircular in shape (in the *Danaidæ* more than half a circle) without the posterior process. The process is also greatly reduced in *Cynthia* and *Cethosia*, the nearest genera of the *Apaturidæ*, while in the lower forms of the *Tetrapoda*, the plate greatly resembles that of other butterflies. The long claws of the *Danaidæ*, culminating in *Danais* with its aborted paronychia, may also show a higher development than other Tetrapoda. But they are also found in the Papilios, and seem to go along with a prolonged and aërial flight. The fore-feet of the male still retain the tarsus, which is lost in most *Neotropidæ* (*Ithomiadæ*), but it is less developed than in the *Morphidæ* and most other higher butterflies.

The striking feature of the *Danaidæ*, however, is the more perfect development of the fore-feet of the female into sensory organs much resembling the antennæ, but set with highly specialized tactile hairs or papillæ.† I have taken a good many notes on this subject, on which so far as I know nothing has yet been written, and when they are more complete, I hope to publish them. So far as examination has yet shown me, there seems to be a gradual development upwards from the *Morphidæ*, in which the joints are tapering, the last the slenderest, with a conspicuous pulvillus and rudimentary claws with their appertaining hairs. In the higher groups, these tarsi become less and less like a foot, and

* Mr. Moore applied this name to two different genera of butterflies in the same issue of the Proceedings of the Zoological Society.

† These also occur in all Tetrapoda, and in some other groups, as the *Nemeobiadæ*, but are there few and small.

more and more like a palpus. The *Satyridæ* and *Nymphalidæ* are more developed in this respect than the *Morphidæ*, and the *Apaturidæ* much more. The *Neotropidæ* according to Mr. Godman have the fore-tarsi of the female not clavate, and hence probably less developed. In the *Danaidæ* and the nearest *Apaturidæ* (*Cethosia* and *Cynthia*), they attain their largest development. This can hardly be an organ of touch, because these feet are poorly provided with muscles, and are capable of but little movement. It may be an organ of hearing, but it is more likely one of smell, correlated with the scent-producing glands of the male. It is significant that in the *Neotropidæ*, where this foot is more normal, the male has no anal tufts.

I think the special development of this organ, which is found in all Tetrapod butterflies, though but little specialized in the lowest, is an argument for the high rank of the *Danaidæ*. But I am aware that the feet of of butterflies often vary most irregularly, independently of the general organism. The aborted forefoot of the male shows some such inconsistencies, rudiments being, as Darwin has shown, eminently variable. *Melanitis* and *Bletogona* in the *Satyridæ*, many *Pieridæ*, and at least one genus of the *Lycænidæ* have the claws bifid. The number of joints in the forefeet of female Tetrapods also varies. And in *Pseudergolis*, a genus of the *Apaturidæ*, differing but little from its neighbours in other points, the fore-tarsi of the female, though small, are quite perfect, with claws, pulvillus and bifid paronychia. This fact would place it quite outside of the Tetrapod butterflies, near the *Nemeobiadæ*, if the feet offered really reliable characters.

The prehensors of the *Danaidæ* are chiefly remarkable for the aborted uncus and the broad flat clasps. They do not vary much in the different species; most in *Hestia* and some kinds of *Danais*. My notes are insufficient to permit me to generalize on the subject. It is remarkable that the only species in which they are really very aberrant is *Danais aglaioides*, where the clasps are prolonged downwards, and exposed to view even in dried specimens. This butterfly is closely allied to *D. aglaia*, differing chiefly in the shape of the wings, and they are found together over much of their range. It seems likely that in this case the prehensors have been strongly differentiated to prevent hybridism, and keep the species separate.*

* This may also be the case with the genus *Lampides*, where a number of protected species, remarkably alike in colour and markings, have the prehensors extremely unlike, and so differently armed with hooks and pincers, that the union of different species would presumably bring about serious consequences. Great confusion has been caused here by the German lepidopterists, who have recently figured a great many species with very brief descriptions, and no account of the prehensors. The

The egg also varies little in the *Danaidæ*, and affords few characters for classification. It is slightly like that of *Libythea* (which more resembles that of the *Pieridæ*), and is nearly identical with that of the *Acræidæ*, and with those of *Cynthia* and *Cethosia*, the first genera of the *Apaturidæ*, which are again connected by several links with *Argynnis*, where the series seems to end. In the *Danaidæ* it is large, soft, cartridge-shaped, more than half again as high as wide, yellowish, or sometimes pearl white. It has a variable number of upright ribs anastomosing near the apex (where the reticulations are more or less hexagonal over a varying extent of surface), and with horizontal cross-lines varying greatly in number and in distinctness, and generally hard to count. I append a list of species with the number of vertical ribs on the egg of each, and with that of the cross-lines in parenthesis, whenever I know it. The numbers always vary slightly in the same species, and that of the cross-lines can only be given approximately. The egg of *Nectaria* and *Macroplœa* I forgot to examine. That of *Hestia* is unlike the others in having the reticulations more or less hexagonal, the ribs being slightly zigzag. The figures support the idea that *Hestia* is nearer *Euplœa* than *Danais*. It will be observed that in *Danais* (including *Ideopsis* and *Radena*, which are practically identical) the cross-lines are usually more numerous than the ribs, while in *Hestia* and *Euplœa* they are fewer, *Stictoplœa* coming near *Hestia* in this respect, as well as in the anal tufts. The figures for *Danais chrysippus* and perhaps *limniace* and *tytia* are doubtful.

Hestia *Group.*	*Hestia cadellii,*	21 (14).
	hadenii,	23 (14-15).
	lynceus,	21 (14).
Euplœa *Group.*	*Stictoplœa lacordairei,*	27 (13).
	Salpinx novaræ,	26.
	kollarii,	22-23 (20).
	splendens,	22 (18-19).
	Euplœa esperii,	26.
	camorta,	31.
	simulatrix,	30.
	core,	34 (23-25).
	midamus,	24-25 (20).
	alcathoë,	39 (26-27).
	rhadamanthus,	21-23 (15).
	pinwillii,	26 (18).
Danais *Group.*	*Danais genutia,*	32 (30).

revision of this genus, which is further complicated by the prevalence of local and seasonal forms, will prove a heavy task to future naturalists.

Danais	*hegesippus*,	31-34 (29-30).
	nesippus,	34.
	chrysippus,	34 ("nearly 50" ?).
	gautamoides,	23-24.
	limniace,	25 (25).
	septentrionis,	19-21 (30).
	melaneus,	16-18 (27).
	larissa,	20-21 (30).
	tytia,	20-21 (38).
	melanoleuca,	19 (22).
	aglaia,	17 (26-27).
	aglaioides,	15-16 (25).
Ideopsis	*daos*,	15 (25).
Radena	*nicobarica*,	16.
	vulgaris,	14-16 (25).

Next comes the vexed question of scent-glands. I was so discouraged by the loss of all my notes on this and other structural matters in 1887, that I have taken but few since, so I cannot now speak with much authority on the subject.

It seems probable that there is a disagreeable odour in all *Danaidæ*, apart from that of the anal tufts and alar glands. Though infinitely less in strength than it is in the *Agaristidæ* and other moths, it is still quite perceptible on pinching some species, such as *Danais genutia*, *crocea* and *vulgaris* (which smells of sorrel). In others I cannot make it out at all. This smell is probably associated with a taste highly disagreeable to spiders, chickens, etc. The results of my experiments made some years ago in the Celebes, Java, etc., are now lost, but in the Malay Peninsula I lately made a few on spiders, with the following results. Except in the case of the first two species, they cannot be entirely trusted.

Species always rejected, *Danais genutia*,
Radena vulgaris,
Ornithoptera ruficollis,
(only two offered).

Species sometimes rejected, *Euplœa midamus*;
„ *rhadamanthus*,
Neptis varmona,
Cethosia hypsina,
Loxura atymnus,
Lampides ælianus.

Species never rejected, *Neptis* sp.
Athyma sp. etc.

It is to be observed that the *Radenas* are perhaps the most perfectly

protected of the *Danaidæ*, and yet they are not brightly coloured, they have no alar scent-glands, and the anal tufts are the smallest in the whole family, and give the least fragrance.

Apart from those producing the odour pervading the whole body, four different classes of scent-glands have been pointed out.

The first are the impressed silky streaks of altered scales on the forewings of some *Euplœas*, often called *brands*. Mr. Distant oddly enough calls these pseudo-scent-glands, taking the falsity of their claims for granted, while assuming to leave the question open. The marks in question seem to consist of scales only, and I have not yet observed any glands connected with them. Though not very conspicuous in some cases, they may be addressed to the eye of the female, and help her to recognize the male of her species. For odours vary but little in the *Euplœas*, and the amount of mimicry is so great that in most localities there are several species similarly coloured but bearing different sex marks. In any case these brands can hardly be protective, and the assumption by some writers that a species furnished with them is better protected, and more likely to be a mimicked than a mimicking form, is without foundation.

The variously-coloured velvety patches on the hindwing of *Trepsichrois*, *Salpinx* etc., are no doubt true scent-organs. In the case of *Trepsichrois midamus* the odour is sometimes quite perceptible in the detached hindwing, while in *Salpinx* and *Calliplœa* it is apparently excited by friction against the forewing. In some cases, such as *Euplœa oceanis*, described below, the velvety area is on the underside of the forewing.

The "pouches" on the hind-wings of certain species of *Danais*, such as *D. limniace*, are probably true scent-organs, though neither Professor Wood-Mason, who has given them special attention, nor myself, have been able to detect any odour. He has kindly shown me a microscopic section of the pouch. The cavity is lined with a semicircle of long cylindrical cells radiating from it, their nuclei near their inner ends, the outer wall of the mass thick and chitinous, the inner membranous, with the attached scales aborted. According to Professor Wood-Mason, the odour-giving fluid is presumably manufactured in these cells, and not merely drawn from the body and stored in them. An account of these pouches, apparently made from the study of dried specimens, has appeared in the work on the "Duftapparate indo-australischer Schmetterlinge," by Dr. Erich Haase of Dresden.

Finally there are the abdominal tufts which we find in this family alone of all butterflies. They resemble those of the *Callidulidæ*, but are more specialized, though proportionately smaller than in these and

many other moths.* They exist in a very rudimentary state in the female, and can as in the male be forced to the surface by the action of the fluids in the body. From some such small beginning, they have grown to their greatest development, several stages of the process remaining as fixed characters in the different genera. The smallest tufts occur in *Radena vulgaris*; they are much longer in *R. juventa*. The greatest development of simple tufts occurs perhaps in *Euploea* (*Trepsichrois*) *midamus*. In all the species of the *Danais* group the tufts are simple and single, only in *Tirumala* the hairs are curled at the tips. They are also simple in the majority of the old genus *Euploea*, and I limit the name to these. The gland in all these consists, when protruded, of a finger-like projection extending laterally on each side of the abdomen, and bent round forwards (*i. e.*, towards the head) in a semicircle, bearing long odoriferous hairs to the very tip.

But in the genus *Salpinx*, as limited by Mr. Butler (including Mr. Moore's *Salpinx*, *Isamia*, *Pademma*, *Satanga* and *Selinda*, but not apparently *Danisepa*), and also in his genus *Calliploea*,† while the gland is similar (somewhat longer and more bent), the long hairs are gathered chiefly around its base, the outer part being naked, except at the extreme tip, where there is a brush of short, stiff bristles, sometimes coloured differently from the long basal hairs. This terminal brush is only seen when the gland is fully protruded. The development of this form from the first is obvious. This group is also large, but the number of species seems to me to have been greatly exaggerated.

In more advanced forms, a new gland, generally somewhat shorter than the other, has been pushed out from its hairy base on the anterior side. In this case both glands are covered with hair to the tip, the space between their bases being naked. This occurs in the genus *Hestia*, and apparently also in *Macroploea* and *Stictoploea*‡ as defined by Mr. Butler.

Finally in the single genus *Nectaria*, while the posterior tuft remains unchanged, the anterior or last developed one is again absorbed, and is represented by a microscopic tuft at the base of the other. This can hardly be the incipient stage, as it is too small to be of any use, and the nature of its origin is obviously as given above. It hence appears

* In most moths these tufts are attached to the prehensors or clasping-organs of the male.

† Herr Georg Semper and Dr. Haase consider *Calliploea* identical with *Euploea* (*i. e.*, *Macroploea*), but I cannot agree with them. *Calliploea* scarcely differs from *Salpinx*.

‡ My drawings of the glands of *Macroploea* and *Stictoploea* were lost in 1887, and I have not examined those organs since. But my impression is that they are very similar to those of *Hestia*, though somewhat less developed.

that *Nectaria* has attained the furthest development in this regard, and may still with good reason be retained at the head of the *Danaidæ*, and of all butterflies.

The following scheme will serve to show the relations of the genera of this family. Mr. Moore's genera may be reduced to subgenera, though *Parantica* and perhaps one or two others may be retained.

A. *Feet with well-developed paronychia and pulvillus.*
  B. *Forewing with a prediscoidal cell.*
    C. *Anal glands four, two aborted,* ..... NECTARIA.
    C. *Anal glands four, none aborted,* ..... HESTIA.
  B. *Forewing with no prediscoidal cell.*
    C. *Glands four (?), none aborted.*
      D. *Forewing of male with no brand,* ... MACROPLŒA.
      D. *Forewing of male with two brands,* ... STICTOPLŒA.
    C. *Glands two, tufts four,* ..... SALPINX.*
    C. *Glands two, tufts two,* ..... EUPLŒA.
A. *Feet with rudimentary paronychia and pulvillus.*
  B. *Hindwing triangular, with scent-pouches,* ..... DANAIS.
  B. *Hindwing triangular, without scent-pouches,* ... RADENA.
  B. *Hindwing rounded, generally without scent-pouches,* ..... IDEOPSIS.

There seem to be grounds for believing that the scent-tufts in the male serve three distinct purposes, 1st, to warn off enemies, 2nd, to attract the female by colour, 3rd, to attract her by odour.†

1st. The odours given forth are in some cases unpleasant. In *Danais limniace*, it is that of turmeric, and is downright disagreeable. Other species of *Danais* have the peculiar aromatic fragrance characteristic of so many protected Mediterranean plants. In the genus *Salpinx*, in which the tufts reach their greatest development in size, the odour, though exceedingly sweet, is almost overpowering. Now it may at first sight seem absurd to say that the scent of honey may protect an insect from its enemies. But we know this to be sometimes the case. The male of the singular Hesperian, *Calliana pieridoides* has assumed conspicuous white colours along with a delicious odour, the female remaining dark and odourless.‡ The fine Malayan Morphid,

* Including *Calliplœa*.

† The odour is not always present, but comes and goes, whether by the exhaustion of the supply, or by the will of the insect, it would be interesting to learn. I have sometimes examined the tufts of several males one after the other, without detecting the perfume.

‡ Mr. de Nicéville recently discovered the female, and it turned out to be dark, as I had predicted.

Melanocyma faunula, is saturated with sweet perfumes, and drifts feebly about the country, fearless of enemies. The fragrant butterflies of the genera *Stichophthalma* and *Tænaris*, though no doubt not so completely protected, are so conspicuously coloured and fly so feebly, that one cannot suppose them to be eaten by birds. The *Ornithopteras*, though I have shown by experiment that they are protected from some enemies, smell of nothing worse then petunias. I have heard that cattle will not touch peppermint or pennyroyal, though the scent of those plants is so pleasant to us. On the whole I do not doubt that slow-flying, brilliantly-coloured insects like *Trepsichrois* and *Salpinx* are more or less protected by their scent-tufts.

2nd. Colour in the tufts seems a later development than odour. In *Radena*, where they are least developed, the tufts are of very inconspicuous hues. In *Danais* they are usually not at all brilliant, though it must be admitted that the odours are also less developed in these. But in some species the hairs are curled,* and this may be an ornamental development. In the *Euplœas* the growth of colour and odour go on *pari passu*. The brilliant ochreous tufts of *Trepsichrois* contrast finely with the black and shining blue of the wings, and are visible from a long distance. This colour appears in a great many species. In *Salpinx* the tufts are still larger, and the small terminal pair are frequently coloured differently from the others. In *Hestia* the anterior tuft seems usually coloured otherwise than the posterior, though in *H. cadellii* they are both dull grey.

3rd. The great majority of the family smell of honey or of flowers—vanilla, tuberoses, jasmine, etc., and outside of the *Danais* group, the only aberrant perfume I can remember is that of wintergreen,† which is also found in butterflies of other families, and in Pyralid and Geometrid moths. But honey- and flower-like smells are the rule. This suggests the possibility that the odour-producing particles may not be manufactured by the insects, but be derived directly from the plants they frequent. At any rate the attractive scent must often be identical with that of the flowers on which they feed. So that it does not seem incredible that the female should sometimes be wooed under false pretences, and led to expect a dinner instead of a lover.

Male *Euplœas* often meet in great swarms, haunting some particular spot in the forest for many successive days, some perching on leaves and flowers, but most circling slowly around, many of them displaying their tufts, so that the air is noticeably permeated with their fragrance. Many different species meet on these occasions, as if recognizing the

* This is also the case with a few *Euplœas*, such as *alcathoë*.

† The same smell is given out by several tropical plants.

family relationship of all. The females may at the same time be lurking hard by in the jungle, though in smaller numbers, a few of them sometimes joining in the flight of the males. I have often observed males flying alone with expanded tufts, and I suppose they are trying to attract the female from a distance, appealing rather to her sense of smell than that of sight. In the presence of the female, the male keeps his tufts in continual action, and whether of dark or bright colours, they may well be as attractive to her eyes, as the plumes of the cock grouse or peacock are to his hens. The eyes of butterflies are so prominent, that though the female never faces the male, but keeps gliding on just before him in coy retreat, I cannot think that any grace of his escapes her notice. But her sight is probably not so strong as to recognize these ornaments at a great distance. So that the attractive colours are presumably intended to take effect at close quarters only, while with a favourable wind the odour is no doubt perceptible far away. I myself cannot generally make it out more than two or three feet away. But the forefeet of female *Danaidæ* seem to be developed into a powerful organ of smell, and even apart from this, that sense must be keen in all butterflies, since they are attracted from long distances by the scent of flowers. And few flowers are so fragrant as these insects.

List of Enganese Butterflies.

Family Danaidæ.

1. Nectaria leuconoë, Erichson, var. engania. This slight variety seems darker than the typical *N. leuconoë*, as figured by Doubleday, just as *N. clara* (as figured by Herr Semper) is much lighter. The base is but slightly touched with creamy, and more so in the female than in the male. The dark lines in the cell of the forewing are distinct, the black transverse area there narrower and more quadrate than in *leuconoë*, the discal dark markings are more connected, and those on the hindwing are more triangular, the wedge-shaped white spot near the lower angle of the forewing is distinct, and in general the markings are very clearly cut and distinctly outlined. The male has two large whitish abdominal tufts, each with a minute rudiment of another near its outward base.

2. Macroploea corus, Fabricius, var. micronesia. Somewhat resembling *M. corus* (*clisa*), with the size and shape of *M. phœbus*. Male, forewing with the spots minute, one in the cell, seven in a bent discal series, and ten submarginal dots. Hindwing with two or three discal, and one or two subapical dots. *Below*, forewing with a dot in the cell, two large discal spots with a dot below them, two subapical dots, and

a submarginal row of thirteen dots. Hindwing with three discal dots subapically, and four or five submarginal ones. The single female has the spots still fewer and less conspicuous, the submarginal ones wanting except at the apex.

As I took only two or three specimens, I can hardly describe this form as a distinct species. It seems greatly to resemble *M. semicirculus* from the Moluccas. The extreme smallness of the spots easily distinguishes it from *M. phæretena*, described by Herr Kheil from Nias. *M. phæretena* (the name was perhaps intended as an anagram of *phænarete*) seems to be simply the female of *M. phœbus*, which he also includes in his list of Nias butterflies.

3. Salpinx phane, n. sp. Male, above rich velvety blue, resplendent in some lights, the hindwing nearly equally brilliant, whereas in *S. novaræ* and *S. vestigiata* it is all brown. Forewing, with one costal and the usual interno-median pale blue spot, and a row of seven outer-discal ones, of which the first three are united, the third the largest. Hindwing generally with two subapical spots. *Below*, rich violet brown; the spots are sometimes wholly wanting in both sexes, but generally one or two remain subapically on the hindwing. The male before me has five subapical spots in two series on the forewing and four larger ones on the hindwing. The larger tufts are dark brown, the small terminal ones whitish. The female is less richly coloured, the hindwing being brown: there are two elongate blue spots in the interno-median space of the forewing above.

This is a local form of *S. leucostictos*, Gmelin, but it seems more distinct from the Javanese type than are either the Malaccan (*vestigiata*) or the Nicobarese (*novaræ*) forms.

4. Euploea (Trepsichrois) malakoni, n. sp. Male like *E. mulciber* but with the hindwing blue like the forewing, though less brilliant, whereas in the other species it is brown. The odoriferous patch on the hindwing occupies all the end of the cell, extending to the upper median vein. The pale blue spots of the forewing, though variable, are few and inconspicuous; in the specimen before me there are only nine in all, some very minute. The female varies greatly in the distinctness of the spots, but in all cases the forewing has no trace of blue, which distinguishes it from the other local forms of *E. midamus*. Tufts bright yellow.

5. Euploea (Crastia*) enganensis, n. sp. It greatly resembles

* Mr. Moore's *Vadebra*.

E. climena from the Moluccas, and is near *E. sepulchralis*, Butler, from Java, but with the forewing imperceptibly paler outwardly, while the hindwing is very distinctly so, both above and below. Both sexes are rich brown above, without any trace of blue; the female has a single whitish spot in the middle of the disc. *Below*, there are usually on the forewing, one large violet-white spot in the cell, two or three subapical dots, two submarginally in the median spaces; five discal ones, the lower two larger and quadrate, the middle one slender, the upper two usually minute. *Hindwing* with one spot in the cell, a semicircle of six beyond it, then a curved series of about eight, (those below the middle median vein minute or wanting), and four submarginal spots near the apex, occasionally five or six. Tufts bright ochre.

This common species outwardly resembles *Euploea simulatrix*, Wood-Mason, from the Nicobars, which, however, has a large sex-mark, somewhat as in *Salpinx*, on the hindwing above. Mr. Moore placed this species first in *Vadebra* (*Crastia*) and then in *Menama*, where it certainly does not belong.

6. Euploea (Crastia?) oceanis, n. sp. Male. Above dark brown with dull bluish reflections in some lights, the margin not visibly paler. *Below* uniform dark violet-brown, the markings varying greatly, most of them elongate but small. Forewing with one spot in the cell and seven beyond it, the upper ones slender, sometimes minute; a line of five outer-discal spots, the upper ones frequently absent; the female has sometimes a sixth spot in the interno-median space, beyond the line of the others. Hindwing with a small spot in the cell, and a row of 6-7 larger ones beyond it, and then a very variable series of 5-10, all but the first (which is sometimes absent) forming nearly a straight line: beyond these there are generally a few submarginal dots, sometimes forming an irregular line of ten.

The female has an obscure whitish spot in the cell of the forewing above, and seven similar ones beyond it, the upper ones slender. Beyond this the outer discal spots are slightly indicated. Hindwing with the outer discal line of spots indicated in various degrees.

The form of the wing in this species is as in Mr. Moore's genus *Gamatoba*, but the sex-mark is peculiar. The female has an elongate white mark on the underside of the forewing, below the lower median vein. Both sexes have the hind margin broadly whitish and shining below the internal vein. In the male there is a slightly velvety grey-brown patch of altered scales forming an elongate, quadrate mass, from the internal vein nearly to the lower median, equally divided by the wrinkle representing the submedian vein.

This species can scarcely be included in any of Mr. Moore's subgenera, and I know no described form resembling it. It was unluckily out of season when I was in Engano, and I only got two or three in fair condition, the rest being worn and faded.

7. Euplœa pahakela, n. sp. Male, above, forewing rich brown, not at all lighter outwardly; hindwing paler brown, slightly darkening near the margin; a single "brand" like that of *E. core;* no other markings above in either sex. *Below* there is a rounded violet white spot in the cell, and a larger pinkish one in the lower median space, one in the upper median space, and sometimes one in the space above. Hindwing with a small spot in the cell, and 3-5 minute ones beyond it. There are sometimes traces of obscure subapical and subanal dots. Tufts bright ochre. The female is very pale brown and remarkably translucent; it has a long white streak below the lower median vein on the forewing below.

This species seems to have no near allies except *E. camorta*, Moore, from the Nicobars, which obviously differs in the pale borders of the wings.

Besides the *Euplœas* mentioned, I believe I saw a species of *Calliplœa*, near *mazares*, flying at Kayapu on the day of my arrival.

The *Euplœas* of Nias, as described by Herr Kheil, differ greatly from those of Engano; there can hardly be more than one species (a *Salpinx*) common to both. I append the list.

Nias.	Engano.
Macroplœa phœbus.	*Macroplœa micronesia.*
„ *phœretena* (♀ of preceding?)	
Euplœa (*Tronga*) *niasica*	.....
„ (*Trepsichrois*) *verhuelli.*	*Euplœa* (*Trepsichrois*) *malakoni.*
„ (*Penoa*) *menetriesii.*	.....
.....	*Euplœa* (*Crastia*) *enganensis.*
.....	„ „ *oceanis.*
.....	„ *pahakela.*
Salpinx leucostictos (perhaps the same as *phane*).	*Salpinx phane.*
„ (*Isamia*) *lowii.*	.....
„ „ *staudingerii.*	.....
„ (*Tiruna*) *ochsenheimeri.*	.....
.....	*? Salpinx* (*Calliplœa*) *sp.*

The absence of the true *Euplœa* (*Core* group) and of *Crastia* (*Climena* group) from Nias, and of *Tronga* and *Isamia* from Engano, are interesting.

8. Danais pietersii, n. sp. Pl. I, Fig. 1. Male and female, above black, forewing with the lower part of the cell, the basal part of the lower median, and the greater part of the interno-median space dull ferruginous, the veins black. Margin touched with white at intervals; a line of four submarginal white dots in the median spaces; another larger and diffused near the lower angle; an inner line of seven white marks, of which the pair in the upper median space is of some size, the other dots: a subapical band of six widely-separated diffused whitish spots from the costa, the lower two largest; below these two obscure spots in the upper median space. *Hindwing* black, a large, pale ferruginous area in the cell, and others in the submedian and internal spaces extending three-fourths towards the margin; shorter, slender ferruginous streaks in the other discal spaces: two lines of submarginal whitish dots mostly obsolete, more distinct in the median spaces; cilia alternately black and white. *Below*, similarly marked but with the spots more distinct and numerous and violet-white instead of whitish; the lower part of the forewing ferruginous, the apex, as well as the outer part of the hindwing, suffused, with dull, dark reddish, which takes the place of the black. *Hindwing*, with pale ferruginous areas in all the spaces, most of them bordered with silvery white, the veins dark; the two submarginal series of the white spots distinct and complete. In some specimens the cell is nearly white, the inner ferruginous area evanescent.

I am not able to compare this species with *D. eurydice* from Nias, but judging from the forms with which Mr. Butler compares it, that species is without the ferruginous areas on the hindwing above.

I name this for my kind friend Mijnheer Pieters, Controleur of Kroë in Sumatra. It is a common and conspicuous species in Engano, whereas Herr Kheil describes *D. eurydice* as rare in Nias.

9. Danais (Bahora) chrysea, n. sp. Pl. I, Fig. 3. A local form of *D. philomela* from Java, differing in the subapical spots being more elongate, and in all the markings of the forewing being yellow except the two outer series, the yellow area of the cell heavily clouded with black scales except at its lower angle, in this resembling *D. crocea*. The interno-median yellow area shows is divided by a line of black scales in the middle, the quadrate discal spots are partly joined, as in *crocea*. Hindwing marked as in *crocea* and coloured as in *philomela*. The wings are very long and narrow. The female has the yellow area more restricted, all the spots larger and more conspicuous.

I think I saw *Parantica aglaia*, or its representative, on the day of my arrival at Engano, but no specimens were taken.

10. Radena longa, n. sp. Pl. I, Fig. 2. A local form of the Javanese *R. juventa*. Forewing very long, falcate, the white markings mostly elongate and reduced, cell of forewing with the basal mark slender, clavate at tip, the outer one small with the upper streak absent, the discal spots beyond the cell much reduced. Hindwing, with the white area in the cell broken by two dark lines, the upper wide, the lower slender, not quite continuous; all the discal spots beyond the cell slender and elongate.

11. Radena macra, n. sp. Pl. I, Fig. 4. A local form of *R. vulgaris*, the forewing elongate (but shorter than in *R. longa*), falcate, cell with the basal mark bifid, the upper streak slender, not so long as the lower, the outer spot narrow at its upper end, with a minute spot adjoining it above, and without the slender prolongation present in *R. vulgaris*; the three spots beyond the cell greatly, and all the others more or less reduced in size. *Hindwing* with all the spots reduced, that in the cell simply bifid, without any spot in the bifurcation (such as occurs in *R. vulgaris*). The submarginal dots are wanting on the apex of the forewing above and below.

These two *Radenas* are about equally common, and are found together. In the island of Sembawa, east of Java, two *Radenas* also occur, but in this case the *juventa* form is restricted to higher altitudes, though there is a zone in which both are found. These facts surprised me as I had supposed *juventa*, like *vulgaris*, to be simply a local form of *R. similis*.

The anal tufts of *R. vulgaris* and *macra* are shorter than in any other Danaid, the hairs white at the base and grey outwardly. In *R. juventa* and *longa*, they are nearly twice as long and grey throughout.

All the Enganese species of *Danais* are distinguished by their elongate form. This is also the case with several groups of butterflies in the Celebes, as shown by Mr. Wallace.

Family Satyridæ.

12. Lethe europa, Fab. scarce.

13. Melanitis leda, Linn. (*ismene*). My specimens were dark and nearly unmarked above, but of the usual shape. Both the ocellate and the non-ocellate forms were taken.

14. Mycalesis mineus, Linn. Common.

Family Elymniadæ.

15. Elymnias dolorosa, Butler, var. enganica. A local form of

Elymnias panthera, Java, resembling *dolorosa*, as described by Mr. Butler from Nias. The forewing, however, is scarcely paler outwardly, its lower angle generally suffused with reddish; the ocelli of the hindwing are placed in diffused pale spots. Underside with two or three minute ocelli on the forewing, and six on the hindwing the first nearly all white, the others blue with the outer end dark and the pupil white. The outer part of the wing is but slightly paler than the inner, and is not "stone yellow striated with blackish" as in *dolorosa*, but pale grey-brown with red striæ similar to those of the base. *E. dolorosa* has the hindwing more strongly dentate than in *panthera*, with a decided tail, but in the Enganese form the tail is much less distinct than in *panthera*. I took only females. The sex of the type of *dolorosa* is not stated.

Family Morphidæ.

16. Amathusia amythaon, Doubleday, var. insularis. Above black, the disc glossed with blue in some lights up to the border of the hindwing, but not apically on the forewing, the marginal line white. The lilac band is somewhat intermediate between that of *A. portheus*, or *dilucida*, and that of *A. westwoodii*, tapering less than in the latter, extending down to the internal, and up to the upper median vein near the outer margin, very broad costally. *Below*, the extensive space beyond the middle striga of the hindwing almost to the submarginal line is dusky in both sexes, without the lilac gloss of the rest. On the forewing there is a smaller dusky patch chiefly costal, beyond the fifth striga. These dark spaces are scarcely visible in the allied forms. The underside seems generally darker than in *westwoodii*, the ocelli have broader dark borders, the tails are much broader and more marked with white than in any other variety; the anal black spots are touched with blue in both sexes.

The ochreous band of the female is narrow, bifid near its lower end, deeply incised outwardly along the middle median vein and partly enclosing a dark spot in its inner margin above the same vein.

One of the numerous local forms of *Amathusia amythaon*, which are by some held as species. I am unluckily unable to compare it with Felder's Javanese varieties. It differs from *portheus* and *dilucida* in the broad tails and narrower blue band. It is like Westwood's *amythaon* (now called *westwoodii*), of uncertain habitat, but the band is less tapering, broader outwardly, the tails much broader, and the outer margin of the forewing convex instead of concave.

Family Apaturidæ.

17. Cupha erymanthis, Drury.

18. Atella alcippe, Cramer. The specimens are quite normal. Herr Kheil mentions *Atella phalanta*, and not *alcippe*, as occurring in Nias, possibly a mistake.

19. Cyrestis periander, Fabr. Resembles the Malaccan form (*themire*, Honrath), but still darker, much darker than the Tenasserim one, which is perhaps a distinct variety. I have not seen the Javanese form, but if Horsfield's drawing is correct, and the insect has only the single space between the two outermost ochreous bands white, *themire* may be considered a distinct species.

A common species in the high forest.

20. Precis ida, Cramer. Only one taken.

21. Hypolimnas bolina, Linn. The male is normal, the female infinitely variable. Occasionally it is not much unlike the male. Usually the bluish band across the forewing is obscure and there are traces of a reddish band from the disc of the forewing across the hindwing, with white discal spots beyond it. The white band across the forewing below is present or absent. Sometimes this form resembles *Danais pietersii* when flying. Mr. Woodford has given an interesting account of the variability of the female of this butterfly in the Solomon Islands.

22. Hypolimnas anomala, Wallace. My single male, taken at Malakoui, has only the costa and outer margin of the forewing purplish, with an outer-discal line of white spots on both wings, a submarginal line, and a few discal streaks. The hindwing has no white on the disc. No doubt the species is as variable in Engano as elsewhere.

23. Doleschallia niasica, Butler. I took two or three males which may be conspecific with the female described as *niasica*. They are much darker than males of *D. bisaltide*, the apex of the hindwing strongly suffused with black. Herr Kheil gives both *niasica* and *bisaltide* from Nias, apparently considering them distinct, but it is unlikely that two varieties so closely allied can be found together. I have recently taken typical *Doleschallia pratipa* and typical *polibete* in the same piece of jungle in Western Siam, but this is a case of two local forms overlapping at the limit of their ranges. The same is true of *Parthenos lilacinus* and *gambrisius* from Karenni to Lower Siam.

Family Nymphalidæ.

24. Neptis soma, Moore, var. meridiei. Smaller than the Indian variety, and darker below, the markings of the upperside somewhat smaller and less fuliginous.

25. Neptis ombalata, Kheil, var. engano. Like the Nias form described by Herr Kheil, but on the upperside the subapical white spots are smaller and better separated, the two lines of submarginal lunules distinct, and the upper white band of the hindwing much narrower and more broken. The colour of the underside is a rich red-brown, and the black borders of the white bands are very conspicuous.

Family Lycænidæ.

Subfamily Aphnœinæ.

26. Hypolycæna thecloides, Felder. This butterfly occurs locally in the Nicobars and the Malay Peninsula, and seems to feed on some shore-plant. It seemed scarce in Engano.

27. Eoöxylides tharis, Hübner. Common in the forests of the interior. The specimens are smaller than Sumatran ones, with the inner black fascia of the underside obsolescent.

28. Bindahara sugriva, Horsf. Only two males taken, both quite normal. Herr Kheil mentions *B. phocides* in his Nias list, probably by mistake. I have taken *sugriva* in Great and Kar Nicobar, and again in Java.

Subfamily Deudoriginæ.

29. Deudorix epiarbas, Moore. The cell of the forewing is touched with red in the female.

Subfamily Lycœninæ.

30. Nacaduba ardates, Moore. Common.

31. Nacaduba viola, Moore. Only one or two seen.

32. Nacaduba prominens, Moore. Scarce.

33. Nacaduba macrophthalma, Felder. Scarce. None of these species are mentioned as occurring in Nias, but Herr Kheil's *Plebeius kupu* is apparently the female of *N. viola*.

34. Catochrysops strabo, Fab., var. lithargyria. I think the true *strabo* was also seen, and no doubt *C. pandava* and *cneius* also occur. These species all seem to feed on a leguminous plant growing on the sea-beach, and are found on many small islands. *Catochrysops pandava* is per-

haps the commonest butterfly of the Nicobars. Herr Kheil mentions only *C. strabo* and *cneius* from Nias, and also *C. kandarpa* (=*strabo*).

35. Everes parrhasius, Fab., (stated by Mr. de Nicéville to be the same as the European *argiades*). Only one or two seen. This is Herr Kheil's *Plebeius polysperchinus*.

36. Lampides bochus, Cramer, (*Jamides bochus*). My specimens were identical with Indian ones. The species seems to vary but little throughout its range. The Nicobar form seems perfectly distinct, and should stand as *L. nicobaricus*, Wood-Mason and de Nicéville. Herr Kheil's *Plebeius siraha*, from Nias, is apparently the same as *L. bochus*, but why he should compare it with *Plebeius balliston* (*Lycænæsthes bengalensis*) I do not know.

37. Lampides subditus, var. telanjang. Female. Above, with the inner border of the black outer area excised by an entering angle. Hindwing with the outer bluish rings bounded inwardly by a broad dark band which is suffused anally with reddish. Below, the submarginal pair of faseiæ diffused and lunular. Hindwing with the orange forming a large area discally, extending above the radial vein and to the submedian, only three of the black spots complete, the inner zigzag line obsolescent.

Only a single female taken, but *subditus* is so different from other species of *Lampides*, and this form is so distinct from *subditus*, that I have thought best to name it.

38. Lampides elpidion, n. sp. A local form of *Lampides elpis*, the dark white-bordered submarginal spots of the hindwing separated from the basal blue by a broad unbroken dark wavy band: forewing with the blue pale and milky, the outer dark margin rather broad, the veins edged slenderly with black at the apex. Below the ground-colour is uniform pale reddish-brown, as in the dry season form of *elpis*. Prehensors as in *elpis*. I have compared this butterfly with a long series of Indian and with four Javanese males, and it seems a good local race, easily distinguished. It is very much larger than Herr Kheil's *Plebeius talinga*, which has the black border of the forewing much broader, and the inner band of the hindwing wanting.

39. Lampides celæno, Cramer. I identify this species with some doubt; a small pale-blue form, quite common along the shore. Another *Lampides*, which I have not been able to place, is pale grey above, with the border rather narrow on the forewing and reduced to a thread on the hindwing.

Herr Kheil describes a *Cyaniris* from Nias, *puspinus*, dubiously distinct from *C. puspa*. *Zizera karsandra* certainly occurs in Engano, but I do not seem to have taken it. Herr Kheil gives it in his Nias list under the name of *Plebeius lysimon*.

40. Pithecops hylax, Fab. Scarce.

*Subfamily Gerydinæ.**

41. Paragerydus unicolor, Felder, (*horsfieldii*, Moore). The identity of *horsfieldii* and *unicolor* seems generally accepted by the German naturalists, and Mr. de Nicéville, who has examined Felder's types (three females) of *unicolor* at Vienna, has come to the same conclusion.

Paragerydus certainly does differ considerably in aspect from *Allotinus*. I think it may be kept distinct from it for the present, on account of the approximate second and third subcostal branches in the forewing of the male.

Family Pieridæ.

42. Terias harina, Horsf. Only one taken. Herr Kheil does not record it from Nias.

43. Terias hecabe, Linn.

44. Terias sari, Horsf. Taken only on the hills.

45. Appias hippo, Cramer. Only females taken. It may be the Javanese *Appias lyncida*, and not *hippo*.

46. Huphina ethel, n. sp. Male, above white, all the veins, including the internal and medians, black, and bordered with diffused black scales, the cell and the upper median vein heavily bordered with black, the costa tinged with lemon. Outer border rather widely and equally black, a dark, diffused outer-discal band parallel with the margin as far as the internal vein, cutting off seven submarginal spots, all white except the first, which is bright yellow, slender, the last large and out-

* In the 1889 volume of this Journal, by an unfortunate blunder I described the fore tarsi of the *Gerydinæ* as like the middle and hind ones, in spite of my numerous drawings showing the contrary. I also gave Herr Kheil's *Allotinus aphocha* as equivalent to *horsfieldii*. *A. aphocha* may be distinct, though badly described, and figured only on the underside, where it is identical with *horsfieldii*. I now doubt if my proposed genus *Malais* is distinct from *Logania*, though a Bornean form resembling *L. sriwa* does have the tibiæ short and thick.

wardly incised. *Hindwing*, rich ochreous yellow, (without any orange tinge) from the first subcostal vein to the hind margin; the outer border rather widely black (but not subanally), the outer part of the veins, except the submedian and especially the subcostals and radial, also black, bordered with diffused scales. *Below*, the white area is reduced on the forewing, the upper submarginal spots united in a large triangular bright yellow mass, only the lower two white, that above the upper median vein obsolescent. *Hindwing* lemon yellow, ochreous yellow on the extreme anal margin, with greenish areas above and below the cell, especially around the subcostal veins; the dark brown border very wide, attaining the cell, enclosing six yellow spots, all large except the fourth which is obsolescent, the first three more or less united.

The absence of all orange on the wings, the submarginal band of the forewing, the veins outlined with black on both wings, the very broad marginal dark band of the hindwing below, and the large extent of the yellow area, tinged with greenish below, easily distinguish this peculiar species from *Huphina lea* and *judith*.

Only one male, taken at Bua Bua.

Family Papilionidæ.

47. Ornithoptera nereis, n. sp. A local form of *O. pompeius*, Cramer. Male. Above, black, the cell immaculate, the veins of the disc black, bordered with rather conspicuous whitish rays. *Hindwing* golden yellow, bordered with a deeply scalloped black band, which is only about $\frac{1}{16}$ of an inch wide at the ends of the veins, the base black above the middle of the costal space, including the root of the cell; two (in one specimen five) black discal spots subanally in the gold. *Below*, the white streaks near the veins are more continuous, and the end of the cell is slightly touched with whitish; a little red at the base of the wings.

Female, with the outer third of the cell entirely dull whitish, the whitish streaks between the veins coalescing, and extending nearly to the outer margins, the black rays in the middle of the spaces not nearly reaching the cell; hindwing very dull golden, the border wide, the discal spots coalescing widely with each other and with the outer black band, so as to enclose small yellowish lanceolate spots in pairs divided by the veins. *Below*, the hindwing is dull pale whitish-yellow, without any golden tint; this area extends only to the upper subcostal vein and occupies two-thirds of the cell. Several males and two females were taken, but one of the latter was unluckily destroyed, and the other is worn.

This species seems nearest the South Indian *Ornithoptera minos*.

Herr Kheil calls the Nias form *O. amphrysus*, Cramer, but it seems unlikely that a Javan species should occur in Nias and not in Engano. *O. nereis* obviously differs from *amphrysus* in the absence of the yellow band across the forewing of the male. The opaque whitish-yellow of the underside of the female is a striking character, and distinguishes it from a Philippine form, which otherwise resembles it considerably, especially in the male sex.

48. Papilio (Menelaides) aristolochiæ, Fab. Only one specimen taken; it was quite small. The species seems wanting on the opposite coast of Sumatra, being apparently replaced by *Papilio antiphus*.

49. Papilio (Iliades) oceani, n. sp. A local form of *Papilio memnon*, from Java. Male, above like *memnon*, but the lines of luteous scales on the forewing are nearly obsolete (slightly visible near the apex), and those of blue scales on the hindwing less conspicuous, and not nearly reaching the cell. *Below*, the red basal areas are wholly wanting, and the outer grey area much narrower, not at all enclosing the series of large black spots.

Female, forewing above heavily marked with pale luteous bands bordering the dark veins over the whole disc, entering the upper end of the cell, black rays in the middle of the spaces, the apex darker. Hindwing similar but with the luteous bands less conspicuous, enclosing a series of large black spots. Below, the red basal spots are present, but very small, the grey border slightly broader than in the male.

The absence of the red basal spots above and below in the male, above in the female, the obsolete markings of the upperside of the male, and the narrow band of the hindwing below in both sexes, easily distinguish this species from its allies.

Only one male and one female taken.

50. Papilio (Charus) helenus, Linn. var. enganius. The lines of luteous scales are conspicuous above and below, more or less whitish near the lower angle of the forewing; the red lunules of the upperside are absent, except the anal one, which is obscure. *Below*, the white area is large, the marginal white lunules are distinct, the submarginal orange ones small and obscure, wanting in the lower radial and upper median spaces, giving the insect somewhat the appearance of *Papilio prexaspes*; the female has a diffused white spot on each side of the radial vein.

51. Papilio (Zetides) agamemnon, Linn. One tattered male, Bua Bua.

52. Papilio (Zetides) sarpedon, Linn.

Family Hesperiadæ.

53. Hasora badra, Moore. Two males and a female taken, normal.

54. Padraona palmarum, Moore, var. kayapu. The black area beyond and below the cell of the forewing is nearly obsolete, the yellow band of the hindwing very wide. This is perhaps a distinct species, but as only one male was taken, I cannot be sure.

55. Chapra mathias, Fab.

56. Udaspes folus, Cram.

57. Hidari irava, Moore. One male.

58. Tagiades atticus, Fab. The two hyaline spots below the three subapical ones are absent in the male, the two at the end of the cell are joined in the female. The white area of the hindwing is very large in both sexes, extending to the outer margin, where there are three black spots.

EXPLANATION OF PLATE I.

Fig. 1. Danais pietersii, n. sp.
„ 2. Radena longa, n. sp.
„ 3. Danais chrysea, n. sp.
„ 4. Radena macra, n. sp.
Figs. 5-8 refer to Mr. Doherty's other paper.

III.—*New and Rare Indian* Lycænidæ.—*By* William Doherty, *Cincinnati, U. S. A. Communicated by the* Natural History Secretary.

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(With Plate I, Figs. 5-8.)

Family LYCÆNIDÆ.

Subfamily *THECLINÆ*.

1. Arhopala khamti, n. sp. Pl. I, Fig. 5.

Near *A. aënea*, Hew., differing in the dark, dull indigo-blue of the upperside, and the darker shade of the underside, with the terminal cell-spot remote from that in the lower median space of the forewing; hindwing with a large subanal ocellus bordered with metallic green, which

extends to the lower median vein; a dark spot edged with whitish in the lower median space. Lobe and tail large.

Margherita, Upper Assam.

2. Flos ahamus, n. sp. Pl. I, Fig. 6.

Female, like *Flos asoka*, but with the blue of the upperside pale, slightly violescent outwardly, not reaching up to the upper radial vein. Below, forewing with the transverse fasciæ much duller, and more regular, those in the interno-median space of the forewing obscure. Hindwing with the pale basal stripe absent, the base all dark, touched with scarlet costally; the lower half of the wing very dark, especially subabdominally, the markings there obscured; beyond the dark base there is a broad lilac area transversely from the costa to the hind-margin, containing a sinuous irregular band from the costa to the median vein, continued by a small separate spot in the interno-median space; an obscure ocellus in the lower median space submarginally, no other metallic markings. The species also resembles the Himalayan form of *Flos fulgidus*, Hew., but obviously differs in the colour of the upperside; and on the underside in the whitish spot at the end of the cell of the forewing, which is narrow and conspicuous, (broad and dull in *fulgidus*); the lower part of the hindwing is much darker, and the pale costal band absent.

Margherita, Upper Assam.

3. Acesina zephyretta, n. sp.

Male, above dark brown, a small diffused light blue area occupying less than a sixth of the forewing, including part of the cell, the interno-median and the lower median space, extending just above the middle median vein, the veins dark; hindwing unmarked, the cilia whitish, especially apically. Below brown, slightly glossed with violet, except the spots, which are darker and encircled by broad whitish rings. There is no costal white spot on the hindwing, but the apex is chiefly whitish, the disc irrorated with whitish scales, the ocelli obsolescent.

This species, in which the male resembles a female, is obviously distinct, and seems to connect *A. paraganesa* with the other species of *Acesina*.

Margherita, Upper Assam.

4. Acesina ariel, n. sp.

Male, above violet-blue (dull in some lights) over half of the hindwing, and rather more than half of the forewing, the blue areas rounded. Underside uniform brown, strongly glossed with violet, not irrorated with whitish scales, the markings annular, scarcely darker than the

ground-colour, with slender, pale violet-whitish rings; no costal white patch on the hindwing, the apex not whitish; three distinct subanal ocelli with metallic bluish-green irides. The violet hue of the uppersido distinguishes it from *A. ammon* and *ammonides*, as well as the entire absence of the costal white patch on the hindwing below.

Margherita, Upper Assam.

5. Acesina ammonides, n. sp. (= *ammon*, mihi, nec Hewitson).

The Tenasserim form of *A. ammon*, which I have now been able to compare with a specimen from Pahang (Malay Peninsula) kindly lent me by Mr. de Nicéville, and one from Perak, taken by myself, seems a good local race, which I distinguish by the above name. In *A. ammon* the blue is slightly tinged with violet (but much less than in *A. ariel*), and occupies less than half of the forewing and hardly more than a quarter of the hindwing. In *ammonides*, the blue is more azure in tint, extends well beyond the cell all around it, and occupies half of the forewing and half of the hindwing. Below, in *ammon* there is only the conspicuous white costal mark on the hindwing. In *ammonides*, the apices of both wings, especially the hindwing, are strongly suffused with whitish, and there are whitish scales abdominally on the hindwing, and a quadrate discal white spot between the lower two median veins. In one specimen of *ammonides*, the three minute ocelli of the hindwing are touched with metallic gold; *ammon* is without metallic scales.

Tenasserim valley.

Besides those above mentioned, I took the following species of this subfamily at Margherita, Upper Assam. *Zephyrus distortus* (*Zinaspa distorta*, de Nicéville), *Flos moellerii*, *Darasana perimuta* and *paramuta*, *Arhopala teesta*, *singla*, *centaurus*, *amantes*, *rama*, *anarte*, *belphœbe*, *bazalus* and *camdeo*.

Subfamily *APHNÆINÆ*.

6. Drina maneia, Hew.

The veins of the forewing are marked with raised lines of light-brown scales in the blue area, somewhat as in *Papilio ganesa* or *Argynnis childrenii*. The veins so marked are the three medians, the lower radial and the submedian, besides a line in the interno-median space, and two terminally in the cell. These are presumably scent-glands.

The venation agrees well with that of *Drina donina*, the type of the genus; so that Mr. de Nicéville, who had never seen the species, showed some acuteness in placing it here, in spite of its wholly different appearance.

Rare at Padang Rengas, Perak.

Genus Thrix, novum.

Male, forewing with the subcostal vein five-parted (including the vein itself as a branch), the first branch originating one-third before the end of the cell, the third a little before the end, the second nearer the first than the third, the fourth from the third halfway to the apex, the fifth close to the apex, very short. Discocellular veins nearly straight, the lower half again as long as the upper, cell slightly longest at its lower angle, second bifurcation of the median vein a little before its end. Submedian vein exceedingly remote from the median, straight for nearly half of its length, then bent downwards like a bow. In the interno-median space discally, there is a deep oblique depression on the upperside, covered with short grey down, and bearing a conspicuous extensile tuft of long orange hairs produced downwards and outwards over the depression. Hindwing with the two lower median branches forking simultaneously from the end of the cell; a long tail from the submedian, a short one from the lower median vein.

The curious scent-organ in the middle of the forewing of the male, resembling that of *Dacalana* and *Arrhenothrix*, has so distorted the venation that I have thought it advisable to separate this genus from *Neocheritra*. Whether the male has five and the female four subcostal branches, as in that genus, I do not know.

7. Thrix gama, Distant, (*Neocheritra gama*).

Above black, a tuft of orange hairs over a small grey cavity in the middle of the forewing. Hindwing with the lower part white, containing two black spots; above this grey, with three black spots on the boundary between the grey and the white; the upper part of the wing black. Below as in the female. The species apparently mimics *Eoöxylides tharis*.

Rare at Padang Rengas, Malay Peninsula. I have also taken it in the mountains of south-western Sumatra.

Subfamily *PORITINÆ*.

Genus Massaga, mihi. I find that in the male of *M. pediada*, the type of this genus, there is a narrow tuft of prostrate black hairs arising at the end of the cell, extending beyond it along the upper border of the upper median vein. This was pointed out to me in *M. pharyge* by Mr. de Nicéville and I afterwards found it in *M. pediada*. In *M. potina* it is apparently present, but very small and inconspicuous. In all these species the upper tuft is of considerable size, yellowish or whitish, turned upwards along the upper subcostal vein, in a large whitish patch. In

Poritia, the lower tuft is absent, the upper one black or dark brown, without the whitish patch.

Subfamily *LYCÆNINÆ*.

Genus PHENGARIS, novum. The splendid Chinese butterfly *Lycæna atroguttata*, Oberthür, deserves to be placed in a separate genus or subgenus, distinguished from *Lycæna* by the upper discocellular vein of the hindwing being short and angled outwardly, the lower discocellular meeting the median vein opposite its second forking.

This butterfly is certainly the finest of the subfamily, unless the *danis* group of *Cyaniris* be excepted. I was not able to detect any odour about it, but it has all the air of a protected species. I often saw it in the meadows of the Kutcha Naga country, Naga Hills, from 6000 to 8000 feet elevation, flying very slowly and visible from a great distance, so that I caught a good number, in spite of its rarity. The character of its markings, round black spots on a pure white ground, is very remarkable. It is hard to avoid thinking *Tajuria maculata*, Hew. a mimic of this species, though it seems to live at a lower elevation, and further to the westward. *Taraka hamada* is somewhat similarly marked, and is obviously protected.

I have taken the name *Phengaris*, which means *a daughter of the moon*, from the modern Greek.

Subfamily *GERYDINÆ*.

8. GERYDUS HERACLEION, n. sp.

Male, forewing less acute than in *G. symethus*, hindwing rounded. *Above*, brown, forewing with a slaty gloss, the apex darker, a broad oblique white band from the upper end of the cell and beyond it (above the cell it is obscure), almost to the middle of the interno-median space, the outer part dehiscent along the lower median vein, projecting furthest in the lower median space (unlike *symethus*). The band is much broader than in *Gerydus biggsii*, Distant, (*gopara*, de Nicéville). Hindwing all dark. *Below*, the white band of the forewing is obscure and broken, the spot in the lower median space quite separate from and more distinct than the rest, the transverse lunular band obsolescent in the forewing, three costal ring-spots, three small subapical lunules. Hindwing, much less clouded with blackish than in *G. croton*, the lunular transverse band nearly regular, the basal spots quadrate, the submarginal black dots very distinct.

Perak, Malay Peninsula.

The species is larger than *G. symethus*, not quite so large as *G. ancon*. The upper median vein of the male is naked above and swollen from the end of the cell one-fourth towards the outer margin. This may be regarded as a generic character of *Gerydus*, since it occurs at any rate in *G. symethus*, *biggsii*, *boisduvalii*, *heracleion*, *irroratus* var. *assamensis*, and *ancon*. In *G. croton* the swelling is indistinct, and the vein is covered with black scales.

9. Gerydus irroratus, Druce, var. assamensis, nov. Pl. I. Fig. 7.

Above, unmarked except by a small, pale, longitudinal area around the base of the upper median vein on the forewing. Below, pale grey-brown, without the dark markings of *G. boisduvalii*, a small pale area on the forewing below the middle median vein, the markings lunular, those in the cell of the forewing reduced, the transverse discal band of the forewing subapical, extending only to the upper median vein, a single conspicuous dark lunule near the lower angle; the transverse band of the hindwing regular, an undulated, continuous submarginal dark line.

Dhansiri Valley, Naga Hills.

It resembles *G. melanion* from the Philippines, but is without the white area near the lower angle of the forewing above. It may be conspecific with Mr. Druce's *G. irroratus* (from Siam) which has never been figured or properly described.

I have taken what may be the female of *Gerydus irroratus* in Perak. Some pale markings represent the broken white band of *G. boisduvalii*, the hindwing is angled at the upper median vein.

The figure represents the transverse band of the hindwing incorrectly; it is really composed of separate annular lunules.

10. Logania massalia, n. sp., Pl. I, Fig. 8.

Female. Above black, a round, dull white discal area on the forewing from just above the upper median vein almost to the submedian vein. Below irregularly speckled and variegated; forewing with the costal and apical parts ochreous-brown, the rest blackish. Hindwing also tinged with ochreous, a submarginal dark area, and obscure dark transverse bands. Hindwing not angled, the margin entire.

Nearest an undescribed *Logania* from Perak, Malay Peninsula, which, however, has the upperside marked as in *L. marmorata*, and the margin undulated,

Margherita, Upper Assam.

EXPLANATION OF PLATE I.

Fig. 5. Arhopala khamti, n. sp. (Assam.)
Fig. 6. Flos ahamus, n. sp. (Assam.)
Fig. 7. Gerydus irroratus, Druce, var. assamensis, var. nov. (Assam.)
Fig. 8. Logania massalia, n. sp. (Assam.)
Figs. 1—5 refer to the previous paper on the Butterflies of Engano.

IV.—*Materials for a Flora of the Malayan Peninsula.*—*By* George King, M. B., LL. D., F. R. S., C. I. E., *Superintendent of the Royal Botanic Garden, Calcutta.* No, 3.

(Continued from page 206 of Vol. LIX of 1890.)

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In the arrangement of the Natural families which is being followed in these papers (that of DeCandolle as modified by the late Mr. Bentham and Sir Joseph Hooker), the family *Dipterocarpeae* should have preceded *Malvaceae*. Delays have, however, occurred in the elaboration of that family; and, rather than postpone the publication of the remaining three *Thalamifloral* orders, I have decided to submit my account of these to the Society now, deferring my paper on the *Dipterocarpeae* and on the previously omitted *Anonaceae* to a future occasion.

Order XVII. MALVACEÆ.

Herbs, shrubs or trees; herbaceous portions often stellate-hairy or scaly. *Leaves* alternate, palminerved, simple, lobed, or rarely compound. *Stipules* free, sometimes caducous. *Bracteoles* 3 or more, free or combined, often forming an epicalyx. *Flowers* axillary or terminal, solitary, fascicled or cymose-paniculate, regular, hermaphrodite or 1-sexual. *Sepals* 5, valvate, free or connate. *Petals* 5, twisted-imbricate. *Stamens* ∞, rarely definite, adnate to the base of the petals; filaments monadelphous, forming a tube; anthers oblong or reniform, cells sinuous or twisted, linear or annular, ultimately 1-celled bursting longitudinally. *Ovary* 2-many-celled, entire, or lobed, of 2-5 or usually more carpels whorled round a central axis; styles connate below or throughout their length; ovules 1 or more, curved, attached to the inner angle of each carpel. *Fruit* of dry cocci, or capsular and loculicidal, often large and woody. *Seeds* reniform or obovid, sometimes arillate; albumen scanty, often mucilaginous or 0; embryo curved; cotyledons leafy, usually

folded or crumpled.—Distrib. Abundant in warm regions, common in temperate, absent from arctic. Genera 57; known species about 700.

A. Staminal tube entire, or but slightly divided at the apex.

Tribe I. *Malveæ*. Herbs or shrubs. *Ripe carpels* separating from the axis. *Styles* as many as the carpels.

Ovules solitary; carpels with convergent, often beaked, apices ... ... 1. *Sida*.

Ovules 2 or more; carpels with divergent, not beaked, apices ... ... 2. *Abutilon*.

Tribe II. *Ureneæ*. *Styles or stigmatic branches* twice as many as the carpels.

Fruit of indehiscent cocci ... ... 3. *Urena*.

Tribe III. *Hibisceæ*. Herbs or shrubs. *Fruit* capsular. *Sepals* leafy. *Staminal-tube* truncate or 5-toothed at the apex.

Calyx toothed: stigmas distinct, spreading ... 4. *Hibiscus*.

„ truncate: stigmas united ... ... 5. *Thespesia*.

B. Staminal tube short or divided into single filaments to its base.

Tribe IV. *Bombaciæ*. Trees. *Sepals* leathery: styles connate or free. *Fruit* capsular.

Leaves digitately compound, calyx truncate or irregularly 3 to 5-lobed; seed silky outside.

Anthers solitary ... ... 6. *Bombax*.

„ in groups of 2 or 3 ... ... 7. *Eriodendron*.

Leaves simple, usually scaly; fruit woody, muricate; seeds arillate.

Calyx tubular or bell-shaped.

Anthers linear, cells sinuous ... 8. *Durio*.

Anthers globose, opening by a pore ... 9. *Boschia*.

Calyx dilated at the base.

Calyx finally forming a cushion-shaped annulus ... ... 10. *Neesia*.

Calyx 5-pouched at the base, petals inserted on the calyx ... ... 11. *Cœlostegia*.

1. Sida, Linn.

Herbs or undershrubs. *Leaves* entire or lobed. *Bracteoles* 0. *Calyx* of 5 valvate sepals, tubular below. *Corolla* of 5 petals, free above, connate below and adnate to the tube of the stamens. *Staminal-tube* dividing at the summit into numerous anther-bearing filaments. *Carpels* 5 or more, whorled; styles as many as the carpels, stigmas terminal.

Ripe carpels separating from the axis, generally 2-awned at the summit, and dehiscing irregularly or by a small slit. *Seed* solitary, pendulous or horizontal; radicle superior.—Distrib. A genus of about 80 species, most of them being tropical weeds.

1. S. Mysorensis, W. & A. Prod. 1, 59. A sub-erect, sometimes decumbent, herb 1 to 2 feet high, covered with more or less glutinous hairs. *Leaves* cordate-ovate, acuminate, coarsely serrate-crenate, 1·5 to 2·5 in. long and 1 to 1·5 in. broad; petiole about half as long as the blade. *Stipules* linear, less than half as long as the petiole. *Flowers* less than ·5 in. in diam., in few-flowered axillary racemose cymes, corolla yellow; pedicels shorter than the petioles, jointed near the middle. *Carpels* shorter than the calyx, sub-glabrous, each with a short awn, or awnless. Mast. in Hook. fil. Fl. Br. Ind. I, 322; Thwaites Enum. 28. *S. hirta*, Wall. Cat. 1855, not of Lam. *S. urticæfolia*, W. & A., l. c. *S. nervosa*, Wall. Cat. 1853 E. *S. olens*, Ham. in Wall. Cat. 1874. *S. glutinosa*, Roxb. Hort. Beng. 97; Fl. Ind. iii, 172; Wall. Cat. 1855, not of Cav. *S. tenax*, Ham. in W. & A. Prodr. i, l. c.; Wall. Cat. 1855, E. F. *S. fasciculiflora*, Miq. Fl. Ind. Bat. i, Pt. 2, 140. *S. radicans* Cav. Diss. i, 8: W. & A. Prod. i, 59.

A weed by roadsides; in Perak and probably in the other provinces. Distrib. India, Java.

2. S. carpinifolia, L. An undershrub 2 to 3 feet high; glabrous or sub-glabrous; a few minute stellate hairs on the stems and petioles. *Leaves* linear-lanceolate, acute, serrate, 2 to 3 in. long and ·25 to ·35 in. broad; petioles ·1 to ·2 in. *Stipules* subulate, nerved, much longer than the petiole. *Flowers* ·5 in. in diam, solitary, axillary; corolla yellow, peduncles as long as the petiole, jointed, minutely bracteolate. *Carpels* shorter than the sub-globose ribbed calyx, glabrous, rugulose, each with 2 short awns. DC. Prod. i. 460. Mast. in Hook. fil. Fl. Br. Ind. i. 323; Wall. Cat. 1871. *S. acuta*, Burm.; Cav. Diss. i p. 15, t. 2, f. 3; DC. Prodr. i. 461; Wall. Cat. 1868, 1, 2. 3, 4, 5; Roxb. Fl. Ind. iii. 171; W. & A. Prodr. i. 57; Dalz. & Gibs. Bomb. Fl. 17; Thwaites Enum. 27; Miq. Fl. Ind. Bat. i. Pt. 2. p. 143; Wight Ic. t. 95; Bl. Bijdr. 55; Wall. Cat. 1868 G. *S. lanceolata*, Roxb. l.c. 175; Wall. Cat. 1868 F. *S. stipulata*, Cav. Diss. i. t. 3, f. 10; DC. Prodr. i. 460; W. & A. Prodr. l.c. *S. Stauntoniana*, DC. l.c.; *S. scoparia*, Lour. ex W. & A. lc.

In all the provinces as a weed. Distrib. India and Tropics generally.

3. S. rhombifolia, Linn. sp. 961. An erect under shrub 2 to 3 feet high, from glabrous to hoary, stellate-pubescent. *Leaves* varying

from ob-lanceolate or obovate to rhomboid, but always with tapering bases, serrate to crenate; under surface hoary, rarely green; length ·5 to 2·5 in., petiole ·1 to ·2 in. *Stipules* setaceous, longer than the petioles. *Flowers* ·5 in. in diam., axillary, solitary; corolla yellow, rarely white; peduncles much longer (sometimes six times) than the petioles, variously and sometimes indistinctly jointed, ebracteolate. *Carpels* smooth or pubescent, or reticulate, each usually with 1 or 2 rather long awns, sometimes awnless, generally longer than the calyx. Mast. in Hook. fil. Fl. Br. Ind. i. 323; Miq. Fl. Ind. Bat. i. pt. 2. p. 142; DC. Prodr. i. 462; Roxb. Fl. Ind. iii. 176; Wall. Cat 1862, 2; Thwaites Enum. 28. *S. canariensis*, Willd.; DC. Prodr. i. 462. *S. compressa*, Wall. Cat. 1866; DC. Prodr. i. 462.

This very polymorphic species has been divided into varieties by Dr. Masters in Hooker's Fl. Br. Ind. l.c. as follows:—

"Var. 1. *scabrida*, W. & A. Prodr. i. 57 (sp.); sprinkled with rigid hairs, leaves concolorous, peduncles joined at the base, carpels awned.

"Var. 2. *retusa*, Linn. (sp.); leaves obovate retuse hoary underneath, peduncles equalling the leaves jointed above the middle, carpellary awns short.—Cav. Diss. i. t. 3, f. 4, and Diss. v. t. 131, f. 2; Bl. Bijdr. 75; W. & A. Prodr. i. 38; Wall. Cat. 1870; DC. Prodr. i. 462; Roxb. Fl. Ind. iii. 175; Dalz. & Gibs. Bomb. Fl. 17; Miq. Fl. Ind. Bat. i. pt. 2, 142. *S. chinensis*, Retz ex Roxb. Hort. Beng. 97; Fl. Ind. iii. 174. *S. philippica*, DC. Prodr. i. 462; W. & A. Prodr. l.c.; Wall. Cat. 1869; Rheede Hort. Mal x. 18; Rumph. Amb. v. t. 19.—The *S. corynocarpa*, Wall. Cat. 1870, seems to be a form of this variety, with densely intricate woody branches, and long carpellary awns.

"Var. 3. *rhomboidea*, Roxb. Hort. Beng. 50; Fl. Ind. iii. 176 (sp.); leaves rhomboid hoary beneath, peduncles jointed at the base, carpellary awns very short inflected. DC. Prodr. i. 462; W. & A. Prodr. i. 57, Wall. Cat. 1862 E., 1863; Thwaites Enum. 28. *S. rhombifolia*, Wall. Cat. 1862 F.? *S. orientalis*, Cav. Diss. i. t. 12.—The flowers expand at noon (Roxb.).

"Var. 4. *obovata*, Wall. Cat. 1864 (sp.); leaves 1½ by 2 in., broadly obovate, hoary beneath, apex coarsely toothed, base cuneate, petiole ¼ in., peduncle longer than the petiole shorter than the blade.

"Var. 5. *microphylla*, Cav. Diss. i. t. 12, f. 2 (sp.); leaves small, elliptic dentate hoary beneath, peduncle slightly exceeding the petiole, carpels 5-7 awned.—Roxb. Fl. Ind. iii. 170; DC. Prodr. i. 461."

In all the provinces—a common weed. Distrib. The Tropics generally.

4. S. CORDIFOLIA, Linn. spec. 961. An erect softly hairy undershrub

2 to 3 feet high, the hairs on the branches and petioles long and spreading. *Leaves* oblong-cordate, obtuse, rarely acute, cronate; both surfaces, but especially the pale lower surface, softy hairy; length 1·25 to 2 in., breadth ·8 to 1·25: petiole slightly longer than the blade. *Stipules* linear, less than half the length of the petiole. *Flowers* ·6 in. in diam., axillary, solitary; corolla yellow; peduncles jointed near the apex, varying in length, the lower longer, the upper shorter, than the petioles. *Carpels* boldly 3-angled, reticulate, sub-glabrous, crowned by 2 strong, divergent, retro-hispid awns. DC. Prod. i. 464, Roxb. Fl. Ind., iii. 177; Wall. Cat. 1849; W. & A. Prod. i. 58; Thwaites Enum. 28. Dalz. & Gibs. Fl. Bombay, 17; Mast. in Hook. fil. Fl. Br. Ind. i. 324, and in Oliver's Fl. Trop. Afr. i. 181; Miq. Fl. Ind. Bat. i. pt. 2, 140. *S. herbacea*, Cav. Diss. i. 19, t. 13, f. 1; DC. Prodr. i. 463. *S. micans*, Cav. Diss. i. 19, t. 3. f. 1. *S. rotundifolia*, Cav. Diss. i. 20, t. 3, f. 6, and Diss. vi. t. 194, f. 2; Wall. Cat. 1849, D; DC. Prodr. i. 464. *S. althæifolia*, Swartz, Guill. & Per. Fl. Seneg. i. 73.—Rheede Hort. Mal. x. t. 54.

In Malacca: and probably in all the Provinces as a weed. Distrib. The Tropics generally.

2. Abutilon, Gærtn.

Herbs or undershrubs more or less covered with down. *Leaves* angled or palmately-lobed. *Inflorescence* axillary or terminal. *Bracteoles* 0. *Calyx* of 5 valvate sepals, tubular below. *Corolla* of 5 petals, free above, connate below and adnate to the tube of the stamens. *Staminal-tube* divided at the apex into numerous filaments. *Carpels* 5-8. Styles as many as the carpels. Ripe *carpels* separating from the axis, awned or not, 1- or more-seeded. *Seeds* reniform. Distrib. About 70 species, all tropical or subtropical.

A. indicum, G. Don. Gen. Syst. i. 504. An annual or perennial undershrub. *Leaves* broadly cordate, irregularly and coarsely toothed or sub-entire, pale and minutely pubescent on both surfaces, often with a few longer hairs intermixed, length 1 to 2 in., breadth. 1 to 2 in.; petiole usually longer than the blade. *Flowers* 1 in. in diam, axillary, solitary, the peduncles longer than the petioles, jointed near the top; corolla yellow. *Sepals* ovate, acute, shorter than the spreading petals. *Carpels* 15 to 20, longer than the calyx, truncate or with short spreading awns, tomentoso at first, ultimately sub-glabrous. *Seeds* dark brown, minutely stellate-hairy. Mast. in Hook. fil. Fl. Br. Ind. i. 326; *A. asiaticum*, W. & A. Prodr. i. 56, not *Sida asiatica*, Linn.; W. & A. Prodr. i. 56; Wight Ic. t. 12; Dalz. & Gibs. Bomb. Fl. 18; Thwaites Enum. 27; Mast. in Oliv. Fl. Trop, Afr. i. 186; Miq. Fl. Ind.

Bat. i. pt. 2, 146. *Sida indica*, L.; DC. Prodr. i. 471; Cav. Diss. i. p. 33, t. 7, f. 10; Roxb. Fl. Ind. iii. 179; Wall. Cat. 1859, 1, 2, D. F. *Sida populifolia*, W. & A. l.c. *A. populifolia*, G. Don. l.c. *Sida populifolia*, DC. Prod. i. 470; Cav. Diss. i. t. 7, fig. 9; Roxb. Fl. Ind. iii. 179; Bl. Bijdr. 79. *S. Beloere*, L'Her. Stirp. i. 130. *S. Eteroomischos*, Cav. Diss. ii. 55 and v. p. 275, t. 128.

Singapore, Selangore and probably in all the other provinces. A weed.

3. Urena, Linn.

Herbs or undershrubs, more or less covered with rigid stellate hairs. *Leaves* angled or lobed. *Flowers* clustered. *Bracteoles* 5, adnate to the 5-cleft calyx, sometimes coherent at the base into a cup. *Petals* 5, often tomentose at the back, free above, connate below and united to the base of the tube of the stamens. *Staminal-tube* truncate or minutely toothed. *Anthers* nearly sessile. *Ovary* 5-celled, cells 1-ovuled, opposite the petals; stigmatic branches 10; stigmas capitate. *Ripe carpels* covered with hooked bristles or smooth, indehiscent, separating from the axis when ripe. *Seed* ascending; cotyledons bent and folded; radicle inferior. Distrib. Species 4-5, natives of tropical and subtropical countries, 2 only being confined to Asia.

U. lobata, Linn. Spec. 974. A herbaceous undershrub 1 to 3 feet high, more or less hairy. *Leaves* very variable; the lower rotund to reniform, more or less cordate at the base, the apex usually acute, edges with 5 to 7 shallow lobes or sub-entire, 5 to 7-nerved; length 1 to 2 in., breadth 1 to 2·5 in.; upper leaves smaller and sometimes ovate to linear-lanceolate, 3-nerved. *Petiole* shorter than the blade; bracteoles oblong-lanceolate, as long as the sepals. *Corolla* pink, ·5 to 1 in. in diam. *Carpels* tomentose, and with many smooth hooked spines. Mast. in Hook. fil. Fl. Br. Ind. i. 329; Miq. Fl. Ind. Bat. i. pt. 2, p. 149; Cav. Diss. iv. p. 336, t. 185, fig. 1; Miq. Pl. Jungh. 283; DC. Prodr. i. 441; Roxb. Fl. Ind. iii. 182; W. & A. Prodr. i. 56; Wall. Cat. 1928; Dalz. & Gibs. Bomb. Fl. 18; Thwaites Enum. 25; Miq. Fl. Ind. Bat. i. pt. 2, 148. *U. cana*, Wall. Cat. 1930 B. *U. palmata*, Roxb. Fl. Ind. iii 182. *U. tomentosa*, Bl. Bijdr. 65.

All the Provinces: a weed. Distrib. The tropics generally.

Var. 1. *sinuata*, Miq. Fl. Ind. Bat. l.c.; leaves deeply 5-lobed, the lobes narrowed at the base, serrate, often pinnatifid, bracteoles linear; flowers often smaller than in the typical plant. *U. sinuata*, Linn.; DC. Prodr. i. 441; Roxb. Hort. Beng. 50; Fl. Ind. iii. 182; Wall. Cat. 1933 E.; W. & A. Prodr. i. 46; Hook. Fl. Br. Ind. i. 329; Thwaites Enum.

Pl. Cey. 25; Dalz. & Gibs. Bomb. Fl. 18. *U. muricata*, DC. Prodr. i. 442. *U. Lappago*, DC. Prodr. i. 441. *U. morifolia*, DC. Prodr. i. 442? *U. heterophylla*, Smith in Rees' Cycl. 37; Wall. Cat. 1933 E, F. G, H, K. *U. tomentosa*, Wall. Cat. 1933 H.;—Burm. Zeyl. t. 69, f. 2.

Distributed like the last.

Var. 2. *scabriuscula*, DC. Prod. i. 441 (sp.); herbaceous; leaves roundish, scarcely lobed, with 1-3 glands beneath; bracteoles linear, longer than the sepals. *U. scabriuscula*, Wall. Cat. 1928 F; W. & A. Prodr. i. 46; Dalz. & Gibs. Bomb. Fl. 18.

4. Hibiscus, Linn.

Herbs, shrubs, or trees. *Leaves* stipulate, usually more or less palmately-lobed. *Inflorescence* axillary, rarely terminal. *Bracteoles* 5 or more, free, or connate at the base. *Calyx* 5-toothed or 5-fid, valvate, sometimes spathaceous. *Petals* 5, connate at the base with the staminal-tube. *Staminal-tube* truncate or 5-toothed at the summit; filaments many; anthers reniform, 1-celled. *Ovary* 5-celled, cells opposite the sepals, each with 3 or more ovules; styles 5, connate below; stigmas capitate or sub-spathulate. *Capsule* loculicidally 5-valved, sometimes with a separate endocarp, or with false dissepiments forming a spuriously 10-celled fruit. *Seeds* glabrous, hairy or woolly. About 150 species; distributed chiefly in the tropical regions of both hemispheres.

Calyx spathaceous, deciduous ... ... 1. *H. Abesmoschus.*
Calyx persistent, 5-cleft.
Bracteoles of involucre distinct, their apices spathulate ... ... 2. *H. Surattensis.*
Bracteoles united at the base, nearly as long as the calyx ... ... 3. *H. macrophyllus.*
Bracteoles united into a cup much shorter than the calyx.
Involucre and calyx softly pubescent 4. *H. tiliaceous.*
„ „ rugulose 5. *H. floccosus.*

1. H. Abelmoschus, Linn. Spec. 980. A stout annual undershrub 2 to 3 feet high: young branches and peduncles retro-hispid, all other parts hispid or stellate-hispid. *Leaves* variable, usually with 3 to 5, deep, oblong-lanceolate or linear, serrate-crenate, acute lobes, sometimes hastate or sagittate, the base always rounded; length and breadth 3 to 5 in.; petiole longer than the blade: stipules minute, subulate, fugaceous. *Flowers* 3 in. in diam., axillary, solitary; peduncles shorter than the petioles, ebracteate. *Involucres* 8 to 12, linear, ·5 to ·75 in. long. *Calyx* 1·25 in. long, toothed at the apex. *Corolla* yellow with a crimson

centre, glabrous. *Capsule* oblong, pointed, hispid, becoming subglabrous, 1 to 3 in. long. *Seeds* reniform, striate, glabrous, musky. Mast. in Hook. fil. Fl. Br. Ind. i. 342 (excl. syn. *H. sagittifolius*, Kurz.); DC. Prod. i. 452; Roxb. Fl. Ind. iii. 202; Griff. Not. iv. 521. *Abelmoschus moschatus*, Mœnch; W. & A. Prod. i. 53; Wight Ic. t. 399; Wall. Cat. 1915, F, G, H, I, K, L; Thwaites Enum. 27; Miq. Fl. Ind. Bat. i. pt. 2, 151. *H. flavescens*, Cav. Diss. iii. t. 70, f. 2; DC. l.c. 454. *H. spathaceus*, Wall. Cat. K. *H. ricinifolius*, Wall. Cat. 1915. *Bamia chinensis*, Wall. Cat. 1616? *Hibiscus pseudo-abelmoschus*, Bl. Bijdr. 70. *H. longifolius*, Willd. Spec. iii. 827; DC. Prod. i. 450. *Bamia multiformis* and *betulifolia*, Wall. Cat. 1917 and 1918.

In all the Provinces; cultivated or naturalised. Distrib. the tropics generally.

2. H. SURATTENSIS, Linn. Spec. 979. A weak straggling undershrub; the branches, petioles and peduncles with small recurved prickles and a few soft spreading pale hairs. *Leaves* palmately 3 to 5-partite, rarely ovate, sub-entire, serrate, sparsely pilose; length and breadth 1·5 to 3 in.; petiole slightly longer than the blade. *Stipules* broadly ear-shaped. *Flowers* 2 to 2·5 in. long, solitary, axillary, corolla yellow with dark centre; bracts of involucre 10 to 12, linear with spathulate apices. *Capsules* membranous, the individual carpels with 3 bold aculeate nerves and a long terminal point. *Seeds* with long straight brittle yellowish hairs. Mast. in Hook. fil. Fl. Br. Ind. i. 334; Miq. Fl. Ind. Bat. i. pt. 2, 161; Bl. Bijdr. 68; DC. Prodr. i. 449; W. & A. Prodr. i. 48; Roxb. Fl Ind. iii. 205; Wight Ic. t. 197; Cav. Diss. iii. t. 53, f. 1; Thwaites Enum. 26; Wall. Cat. 1893, 1, 2, 3, D, E, F, G; Dalz. & Gibs. Bomb. Fl. 20; Mast. in Oliv. Fl. Trop. Afr. i. 201; Miq. Fl. Ind. Bat. i. pt. 2, 161. *H. furcatus*, Wall. Cat. 1896 C, not of Roxb.

Malacca, Perak, and probably in the other Provinces. Distrib. The tropics generally.

This has a decumbent or even climbing habit.

3. H. MACROPHYLLUS, Roxb. Hort. Beng. 51. A large shrub or small tree, all parts more or less covered with pale soft minute velvetty tomentum; the young branches, petioles, pedicels, bracteoles and calyx bearing, in addition, numerous more or less deciduous tufts of long spreading stiff tawny hairs. *Leaves* large, on long petioles, cordate-orbicular to reniform, the apex shortly sharply and abruptly acuminate, the edges entire; palmately 7 to 9-nerved; length and breadth 7 to 12 in.; petiole usually longer than the blade. *Stipules* oblong, convolute, hispid-tomentose, 3 to 4 in. long. *Flowers* in terminal cymos, pedicels

1·5 to 2 in. long, articulate near the apex and bearing two large broadly ovate deciduous bracts. *Involucres* of the individual flower 10 to 12, linear-lanceolate, connate at the base, as long as the calyx, hispid-tomentose like the calyx. *Calyx* with 5 deep linear teeth; the tube 10-ribbed, 1 to 1·25 in. long. *Corolla* 4 in. in diam., purple. *Fruit* pointed, hispid, as long as the persistent calyx. *Seeds* reniform, their edges densely fulvous-sericeous. Mast. in Hook. fil. Fl. Br. Ind. i. 337; Kurz For. Fl. Br. Burm. i. 126; DC. Prod. i. 455; Wall. Pl. As. Rar. i. 44, t. 51; Wall. Cat. 1903. *H. setosus*, Roxb. Fl. Ind. iii. 194. *H. vestitus*, Griff. Notul. iv. 519.

Penang, Perak. Distrib. Java, India.

4. H. TILIACEUS, Linn. Spec. 976. A small much branched tree; young branches minutely pubescent. *Leaves* sub-coriaceous, broadly cordate to reniform, minutely crenulate or entire, rarely lobed, acute; upper surface scaly, minutely pubescent, glabrescent or glabrous; lower densely and minutely hoary-pubescent; nerves 7 to 9 pairs, palmate; length and breadth 3·5 to 6·5 in., petioles ·5 to 2 in., stipules oblong, oblique, shorter than the petiole. *Flowers* solitary; or in pedunculate, solitary, 2 to 3-flowered, axillary cymes; the peduncles 2 or 3 times as long as the petioles, with 2 obliquely oblong, opposite, pubescent, caducous bracts. *Involucres* 7 to 10, acute, united above the middle. *Sepals* 5, like the involucres but twice as long, with an elongated gland externally. *Corolla* campanulate, 4 in. in diam., yellow with crimson centre. *Fruit* as long as the calyx or shorter, ovate-acute, stellate-pubescent, spuriously 10-celled. *Seeds* few, obovate-reniform, faintly striate, sparsely scaly, pubescent, or glabrous. Mast. in Hook. fil. Fl. Br. Ind. i. 343; Kurz For. Fl. Burm. i. 126; DC. Prod. i. 454; Cav. Diss. iii. p. 151, t. 55, f. 1; Bl. Bijdr. 72; Roxb. Fl. Ind. iii. 182; Miq. Fl. Ind. Bat. i. pt. 2, 153; Beddome Fl. Sylvat. Anal. Gen. t. 4. *Paritium tiliaceum*, A. Juss. in St. Hil. Fl. Bras. Med. i. p. 156; (excl. syn. *H. elatum*) W. & A. Prodr. i. 52; Wight Ic. t. 7; Wall. Cat. 1912; Thwaites Enum. 26; Dalz. & Gibs. Bomb. Fl. 17; Griff. Notul. iv. 523. *H. tortuosus*, Roxb. Fl. Br. Ind. iii. 192; Wall. Cat. 1912 G, 1913 B.

All the provinces; near water. Distrib. The tropics generally near the coasts.

5. H. FLOCCOSUS, Mast. in Hook. fil. Fl. Br. Ind. i. 343. A tree 30 to 40 feet high; young branches, petioles, peduncles and outer surfaces of involucres and calyx rugulose and minutely rusty-puberulous. *Leaves* sub-coriaceous, cordate-reniform, 5-angled, acute, irregularly and

distantly sub-crenate ; both surfaces minutely and sparsely stellate-pubescent, glabrescent when old, harsh ; length and breadth 2 to 6 in., petiole less than half as long as the blade. *Flowers* in stout few-flowered terminal racemes longer than the leaves ; peduncles stout, very rugulose, ebracteate, ·75 to 1·5 in. long. *Involucres* combined into a bluntly-lobed cup much shorter than the calyx. *Sepals* oblong-lanceolate, 1·5 in, long, coriaceous, united for half their length or more. *Petals* membranous, spathulate, 4 in. long, glabrous inside, boldly striate and hispid-pubescent externally. *Staminal-tube* stellate-pubescent. *Capsule* obovoid, truncate, shorter than the persistent closely adherent calyx, densely stellate-pubescent and very rugulose, 5-valved, dehiscing only at the apex. *Seeds* numerous, obovate, subcompressed, with shortly pilose angles, the rest of the surface scaly.

Mount Ophir, Malacca ; Maingay (Kew Distrib.) 216. Perak ; King's Collector 7024.

I have not been able to detect stipules on any of the specimens I have seen. They are probably fugacious.

5. Thespesia, Corr.

Trees or shrubs. *Leaves* entire. *Inflorescence* axillary. *Bracteoles* 5-8, arising from the thickened end of the peduncle, deciduous. *Calyx* cup-shaped, truncate, minutely 5-toothed. *Corolla* convolute. *Staminal-tube* 5-toothed at the apex. *Ovary* 4-5-celled ; style club-shaped, 5-furrowed, entire or 5-toothed ; ovules few in each cell. *Capsule* loculicidal or scarcely dehiscent. *Seeds* tomentose ; cotyledons conduplicate, black-dotted.—Natives of tropical Asia, Madagascar, and Australasia ; species about 6.

T. populnea, Corr. in Ann. Mus. ix. p. 290. A tree 20 to 30 feet high, young shoots scaly. *Leaves* on long petioles, sub-coriaceous, broadly cordate, acuminate, entire, glabrous above, sparsely scaly on lower surface ; the base 5 to 7-nerved with a glandular pore between the nerves ; length 4·5 to 6 in., breadth 3 to 4 in. petiole 2·5 in. *Flowers* 2 to 3 in. in diam., solitary, axillary, on peduncles shorter than the petioles ; *petals* bright yellow with a brown spot at the base ; bracteoles close to the calyx, lanceolate, often abortive. *Capsule* 1 to 1·5 in. in diam., depressed-spheroidal, scaly, becoming glabrescent ; pericarp of 2 layers. *Seeds* 1 to 3 in each cell, reniform, minutely tomentose or mealy. Mast. in Hook. fil. Fl. Br. Ind. i. 345 ; Kurz For. Fl. Burm. i. 128 ; Miq. Fl. Ind. Bat. i. pt. 2, 150 ; Pierre Fl. For. Coch-Chine x. 173 ; Bl. Bijdr. 73 ; Cav. Diss. iii. 152, t. 56, f. 1 ; DC. Prodr. i. 456 ; W. & A. Prodr. i. 54 ; Wight Ic. t. 8 ; Thwaites Enum. 27 ; Beddome Fl. Sylvat. t. 63 ;

Dalz. & Gibs. Bomb. Fl. 18; Wall. Cat. 1888, 1, 2, & C to H. Miq. Fl. Ind. Bat. i. pt. 2, 150. *Hibiscus populneus*, L.; Roxb. Hort. Beng. 51; Flor. Ind. iii. 190. *H. populneoides*, Roxb. l.c. *Malvaviscus populneus*, Gærtn. Fruct. ii. 253, t. 135. *Azanza acuminata*, Alefeld Bot. Zeit. 1861, 299.

In all the provinces, on the sea-shore. Distrib. Tropics generally.

6. Bombax, Linn.

Trees. *Leaves* digitate, deciduous. *Peduncles* axillary or subterminal, solitary or clustered, 1-flowered. *Flowers* appearing before the leaves. *Bracteoles* 0. *Calyx* coriaceous, cup-shaped, truncate or lobed. *Petals* obovate or oblong. *Stamens* in 5 bundles opposite the petals: filaments numerous; anthers reniform, 1-celled. *Ovary* 5-celled, multiovulate; style clavate, stigmas 5. *Capsule* loculicidally 5-valved, valves coriaceous, wooly within. *Seeds* silky, the testa thin, albumen small; cotyledons contortuplicate. About 10 species, all tropical and mostly American; 1 in Africa.

1. B. insigne, Wall. Pl. As. Rar. i. 71, t. 79, 80; Cat. 1841. A tall tree; trunk without prickles; branchlets armed or not; all parts glabrous. *Leaves* 7-9-foliolate; leaflets sub-coriaceous, obovate or oblanceolate, shortly acuminate, attenuate at the base, glaucous beneath; length 5 to 8 in., breadth 2·5 to 3 in.; petiolules ·5 to ·75 in.: petioles longer than the leaflets. *Flowers* 5 or 6 in. long, solitary towards the end of the leafless branches; peduncles ·75 in. long, stout, clavate. *Calyx* 1·5 in. long, thickly coriaceous, urceolate-globose, obscurely and irregularly lobed, ultimately 2-cleft, sub-glabrous outside, silky inside. *Petals* fleshy, oblong, obtuse, recurved, internally glabrous, externally shortly sericeous, red to orange or yellowish. *Stamens* many; filaments fleshy, united for ·5 in. above the base into 4 or 5 bundles. *Capsule* oblong, 10 in. long by 1·5 in thick, curved, glabrous. Mast. in Hook. fil. Fl. Br. Ind. i. 349; Kurz For. Fl. Burm. i. 130; Journ. As. Soc. Beng. 1873, ii. p. 61. *B. festivum*, Wall. Cat. 1841.

Andamans. Distrib. Burmah.

The earliest name of this is *B. festivum* (1828). But at p. 89 of his Catalogue, Wallich changed this to *B. insigne*, under which name he figured and described it. It comes very near to *B. malabaricum*, DC.; but Wallich says it is a much smaller tree, and Kurz says it has many more stamens, than the former. I include it as an Andaman plant solely on the authority of the late Mr. Kurz, but I have seen no specimen collected by him or by any other person in the Andamans. And I have a strong suspicion that what Kurz regarded

as *B. insigne* is really an undescribed species which Wallich issued as 1840-2 B of his Catalogue under the name *B. malabaricum*, var. *albiflora*. His No. 3 of the same name I have not seen. A tree with leaves exactly like Wallich's 1840-4 and with unarmed trunk and branches has recently been collected in the little Coco Island by Dr. D. Prain for the Calcutta Herbarium.

2. B. MALABARICUM, DC. Prod. i. 479. A tree with the general characters of the last, but much larger; and with the trunk and branches prickly, the leaflets much narrower (lanceolate not obovate) and the flowers and fruit smaller. Mast. in Hook. fil. Fl. Br. Ind. i. 349; Kurz For. Fl. Burm. i. 136; Bl. Bijdr 81; Wight Ill. t. 29; W. & A. Prodr. i. 61; Wall. Cat. 1840 (exclude No. 4 and possibly No. 2 B); Beddome Fl. Sylvat. t. 82. *Salmalia malabarica*, Schott Meletem, 35; Thwaites Enum. 28; Dalz. & Gibs. Bomb. Fl. 22; Miq. Fl. Ind. Bat. i. pt. 2, 166. *Bombax heptaphylla*, Cav. Diss. v. p. 296; Roxb. Hort. Beng. 50; Cor. Pl. iii. t. 247; Fl. Ind. iii. 167. *B. Ceiba*, Burm. Fl. Ind. 145, excl. syn. *Gossampinus rubra*, Ham. in Trans. Linn. Soc. xv.

Andaman Islands; common.

7. ERIODENDRON, DC.

Trees. *Leaves* digitate, deciduous. *Flowers* appearing before the leaves, tufted at the ends of the branches, or axillary, large white or rose-coloured. *Bracteoles* 0. *Calyx* cup-shaped, truncate, or 3-5-fid. *Petals* oblong. *Staminal* bundles 5, opposite the petals, connate at the base, each bearing 2-3 sinuous or linear anthers. *Ovary* ovoid, 5-celled; style cylindrical, dilated, stigma obscurely 5-lobed. *Capsule* oblong, coriaceous or woody, 5-celled, 5-valved, valves densely silky within. *Seeds* globose or obovoid; testa crustaceous, smooth with silky hairs, albumen scanty; cotyledons contortuplicate.—About eight species—1 Asiatic and African, the others American.

1. E. ANFRACTUOSUM, DC. Prod. i. 479. A tall tree, the trunk prickly when young; branchlets stout, smooth, glaucous. *Leaflets* 8 or 9, lanceolate, acuminate, entire or serrulate towards the apex, the base acute; glaucous beneath; length 3 to 4 in., breadth ·75 to 1 in., petiolule ·25 in. broad; petioles usually longer than the leaflets. *Flowers* pedunculate, in fascicles of 3 to 8 below the apices of the branches; peduncles 1 to 2 in. long, minutely bracteate: involucre none. *Calyx* cup-shaped, with 5 rounded lobes, glabrous externally, sericeous internally. *Petals* oblanceolate, tomentose externally, glabrous within, 1 to 1·5 in. long, whitish. *Filaments* shorter than the petals. *Capsule* oblong, 3 to 5 in. long, smooth. *Seeds* numerous, sub-ovoid, black. Mast. in Hook. fil.

Fl. Br. Ind. i. 350; Bl. Bijdr. 81; W. & A. Prodr. i. 61; Wight Ic. t. 400; Griff. Not. iv. 533; Dalz. & Gibs. Bomb. Fl. 22; Miq. Fl. Ind. Bat. i. pt. 2, 166; Beddome Fl. Sylvat. Anal. Gen. t. 4. Wall. Cat. 1839. *Bombax pentandrum*, Linn. Sp. Pl. 989; Cav. Diss. v. 293, t. 151; Roxb. Fl. Ind. iii. 165. *B. orientale*, Spreng. Syst. iii. 124. *Ceiba pentandra*, Gærtn. Fruct. ii. 244, t. 133; Ham. in Trans. Linn. Soc. xv. 126. *Eriodendron orientale*, Steud. Nomencl. 587; Thwaites Enum. 28; Kurz For. Fl. Br. Burm. i. 131.

In all the provinces. Distrib. Malayan Archipelago, British India, West Indies. Often planted.

8. Durio, Linn.

Trees, with entire coriaceous penni-nerved leaves, scaly beneath (except in *D. Oxleyanus*). *Flowers* in lateral cymes: peduncles angular. Bracts 2 or 1, connate into a cup, or distinct below, tips free, deciduous. *Calyx* bell-shaped, leathery, like the bracteoles densely scaly, the sepals distinct, or 5-fid, lobes valvate oblong or rounded. *Petals* 5, contorted-imbricate, spathulate, longer than the sepals. *Staminal-tube* divided into 4-5 phalanges opposite the petals; filaments many, bearing a globose head of sinuous 1-celled anthers, or (in *D. Oxleyanus*) a single annular 1-celled anther. *Ovary* usually scaly externally, 4-5-celled; styles connate, stigmas capitate; ovules many and 2-seriate in each cell. *Fruit* very large, subglobose or oblong, spiny, indehiscent or loculicidally 5-valved. *Seeds* arillate; cotyledons fleshy, often connate. Distrib. Malay Peninsula and islands; species 3.

1. D. Zibethinus, Linn. Syst. Nat. edit. xiii. p. 581. A tall tree; young branches thin and, like all the soft parts except the upper surfaces of the leaves, minutely scaly. *Leaves* elliptic-oblong, rarely obovate-oblong, shortly and abruptly acuminate, the base rounded; both surfaces shining, the upper glabrous, the lower adpressed-lepidote; main nerves 10 to 12 pairs, thin, slightly ascending; length 4·5 to 6 in., breadth 1·5 to 1·8 in., petiole ·4 to ·5 in. *Flowers* 2 in. long, 2 to 3 in. in diam., on long slender pendulous dichotomus peduncles in fascicles from the stem and larger branches, globose in bud: peduncles lepidote, 3 in. long, the bracts embracing the calyx and shorter than it. *Calyx* tubular, ventricose at the base, the limb with 5 or 6 short broad teeth. *Petals* twice as long as the calyx, spathulate. *Stamens* in 5 bundles united only at the very base; the filaments in each bundle united for one-fourth of their length: anthers glomerulate, reniform, compressed. *Ovary* elongate-ovoid, scaly; style pubescent, as long as the stamens. *Fruit* ovoid-globose, 8 to 12 in. long, woody, densely covered with strong

smooth pyramidal spines, 5-valved. *Seeds* few, large, with copious succulent arillus. Mast. in Hook. fil. Fl. Br. Ind. i. 351, and Journ. Linn. Soc. xiv. 501; Beccari Malesia, iii. 230, t. xii. f. 1 to 5, xxxvi. f. 1 to 12; Kurz For. Fl. Burm. i. 131; DC. Prod. i. 480; Bl. Bijdr. 81; Koen. in Trans. Linn. Soc. vii. 266, t. 14—16; Roxb. Fl. Ind. iii. 399. Miq. Fl. Ind. Bat. i. pt. 2, 167. Griff. Not. iv. 528; Ic. t. 596. Wall. Cat. 1842. —Rumph. Amb. i. 99, t. 29.

In all the provinces except probably the Nicobars, cultivated. Distrib. Malayan Archipelago.

2. D. Lowianus, Scortechini MSS. A tree 50 to 60 feet high; young branchlets and petioles and lower surface of midrib with rather large loose scales. *Leaves* narrowly elliptic-oblong, shortly acuminate; the base rounded, not attenuate; upper surface glabrous, the midrib puberulous, lower quite covered with adpressed scales, mostly minute, but a few larger and loose; main nerves 14 to 18 pairs, faint, sub-horizontal; length 4·5 to 5·5 in., breadth 1·5 to 2 in.; petiole ·5 in. stout. *Cymes* crowded on small tubercles on branches several years old, trichotomous, 3 in. in diam. and about as long. *Flower-pedicels* ·5 to ·75 in. long, angled, covered with loose coppery scales. *Flowers* 2 in. in diam.; bracts 2 or 3, ·5 in. long, broadly ovate, connate, deciduous. *Calyx* campanulate, its base sub-inflated, ·75 in. long, its mouth with 3 broad blunt, shallow teeth, glabrous inside, covered with large silvery scales outside. *Petals* 5, oblanceolate, glabrous inside, pubescent outside, 1·25 in. long. *Stamens* in 5 phalanges, dividing shortly above the base into about 8 processes each dividing at its apex into several short filaments, each bearing a single reniform anther with marginal dehiscence. *Ovary* broadly ovoid, densely covered with large loose scales, 5-celled with 4 ovules in each, biseriate. *Style* cylindric, tapering, pubescent: stigma capitate. Fruit unknown.

Perak. Scortechini No. 1969.

A species collected only once and named by the late lamented Father Scortechini in honour of Sir Hugh Low, representative of the British Government at Perak, and to whose enlightened help Malayan Botany owes very much. The species approaches *D. Zibethinus* in many respects.

3. D. malaccensis, Planch. MSS. Mast. in Hook. fil. Fl. Br. Ind. i. 351. A tree; the young branches thin, very minutely adpressed-scaly. *Leaves* elliptic-lanceolate with acute apices; the base acute, sometimes slightly rounded; main nerves about 20 pairs, thin, almost horizontal; both surfaces shining, the upper glabrous, the lower very

minutely adpressed-scaly; length 5 to 6·5 in., breadth 1·5 to 1·8 in.; petiole ·5 in., scaly like the branches. *Peduncles* ·5 to 1 in. long, in fascicles from tubercles on the stem, angled, bifurcating at the apex and bearing two pedicellate flowers, sometimes bearing one or two pedicels below the apex: pedicels two or three times as long as the common peduncles, angled, loosely scaly. *Flowers* 2·5 to 3 in. long. *Bracts* 2, broadly ovate, acute, embracing the buds. *Sepals* 5, ovate-oblong, blunt, valvate, 1·25 in. long, glabrous internally but with numerous very loose scales externally. *Petals* nearly twice as long as the sepals, narrowly oblong, pubescent on both surfaces, the outer with a few loose scales. *Anthers* narrowly oblong, 1-celled, sessile in groups on the apices of groups of combined filaments which are again united into 5 phalanges which, for more than half their length, form a tube round the ovary and stylo. *Ovary* oblong, angled, densely covered with scales with long cylindric stalks and flat heads. *Style* shorter than the staminal tube, pubescent, slightly scaly. *Stigma* capitate. *Young fruit* globular, densely covered with subulate pubescent spines. *Ripe fruit* unknown. Mast. in Journ. Linn. Soc. xiv. p. 501, t. xiv. fig. 17 to 20: *Beccari Malesia*, iii. 237, t. xii. fig. 6 to 8.

Malacca; Griffith, Maingay (No. 212, Kew Distrib.) Distrib. Burmah.

This is known only from Malacca and Burmah. It is distinguished from *D. Perakensis*, which in other respects it much resembles, by the stalked scales on the ovary, and by the larger and looser scales on the leaves. Doubtless when ripe fruit of both is found, better characters will be yielded by it. Beccari's specimen No. 852, and the same distinguished botanist's Nos. 2190 and 2590 from Borneo, have been referred by Masters (Journ. Linn. Soc. l. c.) to this species. But Beccari (in *Malesia* iii. 238, 244) founded his species *D. affinis* on the former, and his *D. testitudinarum* on the two latter.

4. D. TESTITUDINARUM, Becc. Malesia, iii. p 244, t. xiii and xiv. A tall tree bearing flowers only near the base of the trunk; young branches rather slender, minutely sub-adpressed scaly. *Leaves* narrowly elliptic-oblong or oblanceolate-oblong, acute or shortly acuminate, the margins (in var. 2) sometimes with a single wide shallow indentation, the base rounded; upper surface glabrous, the lower densely covered with sub-adpressed scales: main nerves 18 to 22 pairs, rather bold, subhorizontal: length 4·6 to 8·5 in. (only 2·5 to 3·5 in. in var. 1 and much longer and broader in var. 2); breadth 1·4 to 2·2 in.; petiole 6 to ·25 in., thickened at apex. *Flowers* 3 to 3·5 in. long, in short condensed bracteolate racemes from tubercles near the base of the trunk;

the axes, pedicels, bracteoles and bracts densely covered with large loose scales: bracts enveloping the buds 2, broadly ovate, blunt. *Sepals* 5, valvate, wide and saccate at the base, the apices narrowed, glabrous inside, densely covered outside with loose large scales. *Petals* narrowly oblong, obtuse, more than twice as long as the sepals. *Stamens* as in *D. Malaccensis*. *Ovary* oblong, densely covered with loose, flat, sessile scales. *Style* shorter than the stamens, pubescent, sparsely scaly. *Stigma* capitate. *Fruit* (according to Beccari) on long peduncles, globose, 4 in. in diam., with 4 or 5 slight superficial grooves, densely covered with short broad pyramidal spines. *Seeds* sub-ovate, obtuse, angled; the arillus short, thin, cup-shaped.

Perak; at low elevations, Kunstler, Wray. Distrib. Borneo.

Var. 1. *Pinangiana*, Becc. l. c. 246. Leaves narrowly lanceolate, acuminate, 2·5 to 3 5 in. long by ·6 to ·9 in. broad. *Flowers* smaller than in the typical form: fruit unknown.

Penang, at 2,500 feet; Curtis No. 293. This variety, of which only imperfect specimens have as yet been obtained, will probably, when full material shall be forthcoming, prove to be a distinct species.

Var. 2. *macrophylla*, King. *Leaves* 10 to 17 in. long, 2·5 to 5·5 in. broad, the edge sometimes with a single shallow indentation. Racemes 3 in. long, many-flowered, with numerous bracteoles.

Perak; Kunstler 7497, Wray 3397. No fruit of this variety has as yet been collected. Like the last, it may prove to be a distinct species.

5. D. Wrayii, King, n. sp. A large tree; young branches very slender and, like the petioles and under surface of midrib, covered with rather large adpressed pale brown scales. *Leaves* narrowly elliptic-oblong with caudate acuminate apex and rounded base; upper surface quite glabrous, lower closely covered with thin adpressed silvery scales smaller than those on the midrib; main nerves 10 to 12 pairs, sub-horizontal, faint: length 5·5 to 8·5 in., breadth 2 to 2·5 in., petiole ·75 in. *Flowers* nearly 2 in. long, from the branches; pedicels of individual flowers rather more than 1 in. long, with many large loose scales. *Bracts* 3, broadly ovate, connate. *Calyx* cup-shaped, the mouth with 5 broad, rather deep, sub-acute teeth; inside glabrous, outside covered with large adpressed silvery scales as are also the bracts. *Petals* 1·5 in. long, oblanceolate, or spathulate-clawed, the claw very narrow, pubescent on both surfaces but especially on the outer. *Stamens* in 5 phalanges united at the bases only, each phalange dividing into 5 or 6 processes at the apices of which are born about 8 narrow reniform authers dehiscing by their edges. *Ovary* broadly ovoid, loosely scaly.

Style longer than the stamens, cylindric, pubescent, not scaly: stigma capitate. *Fruit* unknown.

Upper Perak at 300 feet; Wray.

The fruit of this is unknown. Mr. Wray describes the petals as pink. The caudate-lanceolate leaves of this are different from those of any other *Durio* of the Malayan Peninsula.

6. D. Oxleyanus, Griff. Notul. iv. 531. A tree, the young branches, petioles and under surfaces of the midrib adpressed-lepidote. *Leaves* elliptic-oblong, rounded at base and apex; upper surface glabrous; the lower softly pubescent, not scaly except on the midrib, the 15 to 18 pairs of main nerves stout, sub-horizontal, prominent beneath; length 3·5 to 5 in., breadth 1·5 to 2 in., petiole ·5 in. *Flowers* about 1 in. in diam., in few-flowered scaly cymes from the smaller branches. *Involucral bracts* 2, broadly ovate, pubescent, sparsely and minutely scaly. *Calyx* cup-shaped, the mouth with 4 broad shallow rather blunt teeth, inside glabrous, outside with many large loose scales. *Petals* 4, oblanceolate or spathulate, little longer than the calyx, pubescent on both surfaces, not scaly. *Stamens* 20, shorter than the petals; 5 free and alternating with 5 phalanges of 3 each which are slightly united by the bases of their filaments: *anthers* solitary, drum-shaped, the dehiscence circular. *Ovary* depressed-globular, 4-celled, densely stellate-hairy. *Style* cyliudric, pilose; stigma capitate. *Fruit* unknown. Mast. in Hook. fil. Fl. Br. Ind. i. 351 and Journ. Linn. Soc. xiv. 501, t. xvi. fig. 13 to 16. Beccari Malesia, III, 252. *Neesia Griffithii*, Planch. MSS.

Malacca, Griffith No. 545. Maingay, No. 220, (Kew Distrib.)

This differs, as Beccari has well pointed out (Malesia l. c.), from the other species of *Durio* by the absence of scales from every part of the leaf except the petiole and midrib; by the single, not glomerulate, anthers; by the hairy, not squamose, ovary. Should the fruit when found also present differences, it may be desirable to create a new genus for this species.

9. Boschia, Korth.

Trees. *Leaves* oblong, entire, scaly beneath. *Flowers* small, axillary. *Bracteoles* 2-3, connate at the base, deciduous. *Calyx* deeply 4-5 parted. *Petals* linear-ligulate, entire or laciniate. *Stamens* many, some free, others irregularly coherent, outermost without anthers; anthers globose, 1-celled, opening by a terminal pore, solitary, or in groups of 2-6. *Ovary* 3-5-celled, style elongate; ovules one or more in each cell. *Fruit* oblong, 3 to 5-celled, 3 to 5-valved, muricate. *Seeds* few, ovoid, half-covered by a fleshy, coloured, cup-shaped arillus; cotyledons foliaceous. Species 4: all Malayan.

1. B. Griffithii, Masters in Hook. fil. Fl. Br. Ind. i. 352. A tree 40 to 60 feet high; young branches rather slender, pale, minutely furfuraceous. *Leaves* oblong, or elliptic-oblong, or obovate-oblong, shortly and abruptly acuminate, slightly narrowed towards the rounded base; upper surface quite glabrous; the lower pale, very minutely pubescent, the midrib and nerves slightly scaly; main nerves 8 to 11 pairs, spreading, prominent beneath and dark coloured; length 5 to 6·5 in., breadth 1·5 to 2·25. in., petiole ·4 to ·6 in.: stipules linear, deciduous. *Flowers* ·75 in. in diam., solitary, or in 2 to 3-flowered cymes from the axils of leaves or of fallen leaves; pedicels shorter than the petioles, bracteolate. *Involucral bracts* 2, broadly-ovate, blunt, connate at the base, closely enveloping the buds; scaly externally, glabrous within. *Sepals* 4, ovate, spreading, pubescent on both surfaces, scaly also on the outer. *Petals* 4 to 8, nearly twice as long as sepals, linear or linear-spathulate, ·1 in. broad. *Stamens* very numerous, unequal, slightly united by the bases of the filaments: the outer without anthers, some flat resembling the petals, a few of the inner longer and bearing at their apices 1 to 4 oblong obovoid anthers which dehisce by an apical pore. *Ovary* ovoid, 3-celled, densely covered with peltate, fimbriate, long-stalked scales. *Style* as long as the longest stamens. *Stigma* subcapitate. *Fruit* oblong, pointed at each end, 1·5 to 2 in. long, densely covered with sharp stout conical spines, 3-celled, dehiscent. *Seeds* 3 to 6, or fewer. Mast. in Journ. Linn. Soc. xiv. t. xv, fig. 29 to 39, t. xvi., fig. 40 to 42. *Beccari Malesia* III, p. 256. *Heteropyxis*, Griff. Not. iv. 524; Ic. Pl. As. t. 594.

Malacca; Griffith, Maingay. Perak, very common. Distrib. Sumatra, Forbes, No. 3068.

10. Neesia, Blume.

Trees. *Branches* marked with large leaf-scars. *Leaves* entire, pinnate-veined. *Stipules* leafy. *Cymes* from the stem in the axils of the fallen leaves. *Bracteoles* 3, connate into a cup, deciduous, covered, like the sepals, with peltate scales. *Calyx* ventricose, conical above, opening by a circular irregularly crenulate orifice at the top, ultimately dilated and cushion-shaped at the base. *Petals* 5, free, imbricate. *Stamens* numerous, the filaments more or less united; anthers 2-celled, opening lengthwise, connective thick; staminodes 0. *Ovary* oblong, 5-celled; style short; stigma capitate; ovules numerous, 2-seriate, horizontal, anatropous. *Fruit* ovoid, woody, muricate, loculicidally 5-valved. *Seeds* albuminous; aril 0; cotyledons flat, leafy. Distrib. Seven species, all Malayan.

N. SYNANDRA, Mast. in Hook. fil. Fl. Br. Ind. i. 352. A tree 70 to 100 feet high; young branches stout, their bark dark lenticellate and with large cicatrices. *Leaves* large, crowded near the apices of the branches, coriaceous, oblong-elliptic to obovate-elliptic: the apex rounded, emarginate; the edges sub-undulate, slightly narrowed in the lower third to the sub-cordate base; upper surface glabrous, lower puberulous; nerves 13 to 22 pairs, spreading, stout and distinct on both surfaces, the reticulations also distinct; length 7 to 16 in., breadth 3·5 to 8 in.; petiole 1·5 to 3 in., thickened at base and apex; stipules foliaceous, with very stout midribs, 1·5 to 2·5 in. long. *Cymes* short (1·5 in. long), crowded, dichotomous, 8 to 12-flowered, from the axils of sub-apical fallen leaves; the pedicels short, scaly. *Flowers* about ·6 in. long. *Bracts* connate into a 3-lobed cup surrounding the base of the flowers. *Calyx* ventricose with a contracted irregularly and minutely toothed mouth, densely pubescent inside, scaly outside as are the bracts, ultimately involute so as to form an annular cushion ·5 in. or more in diam. *Petals* 5, free, much imbricate, ovate-lanceolate, glabrous. *Stamens* numerous, the filaments more or less connate at the base, unequal; anthers sub-globular, 2-celled. *Ovary* conical, sessile, densely pilose, not scaly: style slightly longer than the ovary; stigma capitate, 5-angled. *Fruit* 6 to 8 in. long and 4 to 5 in. in diam., ovoid-conic, pedunculate, with 5 bold rounded vertical angles: the pericarp very thick, woody, externally covered with stout pyramidal sharp spines, internally lined with a dense layer of stiff yellow hair; 5-celled, dehiscent. Mast. in Journ. Linn. Soc. xiv. p. 504. *Beccari Malesia*, iii. 263.

Malacca, Maingay. Perak; Scortechini, Wray, King's Collector.

I have seen no specimens of the plant (*N. altissima*) on which Blume founded this genus. But, judging from his admirable description and fine coloured figure (Nov. Act. Acad. Caes. xvii. 83, t. vi), this species must be very closely allied to that. I find the stamens of this agree both with Blume's description above referred to, and with Sig. Beccari's, in his admirable and splendidly illustrated monograph in *Malesia* iii. pp. 258 to 268. Ripe fruit and seeds of this are as yet unknown.

11. CŒLOSTEGIA, Benth.

Tall trees. *Leaves* simple, entire, scaly beneath. *Flowers* small (scarcely ·25 in. in diam.), cymose; the inflorescence, bracts and calyx scaly. *Bracts* connate into a toothed cup. *Calyx* with constricted tube, pouched above and constricted at the apex into 5 connivent lobes. *Petals* 5, free, inserted near the apex of the calyx tube, connivent. *Stamens* numerous; the filaments short, thick, slightly connate at the base, the apex constricted; the anthers globose, 3 to 4-celled. *Ovary*

partly immersed in the calyx-tube, globular or sub-globular, 5-celled; the ovules few, erect. *Style* short; stigma peltate, discoid, large. *Fruit* large, woody, murieate externally, hairy within, 5-celled, few-seeded, dehiscent. Three species; all Malayan.

C. Griffithii, Benth. in Benth. & Hook. fil. Gen. Plant. i. 213. A tree; the young branches rather slender, dark-coloured, striate, minutely and deciduously scaly. *Leaves* coriaceous, oval, shortly and bluntly acuminate, the base rounded; upper surface glabrous, lower sparsely adpressed-scaly; main nerves about 8 pairs, spreading, faint; length 2·4 to 3·75 in., breadth 1·25 to 1·6 in.; petiole ·5 to ·75 in., minutely adpressed-scaly. *Inflorescence* of fasciculate cymose racemes about 2 in. long, from the axils of fallen leaves, many-flowered; pedicels longer than the flowers. *Flowers* ·25 in. in diam., scaly. *Bracts* connate into a 3-lobed cup less than half as long as the calyx. *Calyx* constricted at the base, then dilated into a 5-pouched sac which is contracted and 5-toothed at its apex. *Petals* 5, distinct, inserted on the calyx at the apex of its tube, triangular, acute, connivent, fleshy, glabrous. *Stamens* numerous, attached to the petals; the anthers small, globose, 3 or 4-celled. *Ovary* globular-obovate, densely covered with large loose scales. *Style* shorter than the ovary; stigma peltate, thick, its edges wavy. *Fruit* unknown. Mast. in Hook. fil. Fl. Br. Ind. i. 353 and Journ. Linn. Soc. xiv. 505, t. xvi, figs. 43 to 50. *Beccari Malesia*, iii. 270.

Malacca, Griffith; Perak, Scortechini, King's Collector.

Fruit was not known when this genus was first established by the late Mr. Bentham; and, of this species, fruit is still unknown. Sig. Beccari has, however, discovered two species in Sumatra and Borneo (*C. Sumatrana* and *Bornensis*) the fruit of which he describes and figures (*Malesia*, iii. 271, t. xxvii. to xxix); and from his description the generic description has been completed.

Order XVIII. STERCULIACEÆ.

Herbs, shrubs or trees; herbaceous portions usually more or less stellate-pubescent. *Bark* usually abounding in mucilage, inner fibrous. *Leaves* alternate, simple, often lobed, stipulate. *Inflorescence* axillary, rarely terminal, usually cymose. *Flowers* regular, uni- or bi-sexual. *Sepals* 5, often connate. *Petals* 5 or 0. *Androecium* columnar or tubular, of many stamens; or stamens rarely few, free; anthers in heads, or in a single ring at the apex of the column, or dispersed on the outside of the tube, or arranged along the edge of a cup or tube, with intervening staminodes or sterile stamens; anther-cells always 2,

parallel or divergent. *Ovaries* 2 to 5, free, rarely 1, sessile or stalked; styles slightly united and becoming free or slightly coherent, as many as the ovaries. *Ovules* many or few, attached to the inner angles of the ovaries, anatropous, ascending or horizontal, raphe ventral or lateral. *Fruit* dry or fleshy, dehiscent or indehiscent. *Seeds* sometimes arillate, albuminous or oxalbuminous: cotyledons leafy, flat, folded or convolute; radicle short, inferior, pointing towards, or remote from the hilum. Distrib. Abundant in the tropics of either hemisphere and in subtropical Africa and Australia. Genera 40—45; species from 500 to 600.

Tribe I. *Sterculieæ.* *Flowers* unisexual or polygamous. *Petals* 0. *Androecium* columnar; the anthers clustered at its apex; or in a 1-seriate ring.

Anthers numerous.

Ovary with 2 or more ovules in each cell; fruit dehiscent ... ... 1. *Sterculia.*

Ovarian cells 1-ovuled; fruit indehiscent 2. *Tarrietia.*

Anthers 5, whorled; fruit indehiscent. 3. *Heritiera.*

Tribe II. *Helictereæ.* *Flowers* hermaphrodite. *Petals* deciduous. *Androecium* columnar below, dilated above into a cup, margin bearing on it the anthers usually alternating with staminodes.

Capsule membranous, inflated... ... 4. *Kleinhovia.*

Capsule more or less woody, not inflated.

Anther-cells divaricate; seeds not winged 5. *Helicteres.*

Anther-cells parallel; seeds winged ... 6 *Pterospermum.*

Tribe III. *Hermannieæ.* *Flowers* hermaphrodite. *Petals* marcescent, flat. *Androecium* tubular at the base only; stamens 5, staminodes 0.

Ovary 5-celled ... ... 7. *Melochia.*

Ovary 1-celled, 1-seeded ... ... 8. *Waltheria.*

Tribe IV. *Buettneriæ.* *Petals* concave or unguiculate at the base; filaments in a tube with the anthers at its apex, solitary or in groups between staminodes.

Stamens in a single series.

Stamens in groups between the staminodes;

Petals unguiculate ... ... 9. *Abroma.*

Stamens solitary between the staminodes.
Petals unguiculate, with 2 lateral lobes and a long subterminal appendage ... ... 10. *Buettneria.*
Petals linear not lobed, concave not unguiculate at the base ... 11. *Commersonia.*
Stamens in several series ... ... 12. *Leptonychia.*

1. Sterculia, Linn.

Trees or shrubs. *Leaves* simple, entire or palmately lobed, sometimes digitately compound. *Inflorescence* panicled or racemose, usually axillary and crowded towards the apices of the branches. *Flowers* male and hermaphrodite. *Calyx* campanulate or rotate, 4-5 lobed, often coloured. *Petals* 0. *Staminal column* bearing a head or ring of usually sessile, 2-celled, anthers at its apex, the cells often divergent. *Carpels* 5, distinct or slightly cohering, 2 to many-ovuled, borne on the apex of a more or less elongated gynophore; styles more or less connate: stigmas free or united so as to form a peltate lobed disc. *Ripe carpels* distinct, spreading, sessile or stalked, follicular, from membranous to woody, with several (rarely many) seeds; or navicular with a single seed. *Seeds* 1 to many, sometimes winged, rarely arillate; albumen bipartite, flat or lobed: cotyledons thin flat and adherent to the albumen, or fleshy; radicle near to or remote from the hilum. Distrib. About 70 species tropical and chiefly Asiatic.

Sect. I. *Eusterculio*, Endl. *Follicle* coriaceous or woody. *Seeds* two or more.
Leaves simple, orbicular or reniform.
Leaves lobed.
Follicles glabrous within, the edges only ciliate; gynophore and staminal tube glabrous ... ... 1. *S. villosa.*
Follicles hispid-pilose within; gynophore and staminal tube hairy ... 2. *S. ornata.*
Leaves not lobed ... ... 3. *S. macrophylla.*
Leaves simple, longer than broad; not orbicular or reniform.
Leaves quite glabrous.
Calyx-lobes not cohering by their apices ... ... 4. *S. laevis.*
Calyx-lobes cohering by their apices.
Flowers in racemes: nerves of leaves 6 pairs or fewer ... 5. *S. hyposticta.*

Flowers in panicles: nerves of leaves more than 6 pairs
Leaves narrowly oblong-lanceolate; follicles 1 to 1·25 in. long ... ... 6. *S. parvifolia.*
Leaves ovate or obovate-oblong to narrowly elliptic.
Ovaries 3, villous: stamens 7 7. *S. Kunstleri.*
Ovaries 5, scaly; stamens 10 8. *S. parvifolia.*
Leaves more or less hairy.
Calyx-lobes not cohering by their apices: leaves glandular-dotted beneath ... ... 9. *S. Scortechinii.*
Calyx-lobes slightly cohering by their apices: leaves white beneath ... 10. *S. bicolor.*
Calyx-lobes spreading, connivent and cohering by their apices.
Stigmas free, long, recurved ... 11. *S. augustifolia.*
Stigmas united into a lobed disc.
Leaves more or less obovate 12. *S. rubiginosa.*
„ lanceolato ... ... 13. *S. ensifolia.*
Species of uncertain position... ... 14. *S. pubescens.*

Sect. II. *Firmiana*, Marsili; Br. in Benn. Pl. Jav. Rar. 235 (gen.). *Follicles* membranous, opening long before maturity. *Seeds* two or more.
Calyx ·75 in. long: staminal tube about the same length; adult leaves glabrous... 15. *S. colorata.*
Calyx 1·25 in. long, staminal tube ·5 in. longer: adult leaves minutely stellate-pubescent ... ... 16. *S. fulgens.*

Sect. III. *Pterygota*, Endl. (gen.). *Follicles* woody. *Seeds* many, winged at the apex ... 17. *S. alata.*

Sect IV. *Scaphium*, Endl. *Anthers* 15, (sometimes 10). *Stigmas* lobed. *Follicles* large, membranous, boat-shaped, often gibbous, opening long before maturity, containing only 1 seed near the base.
Leaves ovate-rotund, deeply cordate ... 18. *S. linearicarpa.*
Leaves ovate to ovate-oblong: main nerves 2 to 4 pairs ... ... 19. *S. scaphigera.*

Leaves elliptic-oblong: main nerves 6 to 7 pairs ... ... 20. *S. affinis.*

Sect. V. *Pterocymbium*, Br. in Benn. Pl. Jav. Rar. 219 (gen.). *Flowers* sub-hermaphrodite. *Anthers* 10. *Styles* coherent, stigmas recurved. *Follicles* 4—6, membranous, opening long before maturity. *Seed* solitary.

Leaves broadly ovate, acuminate, the base deeply cordate ... ... 21. *S. campanulata.*

Leaves elliptic-oblong; the base broadly rounded or sub-truncate, not cordate... 22. *S. tubulata.*

1. S. VILLOSA, Roxb. Hort. Beng. 50. A tree 30 to 60 feet high: young branches thick, their apices tawny-tomentose and enveloped by the large sub-caducous stipules, the bark pale with large leaf-cicatrices. *Leaves* thickly membranous, rotund or reniform, with 5 to 7 broad abruptly acuminate often toothed lobes, the sinuses between the lobes acute; the base deeply cordate, the basal lobes rounded: upper surface at first minutely stellate-pubescent, ultimately glabrous, except the 5 to 7 radiating tomentose nerves: under surface uniformly and minutely tomentose; length and breadth from 12 to 18 inches: petiole deciduously densely pubescent, about as long as the blade: stipules ovate-lanceolate, acuminate, with cordate bases, pubescent, sub-caducous. *Panicles* from the axils of the previous year's leaves, solitary, from 6 to 12 in. long: branches short, many-flowered, tomentose. *Calyx* campanulate, ·4 in. in diam., with 5 ovate acute spreading lobes as long as the tube, yellowish with purple fundus, veined, puberulous outside especially towards the base, almost glabrous inside. *Male flower;* staminal column longer than the calyx-tube, slightly curved, quite glabrous, bearing at its apex 10 sub-sessile anthers with thick connective and 2 divergent cells. *Female flower;* gynophore glabrous, thickened above; ovaries 5, conjoined, tomentose; styles conjoined, puberulous, curved; stigma small, lobed. *Follicles* 3 to 5, coriaceous, sessile, bright red when ripe, oblong, tapering to both ends; 2 to 2·5 in. long by 1 in. broad; shortly hispid-pubescent externally, smooth and shining internally and glabrous except along the placental edges which are strongly ciliate. *Seeds* 6 or more, oval, smooth. Roxb. Fl. Ind. i. 153; Kurz For. Fl. Burm. i. 136; Mast. in Hook fil. Fl. Br. Ind. i. 355; Pierre Fl. Forest. Coch-Chine, t. 185, fig. D.; Wall. Cat. 1136, 2, 3, D.; W. & A. Prodr. i. 63; Dalz. & Gibs. Bomb. Fl. 22; Br. in Benn. Pl. Jav. Rar. 227.

Andamans, Prain. Distrib. British India.

2. S. ORNATA, Wall. in Herb. Calcutta. A tree 20 to 30 feet high: young branches thick, glabrous, pale, the leaf-cicatrices very large, the apices deciduously pilose, coccineous drying into brown. *Leaves* thickly membranous, reniform, more or less deeply divided into 5 or 7 acuminate lobes, the sinuses between the lobes wide, the base deeply cordate; upper surface minutely strigose, often stellate, minutely pitted; lower surface yellowish-brown, minutely and uniformly tawny-tomentose, minutely glandular-dotted under the hair; the 5 to 7 radiating main nerves and the ascending secondary nerves bold and distinct; length about 12 in., breadth about 15 in.; petiole 15 to 18 in. long, thickened at the base, minutely tomentose. *Panicles* from the axils of the previous year's leaves, solitary, 8 to 15 in. long, shortly branched, many-flowered, pulverulent reddish-tomentose. *Calyx* ochre-coloured with red fundus, veined, widely campanulate, sub-rotate, with 5 ovate acute spreading lobes longer than the tube, stellate-pubescent externally, puberulous internally; ·75. in. in diam. *Male flower;* gynophore about as long as the tube, curved, sparsely glandular-hairy, bearing at its apex 10 small anthers with thick connective. *Female flower;* gynophore thickened above, densely tawny-tomentose as are the conjoined ovaries and curved stylo; the ovaries with a ring of about 10 sessile anthers at their base; stigma discoid, rugulose, 5-lobed. *Follicles* about 5, sessile, coriaceous, narrowly oblong, very shortly beaked, brilliant orange scarlet when ripe, outside glabrescent, inside densely coccineous-pilose; length 4 in., breadth 1·25 in. *Seeds* about 6, oval, smooth. Wall. in Voigt Hort. Calc. Suburb. 105 (*name only*); Kurz Journ. As. Soc. Beng. Vol. xlii. pt. 2, p. 258; Vol. xliii. pt. 2, p. 116; For. Fl. Burm. i, 136. *Sterculia armata*, Mast. in Hook. fil. Fl. Br. Ind. i. 357, *in part.* Pierre Fl. Forest. Coch-Chine, t. 185, fig. C.

Burmah; Wallich, Brandis, Kurz. Andamans, Kurz.

I include this species because, although the evidence of its having been collected in the Andamans is not very good, I think it extremely likely that it does occur there, and that good unmistakeable specimens will soon be forthcoming. The species in many respects resembles *S. villosa*, with which it appears to have often been confused. The distinctive marks to separate it from *S. villosa* are that the leaves are minutely dotted and pitted; that the apices of the young branches have red hairs (becoming brown on drying); that after the hairs have fallen the young branches have pale polished bark with very large leaf-cicatrices and some warts, but no sub-persistent stipules; that the flowers are larger (·75 in. in diam. as against ·4 in); that the staminal column and gynophore are hairy; that the follicles are larger and paler; and that the whole of their inner surface is densely hispid-pilose.

3. S. MACROPHYLLA, Vent. Hort. Malm. ii. No. 91 (in note). A tree 80 to 120 feet high; young branches very thick, rough from the leaf cicatrices, the apices deciduously rufous or tawny-pilose. *Leaves* sub-coriaceous, broadly ovate to ovate-rotund or obovate-rotund, entire, narrowing to the slightly cordate 7-nerved base; upper surface sparsely and rather minutely pubescent, some of the hairs 2-branched, becoming glabrescent with age, the midrib and nerves always pubescent; under surface sub-tomentose, tawny, the midrib and 6 to 8 pairs of lateral nerves prominent, rufous-villose; transverse venation distinct, rather straight; length 8 to 16 in., breadth 6 to 12 in., petiole 3·6 to 6 in., softly hairy, tawny. *Panicles* solitary, axillary, nearly as long as the leaves, much-branched, many-flowered, hispidulous-pubescent, capillary, shorter than the flowers. *Flower-buds* minute, sub-globose. *Calyx* ·15 in. long, campanulate, stellate-hairy, 5-lobed; the lobes triangular, erect, shorter than the tube. *Follicles* 3 to 5, shortly stalked, woody, sub-rotund, about 2·25 in. each way, crimson when ripe, outside pubescent and longitudinally rugose; inside smooth. *Seeds* oblong, black, smooth, ·75 in. long. Mast. in Hook. fil. Fl. Brit. Ind. i. 356; R. Brown in Benn. Pl. Jav. Rar. 230.

Malacca; Maingay No. 233 (Kew Dist.). Perak; at elevations of 200 to 500 feet; King's Collector Nos. 6052 and 7923; Scortechini, No. 230. Distrib. Java, Brit. North Borneo.

4. S. LAEVIS, Wall. Cat. 1138. A shrub or small tree; young branches rather thin, with pale striate bark, the apices deciduously rusty-puberulous. *Leaves* membranous, narrowly ovate-oblong, sometimes slightly obovate, the apex shortly and bluntly acuminate; the base tapering, acute, rarely rounded, faintly 3-nerved: both surfaces glabrous, shining, the midrib and 6 to 9 pairs of spreading nerves prominent on the lower: length 4·5 to 9 in., breadth 2 to 3 in.; petiole 1·1 to 2·5 in., smooth, thickened at the apex. *Panicles* meagre, solitary, axillary, slender, puberulous, shorter than the leaves, few-flowered; pedicels about as long as the flowers. *Flower-buds* oblong. *Calyx* ·5 in. long or more, pubescent on both surfaces but especially on the inner; the tube urceolate, divided at its apex into 5 linear-oblong sub-acute ascending lobes, longer than the tube, slightly connivent but not cohering by their apices, hispidulous on their inner surface. *Male flower;* staminal column shorter than the tube, glabrous; anthers 10, sessile at its apex, elongate-ovate. *Hermaph. flower:* gynophore very short; ovaries 5, boat-shaped, rusty-pubescent, sub-sessile, with a ring of 10 sessile anthers at their base outside: styles almost obsolete; stigmas 5, cylindric, free, radiating, recurved, pubescent beneath. *Follicles* 3 to 5, coriaceous, narrowly

oblong, with short straight beaks, bright red when ripe, puberulous externally, slightly curved, glabrous, shining and ridged internally, 2 in. long and about ·5 in. broad. *Seeds* 3 or 4 oblong, black, shining. Mast. in Hook. fil. Fl. Br. Ind. i. 357. Pierre Fl. Forest. Coch-Chine t. 192, figs. 1 to 7; Br. in Benn. Pl. Jav. Rar. 230; Miq. Fl. Ind. Bat. i. pt. 2, 174. *S. coccinea*, Jack Mal. Misc. i. 286, not of Roxb.

Penang, Perak, Malacca, Singapore: at low elevations: but not common.

5. S. HYPOSTICTA, Miq. Fl. Ind. Bat. Suppl. 399. A shrub or small tree, all parts glabrous except the inflorescence: young branches slender, dark and smooth becoming (by the falling off of the bark) pale and striate. *Leaves* membranous, oblong, to oblong-lanceolate, sometimes slightly obovate, abruptly acuminate or even caudate-acuminate, entire, the base slightly narrowed and rounded, or not narrowed and truncate, emarginate, rarely acute, 3-nerved; both surfaces glabrous, shining: lateral main nerves 3 to 5 pairs, spreading, curved, inarching far from the margin, prominent beneath: length 3·5 to 5·5 in., breadth 1·5 to 2·25 in., petiole 1 to 1·5 in., thickened at base and apex. *Racemes* axillary, solitary, drooping, longer than the leaves, minutely whitish pubescent, with superficial brown stellate hairs: bracteoles linear, longer than the pedicels. *Calyx* with narrowly campanulate tube ·25 in. long, densely rufous-pubescent externally and glabrous inside: lobes 5, not quite so long as the tube, linear, spreading, connivent, cohering from some time by their tips, the edges recurved, glandular-pilose inside, sub-pubescent outside. *Male flower;* staminal column short, glabrous, with 8 sessile oblong 2-celled anthers at its apex. *Female flower:* gynophore short; ovaries 4, ovoid, conjoined, shortly tomentose, with ring of 8 sessile anthers at their base. *Style* simple, curved, sparsely villous; stigma large, glabrous, with 4 fleshy oblong-obovoid curved lobes. *Follicles* 2 or 3, coriaceous, bright red when ripe, narrowly oblong, tapering to each end, 2 to 2·25 in. long and ·65 in. broad; externally minutely rusty-pubescent; internally glabrous, wrinkled. *Seeds* 4, oblong, pointed, black. Kurz in Journ. As. Soc. Beng. Vol. xlv. pt. 2, p. 120.

Perak; King's Collector, Wray. Nicobars, Kurz.

6. S. PARVIFOLIA, Wall. Cat. 1123. A tree 20 to 30 feet high: young branches slender, striate, the older pale, the younger dark-coloured, glabrous. *Leaves* membranous, drying of a pale green, oblong-lanceolate, rarely ovate-oblong, bluntly acuminate, entire; the base acute or rounded, faintly 3-nerved; both surfaces glabrous: main nerves 6 to 8 pairs,

spreading, rather prominent on both surfaces as is the midrib: length 4 to 6·5 in., breadth 1 to 1·75 in.; petiole 1 to 1·75 in., smooth, slender, thickened at the apex. *Racemes* solitary, axillary, much shorter than the leaves, few-flowered, glabrous; flower-pedicels shorter than the flowers, capillary. *Flower-buds* oblong. *Calyx* less than ·5 in. long, glabrescent externally, puberulous internally especially on the lobes; tube wide, cylindric, with 5 linear-lanceolate lobes about as long as itself, spreading, incurving and joined for some time by their tips. *Male flower:* staminal column shorter than the tube and bearing at its apex about 12 small oblong anthers with thick connective and diverging cells. *Herm. flower:* gynophore very short, glabrous; ovaries 5, broadly ovate, rusty-pubescent; styles united, recurved, with many white spreading hairs: stigmas clavate, flattened, recurved, spreading. *Follicles* 3 to 5, broadly oblong, with a straight beak, 1 to 1·25 in long, ·6 in. broad. *Seeds* 2, broadly ovoid, black, shining. Mast. in Hook. fil. Fl. Br. Ind. i. 356; R. Brown in Benn. Pl. Javan. Rar. 229; Miq. Fl. Ind. Bat. Vol. i. pt. 2, p. 173.

Penang, Perak, Malacca.

Closely allied to *S. laevis*, Wall.: but with smaller flowers and follicles, and with calyx lobes coherent at their tips.

7. S. Kunstleri, King, n. sp. A tree 30 to 60 feet high; all parts (except the inflorescence and the tips of the young branches) glabrous; branches with pale smooth striate bark. *Leaves* thinly coriaceous, broadly ovate (or slightly obovate) to oblong or narrowly elliptic, the apex rounded, blunt, sub-acute or very shortly and sub-abruptly acuminate; slightly narrowed to the rounded or sub-truncate, rarely acute, 3 to 5-nerved, base; both surfaces shining; lateral nerves about 7 to 9 pairs, spreading, slightly prominent beneath: length 4 to 9 in., breadth 2 to 4·5 in.; petiole ·75 to 2·75 in., slender, glabrous. *Panicles* solitary, narrow, in the axils of (and shorter than) the mature leaves, or supra-axillary, slender; the lateral branches short, 1-to 3-flowered, flocculent-tomentose, rusty; bracteoles lanceolate to ovate, caducous. *Calyx* ·3 to ·35 in. long, the tube urceolate, densely stellate-tomentose outside, sub-glabrescent inside; lobes 5, shorter than the tube, linear-lanceolate, villous on the inner surface, tomentose on the outer, spreading, connivent and slightly coherent by their tips. *Male flower:* staminal column slender, shorter than the calyx-tube, curved, bearing at its apex 5 to 7 sessile broad anthers. *Hermaph. flower:* gynophore short; ovaries 3, ovoid, villous, with a ring of adpressed sessile oblong anthers at their base: styles distinct, short, thin, sparsely villous; stigmas thick, fleshy, clavate, bent (outwards) on themselves. *Follicles* 2 or 3,

woody, from peach-coloured to carmine when ripe, oblong, rounded at at the base, the apex acute and slightly curved; externally rugose (the rugae mostly longitudinal), minutely tomentose, inside smooth; length 3 to 3·5 in., breadth 1·25 to 1·5 in. *Seeds* narrowly ovoid, nearly 1 in. long, black.

Perak; King's Collector Nos. 3259, 7211, 7245, Scortechini No. 1805; at 100 to 300 feet elevation. Distrib. Sumatra; Forbes, No. 2679.

In externals this species closely resembles *S. parviflora*, Roxb. But, after numerous dissections, I conclude that the two species are quite distinct. The ovaries of this are never more than 3, and they are always densely villous; those of *parviflora* are invariably 5, and they are scaly, not villous. The stigmas of this are long and are bent outwards on themselves; these of *parviflora* are short and recurved outwards from their junction with the styles: they are not bent on themselves. The follicles of this are thicker and more woody and the seeds are larger than those of *S. parviflora*. Moreover this has never more than 7 stamens, while *S. parviflora* has 10. The leaves of this are rather thicker in texture and the young branches are thinner and paler than those of *S. parviflora*.

8. S. PARVIFLORA, Roxb. Hort. Beng. 50. A tree 20 to 50 feet high; young branches rather thick; the tips ferruginous-tomentose; the bark pale, rough, glabrous. *Leaves* membranous, oval, ovate or obovate-oblong, the apex rather abruptly shortly and bluntly acuminate, entire; the base rounded and slightly cordate, or sub-truncate and emarginate, 5-nerved; both surfaces glabrous, but not shining; the midrib and 7 or 8 pairs of spreading rather prominent lateral nerves sparsely stellate-pubescent on the lower when young; length 4 to 10 in., breadth 2 to 5·5 in.; petiole 1 to 4 in., deciduously rufous-tomentose. *Panicles* about as long as the leaves, slender, the lateral branches short and the flower-pedicels capillary, everywhere covered with rusty stellate tomentum, ebracteolate. *Calyx* ·2 in. long with an urceolate tube, the mouth with 5 linear-lanceolate lobes almost as long as the tube, incurved and united by their apices, stellate-tomentose externally, glabrous within. *Male flower:* staminal column shorter than the calyx-tube, bearing at its apex 10 sessile short narrowly ovate anthers with thick connective. *Herm. flower:* ovaries 5, ovoid, scaly, with a ring of anthers at their base: ovules 4 or 5. *Styles* slightly united, slender, sparsely villous, short; stigmas united into a fleshy boldly 5-lobed disc, but easily separable into 5 fleshy flattish recurved stigmas. *Follicles* 1 to 5, thickly coriaceous, brilliant red to orange, pubescent to glabrescent, oblong, shortly beaked, 2·5 to 3·5 in. long and 1·25 to 1·5 in. broad; inside glabrous, shining,

boldly ridged. *Seeds* broadly ovoid, black, ·6 in. long, smooth. Roxb. Fl. Ind. iii. 147; Brown in Bennett Pl. Jav. Rar. 232: Wall. Cat. 1121. Kurz For. Fl. Burm. i. 138. Pierre Fl. Forest. Coch-Chine, t. 195 F. *S. Maingayi*, Mast. in Hook. fil. Fl. Br. Ind. i. 359; Pierre Fl. Forest. Coch-Chine, t. 188 A.

Penang, Malacca, Perak; at low elevations, common. Distrib. Burmah and Sylhet in British India; Cochin China.

After carefnl dissection of the flowers of the types of the two species *S. parviflora*, Roxb. and *S. Maingayi*, Masters, and of flowers of many other specimens, I can come to no other conclusion than that they are one and the same. There is a curious tendency to inequality in size in the leaves, some being twice as large as others rising from the same twig within the distance of an inch. And the panicles usually follow the leaves in the matter of length.

9. S. Scortechinii, King, n. sp. A tall tree; young branches rather thick, their bark pale, rough, the youngest parts deciduously rusty-pubescent. *Leaves* thinly coriaceous, oblong, slightly obovate, the apex rounded, with an abrupt short blunt point, entire; the base slightly narrowed, rounded or minutely cordate, 3-nerved; upper surface glabrous, shining; the lower slightly paler, dull, thickly dotted with minute reddish flat shining glands, the midrib and 4 to 5 pairs of prominent ascending lateral nerves stellate-pubescent: length 2·5 to 3·5 in., breadth 1·25 to 1·65 in.; petiole ·65 to 1 in., deciduously pulverulent-tomentose. *Panicles* racemes-like, axillary, solitary, shorter than the leaves, densely pulverulent-tomentose, rusty; pedicels as long as the buds: bracteoles ovate, ·25 in. long, imbricate, caducous. *Calyx* campanulate, divided almost to its base into 5 broadly ovate spreading not connivent lobes, pubescent-tomentose both internally and externally *Male flower:* staminal column shorter than the calyx, crowned by about 10 short anthers with thick sub-cuncate connective and short divergent cells. *Herm. flower: Ovary* 3-celled, obliquely ovoid, pubescent-scaly; ovules 3 or 4 in. each cell. *Styles* connate, pubescent. *Stigmas* 3, large, ovoid, spreading, glabrous, dark-coloured. *Follicles* not seen.

Perak; Scortechinii, No. 2068.

Collected only once, and without fruit.

10. S. bicolor, Mast. in Hook. fil. Fl. Br. Ind. i. 359. A tree 40 to 60 feet high: young branches rather thin, cinereous, striate, glabrous, rufous-pubescent at the very tips. *Leaves* small, membranous, obovate-oblong, acute or shortly mucronate, entire, slightly narrowed to the minutely 2 to 3-nerved rounded base; upper surface glabrous

when adult, with a few small scattered white stellate hairs when young; under surface pale from a layer of minute whitish hairs, the midrib and 16 to 18 pairs of sub-horizontal lateral nerves rufous-tomentose; length 2·5 to 3 in., breadth 1·2 to 1·4; petiole about 1 in., slender, scaly-tomentose. *Panicles* about as long as the leaves, slender, in the axils of young leaves, pulverulent-tomentose, sub-ferruginous; branches short, spreading. *Calyx* pedicellate, ovoid-oblong, pointed in bud, when adult ·3 in. long, widely campanulate, with 5 linear incurved pubescent lobes as long as the tube. *Staminal column* shorter than the tube, glabrous; anthers about 12, sessile at the apex of the column, their connective thick, cuneate, the cells divergent. *Follicles* unknown.

Malacca; Maingay, No. 230 (Kew Distrib.) Perak. Wray, No. 2378.

Recognisable at once by its small leaves, white beneath. The figure named *S. bicolor*, Mast. by Pierre (Fl. Forest. Coch-Chine t. 187) agrees neither with M. Pierre's own description of it; nor with Masters' type-specimen. There may probably have been some printer's blunder in the matter.

11. S. ANGUSTIFOLIA, Roxb. Hort. Beng. 50. A small tree: young branches densely velvetty rusty-tomentose; ultimately rather pale, glabrous, warted and striate. *Leaves* membranous, oblong-lanceolate rarely ovate-lanceolate, acuminate or acute, entire, slightly narrowed to the rounded 3-nerved base: upper surface glabrous, the lower more or less densely and softly rusty-tomentose: length 4 to 7 in., breadth 1·25 to 2·25; petiole ·6 to 1·1 in., rusty-tomentose. *Panicles* solitary, axillary, crowded at the apices of the branches, lax, drooping, longer than the leaves, everywhere densely rusty-tomentose; pedicels much longer than the ovate pointed buds. *Calyx* ·2 in. in diam., hispidulous-pubescent everywhere except the tube which inside is glabrous, deeply divided into 5 linear-lanceolate lobes; the lobes longer than the tube, spreading, connivent, cohering by their tips, their edges recurved. *Male flower:* staminal column as long as the tube, glabrous, recurved, bearing at its apex 10 oblong sessile anthers with large connective, the cells slightly divergent. *Herm. flower:* gynophore short, glabrous: ovaries 5, ovoid, rusty-tomentose with a ring of 10 sessile anthers at their base: style short, sparsely pilose: stigmas much longer than style, fleshy, spreading, recurved. *Follicles* 4 or 5, ovate-oblong with a short curved beak, 2·75 in. long and 1·35 in. broad, densely but minutely velvetty rusty tomentose outside, smooth shining and rugose inside and with a few small scattered whitish hairs. Roxb. Fl. Ind. iii. 148. Pierre Fl. For. Coch-Chine, t. 190; Wall. Cat. 1133; R. Brown in Benn. Pl. Jav.

Rar. 231. Kurz For. Fl. Burm. i. 138, in part. *S. mollis*, Wall. Cat. 1131; R. Brown in Benn. Pl. Jav. Rar. 231. *S. Balanghas*, L. var. *mollis*, Mast. in Hook. fil. Fl. Br. Ind. i. 358.

Burmah; Griffith No. 578 (Kew Dist.); Helfer Nos. 579, 580; Falconer. Perak, King's Collector, No. 8360.

Roxburgh left in the Calcutta Herbarim an excellent coloured drawing of his S. *angustifolia*. In his Flora Indica he gives a very brief account of the species, drawn up from specimens flowering in the Botanic Garden and which he states came from Nepal. His description is too brief to be of any use: but his figure is so good that I have no hesitation in saying that no species of *Sterculia* collected since Roxburgh's time in any part of the outer Himalaya, or from the plain at its base, is in the least like this plant. I have little doubt that Roxburgh was deceived as to its origin by some changing of labels of the native gardeners at Calcutta (a sublimely inaccurate race!); and that the plant was really received, like so many others during the early years of the garden, from the Straits. Wallich, no doubt deceived by the alleged Himalayan origin of the plant, distributed (as No. 1133 of his list) specimens from the trees of it which were still in his time cultivated in the Calcutta Garden under Roxburgh's name, while specimens collected in Burmah he issued as No. 1131, under the name *S. mollis*, Wall. Pierre's figure above quoted does not agree very well with Roxburgh's, the panicles being by far too short and not nearly hairy enough.

12. S. RUBIGINOSA, Vent. Hort. Malmaison, ii. 91. A tree 20 to 50 feet high: young branches rather thick, their apices deciduously rufous-tomentose; the bark pale or brown, striate, glabrous. *Leaves* membranous, obovate-oblong, sometimes ovate-oblong, shortly and abruptly acuminate, entire; narrowed to the acute, rounded or minutely cordate, 3-nerved base: upper surface glabrous, or sparsely stellate-pubescent; the lower stellate-pubescent, most of the hairs pale and minute but those on the midrib and 7 to 10 pairs of spreading stout nerves larger and darker coloured: length 4·5 to 7·5 or rarely 12 in., breadth 2 to 3 in., rarely 4 in.; petiole varying with age from ·3 to 1·5 in., rufous tomentose as are the linear caducous ·5 in. long stipules. *Panicles* solitary in the axils of the crowded young leaves, many-flowered, shorter than, or as long as the leaves, rufous-tomentose like the outer surfaces of the flowers; flower-pedicels spreading, capillary. *Flower buds* broadly ovate. *Calyx* less than ·5 in. long, widely campanulate, divided for half its length or more into 5 lanceolate spreading incurved lobes cohering by their tips, the lobes densely covered inside with white hispidulous hairs. *Male flower;* staminal column longer than the tube or about as

long, glabrous; *anthers* about 10, sessile at the apex of the column, 2-celled, the cells distinct. *Female flower;* gynophore very short; ovaries ovoid, villous (as are the united styles); with 10 sessile anthers at their base; stigma discoid, deeply 5-lobed. *Follicles* 5, coriaceous, crimson when ripe, oblong, shortly beaked, about 2 in. long and 1 in. broad; pubescent externally, glabrous shining and boldly ridged inside. *Seeds* oblong, ovoid, black. Mast. in Hook. fil Fl. Br. Ind. i. 358: Kurz For. Fl. Burm. i. 138; Pierre Fl. Forest. Coch-Chine, t. 194 B; Blume Bijdr. i. 82; Br. in Benn. Pl. Jav. Rar. 231; Miq. Fl. Ind. Bat. i. pt. 2, 175. *S. angustifolia*, Jack Mal. Misc. ex Hook. Bot. Misc. i. 287. *S. Jackiana*, Wall. Cat. 1134.

In all the Provinces except the Andaman and Nicobar Islands: at low elevations. Common. Distrib. Java and Sumatra, Cochin-China, Burmah.

Var. *glabrescens*, King: leaves 8 to 12 in. long, by 3 to 4·5 in. broad, softly pubescent beneath when young, much less narrowed to the (always sub-cordate or cordate) base than in the type; panicles much branched and sometimes longer than the leaves. *S. angustifolia*, Kurz (not Roxb.), in part, For. Fl.. Burm. i. 138; *S. parviflora*, Kurz (not of Roxb.) Journ. As. Soc. Beng. xliii. pt. 2, p. 116. *S. mollis*, Kurz (? of Wall.) l. c. xlv. pt. 2, p. 120. *S. Balanghas*, Linn. var. *glabrescens*, Mast. in Hook. fil. Fl. Br. Ind. i. 358, in part.

Andaman Islands; Helfer (Kew Distrib. No. 595); Kurz, Prain, Bot. Gard. Collectors. Nicobars, Kurz. Great Cocos, Prain. There are no Mergui or Eastern Peninsula specimens of this at Calcutta, and I believe the variety to be confined to the Islands above named.

In this species the petioles lengthen with the age of the leaf, many young leaves having petioles less than ·25 in. long, while in old leaves the length varies from 1 to 1·5 in. And there is considerable variability in the size of the blade. Moreover, while in some the upper surface of the leaves is perfectly glabrous (except the midrib which is almost invariably rusty-tomentose), in others it is rough and scaberulous from the presence of scattered stellate hairs. The next species (*S. ensifolia*, Mast.) has, in my opinion, a very poor claim to specific rank; and I think it would be better to treat it a shrubby variety of this with narrower leaves and longer flowers. *S. parviflora*, Roxb. also differs very little from this, and might be reasonably enough regarded as a form of it with broader more glabrous cordate leaves with fewer nerves.

13. S. ENSIFOLIA, Mast. in Hook. fil. Fl. Br. Ind. i. 359. A shrub or small tree: young branches and petioles densely ferruginous-tomen-

tose. *Leaves* membranous, oblong-lanceolate or oblanceolate, shortly caudate-acuminate, entire, the base rounded, sometimes minutely cordate, rarely acute; upper surface glabrous, the midrib alone tomentose; under surface sparsely rusty-tomentose, the midrib and 8 to 10 pairs of spreading lateral nerves prominent: length 6 to 12 in., breadth 1·25 to 3·5 in., petiole ·3 to 1·5 in.; stipules erect, linear, half as long as the petiole, deciduous. *Panicles* or *racemes* axillary, solitary, lax, few-flowered, rusty-tomentose, hardly so long as the leaves; bracteoles linear, shorter than the pedicels. *Calyx* ·5 or ·6 in. long, broadly campanulate, pubescent on both surfaces, the tube much shorter than the linear-lanceolate spreading lobes the tips of which curve inwards and cohere. *Male flower;* staminal column longer than the calyx-tube but much shorter than its lobes, glabrous, curved, bearing at its apex 10 2-celled, oblong, nearly sessile, anthers. *Female flower;* gynophore very short: ovaries 5, ovoid, rusty-villous, surrounded at the base by 10 sub-sessile stamens. *Styles* short, united, densely covered with white hairs; stigmas united into a boldly 5-lobed disc. *Follicles* 1 to 5, shortly stalked, narrowly oblong, tapering to each end, the apex with a hooked beak, coriaceous, brownish-velvetty, red when ripe, 2 to 2·5 in. long and ·75 in. broad. *Seeds* oval, black, smooth. Pierre Fl. Forest. Coch-Chine t. 194 C. *S. angustifolia*, Jack (not of Roxb.) Mal. Misc. ex Hook. Bot. Mis. i. 287.

Penang, Perak, at low elevations, common. Distrib. Burmah.

I have no doubt whatever that this is the plant described by Jack as the *S. angustifolia* of Roxb.

14. S. PUBESCENS, Mast. in Hook. fil. Fl. Br. Ind. i. 357. A tree, the younger parts rusty-pubescent. *Leaves* oblong, obtuse, or abruptly acuminate, entire, the base cordate; upper surface glabrous; lower densely and minutely pubescent, the nerves stellate-pilose: length 4 to 6 in., breadth 2 to 2·5 in.; petiole 1·25 in., sulcate: stipules subulate, ·25 in long. *Panicle* erect, as long as or longer than the leaves, much branched: ultimate pedicels jointed, pubescent, spreading. *Calyx* ·25 in. long, campanulate; the lobes triangular acute, as long as the tube, hairy within. *Ovary* globose, downy.

Malacca, Maingay.

Except by Maingay's two specimens in the Kew Herbarium, this species is unknown. Specimens of it in good flower and in fruit are much wanted, so that a completer description than the foregoing may be prepared.

15. S. COLORATA, Roxb. Hort. Beng. 50. A tree 30 to 60 feet

high; young branches thick, rough, rather pale, glabrous. *Leaves* thinly coriaceous, roundish or reniform, usually palmately 3 to 5-lobed, the lobes triangular, acuminate; base deeply cordate, 5 to 7-nerved; both surfaces pulverulent-pubescent when young, glabrous when adult; length 4·5 to 9 in., breadth 5 to 12 in.; petiole 3·5 to 8 in., puberulous; stipules lanceolate, caducous. *Flowers* in axillary panicles or racemes from the axils of last year's fallen leaves, 2·5 to 4 in. long, densely covered, as is the exterior of the flowers, with coral-red, scaly tomentum. *Calyx* ·75 in. long, funnel-shaped, curved, the mouth with 5 acute short triangular teeth, puberulous internally, villous at the base. *Staminal column* as long as, or longer than the calyx, slightly flattened, minutely furfuraceous-puboscent: anthers 20 to 25, sessile at the apex of the column, oblong, closely surrounding the 5 flask-shaped ovaries; styles 5, short, recurved: stigmas acute. *Follicles* 2 to 3 in. long, membranous, glabrous, veined, stipitate, open from an early age and bearing on their edges usually 2 smooth oval seeds. Roxb. Cor. Pl. i. 26, t. 25; Fl. Ind. iii. 146; Mast. in Hook. fil. Fl. Br. Ind. i. 359; Pierre Fl. Forest. Coch-Chine, t. 199; Kurz For. Fl. Burm. i. 138; Brand. For. Flora N. W. Ind. 34; Wall. Cat. 1119; Hook. Ic. Pl. 143; Dalz. & Gibs. Bomb. Fl. 23; W. & A. Prodr. i. 63. *Firmiana colorata*. Br. in Benn. Pl. Jav. Rar. 235; Thwaites Enum. 29. *Erythropsis Roxburghiana*, Scott. & Endl. Melet. Bot. 33.

Andamans; Kurz, Prain. Distrib. India, Ceylon.

16. S. FULGENS, Wall. Cat. 1135. A tree 30 to 70 feet high; young branches rather thick, with smooth dark bark, at first pubescent, ultimately quite glabrous. *Leaves* large and with long petioles, thinly coriaceous, rotund with 5 shallow acuminate lobes, the base cordate: upper surface glabrous, harsh to the touch: lower densely and minutely stellate-pubescent, palmately 7-nerved, the nerves prominent beneath: length and breadth 15 to 18 in.; petiole 15 to 20 in., sulcate, minutely puberulous. *Racemes* or *panicles* 3 to 4 in. long, from the axils of last year's leaves, densely covered with orange or golden-yellowish scurfy tomentum as are the outer surfaces of the flowers. *Calyx* 1·25 in. long, funnel-shaped, slightly curved, the mouth with 5 short triangular teeth; internally minutely velvetty-puberulous with a ring of long matted hair near the base. *Staminal tube* ·5 in., longer than the calyx, 5-angled, sulcate, minutely tomentose; anthers 20, sessile, oblong, 1-celled, embracing the 5 flask-shaped ovaries; styles short, reflexed: stigmas acute. *Follicles* unknown. Mast. in Hook. fil. Fl. Br. Ind. i. 360; Kurz For. Fl. Burm. i. 139: Journ. As. Soc. Beng. pt. 2, 1874, p. 117; Wall. Cat, 1135; *Firmiana colorata* var. β, Br. in Benn. Pl. Jav. Rar. 235; Miq. Fl. Ind. Bat., i. pt. 2, 178.

Perak; King's Collector, No. 8673, Scortechini. Distrib. W. Sumatra, Forbes, No. 2105: Java, Burmah; Wallich.

There is no doubt this comes very close to *S. colorata*, Roxb. of which it might possibly be better to treat it as a variety characterised by larger flowers, with much more exserted staminal column, larger leaves, thinner and dark-coloured branchlets. Wallich, however, who saw the tree growing, regarded it as a species; and Robert Brown (Pl. Jav. Rar. p. 235), while treating it as a variety of *colorata*, remarks that it is probably worthy of specific rank. This plant (whether species or variety) is never found in British India proper. Its most northerly limit is Tenasserim, and from thence it extends southward into the Malayan Archipelago. In the Flora of British India, Dr. Masters gives the distribution of this as "Tropical Western Himalayan." The plant, however, which occurs in tropical valleys in that region is just as different from *S. fulgens*, Wall., as that is from *S. colorata*, Roxb. It is the tree to which Wallich gave the name *S. pallens;* and which he published (without describing) in Voigt's Hort. Suburb, Calcutta, p. 105. The leaves of *S. pallens* resemble those of *colorata* in shape; but their under surface is covered with dense pale yellow stellate tomentum. The calyx has a much wider mouth than that of *colorata*, and (like the axis and pedicels of the panicle) is densely covered with a very pale yellow tomentum, while the tomentum of *colorata* is of a vivid coral red. *S. pallens* is confined to the Western Himalaya, just as *S. fulgens* is limited to Burmah and Malaya.

17. S. ALATA, Roxb. Hort. Beng. 50. A tree 80 to 150 feet high; young branches rather stout, striate, glabrous. *Leaves* membranous, broadly ovate or ovate-oblong, acute or shortly acuminate, entire; the base deeply cordate, 5 to 7-nerved, some of the basal nerves pinnate on one side; both surfaces glabrous; lateral nerves 4 pairs, prominent on both surfaces as are the midrib and basal nerves; length 4 to 12 in., breadth 3 to 8 in., petiole 1·5 to 7 in.: stipules minute, subulate, caducous. *Racemes* from the axils of previous year's fallen leaves, usually in pairs, sometimes solitary, rarely terminal, about as long as the petioles, flocculent, rusty-tomentose, as are the flowers externally; bracts 3 to each flower, ensiform, caducous. *Calyx* ·75 in. long, campanulate, deeply divided into 5 or 6 thick, fleshy, lanceolate segments. *Male flower;* staminal column thin, cylindric, much shorter than the calyx, glabrous, bearing at its apex 25 elongate anthers in five groups of 5 each; ovaries imperfect. *Female flower;* staminodes in 5 phalanges, sessile, embracing the bases of the 5 sub-ovate, multi-ovulate-ovaries; stigmas broad, emarginate. *Follicles* pedunculate, woody, pulverulent.

pubescent, 5 in. in diam., sub-globular, slightly compressed. *Seeds* oblong, compressed, the testa spongy, 1 in. long, with a large obovate thick spongy terminal wing 2·5 in. long and 1·25 broad. Roxb. Corom. Pl. iii. 84, t. 287; Fl. Ind. iii. 152; Kurz Fl. Br. Burm. i. 134; Pierre Fl. Forest. Coch-Chine, t. 196; Wall. Cat. 1125. *Pterygota Roxburghii*, Schott & Endl. Melet. *P. alata*, Br. in Benn. Pl. Jav. Rar. 234. *S. coccinea*, Wall. Cat. 1122, partly. *S. Heynii*, Beddome Flor. Sylvat. t. 230.

Perak, Scortechini: Andamans, Kurz. Distrib. Brit. India, Cochin-China.

18. S. LINEARICARPA, Mast. in Hook. fil. Br. Ind. i. 360. A tree 60 to 80 feet high: young branches thick, striate, deciduously pulverulent-tomentose, leaf-cicatrices large. *Leaves* coriaceous, ovato-orbicular, blunt or very slightly narrowed at the apex, edges entire, base deeply cordate, 7-nerved; upper surface glabrous, shining; lower deciduously pulverulent, hairy, almost glabrous when old, minutely reticulate, the midrib and 4 or 5 pairs of lateral nerves prominent: length and breadth 6 to 12 in.; petiole 2·5 to 6 in., sulcate, pulverulent-tomentoso. *Panicles* axillary, solitary, stout, erect, as long as or longer than the leaves, rusty pulverulent-tomentose as are the outer surfaces of the calyces, the lateral branchlets short; bracteoles numerous, rotund, concavo, caducous; flower-buds globose, sessile. *Calyx* rotate, the tube ·1 in. long, with 5 slightly longer ovate acute lobes, tomentose externally, glabrous within. *Staminal column* not so long as the calyx-tube, glabrous; anthers 10, each with a short filament, connate, 2-celled; ovaries (rudimentary in some flowers) about 3, free, each 1 or 2-ovulate; style short; stigma entire, small. *Follicles* (? ripe) linear-lanceolate, 3 to 4 in. long and ·6 in. broad, stipitate, longitudinally ridged and covered outside and inside with yellowish tomentum as is also the single oblong seed.

Malacca, Maingay. Perak; Scortechini, King's Collector.

The flowers and follicles of this are, in my opinion, those of *Scaphium* rather than of *Firmania*, to which section Dr. Masters has referred it.

19. S. SCAPHIGERA, Wall. Cat. 1130. A tree 90 to 120 feet high: young branches rather thick; the bark pale, minutely warted and striate, glabrous. *Leaves* coriaceous, glabrous, ovato to oblong-ovate, sub-acute or bluntish-acuminate, entire; the base rounded or sub-truncate, often faintly cordate or emarginate, 3 to 5-nerved; main nerves 2 to 4 pairs, sub-erect, prominent on both surfaces; length 5 to 10 in., breadth 2·75 to 4·5 in.; petiole 2 to 5 in., thickened at both ends. *Panicles* only at

the ends of the branchlets, puberulous, shorter than the petioles, robust, with many short spreading branches, many-flowered; pedicels short, pubescent; bracteoles subulate, deciduous. *Calyx* from ·3 to ·4 in. long, deeply 5-lobed and almost rotate when expanded, stellate-puberulous externally, glabrous internally, the lobes lanceolate. *Male flower* with 15 to 30 anthers almost sessile round the apex of the column and surrounding the rudimentary villous ovary. *Female flower;* ovaries 5, bi-ovulate; styles united; stigma 5-lobed. *Follicles* 1 to 5, on rather stout pubescent stalks, when ripe 6 to 8 in. long and 1·25 to 2·5 in. broad, membranous, boat-shaped, gibbous about the middle, conspicuously veined and more or less puberulous externally especially on the nerves. *Seeds* 1 (rarely 2), ovoid, glabrous, shining, ·5 to 1 in. long, attached to the very base of the follicle. Mast. in Hook. fil. Fl. Br. Ind. i. 361; Kurz For. Fl. Burm. i. 140; Pierre Fl. Forest. Coch-Chine, t. 201. *Scaphium Wallichii*, R. Br. in Benn. Pl. Jav. Rar. 226.

Malacca, Griffith. Distrib. Sumatra, Burmah.

M. Pierre is in doubt whether his fine figure (l. c. t. 201), represents really the true plant of Wallich. In my opinion it does so most decidedly: R. Brown was right in describing the ovaries as five, and there is a specimen in the Calcutta Herbarium with 5 follicles.

20. S. AFFINIS, Mast. in Hook. fil. Fl. Br. Ind. i. 361. A tree: young branches rather stout, rough, dark in colour, the leaf cicatrices large, the very youngest minutely rusty-tomentose. *Leaves* thinly coriaceous, elliptic-oblong, with rather straight edges; the apex broad, suddenly acute; the base truncate (sometimes obliquely so), 3-nerved; both surfaces glabrous, the upper shining, the lower pale and rather dull: main nerves 6 or 7 pairs, conspicuous beneath as is the midrib; length 5 to 9 in., breadth 4·75 to 5·5 in.; petiole 4·5 in., thickened at each end. "*Panicle* erect, as long as the leaves, its branches downy, flattened or angular; peduncles thickly striated, angular, sub-pilose, spreading; ultimate pedicels downy, densely crowded. *Flowers* very small, the buds ovoid. *Flowers* ·25 in. *Calyx-lobes* ovate, longer than the funnel-shaped tube. *Follicle* a span long, falcate, leafy, glabrescent, shining within. *Seeds* ·65 in. long, solitary, oblong, black." *Scaphium affine*, Pierre Fl. Forest, Coch-Chine, t. 195 E.

Malacca; Maingay, No. 225 (Kew. Distrib.)

The only Maingayan specimen of this in the Calcutta Herbarium consists of leaves only, with a single detached fruit; and I have seen no specimen from any other collector. The foregoing description (as regards inflorescence, flower and fruit) is therefore copied verbatim from Masters (in F. B. I. l. c.).

21. S. CAMPANULATA, Wall. A tree 50 to 60 feet high: young branches rather slender, rusty-tomentose, soon becoming glabrous. *Leaves* membranous, broadly ovate, shortly acuminate, entire; the base usually deeply cordate, 3 to 7-nerved; sometimes 3 to 5-lobed; lateral nerves 3 or 4 pairs; upper surface glabrous, the midrib and nerves pubescent or puberulous; lower surface pubescent; length 4 to 6 in., breadth 3·75 to 5·5 in.; petiole 2·25 to 5 in. puberulous: stipules lateral, subulate, caducous. *Panicles* 3 or 4 in. long, in clusters of 2 or 3 at the apices of the branches, few-flowered, glabrous, erect, sub-corymbose; pedicels jointed, about ·3 in. long, bracteoles caducous. *Calyx* widely campanulate, more than ·75 in. across, green, pruinose, glabrous, veined, its mouth cut half-way down into 5 triangular velvetty-edged lobes: *Staminal column* pubescent below. *Ovaries* gibbous at the apex: styles short, cohering; stigmas filiform, recurved: ovules 2, erect. *Follicles* 3 to 6, on slender puberulous stalks, membranous, veined, 2 to 3 in. long, boat-shaped, saccate with a sub-terminal lanceolate wing. *Seeds* sub-globose, with a shining crustaceous testa, ·5 in. long or less. Mast. in Hook. fil. Fl. Br. Ind. i. 362; Kurz For. Fl. Br. Burm. i. 139. *Pterocymbium Javanicum*, Br. in Benn. Pl. Jav. Rar. 219, t. 45; Miq. Fl. Ind. Bat. i. pt. 2, 179. *Pt. campanulatum* and *Javanicum*, Pierre, Fl. Forest. Coch-Chinc, t. 195.

Perak; Fr. Scortechini, King's Collector. Nicobars, Kurz. Distrib. Malayan Archipelago, Burmah.

M. Pierre (l. c.) remarks that, in his opinion, the two species *campanulatum* and *Javanicum*, although closely related, are distinct species; but he does not mention the characters on which he relies for separating them. After dissecting many flowers of the tree (until recently growing in the Botanic Garden, Calcutta), on which Wallich founded his species *campanulatum*, I cannot see any respect in which they differ from Robert Brown's minute and excellent description and figures of *Pt. Javanicum*. I therefore agree with Dr. Masters in considering the two as one and the same species.

22. S. TUBULATA, Mast. in Hook. fil. Fl. Br. Ind. i. 362. A tree; young branches about as thick as a goose-quill, tomentose at the very points, the bark dark and rather rough. *Leaves* thinly coriaceous, elliptic-oblong, with a short abrupt rather blunt apiculus; edges entire; the base broadly rounded or sub-truncate, very slightly cordate; when adult both surfaces glabrous except the midrib and main nerves which are minutely rusty-tomentose; main nerves 5 to 7 pairs, spreading, slightly prominent below: length 4 in., breadth 1·75 in.; petiole ·75 in. slender, deciduously rusty-tomentose. *Cymes* terminal, as long as the

leaves, many-flowered. *Calyx* ·5 in. long, glabrous, narrowly tubular below, the mouth slightly expanded and with 5 ovate-lanceolate lobes shorter than the tube. *Staminal column* pilose; anthers in a ring. *Ovaries* 5; styles inflexed, cohering by their tips. *Follicles* 5, from 2 to 3 in. long and 1 in. broad, on tomentose stalks, oblong, acute, dilated at the base. *Seed* ovoid.

Malacca, Maingay.

At once distinguished by the singular calyx, tubular in its lower, lobed and spreading in its upper, half.

2. Tarrietia, Blume.

Tall trees. *Leaves* digitate or simple, glabrous or scaly. *Flowers* unisexual, panicled. *Calyx* tubular, small, 5-toothed. *Petals* 0. *Staminal-column* short, bearing a ring of 10-15 very densely clustered anthers, cells parallel. *Ovary* of 3-5 nearly free carpels opposite the sepals; styles as many, short, filiform, stigmatose within; ovules 1 in each cell. *Ripe carpels* of stellately spreading samaras with long falcate wings. *Seeds* oblong; albumen bipartible; cotyledons flat; radicle next the hilum.—Distrib. Known species 5 or 6, Australian and Malayan.

Leaves digitately compound.

Under-surface of leaflets persistently stellate-tomentose	1. *T. Perakensis.*
Under-surface deciduously tomentose, the hairs simple	2. *T. Penangiana.*

Leaves simple.

Fruit glabrous	3. *T. simplicifolia.*
,, tomentose.	4. *T. Kunstleri.*

1. T. Perakensis, King, n. sp. A tree 40 to 60 feet high: young branches, petioles, petiolules, under surface of leaves (when young) and inflorescence with minute deciduous rusty tomentum. *Leaves* digitately compound; leaflets 5 or 6, the lower smaller, obovate-elliptic to obovate-rotund, shortly and rather abruptly acuminate, the edges entire, slightly wavy; the base narrowed; upper surface minutely areolate, glabrous except the very minutely tomentose midrib and nerves; lower glabrous except the midrib: main nerves 10 to 14 pairs, stout and prominent beneath: length of the middle leaflet 4·5 to 5·5 in., of the lower 2 to 3·5 in.: breadth of the middle 2 to 3 in., of the lower 1·25 to 1·5 in.; petiolules ·5 to 1 in.; petioles ·3 to 4·5 in. *Inflorescence* in solitary, axillary, cymose racemes or panicles more than half as long as the

leaves, much crowded at the points of the branches. *Flowers* ·15 in. long: pedicels slender, three times as long. *Calyx-tube* tomentoso externally, sparsely pubescent within; *staminal tube* less than half its length. *Female calyx* rather longer than the male, otherwise the same: stamens 0: ovaries 5, obliquely ovoid, glabrous, each with a pubescent conic style crowned by a small hooked stigma. *Ripe fruit* compressed-ovoid, 1·25 to 1·5 in. long, and 1 to 1·15 in. in diam., glabrous, the wing falcate, 2 in. long and ·5 in. broad, striate.

Perak, at low elevations; King's Collector, Penang, Curtis, No. 2229.

In its leaves this much resembles *T. Javanica*, Bl. (Rumphia iii. t. 127, fig. 1); but the leaves of Blume's plant are smaller and have more wavy edges. The flowers, however, of the two differ much in size, those of this being twice as large as the flowers of *T. Javanica*.

2. T. Curtisii, King, n. sp. A tree 20 to 40 feet high; young branches, petioles, petiolules and under surfaces of leaves densely covered with rusty stellate, non-deciduous tomentum. *Leaves* digitately 5 or 6-foliolate, the lower smaller, obovate, entire, wavy, apex retuse, base acute; upper surface minutely areolate, glabrous except the stellate-tomentose midrib and main nerves; under surface, and especially the midrib, stellate-tomentose: main nerves 9 or 10 pairs, spreading, prominent beneath: length of the middle leaflet 3·5 to 4·5 in., of the lower 1·5 to 2·5 in.; breadth of the middle 2·25 to 2·5 in., of the lower ·8 to 1·5 in., petiolules ·5 to ·75 in., petioles 2 to 2·5 in. *Inflorescence* in solitary, axillary, cymose racemes or few-flowered panicles, more than half as long as the leaves. *Ripe fruit* glabrous, compressed-ovoid, 1 in. long and ·8 in. broad; wing narrowly falcate, 1·25 in. long and ·25 in broad, striate.

Penang at 2000 feet: Curtis No. 1427.

This is known only by Curtis's scanty specimens which are in fruit only. Its flowers are unknown. In leaves it closely approaches *T. Perakensis*, but the tomentum is stellate and persistent; whereas in *T. Perakensis*, the hairs are simple and deciduous. The leaflets of this are also smaller, fewer-nerved, more decidedly obovate, less elliptic than in *T. Perakensis*, and they are mucronate rather than acuminate.

3. T. simplicifolia, Mast. in Hook. fil. Fl. Br. Ind. i. 362. A tree, young branches pale, sub-glabrous, striate. *Leaves* simple, coriaceous, elliptic or obovate-elliptic, apex truncate or emarginate, shortly mucronate, entire, rather suddenly narrowed at the base or rounded; upper surface glabrous, shining; lower dull, rusty, minutely puberulous,

and slightly scaly; main nerves 16 to 20 pairs, prominent below, spreading; length 4·5 to 7 in., breadth 3 to 4·5 in.; petiole 2 to 3 in., thickened towards the apex. *Cymes* axillary, solitary, many-flowered, 1·5 to 2·5 in. long, minutely rusty-tomentoso. *Flowers* ·1 in. long; the pedicels shorter, stout. *Calyx-tube* campanulate, minutely tomentose externally, puberulous within: staminal tube short. *Fruit* (including wing) 3 in. long, obliquely spathulate, glabrous.

Malacca; Griffith, Maingay (Kew Distrib.) No. 231.

4. T. Kunstleri, King, n. sp. A tree 50 to 70 feet high: young branches petioles and peduncles minutely stellate-pubescent and lenticellate. *Leaves* elliptic to obovate-oblong, blunt, mucronate, entire, the base rounded or slightly narrowed: upper surface smooth, shining; the lower pale, sparsely stellate-puberulous on the midrib and nerves, otherwise (under a lens) minutely puberulous: main nerves 7 to 10 pairs, ascending, prominent beneath. *Fruit* at the apex of a solitary stellate-hairy peduncle, ovoid with an oblique sub-spathulate wing, minutely but densely velvetty fulvous-tomentose; length of body 1 in. or more; wing about the same length and ·6 in. broad.

Perak, near Laroot; King's Collector No. 7581.

Flowers of this are at present unknown. The leaves are at once distinguished from those of *T. simplicifolia* by their pale under surface, and the fruits by their tomentum.

3. Heritiera, Aiton.

Trees. *Leaves* coriaceous, simple, scaly beneath. *Flowers* small, unisexual, in axillary panicles. *Calyx* 5, rarely 4-6 toothed or cleft. *Petals* 0. *Anthers* in a ring at the top of the column, cells 2, parallel. *Ovaries* 5-6, almost free: style short, stigmas 5, thick; ovules solitary in each cell. *Ripe carpels* woody, indehiscent, keeled or winged. *Albumen* 0; cotyledons thick; radicle next the hilum.—A genus of 6 or 7 species, natives of the Tropics of the old world, and of Australia.

H. littoralis, Dryand. in DC. Prod. i. 484. A tree: young branches stout, rough. *Leaves* oblong or elliptic, the apex rounded or acute; the edges entire; base rounded or slightly cordate; lower surface pale; main nerves 7 to 9 pairs, slightly prominent beneath: length 5 to 10 in., breadth 2·25 to 4 in., petiole ·5 to ·75 in.: stipules lanceolate, caducous. *Flowers* ·2 in. long, in many-flowered axillary cymose panicles shorter than the leaves. *Calyx* 5-toothed, puberulous, half as long as the pedicel. *Ripe fruit* 1·5 to 3·5 in. long, woody, compressed ovoid, boldly keeled at apex and on dorsum, glabrous, shining. Mast. in Hook. fil. Fl.

Br. Ind. i. 363; Kurz For. Fl. Burm. i. 140; Pierre Fl. Forest. Coch-Chine, t. 203; Miq. Fl. Ind. Bat. i. pt. 2, p. 179; Blume Bijdr. 84; Roxb. Fl. Ind. iii. 142; W. & A. Prodr. i. 63: Thwaites Enum. 28; Br. in Benn. Pl. Jav. Rar. 237; Miq. Fl. Ind. Bat. i. pt. 2, p. 179. *H. Fomes*, Wall. Cat. 1139, partly. *Balanopteris Totlula*, Gærtn. Fruct. ii. 94, t. 99.

All the Provinces, on the coasts. Distrib. Malayan Archipelago and coasts of the tropics of the old world generally, and of Australia.

The plant originally issued by Wallich as *Trochetia contracta* (Cat. No. 1162) and afterwards named by him *Heritiera macrophylla*, (Pierre l. c. t. 204) has by some writers been reduced to *H. littoralis*. But Wallich's species was originally found in the interior of Burmah, and it has since been found in Cachar, far from the sea coast to which *H. littoralis* is strictly confined. *H. macrophylla* has moreover leaf-petioles more than twice as long as those of *H. littoralis*, and its fruit is warted and not smooth. I believe *H. macrophylla* to be a perfectly distinct species; as is also, in my opinion, the other Sylhet and Khasia small-leaved plant which Wallich issued as *H. acuminata*. (Cat. No. 7836.)

4. Kleinhovia, Linn.

A tree. *Leaves* 5 to 7-nerved and often cordate at the base. *Inflorescence* a terminal, lax, cymose panicle. *Bracteoles* small. *Sepals* 5, much longer than the petals, linear-lanceolate, deciduous. *Petals* 5, unequal, the upper short, ovate-round, saccate, the middle pair concave and obliquely oblanceolate, the lower pair flat with convolute edges. *Stamens* 20, in 5 phalanges of 3 each with five solitary, free, often non-antheriferous, filamonts between the phalanges; the filaments of all conjoined below into a long, externally hairy, narrowly cylindric tube which surrounds the gynophore: anthers 4-celled, divergent. *Ovary* at the apex of the long gynophore and surrounded by the staminal tube, 5-lobed, 5-celled. *Capsule* turbinate-pyriform, membranous, inflated, 5-celled, loculicidal. *Seeds* 1 or 2 in each cell, tuberclod: cotyledons convoluto, radicle inferior. Distrib. One species. Tropics of the old world.

K. Hospita, L. Spec. 1365. *Leaves* ovate-rotund, acuminate, entire, palmately 3-5-nerved at the base, glabrous: length 3 to 6 in., breadth 2·5 to 5 in., petiole 1·5 to 2·5 in. DC. Prodr. i. 488; W. & A. Prodr. i. 64; Roxb. Fl. Ind. iii. 141; Miq. Fl. Ind. Bat. i. pt. 2, 186; Blume Bijdr. 86; Hassk. Pl. Jav. Rar. 313; Mast. in Hook. fil. Fl. Br. Ind. i. 364. Pierre Fl. Forest. Coch-Chine, t. 177.

In all the Provinces, but usually planted. Distrib. Malaya, Australasia, Br. India.

Apparently a variable plant. Dr. Masters (in Oliver's Flora of Trop. Africa, i. 226), describes the African specimens as having no stamens or staminodes alternating with the 5 phalanges of stamens. A specimen in the Calcutta Herbarium from Java has the under surface of the leaves softly hairy.

5. Helicteres, Linn.

Trees or shrubs, more or less stellate-pubescent. *Leaves* simple. *Flowers* axillary, solitary or fascicled. *Calyx* tubular, 5-fid, often irregular. *Petals* 5, clawed, equal or unequal, the claws often with ear-shaped appendages. *Staminal column* surrounding the gynophore, 5-toothed or lobed at the apex; anthers at the top of the column, 2-celled. Five staminodes below the apex of the column. *Ovary* at the top of the column, 5-lobed, 5-celled; styles awl-shaped, more or less united, slightly thickened and stigmatose at the tips; ovules many in each cell. *Follicles* spirally twisted, or straight. *Seeds* tubercled; albumen scanty; cotyledons leafy, folded round the radicle which is next the hilum.—Distrib. About 30 species, natives of the tropics of both hemispheres.

Fruit spirally twisted ... ... 1. *H. Isora.*
Fruit not twisted.
Leaves ovate to oblong-lanceolate, oblique; fruit more than 1 in. long ... 2. *H. hirsuta.*
Leaves lanceolate or oblanceolate, not oblique: fruit less than 1 in. long ... 3. *H. angustifolia.*

1. H. Isora, Linn. Spec. 1366. A shrub or small tree; young branches minutely tomentose. *Leaves* ovate-rotund, obliquo; the apex rounded, abruptly acuminate; the edges irregularly serrate-dentate, sometimes lobed; the base cordate or rounded, rarely acute, palmately 5- to 7-nerved; upper surface scabrous, minutely hispid; lower pubescent or tomentose; length 2 to 4 in., breadth 1·25 to 3 in.; petiole ·3 in. long, tomentose; stipules linear, about as long as the petioles. *Flowers* axillary, solitary, or in few-flowered minutely bracteolate cymes, 1·5 in. long. *Calyx* narrowly campanulate, laterally compressed, 2-lipped, 5-toothed, tomentose outside. *Petals* reflexed, the lower two much shorter and broader than the three upper. *Staminal column* longer than the petals, curved, very narrowly cylindric, bearing at its apex 10 to 12 elongate-ovate stamens, and more internally 5 flat bifid staminodes. *Ovary* ovoid, sulcate, tomentose: styles slender, glabrous, united. *Fruit* cylindric, twisted, crowned by the persistent styles, pubescent; 1·5 in. long, ·4 in. in diam. Mast. in Hook. fil. Fl. Ind. i. 365; Bl.

Bijdr. 79; Pierre Fl. Forest. Coch-Chine, t. 208, figs. 12 to 25; DC. Prodr. i. 475; Roxb. Fl. Ind. iii. 143; W. & A. Prodr. i. 60; Wight Ic. t. 180; Miq. Fl. Ind. Bat. i. pt. 2, 169; Kurz For. Fl. Burm. i. 142; Brand. For. Flor. 34. *H. chrysocalyx*, Miq. in Pl. Hohen. *Isora corylifolia*, Wight, Hassk. in Tijds. Nat. Gesch. xii. 107.

Perak; and probably in all the provinces. Distrib. Brit. India.

2. H. HIRSUTA, Lour. Fl. Coch-Chine, 648. A shrub 6 or 8 feet high; the young branches velvetty-tomentose. *Leaves* ovate, or ovate-rhomboid, sub-oblique (oblong to oblong-lanceolate in vars.) acuminate, irregularly erose-serrate; the base sub-truncate or rounded, rarely sub-emarginate; upper surface scabrid-pubescent, the midrib and nerves tomentose; lower velvetty-tomentose; nerves 4 or 5 pairs, prominent beneath; length 3·5 to 6 in., breadth 1·75 to 2·5 in.; petiole ·4 in., tomentose. *Cymes* scorpioid, few-flowered, axillary, solitary, twice as long as the petiole. *Flowers* ·75 in. long. *Calyx* narrowly cylindric-campanulate, coarsely stellate-tomentose externally, the mouth with 5 acute unequal teeth. *Petals* linear, sub-spathulate, two rather broader than the others with slight horn-like appendages about the middle and all longer than the calyx and about as long as the stamens. *Staminal column* and pistils as in *H. Isora*. *Fruit* cylindric, acuminate, not twisted, the carpels firmly coherent; externally densely covered by long villous and stellately pilose soft prickles, 1·2 in. long and ·35 in. in diam. Pierre Fl. Forest. Coch-Chine, t. 208, figs. 1 to 11; Kurz For. Fl. Burm. i. 143. *H. hirsuta*, Bl. Bijdr. 80. *H. spicata*, Colebr. in Wall. Cat. 1182; Mast. in Hook. fil. Fl. Br. Ind. i. 366; *Oudemansia hirsuta*, Miq. Fl. Ind. Bat. i. pt. 2, p. 171; Hassk. Retzia, i. p. 184; *Orthothecium hirsutum*, Hassk. Pl. Jav. Rar. 308.

Selangore, King's Collector. Penang, Curtis; and probably in the other provinces at low elevations. Distrib. Malayan Archipelago, China, Brit. India.

Var. *oblonga*, (species Wall. Cat. 1183). *Leaves* oblong, 5 or 6 in. long and 1·35 to 1·75 in. broad, sparsely stellate-tomentose beneath.

Penang, Andamans.

Var. *vestita*, (species Wall. Cat. 1844). *Leaves* oblong-lanceolate, oblique at the base; 3·5 to 5·5 in. long and 1 to 1·5 in. broad.

Burmah: ? Andamans.

There seems to be little doubt that Loureiro and Blume independently of each other gave this species the same specific name. Wallich's distribution of it under Colebroke's MSS. name *spicata* took place many years subsequently, and that name must (although adopted by Dr. Masters) I think fall to the ground.

3. H. ANGUSTIFOLIA, L. sp. 1366. A shrub 4 to 6 feet high: young branches, petioles, under surfaces of leaves and peduncles minutely and more or less densely pubescent. *Leaves* lanceolate or oblanceolate, acute (or obtuse and mucronate in var. obtusa); entire; the base narrowed 3-nerved; upper surface glabrescent or glabrous; lateral nerves 5 or 6 pairs, not prominent; length 1·5 to 2 in., breadth ·4 to ·8 in., petiole 2 to ·3 in. *Cymes* axillary, solitary, not much longer than the petioles, few-flowered. *Flowers* ·4 or ·5 in. long. *Calyx* densely stellate-tomentose externally, cylindric, the mouth slightly expanded, with 5 acute triangular teeth, 2-lipped. *Petals* longer than the calyx, linear-subspathulate, with 2 or 3 horned appendages below the middle. *Staminal column* shorter than the petals, narrowly cylindric and otherwise as in *H. Isora*, the stamens smaller. *Ovary* inserted near the apex of the staminal tube, sub-globular, ridged, tomentose. *Fruit* ovoid-cylindric, apiculate, not twisted, the carpels closely coherent, ·75 in. long and ·4 in. in diam., densely covered with stellate, villous soft prickles as in *H. hirsuta*. DC. Prodr. i. 476; Mast. in Hook. fil. Fl. Br. Ind. i. 365; Bl. Bijdr. 80; Pierre Fl. Forest. Coch-Chine, t. 210 and 211; Wall. Cat. 1180. *H. lanceolata*, DC. Prodr. i. 476; Pierre, l. c. 210 B. *H. virgata*, Wall. Cat. 1181. *Oudemansia integerrima*, Miq. Pl. Jungh. i. 296; Fl. Ind. Bat. i. pt. 2, 170. *Oud. Javensis*, Hassk. Retzia, i. 134. *Orthothecium Javense*, Hassk. Pl. Jav. Rar. 307.

Malayan Archipelago, China.

Var. *obtusa*, (species Wall. Cat. 1184); Pierre, l. c. 211 B, 14 to 25. Kurz in Journ. As. Soc. Beng. 1873, pt. ii. 62. *Leaves* obtuse, mucronate.

Perak; Nicobar Islands.

6. PTEROSPERMUM, Schreb.

Trees or shrubs, scaly or stellate-tomentose. *Leaves* usually bifarious, leathery, oblique, simple or lobed, penninerved. *Peduncles* 1-3, axillary and terminal. *Bracteoles* entire, laciniate, persistent or caducous. *Calyx* of 5 valvate, coriaceous, more or less connate, sepals. *Petals* 5, imbricate, membranous, deciduous with the calyx. *Staminal column* short, bearing opposite to the sepals 3 linear 2-celled anthers, and opposite to the petals 5 ligulate staminodes; cells parallel; connective apiculate. *Ovary* inserted within the top of the staminal column, 3-5 celled; style entire, stigma 5-furrowed; ovules many in each cell. *Capsule* woody or coriaceous, terete or angled, loculicidally 5-valved. *Seeds* winged above, attached in two rows to the inner angle of the cells of the capsule; albumen thin or 0; cotyledons plaited or corrugated,

radicle inferior. Distrib. A genus of about 18 species, confined to tropical Asia.

Flowers 6 in. long ... ... 1. *P. diversifolium.*
„ 2 in. long.
Sepals shortly pubescent inside, capsule 3 to 4 in. long. 2. *P. Blumeanum.*
Sepals with silky hairs inside; capsule 1·5 in. long, with scaly hairs ... ... 3. *P. Jackianum.*
„ less than 2 in. long; capsule 2 to 2·5 in., glabrous ... ... 4. *P. aceroides.*

1. P. DIVERSIFOLIUM, Blume, Bijdr. 88. A tree 60 to 100 feet high: young branches, petioles, under surfaces of leaves and outer surface of sepals and fruit covered with a layer of minute, tawny tomentum with many, more or less deciduous, rufous, stellate hairs on its surface. *Leaves* coriaceous, varying from obovate-oblong to elliptic-rotund; the apex broad, blunt, or sub-truncate, suddenly contracted into a triangular point; the edges entire or sinuous, rarely lobed; the base always cordate or emarginate, 3 to 7-nerved and often oblique: upper surface shining, glabrous, except the tomentose midrib: main nerves 8 to 10 pairs, straight, sub-erect, prominent on both surfaces; length 6 to 9 in., breadth 3·5 to 6 in., petiole 1 to 1·25 or even 2 in., stipules small linear, caducous. *Flowers* 6 to 7 in. long, buds narrowly cylindric, solitary, or in 3 to 4-flowered sub-sessile axillary cymes; pedicels ·2 in. long, each with a minute recurved lanceolate bracteole. *Sepals* coriaceous, slightly shorter than the petals, linear, blunt, adpressed-sericeous internally. *Petals* membranous, linear, glabrescent. *Staminal tube* and gynophore 2 in. long; the free part of the filaments slightly longer; fertile anthers about 10, linear; staminodes 5, pubescent. *Ovary* fusiform, tomentose, 5-celled. *Style* less than 2 in. long, angled, pubescent; stigma fusiform. *Capsule* woody, oblong, pointed, acutely 5-angled, suddenly constricted at the base, about 4 to 5 in. long and 1·5 to 2 in. in diam. *Seeds* flattened, 1·5 to 2 in. long. Mast. in Hook. fil. Fl. Br. Ind. i. 367; Pierre Fl. For. Coch-Chine, t. 179; Miq. Fl. Ind. Bat. i. pt. 2, p. 192; Hassk. Pl. Jav. Rar. 316; Korth. Ned. Kruik. Arch. i. 312. *P. acerifolium*, Zoll. et Mor. Syst. Verz. p. 27 (excl. syn. Willd.)

Perak, Malacca; common; at low elevations. Distrib. Java, Philippines, Cochin-China.

The leaves on young shoots of this are often peltate and deeply lobed.

2. P. BLUMEANUM, Korth. Ned. Kruik. Arch. ii. p. 311. A tree

40 to 50 feet high: young branches slender, almost black when dry; when very young covered by deciduous furfuraceous rufous stellate hairs. *Leaves* thinly coriaceous, very inequilateral, oblong to ovate or lanceolate-oblong, entire, acuminate; the base broad, unequally cordate, one side auriculate or sub-auriculate; upper surface very dark when dry, glabrous, shining; the lower densely but minutely tawny or rufous-tomentose with many deciduous cinnamoneous stellate hairs on the surface; main nerves 5 to 7 pairs, prominent beneath; length 3 to 5·5 in., breadth 1·35 to 2 in.; petiole ·15 in.; stipules subulate-lanceolate. *Flowers* 2 in. long, solitary, or in 2-3-flowered cymes, axillary, or (by the suppression of the leaves) in terminal racemes: pedicels ·5 in. long, bracteate, cylindric in bud. *Sepals* coriaceous, narrowly linear, acute, scurfy, stellate-pubescent externally as are the pedicels and bracteoles, pubescent internally. *Petals* membranous, obliquely oblong-oblanceolate or sub-spathulate, shorter than the sepals, glabrescent. *Staminal tube* and gynophore about ·5 in. long, the free part of the filaments rather longer; fertile anthers about 10; staminodes 5, scaly-pubescent above. *Ovary* ovoid, villous, 5-celled. *Style* shorter than the staminal tube, glabrous: stigma narrowly ovoid. *Capsule* woody, oblong, 5-angled, sub-acute, gradually and slightly narrowed at the base, glabrous when ripe; 3 to 4 in. long and 1·5 in. in diam. *Seeds* flat, 1·5 in. long. Miq. Fl. Ind. Bat. i. pt. 2, p. 191. *Pterospermum lanceaefolium*, Bl. (not of Roxb.) Bijdr. 87. *P. cinnamoneum*, Kurz, For. Fl. Burm. i. 147. *P. Javanicum*, Jungh. Kurz, l. c. i. 147.

Perak, Penang; common at low elevations. Distrib. Sumatra, Java, Borneo, Burmah, Assam.

A very common tree in Perak. Korthal's Bornean species *P. fuscum* appears to me to be nothing more than a very cinnamoneous-tomentose form of this. And the Peninsular-Indian *P. rubiginosum*, Heyne, (Mast. in Hook. fil. Fl. Br. Ind. i. 368) cannot be very different. I should be induced to reduce both to the oldest described species which is this. Of the absolute identity of Kurz's *P. cinnamoneum* with this I have no doubt whatever.

3. P. Jackianum, Wall. Cat. 1164. A tree: the small branches slender, rather dark, when young covered by a layer of white minute tomentum with many rufous stellate hairs on its surface. *Leaves* sub-coriaceous oblong or elliptic-oblong, slightly inequilateral, entire, or sinuate towards the rather abruptly acuminate apex; the base sub-acute, or truncate and minutely cordate or emarginate, never auricled; upper surface pale brown when dry, glabrous except the puberulous midrib and nerves; under surface pale brown or buff, with

a layer of minute tomentum and on the surface (and especially on the midrib and nerves) many minute deciduous rusty stellate hairs; nerves 10 to 12 pairs, prominent beneath, spreading; length 4 to 5·5 in., breadth 1·5 to 2 in., petiole ·25 in.; stipules caducous. *Flowers* 2 in. long: the buds cylindric, acute, solitary, axillary; pedicels ·1 in. long, tomentose like the exterior of the sepals, minute, linear-subulate. *Sepals* linear-lanceolate, adpressed-sericeous within. *Petals* shorter than the sepals, oblanceolate, scaly, puberulous externally. *Staminal tube* and gynophore ·25 in. long, the free part of the filaments more than twice as long; fertile anthers about 12; staminodes 5. *Ovary* fusiform. *Style* longer than the stamens, pubescent below; stigma cylindric. *Capsule* (*fide* Masters) shortly stalked, ovoid, terete, acute, 1·5 in. long and 1 in. in diam., covered with flat scaly hairs. Mast. in Hook. fil. Fl. Br. Ind i. 367; *P. oblongum*, Wall. Cat. 1165.

Penang; Jack, Wallich, Curtis. Malacca; Stolickza, at low elevations.

This species does not appear to be a common one. *P. Blumeanum* has probably been mistaken for it.

4. P. ACEROIDES, Wall. Cat. 1171. A tree 35 to 50 feet high: young branches rather slender, covered (as are the petioles and under surfaces of the leaves) by a thin felted layer of minute white tomentum, above which is a superficial deciduous layer of loose stellate rufous hairs. *Leaves* coriaceous, more or less elliptic, sometimes obovate-elliptic, the apex abruptly and shortly acuminate, the edge often straight at the sides, sometimes waved, never lobed: the base sub-truncate, often cordate, 5 to 7-nerved; upper surface (when adult) glabrous: main lateral nerves 12 to 15 pairs, straight, oblique; length 5 to 10 in., breadth 3·25 to 5·5 in., petiole ·4 to ·5 in. *Flowers* 1·5 to 1·75 in. long; solitary, or in 3 to 4-flowered sub-sessile axillary cymes; pedicels ·2 in. long, each with a deeply lobed tomentose bract; the buds narrowly cylindric, ribbed. *Sepals* very coriaceous, recurved, longer than the petals, linear, acute, scurfy-tomentose outside, adpressed-pubescent within. *Petals* membranous, obovate, glabrous in the inner, scurfy on the outer, surface. *Stamens* as long as the petals or shorter, the tube only ·25 in. long: fertile anthers about 15, linear. *Style* shorter than the stamens, glabrous; stigma clavate; ovary densely sericeous, 5-angled. *Capsule* woody, oblong, pointed at both ends, angled, glabrous, 2 to 2·5 in. long. Kurz in Journ. As. Soc. Beng. 1873, pt. 62; For. Flora Burm. i. 145. *P. acerifolium*, Mast. (not of Willd.) in Hook. fil. Fl. Br. Ind. i. 368, in part. Miq. Ill. Arch. Ind. 84, in part.

Andaman Islands; Helfer, No. 568 (Kew Distrib.), Kurz, King's Collectors. Distrib. Burmah; Wallich.

The nearest ally of this is no doubt *P. acerifolium*, Willd., to which it has been reduced by Dr. Masters. But (having had living trees of both under observation in the Botanic Garden, Calcutta, for many years) I have no hesitation in saying that the two species are quite distinct. *P. aceroides* has entire, not lobed, leaves; much smaller flowers (less than 2 in. long) which expand during December and January: while those of *P. acerifolium* measure ·6 in. length and open in March or April. The capsule of *P. aceroides* is moreover only 2 to 2·5 in. long and quite glabrous; while that of *P. acerifolium* is 4 to 6 in. long, with a rough densely stellate tomentose exterior.

7. Melochia, Linn.

Herbs or undershrubs, more or less downy. *Leaves* simple. *Flowers* small, clustered or loosely panicled. *Sepals* 5, connate below. *Petals* 5, spathulate, marcescent. *Stamens* 5, opposite to the petals, connate below into a tube; anthers extrorse, 2-lobed, lobes parallel. *Ovary* sessile, 5-celled; cells opposite the petals, 2-ovuled; styles 5, free or connate at the base. *Capsule* loculicidally 5-valved. *Seeds* ascending, albuminous; embryo straight, cotyledons flat, radicle next the hilum.—Distrib. Species about 50, natives of the warmer regions of both hemispheres.

1. M. corchorifolia, Linn. sp. 944. A pubescent, branching herb or undershrub. *Leaves* membranous, variable, broadly ovate, to ovate-oblong or lanceolate, acute, serrate or obscurely lobed; the base rounded, truncate or sub-hastate, 5-nerved, often plaited; petiole from ·4 to 1 in.; stipules linear, minute. *Flowers* ·2 in. in diam., in crowded terminal or axillary heads with many villous bracteoles intermixed. *Sepals* lanceolate, acuminate, ascending. *Petals* obovate. *Ovary* villous; styles glabrous. *Capsule* pisiform, pubescent, exceeding the calyx. Willd. Sp. Pl. iii. 604; Roxb. Fl. Ind. iii. 139; Wall. Cat. 1196, in part; Mast. in Hook. Fl. Br. Ind. i. 374. *M. truncata*, Willd. Sp. Pl. iii. 601. *M. supina*, L. Sp. Pl. 944. *M. affinis*, Wall. Cat. 1198. *M. pauciflora*, Wall. Cat. 1199. *Riedleia corchorifolia*, DC. Prodr. i. 491; W. & A. Prodr. i. 66; Miq. Fl. Ind. Bat. i. pt. 2, 188. *R. truncata*, W. & A. l. c. 66. *R. supina*, DC. Prodr. i. 491. *R. concatenata*, DC. Prodr. i. 492. *Visenia corchorifolia*, Spreng. Syst. iii. 30. *V. concatenana*, Spreng. Syst. iii. 30. *V. supina*, Spreng. Syst. iii. 31. *Melochia concatenata*, Wall. Cat. 1197. *Sida cuneifolia*, Roxb. Hort. Beng. 50,

In all the provinces, a common weed. Distrib. The Tropics generally.

2. M. VELUTINA, Bedd. Fl. Sylvat. t. 5. A large shrub or small tree, all parts pubescent and with many of the hairs stellate. *Leaves* membranous, long-petioled, broadly ovate, acuminate, coarsely and irregularly serrate; the base 5 to 7-nerved, rounded or cordate; 4 to 9 in. long, by 3·5 to 8 in. broad: petioles 2·5 to 4·5 in.; stipules rounded, ·25 in. long. *Cymes* on peduncles longer than the petioles, much branched, spreading, many-flowered, terminal and axillary. *Flowers* ·25 in. in diam., pink. *Calyx* campanulate, with 5 deep broad abruptly acuminate teeth. *Petals* narrowly oblong, longer than the calyx, membranous. *Stamens* inserted on a hypogynous disk as are the petals; filaments flat. *Ovary* villous, as are the lower parts of the styles. *Capsules* ·3 to ·5 in. long, ovoid-cylindric, apiculate, deeply 5-grooved, bristly-tomentose. *Seed* solitary in each cell, its wing ascending. Mast. in Hook. fil. Fl. Br. Ind. i. 374; Kurz For. Fl. Burm. i. 148. *Visenia indica*, Houtt. Linn. Syst. vi. p. 287, t. 46; Miq. Fl. Ind. Bat. i. pt. 2, p. 189. *V. umbellata*, (Houtt.) Bl. Bijdr. 88; Wight Ic. 509. *V. Javanica*, Jungh. in Tijdsc. Nat. Gesch. viii. 302. *Glossospermum velutinum*, Wall. Cat. 1153. *G. ? cordatum*, Wall. Cat. 1155.

In all the Provinces at low elevations—a tree-weed appearing in abandoned fields. Distrib. Malayan Archipelago, British India, Mauritius.

8. WALTHERIA, Linn.

Herbs or undershrubs. *Leaves* simple. *Stipules* linear. *Flowers* small, in dense axillary or terminal clusters. *Sepals* 5, connate below into a bell-shaped tube. *Petals* 5, oblong-spathulate. *Stamens* 5, tubular below; anthers 2-lobed, lobes parallel. *Staminodes* 0. *Ovary* sessile, 1-celled; 2-ovulate. *Styles* 2, distinct, clavate. *Capsule* 2-valved, 1-seeded. *Seeds* ascending, albuminous; embryo straight, cotyledons flat. Distrib. About 15 species, one or two of which are weeds in the Tropics generally; the others are Tropical S. American.

W. INDICA, Linn. sp. 941. A pubescent undershrub. *Leaves* ovate-oblong, obtuse, serrate or crenate, the base rounded or cordate; nerves 5 to 7 pairs, prominent beneath. *Flowers* ·25 in. in diam., sessile; bracts linear. *Calyx* campanulate, villous, 10-nerved, the mouth with 5 acuminate teeth. *Petals* oblanceolate, clawed, longer than the calyx. *Capsule* membranous, pubescent. DC. Prod. i. 493; W. & A. Prod. i. 67; Mast. in Hook. fil. Fl. Br. Ind. i. 374; Miq. Fl. Ind. Bat. i. pt. 2, p. 187; Wall. Cat. 1194. *W Americana*, L. DC. Prod. i. 492. *W. elliptica*, Cav. Diss. vi. 171; Wall. Cat. 1195.

In all the Provinces: a weed. Distrib. The Tropics generally.

9. Abroma, Jacq.

Trees or shrubs. *Leaves* cordate, ovate-oblong, serrulate, sometimes angled. *Peduncles* opposite the leaves, few-flowered. *Sepals* 5, connate near the base. *Petals* 5, purplish, concave below, prolonged above into a large spoon-shaped lamina. *Staminal-cup* of 5 fertile and as many sterile divisions; fertile filaments opposite the petals, 3-antheriferous; anthers 2-lobed, lobes divergent. *Staminodes* longer than the fertile filaments, obtuse. *Ovary* sessile, pyramidal, 5-lobed; cells many-ovuled, styles 5. *Capsule* membranous, 5-angled, 5-winged, truncate at the apex, septicidally 5-valved, valves villous at the edges. *Seeds* numerous, albuminous; embryo straight, cotyledons flat, cordate, radicle next the hilum.—Distrib. 2 or 3 species, natives of Tropical Asia.

1. A. augusta, Linn. fil. Suppl. 341. A pubescent large shrub or small tree: young branches pale. *Leaves* 5 to 7-nerved at the base, 3·5 to 6 in. long and 3 to 5 in. broad; petiole 1·75 to 2·5 in., the upper much smaller and narrower. *Stipules* linear, deciduous. *Flowers* 2 in. in diam., peduncles 1·5 in., extra-axillary. *Sepals* 1 in. long, lanceolate, free to nearly the base. *Petals* longer than the sepals, imbricate, deciduous. *Capsule* 1·5 to 2 in. in diam., glabrous or nearly so when ripe. DC. Prod i. 485; Mast. in Hook. Fl. Br. Ind. i. 375; Bl. Bijdr. 85; Roxb. Hort. Beng. 50; Fl. Ind. iii. 156; Miq. Fl. Ind. Bat. i. pt. 2, 183; Beddome Flor. Sylvat. Anal. Gen. t. 5; W. & A. Prodr. i. 65; Wall. Cat. 1142. *A. angulata*, Lam. Ill. 636. *A. Wheeleri*, Retz. Obs. v. 27; Willd. Sp. Pl. iii. 1425. *A. fastuosum*, Gærtn. Fruct. i. 307, t. 64.

In all the Provinces at low elevations: usually near cultivation. Distrib. Malayan Archipelago, Philippines, China, Brit. India.

The bark yields a stout fibre.

10. Buettneria, Linn.

Erect climbing or tomentose shrubs, herbs, or trees; sometimes prickly. *Leaves* various. *Flowers* minute, in axillary or terminal much-branched, umbellate cymes. *Sepals* 5, slightly connate near the base. *Petals* 5, unguiculate, concave, inflexed, with 2 small lateral lobes, and a long sub-terminal simple linear or narrowly lanceolate appendage. *Staminal tube* with 5 broad truncate or emarginate teeth and, between them, five 2-celled extrorse anthers (mouth entire in *B. Curtisii*). *Ovary* sessile, 5-celled, the cells 2-ovulate. *Style* entire, 5-fid. *Capsule* globose, echinate, septicidaly 5-valved, the cells 1-seeded. *Seed* ascending, exalbuminous: cotyledons folded round the radicle. Distrib. About 48 species, mostly tropical American: a few tropical Asiatic and one African.

Leaves longer than broad, their bases not cordate or only minutely so.
- Staminal tube with entire mouth ... 1. *B. Curtisii.*
- Staminal tube with its mouth 5-lobed.
  - Leaves quite glabrous.
    - Capsule less than 1 in. in diam., covered with glandular barbed spines ... ... 2. *B. uncinata.*
    - Capsule more than 1 in. in diam., covered with short subulate spines ... ... 3. *B. Maingayi.*
  - Leaves more or less minutely hispid on both surfaces ... 4. *B. elliptica.*
  - „ hispid on the upper, hispid-tomentose on the lower, surface ... ... 5. *B. Jackiana.*

Leaves about as broad as long, deeply cordate at the base.
- Leaves glabrous, or glabrescent, not lobed ... ... 6. *B. aspera.*
- „ sparsely pubescent, often lobed ... ... 7. *B. Andamanensis.*

1. B. Curtisii, Oliver in Hook. Ic. Pl. t. 1761. A slender woody creeper, 10 to 15 feet long: young branches minutely puberulous. *Leaves* linear-lanceolate or oblanceolate-oblong, rarely ovate-oblong, acuminate, entire, narrowed to the sub-obtuse, minutely cordate, 5-nerved base: lateral nerves numerous, unequal and spreading at various angles, reticulations distinct: both surfaces glabrous, the lower with tufts of stellate hairs in the axils of the leaves; length 2·5 to 7 in., breadth ·5 to 2 in.; petiole ·25 in., pubescent. *Cymes* in axillary fascicles of 2 to 4, slender, 3 to 7-flowered, puberulous; peduncles about 1 in. long: flower pedicels ·25 in. *Flowers* ·45 in. in diam., buds conical. *Calyx* deeply 5-partite, the segments ovate-lanceolate, acuminate. *Petals* strap-shaped with 2 rather broad inflexed lateral lobes, and a long cylindric curved sub-terminal appendage, about as long as the sepals. *Capsule* globular, about 1 in. in diam., veined, pubescent, and armed with numerous straight smooth bristles.

Penang, Curtis, Nos. 817 and 1166; Perak, common at low elevations.

This is closely allied to the Bornean *B. lancifolia*, Hook. fil. The leaves vary a good deal in shape, the most prevalent form in the Perak

specimens being linear-lanceolate. The Penang specimens are, on the other hand, as figured by Professor Oliver, oval-oblong.

2. B. UNCINATA, Mast. in Hook. fil. Fl. Br. Ind. i. 377. A woody climber: young branches at first scurfy and hispid, but very soon glabrous. *Leaves* sub-coriaceous, elliptic-oblong; gradually tapering in the upper third to the acuminate apex, entire, the base slightly cuneate, 3-nerved; both surfaces glabrous and shining, nerves 9 or 10 pairs, spreading, thin but prominent beneath: length 9 to 11 in., breadth 3 in., petiole nearly 3 in., thickened at the apex, glabrous. *Sepals* lanceolate, spreading, hispid. *Fruiting peduncles* (fide Masters) "half the length of the leaves. *Capsule* depressed-spheroidal, the size of a hazelnut, covered with hooked gland-tipped barbed hispid spines, 3-celled."

Malacca, Maingay, No. 242 (Kew Distrib.).

I have seen only Maingay's Malacca specimens.

3. B. MAINGAYI, Mast. in Hook. fil. Fl. Br. Ind. i. 377. A woody climber: young branches glabrous. *Leaves* sub-coriaceous, elliptic to elliptic-oblong, shortly bluntly and rather abruptly acuminate, entire; the base rounded with 3 bold and 2 minute nerves: both surfaces quite glabrous; lateral nerves about 2 or 3 pairs, prominent beneath as are the reticulations; length 7 or 8 in., breadth 3 to 3·5 in.; petioles 1·2 in., thickened towards the apex, glabrous. *Umbels* in axillary fascicles of 6 or 8, their peduncles about 1 in. long, slender, glabrescent; pedicels ·25 in. *Sepals* ·25 in. long, ovate-lanceolate. "*Petals* shorter than the sepals, with a long linear appendage. *Staminodes* erect, oblong, obtuse, bifid. *Style* as long as the ovary. *Fruiting peduncle* as long as the petiole. *Capsule* globose, 1·25 in. in diam., obscurely 5-lobed, studded with short subulate prickles."

Malacca; Griffith, Maingay.

Of this species I have seen no good specimens in flower or fruit, and the above account of these parts is taken from Masters' description.

4. B. ELLIPTICA, Mast. in Hook. fil. Fl. Br. Ind. i. 377. A woody climber; young branches minutely rusty-tomentose. *Leaves* broadly elliptic, abruptly and shortly acuminate, entire; the base 5-nerved, rounded or minutely cordate; upper surface minutely scabrid-hispid, the midrib and nerves hispid-tomentose; lower minutely pubescent on the veins, the midrib and longer nerves tomentose: lateral nerves 3 pairs, oblique, curving, prominent beneath as are the secondary nerves and reticulations: length 5·5 to 7·7 in., breadth 3·5 to 4·75 in., petiole

2 to 3 in., tomentose. *Umbels* pedunculate, solitary or in fascicles of 5 or 6, axillary, few-flowered, stellate-tomentose: peduncles ·5 to 1 in.; pedicels ·1 to ·25 in., both slender. Buds ·1 in. in diam. *Sepals* ovate, acute. *Petals* rounded, with long cylindric inflexed apices longer than the sepals. *Fruit* unknown.

Malacca, Maingay: No. 241 (Kew Distrib.). Perak; Scortechini.

Evidently a rare species; for I have seen, besides Maingay's, only Scortechini's solitary specimen.

5. B. Jack'ana, Wall. in Roxb. Fl. Ind. (ed Carey) ii. 386. A stout woody creeper, the young branches with densely minute ferruginous tomentum some of which is stellate. *Leaves* narrowly or broadly elliptic, acuminate, entire; the base boldly 3-nerved, rounded, sometimes slightly cordate, rarely acute; upper surface sparsely and shortly hispid; under surface rufous, hispid-tomentose especially on midrib and nerves, many of the hairs on both surfaces stellate; lateral nerves 3 or 4 pairs, curved, spreading; length 3·5 to 6 in., breadth 2 to 3·75 in.; petiole ·4 to 1 in. tomentose. *Umbels* pedunculate, solitary or in groups of 3 or 4 from the leaf-axils, few-flowered, tomentose: peduncles ·25 to 1 in. long; pedicels about ·35, slender. *Sepals* linear-subulate, spreading, hispid, about ·4 in. long. *Petals* sub-rotund, lobed, each with a single long cylindric terminal appendage as long as the sepals. *Capsule* globose, slightly 5-furrowed, 1 in. in diam., black, glabrescent, armed with many straight spines. *Seeds* oblong, black. Mast. in Hook. fil. Fl. Br. Ind. i. 376; Wall. Cat. 1147.

Penang, Perak and Singapore; at low elevations.

6. B. aspera, Colebr. in Roxb. Fl. Ind. (ed. Carey), ii. 383. A powerful woody climber often with a tree-like stem; young branches glaucous, minutely and deciduously pubescent. *Leaves* sub-orbicular or ovate-orbicular, shortly acuminate, entire, the base cordate, 5 to 7-nerved; upper surface glabrous, shining; the lower glabrescent, the midrib and nerves puberulous; lateral nerves 4 to 6 pairs, prominent beneath as are the stout transverse veins; length 4·5 to 7·5 in., breadth about the same: petiole 2 to 5 in., glaucous-pubescent at first, afterwards glabrous. *Cymes* axillary, solitary or fasciculate, pedunculate, much branched, many-flowered, pubescent to tomentoso, 3 or 4 in. long: ultimate pedicels ·5 in. long, slender. *Sepals* lanceolate, acute, spreading, ·15 in. long, puberulous externally. *Petals* cuneate, shorter than the sepals, 3-lobed, the middle lobe linear-lanceolate, reflexed. *Staminodes* truncate. *Ovary* globular, scabrid. *Capsules* globular, 1·5 to 2 in. in diam., slightly depressed, pubescent when young, glabrous when ripe,

armed with many long, nearly straight, sharp spines. *Seeds* oblong, ·5 in. or more long. Wall Cat. 1144; Mast. in Hook. fil. Fl. Br. Ind. i. 377; Kurz For. Fl. Burm. i. 151; Pierre Fl. Forest. Coch-Chine, t. 206, figs. 1 to 8. *B. grandifolia*, DC. Prodr. i. 486. *B. nepalensis*, Turcz. in Bull. Mosc, 1858, 207.

Andaman Islands. Distrib. Brit. India, China, Cochin-China.

7. B. Andamanensis, Kurz in Journ. As. Soc. Bengal, 1871, ii. 47. A woody climber: young branches scaberulous. *Leaves* sub-orbicular, crenate and palmately 3 to 5-lobed, the lobes acuminate; or ovate-rotund, acuminate and irregularly serrate-crenate and not lobed; the base always deeply cordate, 5 to 7-nerved; lateral nerves about 5 pairs, opposite, prominent beneath as are the midrib and straight transverse veins; both surfaces sparsely pubescent at first, but afterwards glabrous. *Cymes* umbellate, 2 or 3 times branched, spreading, many-flowered, solitary, or 2 or 3 in a fascicle, axillary: the common peduncle stout, ·6 to ·75 in. long; secondary peduncles about the same length, tertiary half as long: flower-pedicels ·15 in., all slender and slightly pubescent. *Sepals* ovate acuminate or deltoid, puberulous externally. *Petals* with 2 obscure lateral lobes, and a long lanceolate inflexed middle lobe. *Staminodes* truncate. *Capsule* globose, less than 1 in. in diam., glaucous when young, armed with a few unequal, rather short, smooth, stiff spines. Kurz in Flora, 1871, p. 277; For. Fl. Br. Burm. i. 152; Mast. in Hook. fil. Fl. Br. Ind. i. 377; Pierre Fl. Forest. Coch-Chine, t. 207, figs. 1 to 9..

Andaman Islands. Distrib. Burmah, Siam, Cochin-China.

11. Commersonia, Forsk.

Trees or shrubs. *Leaves* simple, oblique. *Inflorescence* cymose, terminal or axillary or leaf opposed. *Calyx* 5-cleft. *Petals* 5, concave at the base, prolonged into a long strap-shaped appendage at the apex. *Fertile stamens* 5, opposite the petals; anthers subglobose, 2-celled, cells diverging; staminodes 5, opposite to the sepals, lanceolate. *Carpels* 5, opposite to the sepals, connate; *styles* connate; ovules 2-6. *Capsule* loculicidally 5-valved, covered with bristly hairs. *Seeds* ascending, albuminous, strophiolate; cotyledons flat, radicle next the hilum. Distrib. A genus of about 8 species, some of which are natives of the Malay peninsula and Archipelago, others of Australia.

C. platyphylla, Andr. Bot. Rep. t. 603 (note). A low tree; young branches softly rusty-tomentose. *Leaves* membranous, inequilateral, ovate-acuminate, irregularly dentate-serrate; the base more or less cordate, one side sub-auriculate, upper surface sparsely and minutely

stellate-hairy, lower softly hoary tomentose: length 5 to 8 in., breadth 3 to 4·5 in., petioles ·2 to ·3 in.; stipules shorter than the petioles, scarious, lobed. *Cymes* corymbose, much shorter than the leaves, spreading, much branched, tomentose. *Flowers* ·2 or ·25 in. in diam. *Calyx* pubescent, cut nearly to the base into 5 ovate-lanceolate lobes. *Petals* as long as the sepals but much narrower, concave at the base; the terminal appendage elongate, narrowly oblong, its edges inflexed. *Stamens* 5, the anthers broad, extrorse. *Staminodes* 5, lanceolate, spreading, reflexed, shorter than the petals. *Ovary* 5-celled. *Capsule* globose, ·4 or ·5 in. in diam., densely covered with long soft, flexuose, pubescent bristles. Mast. in Hook. fil. Fl. Br. Ind. i. 378. *C. Javensis*, G. Don. Gen. Syst. i. 523; Hassk. Pl. Jav. Rar. 312. *C. echinata*, Blume Bijdr. 86; Wall. Cat. 1143; Andr. Bot. Rep. t. 519, not of Forst. *C. echinata*, var. *β.* Miq. Fl. Ind. Bat. i. pt. 2, 182. *Buettneria hypoleuca*, Turcz. in Mosc. Bull. 1858, 207.

In all the provinces except the Andamans and Nicobars. Distrib. Malayan Archipelago, Philippines.

12. Leptonychia, Turcz.

Shrubs or trees. *Leaves* simple, entire. *Flowers* in small axillary cymes. *Sepals* 5, valvate, united near the base. *Petals* 5, valvate, short, orbicular, concave. *Andræcium* tubular below, filamentiferous above, filaments 3-seriate, outer series of 5 to 10 ligulate staminodes opposite the petals, middle of 10 fertile stamens also opposite the petals, innermost of 5 very short fleshy subulate staminodes opposite the sepals; anthers linear-oblong, introrse, dehiscing at the sides longitudinally. *Ovary* sessile, 3-4-celled; placentas axile; styles connate, stigmas capitellate; ovules many in each cell, anatropous. *Capsule* 2-3-celled, or by abortion 1-celled, dehiscing septicidally or loculicidally, or both simultaneously or irregularly. *Seeds* black, with a fleshy yellowish arillus; albumen fleshy, cotyledons foliaceous, radicle superior. Distrib. three or four species—Indo Malayan and Tropical African.

L. glabra, Turcz. in Mosc. Bull. for 1858, p. 222. A tree: the young branches glabrous. *Leaves* ovate-oblong or oblong-lanceolate, rather abruptly acuminate, the base slightly narrowed or rounded, 3-nerved; both surfaces glabrous, shining; main nerves 4 to 7 pairs, thin: length 4 to 8 in., breadth 1·6 to 3 in.; petiole ·4 to ·5 in., glabrous. *Flowers* ·25 in. in diam.; the buds oblong, obtuse, 5-ridged. *Sepals* ovate-lanceolate or oblong, rather obtuse, spreading, pubescent on both surfaces, not veined. *Petals* about one-fourth the size of the sepals, broad, truncate, villous. *Stamens* 10, in five phalanges of two each,

nearly as long as the sepals. *Staminodes* 10 to 20, glabrous, the outer 5 to 15 shorter than, or as long as, the stamens, filiform; the inner invariably 5, short, subulate, internal to, and alternating with, the phalanges of stamens. *Ovary* broadly obovate, obtuse, obscurely 4-grooved, with a few scattered hairs near the apex, 4-celled. *Style* cylindric, taporing, with sparse spreading hairs. *Capsule* coriaceous, depressed-obovoid, pale greyish, ·5 in. long, rugose; within shining pale and wrinkled. *Seed* solitary, oblong, black, less than half covered by a thin arillus proceeding from its side. Mast. in Hook. fil. Fl. Br. Ind. i. 379; Kurz For. Fl. Burm. i. 150; Oudem. in Compt. Rend. Ac. Roy. Sc. Amsterd. 2 Ser., 11, 8, cum ic; Walp. Ann. vii. 449. *Grewia? caudata*, Wall. Cat. 1099. *L. heteroclita*, Kurz For. Fl. Burm. i. 150. *G. heteroclita*, Roxb. Fl. Ind. ii. 590. *Binnindykia trichostylis*, Kurz in Nat. Tijdsc. Ned. Ind., Ser. 3, iii. 164. *Turrœa trichostylis*, Miq. Fl. Ind. Bat. Suppl. 502.

Malacca, Penang, Perak, Andamans; at low elevations. Distrib. Malayan Archipelago, Burma.

Var. *Mastersiana*, young branches, midribs and petioles of leaves puberulous; flowers ·5 in. in diam., the buds pointed; sepals 3-veined: outer staminodes varying from 5 to 15, often pubescent in the upper half: ovary oblong-ovoid, villous, 3-celled: style glabrous: capsule black. *L. acuminata*, Mast. in Hook. fil Fl. Br. Ind. i. 379.

Malacca and Perak. Distrib. Sumatra, Borneo, Burmah.

This shrub or small tree is common, and I have thus had the advantage of being able to examine a large number of flowers. The result of my examination of these is that, whereas the inner staminodes are invariably 5 in number, the outer series varies in number in the most perplexing way from 5 to 15. Where there are 10, they are always arranged in pairs united at the base: and where there are 15, they are arranged in threes united at the base. The proper view to take of these staminodes is I believe therefore that they are single organs, but sometimes deeply cleft into 2 or 3 linear and equal segments. On this account, and also on account of the similarity of the other organs, I am induced to think that there is but *one* species of *Leptonychia* and that Masters' species *acuminata* and Beddome's *L. moacurroides* are merely forms of the species on which Turczaninow originally founded the genus.

Order XIX. TILIACEÆ.

Trees, shrubs or herbs. *Leaves* alternate, rarely opposite, simple or lobed. *Stipules* free, usually caducous. *Flowers* usually cymose, or in cymose panicles, or racemose. *Flowers* regular, hermaphrodite, rarely unisexual. *Sepals* 3-5, free or connate, valvate. *Petals* as many as the sepals, rarely absent, imbricate or valvate. *Stamens* numerous, rarely

definite, usually springing from a prolonged or dilated torus, free or sometimes 5-adelphous, filaments filiform; anthers 2-celled. *Ovary* free, 2-10-celled; styles columnar, or divided into as many divisions as there are cells to the ovary, stigmas usually distinct, rarely confluent or sessile. *Ovules* attached to the inner angle of the cells of the ovary; if few in number, often pendulous from the apex or ascending from the base; if more numerous, disposed in 2 or more ranks, anatropous; raphe ventral or lateral. *Fruit* fleshy or dry, dehiscent or indehiscent, 2-10 or by abortion 1-celled (cells sometimes divided by false partitions); carpels separable or always united. *Seeds* 1 or many, ascending, pendulous or transverse, with no arillus; testa leathery or crustaceous or pilose; albumen fleshy, abundant or scanty, rarely wanting; embryo straight or slightly curved, cotyledons leafy, rarely fleshy, radicle next the hilum.—Distrib. about 370 species; most abundant in the tropics of either hemisphere.

Series A. *Holopetalæ*. *Petals* glabrous or rarely downy, coloured, thin, unguiculate, entire or nearly so, imbricate or twisted in the bud. *Anthers* globose or oblong, opening by slits.

Tribe I. *Brownlowieæ*. *Sepals* combined below into a cup. *Anthers* globose, cells ultimately confluent at the top.

* *Staminodes* 5.

Carpels distinct, 2-valved ... ... 1. *Brownlowia*.

Carpels combined, indehiscent, winged ... 2. *Pentace*.

** *Staminodes* 0.

Stamens on a raised torus ... ... 3. *Schoutenia*.

Stamens on a contracted torus ... ... 4. *Berrya*.

Tribe II. *Grewieæ*. *Sepals* distinct. *Petals* glandular at the base. *Stamens* springing from the apex of a raised torus.

Fruit drupaceous, not prickly ... ... 5. *Grewia*.

Fruit dry indehiscent or 3-5 coccous, prickly 6. *Triumfetta*.

Tribe III. *Tilieæ*. *Sepals* distinct: petals not glandular. *Stamens* springing from a contracted torus.

Herbs or undershrubs with 3 or 5-celled capsules: seeds without hairs ... 7. *Corchorus*.

Trees with 2-celled capsules; seeds with marginal hairs ... ... 8. *Trichospermum*.

Series B. *Heteropetalæ*. *Petals* usually incised, rarely entire or absent, induplicate or imbricate not twisted: anthers linear, opening by a terminal pore often with an apical awn or tuft of hairs.

Stamens on a raised torus; fruit drupaceous 9. *Elæocarpus*.

1. Brownlowia, Roxb.

Trees. *Pubescence* stellate or scaly. *Leaves* entire, 3-5-nerved, feather-veined. *Flowers* numerous, small, in large terminal or axillary panicles. *Calyx* bell-shaped, irregularly 3-5-fid. *Petals* 5, without glands. *Stamens* many, free, springing from a raised torus. *Staminodes* 5, within the stamens, opposite the petals and petaloid. *Anthers* sub-globose. *Ovaries* 5, each 2-ovulate; styles awl-shaped, slightly coherent; ovules ascending. *Carpels* ultimately free, 2-valved, 1-seeded. *Albumen* 0; cotyledons thick, fleshy.—Distrib. Nine species confined to Tropical Asia.

Leaves not peltate.
- Leaves lanceolate ... ... 1. *B. lanceolata.*
- „ broadly elliptic to elliptic-rotund 2. *B. Kleinhovioidea.*

Leaves peltate.
- Leaves minutely hairy beneath ... 3. *B. Scortechinii.*
- „ glabrous on both surfaces ... 4. *B. macrophylla.*

1. Brownlowia lanceolata, Benth. in Journ. Linn. Soc. V. Suppl. ii. 57. A tree 25 to 30 feet high; young branches pale when dry, sub-lepidote. *Leaves* thinly coriaceous, lanceolate or oblong-lanceolate, acuminate, the base obtuse; upper surface when adult glabrous, shining, the lower covered by a dense layer of minute whitish yellow shining scales: main nerves 6 to 8 pairs (1 pair of them basal), not prominent: length 4·5 to 6 in., breadth 1·5 to 1·75 in., petiole ·25 to ·4 in. *Panicles* axillary or terminal, 1 to 3 in. long, and less than 1 in. across, few-flowered. *Flowers* ·25 in. long, their pedicels about as long. *Calyx* ·2 in. long, scaly like the pedicel, its lobes lanceolate. *Petals* longer than the calyx, oblong, blunt, slightly narrowed to the shortly unguiculate base, glabrous. *Anther-cells* sub-divaricate, sub-confluent when adult. *Ovary* deeply 3 to 5-lobed, pubescent, the cells 2-ovuled. *Ripe carpels* distinct, sub-globose, truncate, compressed on their inner surfaces, minutely lepidote and pubescent, ·5 in. in diam. *Seed* solitary, with thin testa and large sub-hemispheric cotyledons. Hook. fil. Fl. Br. Ind. i. 381: Kurz For. Flora Burm. 154.

Malacca, Griffith. Distrib. Burmah and Bengal; in tidal forests and mangrove swamps.

The young parts are covered with rusty or pale brown scales, but the adult branchlets leaves and flowers are as above described.

2. Brownlowia Kleinhovioidea, King, n. sp. A tree 40 to 50 feet high: young branches rather slender, covered with a dense thin layer of

minute pale brown hair. *Leaves* thinly coriaceous, broadly elliptic to elliptic-rotund, slightly narrowed to the obtuse apex, very little narrowed to the more or less cordate base: upper surface glabrous, very sparsely lepidote, the lower covered with a thin layer of very minute pale hair; basal nerves 4 or 6 (two of them small): main lateral nerves 3 pairs; transverse secondary nerves distinct: length 5 to 7 in., breadth 3·5 to 4·5 in.; petiole 2·5 to 3 in., thickened towards the apex, pubescent like the under surfaces of the leaves. *Panicles* mostly terminal, rarely axillary, 9 to 15 in. long (the axillary ones much smaller) the branches rather few, spreading little, the flowers rather closely clustered on the branchlets. *Flowers* ·25 in. long, on pedicels about half as long. *Calyx* widely campanulate, cut for a third of its length into 5 acute triangular teeth, minutely tomentose externally, glabrous inside. *Petals* longer than the calyx, oblong, very obtuse, slightly narrowed but thickened towards the rather long basal claw. *Staminodes* linear, flat, about as long as the filaments. *Ovaries* 3 to 5, sub-globose, laterally compressed, pubescent. *Styles* subulate, a little longer than the stamens, slightly coherent. *Fruit* unknown.

On Gunong Bubu in Perak, at elevations of 600 to 1000 feet; King's Collector.

A species with leaves not unlike these of *Kleinhovia hospita:* in many respects closely allied to *B. elata*, but with much smaller flowers.

3. Brownlowia Scortechinii, n. sp., King. A small slender tree: young branches stout, pale, sparsely lenticellate, pubescent at first but soon glabrous. *Leaves* coriaceous, ovate-elliptic, peltate, slightly narrowed to the acute or sub-acute apex; the edges sub-undulate; very little narrowed to the rounded, or sometimes sub-emarginate, base; upper surface glabrous; the lower pale from a thin continuous layer of very minute hairs; petiole attached 2·5 to 3 in. above the base, nerves radiating from it about 9, lateral nerves from the midrib about 4 pairs; all rather prominent beneath, as are the transverse secondary nerves: length 10 to 15 in., breadth 5·5 to 7 in., petiole 7 to 9 in. long, thickened at both ends. *Panicle* terminal, 6 to 12 in. long and about 6 in. broad, or sometimes small narrow panicles in terminal clusters of 6 to 10: branches spreading, compressed, puberulous; bracteoles ovate, fugaceous; pedicels, stout, ·15 in. long in the bud but lengthening as the flower expands, puberulous. *Flowers* ·6 in. long, crowded. *Calyx* narrowly campanulate; its teeth half as long as the tube, lanceolate, sub-acute, tomentose-lepidote externally. *Petals* longer than the calyx, narrowly obovate, much narrowed to the clawed base. *Staminodes* linear, about as long as the filaments. *Ovaries* 5, ovoid, compressed, stellate-pubescent·

Styles slightly longer than the stamens, subulate, bent at the apex. *Fruit* unknown.

Perak; Scortechini, No. 1918.

Collected only once by the late Fr. Scortechini and referred by him to *B. elata*, Roxb. The species is, however, quite distinct from *B. elata;* and also from *B. peltata*, which it more resembles in its leaves.

4. Brownlowia macrophylla, King n. sp. A tree 30 to 40 feet high: young branches very stout, deciduously rufous-puberulous. *Leaves* very coriaceous, rotund, those on the older branches elliptic, the apex rounded or very slightly and shortly apiculate, the edges subundulate, the base broad, emarginate or slightly cordate, both surfaces glabrous; main nerves 7 to 9 basal and about 2 pairs lateral, prominent on both surfaces, secondary nerves transverse and very distinct: length of the rotund leaves 11 to 17 in., breadth 10 to 14: of the elliptic, length 6 to 10 in., breadth 3·5 to 5·5 in.: petiole 2·25 to 4·5 in., thickened at both ends. *Panicle* terminal, almost as long as the leaves, its branches numerous, compressed, grooved, spreading, scurfy and rusty-pubescent: bracts few, linear-lanceolate, nearly 1 in. long, persistent. *Flowers* ·65 in. long: their peduncles shorter than the calyx, stout, deeply grooved. *Calyx* rather widely cylindric-campanulate, its teeth about half as long as the tube, acute, triangular, rusty-tomentose and scurfy externally. *Petals* oblong, obtuse, very little narrowed to the base and without any very distinct claw. *Ovaries* 3 to 5, narrowly ovoid, compressed, vertically ridged, lepidote as are the conjoined styles. *Fruit* sub-globose, much compressed, covered with a layer of very minute pale hairs, ·75 in. in diam.

Perak, at low elevations and in moist ground; Scortechini, Wray, King's Collector.

2 Pentace, Hassk.

Trees. Herbaceous portions sometimes pubescent or scaly, ultimately glabrous. *Leaves* entire, leathery, the lower surface (except in one species) pale from a thin layer of minute adpressed scaly hair. *Flowers* numerous, small, in terminal panicles. *Calyx* bell-shaped, usually 5-fid. *Petals* 5, membranous, glabrous, longer than the calyx, glandless. *Stamens* numerous, on a slightly raised torus, usually pentadelphous. *Staminodes* 5, opposite the sepals. *Anthers* subglobose; pollen globose, 3-pored. *Ovary* 5-celled, cells 2-ovuled; ovule pendulous, raphe next the placenta. *Styles* united, rarely free. *Fruit* dry, indehiscent, 3-10-winged, 1-celled, 1-seeded by abortion. *Seed* solitary, albuminous.—Distrib. About 15 species, all Malayan.

Leaves with pinnate nervation.
- Ovary 3-ridged... ... ... 1. *P. triptera.*
- Ovary 5-ridged.
  - Leaves with 6 or 7 pairs of nerves... 2. *P. Hookeriana.*
  - „ „ 3 or 4 „ ... 3. *P. Kunstleri.*
- Ovary 10-ridged ... ... 4. *P. perakensis.*

Leaves boldly 5-nerved at the base, lateral nerves from the central nerve (midrib) 3 pairs; 7 to 14 in. long; ovary 5-ridged... 5. *P. macrophylla.*

Leaves boldly 8-nerved at the base; the central nerve (midrib) with 1 or 2 pairs of lateral nerves: rarely more than 7 in. long.
- Ovary not visibly ridged ... ... 6. *P. floribunda.*
- Ovary 8 or 9-ridged.
  - Styles quite confluent ... ... 7. *P. Curtisii.*
  - „ free. . ... 8. *P. eximia.*
- Ovary 10-ridged.
  - Leaves glabrous on both surfaces ... 9. *P. Scortechinii.*
  - „ with a dense layer of minute adpressed hair on the under surface ... ... 10. *P. Griffithii.*

Leaves boldly 3-nerved at the base, the central nerve (midrib) without lateral nerves, only 3 or 4 in. long; ovary 5-ridged 11. *P. strychnoidea.*

1. Pentace triptera, Mast. in Hook. fil. Fl. Br. Ind. i. 382. A large tree: young branches pubescent, speedily becoming glabrous, their bark dark-coloured. *Leaves* ovate to ovato-rotund, sometimes ovate-oblong, sub-acute or shortly and bluntly acuminate, the margins undulate, the base rounded; upper surface glabrous, the lower pale, minutely scaly; basal nerves one or two pairs; lateral 5 to 7 pairs, ascending, straight; length 4 to 5 in., breadth 2 to 2·75 in.; petiole ·6 to 1·2 in. thickened towards the apex, pubescent. *Panicles* terminal and axillary, 6 to 8 in. long, with short many-flowered branches minutely and softly stellate-tomentose. *Flowers* nearly ·2 in. long, on pedicels shorter than the calyx. *Calyx* with 5 lanceolate teeth, tomentose outside. *Petals* spathulate-oblong, obtuse. *Stamens* 5-delphous, longer than the style. *Staminodes* subulate, shorter than the stamens. *Ovary* densely tomentose, shortly 3-winged. *Style* filiform, glabrous, bent at the apex. *Fruit* oblong, narrow, ·6 in. long, with 3 spreading membranous rounded wings ·5 in. broad.

Malacca; Griffith, Maingay. Perak: Scortechini.

This approaches the Javan *P. polyantha*, Hassk., which has, however, larger flowers with a shallower calyx with longer teeth, a shorter style, and a 5-lobed ovary.

2. Pentace Hookeriana, n. sp., King. A tree 30 to 40 feet high: young branches cinereous, glabrous. *Leaves* elliptic-oblong, slightly obovate, acute, the base narrowed and slightly unequal; upper surface glabrous, the lower dull; lateral main nerves about 6 pairs (one of the pairs basal), prominent on both surfaces; the intermediate nerves, transverse veins and reticulations prominent only on the lower: length 5 to 7·5 in.; breadth 2 to 2·75 in.; petiole ·25 in., stout. *Panicles* terminal and in the axils of the upper leaves, 2·5 to 5 in. long, the branches spreading, everywhere scurfy-tomentose. *Flowers* rather crowded, ·2 in. long, on pedicels shorter than the calyx. *Calyx* campanulate, cut half-way down into 3 or 4 broadly triangular sub-acute spreading teeth, scaly and minutely tomentose outside. *Petals* narrowly obovate. *Stamens* 15 in 5 bundles of 3 each, very much shorter than the petals. *Staminodes* thick, orbicular, embracing the ovary. *Ovary* depressed-globose, densely pubescent, obscurely 5-lobed, 5-celled. *Styles* 5, free, shorter than the ovary. *Fruit* unknown.

Perak, on the banks of the Kinta river: King's Collector, No. 815.

3. Pentace Kunstleri, n. sp., King. A tree 30 to 40 feet high: young branches slender, dark-coloured, glabrous. *Leaves* broadly ovate, with an abrupt short broad blunt acumen, the base rounded: upper surface shining, glabrous, the lower dull; lateral nerves 3 or 4 pairs, curved, prominent beneath; sometimes a pair of short slender submarginal nerves at the base: length 4·5 to 6 in., breadth 2·5 to 3·5 in.; petiole ·75 to 1 in., stout, thickened at the apex. *Panicles* terminal, 3·5 to 6 in. long, puberulous, much-branched. *Flowers* numerous, ·15 in. long, the pedicels slightly shorter. *Calyx* tubular-campanulate, minutely stellate-hairy and lepidote outside; the teeth triangular, acute, erect. *Petals* spathulate with a very long claw. *Stamens* in 5 bundles. *Staminodes* linear-lanceolate, as long as the filaments. *Ovary* depressed-globose, with 5 blunt angles, lepidote and pubescent, 5-celled. *Style* straight, glabrous. *Fruit* unknown.

Perak, at a very low elevation; King's Collector, No. 6871.

4. Pentace Perakensis, n. sp., King. A tree 30 to 40 feet high: young branches cinereous, glabrous. *Leaves* ovate-elliptic, slightly oblique, bluntly acuminate, the base rounded or sub-cuneate: upper surface shining, glabrous: the lower dull; lateral nerves about 5 pairs,

ascending, curved; length 5 to 6 in., breadth 2·5 to 3 in.; petiole ·75 to 1 in., stout, and thickened at the apex. *Panicles* terminal, 4 to 5 in. long and less than 2 in. wide, little branched and few-flowered. *Flowers* about ·1 in. long, their pedicels about as long. *Calyx* rotate, minutely lepidote outside; the teeth triangular, spreading. *Petals* ovate, narrowed to a short claw. *Stamens* about 30, 5-delphous. *Staminodes* lanceolate, as long as the filaments. *Ovary* globose, slightly pointed, 10-ridged, slightly hairy, 5-celled. *Style* about as long as the ovary, cylindric. *Stigma* terminal, small. *Fruit* unknown.

Perak, King's Collector, No. 3428.

5. Pentace macrophylla, n. sp., King. A tree usually from 20 to 30 feet high, but occasionally as much as 50 feet. Young branches rather slender, pale brown, glabrous. *Leaves* large, ovate-elliptic to almost rotund, the apex very shortly and abruptly blunt-acuminate, the base rounded: upper surface glabrous; the lower dull; basal nerves 2 pairs, the upper branched on one side; lateral nerves from the midrib 2 to 3 pairs, all ascending and little curved, prominent beneath; length 7 to 14 in., breadth 5 to 12 in.; petiole 2·5 to 3 in., stout. *Panicles* terminal and axillary, 6 to 15 in. long, lax, spreading, minutely yellowish-pubescent and scurfy. *Flowers* ·15 in. long and ·2 in. in diam., on pedicels about as long as the calyx. *Calyx* almost rotate, cut for two-thirds of its length into 5 lanceolate acute teeth, minutely yellowish-tomentose outside. *Petals* oblanceolate, obtuse. *Staminodes* linear, as long as the stamens. *Stamens* in 5 bundles of about 15 each. *Ovary* ovoid, scaly and pubescent, obtusely 5-angled. *Style* rather shorter than the stamens, cylindric, pointed. *Fruit* ·75 in. long with 10 radiating semi-elliptic striate sparsely scaly wings each ·4 in. wide.

Perak at elevations up to 500 feet; King's Collector, Scortechini, Wray: common.

Distinguished from all the other known species by the large size of its leaves.

6. Pentace floribunda, n. sp., King. A tree 40 to 70 feet high: young branches slender, sparsely stellate-puberulous, the bark dark-coloured. *Leaves* elliptic-oblong to elliptic-rotund, the apex shortly and rather abruptly apiculate; the base rounded or slightly narrowed; upper surface glabrous, lower cinereous and with some scattered pubescence; basal nerves 2 pairs, one of them branching on one side: lateral nerves 2 or 3 pairs, all ascending and all rather prominent: transverse veins not prominent; length 5 to 6·5 in., breadth 2·5 to 3·75 in., petiole 1 to 2 in., thickened towards the apex. *Panicles* towards the apices of the

branches, axillary and terminal, stellate-pubescent, slender, spreading, many-branched. *Flowers* very numerous, ·1 in. long, the pedicels slender and rather longer. *Calyx* when expanded rotate, cut half way down into triangular very acute or acuminate spreading teeth, densely stellate-tomentose outside. *Petals* broadly oblanceolate, obtuse, narrowed to the base. *Stamens* 5-delphous. *Staminodes* apparently absent. *Ovary* globose, densely tomentose, not visibly ridged, 5-celled. *Style* filiform, tapering, straight, glabrous. *Fruit* unknown.

Perak, at elevations from 600 to 1000 feet: King's Collector, Nos. 7616 and 7730.

A species distinguished by its slender hoary panicles, with flowers by far more numerous than in any of the other species described here.

7. Pentace Curtisii, n. sp. King. A large tree: the young branches slender, with dark-coloured bark, very minutely adpressed-lepidote, not hairy. *Leaves* ovate elliptic, with a short abrupt blunt acumen, the base rounded: upper surface glabrous, the lower cinereous; basal nerves 2 pairs, one pair slender and close to the margin, the other branching on one side: lateral nerves 2 or 3 pairs; all ascending and rather prominent beneath: length 3·25 to 5·5 in., breadth 2·25 to 2·75 in.; petiole ·75 to 1 in. slender, slightly thickened at apex. *Panicles* mostly terminal (a few smaller axillary) 4·5 to 6 in. long with sparse cinereous stellate tomentum and scales, few-branched, and few-flowered. *Flowers* ·15 in. long, on pedicels shorter than themselves. *Calyx* widely campanulate, stellate-tomentoso outside; its teeth as long as the tube, broadly triangular, rather blunt. *Petals* oblanceolate or obovate-obtuse, much narrowed to the base. *Staminodes* lanceolate, acuminate, half as long as the filaments. *Stamens* in 5 bundles. *Ovary* turbinate, with 8 or 9 blunt ridges, lepidote-pubescent: style rather stout, cylindric, shorter than the stamens. *Fruit* ·5 in. long, with 8 semi-elliptic membranous wings ·2 in. broad.

Penang; Curtis, No. 1573.

8. Pentace eximia, n. sp., King. A tree 50 to 70 feet high: young branches slender, dark-coloured, glabrous. *Leaves* ovate-elliptic to ovate-rotund, shortly and abruptly acuminate, the base slightly narrowed or rounded: upper surface glabrous, shining: lower paler and dull; basal nerves 1 pair, bold and reaching to the apex, often with a slender small sub-marginal pair: lateral nerves usually only one pair, short and curving; all rather bold beneath: length 4 to 5·5 in., breadth 2 to 4 in.; petiole ·75 to 1·1 in., thickened at the apex. *Panicles* terminal, 3·5 to 5 in. long, (longer in fruit), minutely scurfy-tomentose, with

rather numerous spreading branches. *Flowers* numerous, ·1 in. long, the pedicels about the same length. *Calyx* densely scaly outside, the teeth triangular. *Petals* cuneate, obtuse, narrowed to a broad claw. *Stamens* about 25, in groups of 5. *Staminodes* lanceolate. *Ovary* subglobular, 10-ridged (the ridges in pairs), scaly and pubescent, 5-celled, the cells with imperfect septa and thus falsely 10-celled. *Styles* 10, much shorter than the stamens, free, or united when young at the base only. *Fruit* about ·5 in. long, with 8 radiating semi-elliptic wings ·1 to ·15 in. broad, minutely adpressed-scaly.

Perak; at elevations under 1000 feet, King's Collector, Nos. 3482 and 3649.

This agrees with *P. Curtisii* in having 8-winged fruit, but the flowers are much smaller. The styles moreover are shorter than the ovary and quite distinct, which is the case in no other species of this genus which I have yet met with.

9. Pentace Scortechinii, n. sp. King. A tree? young branches slender, glabrous, dark-coloured. *Leaves* elliptic-oblong, shortly caudate-acuminate, the base more or less cuneate: both surfaces quite glabrous, concolorous; basal nerves 1 pair very bold, as is the midrib; lateral nerves (from the midrib) 1 or 2 pairs, not conspicuous: length 7 to 9 in., breadth 2·75 to 3·5 in.; petiole less than ·5 in., stout. *Panicles* terminal and axillary, slender, only about half the length of the leaves, few-branched, minutely tomentose. *Flowers* rather crowded, ·25 in. long, on pedicels shorter than the calyx. *Calyx* widely tubular-campanulate, minutely scurfy-tomentose outside, cut a third of its depth into 5 small triangular reflexed teeth. *Petals* obovate, obtuse, much narrowed to the base. *Stamens* in 5 bundles of 15 each. *Staminodes* lanceolate, half as long as the stamens. *Ovary* ovoid, obscurely 5-ridged, scaly, 5-celled. *Style* cylindric, tapering, longer than the stamens. *Fruit* unknown.

Perak, Father Scortechini, No. 119b.

Only once collected and without fruit. A very distinct species.

10. Pentace Griffithii, n. sp., King. A tree: young branches slender, dark-coloured, glabrous. *Leaves* ovate-elliptic, tapering about equally to the acute apex and base; upper surface shining, lower dull; basal nerves 2 pairs, the lower pair slender and sub-marginal, the upper branched on one side and bold (as is the midrib), ascending, curved; lateral nerves (from the midrib) 2 pairs; length 4 to 7 in., breadth 2·25 to 3 in.; petiole nearly 1·5 in. long, thickened at both ends, but especially at the apex. *Panicles* terminal, slender, few-branched, lax, minutely

cinereous-tomentose. *Flowers* not very numerous, large for the genus (·25 in. long and ·25 in. in diam.), on pedicels about as long as the calyx. *Calyx* widely campanulate, almost rotate, minutely stellate-tomentose outside; the teeth as long as the tube, spreading. *Petals* ovate, obtuse, rather suddenly contracted into a linear claw. *Stamens* in 5 groups of 12 or 13 each. *Staminodes* lanceolate, as long as the filaments. *Ovary* sub-globose, slightly compressed, minutely stellate-tomentose and scaly, obtusely 5-angled, 5-celled. *Style* cylindric, rather shorter than the filaments. *Fruit* nearly 1 in. long, with 10 radiating membranous, horizontal striate, minutely scaly, semi-elliptic, membranous wings, each ·35 in. broad.

Tavoy in Tenasserim; Griffith, Aplin.

A very distinct species only once collected within recent years, by Mr. Aplin. There is, however, in the Kew Herbarium a twig of it collected by Griffith many years ago bearing this note in Griffith's handwriting "*Tiliacearum gen. nov. capsulis pluri-alatis.*" Although this plant has hitherto been found only in territory which is politically Burmese, yet Tavoy (being at the southern extremity of Tenasserim) is practically Malayan in its Flora and Fauna. I therefore include it here.

11. Pentace strychnoidea, n. sp., King. A tree 60 to 80 feet high: young branches slender, cinereous, glabrous. *Leaves* ovate-elliptic rarely ovate-oblong, shortly and abruptly acuminate, the base rounded or slightly narrowed; upper surface shining, glabrous; lower pale and dull; boldly 3-nerved and often with a slender sub-marginal pair of nerves; length 3 to 4 in., breadth 1·75 to 2·25. in.; petiole ·75 in. slightly thickened at the apex. *Panicles* terminal, 3 to 6 in. long, few-branched, lax, minutely lepidote-puberulous. *Flowers* rather large for the genus (·2 in. long). *Calyx* cup-shaped, tomentose outside, cut more than half way down into 5 triangular acute teeth. *Petals* oblanceolate, slightly oblique, much narrowed to the base. *Stamens* in 5 bundles of about 20 each. *Staminodes* linear-lanceolate. *Ovary* ovoid-globose, obtusely 5-ridged, minutely tomentose and lepidote, 5-celled. *Style* filiform, as long as the stamens. *Fruit* unknown.

Perak; at elevations of from 500 to 1000 feet, King's Collector, No. 3478.

3. Schoutenia, Korth.

Trees with alternate simple pinnately-nerved leaves. *Flowers* axillary, solitary or in clusters; or in terminal few-flowered panicles. *Calyx* campanulate, 5-lobed; lobes valvate, accrescent, coloured. *Petals*

small, linear without claw, or absent. *Stamens* numerous, free, sometimes inserted on the apex of a short gynophoro; anthers oblong, 2-celled: cells parallel, with longitudinal sutural dehiscence. *Staminodes* 0. *Ovary* sessile or shortly stalked, imperfectly 3 to 5-celled; cells with 2 ovules from the base of the axile placentas, style filiform; stigmas 3 to 5, linear fleshy, reflexed. *Capsule* with crustaceous fragile pericarp, dehiscing irregularly, 1-celled (by abortion), 1- to 3-seeded. *Seeds* subglobose, with leathery smooth testa, exalbuminous: the cotyledons large, leafy, thin, crumpled: embryo straight. Distrib. 5 species, of which 4 are Malayan and 1 Cambodian.

Flowers in panicles or solitary, axillary.

Calyx very accrescent very deeply lobed — 1. *S. Mastersii.*
„ slightly accrescent not deeply lobed — 2. *S. Kunstleri.*]
Flowers in dense axillary glomeruli ... 3. *S. glomerata.*

1. Schoutenia Mastersii, King. A tree 60 to 80 feet high: young branches slender, dark-coloured, at first scaly but soon glabrous. *Leaves* thinly coriaceous, ovate-lanceolate, slightly obovate, shortly and bluntly acuminate, the base rounded; upper surface glabrous, the lower minutely and softly tawny-tomentose; nerves slightly prominent beneath, about 3 pairs lateral and 1 pair basal: length ·75 to 3·25 in.; breadth ·4 to 1·1 in.; petiole less than ·1 in. *Flowers* solitary and axillary, or in terminal leafy panicles; the pedicels from ·35 to ·75 in. according to age, tawny-tomentose, jointed below the middle. *Calyx* membranous, pink, conspicuously veined, at first widely campanulate, ·35 in. long, with 5 shallow teeth becoming with the ripening of the fruit, rotate, flat 1·5 to 2 in. in diam., and 5-angled; pubescent outside, glabrous within. *Filaments* very slender, longer than the style. *Ovary* obovoid-globose, tawny-tomentose. *Style* stout, three times as long as the ovary, tomentose: stigmas scaly. *Fruit* depressed-globose, ·3 in. in diam., minutely tomentose. *Chartacalyx accrescens*, Mast. in Hook. fil. Fl. Br. Ind. i. 382.

Malacca, Penang, Perak. Distrib. Borneo.

On this plant the late Dr. Maingay founded his genus *Chartacalyx*. The only points, however, in which it differs from *Schoutenia* (as defined by Bentham and Hooker) are the absence of petals and the presence of a stalk to the ovary on the upper part of which the stamens are inserted; and these appear to me to be, in this order, differences of quite minor importance. Maingay never saw the fruit of this; but copious fruiting specimens have recently been collected and the fruit is found to be exactly that of *Schoutenia*. As regards the structure of the seeds of

Schoutenia, Korthals (the author of the genus) says nothing: nor does Bennet who (Pl. Jav. Rar. p. 239, t. 46) describes at greater length than Korthals the species *S. ovata*, the only one then known. Bennett neither describes nor figures albumen in the seed. Hasskarl (Retzia I, 136) describes the seeds as exalbuminous, and I find none in the seeds of these species of which I have been able to examine ripe fruit. The only other known species are *S. ovata*, Korth. from Java; and *S. hypoleuca*, Pierre (Fl. Cochin-Chine t. 134) from Cambodia.

2. Schoutenia Kunstleri, n. sp., King. A tree 60 to 70 feet high: young branches cinereous, rather rough-glabrous. *Leaves* thinly coriaceous, narrowly obovate-oblong or oblanceolate, acute, the margin slightly waved, slightly narrowed to the rounded 3- to 5-nerved base; upper surface glabrous, shining: lower sub-silvery; the lateral nerves 4 or 5 pairs, spreading, curving, inter-arching near the margin, prominent on the lower surface as are the basal nerves and the numerous slightly curved transverse veins. *Flowers* crowded towards the ends of the branches, in numerous short few-flowered scurfy-tomentose racemes or cymes: pedicels from ·5 to ·75 in. long, jointed and bracteolate above the base, the bracteole oblanceolate. *Calyx* campanulate, membranous, coloured and veined, stellate-hairy on both surfaces, ·5 to ·75 in. long, according to age, cut to the base into 5 ovate spreading lobes. *Petals* 0. *Stamens* on a slightly elevated torus. *Ovary* sessile, sub-globose, densely tomentose, 5-celled. *Style* longer than the stamens. *Stigmas* 5, short, fleshy. *Fruit* 1-celled, 1-seeded, surrounded by the slightly accrescent persistent calyx.

Perak at elevations of from 300 to 800 feet: King's Collector, No 3409: on Ulu Tupa, Wray, No. 2692.

According to the field notes of Messrs. Kunstler and Wray, the calyx is yellow when young, but becomes brown when the fruit ripens.

3. Schoutenia glomerata, n. sp., King. A tree from 40 to 60 feet high: young branches slender, cinereous, minutely pubescent. *Leaves* membranous, glabrous, elliptic-oblong, acute or shortly and bluntly acuminate, the margins slightly waved; the base broad, rounded or emarginate, 3-nerved, the upper pair of nerves very strong, running to the apex of the leaf and joined to the midrib by numerous prominent curving transverse secondary nerves, all very prominent on the pale silvery shining under surface: length 10 to 15 in., breadth 3·5 to 5·5 in.; petiole only ·25 in. long, stout, wrinkled. *Cymes* condensed, very crowded, axillary, 1 to 1·5 in. in diam. *Flowers* ·25 in. long and ·3 in. wide, on tomentose rufous pedicels about ·2 in. long. *Calyx* widely

campanulate, densely rufous-tomentose; teeth 5, broadly triangular, sub-erect. *Petals* 0. *Stamens* numerous; the filaments slender, longer than the calyx. *Ovary* ovoid-globose, densely tawny-tomentose, 5-celled: style longer than the stamens: stigmas short, sub-globose. *Fruit* depressed globose, ·75 in. in diam., sparsely stellate-tomentose, becoming glabrous, covered only at the base by the slightly accrescent calyx.

Johore; on Gunong Panti, King's Collector, No. 159.

4. Berrya, Roxb.

A tree. *Leaves* alternate, ovate, acuminate, glabrous; base cordate, 5-7-nerved. *Panicles* large, many-flowered, terminal and axillary. *Calyx* campanulate, irregularly 3-5-lobed. *Petals* 5, spathulate. *Stamens* many, inserted on a short torus; anthers didymous, lobes divergent, opening lengthwise. *Staminodes* 0. *Ovary* 3-4-lobed, cells 4-ovuled; style consolidated, stigma lobed; ovules horizontal. *Fruit* loculicidally 3-4-valved, each valve 2-winged. *Seeds* pilose; albumen fleshy; cotyledons flat leafy, radicle superior next the hilum.—Distrib. The following is the only species.

Berrya Ammonilla, Roxb. Hort. Beng., 42. A large tree, glabrous except the inflorescence. *Leaves* membranous, broadly ovate, acuminate, the base slightly narrowed and cordate: both surfaces shining, minutely reticulate: basal nerves 2 or 3 pairs, lateral 5 or 6 pairs: length 4 to 8 in., breadth 3 to 5 in.; petiole ·75 to 2·75 in. *Panicles* terminal, or in the upper axils, branching, 6 to 10 in. long, scurfy-pubescent: flowers ·35 in. in diam.; their pedicels slender, ·3 to ·5 in. long. *Petals* longer than the calyx, narrowly oblong, obtuse, glabrous. *Anthers* half as long as the petals. *Ovary* ovoid, truncate, depressed at the origin of the styles, 6 to 8-ridged, pubescent. *Fruit* with 6 radiating, falcate, membranous, striate, deciduously stellate-tomentose wings ·8 in. long. *Seeds* small: 1 to 4 in. each cell, covered with prurient pale brown hairs. Roxb. Fl. Ind. ii. 639; Corom. Plants, ii. t. 264; Wall. Cat. 1068; W. & A. Prodr. i. 81; Wight Ill. t. 34; Thwaites Enum. 32; Beddome Flor. Sylvat. t. 58; Kurz Fl. Burm. i. 155; Hook. fil. Fl. Br. Ind. i. 383.

South Andamans. Distrib. Burmah, Southern Peninsula, India, Ceylon.

5. Grewia, Linn.

Trees or shrubs more or less stellate-pubescent. *Leaves* entire, 1-9-nerved. *Flowers* axillary and few, or more numerous and panicled. *Sepals* distinct. *Petals* 5, glandular at the base, sometimes 0. *Stamens*

many on a raised torus. *Staminodes* 0. *Ovary* 2-4-celled, cells opposite the petals, 2-many-ovuled; style subulate, stigma shortly lobed. *Drupe* fleshy or fibrous, entire, or 2-4-lobed; stones 1-4, 1-2-seeded, with false paritions between the seeds. *Seeds* ascending; albumen fleshy or rarely 0; cotyledons flat. Distrib. About 60 species, chiefly tropical.

Sect. I. *Grewia* proper. *Flowers* axillary or terminal. *Fruit* fleshy or crustaceous, usually lobed ... ... 1. *G. umbellata.*

Sect. II. *Microcos.* *Inflorescence* terminal, in panicled cymes. *Flowers* involucrate. *Drupe* fleshy, entire ... ... 2. *G. paniculata.*

Sect. III. *Omphacarpus.* *Inflorescence* terminal, or terminal and axillary. *Flowers* involucrate. *Drupe* with a corky or fibrous rind.

Fruit minutely tomentose: mesocarp thick, soft, pulpy, and with many fibres; pyrene single, small.

Pyrene membranous: leaves softly tomentose beneath ... ... 3. *G. fibrocarpa.*

Pyrene cartilaginous: leaves sparsely stellate-hispid beneath ... ... 4. *G. globulifera.*

Fruit glabrous: mesocarp with thin pulp and a few fibres: pyrenes 2 or 3, bony.

Leaves sparsely-stellate pubescent beneath: drupe not narrowed into a pseudo-stalk... ... ... 5. *G. latifolia.*

Leaves glabrescent or pubescent beneath: drupe narrowed into a long pseudo-stalk... ... ... 6. *G. antidesmæfolia.*

Leaves quite glabrous.

Basal nerves bold and reaching beyond the middle.

Fruit ·5 in. long, furrowed, not compressed ... .. 7. *G. laurifolia.*

Fruit 1·4 in. long, not furrowed, compressed ... ... 8. *G. calophylla.*

Basal nerves slender, not reaching to the middle: drupe ·75 in. long 9. *G. Miqueliana.*

1. Grewia umbellata, Roxb. Hort. Beng. 42: Fl. Ind. ii. 591. A shrubby climber 10 to 20 feet long; whole plant except the upper surfaces of the leaves sparsely stellate-puberulous, the bark of the young

branches dark-coloured. *Leaves* oblong-ovate or elliptic, shortly and bluntly acuminate, minutely serrate; base rounded, 3-nerved; upper surface glabrous; the lower pale with the transverse veins prominent and straight: lateral nerves about 3 pairs: length 3 to 4·5 in., breadth 1·5 to 2 in., petiole ·25 in. *Umbels* pedunculate, axillary or terminal, 6 to 8-flowered; the peduncle from ·6 to 1 in. long, with a whorl of small lanceolate glabrous bracteoles at its apex. *Flowers* ·75 in. long when expanded; their pedicels hirsute, unequal, from ·2 to ·5 in. long. *Sepals* ribbed and tomentose outside, glabrous inside, linear-oblong, reflexed. *Petals* much shorter than the sepals, oblong, each springing from the back of a large orbicular claw with hirsute edges. *Torus* long, ridged, tomentose. *Fruit* depressed-globular, obtusely 2- to 4-angled and with 2 to 4 shallow lobes, pericarp sparsely stellate-puberulous; endocarp pulpy; pyrene 2 to 4-celled; its loculi 1-seeded, the endocarp bony. Wight Ic. 83; Wall. Cat. 1084; Mast. in Hook. fil. Fl. Br. Ind. i. 385.

Malacca, Penang, Griffith, Maingay. Perak, King's Collector, Wray.

Roxburgh has left an excellent coloured drawing of this in the library of the Calcutta Herbarium, and there is no doubt about his plant. I cannot agree in identifying with this *G. pedicellata*, Roxb., which that author received from Amboyna: nor do I think that any *Grewia* from the Peninsula of Hindustan is referable to this species

2. Grewia paniculata, Roxb. Fl. Ind. ii. 591. A bushy tree 15 to 30 feet high: young branches scurfy stellate-tomentose, ultimately glabrous, their bark brown. *Leaves* coriaceous, cuneate-obovate to elliptic; the apex blunt, shortly and abruptly acuminate, sometimes 3-lobed and unequal, obscurely serrate-dentate; the base rounded, 3-nerved; upper surface powdered with minute sparse stellate pubescence, the midrib and nerves tomentose: lower surface uniformly stellate-tomentose; the veins transverse, little curved, bold; lateral nerves 4 or 5 pairs, ascending, rather straight, prominent beneath: length 3 to 6 in., breadth 1·5 to 2·75 in.; petiole 25 in., tomentose: stipules glabrescent, lanceolate, often united in pairs, rather shorter than the petioles. *Panicles* 2·25 to 3·5 in. long, terminal or axillary, rusty-tomentose; bracteoles numerous, linear, sometimes bifid: branches spreading. *Flowers* ·25 in. long, the pedicels rather shorter. *Sepals* spreading, concave, obovate narrowed to the base, the edges thin; tomentose on the outer, pilose on the inner, surface. *Petals* shorter than the sepals, oblong, blunt, expanded at the base into a concave claw, hirsute especially outside. *Torus* cup-shaped, short, the lip tomentose. *Ovary* ovoid, stellate-tomentose, 4-celled, each cell with several ovules. *Fruit* ob-

ovoid, recurved, with many curved striae, pericarp membranous, minutely and sparsely stellate-pubescent, the mesocarp fibrous with an outer layer of pulp: pyrene 1-celled, 1-seeded; endocarp stony. Wall. Cat. 1097, partly; Miq. Fl. Ind. Bat. i. pt. 2, 203; Mast. in Hook. fil. Fl. Br. Ind. i. 393. *G. Blumei*, Hassk. Tijdschr. Nat. Gesch. xii. 130; Miq. Fl. Ind. Bat. i. pt. 2, 203. *Microcos tomentosa*, Smith in Rees, Cyel. *G. affinis*, Hassk. Cat. Hort. Bog. 207, not of Lindl.

Singapore; Malacca, Maingay, No. 250. Griffith, No. 634 (Kew Distrib.). Perak. Penang; common.

I retain for this plant the name adopted for it by Masters in Hooker's Flora of British India. But Blume's *G. paniculata* (Bijdr. 115) was published seven years before Roxburgh's. I have not seen any specimen of Blume's plant: but if it be the same as this, then Blume's name must be substituted for that of Roxburgh as the author of the specific name. If Blume's plant, however, be different from Roxburgh's, then some other name must be found for the latter. That the plant above described is what Roxburgh meant to call *G. paniculata*, his coloured drawing in the Calcutta Herbarium leaves no room for doubt.

3. Grewia fibrocarpa, Mast. in Hook. fil. Fl. Br. Ind. i. 391. A tree 15 to 40 feet high; young branches, under surfaces of leaves, petioles, inflorescence and fruit densely clothed with yellowish-brown stellate tomentum. *Leaves* membranous, ovate-oblong or elliptic, shortly and abruptly acuminate, minutely and obscurely serrulate, the base rounded and boldly 3-nerved; upper surface scaberulous, the midrib and nerves tomentose, under surface softly tomentose; the 5 to 7 pairs of lateral nerves and the transverse veins rather prominent beneath: length 4·5 to 9 in., breadth 1·75 to 4 in., petiole ·25 to ·5 in., stout: stipules deeply and narrowly lobed. *Panicles* terminal and in the upper axils, crowded, ·5 to 2 in. long: involucres lanceolate, curved, tomentose. *Flowers* ·25 in. long, their pedicels much shorter. *Sepals* obovate-elliptic, very tomentose externally, the edges inflexed, sparsely pilose internally. *Petals* minute, sub-orbicular, sometimes absent. *Torus* short, hirsute. *Ovary* ovoid-globose, tomentose; the style short, conical, glabrous. *Fruit* soft, ovoid or obovoid, compressed, 1·25 in. long and ·75 in. in diam., the pericarp membranous and densely tomentose outside, mesocarp fibrous and pulpy; pyrene small, solitary, leathery, 1-celled, 1-seeded. *G. paniculata*, Wall. (Cat. No. 1097 partly) not of Roxb.

Penang; Wallich, Curtis. Malacca; Griffith; Maingay, No. 248, (Kew Distrib.). Perak; Scortechini, King's Collector, Wray. Common.

In the fruit both of this and of *G. globulifera*, the mesocarp forms a thick pulp with many fibres intermixed, and the solitary pyrene is small with a soft coat.

4. Grewia globulifera, Mast. in Hook. fil. Fl. Br. Ind. i. 391. A small shrubby tree; young branches densely covered with short yellowish-brown tomentum. *Leaves* thinly coriaceous, broadly elliptic, sometimes slightly obovate and unequal-sided, shortly and abruptly acuminate, entire, the base rounded, boldly 3-nerved: upper surface scaberulous, glabrous except the minutely tomentose midrib and nerves: under surface shortly and sparsely stellate-hispid: main nerves 7 to 8 pairs, spreading, prominent beneath, the transverse nerves rather thin, the reticulations minute but distinct: length 4·5 to 10 in., breadth 3 to 6 in.; petiole ·4 to ·75 in., tomentose. *Panicles* often on long peduncles, axillary and terminal, narrow, few-flowered, covered with soft yellowish stellate tomentum: length 2·5 to 4·5 in. (of which the peduncle may be more than half). *Flowers* ·35 in. long, their pedicels much shorter. *Sepals* oblong, spreading, curved inwards, tomentose on both surfaces, the edges much incurved. *Petals* much shorter than the sepals, glabrous, linear-lanceolate, without any distinct claw but sometimes more or less thickened and hairy at the base. *Torus* a very shallow cup with hirsute edge. *Ovary* ovoid, pointed, tomentose; style as long as the ovary, cylindric, glabrous. *Fruit* usually solitary at the apex of a branch of the panicle, sub-obovoid, compressed, 1·25 in. long and ·65 in. in diam.; pericarp membranous minutely tomentose, the mesocarp pulpy and very fibrous; the single pyrene much smaller, endocarp cartilaginous, 1-celled, 1-seeded.

Malacca; Griffith, No. 635; Maingay, No. 245, (Kew Distrib.); Harvey. Perak; Scortechini, King's Collector, Wray: at low elevations.

In its fruit this much resembles *G. fibrocarpa*. The drupe, however, of this is obovoid not ovoid, and the stone is larger with cartilaginous not membranous endocarp. The leaves also differ in being sparsely shortly hispid-pubescent instead of softly tomentose. A near ally of this species is also *G. latifolia*, Mast. from which this differs in its petals having no distinct claw, whereas in those of *G. latifolia* the claw is larger than the limb. This also differs in the shape of its ovary and style, and in the very different appearance of its drupe.

5. Grewia latifolia, Mast. in Hook. fil. Fl. Br. Ind. i. 392. A shrubby tree 20 to 40 feet high: young branches rather stout, minutely but harshly tawny-or cinereous-tomentose. *Leaves* coriaceous, drying a dark brown, broadly elliptic, shortly and abruptly sub-acuminate,

entire, slightly narrowed to the rounded 3-nerved base: upper surface glabrescent, the midrib sub-tomentose, lower surface rather sparsely rusty stellate-pubescent: main lateral nerves 5 to 8 pairs, prominent beneath as are the rather straight transverse veins: length 6 to 9 in., breadth 3·5 to 4·5 in.; petiole ·5 to ·75 in. stout, tomentose. *Panicles* short, axillary or terminal, rusty-tomentose 1·5 to 2·5 in. long and 1 in. or more broad, few-flowered: involucres ovate-lanceolate. *Flowers* 2·5 in. long, their pedicels shorter. *Sepals* oblong, tomentose on both surfaces. *Petals* shorter than the sepals, oblong, acute, the hirsute claw larger than the glabrescent limb. *Torus* cup-shaped, with hirsute margin. *Ovary* depressed-globose: style cylindric, puberulous. *Drupe* obovoid, ·75 in. long and ·5 in. in diam., pericarp at first sparsely pubescent, afterwards glabrous, mesocarp fibrous and pulpy: pyrene single, 1-celled, 1-seeded: endocarp bony.

Malacca; Griffith, (Kew Distrib.) 638/1; Maingay. Perak; King's Collector, Scortechini, Wray.

6. Grewia antidesmæfolia, n. sp., King. A tree usually 30 to 40, but sometimes 50 to 60 feet, high: young branches glabrous, their bark cinereous. *Leaves* membranous, glabrescent when young, when old quite glabrous, elliptic-oblong, acute or shortly acuminate, entire, the base usually cuneate but sometimes rounded, boldly 3-nerved; lateral main nerves 5 or 6 pairs, little curved, ascending, prominent beneath; length 4·5 to 8 in., breadth 1·5 to 2·75 in.; petiole ·4 to ·6 in. slender. *Panicles* pedunculate, axillary and terminal, slender, the branches short, spreading, few-flowered, densely but minutely cinereous, velvetty, 2 to 3 in. long. *Flowers* ·25 in. long, their pedicels shorter. *Sepals* elliptic, slightly obovate, their edges in the upper half much incurved, tomentose outside, pubescent inside. *Petals* much shorter than the sepals, oblong, blunt, the glabrescent limb about as long as the broad thickened claw; claw pilose behind, with hirsute edges in front. *Torus* cylindric, glabrous, with wide wavy hirsute mouth. *Ovary* ovoid-globose, pilose when young, glabrescent when adult, shorter than the cylindric glabrous style. *Fruit* pyriform, obtusely 3-angled, narrowed to a long pseudo-stalk, ·75 in. long (including the narrowed portion) about ·35 in. in diam.; pericarp glabrous, mesocarp slightly fleshy with a thin fibrous inner layer. *Pyrenes* 3, with bony endocarp, two of them abortive and the third 1-celled, 1-seeded.

Perak: at low elevations; common, Scortechini, King's Collector, Wray.

Var. *hirsuta;* young branches, lower surfaces of leaves, and ovary pubescent to tomentose.

Perak; King's Collector.

7. Grewia laurifolia, Hook. in Hook. fil. Fl. Br. Ind. i. 392. A tree 20 to 30 feet high; all parts except the inflorescence glabrous: young branches with dark-coloured bark. *Leaves* thinly coriaceous, oblong-lanceolate or lanceolate, acuminate or acute, entire; the base rounded boldly 3-nerved: both surfaces shining; lateral nerves 1 or 2 pairs, alternate; length 4 to 6 in., breadth 1·5 to 2·5 in., petiole ·5 to ·7 in. *Panicles* terminal and axillary, 1·5 to 4 in. long, lax, few-flowered, puberulous: bracteoles few, linear, fugaceous. *Flowers* ·2 in. long, their pedicels about ·15 in. *Sepals* ovate, concave, the edges much inflexed, minutely tomentose on both surfaces. *Petals* much shorter than the sepals, oblong, often absent. *Torus* cup-shaped, its rim hirsute. *Ovary* globose, sub-glabrous, 4-celled. *Style* thick, cylindric, tapering, glabrous. *Drupe* ovoid, ·5 in. long, the pedicel about as long, with 1 or 2 vertical furrows, pericarp glabrous, endocarp fleshy and fibrous: pyrene 1 to 3-celled, but usually only one cell containing a single seed; endocarp bony.

Malacca; Griffith, Maingay. Penang; Curtis. Perak; Scortechini, King's Collector. Distrib. Sumatra.

8. Grewia calophylla, Kurz Andam. Rep. App. B. iii; Flor. Burm. i. 157. A tree 20 to 30 feet high: all parts glabrous except the minutely velvetty tawny inflorescence: young branches slender, dark-coloured. *Leaves* thinly coriaceous, shining, ovate-lanceolate to ovate-elliptic, acuminate, entire; the base rounded or slightly cuneate, 3-nerved; lateral nerves 3 or 4 pairs, ascending; transverse nerves slender: length 4 to 7 in., breadth 1·75 to 3 in., petiole ·3 to ·75 in. *Panicles* pedunculate, axillary or terminal, few-flowered, 1·5 to 3 in. long. *Flowers* ·5 in. long, their pedicels very short. *Sepals* narrowly oblong, the edges much incurved, minutely velvetty, much reflexed. *Petals* about half the length of the sepals and much narrower, lanceolate; the limb subulate; the claw ovoid, expanded, thick and densely tomentose at the margin. *Torus* cylindric, puberulous outside. *Ovary* ovoid, pointed, style long filiform, both puberulous. *Fruit* obovoid, compressed, 1·4 in. long and ·75 in. in diam.; pericarp membranous, glabrous, shining; mesocarp thick, pulpy and fibrous: pyrenes 3, of which one is 2-celled but contains only a single seed, the others abortive; the endocarp bony. Mast. in Hook. fil. Fl. Br. Ind. i. 392.

Nicobar Islands, Kurz: S. Andaman, Kurz, King.

This is very near *G. laurifolia*, Hook. but has very much larger fruit. A Malacca plant (Griffith, No. 630/2 Kew Distrib.) resembles this in leaves but not in flower. The only specimens which I have seen are too imperfect for determination.

9. Grewia Miquelіana, Kurz, in Flora for 1872, p. 398. A tree 20 to 40 feet high: young branches at first very sparsely and minutely lepidote, afterwards glabrous, the bark dark brown. *Leaves* thinly coriaceous, glabrous, shining, ovate-lanceolate to lanceolate, shortly acuminate, entire, the base cuneate, faintly 3-nerved; both surfaces glabrescent soon becoming glabrous: main lateral nerves 5 or 6 pairs, not prominent; length 3 to 5 in., breadth 1 to 1·75 in.; petiole ·2 to ·3 in., scaly-tomentose; stipules oblong, blunt, obliquo. *Panicles* axillary and terminal, lax, few-flowered, sparsely lepidote and puberulous, 1 to 2 in. long. *Flowers* ·3 in. long, their pedicels very short. *Sepals* oblanceolate, acute, the edges inflexed, minutely tomentose. *Petals* much shorter than the sepals, the glabrescent linear acute limb shorter and narrower than the thickened rounded tomentose claw. *Torus* short, cylindric, puberulous with villous edges. *Ovary* globose-ovoid, tomentose, shorter than the cylindric glabrous style, 2-celled. *Drupe* pyriform, ·75 in. long and ·5 in. in diam., glabrous: pericarp smooth, glabrous, shining; mesocarp fibrous with a little pulp: pyrenes 2, each 1-celled, one 1-seeded, the other barren: the endocarp bony. *Inodaphnis lanceolata*, Miq. Fl. Ind. Bat. Suppl. 357; Ann. Mus. Lugd. Bat. iii. 89; Meisn. in DC. Prod. xv. 1, 265.

Malacca; Maingay, (Kew Distrib.) No. 244. Perak; Scortechini, King's Collector, at low elevations. Diudings; Curtis, No. 1613. Distrib. Sumatra.

There is an authentic fruiting specimen in the Calcutta Herbarium of Miquel's *Inodaphnis lanceolata* collected in Sumatra. And there is no doubt whatever that Kurz was right in referring the plant to *Grewia*. Miquel founded his genus on specimens without flowers; and, apparently from the structure of the fruit, he suggested its affinity to *Inocarpus*. Later on he suggested (Ann. Mus. Lugd. Bat. iii. 89) its affinity with the Rosaceous genera *Chrysobalanus*, *Parastemon* and *Diemenia* (= *Trichocarya*). Meissner in DC. Prod. (l. c.) briefly described the genus at the end of *Hernandiaceae*, but without indicating his opinion as to its proper place. Had these distinguished botanists had an opportunity of examining flowers, they would doubtless have referred it without hesitation to *Grewia*. The practice (fortunately confined to a few authors) of founding genera on specimens without flowers cannot be too strongly condemned.

6. Triumfetta, Linn.

Herbs or undershrubs, generally more or less covered with stellate hairs. *Leaves* serrate or dentate, simple or lobed. *Flowers* yellowish, in dense cymes. *Sepals* 5, oblong, concave. *Petals* 5. *Stamens* 5-35,

springing from a fleshy, lobed, glandular torus. *Ovary* 2-5-celled, cells 2-ovuled; stylo filiform, stigma 5-toothed. *Fruit* globose or oblong, spiny or bristly, indehiscent or 3-6-valved. *Seeds* 1-2 in each cell, pendulous, albuminous embryo straight, cotyledons flat. Distrib. A genus of about 40 very variable species, mostly tropical weeds.

Fruit tomentose, bristles shorter than itself				...	1. *T. rhomboidea.*
,,	villous	,,	longer	,,	... 2. *T. pilosa.*
,,	glabrous	,,	,,	,,	... 3. *T. annua.*

1. Triumfetta rhomboidea, Jacq. DC. Prod. i. 507 Erect, herbaceous or shrubby, annual, glabrous or pubescent. *Leaves* polymorphous, but usually rhomboid, 3-lobed, coarsely and unequally serrate, the upper more or less lanceolate; length 1·75 to 3 in., breadth nearly as much in the rhomboid, much less in the lanceolate forms; petioles ·25 to 1·25 in. *Peduncles* short, 4 to 6-flowered. *Flowers* about ·15 in. long, the buds elavate. *Sepals* apiculate: petals oblong, ciliate at the base. *Stamens* 8 to 15. *Fruit* about ·2 in. in diam., globose, tomentose, covered with short glabrous or pubescent hooked spines. Masters in Hook. fil. Fl. Br. Ind. i. 395. *T. angulata*, Lam. Dict. iii. 41; Wight Ic. t. 320; W. & A. Prodr. i. 74; Thwaites Enum. 31; Dalz. & Gibs. Bomb. Fl. 25; Wall. Cat. 1075, 2, C; Miq. Fl. Ind. Bat. pt. i. 197. *T. angulata*, *β. acuminata*, Wall. Cat. 1075 *β. T. Bartramia*, Roxb. Fl. Ind. ii. 463; Wall. Cat. 1075, D, E. *T. trilocularis*, Roxb. Fl. Ind. ii. 462; Wall. Cat. 1083. *T. vestita*, Wall. Cat. 1078, in part.

In all the provinces: a weed. Distrib. British India, Ceylon, Malacca, Archipelago, China, Africa.

2. Triumfetta pilosa, Roth Nov. Sp., 233. Erect, herbaceous or shrubby, annual; the whole plant, but especially the young branches and the under surface of the leaves, villous, stellate-tomentose. *Leaves;* the lower broadly ovate, sometimes 3-lobed; the upper ovate to ovate-lanceolate, acute or acuminate, unequally and rather coarsely serrate or dentate; length 2 to 4·5 in., breadth 1 to 1·75 in; petiole ·5 to 1 in. *Stipules* linear-subulate. *Peduncles* many-flowered, usually shorter than the petiole. *Calyx* ·25 in. long, sparsely hairy. *Petals* spathulate-oblong, nearly as long as the calyx. *Fruit* globular, about ·25 in. in diam., villous, densely covered with spines longer than itself which are hispid below, glabrous above, and usually hooked at the apex. W. & A. Prodr. i. 74; Hook. fil. Fl. Br. Ind. i. 394. *T. pilosa*, var. *β*, Thwaites Enum. 31; Dalz. & Gibs. Bomb. Fl. 25. *T. tomentosa*, Wall. Cat. 1078 C. *T. glandulosa*, Heyne Herb.; Wall. Cat. 1077, 5. *T. polycarpa*, Wall. Cat. 1079. *T. oblongata*, Link Enum. Pl. Hort. Ber. ii. 5; Wall.

Cat. 1077, 1, 2, 3. *T. ovata*, DC. Prodr. i. 507? *T. pilosa*, Wall. Cat. 1080. *T. pilosa*, var. *a*, Thwaites Enum. 31. *T. vestita*, Wall. Cat. 1078, 1, 2. *T. indica*, Ham. in Wall. Cat. 237, 1078 D; W. & A. Prodr. i. 74. *T. oblonga*, Wall. in Don. Prodr. 227.

Malacca, Singapore: Perak, King's Collector, No. 989; and probably in all the provinces. Distrib. British India, Ceylon, Africa.

A common and rather variable weed. The bristles of the fruit are usually hooked at the apex; but in some specimens they are quite straight. The species *T. tomentosa*, was founded by Bojer on specimens collected in Mombassa, having straight fruit-bristles and the lower leaves broadly oval or oblong and often 3-lobed. Many of the Indian forms have been referred to that, but I think they might very well be included in *T. pilosa*, and in the synonymy above quoted I have adopted this view.

3. Triumfetta annua, Linn. Mant. p. 73. Annual, shrubby, erect, 1 to 2 feet high; the whole plant with sparse pale straight hairs, the older parts glabrescent. *Leaves* thin, ovate-acuminate, coarsely dentate, 3-nerved, 3 to 5 in. long, by 1·5 to 2 broad: petioles nearly 1·5 in. *Stipules* subulate, minute. *Peduncles* axillary, 3-flowered. *Calyx* ·25 in. long, nearly glabrous. *Petals* shorter than calyx. *Stamens* 10. *Fruit* globose, pitted, glabrous, ·2 in. across, bearing numerous smooth glabrous thin hooked spines longer than the capsule. DC. Prod. i. 507; Miq. Fl. Ind. Bat. i. pt. 2, 196; Hook. fil. Fl. Br. Ind. i. 396. *T. polycarpa*, Wall. Cat. 1079, partly. *T. trichoclada*, Link. ex DC. Prodr. i. 507; Wall. Cat. 1082. *T. indica*, Lam. Dict. iii. 420?

Perak: a weed. Distrib. British India, Malay Archipelago, Africa.

7. Corchorus, Linn.

Herbs or undershrubs, more or less covered with stellate pubescence, or glabrescent. *Leaves* simple. *Peduncles* axillary or opposite to the leaves, 1-2-flowered. *Flowers* small, yellow. *Sepals* 4-5. *Petals* 4-5, glandless. *Stamens* free, indefinite or rarely twice the number of the petals, springing from a short torus. *Ovary* 2-6-celled, style short, stigma cup-shaped. *Capsule* elongated, slender or subglobose, smooth or prickly, loculicidally 2-5-valved, sometimes with transverse partitions. *Seeds* numerous, albuminous, pendulous or horizontal; embryo curved. Distrib. 35 species, throughout the tropics.

Capsules globular	...	...	1. *C. capsularis.*
,, cylindric, 10-ridged	...	...	2. *C. olitorius.*
,, ,, 6-winged	...	...	3. *C. acutangulus.*

1. Corchorus capsularis, L. sp. 746. Annual, shrubby, glabrescent. *Leaves* lanceolate or oblong-lanceolate, acuminate, coarsely serrate, the base rounded and with 2 subulate appendages: length 2 to 4 in., breadth ·75 to 1·5 in., petiole ·5 in. or less; stipules linear-subulate ·25 to ·5 in. *Capsules* axillary, truncate-globose, ridged, wrinkled, sub-muricate, 5-celled. *Seeds* few in each cell. DC. Prodr. i. 505; Roxb. Fl. Ind. ii. 581; W. & A. Prodr. i. 73; Wall. Cat. 1071 A, B, C; Wight. Ic. t. 311; Thwaites Enum. 31; Dalz. & Gibs. Bomb. Fl. 25; Miq. Fl. Ind. Bat. i. pt. 2, 194; Hook. fil. Fl. Br. Ind. i. 397. *C. Maruа*, Ham. in Wall. Cat. 6311.—Rumph. Amb. v. t. 78, f. 1.

Cultivated here and there in all the provinces for its fibre which is known in commerce as "Jute." Doubtfully wild.

2. Corchorus olitorius, L. sp. 746. Annual, shrubby, glabrescent. *Leaves* ovate-lanceolate, serrate, the base rounded and with 2 subulate appendages: length 2 to 4 in., breadth ·75 to 2 in., petiole ·75 to 1·5 in.,; stipules linear, ·5 to 1 in. *Capsules* cylindric, 10 ribbed, 5-celled, 2 in. long. DC. Prod. i. 504; Roxb. Fl. Ind. ii. 581; W. & A. Prod. i. 73; Wall. Cat. 1072; 1, 2, 3, 4, D, E, F; Boiss. Fl. Orient. i. 845; Dalz. & Gibs. Bomb. Fl. 25; Miq. Fl. Ind. Bat. i. pt. 2, 195; Thwaites Enum. 31; Hook. fil. Fl. Br. Ind. i. 397. *C. decemangularis*, Roxb. Fl. Ind. ii. 582; Wall. Cat. p. 237, 1072 G.

Doubtfully wild: but occasionally cultivated in all the provinces under the name of "Jute."

3. Corchorus acutangulus, Lamk. Dict. ii. 104. Erect, herbaceous, the stems with a broad line of pubescence interrupted and varying in position at the nodes, otherwise glabrous. *Leaves* ovate to ovate-lanceolate, acute or acuminate, serrate, the base rounded, with or without subulate appendages, sparsely hairy on both surfaces; length 1·5 to 2 in., breadth ·75 to 1·75 in.; petiole ·25 to ·75 in. slender, villous at the apex: stipules lanceolate, acuminate, ·5 in. long. *Capsules* 1 to 1·5 in. long, cylindric, 6-winged, with 3 terminal bifid beaks, 3-celled. DC. Prod. i. 505; W. & A. Prodr. i. 73; Wall. Cat. 1069, 1074 D, E; Wight Ic. t. 739; Thwaites Enum. 31; Dalz. & Gibs. Bomb. Fl. 25; Miq. Fl. Ind. Bat. i. pt. 2, 194; Hook. fil. Fl. Br. Ind. i. 398. *C. æstuans*? Ham in Wall. Cat. p. 237, 1074 C. *C. fuscus*, Roxb. Hort. Beng. 42; Fl. Ind. ii. 582; Ham. in Wall. Cat. 1069.

Johore: at the base of Gunong Panti, King's Collector, No. 180. Distrib. India, Ceylon, Australia, Africa, W. Indies.

8. Trichospermum, Blume.

Trees with penni-nerved, minutely stellate, puberulous leaves.

Flowers in axillary or terminal, umbellate, stalked cymes or panicles. *Sepals* 5 valvate, thick. *Petals* 5, membranous with a scale at the base. *Stamens* numerous, free, inserted on the inner surface of an annular marginally villous sub-crenate disk; anthers broad, short, versatile, the connective sub-orbicular. *Ovary* sessile, 2-celled, with numerous ovules on axile placentas: style short, stigma expanded, papillose. *Capsule* orbicular-reniform, much compressed at right angles to the dissepiments, loculicidally 2-valved, many-seeded. *Seeds* sub-lenticular, with a thin imperfect marginally villous arillus; albumen fleshy; embryo central the cotyledons orbicular, foliaceous; radicle straight. Distrib. 3 species 2 of which are Malayan and Polynesian.

1. Trichospermum Kurzii, King. A tree 40 to 60 feet high: bark of young branches very dark-coloured, sparsely and minutely stellate-pubescent when young, speedily glabrous. *Leaves* membranous, ovate-elliptic, shortly acuminate, minutely serrate-crenate especially near the apex; the base rounded, sub-truncate, sub-cordate, boldly 3-nerved: lateral nerves about 4 pairs: the transverse veins sub-horizontal, curved, bold: length 4 to 6 in., breadth 2 to 3 in., petiole about ·5 in. *Panicles* solitary, axillary or terminal, stalked, cymose, 2-3-chotomous, much shorter than the leaves when in flower, nearly as long when in fruit, stellate-tomentose. *Sepals* oblong, acute, stellate-tomentose outside, glabrous inside except a tuft of hairs at the base. *Petals* about the size and shape of the sepals, glabrescent, with a fleshy scale at the base and a transverse belt of long hairs above it. *Ovary* sessile, densely villous; style shorter than the ovary, cylindric, expanding upwards into the broad papillose stigma. *Capsule* about ·75 in. long and slightly wider, emarginate at the apex and crowned by the persistent style: pericarp leathery, villous and dark-coloured; inside white, shining and glabrous: placentas broad, seeds sessile or shortly stalked, sub-lenticular, the long hairs of the arillus forming a marginal ring. *Bixagrewia nicobarica*, Kurz, Trim. Journ. Bot. for 1875, p. 325, t. 169.

Nicobars: Kurz. Perak; King's Collector, Wray.

The genus *Trichospermum* was founded by Blume for his single species *T. Javanicum*. The generic definition which I have given above differs from that of Blume (Bijdr. 56), in these respects. Blume describes (1) the æstivation of the sepals as imbricate; (2) the style as absent; (3) the stigmas as two and emarginate. The definition also differs from that given by Benth. & Hook. (G. P. i. 236) inasmuch as these authors describe (1) the petals as naked at the base; (2) anthers oblong; (3) style almost none; (4) stigma sessile, retuse; (5) the apex of the capsule produced into a short thick leathery expansion; (6) leaves entire.

9. Elæocarpus, Linn.

Trees. *Leaves* simple. *Flowers* usually hermaphrodite, rarely polygamous, in axillary racemes. *Sepals* 5, distinct. *Petals* 5, usually laciniate at the apex, rarely entire, springing from the outside of a cushion-shaped, often 5-lobed torus. *Stamens* usually indefinite, never less than 10, arising from the inside of the torus, and more or less aggregated into groups opposite the petals and alternating with the glands of the torus; anthers innate, linear, opening by a terminal pore. *Ovary* sessile, 2-5-celled, cells 2-many-ovuled; style columnar. *Drupe* with a single bony stone which is 3-5 or, by abortion, 1-celled. *Seeds* pendulous, 1 in each cell, albumen fleshy; cotyledons flat. Distrib. About 50 species chiefly in the Indian Archipelago and India; a few in some of the South Sea Islands, New Zealand, and Australia.

Sect. I. *Ganitrus.* *Ovary* and *drupe* 5-celled, the latter globular.

Leaves glabescent or glabrous, without stipules.

Leaves lanceolate ... ... 1. *E. Ganitrus.*

„ ovate-oblong ... ... 2. *E. parvifolius.*

Leaves softly rusty-pubescent or tomentose beneath, stipulate .. ... 3. *E. stipularis.*

Sect. II. *Eu-elæocarpus.* *Ovary* 3-celled: longer cell of anthers usually with an apical tuft of minute hair; petals cunei form, fimbriate.

Leaves pubescent beneath, elliptic-oblong ... ... 4. *E. Scortechinii.*

Leaves glabrescent beneath; the midrib pubescent.

Leaves ovate to elliptic-ovate, with black dots beneath ... 5. *E. Wrayi.*

„ narrowly lanceolate, not dotted beneath... ... 6. *E. salicifolius.*

Leaves quite glabrous everywhere.

Leaves with rounded bases.

Petals glabrous ... ... 7. *E. robustus.*

„ glandular-pubescent ... 8. *E. nitidus*, var. *leptostachyus.*

Leaves with their bases much narrowed.

Petals glandular-pubescent: fruit ovoid or slightly ob-ovoid, blunt ... ... 8. *E. nitidus.*

Petals glabrous except on the edges: fruit ovoid-elliptic, slightly apiculate ... 9. *E. floribundus.*

Sect. III. *Monocera.* Outer cell of anther produced into an awn. *Ovary* 2-celled. *Drupe* 1-celled, 1-seeded.

Petals ovate-acuminate, entire ... 10. *E. paniculatus.*

Petals about equally wide at base and apex; the apex toothed ... ... 11. *E. petiolatus.*

Petals wider at the base than the apex, the edges much incurved below the middle, the apex irregularly toothed or fimbriate.

Apex of leaves acuminate.

Racemes longer than the leaves: stamens 35 to 40 ... 12. *E. Griffithii.*

Racemes usually shorter than the leaves: stamens 20 ... 13. *E. Hullettii.*

Apex of leaves obtuse: stamens about 15 ... ... 14. *E. pedunculatus.*

Petals oblong, slightly obovate, apex obtuse with 6 to 8 broad teeth ... 15. *E. Kunstleri.*

Petals cuneiform.

Apex of petals with 8 to 10 rather broad teeth, sometimes 2-lobed: stamens 30 to 50 ... ... 16. *E. obtusus.*

Petals oblong-cuneiform to cuneiform, with numerous fimbriae ... 17. *E. apiculatus.*

Petals broadly cuneiform, lobed and fimbriate ... ... 18. *E. aristatus.*

Sect. IV. *Acronodia.* Flowers 4-merous, polygamous; anthers not awned and usually not bearded (sometimes slightly bearded in *E. glabrescens*).

Leaves sparsely and minutely pubescent or puberulous beneath, their edges serrulate; petals elliptic, the apex slightly lobed ... ... 19. *E. polystachyus.*

Leaves rufous-tomentose beneath, subglabrescent only when very old, edges quite entire, recurved; petals oblong, obtuse, 8 to 10-toothed ... 20. *E. Jackianus.*

Leaves rufous-pubescent on lower surface when young: ultimately glabrescent or glabrous ... ... 21. *E. glabrescens.*
Leaves glabrous at all stages.
Leaves acute narrowed at the base into the petiole: fruit oblong-ovoid, ·5 in. long ... ... 22. *E. punctatus.*
Leaves acuminate (often caudate) base not passing into petiole: fruit ovoid-globose, ·35 in. long... 23. *E. Mastersii.*

1. Elæocarpus Ganitrus, Roxb. Hort. Beng. 42 : Fl. Ind. iii. 592. A tree 30 to 60 feet high: branchlets with dark bark, cinereously puberulous when quite young. *Leaves* membranous, lanceolate, acute at base and apex, obscurely serrulate, glabrescent or glabrous: main nerves 10 to 12 pairs, spreading, slender: length 3·5 to 5·5 in., breadth 1·25 to 2·25 in., petiole ·3 to ·5 in. *Racemes* from the branches below the leaves, drooping, shorter than the leaves, crowded, many-flowered. *Flowers* ·35 in. long, narrow and pointed in bud; their pedicels rather longer, puberulous. *Sepals* lanceolate, shorter than the petals, puberulous outside, glabrescent inside. *Petals* obovoid, the base thickened, rounded and puberulous at the edge; the limb glabrous, laciniate for more than half its length. *Torus* short, fleshy, wrinkled, pubescent. *Anthers* about 30 to 35, sessile, slightly pubescent or glabrous; the cells slightly unequal, the longer with 1 (or sometimes 2) short white terminal hairs. *Ovary* ovoid-conic, with deep vertical grooves, minutely tomentose, 5-celled, each cell with about 4 ovules. *Style* much longer than the ovary, thin, fluted, puberulous or glabrescent, thickened towards the base. *Fruit* sphorical, ·75 to ·9 in. in diam., glabrous, bluish-purple; the stone vertically 5-grooved, tubercled, 5-celled, often only one cell containing a ripe seed. Mast. in Hook. fil. Fl. Br. Ind. i. 400; Kurz Fl. Burm. i. 13; Wall. Cat. 2660 A to D; Dalz. & Gibs. Bomb. Fl. 27. *Ganitrus sphærica*, Gærtn. Fruct. ii. 271, t. 139, f. 6; Wight Ic. i. 66.—Rumph. Amb. iii. t. 101. *E. cyanocarpa*, Maing. in Hook. fil. Fl. Br. Ind. i. 406.

Malacca; Maingay, No. 263. Penang; Curtis. Perak; King's Collector, Scortechini. Distrib. Java; British India, in damp tropical forests as far west as Nepal.

I have dissected flowers of the type specimen (Maingay No. 263) of *E. cyanocarpa*, Maingay, and I can find no difference in them from those of the type sheets of *E. Ganitrus* in Wall. Cat. Roxburgh's original drawing of *E. Ganitrus* in Herb. Calc. is wrong as regards the petals,

which it represents as too broad and with too many fimbriæ: otherwise it is an equally exact representation of the Indian plant described by him as *E. Ganitrus*, and of *E. cyanocarpa*, Maingay.

2. Elæocarpus parvifolius, Wall. Cat, 2662 A & B. A tree 30 to 50 feet high: young branches at first minutely pubescent, ultimately glabrous greyish-brown and minutely lenticellate. *Leaves* membranous, ovate-oblong, rather bluntly acuminate, serrulate, the base cuneate: upper surface shining, glabrous; the lower dull of chocolate brown colour, glabrous or glabrescent, the midrib and 5 or 6 pairs of curved ascending nerves pubescent on both; length 2·5 to 4 in., broadth 1·1 to 1·4 in.; petiole ·6 to ·75 in., slender, puberulous. *Racemes* from the branches below the leaves, rather shorter than the leaves, the rachis, flower-pedicels and outside of calyx softly and shortly pubescent. *Flowers* ·3 in. in diam., their pedicels about ·1 in., recurved, buds conical. *Sepals* slightly shorter than the petals, lanceolate, puberulous within and 3-nerved. *Petals* cuneiform, slightly nerved, cut half-way down into numerous narrow laciniæ, almost glabrous. *Torus* of 5 distinct, broad, shallow, fleshy, grooved, pale, velvety glands. *Stamens* 15, shorter than the petals, with short filaments; the anthers scaberulous, cells equal, obtuse, the outer sometimes with 2 or 3 minute pale apical hairs. *Ovary* globose, 5-grooved, 5-celled, sparsely pubescent. *Style* as long as the stamens, cylindric, faintly 5-grooved, glabrescent or glabrous. *Fruit* globose, sometimes ovoid-globose, ·75 to 1 in. in diam.: stone 5-celled, with fertile seeds in only 2 or 3 cells, ovoid, ·7 in. long, bluntly rugose, and with 5 very faint grooves from base to apex. C. Mull. Annot. de fam. Elæocarp. 24; Hook. fil. Fl. Br. Ind. i. 401.

Singapore; Ridley, King's Collector. Malacca; Griffith, (Kew Distrib.) 684, Maingay, 254. Penang and Singapore; Wallich, Curtis. Perak; King's Collector, Scortechini.

3. Elæocarpus stipularis, Blume Bijdr. 121. A more or less rusty-pubescent tree 40 to 70 feet high: young branches thin, minutely tomentose. *Leaves* coriaceous, ovate to oblong-ovate, acute or acuminate: the edges usually entire, slightly recurved when dry, sometimes waved; the base slightly cuneate, or sometimes rounded: upper surface at first puberulous, ultimately glabrous, the midrib always pubescent: lower softly rusty-pubescent: main nerves 9 to 12 pairs, spreading, intcrarching close to the margin: length 3·6 to 6·5 in., breadth 1·75 to 2·5 in.; petiole ·5 to ·75 in., minutely tomentose, not conspicuously thickened at the apex; stipules halbert-shaped, tomentose, fugaceous. *Racemes* axillary and from the axils of fallen leaves, usually shorter than, but sometimes as long as the leaves; the rachises, pedicels

and outside of sepals minutely tomentose. *Flowers* ·35 in. in diam., their pedicels ·2 to ·3 in. long; buds sub-globose, obtusely pointed. *Sepals* ovate-lanceolate, pubescent inside especially towards the base, the mid-rib thickened. *Petals* longer than the sepals, cuneiform, lobed and cut irregularly half-way into about 25 slightly unequal fimbriae, veined, glabrous, the edges villous. *Torus* of 5 distinct, fleshy, sub-globose, puberulous, transversely oblong, truncate, 2-grooved glands. *Stamens* 25, about half as long as the petals: filaments about half the length of the scaberulous anthers; cells unequal, the longer with (but sometimes without) an apical tuft of 4 or 5 stiff white hairs. *Ovary* ovoid-globose, vertically 5-furrowed, tomentose, 5-celled. *Style* twice as long as the ovary, conic-cylindric, pubescent at the thickened base, glabrescent above. *Fruit* globose, smooth; ·8 to 1 in. in diam.; pulp thin: stone very hard, thick, 1-seeded. Miq. Fl. Ind. Bat, i. pt. 2, p. 209; Mast. in Hook. fil. Fl. Br. Ind. i. 404; Kurz Fl. Burm. i. 170.

Malacca; Griffith, No. 683, Maingay, No. 255, (Kew Distrib.). Singapore, Malacca, Penang, Perak; very common at low elevations. Distrib. Java, Sumatra, Borneo, Burmah.

Var. *latifolia*, King. *Leaves* broadly elliptic to elliptic-oblong 5 to 7 in. long and 2·75 to 3·75 in. broad: petioles elongate, 1·5 to 2·75 in.; stipules lanceolate.

Perak; Scortechini No. 1991, King's Collector, Nos. 4412, 8176, 10786.

4. Elæocarpus Scortechinii, n. sp. King. A tree 30 to 50 feet high: young branches and stipules as in *E. stipularis*. *Leaves* elliptic-oblong otherwise as in *E. stipularis* except that the main nerves are only 8 to 10 pairs, and the under surface is only softly pubescent, not tomentose: length 5·5 to 7·5 in., breadth 2·25 to 3·25 in. *Flower pedicels* longer than in *E. stipularis*, and the flowers the same, except that the ovary is 3-furrowed and 3-celled. *Fruit* oval, 1 to 1·25 in. long and ·5 to ·75 in. in diam., glabrous and smooth when ripe, 1-celled, 1-seeded by abortion.

Perak; Scortechini, No. 1481; Wray, Nos. 1376, 1836, 2251; King's Collector, Nos. 3483, 10303.

This is one of the few plants to which the lamented Father Scortechini gave a manuscript name. He dedicated it to Jack: but as Wallich's species, dedicated to the same botanist, has long priority, I name this after my deceased friend. In everything but its 3-celled ovary and smooth oval fruit it agrees with *E. stipularis*, Bl.

5. Elæocarpus Wrayi, n. sp., King. A small tree: leaf-buds,

young branches and inflorescence pale tawny-pubescent. *Leaves* ovate to elliptic-ovate, shortly and bluntly acuminate, the margin cartilaginous, sometimes crenate-serrate, the base always entire and rounded; upper surface glabrous, shining: the lower dull, pale but not glaucous, with scattered black dots, glabrescent except the puberulous midrib and 6 or 7 pairs of rather prominent sub-ascending main nerves; the reticulations distinct, wide; length 2·25 to 3·75 in., breadth 1·25 to 1·75 in.; petiole ·75 to 1·25 in., pubescent. *Racemes* mostly from the wood below the leaves (a few axillary) more than half as long as the leaves. *Flowers* ·2 in. in diam., their pedicels ·1 in. long or less: buds ovoid, blunt. *Sepals* lanceolate, sub-acute, outside tomentose, inside pubescent and the midrib thickened; the edges not incurved. *Petals* broadly cuneate, glabrous, cut for a third or a fourth of their length into about 25 narrow fimbriae; the base truncate. *Torus* of 5 distinct, fleshy, oblong, truncate, several-grooved, velvety glands. *Stamens* 20 to 25, shorter than the petals; filaments less than half as long as the minutely scaberulous anthers; cells sub-equal, the longer sometimes with 2 or 3 short white hairs. *Ovary* globose, pointed, grooved, tomentose, 3-celled. *Style* slightly longer than the ovary, conic-cylindric, pubescent at the base, glabrescent above. *Fruit* ovoid-globular, glabrous, slightly rugose, 1 to 1·25 in. long when ripe, and ·8 to ·9 in. in diam.: pulp rather thin: stone bluntly rugose: putamen very hard, thick: 1 cell with a solitary seed, the other 2 cells abortive.

Perak; on Gunong Bubu at 5000 feet elevation; Wray, No. 3857: Gunong Batu Pateh, Wray, No. 1107; Scortechini, No. 400.

This resembles *E. parvifolius*, Wall. in some respects; but its leaves have more rounded bases, their nerves are rather more numerous and the petioles longer; the flower buds are blunt and not pointed as in that species, and they are tomentose rather than pubescent; also the stamens are more numerous and the ovary is 3-celled. This is found moreover at much higher elevations than *E. parvifolius* which is found at elevations under 1000 feet.

6. Elæocarpus salicifolius, n. sp., King. A tree 30 feet high: young branches puberulous. *Leaves* thinly coriaceous, narrowly lanceolate, slightly oblique: acuminate, serrulate-crenulate except at the entire cuneate base; upper surface glabrous, shining, olivaceous when dry, the midrib puberulous; lower dull brown when dry, glabrescent, the midrib puberulous: main nerves about 8 pairs, rather straight, sub-ascending, slender; length 3 to 3·5 in., breadth ·7 to ·9 in.: petiole about ·5 in., puberulous. *Racemes* from the lower axils and from the axils of fallen leaves, nearly as long as the leaves; the slender rachises,

and pedicels pubescent. *Flowers* ·25 in. in diam., the pedicels ·15 to ·2 in. *Sepals* lanceolate, spreading, hoary adpressed-tomentose outside, pubescent inside, the midrib slightly thickened, the edges not incurved. *Petals* a little longer than the sepals, cuneiform, contracted into a rather narrow claw, divided more than half-way down into about eight 3-fimbriate lobes, glabrescent outside, pubescent inside. *Torus* of 5 distinct, subglobose, fleshy, externally grooved glands. *Stamens* 25, shorter than the petals: filaments half as long as the minutely scaberulous shining anthers: cells subequal, pointed, the upper with a minute apical tuft of short hairs. *Ovary* globoso, pointed, tomentose, 3-celled. *Style* longer than the stamens, thick and tomentose at the base, cylindric and glabrous above. *Fruit* unknown.

Singapore; King's Collector, No. 1207.

This approaches *E. augustifolius*, Bl. but has smaller more pubescent petals, fewer stamens, and less glabrous leaves. It is also closely allied to *E. hypadenus*, Miq., but has not the characteristic rounded stipules of that species, and the leaf-venation is different. It is also allied to *E. parvifolius*, Wall. from which it differs in its narrower leaves with much more slender veins, and also by its 3-celled ovary.

7. Elæocarpus robustus, Roxb. Hort. Beng. 42; Fl. Ind. ii. 598. A tree 40 to 60 feet high; young branches rather stout, at first puberulous; afterwards glabrous, cinereous, lenticellate. *Leaves* thinly coriaceous, ovate-lanceolate to ovate, acuminate or acute, serrate almost to the slightly narrowed rounded rarely cuneate base; both surfaces glabrous, the upper shining; the lower dull, slightly paler, the minute reticulations rather distinct and the 10 to 12 pairs of spreading curving nervos rather prominent: length 3·5 to 9 in., breadth 1·75 to 3·5 in.; petiole 1 to 2·25 in., thickened at the apex. *Racemes* from the branches beneath the leaves, and a few axillary, often nearly as long as the leaves: rachis, pedicels and outer surface of the sepals pubescent. *Flowers* ·5 in. in diam., the pedicels slightly recurved and about ·3 in. long. *Sepals* lanceolate, glabrous inside except the incurved pubescent edges, the midrib thick. *Petals* broadly cuneiform, much contracted in the lower half, the base acute, cut half-way down into about 30 narrow fimbriae, glabrous except the puberulous edges. *Torus* of 5 fleshy, truncate, cushion-like velvety glands. *Stamens* 30 to 50, shorter than the petals, scaberulous; the filaments curved, about one-fifth the length of the anthers; cells subequal, the longer with a small tuft of white hair at its apex. *Ovary* ovoid-globose, with about 6 shallow vertical grooves, tomentose, 3-celled. *Style* cylindric, longer than the ovary, shorter than the petals, pubescent in its lower, glabrous

in its upper half. *Fruit* ovoid-globose, 1 to 1·25 in. long: stone oblong-ovoid, rugose, slightly 3-grooved at base and apex, 3-celled. Mast. in Hook. fil. Fl. Br. Ind. i. 402; Kurz Fl. Burm. i. 169; Pierre Fl. For. Coch-Chino, t. 147; Wight Ic. t. 64; Wall. Cat. 2664. *E. ovalifolius*, Wall. Cat. 2665; C. Müll. Annot. de fam. Elæocarp. 21. *E. amygdalinus*, Wall. Cat. 6857. *E. serratus*, Wall. Cat. 2666 C. *E. oblonga*, Wall. Cat. 2677. *E. aristatus*, Wall. Cat. 2665 B. ? Wall. Cat. 9027. *E. Helferi*, Kurz MSS.; Hook. fil. Fl. Br. Ind. i. 402.

Penang; Curtis. Pahang; Ridley. Andaman Islands. Distrib. British India, from Burmah to the tropical forests of the E. Himalaya.

8. Elæocarpus nitidus, Jack Mal. Misc. Vol. i. No. 2, 41; Hook. Bot. Misc. ii. 84. A tree 25 to 35 feet high; young shoots deciduously pulverulent-pubescent, speedily glabrous as are all other parts except the inflorescence; young branches with blackish bark. *Leaves* thinly coriaceous, oblong-lanceolate to elliptic-oblong, acuminate, crenate-serrulate, (sometimes obscurely so) the base cuneate (rounded in var. *leptostachya*); upper surface shining, the lower dull brown; main nerves 10 to 13 pairs, spreading, forming slender arches a little short of the margin: length 4·5 to 9 in., breadth 1·75 to 2·75 in.; petiole 1·25 to 2 in. thickened at the apex. *Racemes* crowded on the old wood below the leaves and rather more than half as long; rachis, flower-pedicels, and exterior of sepals sparsely puberulous. *Flowers* ·35 in. in diam., their pedicels recurved and rather shorter. *Sepals* shorter than the petals, ovate-lanceolate, acute, puberulous and sometimes lenticellate outside, puberulous inside and the midrib very thick. *Petals* cuneiform, finely and irregularly laciniate for nearly half their length, the entire triangular part with thickened nerves and truncate base, glandular-pubescent especially at the edges. *Torus* of 5 truncate, sub-globular, fleshy, tomentose, cushion-like glands. *Stamens* 15 to 35; the filaments nearly as long as the scabrid obtuse anthers: cells sub-equal, awnless, but sometimes the longer with 2 or 3 small white hairs. *Ovary* globose, slightly pointed, tomentose, 3-celled; style longer than the ovary, slightly thickened below and puberulous. *Fruit* ovoid, or slightly obovoid, smooth, 1·5 in. long, and 1 in. in diam. when quite ripe: stone 3-celled, only one cell bearing a perfect seed. Wall. Cat. 2670; Miq. Fl. Ind. Bat. i. pt. 2, p. 208; Mast. in Hook. fil. Fl. Br. Ind. i. 401; Wall. Cat., No. 2678 (*E. pedunculatus*) in part.

Penang; Jack, Curtis, No. 282, 463. Perak; King's Collector, No. 4926.

The anthers are sometimes without any terminal hairs: sometimes there are a few. I have seen no authentic specimen of Jack's naming,

and nothing that I have dissected quite fits his description of *E. nitidus*, of which he describes the stamens as 15: whereas in the plants which I refer to this species they vary from 15 to 35. Jack describes the putamen as 5-ridged and 5-celled: I do not find more than 3 cells in the ovary. In spite, however, of these discrepancies, I believe that Jack's specimen above cited belongs to the species which he named *E. nitidus*. Wallich's specimen No. 2679 has leaves which do not well answer to Jack's description "attenuate at the base." They are only slightly attenuate, and correspond rather with those of his own species *E. leptostachyus* which is sufficiently distinct as regards the shape of its leaves to be maintained as a variety, though not in my opinion entitled to specific rank.

Var. *leptostachya*. *Leaves* elliptic-oblong to elliptic-rotund, acute, the edge obscurely serrate-crenate, often sub-entire, the base rounded: length 6 to 9 in., breadth 2·75 to 4·5 in.; petiole 1 in. to 1·75 in., slightly thickened at the apex. *E. leptostachyus*, Wall. Cat. 2672; C. Müll. Annot. de fam. Elæocarp. 23; Mast. in Hook. fil. Fl. Br. Ind. i. 403.

Penang, Wallich; Perak; King's Collector, Nos. 409, 4905, 10105, 10240; Scortechini, Nos. 195, 1752; Wray, No. 2313.

9. Elæocarpus floribundus, Blume Bijdr. 120. A tree 30 to 40 feet high: young shoots shortly silky; otherwise glabrous, except the inflorescence. *Leaves* thinly coriaceous ovate-elliptic to oblong-lanceolate or oblanceolate, shortly acuminate, coarsely crenate-serrate, the base much narrowed; both surfaces shining, with a blistered appearance when dry: main nerves 5 to 7 pairs; length 3 to 5·5 in., breadth 1·75 to 2·75 in., petiole 1 to 1·5 in., thickened at the apex. *Racemes* usually from below the leaves, sometimes axillary, usually shorter than, but sometimes nearly as long as the leaves; rachises, pedicels and outside of sepals puberulous. *Flowers* ·4 in. in diam., their pedicels about ·35 in. long. *Sepals* lanceolate, outside glabrescent and often pustulate; inside glabrous except the pubescent involute edge, the midrib prominent. *Petals* cuneiform, lobed irregularly half-way down, the lobes divided into about 25 fimbriae, glabrous except the pubescent edges, the lower half veined and thickened, often pustulate. *Torus* of 5 distinct, fleshy, oblong, subglobular, truncate, tomentose glands. *Stamens* about 30, shorter than the petals, scaberulous, the filaments very short, the cells slightly unequal, the longer with a small apical tuft of white hair. *Ovary* ovoid-globose, tomentose, 3-celled. *Style* longer than the stamens, cylindric, puberulous in the lower, glabrous in the upper third. *Fruit* 1 in. long, ovoid-elliptic and slightly apiculate when ripe, oblong and much apiculate when young: stone narrowly ovoid tapering to each end, with 3 vertical grooves and many rather shallow large rugæ, 3-celled, one

or two of the cells sub-abortive, the walls thick. Mast. in Hook. fil. Fl. Br. Ind. i. 401; Miq. Fl. Ind. Bat. i. pt. 2, 210; Kurz Fl. Br. Burm. i. 167; Pierre Fl. Forest. Coch.-Chine, t. 143; Miq. Fl. Ind. Bat. i. pt. 2, 210. *E. serratus*, Roxb. (not of L.) Fl. Ind. ii. 596. *E. grossa*, Wall. Cat. 2661. *E. serratus*, Roxb. ex Wall. Cat. 2666 A, B. partly. *E. oblongus*, Wall. Cat. 2677; C. Müll. Annot. de fam. Elæocarp. 19, f. 30. *E. Lobbianus*, Turcz. in Mosc. Bull. 1858, 235.

The Nicobar Islands. Distrib. British India through Burmah to the E. Himalaya, in tropical forests.

There is no doubt that this is the plant which Roxburgh described as *E. serratus*, Willd.

10. Elæocarpus paniculatus, Wall. Cat. 2663. A tree 15 to 30 feet high: all parts glabrous except the inflorescence, young branches with dark polished bark. *Leaves* thinly coriaceous, lanceolate or oblanceolate-oblong to ovate-oblong, shortly acuminate; the edges entire, slightly wavy; base slightly cuneate, sometimes rounded: both surfaces glabrous, the upper shining; the lower paler and rather dull, the reticulations distinct; main nerves 5 to 7 pairs, sub-ascending, interarching freely within the margin: length 4·5 to 6·5 in., breadth 1·65 to 2·75 in.; petiole ·8 to 2 in., glabrous. *Racemes* numerous, from the axils near the apices of the branches, longer than the leaves, erect, rachises puberulous, becoming glabrous: pedicels spreading, slender, minutely pubescent, ·5 to ·65 in. long. *Flowers* about ·5 in. in diam.; buds ovoid with long narrow points. *Sepals* ovate, acuminate, adpressed-sericeous outside; glabrous inside except the pubescent infolded edges. *Petals* not longer than the sepals, ovate acuminate, entire, outside adpressed-sericeous, inside glabrous in the upper villous in the lower half and especially on the thickened midrib and infolded edges. *Torus* a shallow fleshy waved sericeous disk. *Stamens* 50, almost sessile, nearly as long as the petals; anthers sericeous, the cells subequal, the outer with a rather thick terminal awn. *Ovary* narrowly ovoid, sericeous, 2-celled. *Style* longer than the ovary, cylindric, glabrous. *Fruit* ellipsoid, blunt at each end, smooth, glabrous, bluish when ripe, ·4 to ·5 in. long and ·25 to ·35 in. in diam.; pulp rather thick, slightly fibrous; stone bony, minutely tuberculate, 1-celled, 1-seeded. C. Müll. Annot. de fam. Elæocarp. 12; Mast. in Hook. fil. Fl. Br. Ind. i. 407. *Monoceras leucobotryum*, Miq. Fl. Ind. Bat. Suppl. 409. *Monocera Griffithii*, Müll. l. c.

Singapore; Wallich, Anderson. Malacca; Griffith, Maingay (Kew Distrib.) No. 257. Perak; Scortechini, King's Collector; common at low elevations.

11. Elæocarpus petiolatus, Wall. Cat. 2673. A tree 20 to 40 feet high; all parts glabrous except the inflorescence; young branches dark-coloured, about the thickness of a goose-quill. *Leaves* coriaceous, elliptic to elliptic-oblong, acute or shortly and bluntly acuminate; edges entire: base slightly cuneate or rounded; both surfaces shining, the lower slightly paler when dry, the reticulations sharply distinct on both surfaces: main nerves 7 or 8 pairs, sub-ascending, curving and interarching a little within the margin: length 4·5 to 6·5 in., breadth 2 to 2·75 in.; petiole 1·4 to 2·4 in. slender, dark-coloured, slightly thickened at the apex. *Racemes* numerous from the old wood just below the leaves, shorter than the leaves, rachises and pedicels deciduously puberulous. *Flowers* ·5 in. in diam., their pedicels ·35 in.; buds ovoid, rather abruptly pointed. *Sepals* lanceolate, acuminate, almost glabrous externally; quite glabrous internally, the infolded edges alone pubescent, the midrib thickened from base to apex. *Petals* about as long as the sepals, oblong, the apex cut into 10 to 13 narrow glabrous teeth, the lower two-thirds sericeous, cucullate at the base from the infolding of the edges, a large fleshy villous gland in the middle near the base with a quasi-cell at each side of it, the hairs on the inner surface retroversed. *Torus* a 10-lobed fleshy glabrescent disk. *Stamens* 18 to 25, shorter than the petals, with sericeous or glabrescent flat or sub-cylindric filaments much shorter than the shortly puberulous anthers: apex of anther deeply cleft, the outer cell with a sub-recurved thick awn shorter than the filament. *Ovary* ovoid, pointed, glabrous, 2-celled. *Style* as long as the stamens and much longer than the ovary, cylindric, grooved, glabrous. *Fruit* elliptic, blunt at each end, smooth, ·4 to ·6 in. long, and ·3 in. in diam.: the pulp thin, with very few fibres; stone very slightly rugose, 1-celled, 1-seeded. *Monocera petiolata*, Jack Mal. Misc. i. No. v, 43; ex Hook. Bot. Misc. ii. 86; Cum. et Zoll. in Bull. Mosc. xix, 495. *Monoceras petiolatum*, Miq. Fl. Ind. Bat. i. pt. 2, p. 212; Kurz Fl. Burm. i. 164; Pierre, Fl. Forest. Coch.-Chine, t. 140. *Elæocarpus integra*, Mast. (not of Wall.) in Hook. fil. Fl. Br. Ind. i. 408.

Malacca; Griffith No. 699; Maingay, No. 256, (Kew Distrib.); Derry. Singapore; Hullett, King. Penang; Curtis, No. 383. Perak; Scortechini, King's Collector, Wray, very common at low elevations. Distrib. Sumatra, Beccari, N. S. No. 668.

This is undoubtedly the *Monocera petiolata* of Jack; that it is the *Elæocarpus integra* of Wall. (Cat. No. 2668) I very much doubt. Wallich's No. 2668 was collected in Silhet from which no specimen anything like this has been collected since his day. In fact there is no evidence to show that this species is found in any part of British India (as distinguished from British Malaya), although Kurz includes it in his

Flora of Burmah. This species is a smaller tree than *E. pedunculatus*, which, however, it closely resembles, differing chiefly in the shape of the leaves, the nearly glabrous sepals and in the larger number of stamens. *E. ovalis*, Miq. (a species from Sumatra) must be very nearly allied to this. I have seen only a fruiting specimen of *E. ovalis*, but, except in having leaves of thicker texture and slightly larger fruit, I see little to prevent its being referred here.

12. Elæocarpus Griffithii, Mast. in Hook. fil. Fl. Br. Ind. i. 408. A tree 30 to 40 or over 70 feet high, all parts glabrous except the inflorescence; young branches almost as thin as a crow-quill, dark-coloured. *Leaves* thinly coriaceous, ovate-lanceolate to lanceolate, acuminate, the edges cartilaginous with shallow mucronato crenulations, or subentire with remote marginal black points, the base sub-cuneate or rounded: both surfaces shining, the reticulations minute and distinct: main nerves 5 or 6 pairs spreading, forking and interarching at some distance from the margin, not prominent: length of blade 2·5 to 3·75 in., breadth ·9 to 1·5 in., petiole ·5 to 1 in. *Racemes* from the upper axils, longer than the leaves, rachises and pedicels softly and minutely pubescent. *Flowers* ·5 in. in diam.; pedicels thickened at the apex, ·6 to ·8 in. long: buds ovoid-conic. *Sepals* lanceolate, acuminate, finely adpressed sericeous externally, glabrous internally except the pubescent infolded edges and the thickened sometimes sericeous midrib. *Petals* about as long as sepals, ovate, acuminate, the apex irregularly 2 or 3-toothed with 2 or 3 lateral fimbriæ, outside minutely adpressed-sericeous, inside retroversed hirsuto especially on the large gland near the base; edges in the lower two-thirds much infolded so as to form with the gland 2 quasi-cells. *Torus* a shallow, acutely 10-lobed, fleshy disk. *Stamens* 35 to 40, shorter than the petals: filaments short, sericeous as are the unequally 2-celled anthers: outer cell with a tapering awn $\frac{1}{4}$ to $\frac{1}{3}$ of its own length, the inner with a few apical hairs. *Ovary* narrowly ellipsoid, tapering, glabrous except a few silky hairs, 2-celled. *Style* cylindric, grooved, glabrous, longer than the ovary. *Fruit* ellipsoid, blunt at both ends, smooth, ·5 in. long and ·3 in. in diam.: pulp thin with a few fibres; stone slightly rugose, 1-celled, 1-seeded. Kurz in Journ. As. Soc. Beng. pt. 2, for 1870, p. 68; for 1874, pt. 2, 123; For. Flora Burm. i. 164. *Monocera tricanthera*, Griff. Not. pt. 4, 518, t. 619, fig. 3. *Monocera Griffithii*, Wight Ill. i. 84, (not of Müll.). *Monocera holopetala*, Zoll. et Cum. Bull. Mosc. xix, 496. *Monoceras odontopetalum*, Miq. Fl. Ind. Bat. Supp. 409.

Malacca; Griffith, Maingay, No. 257/2 (Kew Distrib.). Perak, at low elevations; King's Collector, Wray. Penang; King's Collector. Distrib. Tenasserim, Helfer, No. 714, Kew Distrib.

13. Elæocarpus Hullettii, n. sp., King. A tree 30 to 40 feet high: young branches very slender, dark-coloured; all parts glabrous except the inflorescence. *Leaves* thinly coriaceous, lanceolate to ovate-lanceolate, acuminate; edges slightly cartilaginous, entire or remotely and obscurely serrate; the base cuneate or rounded: both surfaces shining, the reticulations minute, elongate and rather distinct on the lower; main nerves 7 or 8 pairs curving, interarching within the edge, rather faint; length of blade 2·5 to 3 in., breadth ·75 to 1·4 in.; petiole ·65 to ·9 in., slender. *Racemes* from the leaf-axils below the apex, crowded, usually shorter than, but sometimes as long as, the leaves, the rachises glabrescent or puberulous, the pedicels silky puberulous. *Flowers* ·3 in. in diam., their pedicels ·35 in. long. *Sepals* linear-lanceolate, acuminate; externally adpressed-pubescent; internally glabrous below, puberulous near the apex and on the infolded edges. *Petals* ovate, concave at the base, narrowed to the 10 to 12-fimbriate apex; outside glabrous, inside villous on the much-thickened base of the mid-rib, otherwise puberulous. *Torus* very shallow, deeply 10-lobed, sericeous. *Stamens* 20, slightly shorter than the petals: filaments nearly as long as the minutely scaberulous anthers, outer cell with tapering awn nearly as long as itself. *Ovary* ovoid, pubescent, 2-celled. *Style* as long as the petals and much longer than the ovary, subulate, puberulous below, glabrous above. *Fruit* ellipsoid, blunt at each end, smooth, ·6 in. long, ·35 in. in diam.; pulp thin, very slightly fibrous: stone rugulose, rather thick, bony, 1-celled, 1-seeded.

Singapore; Hullett, No. 132. Penang; Curtis, No. 1091, King's Collector, No. 1475. Perak, on low hills; Scortechini, King's Collector.

A species not unlike *E. Griffithii*, Wall. but with smaller flowers and much shorter racemes.

14. Elæocarpus pedunculatus, Wall. Cat. 2678 in part. A tree 40 to 80 feet high: glabrous except the inflorescence: young branches nearly as thin as a crow-quill, polished, dark-coloured; their apices and the older branchlets rough and thickened. *Leaves* coriaceous, oblanceolate or narrowly elliptic-oblong, obtuse or slightly narrowed at the apex, the base very cuneate; the edges cartilaginous, remotely-mucronate crenate-waved, slightly recurved when dry: both surfaces shining: the lower very slightly the paler and with the minute reticulations distinct; main nerves 5 to 7 pairs, interarching at some distance from the edge; length of blade 3 to 4·5 in., breadth 1·25 to 1·8 in., petiole ·75 to 1·2 in. *Racemes* axillary but mostly from axils of fallen leaves, 3 or 4 in. long, rachises and pedicels hoary-pubescent. *Flowers* ·3 in. in diam., buds narrowly ovoid, sub-acute; pedicels recurved, slightly longer than the

flowers. *Sepals* lanceolate, sub-acute, minutely adpressed-sericeous externally, almost glabrous internally except the pubescent inverted edges, the midrib equally thickened from base to apex. *Petals* slightly longer than the sepals, oblong, expanded at the base, the apex broad, cut into 10 to 15 cylindric filiform glabrous fimbriæ one-fourth of the length of the petals: lower part sericeous on both surfaces but especially on the inner (where the hairs are reversed), cucullate with the edges much infolded, and with a large basal gland at each side of which is an imperfect cell. *Torus* a fleshy deeply 10-lobed glabrescent disc. *Stamens* about 15; slightly shorter than the petals, filaments pubescent, less than half the length of the puberulous sub-equal anthers: outer cell with a short sub-recurved awn. *Ovary* ovoid, pointed, smooth, glabrous, 2-celled. *Style* as long as the stamens, cylindric, grooved, glabrous. *Fruit* ellipsoid, blunt at each end, ·5 in. long and ·3 in. in diam., 1-celled, 1-seeded; pulp rather thin, slightly fibrous, stone minutely rugulose, 1-celled, 1-seeded. Mast. in Hook. fil. Fl. Br. Ind. i. 408.

Singapore; Wallich, Ridley. Malacca; Griffith, No. 698, Maingay No. 258 (Kew. Distrib.). Penang; Curtis, No. 256. Perak; Scortechini, King's Collector, Nos. 269, 6907, 10831.

Miquel's *Monocera Palembanica*, from Sumatra, judging from the only authentic specimen which I have seen (and which has no flowers), if not identical with this must be a very closed allied species. Under his Catalogue, No. 2678, Wallich issued two species, the above described as *E. pedunculatus*, and another which is clearly *E. nitidus*, Jack.

15. Elæocarpus Kunstleri, n. sp, King. A tree 50 to 70 feet high: young branches as thick as a goose-quill, polished, thickened and rough at the apex: all parts glabrous except the inflorescence. *Leaves* coriaceous, rotund-obovate, the apex broadly obtuse, sometimes with a short broad apiculus, rather abruptly narrowed from below the middle to the acuminate base; both surfaces, shining, glabrous; main nerves about 10 pairs, ascending, interarching freely inside the entire or crenate-serrate edge: prominent beneath; the reticulations rather faint; length 5 to 8 in., breadth 2·75 to 3·75 in., petiole ·5 to ·7 in., pubescent. *Racemes* crowded from the axils of fallen leaves and a few axillary, less than half as long as the leaves, 6 to 9-flowered: rachises and pedicels slender, puberulous, glabrous when old. *Flowers* ·6 in. in diam., their pedicels ·5 in. or more long. *Sepals* lanceolate, sub-acute, pubescent on both surfaces, the midrib thickened and villous at the base inside. *Petals* about as long as the sepals, oblong slightly obovate, obtuse, thickened in the lower half, the apex with 6 to 8 rather broad teeth, adpressed-sericeous outside, densely villous inside. *Torus* a shallow

toothed villous cup. *Stamens* 28 to 30, shorter than the petals; filaments nearly as long as the minutely scaberulous anthers, swollen in the lower half, the apex of the outer anther-cell with a short recurved awn. *Ovary* ovoid, pointed, tomentose, 2-celled. *Style* cylindric, as long as the petals, puberulous below, glabrous at the apex. *Fruit* unknown.

Perak; at elevations under 1000 feet, King's Collector, No. 8328.

A species near *E. apiculatus*, Mast. but with broader, blunter leaves more abruptly attenuated to the base and quite glabrous, also with smaller flowers.

16. Elæocarpus obtusus, Blume Bijdr. 125. A tree 30 or 40 feet high: young shoots minutely pale pubescent, ultimately glabrous. *Leaves* coriaceous, oblong-obovate, the apex rounded or retuse, gradually narrowed from above or below the middle into the acute or acuminate base; the edges sub-entire or with shallow mucronato crenations; upper surface glabrous, shining; the lower minutely puberulous at first, ultimately glabrous, the reticulations very minute and rather distinct; main nerves 6 to 8 pairs, sub-ascending, not much curved, rather prominent below, scrobiculate at their origin from the midrib; length 4·5 to 6·5 in., breadth 2·25 to 2·75 in., petiole ·75 to 1·1 in. *Racemes* axillary, sometimes from the axils of fallen leaves, less than half as long as the leaves, few-flowered; rachises and pedicels puberulous when young, often nearly glabrous when old. *Flowers* ·9 in. in diam; their pedicels slender, ·75 to 1 in. long. *Sepals* oblong-lanceolate, outside minutely pubescent, inside sparsely adpressed-sericeous, the midrib thickened. *Petals* longer than the sepals, cuneiform, the base rather broad; the lower third thickened and its edges infolded, the apex with 8 to 10 rather broad teeth sometimes 2-lobed, sericeous on both surfaces but especially on the thickened lower third. *Torus* a wavy, sub-10-toothed, fleshy, sericeous cup. *Stamens* 30 to 50, shorter than the petals: the filaments slender, slightly swollen in the lower half, as long as the pubescent anthers; outer anther cell with a thin tapering awn about as long as itself. *Ovary* ovoid, sericeous or pubescent, 2-celled. *Style* tapering, cylindric, nearly as long as the petals, slightly grooved, puberulous. *Fruit* ovoid, oblong, not pointed, 1·5 in. long, and ·9 in. in diam., smooth: stone boldly tuberculato, 1-celled, 1-seeded. *Monoceras obtusum*, Hassk. Tijds. Nat. Gesch. xii. 136; Miq. Fl. Ind. Bat. i. pt. 2, p. 212. *E. Monoceras*, Cav. (fide Mast. in Hook. fil. Fl. Br. Ind. i. 405). *E. littoralis*, Kurz (not of Teysm. and Binn.) in Journ. As. Soc. Beng. 1874, pp. 132, 182; For. Fl. Burm. i. 167.

Malacca; Griffith, (Kew Distrib.) No. 700. Perak, at low elevations; King's Collector, Nos. 1096, 4671; Scortechini 1396. Pahang; Ridley, 1312. Distrib. Java, Borneo, Sumatra, Burmah.

E. Monoceras, Cav. to which Dr. Masters reduces this, was founded by its author on specimens from the island of Luzon. The species, however, is not given in the latest Flora of the Philippines (that of Sig. Vidal); and, as the original description of Cavanilles does not quite agree with the flowers of the Perak specimens, I think it safer not to go farther back than Blume's name, leaving it to be settled hereafter whether *E. obtusus*, Bl. is really the same plant as the Philippine *E. Monoceras*. The Perak plant is closely allied to *E. littoralis*, T. B. (for which Kurz mistook it); and also to the smaller-flowered Sumatran *E. cuneifolius*, Miq.

17. Elæocarpus apiculatus, Mast. in Hook. fil. Fl. Br. Ind. i. 407. A tree 50 to 60 feet high: young branches glabrous, their apices much thickened, rough and puberulous. *Leaves* coriaceous, obovate or oblanceolate-oblong, slightly narrowed to the obtuse, sub-acute, or shortly apiculate apex, and much narrowed to the base, the edges sub-entire or with coarse shallow crenations; both surfaces glabrous, shining, the midrib on the lower glabrescent when young; under surface pale, the reticulations minute, rather distinct; main nerves 12 to 14 pairs, slightly prominent beneath and interarching freely within the margin, not scrobiculate; length 7 to 10 in.; breadth 2·5 to 3·75 in., petiole ·3 to 1 in., thickened at the apex. *Racemes* few, mostly from the axils of fallen leaves, usually about a fourth but sometimes half the length of the leaves; the rachises and pedicels softly pubescent. *Flowers* ·9 in. in diam.; buds oblong, sub-obtuse or pointed, their pedicels ·75 to 1·25 in. *Sepals* oblong-lanceolate, rufous-pubescent outside, glabrous or glabrescent inside, the edge infolded and pubescent, the midrib thickened from base to apex. *Petals* slightly longer than the sepals, oblong-cuneiform to cuneiform, cut from one-fourth to one-fifth of their length into numerous rather broad fimbriæ; externally adpressed-sericeous in the lower half, glabrous in the upper; internally thickened and villous in the lower, glabrous in the upper, half. *Torus* a shallow fleshy puberulous cup. *Stamens* 30 to 40, half as long as the petals; filaments shorter than the minutely scaberulous anthers, bulbous at the base: outer anther-cell with short or long apical recurved awn. *Ovary* ovoid, rufous-tomentose, pointed, 2-celled. *Style* as long as the petals, conic-cylindric and pubescent in the lower half, filiform and glabrous in the upper. *Fruit* (fide Masters) "1 in. long, resembling the fruit of a *Diospyros*." *Terminalia moluccana*, Wall. (not of Lamk.) Cat. 3969.

Penang; Wallich. Malacca; Griffith, Maingay, No. 262 (Kew. Distrib.). Perak; Scortechini, King's Collector; common at low elevations.

Allied to *E. Kunstleri*, King and to *E. rugosus*, Roxb. In fact I am inclined to believe that it is merely a form of the latter, from which it should not be separated specifically. Dr. Prain has called my attention to Wallich's sheet No. 3969, which is unmistakeably this species, and has nothing to do with *Terminalia moluccana*, Lamk. which is *T. Catappa*, Linn.

18. Elæocarpus aristatus, Roxb. Hort. Beng.: Fl. Ind. ii. 599. A tree 30 to 60 feet high: young branches of about the thickness of a swan's quill, smooth, thickened and rough towards the apex. *Leaves* thinly coriaceous, obovate, shortly and bluntly apiculate, remotely crenate-serrate, narrowed to the base, glabrous on both surfaces; main nerves 7 to 10 pairs, slender, curving, scrobiculate at the origin from the midrib; length 6 to 8·5 in., breadth 2·75 to 3·75 in., petiole ·5 to ·7 in. *Racemes* axillary and from the axils of fallen leaves, often nearly as long as the leaves, 3 to 5-flowered, rachises and pedicels puberulous or glabrous. *Flowers* nearly 1 in. in diam.; buds cylindric, pointed; pedicels ·8 to 1·25, or longer in fruit. *Sepals* as in *E. apiculatus*. *Petals* also as in *E. apiculatus* but broadly cuneiform, and lobed as well as fimbriate. *Stamens* 50, otherwise as in *E. apiculatus*. *Ovary* less velvety, but otherwise as in *E. apiculatus*. *Fruit* ovoid, smooth, 1·25 to 1·4 in. long and ·8 to ·9 in. in diam., pulp rather thick; stone oblong, flattened, pointed at each end, rugose, slightly ridged in the middle of each side, 1 in. long, 1-celled, 1-seeded. Mast. in Hook. fil. Fl. Br. Ind. i. 405. *E. rugosus*, Wall. Cat. No. 2659 (not of Roxb.).

Andaman Islands; King's Collector. Distrib. Brit. India in Burmah, Chittagong, Sylhet, Assam, Khasia Hills and base of Eastern Himalaya.

This is very closely allied to *E. rugosus*, Roxb.—a species originally discovered by Roxburgh in Chittagong, but specimens of which from that province are very rare in collections. The plants distributed under this name by Wallich as No. 2659 of his Catalogue were not collected there but in Sylhet, while some of them were taken from trees cultivated in the Botanic Garden, Calcutta. They are not *E. rugosus* at all, but *E. aristatus*, Roxb.; and they differ from true *E. rugosus* in having their young branches thinner and smoother; and in leaves which are always glabrous, not so gradually narrowed to the base and with much longer petioles. Their racemes are also more numerous, the petals more broadly cuneiform and the stamens more numerous, (50 as against 30 to 40). The pulp of the fruit is thicker in Andamans specimens of this than in those from Sylhet and Assam; and the stone is proportionately smaller. There is in Assam and Burmah a plant closely allied to this which has

smaller leaves with very large serobiculæ on the lower surface at the junction of the petioles with the midrib. This has been named *E. simplex* by Kurz, (Fl. Burm. i. 165.) A similar form occurs in Travancore and has been named *E. venustus* by Beddome (Flora Sylvatica, t. 574).

19. Elæocarpus polystachyus, Wall. Cat. 2671. A small tree: young shoots rather stout, minutely tawny-tomentose. *Leaves* coriaceous, pale when dry, elliptic to elliptic-oblong, abruptly and shortly acuminate; the edges rather remotely serrulate except at the base, sub-entire when old; the base broad, rounded; upper surface glabrous; the lower sparsely and minutely sub-adpressed pubernlous, the midrib pubescent main nerves 7 to 10 pairs, ascending, curving, prominent beneath, the reticulations minute, faint: length 5·5 to 7·5 in., breadth 2·25 to 3·5 in.; petioles 2·5 to 4 in., minutely tawny-tomentose, slightly thickened at the apex. *Racemes* slightly longer than the petioles; the rachises, pedicels and outside of sepals densely minutely tawny-tomentose. *Flowers* ·35 in. in diam., their pedicels ·4 in., recurved, buds sub-globose. *Sepals* ovate, acute; inner surface glabrous, except the pubescent edges, the midrib thickened. *Petals* elliptic, little longer than the sepals, the apex obtuse, sometimes slightly lobed, not fimbriate: villous on both surfaces, the hairs on the inner reversed. *Torus* of 5 retuse thin densely villous glands. *Stamens* half as long as the petals: filaments nearly as long as the hispid-pubescent anthers; cells subequal, awnless, beardless. *Ovary* ovoid, blunt, densely villous, 2-celled. *Style* about as long as the ovary, pubernlous. *Fruit* oblong, blunt, ·6 in. long and ·35 in. in diam., smooth, glabrous; stone minutely but sharply rugose, 1-celled, 1-seeded, pulp thin and slightly fibrous. C. Müll. Annot. de fam. Elæocarp. 20, f. 13; Mast. in Hook. fil. Fl. Br. Ind. i. 403.

Singapore; Wallich, Hullett, Ridley. Malacca; Maingay, Nos. 264, 266, (Kew Distrib.).

20. Elæocarpus Jackianus, Wall. Cat. 2679. A tree 40 to 80 feet high: young branches stout, densely rufous-tomentose. *Leaves* coriaceous, ovate-oblong to elliptic, rarely oblong-ovoid, shortly acuminate or acute, edges entire, recurved; the base rounded or slightly narrowed: upper surface rather dull and pale when dry; glabrous, the midrib alone sometimes pubescent, the lower softly rufous-tomentose, becoming sub-glabrescent when very old, the minute reticulations distinct; main nerves 8 to 10 pairs, sub-ascending, curving, prominent on the lower, impressed on the upper, surface: length 4 to 7·5 in., breadth 2·5 to 4·5 in.; petiole 1·75 to 3 in., stout, thickened at each end, tomentose. *Racemes* crowded on the branches below the leaves, sometimes

axillary, shorter than the petioles, the rachises pedicels and outside of sepals softly rufous-tomentose. *Flowers* ·25 in. in diam.; their pedicels about ·25 in. long, recurved. *Sepals* 4, ovate, acute; inside puberulous with infolded tomentose edges, the midrib thickened. *Petals* 4, very little longer than the sepals, oblong, slightly obovate, obtuse, shortly 8- to 10-toothed, villous outside, glabrescent inside, the edges villous. *Torus* a shallow rufous-villous cup. *Stamens* about 12, shorter than the petals, scaberulous, the filaments about half as long as the anthers; anther-cells slightly unequal, pointed, the longer sometimes with, but usually without, a minute tuft of white hair. *Ovary* (absent in most flowers) ovoid-oblong, glabrous, imperfectly 2-celled, one cell only perfect. *Fruit* ovoid, tapering at each end, smooth, shining; pulp thin, slightly fibrous: stone sharply rugulose, crustaceous, 1-celled. 1-seeded. *Monocera ferruginea*, Jack Mal. Misc. ex Hook. Bot. Misc. ii. 86.

Singapore; Jack, Kurz. Penang; Curtis, No. 465. Malacca; Griffith, No. 693; Maingay, No. 259, (Kew Distrib.). Perak; King's Collector; common at low elevations.

This species approaches *E. glabrescens*, Mast. but is larger in all its parts and much more persistently tomentose. This is unrepresented by any Wallichian specimen at Kew, and is therefore referred to by Masters in the *Flora of Brit. India* only in a note (i. 409).

21. Elæocarpus glabrescens, Mast. in Hook. fil. Fl. Br. Ind. i. 403. A tree: young branches and petioles densely rufous-tomentose. *Leaves* coriaceous, ovate to ovate-lanceolate, acuminate; edges entire, slightly revolute; base rounded or slightly narrowed; upper surface glabrous, the midrib pubescent; lower surface at first rufous-pubescent ultimately glabrescent or glabrous, the reticulations minute but distinct: main nerves 5 or 6 pairs, prominent beneath, spreading, curved: length 2·5 to 3·5 in., breadth 1·2 to 1·6 in.; petiole 1·25 to 1·75 in., slightly thickened at the apex, glabrescent when old. *Racemes* rather longer than the petioles, axillary and from the axils of fallen leaves; rachises and pedicels sparsely pubescent. *Flowers* ·25 in. in diam., the pedicels about ·2 in. long, recurved. *Sepals* 4, sub-erect, ovate-lanceolate, thickened at the base, pubescent outside, glabrescent inside with puberulous edges, the midrib thickened. *Petals* 4, slightly longer than the sepals, oblong, the apex obtuse and with 6 to 12 short unequal teeth: pubescent outside, glabrescent inside, the edges shortly villous. *Torus* a very shallow villous cup. *Stamens* 10 or 12, shorter than the petals: filaments short: anthers scaberulous, the cells slightly unequal, slightly pointed, usually without small apical tufts of minute hair. *Ovary* (absent in many flowers) ovoid, glabrous, 1-celled. *Style* short, conic, glabrous. *Fruit* (*fide* Masters) the size of a cherry, 1-celled, 1-seeded.

Malacca; Maingay No. 256 (Kew Distrib.). Penang; Stoliczka; on Government Hill at 2,500 feet, Curtis, No. 1092.

The Malacca and Penang specimens agree with a specimen at Kew which Miquel has named *E. tomentosus*, Bl. The two species are no doubt close together: but Blume describes the leaves of his *E. tomentosus*, as "setaceous-denticulate" which is not the case here. This tree appears to be uncommon, for Herbarium specimens of it are very few.

22. Elæocarpus punctatus, King, n. sp. A small tree; all parts glabrous except the puberulous inflorescence; young branches thicker than a crow-quill, rough. *Leaves* coriaceous, oblong-lanceolate, acute, the edges cartilaginous, crenate or serrate, sometimes with a short seta on each tooth, the base much narrowed into the petiole, entire: both surfaces shining; main nerves 8 to 10 pairs, slender but distinct beneath as are the reticulations: length 1·75 to 3 in., breadth ·5 to 1·1 in.; petiole ·25 to ·3 in., channelled in front. *Racemes* axillary and from the axils of fallen leaves, much shorter than the leaves; rachises and pedicels puberulous, becoming glabrescent. *Flowers* ·25 in. in diam., their pedicels ·2 in., recurved. *Sepals* 4, oblong-lanceolate, sub-acute, puberulous on both surfaces, the edges thickened and pubescent but not recurved: midrib thickened inside. *Petals* 4, obovoid-oblong, apex obtuse with 5 to 7 short broad teeth, glabrous. *Torus* a shallow wavy pubescent cup. *Stamens* 8 to 12; filaments less than half as long as the scaberulous obtuse beardless awnless anthers: the cells sub-equal. *Ovary* ovoid, glabrous, slightly grooved, 2-celled. *Style* about as long as the ovary, cylindric, grooved, puberulous. *Fruit* oblong-ovoid, pointed, narrowed to both ends, glabrous, shining, pale, ·5 in. long and ·25 in. in diam.; pulp thin, and slightly fibrous; stone crustaceous, sharply rugose, 1-celled by abortion, 1-seeded. *Elaeocarpus Acronodia*, Mast. in Hook. fil. Fl. Br. Ind. i. 408 *in part*. *Acronodia punctata*, Bl. Bijdr. 123; Miq. Fl. Ind. i. pt. 2, p. 213.

Perak; on Ulu Batang Padang, at 5000 feet, Wray. Malacca. Distrib. Java, Sumatra.

The leaves of specimens from Java and Sumatra are larger than those from Perak and have numerous black dots on the lower surface, whereas those from Perak have no such dots. In other respects the specimens agree: but the Perak material which I have as yet seen is scanty. The plant issued by Wallich as *E. punctatus*, (No. 2676 of his Catalogue) is not the *Acronodia punctata* of Blume, but an altogether different plant. Wallich's specimens are very bad, and Dr. Masters (Fl. Br. Ind. i. 406) suggests that perhaps the leaves are those of a *Pterospermum*; in reality they belong to a species of *Parinarium*.

23. Elæocarpus Mastersii, King. A tree 30 to 50 feet high: young branches as thin as a crow-quill, smooth, puberulous; otherwise glabrous except the inflorescence. *Leaves* thinly coriaceous, oblong-lanceolate to ovate-lanceolate, acuminate, often caudate; the edge slightly cartilaginous, remotely and faintly serrate, the base cuneate; both surfaces shining and with the rather transverse reticulations distinct; main nerves 6 to 8 pairs, faint, spreading, interarching within the edge: length of blade 2·75 to 4·5 in., breadth ·8 to 1·4 in.; petiole ·5 to ·75 in., slender. *Racemes* few-flowered, less than half as long as the leaves, from the axils under the apex; rachises and pedicels puberulous, becoming glabrous. *Flowers* ·2 in. in diam.; buds narrowly ovoid, pointed. *Sepals* 4, ovate-lanceolate, subacute, puberulous or glabrescent outside: glabrous inside on the lower, often puberulous in the upper half and slightly on the infolded edges. *Petals* 4, oblanceolate or narrowly cuneate, the rounded apex with about 15 short teeth, thickened towards the base, veined, glabrous. *Torus* a very shallow wavy pubescent disk. *Stamens* 8 or 9, shorter than the petals, filaments nearly as long as the sub-scaberulous anthers; the cells blunt at the apex, awnless. *Ovary* (absent in many flowers), ovoid, blunt, glabrous, 2-celled. *Style* about as long as the ovary, thick, cylindric, grooved, glabrous. *Fruit* ovoid-globose, the apex slightly pointed, smooth, ·35 in. long and ·25 in. in diam.; pulp thin and without fibres: stone smooth, cartilaginous, 1-celled, 1-seeded. *Elaeocarpus Acronodia*, Mast. in Hook. fil. Fl. Br. Ind. i. 401, in part (excl. syn. *Acronodia punctata*, Bl.).

Malacca; Griffith, No. 681; Maingay, No. 261, (Kew Distrib.). Singapore; Hullett, Ridley. Perak; common at low elevations, King's Collector, Scortechini, Wray.

This is a true *Acronodia* allied to *A. punctata*, Bl. (= *Elæocarpus punctatus*, King, not of Wall.) but is distinguished by its less acuminate longer petiolate leaves, slightly different flowers and smaller more globoso fruit. This occurs at low elevations and is a tree whereas the other is a shrub and is found as high as 7000 feet.

Excluded species.

Elæocarpus punctatus, Wall. Cat. 2676 is, (as Kurz pointed out) no *Elæocarpus* but a *Parinarium*. Maingay's Nos. 621 and 621/2 (Kew Distribution) seem to be conspecific with it.