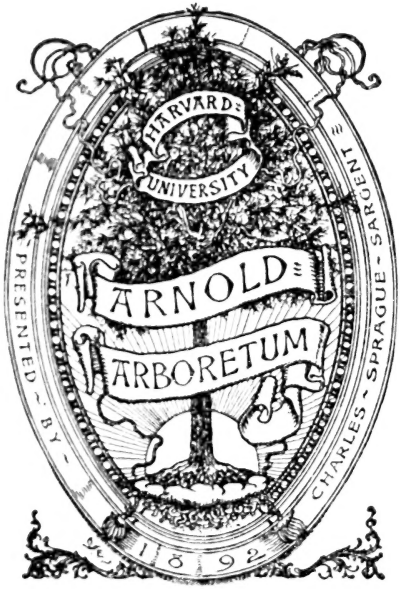

The

Gardens' Bulletin

STRAITS SETTLEMENTS

A Journal reflecting the activities of the Botanic Gardens of the Straits Settlements, published as material is available.

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The Gardens' Bulletin
STRAITS SETTLEMENTS

Vol. III Issued August, 1923. Nos. 1—3

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Branched coconut palm at Bachok, Kelantan.
From a photograph sent by Mr. F. G. Crosste.

THE

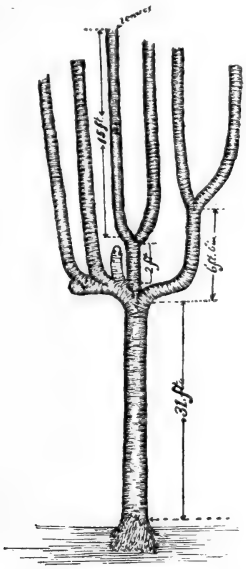
GARDENS' BULLETIN,

STRAITS SETTLEMENTS.

Vol. III Issued August 1923 Nos. 1—3.

THE FERTILITY OF BRANCHED COCONUT PALMS.

In a paper in the *Annals of Botany,* xxi, 1907, p. 420, Mr. H. N. Ridley gave an account of an abnormally branched coconut palm standing upon Perseverance Estate in Singapore island. This tree which is figured upon his plate xxxvi, he was told had never fruited: and the idea that branched coconut-palms are sterile, seems to be general: but it is not absolutely true. Reports of fertile branched coconut palms in New Guinea and in the West Indies have been noticed, and the matter is discussed in Hunger's *Cocos nucifera* (2nd Edition, Amsterdam, 1920) pp. 218-226.



At Geylang on land adjoining the Perseverance Estate there stands at the present time a forked coconut palm. It is sterile now, but is said to have borne fruit.

In Penang island upon a coconut plantation near Tanjong Bunga stands a palm branched as in the annexed drawing by Mr. Mohamed Haniff. It has seven branches and the stumps of two additional ones. Mr. Mohamed Haniff has ascertained that all the fully crowned branches are fertile, and the palm is fruiting now. The tree is said by an old Malay on the Estate to be 45 to 50 years in age.

Mr. Frank G. Crosslé has supplied the following information and the photograph reproduced here of a branched coconut to which the following relates "The tree is upon the outskirts of the village of Bachok, Kelantan. It is said that once it had fourteen branches, and that five have died off: the stumps of two of these can still be seen. The height is approximately 25 feet high from the ground to the place where it divides. It has now started to bear fruit, three nuts on three different branches, which have matured."

Mr. Crosslé continues that he has heard of several branched coconut-palms before, and knows one at Kretay in Trengganu, but that he has never heard of one bearing fruit.

Further information upon branched trees occurring elsewhere would be valued.

I. H. Burkill.

BRANCHING IN ARENGA PINNATA.

A young palm of *Arenga pinnata* Merr. (*A. saccharifera* Labill.) planted out as a replacement in the Arenga Avenue of the Botanic Gardens suffered in 1920 injury to its terminal bud. This bud was replaced by an axillary bud from one of the uppermost axils, and that bud is now commencing to produce a trunk. The possibility of this palm branching has not been recorded before.

I. H. Burkill.

AN EXPERIMENT WITH LETTUCES.

In the end of 1921 lettuce-seed of a number of different races was ordered from England and from France, with the object of ascertaining the best races for local cultivation. The seed duly arrived,—twelve races from Messrs. Sutton and Sons, Reading, England, and 15 races from the firm of Vilmorin-Andrieux and Co., Paris. Of the english races eight were cabbage lettuces and four cos lettuces: and of the french races twelve were cabbage lettuces and three cos. The seeds were sown on November 21st. in a mixture of sand and burned earth, and germination was very satisfactory in forty-eight hours. When the seedlings were 2—3 inches high,—that was in 7—9 days,—they were transplanted into beds, care being taken to do it only when the sun was off the beds.

and set out in rows nine inches apart. A fortnight later they were manured by pouring an emulsion of cow-dung into runnels between the rows. In 41-44 days they were mature, the maximum weight being five ounces.

The lettuces were then sent out in pairs to friends willing to endeavour to judge their table value, each pair with a voting paper. These voting papers showed that the english race was preferred to the french in four cases, and the french to the english in one, while as regards the others the votes cast were roughly equal. The four races of english origin judged better than the french race against which each was pitted, were:—Sutton's Golden Ball, Standwell, Improved Tom Thumb and Satisfaction: the french race judged better than its english competitor was Vilmorin's All-the-year round.

On the whole it appears that from the salad standpoint only races favoured in England are a little better suited to Singapore than races favoured in France.

The races named above are not the only races which did satisfactorily. Sutton's Heartwell, Whiteheart Ideal, and Nonsuch made good in growth, as also did Vilmorin's Large White Stone, Balloon, Neapolitan, Green Madrid and May King.

The experiment, however, must not be considered as final. The chinese cook comes in, and the way in which he served the trial lettuces must have varied. Few know just how a lettuce should be treated, and the cook is not one of them. A lettuce for salad should be allowed just to get flaccid, then an hour before serving it should be plunged into pure cool water, which it will take up the more greedily for the flaccidity and it will be the crisper and better when eaten. But at any rate the chinese cook would treat both competing lettuces with equal disregard to their best.

J. Lennon.

A SPINY YAM FROM SUMATRA.

In the whole vegetable kingdom there are very few instances of the conversion of roots into spines, and these almost without exception in Monocotyledons; *e.g.*, some palms, one of the Iridaceae and a few species of Dioscorea such as *D. esculenta* and *D. prehensilis*.

A new and divergent instance is now added in the undescribed Dioscorea from Sumatra which is here figured. This Dioscorea converts the roots arising on its tubers into spines, and they may cover the whole surface; thus it wears an armour against the depredations of wild pigs etc. It is otherwise with the Asiatic *Dioscorea esculenta* and the African *D. prehensilis* where the spines are the lateral rootlets of long specialised roots produced above the yam and distributed around it in a way that would on the whole

seem to be more effective, because the spines persisting from the year before protect the succulent root of the new year; but the interest of a different method of getting cover is not reduced thereby.

I. H. Burkill.

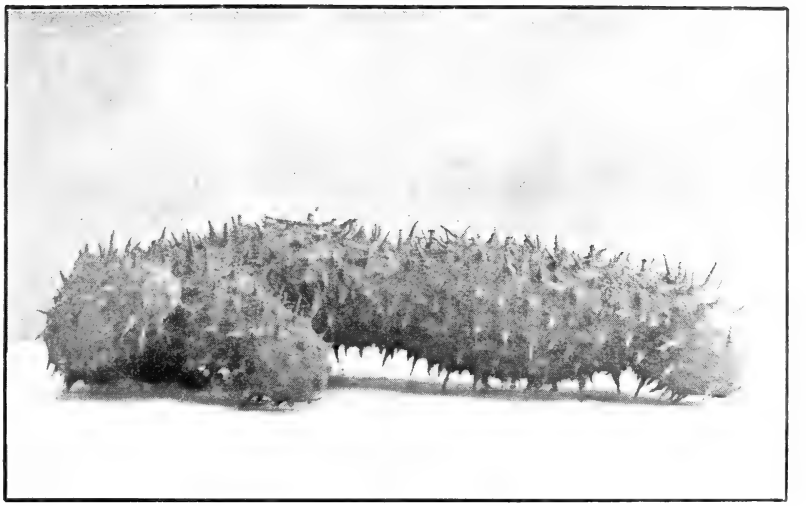
TAHITIAN YAMS.

The statement made in this Bulletin vol. I, 1917, p. 396, that *Dioscorea esculenta* does not penetrate the Pacific to the eastward of Fiji is now proved incorrect. Its tubers have been sent to Singapore by the great kindness of Professor Harrison Smith; who has supplied also all the other yams which he could get wild or cultivated in the neighbourhood of Papeete. They are figured upon the accompanying plate.

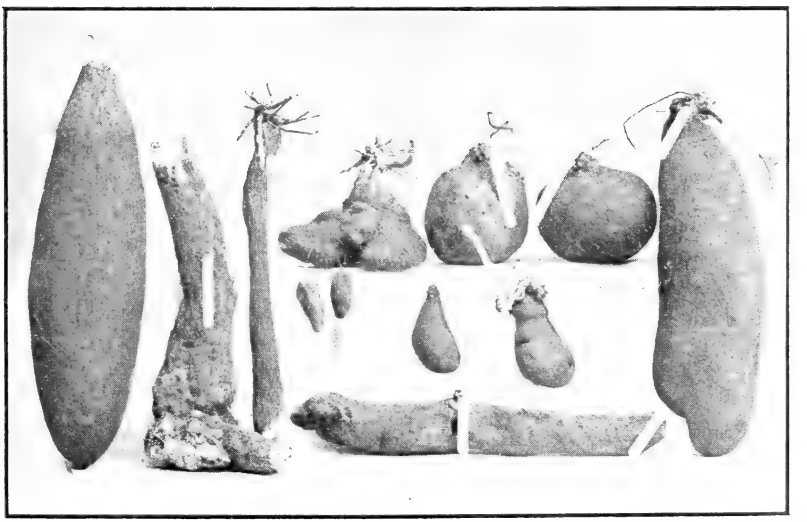
The great yam, *Dioscorea alata,* Linn. is the most important to the Tahitians of these roots. They grow it in several races, such as *ufi taho-taho* (No. 1 on the plate) and *ufi opura* (No. 10), both being large rather long yams, as *ufi mene-mene* (Nos. 4 and 5) which has neat round tubers, as *ufi tiauu* (No. 9) which is long and deep going, and as *ufi paparatea* (No. 2) which is very long and deep going.

The first crop raised in Singapore from these showed above ground differences between *ufi taho-taho* and *ufi opura* in the frills on the angles of the stems, the first having them green and the second having them purple, in a slight earliness in *ufi taho-taho,* and in the lobes of its leaves being larger less rounded and somewhat uprising in comparison with those of *ufi opura.* There were three tubers got from each, the largest of *ufi taho-taho* weighing 5525 grammes, and the smallest 2607 grammes (average 3957 grammes) the largest of *ufi opura* weighing 4590 grammes, and the smallest 2352 grammes (average 3825 grammes). *Ufi paparatea* returned an average of 3230 grammes; *ufi tiauu* of 2230 grammes; and *ufi mene-mene* of 2253 grammes.

No. 6 in the plate are tubers of *Dioscorea esculenta,* Burk.,— the lesser yam, which Professor Harrison Smith obtained with the name *ufi hoi.* Further *Dioscorea bulbifera,* Linn., (No. 3 on the plate) was given to him under the same name, with the explanation that whereas the first is edible, the latter relatively is not. It is most interesting that the edible and the relatively inedible should not have been distinguished by name; and it would seem therefore that the first though edible is really a very little known and used food. Again the name is interesting for *ufi* and *hoi* both have the meaning "Yam" and nothing more, in the centres of their use: and the Tahitian when he says *ufi hoi* says yam-yam in two different, but closely related, languages. This in itself, apart from the confusion of the cultivated with the wild root, suggests a recent introduction of the tuber.



A spiny yam from Sumatra.



1 2 3 4 5
6·6 7 8 10
in two parts. 9

Yams from Tahiti.

Hoi, one may surmise came to the Tahitians from Hawaii, but *ufi* belongs to their language absolutely, being their form of *ubi* or yam in Malay, and certainly represents a very old root in the language as it is in Madagascar as *ofi.*

The last species, *Dioscorea pentaphylla,* Linn., is No. 6 and 8 on the plate. The Tahitians call it *ufi patara* a name to be found in Nadeaud's *Plantes usuelles des Tahitiens,* and possibly a more sought food with those people fifty years ago, which is when Nadeaud was in Tahiti, than now. It grows wild, and does not even in cultivation return more than 1 kilo by weight of tubers.

I. H. Burkill.

YAMS AT THE MALAYA-BORNEO EXHIBITION.

The Malaya-Borneo Exhibition (Singapore, April, 1922) with its agricultural and horticultural objects collected from all parts of the Malay Peninsula, from Sarawak and from Brunei offered an unequalled opportunity of collecting information regarding native crops and was so used. Then at its winding up, through the Committee for the Agri-Horticultural Section exhibitors were persuaded to give many of their exhibits to the Botanic Gardens, notably roots, and from among them a set of yams went into cultivation in the Economic Garden for better study. This is a report upon them.

Of their genus,—the genus Dioscorea,—four species were exhibited in abundance in the following order:—

Dioscorea alata, Linn.—the Greater Yam,
Dioscorea esculenta, Burk.—the Lesser Yam,
Dioscorea hispida, Dennst.—the Gadong,
Dioscorea bulbifera, Linn.:

of all four species there were exhibits from the Malay Peninsula: of the first two from Brunei; and of the first from Sarawak.

Incidentally it was observed that Yam-scale exists in Malacca, Klang, Pahang and Brunei.

The tubers after a preliminary disinfection, were planted on April 21st. They were dug again on January 6th., 1923.

The Greater Yam.

Two races of the Greater yam from Singapore have already been figured in the Gardens Bulletin (vide Plate III in the issue of March 31st, 1917, Vol. 1, part 11-12) being what are called in the markets of the town Ubi nasi (rice yam) and Ubi merah (red yam). It was known before the Exhibition occurred that both these races are cultivated also near Klang, and that Ubi merah comes freely into Malacca town from the country behind it. It was therefore not surprising to find the race commonly sold in

Singapore as "Ubi nasi" on exhibition from Klang. It is a heavy-yielder, and three hills cultivated in the Botanic Gardens from the Klang specimen returned 13 lbs., 8 lbs. 2 oz., and 6 lbs. respectively.

This Ubi nasi grows to 18 inches or more in length, and for most of the Peninsula seems to be the deepest going yam that is cultivated. But in the Exhibition from Sungei Terap, Kinta district, a chinese cultivator exhibited a single root of one of those races which go still deeper, and which do not seem to be in favour for the soil and with the cultivator in this country, though they usually have a greater delicacy. It was interesting to learn thus that deep-going yams, though scarce, exist.

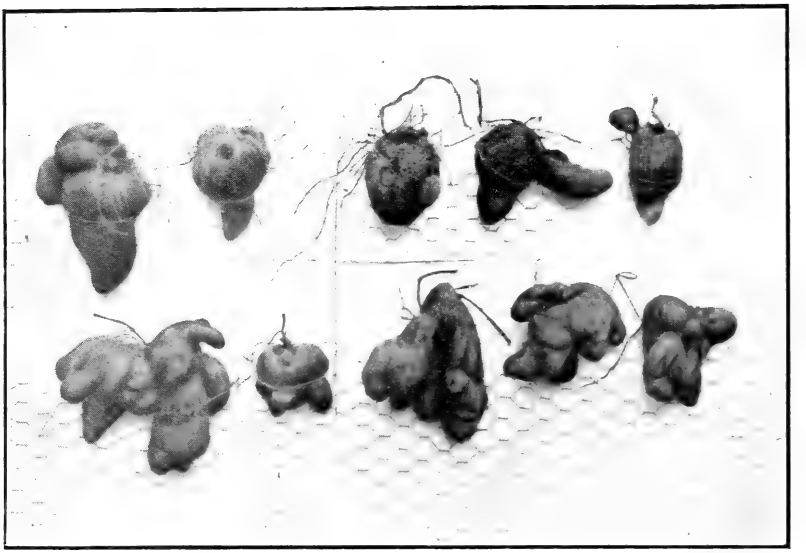
Judging by the Exhibition, the yams which find favour in the Peninsula are such as are represented on the upper block of the attached plate. They may be circular in section as those upon the upper line, or flattened as those in the lower: when they are flattened, they are also lobulate as the illustrations show. Races characterised by producing tubers that are circular in section were exhibited from Klang, Malacca, and Pekan: races with their tubers flattened and lobed were received from Krian, Kuala Kangsar, Temerloh, Klang and Alor-Gajah. Two of these, one circular from Klang, and one flattened from Temerloh, both without any magenta sap, carried the name ubi nasi, which indeed in general does not signify any particular race, but indicates a tuber of the ordinary downwardly-growing habit which boils white, like rice, as it has no magenta sap in it: the name indeed contrasts with ubi merah. One of the tubers circular in section, but with magenta sap was labelled at Klang ubi java (Java yam), and one of the flattened tubers with magenta sap was labelled at Alor-Gajah ubi paha kerbau (buffalo thigh yam).

It is easily realised that, from a condition in which there is one yam deeply lobed, it is a step to one in which the plant produces more than one tuber. A race producing many neatly rounded small tubers was received from Malacca, which when grown in the Economic Garden returned 24 tubers from three plants.

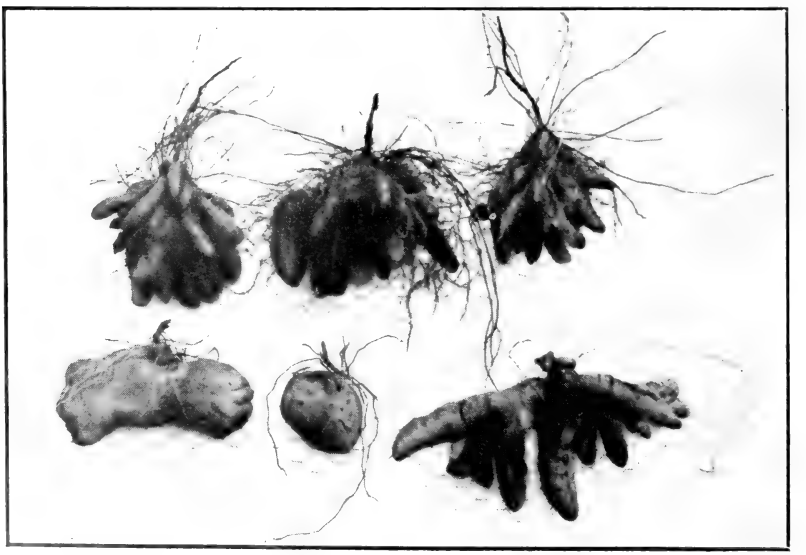
Ubi sekok from Raub, Pahang, which is the race figured on the upper line of the lower block on the plate, proved to be one of which the exact counterpart had not been seen before: it is without magenta sap, and much branched, but not in one plane only, as is usual.

Of conspicuously flattened and branched yams the Peninsula supplied a single example, namely that figured on the lower line of the lower block on the plate. It came from Klang. As such yams travel badly and are not suitable for sending to a distance, it may be that they are more common in the Peninsula than the Exhibition showed.

Very interesting it was to find from the Peninsula examples of those up-growing yams which require earthing-up in cultivation.



(X) Half-long races of the Greater Yam : on the upper line (left), a race with a tuber circular in section such as seems to find favour in the Malay Peninsula : upper line (right), three tubers of a race from Sarawak with the habit of producing one supplementary horizontal tuber : on the lower line (left) two tubers of a flattened and lobed yam from Klang which finds favour in the Peninsula, and (right) three tubers of a still more lobed race received from Krian.



(Y) Upper line, a peculiarly branched race of the Greater Yam sent from Raub with the name of Ubi sekok ; and below (left) two tubers a flattened very smooth race from Brunei, and (right) a much flattened and branched race from Klang.

SOME YAMS OF THE MALAY PENINSULA AND BORNEO.

They came from Kuala Lipis, from Krian and from Klang. The exhibitor at Kuala Lipis attached the name Ubi junjong to his exhibit. Junjong is among other things, the stake that a climber is grown up, and the name may be translated pole yam, the word "pole" being used exactly as in Pole bean. The exhibitor at Klang attached the name ubi ular (or snake yam) to what he sent. This name— ubi ular— is the name which Rumpf between 1628 and 1702, obtained in Amboina for the same type of yam, and is so appropriate that it would persist anywhere where the malay language is spoken. The Klang ubi ular differed slightly from the others in possessing a diminished tendency in the snake-like roots to curve upwards and extrude from the ground, and had no magenta sap.

These snake yams yield well; and ten hills of the Krian and Kuala Lipis race returned nearly fifty lbs. of tubers, one reaching 7 lbs., while nine hills of the Klang race yielded 64 lbs., one attaining 13½ lbs.

Malacca sent a race producing several tubers to each hill, and these subglobose. Upon the average there were eight to each hill.

From Sarawak came a yam which agrees in character with the commoner lobed yams of the Malay Peninsula, and another much flattened and branched like an open hand which has nothing precisely in common with any of the hitherto known Peninsular races.

From Brunei came another race with the flattened lobed tuber, the lobes widely divergent, figured on the lowest line of the plate. All these three carried magenta sap.

The Lesser Yam.

The Lesser Yam was exhibited in two races from Machap in the Alor-Gajah division of Malacca, and also from Klang. Both of these carry thorns upon the specially defensive roots and therefore belong to that group of races which have been called collectively "spinosa." They both produced 6-12 tubers rather closely bunched together, much as in that race which is figured in the Gardens Bulletin for March 1917, volume I, part 11-12 upon the top row in plate IX. But they differed markedly in flavour, and differed somewhat in the colour and smoothness of the skin. The one race when cooked gave a mealy or starchy tuber, and its yellow skin was very smooth; the other when cooked gave a harder sweeter tuber, and its light umber skin carried a fair sprinkling of small rootlets. The Klang exhibitor attached the name "ubi torak" to the second.

This second sweeter race was sent also from Brunei.

Gadong.

The tubers of *Dioscorea hispida* are not edible, but can be made to furnish a large quantity of starch, and this under proper preparation is a good food. Consequently they appeared in the

Exhibition among other roots that are eaten, and some of those shown were of great size.

Dioscorea Bulbifera.

This unimportant yam was exhibited from Klang and from Seremban in the variety "sativa," which produces large and numerous edible bulbils at the expense of the root-tuber. The plants raised from the tubers obtained at the Exhibition proved identical, and appear to be not different from the "Otaheiti potato" which has been grown for some forty years in India, reaching India via the Andaman islands, and is known in various islands and shores towards the Pacific. The name Ubi Kastela (Castile yam) found applied to it in Singapore suggests that the Portuguese or the Spaniards had once something to do with its dispersal.

I. H. Burkill.

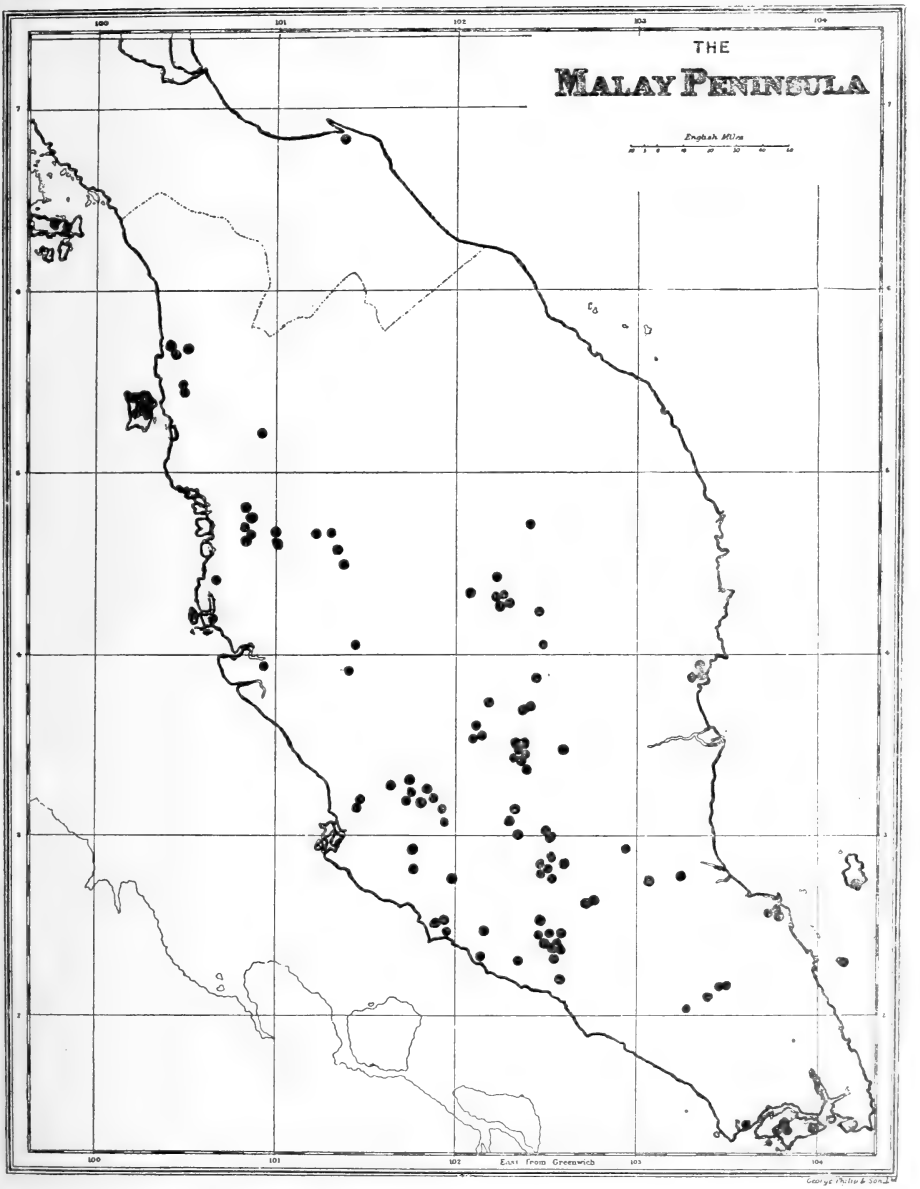
THE AS-YET BOTANICALLY UNEXPLORED PARTS OF THE MALAY PENINSULA.

The object of this note with its two maps is to indicate the parts of the Malay Peninsula which are at present botanically unexplored, and to ask for collections of dried plants from them. One of the maps is of the localities where determined species of the genus *Dipterocarpus* are known to occur; the other is of the localities where determined species of the genus *Dioscorea* are known to occur. The genus Dipterocarpus consists of important forest trees and their economic value has led the Forest Department to pay much attention to them: the genus Dioscorea consists of herbaceous climbers which do not demand attention in the same way: and for that reason the two maps are unlike although there is reason to believe that no wide stretches of the Peninsula are without representatives of either genus. As the maps show, neither genus is known from many parts, and only the one or the other from other parts.

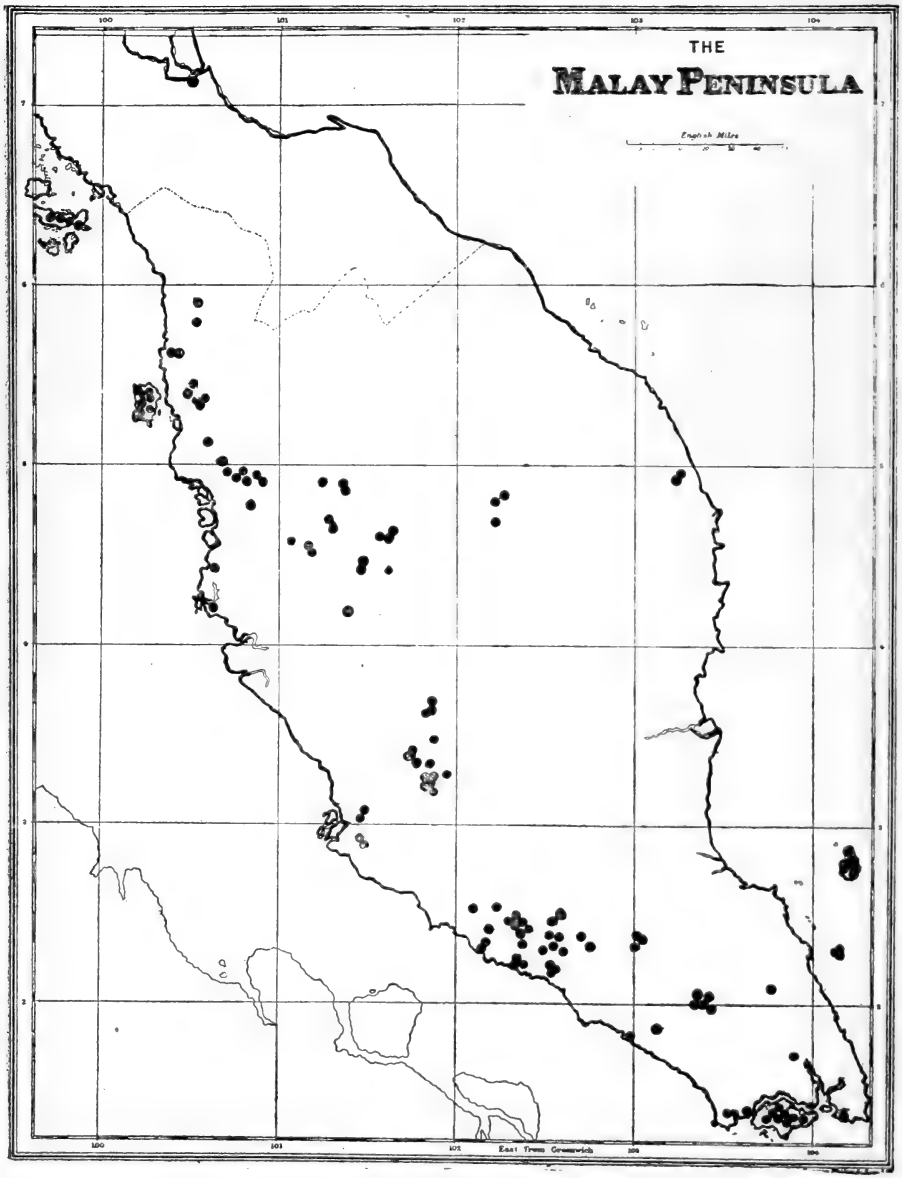
The three Settlements, Penang, Malacca and Singapore, are demonstrated the best studied; after them the parts of Perak about Taiping and north and south of Ipoh; and the parts of Selangor adjacent to Kuala Lumpur: for *Dipterocarpus* Negri-Sembilan and the middle part of the Pahang river have been studied, but not for *Dioscorea*. Large areas of Kedah, the whole of Kelantan and the whole of Trengganu, large areas of Pahang, and also of Johore are without any of the dots that indicate the occurrence of a determined species of either genus.

What is demonstrated in these two maps for the two genera is true of plants of all kinds: Collections of dried plants are wanted from all the blank parts of the maps.

I. H. Burkill.



Known Distribution of Dipterocarpus.



Known Distribution of Dioscorea.

ABNORMAL INFLORESCENCES OF ELAEOCARPUS PETIOLATUS.

In 1921 Mr. Burkill noticed an abnormality in the development of the flowers of a tree of this species growing in the Economic Garden. Some notes were made at the time by Mr. G. B. Deshmukh, who was then Field Assistant at the Gardens. The tree has again produced flowers, and an investigation of them shows a greater complexity in their abnormal features than Mr. Deshmukh records. The unusual points are a complex branching of the inflorescence, accompanied and accentuated by the production of buds in the axils of some or all of the floral organs, and the complete sterilisation of the flowers. The final result is an elaborate branch system bearing minute buds at the apices of its ultimate branchlets. There is some variation of these phenomena in different inflorescences, and an account of these is given below. It is probable that the abnormality is not caused by any stimulation due to insect attack, but is inherent in the nature of the individual tree.

The normal inflorescence of the species is a simple raceme, and some of those on the present tree approximate to this, while others are very much branched before any flowers are produced. The flowers on the less branched inflorescences are of normal size, but in the axils of some or all of the sepals are produced buds, each of which developes into a flower on a pedicel which may reach 4 or 5 cm. in length. The stamens are normal in appearance, but never bear pollen. The axis of the flower continues to grow out above the stamens to a length of 1 to 1.5 cm., carrying some of them, reduced in size, with it. No evidence of the presence of carpels has been observed, but the organs at the apex of the produced axis are too immature to be recognisable. The new flowers are smaller than the original one but behave in the same way, and Mr. Deshmukh records that the process may be repeated four times. During the present flowering very few buds of the third order have been seen, and none of the fourth order. The flowers of each order are smaller than those of the preceding.

The smaller flowers produced by the branchlets of the more complex inflorescences and, to some extent, those of the second and third orders above mentioned show a greater degree of abnormality. The first change is the presence of buds in the axils of petals as well as of sepals. In progressively smaller flowers, on smaller branchlets, additional petals, with or without axillary buds, replace stamens. These small petals are somewhat modified in form, having a less laciniate tip and a few reddish glandular hairs like those on the margins of the sepals. In the smallest flowers of which the organs are not too small to be distinguishable all the stamens (reduced in number) have been replaced by modified petals, and some of these, with axillary buds, are carried above the flower by the continued growth of the axis. When the sepals fall,

the remains of such a flower form a rather modified branch-system of the already complex inflorescence. On the smallest branchlets the reduction in size of the flowers is so great that the floral organs are not differentiated sufficiently to be recognisable.

R. E. Holttum.

ORCHID NOTES.

A New Malayan Orchid,—Dendrobium citrino-castaneum.

This orchid was brought to me by Mr. Poul Feddersen as an epiphyte which he had found near Johore Bahru. It is a typical *Dendrobium* of the section Sarcopodium, falling, in Dr. F. Kränzlin's arrangement of the species of Sarcopodium (Engler's Pflanzenreich, IV, 50, II B. 21, p. 321), near to *Dendrobium elongatum*, Lindl., but being quite distinct from it, and not possessing the affinity to the section *Desmotrichum* which that species has. As one of the Sarcopodiums with rather numerous flowers, and these prettily coloured, it may not be unworthy of cultivation. The duration of the flowers, however, is unknown to me, and possibly it is a little exacting in the conditions of flowering.

Dendrobium (Sarcopodium) citrino-castaneum. *Planta* epiphytica. *Rhizoma* repens, 5 mm. diametro, ab initio vaginis tubulosis pallide virescentibus obtectum, maturitate atro-castaneum, inter pseudobulbos ad 5 cm. longum. *Pseudobulbi* conoidei, glaberrimi, politi, virides, ad 6 cm. longi, ad 2.5 cm. diametro, ex bracteis initio pallide virescentibus, deinde scariosis et atrocastaneis, maturitate liberati, bifoliati. *Folia* obovato-elliptica, ad 14 cm. longa, ad 3.5 cm. lata, glaberrima sed vix polita, firma, apice rotundata vel obtusa, mucronulata, nervis 20 vel ultra inconspicuis, supra saturate viridia, infra pallidiora. *Corymbus* pluriflorus, conspicuus, floribus 6—10: pedicelli cum ovariis 2-4 cm. longi: bracteæ ovato-lineares. *Sepala* citrina; dorsale ad 18 mm. longum, 5 mm. latum, lanceolatum, acutum, 7-nerve: lateralia æquilonga, mentum 6 mm. profundum formantia, ex eodem triangulari-lanceolata, acuta, 6-nervia, nervis 2 supra et nervis 2 infra medium. *Petala* citrina, 16 mm. longa, sepalis paullulo minora, angustiora, concoloria, 5-nervia. *Labellum* ex basi 1.5 mm. lata trilobatum, castaneum; limbus fere planus, crassus, 5 mm. longus: lobus medius exacte linguiformis, crassiusculus, supra sulcatus, 8 mm. longus; lobi laterales oblique oblongi, tenues, apice rotundati atque minutissime denticulati. *Gynostemium* 5 mm. longum.

Johore. Prope Johore bahru, ***P. Feddersen.***

Dendrobium callibotrys, Ridl.

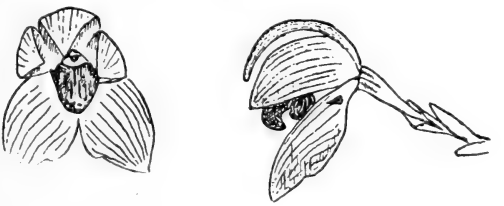
From Gunong Pulai in Johore Mr. G. A. Best recently brought into the Botanic Gardens, Singapore, an orchid which on flowering

appears to be *D. callibotrys,* Ridl.: but as it does not agree with the description in some small points, a note on it is in place. Firstly he said that *D. callibotrys* is an orchid of low levels in Singapore island and adjoining Johore territory, so that the finding of it on Gunong Pulai only extends the range in a measure within expectation.

The raceme of this plant of G. Pulai is 5 cm. long and 9-flowered. The bracts are obovate and at flowering reflexed on to the axis: they are large concave and light green. The sepals and petals are light-yellowish green, not white as is said of the type-plant from Singapore. The dorsal sepal is obovate, obtuse, 9 mm. long: the lateral deltoid-falcate as long: the petals broadly lanceolate obtuse a trifle shorter. The lip is 12 mm. long, very markedly three lobed at the middle and at the base of the side lobes has two lateral warts extended back into crests and one median smaller wart, slightly extended back in a crest, and prolonged forward into a low ridge which runs the length of the mid-lobe: the side lobes stand almost as side walls to the entrance of the flower and are flushed from the tip down with salmon-pink: the mid-lobe is a bright lemon yellow with two grooves down it one on each side of the ridge above mentioned: it is directed obliquely downwards. There is honey; and it has a pleasant faint scent.

The Flowering of Bulbophyllum pustulatum, Ridl.

I received recently from Mr. P. Feddersen a plant of this *Bulbophyllum* with two buds upon it; and I interested myself in observing their expansion. The buds arose from the bases of the lowest two leaf-carrying pseudobulbs, and they flowered one day apart, in the order of their position. The opening of the flower commenced in the afternoon. At noon upon the next day these were as drawn, below, that is to say not yet fully expanded.



Half expanded flowers of *Bulbophyllum pustulatum*, x½.

Full expansion was attained only upon the morning of the third day, and in the afternoon of the same day they began to wither, unfertilised.

The colour is a rather dark amber with crimson veins inside which show translucently through to the outer side, and with a deep crimson fleshy hinged lip, designed to fall forward when an insect alights upon it, thrusting the insect's head against the stigma and the pollinia for the purpose of pollination. The spurs of the

column are light amber, transparent and very firm. The foot is crimson and carries streaks of nectar. The lip has auricles and is hairy below: above it is slightly pitted marginally and with three shallow impressions as the drawing shows upon its face. The crimson sap does not extend through its flesh.

The lip in its natural position: and on the right the pollen masses.

CYMBIDIUM LANCIFOLIUM Hook. in PENANG.

This widely distributed orchid is rare in the Malay Peninsula; and on that account the discovery of it upon Tiger Hill, Penang, by Dr. J. S. Rose and Mr. Mohamed Haniff, is of interest. The species extends from India to Japan, and southwards to Java. In the Peninsula it has been collected on G. Bujong Malaka in the Main range, and on Bukit Sedanan in Malacca and near Nyalas, which are places between the southern termination of the Range and Mt. Ophir.

COELOGYNE CYMBIDIOIDES, Ridl.

This orchid was described by Mr. H. N. Ridley (Jour. Linn. Soc. Lond. Bot., xxxviii, p. 329) from dried herbarium specimens collected by Mr. H. C. Robinson upon Gunong Tahan between 3,000 and 6,000 ft. Its flower is figured here from a living plant brought into the Singapore Gardens by Mr. Mohamed Haniff. The colour is cream and chocolate.

It is one of three Coelogynes of close affinity; viz. *C. dayana*, Reichb. f., *C. densiflora* Ridl., and this. Of the three the first is the most widely distributed, occurring in the Peninsula and in Borneo: in the Peninsula upon the Taiping Hills and on G. Bubu; on the Main range near the Semangkok pass; on Benom; and again on Mt. Ophir. *C. densiflora* occurs on Bukit Etam, and *C. cymbidioides* on G. Tahan. It is a legitimate view to take that the second and the third are subspecies emerging from the more wide *C. dayana*.

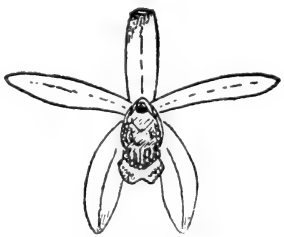
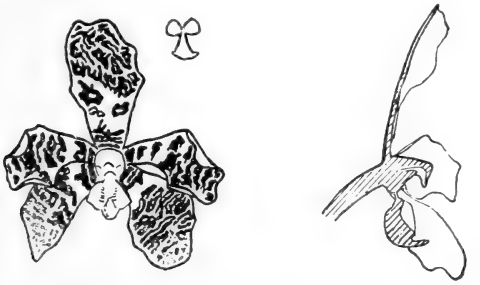


Figure of the flower of *C.cymbidioides*, x½

ARACHNIS BREVISCAPA, J. J. Sm.

The two following drawings represent the flower of *Arachnis breviscapa*, J. J. Sm. (Arachnanthe breviscapa, *J. J. Sm.* or

Vandopsis breviscapa, *Schlechter*) an orchid from Sarawak, which flowers in the Botanic Gardens in April. The colour is mustard yellow with umber markings; the lip has umber lines on it and is white at the tip.



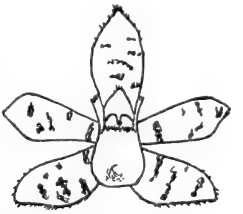
Flower of *Arachnis breviscapa*, in face view and in section, x½.

ASCOCHILUS HIRSUTUS, Ridl., var PORPHYROCHLAMYS.

A pleasing little orchid has recently flowered in the Botanic Gardens, Singapore, which without doubt is to be assigned to *Sarcochilus hirsutus*, Hook. f. (Fl. Brit. Ind., VI, p. 38, and Ann. Roy. Bot. Garden Calcutta, V, p. 44, pl. 67); but having certain peculiarities not found in the type, it is here described as a variety under the name *porphyrochlamys*. Mr. Ridley (Mat. Fl. Malay Peninsula, Monocotyledons, I, p. 179) transferred *Sarcochilus hirsutus* to the genus *Ascochilus* as *A. hirsutus*.

The plant which flowered in Singapore is of uncertain origin.

Its stems ascend obliquely and the solitary inflorescences arise from the axils of lower leaves about to die, standing nearly horizontally, and bearing the flowers in a corymb facing forwards. This means that the twist upon the ovary and pedicel varies in the different flowers. The flowers produced were up to 10 in number, pleasantly fragrant and lasted about four days. They expanded widely as here drawn.



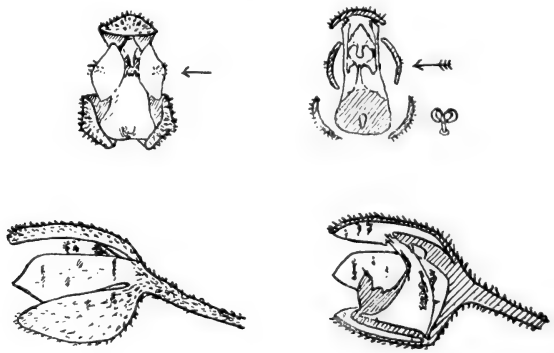
Expanded flower of *Ascochilus hirsutus*, nat size.

The details of the flower are not exactly as in Sir Joseph Hooker's description and drawings; but then he apologises for his work in the following words "Described from the drawing and a very few detached flowers in a very bad state, contained in an attached pocket. The analysis of the lip of the latter was most

difficult and, though conducted with extreme care, I cannot vouch for its perfect accuracy." According to Sir Joseph Hooker's descriptions, the type and this variety differ in the following points:—

Type.	Var porphyrochlamys.
Leaves apparently flaccid and probably drooping	Leaves firm and horizontal on either side of the obliquely ascending stem
Peduncles green suberect	Peduncles purple horizontal
Flowers 2/3 in.	Flowers 1 inch
Dorsal sepal apiculate	Dorsal sepal obtuse
Lip...claw dilating into a cup-like spur:	Lip...claw not dilated into a cup-like spur:
side-lobes or arms of the hypochil wing-like:	side-lobes narrow falcate, even-edged to the toothed apex:
point of spur drawn as elongated.	point of spur very short.

The drawings to which Sir Joseph Hooker referred are those of Kunstler, whose locality is given loosely as "Perak." In the Singapore Herbarium is a drawing of the species made by C. Curtis and localised as from Telok Anson "came with *Phalaenopsis violacea*." It seems that the plant flowered in the Waterfall Gardens. From this source came Mr. Ridley's description in his Materials. The drawing represents the spur at the apex of the labellum as elongated somewhat; and in this respect the plant is as Kunstler's and not as in the var. *porphyrochlamys*. Mr. Curtis represents the hairs on the outside of the flower as reddish purple.



Flower of *Ascochilus hirsutus* expanding.
The same in section; the arrow points to frilled edge of the callus.
Flower of *Ascochilus hirsutus* from the side before expansion.
The same in section.

A New Orchid—Saccolabium crucicallus.

Saccolabium crucicallus is a species brought by Mr. Mahomed Haniff into the Waterfall Gardens, Penang, from Pungah in Lower Siam. It belongs to the section Teretifoliae and suggests the Perak *S. Kunstleri*, Ridl., but in flower is manifestly distinct. It suggests also *S. luisifolium*, Ridl. from Lower Siam.

Saccolabium crucicallus. *Planta* epiphytica. *Caulis* elongatus, pensilis, viridi-purpurascens, 5 mm. crassus, internodiis c. 2 cm. longis. *Folia* teretia, ut cauli 5 mm. crassa, aliquo modo recurvata, minopere versus apicem obtusum contracta, viridia vel purpurascentes, ad 14 cm. longa. *Racemi* ex caule ad latera foliorum enascentes, a caule basi divergentes deindedeflexi versus terram prorsi, ad 15 cm. longi, 25-flori; axis angulatus: pedicelli cum ovariis horizontales, lutescentes. *Sepala* purpureo-brunnea, obtusissima, 4 mm. longa, 2 mm. lata, dorsale quadrato-ovatum; lateralia oblique quadrato-ovata. *Petala* sepalis concoloria, linearia-acuta, 3 mm. longa, 1 mm. lata explanata. *Labellum* cremeum nisi in lobis basalibus ubi luteum; lobi basales rotundati, omnino inflexi; lobi apicales ovati carnosiusculi ad medium inflexi; lobus medius in parte apicali horizontalis, latissime ovatus, obtusus: calcar ob callo cruciformi in ore fere clausum, intra dorso cristatum, lateribus crassum, mellifer, callo in ramo infimo paullulu hirsuto. *Gynostemium* anguste cithariforme, luteum.

Floret mense Septembris in Horto Botanico Penangensi: habitat in collibus prope Pungah, Siam inferioris, *Mohamed Haniff*.

Flower of *Saccolabium crucicallus*, x 2, and the cross shaped callus still more enlarged. W. is the wall of the spur and the arrow indicates the approach to the honey.

Stems more or less pendulous green, but developing a purplish pigment on the exposed side which confused in the eye with the green looks purplish brown, about 5 mm. thick. Leaves about 2 cm. apart, up to 14 cm. long terete as thick as the stem, recurved slightly, in a very slight degree tapered just below the blunt apex, with a little of the purple pigment in them where exposed. Raceme from the side of the leaf, about 15 cm. long and 25-flowered, directed earthwards except in the first few cm. which carry it out from the stem, angled. Pedicels and ovary (at flowering indistinguishable) about 1 cm. long at right angles to the axis yellowish with a few minute purplish markings.

Sepals purplish brown squarely ovate, except for a very slight obliquity in the lateral sepals all three equal, very blunt 4 mm.

long by 2 mm. wide. Lateral petals of the same colour as the sepals linear acute 3 mm. long by 1 mm. wide, standing in the same plane as the sepals *i.e.* at right angle to the ovary. Labellum cream-coloured with bright yellow on the lower of the two pairs of lateral lobes, with a blunt spur 2 mm. long and very faintly bilobed this spur nearly parallel to the ovary and so horizontal. Side lobes bifid, the upper of the two divisions thin circular bent in over the entrances to the spur: the lower of the two pairs ovate slightly fleshy and at first directed forward, but then equally bent in: the mid lobe directed forward very broadly ovate oblate obtuse: interior of the spur with from above a cross-shaped callus hollowed between the points and just hairy upon the lowest point, and from below a curved ridge which impinges upon the back of the callus, while the wall of the spur thickened at either side (W in figure) closes any approach to the honey under the callus. The approach to the abundant honey is thus over the lateral arms of the cross and therefore above the lateral lobes of the lip. An arrow indicates it.

Column yellow slightly fiddleshaped presenting a very slightly hollowed face forwards.

I. H. Burkill.

HAPLOCHOREMA SUMATRANUM.

The late Dr. Karl Schumann defined in 1899 a genus Haplochorema, with then four species from Borneo, to which he added two more from the same island in 1900. He remarked that its affinity was close with *Kaempferia,* but that by having an unilocular ovary, it appeared sharply distinguished from this and from all other genera of the Zingiberaceae to which it belongs. If the character drawn from the ovary holds good then a Sumatran plant now in cultivation in the Botanic Gardens, Singapore, is also a Haplochorema: but it suggests *Gastrochilus* more than *Kaempferia.* The ovary of all the species in these three genera should be examined afresh to decide how they differ and are to be distinguished.

Dr. T. Valeton has already questioned the soundness of Karl Schumann's judgment in regard to an unicellular ovary in a few Zingberaceae marking them off as a genus, and in the *Bulletin du Jardin Botanique de Buitenzorg,* series 2, No. 27, 1918, p. 115, has reminded us that *Curcuma Kunstleri,* Baker, may possess one as an abnormality.

The following is a description of this new Haplochorema.

Haplochorema sumatranum. *Herba* pedalis et ultra, sylvicola. *Rhizoma* breve. *Folia* disticha, 2—4 supra vaginas duas: petiolus ad 12 cm. longus, in dimidio inferiore vaginatus, vaginorum apicibus lanceolatis mox emortuis: lamina late elliptica, apice et basi acuta, araneoso-hirsuta, ad 30 cm. longa, ad 15 cm. lata. *Racemus* 3—5-florus: flores invicem exserti singuli, bracteis

transparentibus cincti, apicibus bractearum brunneo-lineatis. *Sepala* albotransparentia, 1.5 cm. longa. *Corollae* tubus 6—7 cm. longus, albus; petala acuta, inaequalia; dorsale majus anguste triangulari-ovatum, 1.2 cm. longum; lateralia triangulari-lanceolata, 1.4 cm. longa. *Labellum* 1.5 cm., 0.8 cm. latum, basi album, vix bilobatum sed subrotundatum, apice luteum, in medio linea scalariformi notatum. *Staminodia* alba, 1 cm. longa, obovata, apice rotundata. *Staminis* connectivum crista luteo-tincta, dentibus 2—4 parvis latis coronatum; anthera apices deflexi, granas pollinis extendantes. *Ovarium* 6—8-ovulatum; ovula ex basi orta; stigmatis os despiciens.

Habitat in sylvis montis Bukit kramat kuda, prope Sinolangit, in Sumatra: collegit Mohamed Nur sub numero 7258. Colitur in Horto botanico Singapurense.

The flowers of this small herb are not conspicuous; they are produced one at a time close to the ground under the leaves, the bases of the lamina of which they scarcely attain. The raceme is not distichous as are the leaves, but shows an arrangement in three stichies. The ovary is sessile among the transparent bracts, and possesses upwards of eight ascending ovules in its single cavity. The corolla-tube is very long and slender, reaching 7 cm., white, and of the same thickness throughout. The petals are not quite equal, the upper which is inclined to arch over being largest while the other two which lie close together are quite behind the labellum. The labellum is large, and only just bifid at the very tip; in the basal half it is white with a brown ladder-like double stripe down the mid-line not extending into the throat, and in the apical portion it is chrome yellow. The staminodes are white. The connective is bent upon the filament at an angle of 45 degrees; it is crested above by reason of four small teeth.

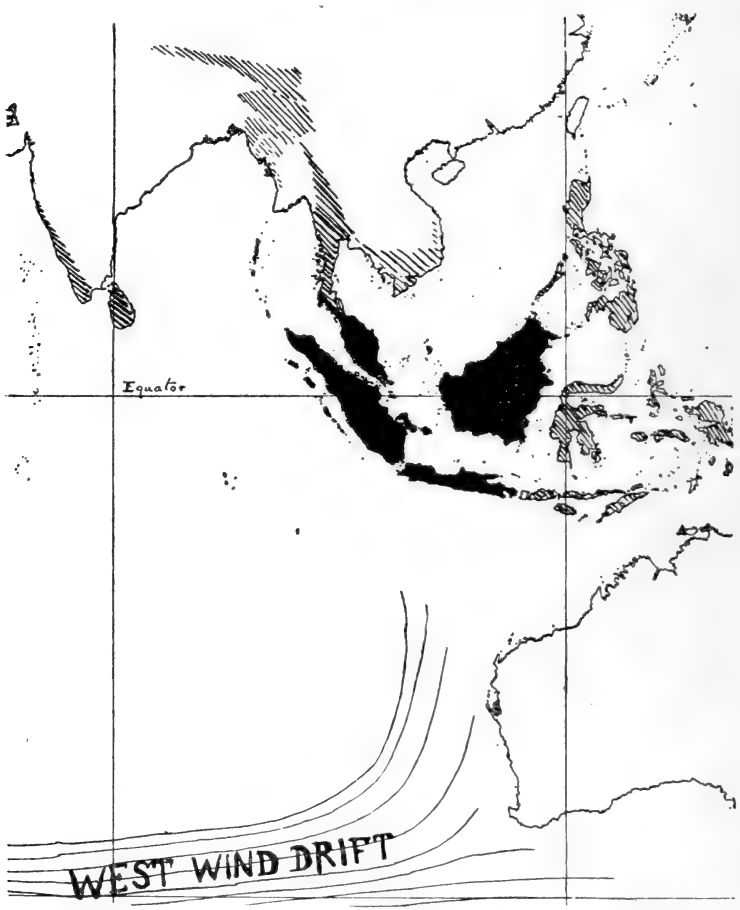
I. H. Burkill.

A BOTANICAL RECONNAISSANCE UPON THE MAIN RANGE OF THE PENINSULA AT FRASER HILL.

These pages are written under the belief that the following more or less accurately represents the history of the warmth and moisture loving flora of the Malay Archipelago from the Miocene period.

In the Miocene there was a time, or there were times, when very humid conditions prevailed right from the westernmost limits of the Indian Ocean to the Pacific. So long as they prevailed it was possible for plants which can only exist under such conditions, namely the components of a tropical rain forest, to spread through the lands between Africa and the neighbourhood of say New Guinea. But there intruded into this warm and moist climate

drier conditions spreading from the west, which on reaching the Arabian Sea cut off that part of the tropical rain forest flora which is now left in the Mascarene Islands, and on reaching the bay of



Map showing present position of the west wind drift and cold ocean current, causing dry climate in Western Australia. Western Malaysia is shown black, and other areas of tropical rain forest shaded.

Bengal cut off the tropical rain forest flora of Ceylon and South India; and then impinged upon a rain forest belt extending from Malaysia northwards to the region of the eastern Himalaya, but never so strongly as to break it down. From the dates of the stages of the eastward advance of dry conditions the three rain forest floras, (1) of Mascarenia, (2) of Ceylon and South India, (3) of Malaysia, with Burma, etc. remained isolated, and evolved independently. About the period when the extension of the dry conditions had become complete, it appears probable that the cold West-wind drift (vide map), which surrenders so little moisture

to the winds that blow upon Western Australia, reached the outer shores of Malaysia more distinctly than it does now, and rendered dry their face towards the Indian Ocean in a measure sufficient for an extension of certain dry-climate plants to Australia. During this extension, the rain forest flora would be at bay in the centre of the archipelago. But a recovery from this extreme soon coming, the rain forest flora spread back to the shores of the Indian Ocean, first reaching it where the west wind drift would be weakest, that is to say along the shores of Sumatra, and subsequently following the retreat of the cold current eastward into Java, and onward.

Within the Archipelago complicated orographic changes helped or hindered in various ways the recovery by the tropical rain forest of mastery; and it is for the present generation of naturalists to gather together the geographic and geologic details, which alone can lead to an understanding of the course of events. Much has been written, all of it subject still to criticism, and especially because most of the writers have neglected the possibility of climatic changes, in their effort to explain the peculiarities of the dispersal of living things by land changes: but this is certain, that at present what is here defined as Western Malaysia (see the map) holds the most intense rain forest flora of the old world—a flora which on that account must be considered to have had the least chequered history. It has produced in itself, in a greater measure than any other Old World flora, forests of lofty trees, with an abundance of epiphytes and a wealth of ground plants physiologically fitted to exist in deep and moist shade; and therefore has great claims on the attention of naturalists, because it demonstrates that there has been a nucleus of constant climate within the Malay Archipelago, though not by any means of necessity throughout it.

More than twenty years ago, Dr. O. Stapf called attention to the appearance that Borneo holds as it were a nucleus of the peculiar Malaysian flora. This would happen as a consequence of Borneo holding its least interrupted developments and is understandable upon the theory that the outer shores of the Archipelago were once dried by the greater volume of cold water in that northward branch of the west wind drift current which still affects southeastern Malaysia somewhat.

There are good reasons for thinking that the cold of the Glacial period did not alter the temperatures of the Equator, though greatly compressing the warm temperate and subtropical belts of the Globe. The seas of the Tropics fell, in consequence of the great volumes of water withdrawn and converted into ice caps at the poles, which ice caps again acting through gravity further lowered tropical sea-levels, a condition adding island to island in a region such as Malaysia where the seas are shallow.*

*The increase of land area in arctic and probably also in antarctic regions during the glacial period would, however, most probably have tended to a decrease of land area in the tropics, this effect counteracting that of the accumulation of ice at the poles (see C. E. P. Brooks, "*Evolution of Climate*", 1922.)

These land unions may be considered as furthering the spread of the rain forest flora after the dry conditions of the outer coast had given way.

In the mountains of southern India and of Ceylon herbs occur of northern genera, and undoubtedly of northern origin. It is possible to believe that the Glacial period gave to most of those in southern India the opportunity which brought them where they are: but as regards those in Ceylon the view which is most acceptable is one which would allow them to have reached the peaks of that island as other plants have undoubtedly reached Oceanic islands, namely by the success now and then of a random shot. And the same supposition is at present the most tenable one for the explanation of the existence of a few truly northern genera (all herbs) upon the mountains of Malaysia. We believe then in a very long continuation of warm and moist conditions within the Malay Archipelago, unbroken over part of it, and that part central, but probably broken at one time on the periphery.

Holding that view, and finding it possible to put a part of it to a test in paying a short visit to some part of the Malay Peninsula we selected for our work the new hill-station of Fraser Hill in Lat. 3° 42′ N. Long. 101° 44′ E. We spent at it the second half of September, 1922, attempting to study the vegetation in the broadest way; and we collected all groups of plants. We were helped in this by Mr. G. S. Neal of the Forest Service, who, with two Malays, was sent most kindly by that Department to assist us. One of us (I.H.B.) has determined the collection of Seed-plants, the other (R.E.H.) has determined the ferns, and is responsible for the naming of the plants of lower position through specialists. We do not in this report enumerate anything below the mosses: but as Mr. H. N. Dixon has most kindly sent his determinations of them, they and their distribution are included. Mr. Ridley's Flora of the Malay Peninsula arrived in the Colony too late for use in the preparation of this report.

We selected Fraser Hill for our work because new roads and paths have made the forest particularly accessible, a new map has fixed the altitudes accurately, and not a little felling has brought the top of the forest within the possibility of investigation. It obviously promised more rapid results than any other place that was open to us.

Fraser Hill occupies the very summit of the Main Range on the Selangor-Pahang boundary. It is not virgin ground, which indeed was an advantage to us, for Mr. C. C. Curtis collected in the neighbourhood, and Mr. H. N. Ridley subsequently visited it twice: the Hon. Mr. C. Hose, Mrs. Ferguson-Davie and Mr. G. E. S. Cubitt also had collected a few plants there between 1919 and our visit; and Mrs. Smith of Bangkok collected ferns in June 1922. Mr. Ridley has described the new species which he got at Fraser Hill as from Sempang mines. These mines, existing as mines no longer, were under a hill whereon a Mr. Fraser built himself a

house, and the hill was called Bukit Fraser. When it was decided to develop a hill-station around this house, several other hill-tops being taken into the area, the name Bukit Fraser or Fraser's hill became no longer accurately descriptive: and we have followed the Ordnance Survey's map by calling it instead "Fraser Hill" as if an English township: by this name we mean all the land above 4,000 ft. which has been allotted for development as circumstances permit into a residential place.

The ridges may be described as three, called the North ridge, the South ridge and the Reservoir ridge, the second and the third being parts of the waterparting 4,289 and 4,370 ft. high respectively: the remaining one is entirely on the Pahang side of the division, and reaches 4,286 ft. while South summits on the same side of the waterparting reaches 4,360 ft. A line of vein-quartz extends under parts of the second and third, and while responsible for the resistance to aerial denudation which has made the two ridges, is also responsible for a change in the flora marked enough to carry peculiar species. There is vein-quartz elsewhere, but not so much in evidence, and under the upper end of North ridge appears a thin wall of quartzite.

About Fraser Hill the crests of the Main range are twisted out of the approximate north-and-south line of the range to be nearly east-and-west. That is how Fraser Hill possesses a "north ridge" entirely in Pahang. Westward from Reservoir ridge reaching 4,370 ft., with many serrations, the range attains 4,800 ft. in Pine-tree hill (so misnamed from the Dacrydiums upon it) and bending a little north successively there is the Gunong Semangkok of the maps (5,600 ft.) and the twin peaks of G. Ulu Liang (6,335 and 6,360 ft.) In the other direction the range falls to the Semangkok pass, where the Gap resthouse is situated at 2,790 ft., and rises very abruptly to a Trigonometrical station at 3,883 ft.,* (which appears to be the "G. Semangkok" of Mr. Ridley in his descriptions of plants) and with serrations to G. Ulu Semangkok (4,576 ft.), south of which is G. Ulu Kali (5,812 ft.), and then comes G. Mengkuang lebar, collected over by Mr. H. C. Robinson, the land falling to the Ginting Sempah pass.

We visited Pine-tree hill and a spot a couple of miles short of the Trigonometrical Survey's post on G. Ulu Semangkok.

The drainage from a large part of Fraser Hill runs down a valley toward Tras,—the Tras stream,—and from the immediate neighbourhood of Fraser's house this valley has been much mined for tin. We descended it to 3,300 ft.

It will be found quite clear in the following pages whether we collected the plants we name beyond the limits of Fraser Hill towards Pine-tree hill, or below the 4,000 ft. contour line either

*For some of the unpublished altitudes we record our best thanks to Mr. V. A. Lowinger, the Surveyor General.

towards the Gap or in the upper Tras valley or south-east of the Gap towards G. Ulu Semangkok: and we count no locality below 4,000 ft. as Fraser Hill.

The normal vegetation of Fraser Hill is forest and this we shall describe. A second form of vegetation is that which the steep hill sides, by reason of landslides, maintain: places in the sun being thus afforded to plants of small growth. Man by mining has destroyed the forest not a little, and into the bared places, the landslide vegetation is able to step; but in the wake of man follow many plants which would not seem to be part of the landslide flora: and the mining has been of long enough duration to have given them a good hold. The making of roads of course has exactly the same effect as the mining. These three elements, then, we distinguish on the face of the land,—the forest, on the one hand, and upon the other the landslide plants with the followers of man.

There have been periods in the history of the every part of the globe, when mountain-building was more active in it than now; and these would be periods of steeper slopes and numerous repeated landslides(yet the hill-sides of the Malay Peninsula are still very steep) ; and in such periods there would be a great opportunity for the development of species suited to such a peculiar condition. We are bound to believe that it has occurred; *Calanthe aurea, Rubus rosaefolius, Litsea citrata, Homalanthus populneus* are plants holding their places in the hills by landslides. *Pteridium aquilinum, Histiopteris incisa, Dipteris conjugata, Hypolepis tenuifolia* and probably the Gleichenias are ferns belonging to this group of plants.

The miners of Fraser Hill formerly had but narrow steep paths for their traffic: but now the station is reached by bullock carts and upon the roads one sees the process of introduction of weeds through bullock droppings: thus the droppings lying upon the bare roads carry grasses, notably *Eleusine indica* and in the second degree *Fimbristylis diphylla*. By their absence away from the droppings it is to be concluded that casual seeds of these upon bare landslide surfaces would have but a poor chance of survival.

The forest of the Main range in the Semangkok pass we consider changes at about 3,300 ft. There the Dipterocarps disappear and the depth of the vegetation is reduced from 200 ft. to 100 ft. Close to the elevation at which the Dipterocarps vanish, Arenga disappears, and Pandanus also. Upon the ridges above 4,000 ft. the big trees are about 100 ft. high. We roughly measured eighty-two on the North, South and Reservoir ridges, as given in the following table, taping the bole at breast height, but judging the other dimensions by eye with the help of a rod laid against the lower part of the bole. We measured all trees in the selected places that appeared to be upwards of five feet in girth, our malay assistants naming them: and we consider that we obtained the height of the forest in this way with a fair measure of accuracy. All measurements are expressed in feet.

TABLE I.

The Size of Trees at Fraser Hill.

Malay name and probable genus	No. of trees	limit of girth	limit of bole	limit of total height	limit of spread of longest branch
Kadondong (*Canarium*)	31	4.5-11.5	35-75	65-105	15-40
Nyatoh (*Payena*)	11	4.5-13	25-65	65-100	15-20
Mempuning (*Quercus*)	7	4.5-8	45-70	75-100	15-30
Kelat (*Eugenia*)	9	4.5-6.5	35-70	60-90	15-30
Rengas (*Gluta*)	5	5-10	40-60	80-100	15-25
Bintangor (*Calophyllum*)	2	5-6	65-70	85-90	20
Meragu	2	4-8	40-45	75-85	20-30
Medang (? *Phoebe*)	2	4.5-5	55-65	80-85	15-20
Penaga betul (*Calophyllum*)	1	8	55	85	30
Samok (*Eugenia*)	1	6.5	40	65	40
Ludai	1	6	20	85	20
Kadondong mata-hari (? *Trigonochlamys*)	1	5.5	25	70	20
Plangi	1	5.5	60	95	20
Kulim burong	1	5.5	60	85	25
Kayu kuning	1	5.5	60	80	20
Tampoi (? *Baccaurea*)	1	5	45	85	30
Kumala	1	4.5	60	90	35
Pelit	1	4.5	55	70	15
Pulangdaing	1	4.5	30	80	20
Kunkur	1	3.5	70	80	10
Putat (*Barringtonia*)	1	3.5	60	80	20

It is a very noteworthy fact that the big trees are upon the tops of the ridges; down their slopes, while there are more trees

to the acre than above, on the average they are smaller. Though not quite certain of the cause of this, we believe that it is a consequence of horizontal light passing under the crowns and making the conditions easier for the lesser growth, which so favoured in the air handicaps in the soil the competitors which might become of larger growth.

From the eighty to one-hundred feet high forest of Fraser Hill, if we ascend, as we do in the direction of Pine-tree hill, we get into forest fifty feet high, and then into forest twenty-feet high. Doubtless on G. Ulu Liang at the height of a further thousand feet, this reduction in depth would bring us to the real Elfin forest of our highest mountains: but we did not approach it at all. The vegetation of the summit of Pine-tree hill is of trees of Dacrydium Beccarii about twenty feet high, and of Rhododendrons and Vacciniums not taller.

Before passing on from the matter of the depth of the forest, it may be said that by means of Negretti and Zambra's dendrometer we measured some of the lofty trees at 3,300 ft. and below and found a lofty Shorea with a bole of 17 ft. in girth to reach 200 ft.

The tall forest, of course, holds more than one height of tree. On slopes it is not layered, but on the tops of the ridges the big trees with crowns 20-40 feet across (see the table above) shut out light enough to make it necessary for light-diffusion spaces to exist, whereunder a new layer of foliage can develop. The forest that is 50 feet high exhibits no layers.

About Fraser Hill there is no mossy forest: it is necessary to ascend higher for it. One of us spent a week in May, 1922, on G. Gedeh in Java at 4,500 feet, finding the climate there, height for height, colder and the forest more mossy. It is very probable that the air currents which sweep down the sides of G. Gedeh from anything up to 9,000 feet account for this: and there are no heights over Fraser Hill to supply cold down-draughts. The higher mountains further north were frequently observed to be covered with cloud when Fraser Hill was free from it (G. Ulu Liang is reputed to be very wet) and this more constant saturation of the atmosphere is no doubt necessary for the maintenance of mossy forest. However, the more one ascends from the height of Fraser Hill in the direction of Pine-tree hill, the more mossy becomes the forest and the deeper the layer of raw spongy humus upon it, until the latter is eighteen inches thick. In this mossy layer *Calanthe angustifolia, Burmannia longifolia, Sonerila rudis, S. velutina, Argostemma Yappii* find themselves particularly at home.

Pine-tree hill is about 4,800 feet high. It is evident that a flora of another type replaces the typical Fraser Hill forest there, and this one observation suggests that the type of vegetation which we have said commenced about 3,300 feet, gives way about 4,800

feet. The conclusion wants confirmation. In this replacing vegetation, because the trees are of lesser size than at lower levels, except for the interference of cloud, more sunlight is able to reach the ground. The vegetation which uses this sunlight is only in a small measure of phanerogamic herbs, apparently because of the acidity of the mossy raw humus on the surface of the soil.

There is no light-diffusion space in the mossy forest, and the small trees are very crowded. Upon the tops of the ridges of Fraser Hill there is however a somewhat imperfect light-diffusion space with the branches of the trees above it and with small to four feet high plants below it such as: *Polygala venenosa, Pterisanthes pulchra, Blastus cogniauxii, Sonerila rudis, S. albiflora, S. integrifolia, Phyllagathis hispida, Begonia tricornis, Begonia sp., Argostemma Yappii, A. urticaefolium, A. spinulosum, A. involucratum, Gardenia pulchella, Chasalia rostrata, C. lurida, Cephaelis* ? spp., *Pentaphragma Scortechinii, Labisia pumila, L. longistyla, Ardisia Maingayi, Didymocarpus flavescens, D. hirta, D. malayana, D. platypus, D. quinquevulnera, D. crinita, D. venusta, D. pumila, Strobilanthes hirtisepalus, Filetia hirta, F. paniculata, Justicia subalternans, Gomphostemma* sp., *Piper stylosum, P. semangkoanum, C. brachystachys, Balanophora multibracteata, Burmannia iongifolia, Liparis* sp., *Calanthe angustifolia, Anoectochilus Reinwardtii, Anoectochilus* sp., *Cryptostylis arachnites, Globba aurantiaca, G. cernua, Camptandra ovata, Zingiber spectabile, Zingiber gracile, Zingiber Griffithii, Alpinia petiolata, Geostachys secunda, Curculigo latifolia, Tacca cristata, Pinanga polymorpha, Pinanga paradoxa, Licuala pusilla, Forrestia gracilis, Arisaema Scortechinii, Amorphophallus* sp., *A. Lowii, Lephatherum gracile, Lindsaya orbiculata, L. decomposita, Trichomanes rigida, T. pluma, Diplazium bantamense, D. sylvaticum, D. tomentosum, D. fraxinifolium, Asplenium tenerum, Dryopteris crassifolia, D. calcarata, D. parasitica, Phegopteris laserpitiifolia, Taenitis blechnoides, Cheiropleuria bicuspis, Selaginella atroviridis, S. Wallichii.*

Equally under dense shade, but requiring running water, or an unusual amount of it, with good soil, are: *Impatiens oncidioides, Ophiorrhiza erubescens, Cyrtandra pilosa, Phaius callosus, Alocasia Beccarii* and *Schismatoglottis* sp.

This assemblage of small plants contains a very large percentage of seed-plants with a restricted distribution. Of the 70, 44 or 63 per cent. are confined to the Malay Peninsula and a further 13, making in all 57, or 84 per cent. do not pass out of what is here called western Malaysia. This is a greater percentage of endemism than in the overshadowing trees and shrubs, but not greater than among epiphytes, nor among giant herbs.

The overshadowing trees and shrubs number 105 and of them 60, or 57 per cent. are confined to the Malay Peninsula, and another 26, making in all 83, or 82 per cent. do not extend beyond western Malaysia.

The climbers which climb these forest trees are 28 in number, and of them 12, or 43 per cent, are endemic, while a further 10, or 22 in all, making 79 per cent, do not pass beyond western Malaysia. The figures will be found in Table II.

The wide-spread seed-plants of the forest-floor flora are: *Chasalia lurida, Chloranthus brachystachys, Crypstostylis arachnites, Panicum indicum* and *Lephatherum gracile*,—plants which do what no epiphyte does, namely spread from Ceylon to Malaysia, but with a broken distribution in almost every case.

The following are the Fraser Hill species which have an extension from western Malaysia into eastern Malaysia in varying degrees, without extending into Australia nor into the Pacific:

(forestal species)

Anoectochilus Reinwardtii reaches Amboina: *Memecylon myrsinoides* reaches Celebes; *Polygala venenosa, Xanthophyllum excelsum, Urophyllum glabrum, Quercus cyrtorrhyncha, Engelhardtia spicata, Dacrydium falciforme, Liparis compressa*, and *Eria major* reach the Philippines: and *Burmannia longifolia* reaches New Guinea;

(species of the open)

Joinvillea borneensis reaches Palawan only, and *Spathoglottis aurea* reaches Celebes. *Spathoglottis plicata* and *Gannia javanica* from western Malaysia reach Samoa and Fiji respectively.

The following species occur in Tenasserim or the Andamans and thence south and east into Malaysia but in no case through it to Australia, nor into the Pacific:

(forestal plants)

Limacia triandra, Leptonychia heteroclita, Schima Noronhae, Adinandra dumosa, Vitis mollissima, Arthrophyllum diversifolium, Rhodamnia trinervia, Elytranthe formosa, Eria floribunda, Curculigo latifolia, Tacca cristata and *Anadendron montanum.*

(plants of the open)

Elaeocarpus gambir, Daphne composita and *Glochidion coronatum.*

There are a few interesting plants with a distribution in the direction of Indo-China and China. They are (1) reaching Indo-China *Illicium cambodianum, Labisia pumila*, and *Dacrydium elatum*: and (2) reaching China, *Gynura bicolor* and *Smilax laevis.*

The following have an extension of range northward to the eastern Himalaya: (all forestal, except *Jussieua, Pratia* and *Blumea*) *Jussieua fissendrocarpa, Randia racemosa, Ophiorrhiza erubescens, Blumea balsamifera, Pratia begonifolia, Ardisia colorata, Loranthus pentapetalus, L. coccineus, Elytranthe globosa, Conocephalus suaveolens, Ficus rostrata, Podocarpus neriifolius.* Out of these *Randia* extends to Australia, the *Podocarpus* to New Guinea; *Loranthus pentapetalus* and *Conocephalus suaveolens* to the Philippine Islands; the others not passing beyond western Malaysia in an eastward direction.

The following occur in Ceylon or Southern India and two reach the Seychelle islands:—

(forestal)

Melastoma malabathricum Eugenia zeylanica, Psychotria sarmentosa, Chasalia lurida, Vernonia arborea, Gaertnera Koenigii, Uncaria dasyoneura, Chloranthus brachystachys, Cryptostylis arachnites, Panicum indicum, Lophatherum gracile

(of open places)

Vitis trifolia, Pithecolobium angulatum, Drymaria cordata, Rubus rosaefolius, Trichosanthes bractescens, Embelia Ribes, Polygonum chinense, Litsea citrata, Homalanthus populneus (doubtful), *Trema orientalis.*

Of these two reach Australia, four eastern Malaysia, and the other two do not pass beyond western Malaysia.

Of the ferns nearly 50% reach Ceylon and nearly 20% reach the Mascarenes.

There remain 19 pantropic plants and everyone of them is a plant of the open. All of them are foreign to the flora of Fraser Hill, being intruders following man: and it will scarcely be necessary in this place to name them. Fourteen ferns are pantropical, six of these being plants of the open.

It is convenient to name here, before passing on, the few plants which we found above Fraser Hill and not at it: they are, *Polyalthia pulchra* which is endemic, an *Eugenia* which appears to be endemic, *Sonerila tenuifolia*, which occurs in Sumatra, Java and Borneo, *S. velutina, Webera salicina* and *Pentapterygium Scortchinii*, all three being endemic, *Diplycosia latifolia* which occurs in Sumatra, a *Diplycosia* and *Dischidia albida,* which are endemic, an *Antidesma* unmatched and possibly endemic, *Dacrydium Beccarii* which occurs in Borneo and in Mindoro, and lastly *Agrostophyllum bicuspidatum,* an orchid whose absence at Fraser Hill is improbable as it occurs from Tenasserim through the Peninsula to Java and to Celebes. Eight out of twelve are endemic species. Three of them are genuine xerophytes, *i.e. Dacrydium Beccarii* and the two species of *Diplycosia.*

The next statement gives the distribution, as known, of those species which are confined to western Malaysia, but not endemic in the Peninsula:—

reaching Lingga only, 1 species,
reaching Bancka only, 1 species,
reaching Sumatra only, 13 species,
reaching Borneo only, 11 species,
reaching Java only, 7 species,
reaching Java and Sumatra, 8 species,
reaching Borneo and Sumatra, 11 species,
reaching Borneo and Java, 5 species.
reaching Sumatra, Java and Borneo, 14 species;

this makes 46 as common to the Peninsula and Sumatra, 36 as common to the Peninsula and Borneo; and 34 common to the

Peninsula and Java: but it is certain that as Sumatra and Borneo become better known the number of plants common to either of them and to the Peninsula, will increase and greatly out-distance the number that are common to Java and the Peninsula.

TABLE II.

Distribution of Species.

	Confined within the Peninsula.	Extending to Islands of Western Malaysia.	Extending to the Pacific.	Extending to Tenasserim and the Pacific.	Extending to the Himalaya, China and the Pacific.	Extending to Ceylon or Masearenia and the Pacific.	Without bounds in the tropics.	TOTAL.
Forest Plants.								
1. *Numbers of species*								
Shading trees and shrubs	60	26	6	5	4	4	..	105
Climbers	12	10	..	2	2	2	..	28
Overhead parasites	2	2	..	1	3	..	..	8
Epiphytes	36	17	1	2	..	..	..	56
Giant herbs	2	1	..	..	..	..	..	3
Plants of the forest floor	44	13	4	2	2	5	..	70
Ground ferns	2	4	4	..	7	12	3	32
Epiphytic ferns	3	4	14	..	5	17	5	48
2. *Percentages*								
Shading trees and shrubs	57	25	6	5	4	4	..	..
Climbers	43	36	..	7	7	7	..	..
Overhead parasites	25	25	..	13	37	..	..	..
Epiphytes	64	30	2	4	..	..	..	..
Giant herbs	67	33	..	..	..	..	..	..
Plants of the forest floor	63	18	6	3	3	7	..	..
Ground ferns	6	13	12	..	22	38	9	..
Epiphytic ferns	6	9	29	..	10	36	10	..
Plants of the Open.								
Trees and shrubs	2	3	..	3	1	3	..	12
Climbers	1	3	..	..	..	4	..	8
Herbs	1	..	4	2	4	1	19	31
Ferns	2	..	..	..	2	3	6	13

In the notes below some trouble has been taken to show how species montane in the north of the Peninsula descend more or less to sea level in the south. This we attribute to the distinct intercalation of a dry period in the north, and its disappearance, all but complete, southwards.

Of the plants which extend from the Peninsula into other parts of western Malaysia, without going further, two thirds descend to low levels. On the other hand very few of the Fraser Hill species which are endemic in the Peninsula descend to low levels. It is as if to have been able to pass between the Peninsula and other parts of western Malaysia, the forestal species with which we are dealing had to possess the ability to live in a climate as of Johore and Singapore at sea level.

A land connection between the Peninsula and Sumatra and another between the Peninsula and Borneo, in past ages, are admitted generally to have existed. It would seem right in general to believe that those land connections, at any rate on the last occasion of their existence, were low, having at the same time the climate of the south of the Peninsula; it is not necessary to place them as geologically remote, and it is possible to believe that while they (or the last of them if they were repeated) existed, our possibly already considerably evolved montane forestal flora retained its isolation in our mountains undisturbed, evolving locally its endemic species.

It is easiest to believe that the dry climate flora which seems to have passed down the coasts toward the Indian Ocean, did so earlier, and that the spread of these moisture loving plants into Java from Sumatra was subsequent.

Mention has been made of the occurrence of quartz in veins about Fraser Hill. This rock by its very slow decomposition makes the poorest of soils: and the vegetation on them is characteristic. In the first place *Dacrydium falciforme* is a most abundant tree. Its chief associates are Eugenias, one of which is *E. zeylanica*. Other trees which were found with it upon this soil are:—
Illicium cambodianum, a curious *Anonacea*, *Weinmannia Blumei* *Pygeum ovalifolium*, *Timonius* sp. *Lindera Wrayii*, *Elaeocarpus paniculatus*, *E. apiculatus*, *E. reticulatus*, *Vaccinium bancanum* *Rhodamnia uniflora*, *Cinnamomum aureofulvum* and *C. rhynchophyllum*, *Evodia pachyphylla*, *Ilex* sp. *Melastoma malabathricum*, var. *perakense*, *Ardisia chrysophyllifolia* and *A. retinervia*, *Eugenia oreophila*, *Arthropanax pinnatum*, *Memecylon myrsinoides*, *Anorincleistus grandiflora*, *Wikstroemia Candolleana*, *Litsea* sp. *Rubus glomeratus*, *Vitis trifolia*, *Gynochthodes sublanceolata*, *Guertnera Koenigii*, *Chasalia curviflora*, *Psychotria sarmentosa*, *Uncaria dasyoneura*, *Dioscorea laurifolia*, *Smilax laevis*, *Nepenthes sanguinea*, *Alyxia pumila*, *Pterisanthes pulchra*, *Scindapsus Scortechinii*, *Cyrtandromaea megaphylla*, *Argostemma Yappii*, *Didymocarpus hirta* *D. pumila*, *Pteridium aquilinum*, *Ceropteris calomelanos*, *Alsophila kingii*, *Hypolepis tenuifolia*, *Histiopteris incisa*.

Of the seed plants in this list 24 are endemic; 10 reach other parts of Western Malaysia; two pass just outside, one to Celebes the other to Mindoro; and the rest are much more widespread; *Melastoma malabathricum* reaching the Seychelles, *Engenia zeylanica*, *Uncaria dasyoneura*, *Psychotria sarmentosa*, *Chasalia lurida*, and *Gaertnera Koenigii* reaching Ceylon, *Vitis trifolia* reaching Himalaya, *Similax laevis* reaching China, and *Illicum cambodianum* reaching French Indo-China.

The percentage of endemism is about 55 or not different from that found in the forest of Fraser Hill taken as a whole.

SUMMARY. When a traveller ascends from the Semangkok pass to Fraser Hill, he passes at about 3300 feet out of a very lofty forest into one of lesser growth—its tall trees being 80-100 feet high at Fraser Hill. At a little distance from Fraser Hill where the range runs higher, about say 4700 feet, another type of forest appears, being of lesser growth and more mossy. The forest which we have studied especially is a part of that between 3300 and 4700 feet, namely that at Fraser Hill itself between 4000 and 4370 feet. Of its woody shading plants 57% are confined to the Peninsula, of its epiphytes 64% and of its ground vegetation (seed plants) 63%. These are high percentages, and indicate a considerable isolation of the mountains of the Peninsula. The species of the forest which are not endemic exist for the most part as lowland plants in the south of the Peninsula: by doing which they suggest that when the Peninsula was joined by land to Sumatra or to Borneo the land bridge was in climate and want of elevation as Johore and Singapore. It is clear that the montane species did not cross it. These montane species were evolved locally from typically Malaysian genera, and do not declare themselves immigrants evolved elsewhere. All their genera except *Daphne*, *Geostachys*, and *Nenga* are known from Borneo and all except *Leptorrhyncha*, *Blastus*, *Anerincleistus*, *Phyllagathis*, *Filitia*, *Dacrydium*, *Agathis* (introduced however) *Camptandra*, *Geostachys* and *Joinvillea* are known from Java: whereas as many as 60 of the genera are absent from Ceylon.

We recognise as present another flora—the flora that requires open ground. It is small and of mixed origin, for there are in it species whose genesis would seem to be upon ground bared by landslides, and there are intruders following man. The flora is rather small for analysis though very interesting.

PART II.

Enumeration of the Seed-Plants, Ferns and Mosses Collected.

In this enumeration the literature cited is the last only which sums up in any way the distribution of the plants in various parts of Western Malaysia.

Abbreviations: G.=Gunong or mountain: P.=Pulau or island (s.n.)=specimen sine numero, an unnumbered specimen: and of Works quoted:—

King, Sir George, Materials for a Flora of the Malay Peninsula in the Journal of the Asiatic Society of Bengal vols. 48 to 75, continued by Mr. J. S. Gamble, with the assistance of Sir David Prain, Dr. O. Stapf, Mr. H. N. Ridley, M. C. deCandolle, Prof. J. M. Macfarlane, quoted as King, Mat., Prain, Mat., etc.

Ridley, H. N., Materials for a Flora of the Malay Peninsula Monocotyledons, Singapore, 1908, 3 vols. quoted as Ridley, Mat. Monoc.

Koorders, Excursions-flora von Java,3 vols. quoted as Koorders.

Smith, J. J., Orchideen von Java, Leiden 1905, quoted as Smith, J. J.

Merrill E. D., A bibliographic enumeration of Bornean plants in the Journal of the Straits branch of the Royal Asiatic Society, special no., 1921, quoted as Merrill.

Ames, O., in the last named, quoted as Ames.

WINTERACEAE.

Illicium cambodianum, Hance: King, Mat., 58, pt. 2, 374. A small tree distributed within the Peninsula and in Indo-China: within the Peninsula it is montane occurring on Kedah peak, on the Taiping hills, on G. Tahan, and down the tops of the Main range from the mountains of Telom to G. Mengkuang Lebar; on Benom; then on Mt. Ophir. It is common about Fraser Hill particularly upon vein-quartz ridges. The claret flowers smell of anise: they are produced both on the old wood and on the ends of branches and turn down. The stigmas overtop the anthers by a little and spread into a ring as the fruit forms. The Malays call the tree Bakau bukit or hill mangrove, because its red wood suggests mangrove wood.

MAGNOLIACEAE.

Talauma Candollei, Blume; Koorders, 2, p. 240: Merrill p. 251: *T. mutablilis*, Blume. King, Mat., 58, pt. 2, p. 373. A shrub very variable in its different varieties, distributed from Sumatra and from Pungah in Lower Siam through the Peninsula to West Java and North Borneo. In the Peninsula it occurs on Kedah peak, in Penang and on the Main range from the mountains of Telom to the Semangkok pass. It was got coming into flower (8860).

Kadsura?. A big climber, flowerless, but appearing as if *Kadsura lanceolata*, King, was found at 3,300 ft. under Fraser Hill towards Tras. (7868). The Malays call it Akar belewar.

ANONACEAE.

Uvaria sp. A big liane with a stem 4 in. through, unfortunately without flowers and without fruit. (8804).

Polyalthia pulchra, King, Mat. 60, pt. 2, p. 55. A small tree, endemic within the Peninsula, and montane, distributed upon the Taiping hills and G. Bubu: upon the Main range from G. Kerbau to G. Mengkuang Lebar. It was obtained on Pine-tree hill at 4500 ft. (8533) in fruit. The fruit-stalks are coral-pink.

Goniothalamus macrophyllus, King, Mat. 60, pt. 2, p. 76. Koorders, 2, p. 252: Merrill, 260. A small shrub, little branched, distributed from Sumatra eastward to mid Java and north Borneo: in the Peninsula in the north montane, and is in Lankawi, and P. Adang, Penang, on the Taiping hills, and on the Main range of Perak, south to the Semangkok pass: further it occurs down approximately to sea level in Johore and Singapore. It was both in flower and fruit (8507, 8957): the wood is fragrant suggesting cinnamon. The Malays call it Tunging.

Goniothalamus sp. A small tree 30 ft. high found in flower (8896) and in fruit (7809), which matches none of the Peninsula species. The Malays call it Tampaian.

Anonacea. A tree of medium size, densely covered under the leaves with tawny felt, occurring upon the vein-quartz ridges (8684. 8930).

MENISPERMACEAE.

Limacia triandra, Miers: King, Mat. 58, pt. 2, p. 382. A climber, within the Peninsula, and extended northwards to Moulmein and French Indo-China: in the Peninsula montane, occuring in Lankawi, in Penang, on Kedah peak; and upon the Main range about Fraser Hill (8620) and on Bukit Kutu.

PITTOSPORACEAE.

Pittosporum sp. A bush with larger fruits than *P. ferrugineum*, Dryand, and not tawny under the leaves, but otherwise rather similar; as known at present quite local: it was obtained by Mr. Ridley at the Semangkok pass in 1904 (no. 12073) and now has been gathered at Fraser Hill (s. n.).

POLYGALACEAE.

Polygala venenosa, Juss.: King, Mat. 59, pt. 2 p. 130: Merrill, p. 324. A herb of the interior of Malaysia: in Sumatra, common in the forests of the Peninsula upon the mountains and to their feet sometimes, extended through Borneo to the Philippine islands. In the Peninsula recorded from Kedah peak, Penang, the Taiping hills, the Main range from G. Kerbau and the mountains of Telom to G. Tampin. It was found to be plentiful in the forest of Fraser Hill both in flower and with half ripe fruit (8590).

Xanthophyllum excelsum, Miq. Merrill p. 326: *X. affine,* Korth.: King, Mat. 59 pt. 2 p. 142: Koorders, 2 p. 453. A tree of the second rank in the forest, distributed from Tenasserim through western and north-eastern Malaysia extending from the Peninsula to Billiton and Java and through Borneo to the Philippines. It extends north to Tongkah in Lower Siam (lat. 8° N.), and southwards to Singapore both in the plains and on the hills. It was less common at Fraser Hill than *X. Maingayi.*

Xanthophyllum Maingayi, Hook. f.: King, Mat., 59 pt. 2. p. 136. An endemic small tree, distributed within the Peninsula, montane, on Penang, on the Taiping hills, and on the Main range from Perak to G. Tampin. About Fraser Hill it is numerically the commonest woody plant, being the universal under-tree of the hundred-feet high forest (8673). Like others of its genus the Malays call it Minyak berok, or baboon's oil.

CARYOPHYLLACEAE.

Drymaria cordata, Willd. Koorders, 2 p. 214. A weed which is to be considered as introduced through man into Malaysia, but from not-remote parts of Asia. It occurs in Sumatra through Java up to 6500 ft. In the Peninsula it occurs about Fraser Hill (7848) very sparingly, upon the roadside near to the Gap on the Semangkok pass, and at Ginting Sempah on the crest of the Kuala-Lumpur-Bentong road.

PORTULACACEAE.

Portulaca oleracea, Linn.: King, Mat., 60, pt. 2, p. 84: Koorders, 2, p. 208: Merrill, p. 247. A weed of all warm countries: in the Malay Peninsula scattered up and down. It was found at about 3300 ft. on the road from the Semangkok pass to Fraser Hill.

GUTTIFERAE.

Calophyllum spectabile, Willd. King, Mat., 59, pt. 2, p. 175: Koorders, Java, 2 p. 617. A *Calophyllum* apparently this, but without flowers and without fruit, was collected at Fraser Hill. *C. spectabile* is a wide-spread tree occurring from the Andamans and Nicobars and Cochin-china through Malaysia to Fiji and the Society Is.

TERNSTROEMIACEAE.

Ternstroemia Scortechinii, King, Mat., 59, pt. 2, p. 193. A medium-sized endemic tree. It is known to occur on the Taiping hills, and on the Main range from the mountains of Telom to Fraser Hill, and is on Benom. It is probable that it is also on G. Tahan. At Fraser Hill it was found attaining 30 ft. in height and in fruit (7754 bis).

Adinandra acuminata, Korth.: King, Mat., 59, pt. 2, p. 189. A tree of second rank occurring in Sumatra and the Malay Peninsula. In the Peninsula it is not uncommon from Penang and

Taiping to Singapore. In the south of the Peninsula it grows at sea-level: but it is one of those species which in the north scarcely descend so low. It has not before this been got on the Main range (8947) unless some of the material at Calcutta came thence.

Adinandra dumosa, Jack: King, Mat., 59, pt. 2, p. 188: Koorders, 2, p. 611: Merrill, p. 391. A small tree distributed through Malaysia. In the Peninsula it is frequent at low elevations: but has been got at 3000 ft. on Kedah peak and on Mt. Ophir (Ridley in Jour. F. M. S. Mus. 7, p. 39). It occurs in the Andamans and the Nicobars. At Fraser Hill it is common: but the Fraser Hill specimens all fail to dry black as *A. dumosa* normally does. It attains there 50 ft. in height (7760). Mr. Cubitt's no. 6527 from Fraser Hill is the same as ours.

Schima Noronhae, Reinw.: King, Mat., 59, pt. 2, p. 201: Koorders, 2, p. 610: Merrill, p. 390. A fairly large tree, distributed from Lower Burma, and Sumatra into the Malay Peninsula, to Java, Borneo and Palawan: in the Peninsula most frequent in the north, and not quite to sea level; reaching 5,000 ft. on G. Tahan and on the Taiping hills. At Fraser Hill it is common, and was in flower.

Gordonia sp. The yellowish flowers of a species of this genus were seen on the ground between Fraser Hill and Pine tree hill; but the tree whence they had fallen could not be identified.

Saurauia nudiflora, D. C.: King, Mat., 59, pt. 2, p. 198: Koorders, 2, p. 604. A small tree in distribution in Sumatra, through Java and in the Malay Peninsula on the Taiping hills, on G. Tahan and on the Main range of Perak and Selangor. It is favoured by the interference of man, and takes possession of cleared areas: below Fraser Hill it was plentiful on slopes that had been mined at 3000-4000 ft. (7764, 7873), attaining 20-25 ft. in height. It is called Jelatang Gajah, or Elephant nettle.

Saurauia rubens, Ridl. in Jour. Str. Br. Roy. As. Soc. 61, p. 1: A small endemic and very local tree producing its pendent flowers close to the base of the trunk in large groups. It carried flowers and fruit at Fraser Hill (8585): these fruits when ripe fall off their pedicels, which persist for a time. Curtis found it in flower in the same neighbourhood in May 1902, and Ridley in April 1911.

DIPTEROCARPACEAE.

Dipterocarpus cornutus, Dyer: King, Mat., 61, pt. 2, p. 93. A lofty tree occurring down the Peninsula from Kedah to Singapore; and ascending the Main range on the east side under Fraser hill to about 3300 ft. where it was in flower (s. n.).

Shorea bracteolata, Dyer: King, Mat., 61, pt. 2, p. 117. This lofty tree ascends to about 3300 ft. on the Selangor face of the hills under Fraser Hill. The species is distributed from Penang to Malacca and in Pahang, within the Peninsula, and is in Sumatra.

MALVACEAE.

Urena lobata, Linn.: King, Mat., 60, pt. 2, p. 43: Koorders, 2, p. 583: Merrill, p. 374. A pan-tropic weed. In the neighbourhood of Fraser Hill it follows man, as it is quite foreign to the forest which is the natural vegetation there: it is therefore most abundant where the land has been mined. Machado collected it near the Semangkok pass in 1903. Ridley in 1910 on Sakai clearings further north.

TILIACEAE.

Grewia fibrocarpa, Mast.: King, Mat., 60, pt. 2, p. 111. A tall bush, endemic, distributed generally in the lower ground of the Peninsula from Penang to Singapore, and upon the east side known from the islands of P. Tiuman and P. Tinggi. It occurs at Fraser Hill in forest and carried its scarlet fruits (8606), one only as a rule as the result of a whole panicle of flowers. The pulp is not unpleasantly acid.

Leptonychia heteroclita, Kurz: Merrill, p. 378: *L. glabra,* Turcz.: King, Mat., 60, pt. 2, p. 94. A shrub, in distribution from Tenasserim and the Andamans down the Malay Peninsula to the northern edge of Johore and in Sumatra, to Borneo and to Celebes. It was found on the edge of a gully at Fraser Hill (7870), and it has been collected before near Fraser Hill (Ridley 15586) and G. Kerbau and in the mountains of Telom.

Elaeocarpus gambir, Becc.: Merrill, p. 370: *E. stipularis*: King, Mat., 60, pt. 2, p. 133: Koorders, 2, p. 369. A tree of moderate size and quick growth, able to take advantage of the clearings of man. It is distributed through western Malaysia except eastern Java and is in Tenasserim. In the Peninsula it occurs under the mountains in the north as well as on them; and in the south it is down at sea-level. It was in flower and in fruit at Fraser Hill and had attained 40 ft. in height; it carried a sprinkling of red dying leaves (7794) on fruiting branches.

Elaeocarpus jackianus, Wall.: King, Mat., 60, pt. 2, p. 137. A small endemic tree which is able to take advantage of the clearings of man. In distribution it is general down the western side of the Peninsula: in Penang it occurs from the coast to the hill-tops at 2500 ft.: it is common at low elevations in Perak and down through Selangor and Malacca to Singapore. About Fraser Hill in places that have once been cleared, young plants of this are very conspicuous (7788), which by their cordate leaves may be distinguished varietally, as var. *cordata,* the leaves being 22 x 12 cm.; the berries sparingly pilose: their pedicels very hispid.

Elaeocarpus paniculatus, Wall.: King, Mat., 60, pt. 2, p. 129: Merrill, p. 371. A tree of the Malay Peninsula Banca and northern Borneo: it occurs in the lowlands of the Peninsula from Lankawi and Kuantan to Singapore: from the hills it has scarcely been recorded. At Fraser Hill it was found flowering sparingly (8567).

Elaeocarpus reticulatus, Ridl. in Jour. Str. Br. Roy. As. Soc. 61, p. 2. A bush about 6 ft. high carrying its berries upright; endemic and confined to the Main range from G. Kerbau to G. Mengkuang lebar. It was got at 7000 ft. on G. Kerbau, at 5000 ft. on G. Mengkuang lebar: at Fraser hill it occurs at 4200 ft. on vein-quartz (8897).

Elaeocarpus sp., near *E. apiculatus,* Mast. A small tree differing in small points from this species was collected at Fraser Hill in fruit. (8570). *E. apiculatus* is a tree of low elevations from Penang to Singapore down the west side of the Peninsula.

GERANIACEAE.

Impatiens oncidioides, Ridl., ex Hook. f. in Kew Bull. 1909, p. 11. A herb with beautiful yellow flowers found by water, endemic and montane, occurring along the higher ground of the Main range from G. Kerbau and Telom to G. Menuang Gasing at the head of the Langat valley in Selangor. It occurs at Fraser Hill with clear lemon-yellow flowers (8589) and more rarely with primrose yellow flowers (8943). It does not descend much below. The spur is in the mid-line of the flower.

RUTACEAE.

Evodia pachyphylla, King, Mat., 62, pt. 2, p. 210. An endemic shrub, montane and of very limited distribution in the Peninsula, occurring on the Main range from G. Kerbau, G. Bujong Malaka and Telom down to Fraser Hill where it was found on a vein-quartz ridge and also upon the very summit of Pine-tree hill at 4800 ft. which is west of Fraser Hill in the variety *grandis,* King. It was obtained in flower (8541). The flowers are of a cream colour.

BURSERACEAE.

Canarium rufum, A. W. Benn.: King, Mat., 62, pt. 2, p. 244. An endemic tree common at low elevations in Perak, extending thence southward to Malacca, and found also in the interior of Pahang. Fraser Hill (7831) at 4200 ft. is its uppermost limit as at present observed. It was sterile.

Trigonochlamys? A big tree growing at Fraser Hill, sterile (7802).

MELIACEAE.

Aglaia sp. A tree with hard wood and sparse foliage called by the Malays Tenkohalan, was collected in fruit (8680). It appears to be the species referred to in the Materials (Jour. As. Soc. Beng., 64, p. 65) by Sir George King with his collector's number 4606. The Sakais are said to eat the fruit.

CELASTRACEAE.

Salacia sp. near to *S. latifolia,* Wall. A sprawler found in mine area on the east of Fraser Hill at about 3600 ft., in flower (8600).

AMPELIDACEAE.

Vitis elegans, Kurz, King, Mat., 65, pt. 2, p. 392. A handsome vine endemic except that it extends to Banca, very plentiful about sea-level in the south of the Peninsula, but northwards rare: it has been collected in Malacca, and in Perak (probably Larut); also there exists a specimen carrying a Penang label, but not properly authenticated. It is very common at Fraser Hill (8445) and was both in flower and in fruit, its fruits small black berries.

Vitis furcata, Laws.: King, Mat., 65, pt. 2, p. 399. A rather small vine, in distribution in Sumatra and in the Malay Peninsula, by no means uncommon under the hills down the west side of the Peninsula from Penang to Singapore, in the Taiping hills and down the Main range from the mountains of Telom southwards. It was in flower and in fruit, (7787).

Vitis mollissima, Wall.: King, Mat., 65, pt. 2, p. 402. A common vine with large white berries exceedingly irritant to the throat (whence the Penang Malay name for it of Kesarkitan burong or bird's complaint) found from Burma, the Andamans and the Nicobars, and through the Malay Peninsula: in the Peninsula in the lowlands chiefly. It carried ripe fruit at Fraser Hill (s. n.).

Vitis trifolia, Linn.: King, Mat., 65, pt. 2, p. 688: *Cissus carnosa,* Gagnep.: Koorders, 2, p. 564: *Columella trifolia, Merr.*: Merrill, p. 368. A rather small vine, widely distributed from north-western India to southern China and through Malaysia to New Guinea. In the Peninsula it is not uncommon in the low country; but as regards the hills it has only been collected where roads have been made across the Main range, and its presence is artificial. It is not uncommon in cleared ground at Fraser Hill both with upwardly directed flowers and green fruits in September (8568).

Pterisanthes pulchra, Ridl. in Jour. Str. Br. Roy. As. Soc., 61, p. 2. A small woodland vine, endemic and absolutely local, very common, but very rarely flowering (8924). Mr. Ridley remarks on the difficulty of finding its flowers. He records it as on rocks but it is within our experience under trees that it is to be found; it was got upon vein-quartz and granite soils.

ILICACEAE.

Ilex sp. A bush attaining 10 ft. in height with black 5-celled fruit, growing on vein-quartz (8921).

Ilex sp. A small stiff tree which has been collected on Bukit Etam (Kelsall no. 1845). It was found at Fraser Hill in flower (8693).

ANACARDIACEAE.

Gluta ? A tree attaining 80 ft. in height rather like *G. elegans*, Kurz, but larger-leaved, which the Malays distinguish as Rengas gunong or mountain rengas (8678).

LEGUMINOSAE.

Millettia sericea, W. and A.: Prain, Mat., 66, pt. 2, p. 88: Koorders, 2, p. 382: Merrill, p. 303. A climber, distributed in western Malaysia:—Sumatra, the Malay Peninsula, north Borneo and through all Java, high and low. In the Peninsula it occurs through the low country on the west side from Penang to Singapore, owing some of its spread to the agency of man, and this is particularly the case about Fraser Hill where it occurs on old mined lands, and newly cleared house-sites (8662). The Fraser Hill plants are rather small-leaved, as are also some from Penang.

Desmodium heterophyllum, D. C.: Prain, Mat., 66, pt. 2, p. 135: Koorders, 2, p. 387: Merrill p. 304. A prostrate weed, spread from the Mascarene islands through southeastern Asia, from the wetter Himalaya, and the wetter parts of southern India and Ceylon, southern China, and Malaysia to the Philippines. In the Peninsula it seems not uncommon in the low country, but of its occurrence in the hills there is only evidence that it occurs on G. Kerbau. It was obtained, not abundantly, at about 3500 ft. in the mined lands under Fraser hill over Tras. (7874) whither obviously it has come with the help of man. It occurs in Java both on and under the mountains.

Desmodium laxum, D. C.: Prain, Mat., 66, pt. 2, p. 138: Merrill, p. 304. An upright herb, wide-spread from the eastern Himalaya and China to the Malay Peninsula and to north Borneo. It is uncommon in the Malay Peninsula, and on the Main range has been got only in Ulu Batang Padang and in Telom, and now within a hundred feet of the Gap at the Semangkok pass (8851) i. e. about 3000 ft.

Bauhinia cornifolia, Baker: Prain, King in Jour. As. Soc. Beng., 66, pt. 2, p. 186. A magnificent woody climber, visible by the mass of its flowers at half a mile away, endemic, and montane but closely allied to *B. bidentata*, Jack, with a wider distribution from Sumatra to the Philippines. In the Peninsula it occurs in Penang, on the Taiping hills, on the Main range from G. Bujong Malaka to G. Angsi in Negri-Sembilan, and just under the hills in Selangor; also on Benom in Pahang. It is common at Fraser Hill (8586).

Pithecolobium angulatum, Benth.: Prain, Mat., 66, pt. 2, p. 274: Koorders, 2, p. 356: Merrill, p. 292. A small tree, doubtfully distinct from the Javanese *P. montanum*, Benth., which is there a feature of certain montane forests; in distribution from the Eastern Himalaya through Burma and Siam to Sumatra,

Singapore, Borneo and the Philippines, also in the Andamans and the Nicobars. In the Peninsula it is on the hills of Penang, on the Main range at G. Batu Puteh, and in the south from Kuala Lumpur to Singapore at low levels. At Fraser Hill it appears to owe its place to man, and was found as a small tree not yet at flowering (8663). The Malays call it Petai belalang, or grasshoppers' Parkia.

ROSACEAE.

Pygeum ovalifolium, King, Mat., 66, pt. 2, p. 292. A small tree, endemic, and of a very restricted distribution, collected by Sir George King's collector at some unrecorded place in Perak, elevation 5000 ft., and now at Fraser Hill (8505, 8558). There is a gland at the base of the leaf below upon each side of the midrib. The Malays call it Sepuleh hutan, or jungle Fragraea.

Pygeum Maingayi, Hook. f.: King, Mat., 66, pt. 2, p. 288. A small shrub endemic and montane or submontane, found in upper Perak and down the Main range from Perak to G. Tampin, then in the forests of Malacca and upon G. Pulai in Johore. It was in flower and in fruit at Fraser Hill (7824, 8405). Though a shrub only at Fraser Hill in Negri Sembilan it seems to be a tree; or two species are confused.

Rubus glomeratus Blume: King, Mat., 66, pt. 2, p. 295: Koorders, 2, 324: Merrill, p. 288. A bramble, montane in the north of the Malay Peninsula, and in the south down near sea-level, in British North Borneo and through Java. In the Peninsula, in Penang it is above 1000 ft.; in the Taiping hills it is at and about 4000 ft.; it is at Fraser hill above 4000 ft., both in cleared places and in the direction of Pine-tree hill in a landslip area (8564): it was found also east of the Gap in Semangkok pass, and Machado collected it in 1903 somewhere near the Gap: it is known to occur on Bukit Kutu.

Rubus rosaefolius, Smith: King, Mat., 66, pt. 2, p. 296: Koorders, 2, p. 326: Merrill, p. 288. A small shrub with a pleasant fruit and for that reason encouraged by man throughout its distribution, which is from Kamaon in the north-western Himalaya to Japan, and southwards, in hilly regions, to Borneo and through Java. In the Malay Peninsula it occurs upon the very tops of the hills in Penang, on the Taiping hills from 4000 to 5000 ft., and down the Main range from Telom to Ginting Sempah just north-east of Kuala Lumpur. At Fraser Hill it is very common chiefly in the neighbourhood of the old mines.

SAXIFRAGACEAE.

Weinmannia Blumei, Planch.: King, Mat., 66, pt. 2, p. 299: Koorders, 2, p. 311: Merrill, p. 287. A medium-sized tree extending from Sumatra to (apparently) British North Borneo, and through Java. In the Peninsula it is found on the Taiping Hills

from 4500 to 5000 ft., on G. Tahan and on G. Bubu at 3300 ft., on the Main range about Fraser Hill (8653), on Benom and on Mt. Ophir. It is called Kasai bukit (hill Pongamia) by the Malays, and is by no means uncommon.

HAMAMELIDACEAE.

Bucklandia populnea, R. Br.: King, Mat., 66, pt. 2, p. 308. A tree of considerable size found from the Central Himalaya down in hilly regions to Sumatra and Java: in the Malay Peninsula, collected on G. Inas at 5000 ft. in Perak, and on the Main range in Ulu Batang Padang at 3900 ft., on G. Tahan, and on Benom. Under Fraser Hill (8855) it occurs commonly as an immature tree in mined lands from 3300 to 3700 ft. in the Upper Tras valley. As it reaches 6000 ft. in the Khasia hills, 3300 ft. is a relatively low elevation.

MYRTACEAE.

Tristania Maingayi, Duthie: King, Mat., 70, pt. 2, p. 72. An endemic tree but only uncertainly distinct from *T. merguensis*, Griff., which as its name implies occurs in Tenasserim (as well as in the Peninsula) and extends to Borneo. *T. Maingayi* is found on the hills of Penang and on Kedah peak and was obtained as an 80-feet-high tree at 4000 ft. in Fraser Hill (7752) with flowers.

Rhodamnia cinerea, Jack: Merrill, p. 423: *R. trinervia,* Blume: King, Mat., 70, pt. 2, p. 74: Koorders, 2, p. 673. A small tree distributed from Tenasserim southwards through western Malaysia (unless it fail in east Java), to the Philippines and to north Australia: in the Peninsula it is very common at low levels, but in the higher hills possibly is rare. At Fraser Hill it occurred as a small tree with leaves of less than the usual size, at 4,100 ft. (7832).

Rhodamnia uniflora, Burkill; *R. trinervia,* var., *uniflora* Ridl., in Jour. F.M.S. Mus., 4, p. 146: *R. trinervia*, Ridl. in Jour. F.M.S. Mus., 2, p. 114. A montane endemic tree, occurring on G. Tahan, and at Fraser Hill, where it is common upon ridges of vein-quartz (8656, 8941), and attains a height of 60 ft. The young leaves are yellow below, the fruit a dull purple. On the breadth of the leaves and upon their colour below the species is to be distinguished, and not as the name suggests upon the fewness of the flowers from the nodes, for some varieties of *R. cinerea* exist wherein the flowers may be very few. The G. Tahan specimens seen are Wray's and Robinbson's No. 5500 from between 5000 and 6000 ft., and Ridley's Nos. 16024 and 16272 from "Wray's camp." It is said also to be on Mt. Ophir, and G. Kerbau: but specimens have not been seen.

Eugenia corrugata, King, Mat., 70, pt. 2, p. 93. A small tree with dark foliage and hard wood, occurring at Fraser Hill

(8803), endemic within the Peninsula. The locality whence the type came in not exactly recorded but was probably on or under the Main range.

No. 7843 from Fraser Hill is an *Eugenia* which also may perhaps be this species.

Eugenia zeylanica, Wight: King, Mat., 70, pt. 2, p. 108: Merrill, 434. A tree of fifty feet with a rather small broken head, in distribution in southern India and Ceylon in the Andamans, in Sumatra, the Malay Peninsula and Borneo. In the Peninsula it occurs in Lower Siam at least from Takuapa, and southwards down both sides to Singapore. It was in flower at Fraser Hill (8677). The Fraser Hill specimens have smaller leaves than is usual at lower elevations.

Eugenia valdevenosa, Duthie: King, Mat. 70, pt. 2, p. 111. A small tree, endemic, occurring in Penang, the Taiping hills, and on the Main range from above Gopeng down into northern Negri Sembilan. It was obtained in fruit (7811, 8829), as a tree 25 ft. high.

Eugenia sp., apparently endemic, and an undescribed species. A tree occurring at Fraser Hill in flower (7751). It has curiously crested branches, which suggest, but differ considerably from, those of *E. setosa,* King.

Eugenia microcalyx, Duthie: King, Mat., 70, pt. 2, p. 124. A medium sized tree, endemic, distributed down the west coast of the Peninsula from Penang to Singapore and in the hills above Gopeng, in Ulu Bubong and about the Semangkok pass. It was in flower at Fraser Hill (7796).

Eugenia sp., near *E. valdevenosa,* Duthie: but with more coriaceous and smaller (12 x 6 cm.) leaves, was got on Pine-tree hill at 4,800 ft. (8535).

Eugenia oreophila, Ridl. in Jour. Str. Br. Roy. As. Soc., 61, p. 9. A shrub very closely allied to *E. jugalis,* Ridl., endemic and local, described from specimens collected in Ulu Semangkok by Mr. F. Dennys in 1907 as Kelat bukit or hill Eugenia; found by us in flower at Fraser Hill (8899) and at the Trigonometrical station immediately over the Gap upon the east side of the Semangkok pass (8870).

Eugenia n. sp., with obovate coriaceous leaves, 8 x 4 cm. the veins most obscure, was got in flower (8685) at 4,300 ft.

Eugenia sp., apparently near *E. corrugata,* King, with leaves about 14 x 7 cm. drying brown, and with flowers about 1.5 cm. across, was got in the valley of Fraser Hill (7777).

Eugenia sp. A tree with red bark, sterile, here and there about Fraser Hill (7806).

Barringtonia Scortechinii, King, Mat., 70, pt. 2, p. 138. A tree of second rank, endemic and montane or submontane except

that it has been collected at Temerloh in Pahang, found in Penang, in the Taiping hills and on G. Bubu, in the Main range from Fraser Hill (8691) to G. Berumban in Negri-Sembilan, reaching the foot of Bukit Kutu. It carried deep crimson flowers on the end of branches, hanging into the light-diffusion space of rather dense one-hundred-feet high forest.

MELASTOMACEAE.

Melastoma malabathricum, Linn.: King, Mat., 69, pt. 2, p. 6: Koorders, 2, p. 690. A shrub of wide distribution, occurring from the Seychelle islands, through the parts of India which are damp enough, into China, and through Malaysia to northern Australia and to New Caledonia. In the Peninsula it is general, and owes its abundance largely to man; but not its presence, for it can hold its own in light forest: and it reaches 5,000 ft. on G. Tahan. It is plentiful at Fraser Hill (8574) in the variety *perakense*.

Blastus Cogniauxii, Stapf: King, Mat., 69, pt. 2, p. 13: Merrill, p. 438. A weak shrub of shade with small inconspicuous flowers, distributed down the Malay Peninsula and in northern Borneo. In the Malay Peninsula it occurs in the Taiping Hills, in Upper Perak, on G. Tahan, on the Main range from Bujong Malaka and the Telom hills to Ginting Bidai east of Kuala Lumpur, on G. Taneng and G. Pantai in Johore, and again in low country about Kuala Lipis and in the south of Johore. It is frequent at Fraser Hill (8613).

Anerincleistus floribundus, King, Mat., 69, pt. 2, p. 17. A shrub 20 ft. high, endemic, and until found between Fraser Hill and the Gap, Semangkok pass, at about 3,300 ft., and west of Fraser hill on the track to Pine Tree hill at 4,300 ft. known only from the Taiping hills and on G. Bubu. Its terminal panicle of pink flowers with exposed yellow stamens is very conspicuous (8509).

Anerincleistus grandiflorus, Ridl. in Jour. Str. Br. Roy. As. Soc., 47, p. 45. A endemic and montane shrub, of limited distribution along the Main range from Fraser Hill to G. Mengkuang, lebar. Curtis obtained it in the neighbourhood of the Semangkok pass at 2,000-3,000 ft. in May 1902: Mr. Ridley in flower in April 1911; the Hon'ble Mr. G. Hose collected it at Fraser Hill in flower in August 1919 and we found it at 4,200 ft. on one of the vein-quartz ridges of Fraser Hill (8939) flowering in September, 1922, but not freely. The specimens from the mountains further south are labelled 5,000 ft. and 5,400 ft. It carried flowers, with white petals and a pink calyx as well as ripe fruit.

Sonerila tenuifolia, Blume: Stapf and King, Mat., 69, pt. 2, p. 24: Koorders, 2, p. 692: Merrill, p. 442. A herb distributed through the wetter parts of western Malaysia, occurring in Sumatra, in western Java, in northern Borneo, and in the Malay Peninsula montane on G. Bubu, on G. Tahan, on the Main chain from G.

Kerbau and the mountains of Telom to Bukit Etam at altitudes of 4,000 to 5,300 ft., and on Mt. Ophir. It was not seen at Fraser Hill, but at Pine tree hill, at 4,800 ft., where it is common (8542).

Sonerila rudis, Stapf and King, Mat., 69, pt. 2, p. 27. A herb growing in moss in forests, endemic, and montane from 3,000 ft. upwards over a restricted area of the Main range, from G. Kerbau, G. Bujong Malaka and G. Batu Puteh south to the Semangkok pass; very common at Fraser Hill both in flower and in fruit (8414, 8624). It propagates itself by runners to a considerable extent.

Sonerila albiflora, Stapf and King, Mat., 69, pt. 2, p. 28. A herb of the forest floor, endemic, and montane, occurring on the main range at 3,500 ft. and above, from G. Bujong Malaka to the Semangkok pass, and also on G. Kledang over Ipoh at only 1.000 ft. above sea-level. It was found between Fraser Hill and Pine-tree hill (8508) in flower and with ripe fruit. The flowers are pale pink, as well as white. The Hon'ble Mr. G. Hose who collected it below Fraser hill in 1919, obtained it at 3,800 ft.

Sonerila integrifolia, Stapf and King, Mat., 69, pt. 2, p. 34. An upright herb of shade, endemic, and montane or submontane, found on the Taiping hills, and under them on the west side: on G. Bubu, on the Main range from Fraser Hill to Ginting Sempah north-east of Kuala Lumpur and under the Main range on the west side. It is very common at Fraser Hill (8540, 8602, 8641) both in flower and in fruit, and was got also above the Gap on the ascent towards G. Ulu Semangkok at 3000 ft. (8886).

Sonerila velutina, Ridl. in Jour. F. M. S. Mus., 4, p. 18. A herb, of a somewhat more upright habit and of a darker chestnut colour than the common *S. rudis*, endemic, and as far as known confined to the Main range between G. Kerbau, the mountains of Telom and the Semangkok pass occurring from 4500 ft. upwards. It was found at Pine-tree hill at 4800 ft. (8645), and on G. Ulu Semangkok which is south-east of the Semangkok pass.

Phyllagathis hispida, King Mat., 69, pt. 2, p. 46. A herb, endemic in the mountain-forests of the Peninsula, found on the Taiping hills, in upper Perak, on G. Tahan, and down the Main range from Ulu Batang Padang and the mountains of Telom to the Semangkok pass. It is very common at Fraser Hill and was in new flower (8623).

Marumia nemorosa, Blume: King, Mat., 69, pt 2, p. 47: Merrill in Jour. Str. Br. Roy. As. Soc p. 444. A woody sprawler, about 20 ft. long, occurring in the interior of western Malaysia, i e. in Sumatra the Malay Peninsula and in Borneo. In the Peninsula it is found in the low country from Penang and Trengganu southwards to the Johore straits; it ascends the Taiping hills to 3500 ft., on Fraser Hill to above 4000 ft. (7791, 8647) and Bukit Kutu. It was found in flower and with half ripe fruit and is frequent. The rose-magenta flowers fall in the afternoon.

Dissochaeta pallida, Blume: King, Mat., 69, pt. 2, p. 52. A endemic woody sprawler extending from Tomah in lower Siam (lat. 6° N.) down to Singapore, ascending the mountains as in Penang, in the Taiping hills to 4500 ft., and on the Main range to about 4000 ft. It carried flowers and fruits at Fraser Hill, (8553, 8646).

Dissochaeta annulata, Hook. f.: King, Mat., 69, pt. 2, p. 50: Merrill, p. 445. A woody sprawler, occurring down the Peninsula and in northern Borneo. In the north of the Peninsula it is montane occurring on Western Hill in Penang, on the Taiping hills, at Fraser Hill (8628) in the Main range, on Mt. Ophir, on G. Pantai in Johore, and lastly in Singapore island within 500 ft. of sea-level.

Anplectrum pallens, Blume: King, Mat., 69, pt. 2, p. 57: Merrill, p. 443. A sprawler, distributed in the interior of western Malaysia from Sumatra to northern Borneo: within the Peninsula occurring as a submontane or montane plant, in Penang on Western Hill, on the Taiping hills from 2000 ft. downwards, on the Main range from the Semangkok pass to the neighbourhood of Kuala Lumpur, and under this range as well as extending southwards to Singapore. It was not observed at Fraser Hill itself, but was obtained at the Trigonometrical station immediately over the Gap of Semangkok pass on the east side at 3800 ft. (8872), in fruit.

Medinilla venusta, King, Mat., 69, pt. 2, p. 61. A shrub, endemic and possibly confined to the Main range; but the origin of the specimens which Sir George King used when writing his description is not recorded more nearly than "Perak." It is common as an epiphyte at Fraser Hill, and is a very beautiful plant (8430, 8554).

Medinilla crassinervia, Blume: King, Mat., 69, pt. 2, p. 64: Merrill, p. 447. A beautiful bush with large cherry-red fruits, extending from the Malay Peninsula eastwards to Borneo and on to Ternate, Banda and New Guinea. Within the Peninsula it is montane in the north, but descends to low levels in Singapore and Johore: in the north it occurs in Penang, on G. Tahan, and on the Main range from Ulu Batang Padang to Gua Batu or Batu Caves near Kuala Lumpur. It was found under Fraser Hill in the upper Tras valley in a mined area upon the tops of boulders, at 3600 ft. (7866).

Medinilla Clarkei, King, Mat., 69, pt. 2, p. 63. A beautiful bush with white flowers and white berries, endemic and montane within the Peninsula, found on Gunong Tahan at 3300 ft., on the Main range from G. Kerbau to G. Menkuang lebar, on Benom and again on the top of Mt. Ophir. It is not uncommon at Fraser Hill (8557), where also the Hon'ble Mr. G. Hose obtained it in August 1919.

Medinilla heterantha, King, Mat., 69, pt. 2, p. 61. Specimens with seven equal anthers (s.n.), but otherwise appearing to

be *M. heterantha* were obtained just under Fraser Hill in the upper Tras valley at about 3500 ft. *M. heterantha* is an endemic and montane species of the Peninsula which is recorded as occurring on the Taiping hills, and on the Main range on G. Batu Puteh.

Memecylon dichotomum, C. B. Cl.: King, Mat., 69, pt. 2, p. 75. A small tree, endemic, submontane found on Kedah peak, on the Taiping hills, on G. Bubu, on G. Tahan, down the Main range in Perak and Selangor; and at Gemas on the Johore-Negri-Sembilan boundary. It occurs at Fraser Hill as a small tree about 30 ft. high under other trees (8697). It is called Nipis kulit or "thin-bark," like several other small trees.

Memecylon heteropleurum, Blume: King, Mat., 69, pt. 2, p. 78: Merrill, p. 453. A shrub with beautiful pinkish-blue flowers and purple fruits; which contain a pink-fleshed seed: distributed in the interior of western Malaysia, *i.e.* in Sumatra, in the Peninsula and in Borneo. In the Peninsula it occurs from Penang down the western side to Singapore. It occurred as an epiphyte at Fraser Hill (7869) and has been collected on G. Tahan. Our specimens have a venation in the leaf closer than usual, but not closer than *Curtis 814*, from Penang which is admitted as this.

Memecylon myrsinoides, Blume: King, Mat., 69, pt. 2, p. 81: Koorders, 2, p. 702: Merrill, p. 454. A shrub, distributed through western Malaysia, Sumatra, the Peninsula, Bancka, Java, Borneo and beyond in Celebes. In the Peninsula it is in the low country from Lankawi to Singapore; and the Fraser Hill locality is of a surprising elevation. It grew as a shrub 15 ft. high upon one of the vein-quartz ridges (8937) and was in flower. Is it really absent from western Java as Koorders implies?

Memecylon laevigatum, Blume: King, Mat., 69, pt. 2, p. 82: Merrill, p. 454. A shrub, in distribution from Tenasserim, the Andamans and Nicobars, through Sumatra, and the Peninsula to Bancka, Java and Borneo. In the Peninsula it is found in the lowlands down both sides. It was not found at Fraser Hill, but at the Trigonometrical station immediately over the Gap, Semangkok pass, on the east side at 3800 ft. (8888), in fruit; and in want of flowers the determination is slightly doubtful.

LYTHRACEAE.

Duabanga sonneratioides, Ham.: King, Mat., 67, pt. 2, p. 10. A tall tree distributed from the central Himalaya in hilly regions through Burma and Siam, to the Andamans and Nicobars, and to the Malay Peninsula, where it seems to reach its limit on the eastern slopes of the Main range not far from Kuala Lumpur. On the east side of Fraser Hill from about 3300 ft. (7867) downwards almost if not quite to the foot of the range it occurs in groups by streams: it is present also on the west side, but is rare. It exists in Penang, on the Taiping hills and is common in the

valley of the Perak river near Kuala Kangsar and again about the mountains of Telom at 4000 ft. The Malays who eat the acid young fruit call it berembang bukit.

ONAGRACEAE.

Jussieua fissendrocarpa, Haines, in Jour. As. Soc. Beng. N. S. 15. p. 313. A marsh-herb distributed from north-eastern India southwards at least to Singapore and possibly to the Philippines, and occurring down the Peninsula here and there in the lowlands. At Fraser Hill it was found in the vegetable garden under Fraser's bungalow (7850).

SAMYDACEAE.

Casearia esculenta, Roxb.: King, Mat., 67, pt. 2. p. 17. A shrub or small tree, distributed in southern India and Ceylon, and then from Tenasserim southwards to Sumatra and Singapore mostly in the low country, but also in the hills, as on Kedah peak, on the hills of Penang, and down the Main range from G. Kerbau and the mountains of Telom to G. Angsi. It is recorded as at 7300 ft. on Korinchi peak in Sumatra. It was found with rather small leaves in fruit on G. Ulu Semangkok, which is south-east of the Semangkok pass (8880).

CUCURBITACEAE.

Trichosanthes bracteata, Voigt: Koorders, 3, p. 297: Merrill, p. 584: *T. palmata*, Roxb.: King, Mat., 67, pt. 2, p. 29. A herbaceous climber distributed from the Himalaya to Ceylon and in Japan, as well as in China, thence southwards through Sumatra, the Peninsula, Borneo, Java, Celebes, Timor to northern Australia.: in the Peninsula not well collected and its presence is not attested for the south. At Fraser Hill it owes its abundance to the interference of man, and its stems extend over the exposed earth of the new roadsides, carrying globose green fruits in abundance (8562).

BEGONIACEAE.

Begonia tricornis, Ridl. in Jour. Str. Br. Roy. As. Soc., 75, p. 35. A herb of forest, endemic and montane, restricted to the Main range from the mountains of Telom to Ginting Bidai, east of Kuala Lumpur. At Fraser Hill it is not uncommon; it was found in fruit (8669) sparingly.

Begonia sp., not uncommon at Fraser Hill (8428) in flower growing in shade, half-prostrate and rooting at the nodes. The flowers are light pink, and the leaves are relatively broader than those of *B. tricornis*.

UMBELLIFERAE.

Eryngium foetidum, Linn.: King, Mat., 61, p. 71: Koorders, 2, p. 724. This American plant which is slowly spreading westward in Asia, is quite common at Fraser Hill round the old

mines, and down the valley towards Tras: so long as the forest is not allowed to close in, it will persist. Machado collected it near the Gap in 1903.

ARALIACEAE.

Heptapleurum, sp. A tree forty feet high, with dark claret flowers (8946), apparently a new species, found at 4000 ft.

Heptapleurum sp.A shrub 6 ft. high, with a prickly stem, is not uncommon at Fraser Hill (7882) and in the upper Tras valley (s.n.), allied to *H. ellipticum*, Seem., but differing in the inconspicuousness of the veins of the leaf.

Arthrophyllum diversifolium, Blume: King, Mat., 67, pt. 2, p. 59: Koorders, 2, p. 717: Merrill, p. 458. A small tree, distributed through western Malaysia and in the Andamans; in the Peninsula common all down the west side, whereas on the east side it has been collected only upon P. Tiuman; but it is assuredly present. It was found in forest at Fraser Hill (7834) at 4200 ft.,— an upward extension of its recorded altitudes, in flower.

Arthrophyllum montanum, Ridl. in Jour. F. M. S. Mus. 4, p. 24. A shrub, endemic, confined to the Main range from the mountains of Telom to the Semangkok pass. It was found on veinquartz ridges at Fraser Hill in flower (8926), being three feet high only.

Arthrophyllum pinnatum, C. B. Clarke in part: King, Mat., 67, pt. 2, p. 59 in part. A small shrub, endemic apparently, occurring on the top of the hills in Penang, and on the Main range from G. Batu puteh to G. Mengkuang lebar. It was found on G. Ulu Semangkok at 3000 ft. (8865). The Mount Ophir plant differs.

CAPRIFOLIACEAE.

Viburnum sambucinum, Reinw.: King & Gamble, Mat., 72 pt. 2, p. 113: Koorders, 3, p. 285: Merrill, p. 512. A bush, spread through western Malaysia, in Sumatra, the Peninsula, Borneo and throughout Java, from about 1000 ft. to 5000 ft. In the Peninsula it is montane as regards the north, but descends to sea-level in Singapore: it occurs upon the summit of Government Hill, Penang, on the Taiping hills, and down the Main range from the mountains of Telom to G. Menkuang lebar. Often it owes its position to man in chief part, and this is the case at Fraser Hill, where it occurs about the old mines (7779). It was newly in flower.

Viburnum Beccarii, Gamble, Mat., 72, pt. 2, p. 114. A bush occurring in Sumatra and in the Malay Peninsula, montane. In the Peninsula it was first collected by Scortechini in Perak, probably in the mountains at some little distance to the north of Fraser Hill. It occurs at Fraser Hill (8631) and was in flower. It has been determined from descriptions only.

RUBIACEAE.

Uncaria dasyoneura, Korth.: King & Gamble, Mat., 72, pt. 2, p.136. A woody climber, distributed in Ceylon, and then disjointedly in Sumatra and the Malay Peninsula. In the Peninsula it is montane: it occurs in Penang, and is on the Main range in Perak where Sir George King's collector got it: at Fraser Hill it is very abundant and in Malacca, probably on Mt. Ophir. It is also said that Lobb got it in Singapore; but then Lobb's plants are not accurately labelled in all cases. At Fraser Hill where it goes to the tops of fairly large trees, it was in flower and new foliage and with enormous quantities of fruit (8409): it was also on G. Ulu Semangkok. Havilland distinguished the Ceylon plants varietally (Jour. Linn. Soc. Bot., 33, p. 82.)

Argostemma Yappii, King in King & Gamble, Mat, 72, pt. 2, p. 145. A half-epiphytic herb, endemic and of narrow distribution on the mountains, on G. Tahan above 5000 ft., and on the Main range from the mountains of Telom to G. Mengkuang lebar. It occurs at Fraser Hill (8573) at 4200 ft. and thence upwards to 4800 ft. in Pine tree hill (8527); and it occurs on G. Ulu Semangkok which is south-east of the Gap. It climbs the lowest one or two feet of tree trunks and has a very fleshy stem.

Argostemma urticaefolium, King: King & Gamble, Mat., 72, pt. 2, p. 146. A herb, perhaps occurring in Sumatra, and found upon the Main range of the Peninsula from the Telom mountains to Bukit Etam. It flowers about the Semangkok pass in May (Curtis 3748); and only in one spot were flowers found in September (8857).

Argostemma spinulosum, C. B. Clarke: King & Gamble, Mat., 72, pt. 2, p. 149. A herb, endemic, and montane, occurring on the Taiping hills, on the Main range from G. Batu puteh to Bukit Etam, and in Johore on G. Pantai. It is rare at Fraser Hill (8622).

Argostemma involucratum, Hemsl.: King & Gamble, Mat., 72, pt. 2, p. 151. An endemic herb with beautiful white flowers montane, occurring on the Taiping hills, on G. Tahan, on the Main range from G. Kerbau, Bujong Malaka and the Telom mountains to the neighbourhood of Kuala Lumpur, on Benom, and on Mt. Ophir. At Fraser Hill it is perhaps the commonest herb in the forest and in September its flowers, turned downwards obliquely with a conspicuous large green nectary, were everywhere (8412); but towards Pine-tree hill it disappeared.

Ophiorrhiza erubescens, Wall.: King & Gamble, Mat., 72, pt. 2, p. 172. A small forest herb, occurring in Upper Burma and down the Malay Peninsula as far as Bukit Sedanan in Malacca. It is montane or submontane, but has been collected at 6500 ft. on Ridley's G. Berumban. It was found in fruit at Fraser Hill (8594) and on G. Ulu Semangkok (8887).

Mussaenda mutabilis, Hook. f.: King and Gamble, Mat., 72, pt. 2, p. 182. A woody sprawler, endemic, rather submontane than montane, distributed from (perhaps) Penang and Bundi south-wards to Singapore, occurring on the Taiping hills, on the Main range and on Mt. Ophir to 2000 ft. at least. It was found under Fraser Hill at about 3800 ft., exposing its brilliant scarlet flowers at a height of about 20 ft. from the ground in a place where a fallen tree had let light into the forest (7759).

Mussaenda villosa, Wall.: King & Gamble, Mat., 72, pt. 2, p. 183. A woody sprawler, distributed in Sumatra and in the Peninsula southwards to Malacca and Mt. Ophir: it occurs at low elevations, and the Fraser Hill plant (s.n.) appears to be varietally distinct from the lowland plant. It was found just above 4000 ft. The Mt. Ophir plant also differs.

Lucinaea Ridleyi, King in King & Gamble, Mat., 72, pt. 2, p. 178: Merrill, p. 558. A woody sprawler occurring in the hilly parts of the north of the Malay Peninsula and in north Borneo. In the Peninsula it has been got in the Taiping hills, and on the Main range in the Batu Padang valley and at Fraser Hill at 4300 ft. in flower (8681). Lobb collected specimens which exist in herbaria with the label "Singapore" upon them: but Lobb's labels are not always accurate.

Urophyllum glabrum, Wall.: King & Gamble, Mat., 72, pt. 2, p. 198: Merrill, p. 539: *U. arboreum*, Korth.: Koorders, 3, p. 255. A small tree distributed in western Malaysia from Sumatra, through the Peninsula, in western Java, in Bancka, Borneo, and to the Philippines. It is one of the species which in the Peninsula occur at sea-level in the south: but are rare or absent in the lowlands in the north, however it is on P. Nipis, an islet off the Lower Siam coast near P. Adang,—but not in the usual form. It has been collected upon the Main range north of Fraser Hill: and is plentiful at Fraser Hill (8668, 8688) as a small tree 25 ft. high, in flower and in fruit. The Malays call it Tabosah.

Stylocoryna fragrans, Blume: King & Gamble, Mat., 72, pt. 2, p. 201: *Tarenna fragrans*, Merrill, p. 561. A shrub, distributed in Sumatra, down the Peninsula from Champawn in Lower Siam to Singapore upon both sides, and in Borneo. This is the first record of its occurrence in the higher hills. It was found at Fraser Hill at 4200 ft. (8686, 8882), and on G. Ulu Semangkok, in flower.

Webera salicina, Ridl. in Jour. F. M. S. Mus., 4, p. 34. A shrub, endemic and confined as far as is at present known, to the Main range from the mountains of Telom to Fraser Hill where it was got in the direction of Pine- tree hill (8513).

Randia racemosa, Cav.: Merrill, p. 563. *Randia densiflora*, Benth.: King & Gamble, Mat., 72, pt. 2, p. 208: *R. oppositifolia*, Koord.: Koorders, 3, p. 297: A shrub, widely distributed from north-eastern India and southern China down the hilly regions of

Burma, in the Andamans and Nicobars, through Malaysia to north Australia: in the Peninsula it is a wide-spread lowland plant of the west side to Malacca: but it has not been collected as yet on the east side north of P. Tinggi. Upon the Main range it is certainly on G. Haram and on Bukit Kutu. It was collected at Fraser Hill (8442) carrying its fragrant white flowers.

Randia anisophylla, Jack: King & Gamble, Mat., 72, pt. 2, p. 209. A small tree or large shrub, in Sumatra and distributed freely down the west coast of the Peninsula from Penang to Singapore, unless rare in Perak, but as yet quite unrecorded for the east coast. It is not uncommon at Fraser Hill attaining 30 ft. in forest under tall trees, in flower (8446), and in fruit (8660). The Malays call it Kayu laha.

Randia sp. A shrub unfortunately flowerless (8664), with two pairs of curved thorns at the base of each lower side branch for climbing, the lower pair of which two are brought against the parent axis by the angle at which the side branch stands,— a very perfect grapple arrangement.

Gardenia pulchella, Ridl. in Jour. F. M. S. Museums 4, p. 31. A fat stemmed small shrub with the flowers close to the ground, occurring in the mountains of Telom and it was found at Fraser Hill in immature fruit (8593).

Timonius diffusus, Ridl. in Jour. F. M. S. Mus. 4, p. 32. A small tree, endemic and montane, found on G. Tahan, and on the Main range in the mountains of Telom, where very common, and now at Fraser Hill (7801), in flower and in fruit, attaining 20 ft.

Timonius sp. near *T. montanus*, Ridl., a small tree found at Fraser Hill, with foliage 8 x 2 cm. and fruits 8 mm. long (8561). *T. montanus* occurs on G. Tahan.

Timonius n. sp. A small tree 10 feet high found on the vein-quartz ridges of Fraser Hill (8922 and s.n.) with a more or less fastigiate habit, carrying orange flowers, its leaves 8 x 3 cm., its ribbed fruits 12 mm. long.

Ixora Lobbii, Loudon: King & Gamble, Mat., 73, pt. 2, p. 78. A shrub, distributed through the Peninsula: it is very common in the lowlands from Khasum in Lower Siam (Lat. 8° 20′ N.) to Singapore; it is but little recorded from the hills, as Penang, the Taiping hills, the Main range at G. Batu Puteh and G. Pantai in Johore. At Fraser Hill it was observed sporadic in the forest carrying its reddish salmon flowers (8607).

Gynochthodes sublanceolata, Miq.: King & Gamble, Mat., 73, pt. 2, p. 92: Merrill, p. 580. A woody climber, distributed in the interior of western Malaysia, from Sumatra through the Malay Peninsula to north Borneo: in the Peninsula down the west side from Penang to Singapore, and now obtained from the Main range

at Fraser Hill, where it is plentiful (8571, 8936 and s.n.), both in flower and in fruit; it occurred on vein-quartz ridges.

Psychotria viridiflora, Reinw.: King and Gamble, Mat., 73, pt. 2, p. 15: Koorders 3, p. 266: Merrill, p. 575. A half-woody plant spread through the whole of western Malaysia, i.e., Sumatra, the Malay Peninsula, the whole of Java and Borneo: in the Peninsula from Koh Pennan and Trang in Lower Siam (Lat. 7° 30′ N.) southwards to Malacca, where it appears to be more common than elsewhere. It occurs at about 4000 ft. on the Taiping hills, and is in the mountains of Telom. It was got in fruit at Fraser Hill (8674), and ascends to 5000 ft. in Java.

Psychotria sarmentosa, Blume: King and Gamble, Mat., 73, pt. 2, p. 5: Koorders, 3, p. 265: Merrill, p. 573. A rather small woody climber, widely distributed, being in southern India and Ceylon, where it ascends to 4000 ft., in Burma, and in the Andamans, down the Peninsula, through Java and through Borneo. In Java it ascends to 6700 ft. It occurs at Fraser Hill on vein-quartz (8935). There is rather too much variability between the specimens put under this species for it to be considered as satisfactorily defined.

Chasalia rostrata, Miq.: King and Gamble, Mat., 72, pt. 2, p. 134: Koorders, 3, p. 268. A bush, distributed down the Peninsula not uncommonly from Larut to Singapore, and in west Java. It has been gathered before this on the lower slopes of the mountains of the Peninsula, *e.g.* the Main range in all three states, Perak, Selangor and the Negri-Sembilan, as well as on the lower slopes of Mt. Ophir but never before as high as Fraser Hill (7818, 8603). The Fraser Hill plants have hirsute pedicels.

Chasalia lurida, Miq.: Merrill, p. 576: *C. curviflora,* Thwaites; King and Gamble, Mat., 72, pt. 2, p. 133: Koorders, 3, p. 268. A weak shrub of wide distribution, and apparently breaking up into subspecies, found in Ceylon and southern India, in north-eastern India, and down through Burma into Sumatra and Malaysia to the Philippines: in the Peninsula it occurs everywhere through the lowlands: it ascends Kedah peak, the Taiping hills and the mountains of Telom, but no altitudes are recorded, except 3,000 ft. for Kedah peak. It was found here and there in the forest about Fraser Hill carrying flowers as well as its black fruits (8526, 8534, 8582), and ascended to Pine tree hill at 4,800 ft. It attains almost 5,000 ft. in Java.

Chasalia sp. This plant appears to be new and endemic within the Peninsula. It was collected near the Semangkok pass by Mr. Curtis in 1902, and by ourselves as a small tree 25 ft. high, with white flowers (8591).

Cephaelis sp., a one-stemmed woody plant, which is rather more slender than the next is common also at Fraser Hill (7810, 8627) where is grows in the forest in the same way. It also has been collected by Mr. Ridley (his No. 12073).

Cephaelis sp. A one-stemmed woody plant growing in shade and carrying its flowers horizontally, perhaps close to *C. Griffithii*, Hook f., is common at Fraser Hill (8435) where it was collected in 1911 by Mr. Ridley (his No. 15667), and occur also on G. Ulu Semangkok equally commonly.

Lasianthus rhinocerotis, Blume: King and Gamble, Mat., 72, pt. 2, p. 114: Koorders, 3, p. 271. A shrub, montane, occurring in Sumatra in the Malay Peninsula and on the mountains of west Java: in the Peninsula in the Taiping hills, on the Main range from the mountains of Telom and G. Batu puteh to Ginting Peras which is between the States of Selangor and Negri-Sembilan. It is not uncommon at Fraser Hill, in flower (8520, 8605).

Lasianthus longifolius, Wight: King and Gamble, Mat., 72, pt. 2, p. 116. A small tree with a most objectionable smell, endemic and submontane, on "G. Tunggal" in Perak, and on the Main range southwards from Fraser Hill, to Kuala Lumpur, and recorded for "Malacca" probably meaning Mt. Ophir. At Fraser Hill it attains 15 ft. in height and is by no means uncommon in flower and with purplish red fruit (8519) also it is on G. Ulu Semangkok (8875). It may be called Kahawa utan or jungle coffee by the Malays. Specimens collected under no (8604) at Fraser Hill may also represent the same species.

Lasianthus oblongus, King and Gamble, Mat., 72, pt. 2, p. 127. A shrub, endemic occurring on Kedah peak, on the Taiping hills, and on the Main range from Fraser Hill to the neighbourhood of Kuala Lumpur where it descends to low levels. It was found in the mine area of the upper Tras valley under Fraser Hill at about 3,500 ft. (7865).

Paederia verticillata, Blume: King and Gamble, Mat., 72, pt. 2, p. 97: Koorders, 3, p. 276: Merrill, p. 580. A woody climber, distributed in Malaysia, from the Peninsula through north Borneo to the Philippines and also in the mountains of west Java. In the Peninsula it occurs at low levels down the west side from Kedah to Singapore and on the east side is in Trengganu. This is its first record for the mountains of the Peninsula: it was found at about 3,600 ft. under Fraser Hill in the upper part of the valley of the Tras stream (7863) in fruit.

Spermacoce ocymoides, Burm., Hook. f., Fl. Brit. Ind., 3, p. 200: *Borreria ocimoides*, D.C.: Koorders, 3, p. 281. A small herb, a weed very wide through the Tropics, but not yet universal in the Malay Peninsula. It has reached the Gap, but has not ascended to Fraser Hill.

COMPOSITAE,

Adenostemma Lavenia, O. Kze.: Merrill, p. 587: *A. viscosum,* Forst.: King and Gamble, Mat., 74, pt. 2, p. 28: Koorders, 3, p. 316. A pantropic herbaceous weed, following man, not yet

abundant in the Malay Peninsula, but probably increasingly spreading. At Fraser Hill it occurs about the mines, and particularly in the old workings of the upper Tras valley (s.n.)

Ageratum conyzoides, Linn.: King and Gamble, Mat., 74, pt. 2, p. 29: Koorders, 3, p. 317: Merrill, p. 587. A pantropic herbaceous weed, very common in the Peninsula but except for a specimen from Bukit Kutu and another got in a Sakai clearing in Telom unrecorded for the hills. It occurs at Fraser Hill up to 4,100 ft.,

Erigeron linifolius, Willd.: King and Gamble, Mat., 74, pt. 2, p. 872: Koorders, 3, p. 322: Merrill, p. 587. A herbaceous weed, more or less pantropic, scattered through the Malay Peninsula, but hitherto there have been no records of its occurrence in the mountains. It occurs in the mined area both at Fraser Hill and in the upper Tras valley below, in flower and fruit (s.n.).

Vernonia arborea, Buch.-Ham.: King & Gamble, Mat., 74, pt. 2, p. 26: Koorders, 3, p. 314: Merrill, p. 586. A tree distributed in southern India and Ceylon where it ascends to 5000 ft., in north-eastern India, not including the Himalaya, thence southwards through Burma into Sumatra and down through western Malaysia, on to Celebes and in north-eastern Malaysia in the Philippines. It ascends to 6500 ft. in Java. In the Peninsula it occurs through the lowlands, and the only specimens which have been seen from its mountains are those from Fraser Hill (7846), and some collected by Mr. Ridley. It was seen as a tree 25 ft. high in fruit.

Blumea balsamifera, D. C.: King & Gamble, Mat., 74, pt. 2, p. 33: Koorders, 3, p. 324: Merrill, p. 587. A big almost woody herb, distributed from the central Himalaya down through the hilly parts of Burma to Malaysia, in Java, where it is more common in mid and east Java than in west Java; in the Peninsula it occurs throughout the lowlands except deep in the forests. It occurs at Fraser Hill up to 4100 ft. in some abundance.

Bidens pilosa, Linn.: King & Gamble in Mat., 74, pt. 2, p. 45: Koorders, 3, p. 339: Merrill, p. 589. A herbaceous weed pantropic, not uncommon through the Malay Peninsula in the lowlands and not absent from the hills though few have taken the trouble to record any observations on it. Mr. Ridley, however says of it, that it is found in Sakai clearings in the mountains of Telom. It was found under Fraser Hill in the mine area of the upper Tras valley at 3300 ft. (7880) in flower.

Erechtites valerianaefolia, D. C.: Koorders, 3, p. 342: Merrill, p. 589. A herb of American origin becoming pantropic; in the Peninsula as yet rare; but occurring in Sumatra, Java (which it reached in 1845 with coffee seed) Dutch Borneo. It is found at Fraser Hill (s.n.)

Gynura bicolor, D. C.: King & Gamble, Mat., 74, pt. 2, p. 40. A herbaceous weed occurring in southern China and down to Malaysia, where it occurs up and down the Peninsula: found plentifully about the mines at Fraser Hill (s.n.) in fruit.

Gynura sarmentosa, D. C.: King & Gamble, Mat., 74, pt. 2, p. 39: Koorders, 3, p. 344: Merrill, p. 590. A sprawling herb, distributed from Siam into Sumatra and western Malaysia generally and through to the Philippine islands and New Guinea: in Java it is more common in the western end than elsewhere. In the Peninsula it occurs in the plains southward to Singapore, and it has been recorded for the mountains thus,—the Taiping hills, and the Main range from the mountains of Telom to the old road from Kuala Lumpur into Pahang. It was found under Fraser Hill at 5300 ft. towards the Gap in flower and in fruit (7763) on a cleared hill side.

Emilia sonchifolia, D. C.: King & Gamble, Mat., 74, pt. 2, p. 38: Koorders, 3, p. 345: Merrill p. 590. A herbaceous pantropic weed, common through the Peninsula, and recorded as ascending high upon the Taiping hills. It was found but not abundantly at 4000 ft. at Fraser Hill, and under it in the mine area of the upper Tras valley (7826).

CAMPANULACEAE.

Pratia begoniifolia, Lindl.: Koorders, 3, p. 303. A small creeping herb distributed from the central Himalaya and southern China through Burma to Sumatra, the Malay Peninsula and Java: in the Peninsula it occurs in the Main range from G. Kerbau to G. Menuang gasing. At Fraser Hill it is quite common about clearings, and possibly owes its abundance there more to man than to landslides.

Pentaphragma Scortechinii, King & Gamble, Mat., 74, pt. 2, p. 53: An herb of forest, distributed through the Peninsula and reaching Lingga. In the north of the Peninsula it is generally upon hills, but it reaches sea-level in Singapore and southern Johore: it occurs in Penang, in the Taiping hills, at 3000-4000 ft., on G. Tahan, on the Main range from G. Kerbau and the mountains of Telom and G. Bujong Malaka into Negri-Sembilan on Bukit Sutu: it is also on the hills of the Dindings, on G. Keledang near Ipoh, and on G. Pulai in Johore. At Fraser Hill it is not uncommon and was in flower (8625).

VACCINIACEAE.

Agapetes Griffithii, C. B. Clarke: King & Gamble, Mat., 74, pt. 2, p. 59. A woody epiphyte with a swollen tap root, functioning as a store for water, endemic and montane, found on the Taiping hills, on the Main range at G. Batu Putch and now at Fraser Hill, and old specimens are labelled "Malacca," which means Mt. Ophir.

At Fraser Hill it is common (7828). These Fraser Hill plants have the calyx slightly larger than the Taiping hills plants.

Agapetes micrantha, Ridl. ms in Herb. Singap. A shrub, endemic and very local in the Main range, having been collected first at Fraser Hill and now on Pine-tree hill (8537), but without flowers.

Pentapterygium Scortechinii, King & Gamble, Mat., 74, pt. 2, p. 60. A woody epiphyte endemic, and montane, occurring upon the the Main range from the mountains of Telom to Pine-tree hill where it was found at 4800 ft. in flower and in fruit (8548). King's collector gave its altitude as about 4500 ft. in Perak.

ERICACEAE.

Diplycosia latifolia, Blume: King & Gamble, Mat., 74, pt. 2, p. 71: Koorders, 3, p. 8: Merrill, p. 464. A small shrub, with an abnormal distribution as follows,—in Sumatra, in the Peninsula on G. Tahan, on the Main range in Perak and down to Bukit Etam, on Benom, in Borneo in Dutch Borneo and in Java upon Tosari near the eastern end of the island. It was found in fruit at Pine-tree hill (8532).

Diplycosia sp.: Merrill, p. 464: *Vaccinium microphyllum,* King & Gamble, Mat., 74, pt. 2, p. 62. A shrub, apparently endemic occurring on Kedah peak on the Taiping hills, on the Main range from G. Batu puteh to Bukit Etam, and on Mt. Ophir. At Fraser Hill it is very abundant (7895, 8942).

Rhododendron Wrayi, King & Gamble, Mat., 74, pt. 2, p. 75. A shrub, endemic and montane, found on G. Tahan, and on the Main range on G. Kerbau, in the mountains of Telom and southwards to G. Ulu Semangkok. It was found to be one of the most abundant of woody plants upon the top of Pine-tree hill, and was in fruit (8539).

Rhododendron jasminiflorum, Hook. f.: King & Gamble, Mat., 74, pt. 2, p. 88: Koorders, 3, p. 7: Merrill, p. 461. A shrub in distribution from Sumatra, in the Malay Peninsula and in Borneo: it is doubtful if it has occurred wild in Java. In the Peninsula it occurs on Kedah peak, on the Taiping hills, on G. Tahan, on the Main range in the mountains of Telom and down to Fraser Hill; and it occurs on Mt. Ophir. It was found in flower at Fraser Hill (8427).

Rhododendron malayanum, Jack: King & Gamble, Mat., 74, pt. 2, p. 78: Koorders, 3, p. 6: Merrill, p. 462. A shrub generally epiphytic, distributed through western Malaysia in Sumatra, the Peninsula, western Java and Borneo: in the Peninsula on the Taiping hills on G. Tahan, on the Main range from G. Kerbau to Bukit Etam and on Mt. Ophir. It is common about Fraser Hill, and was in flower and in fruit (7815, 8436); and

thence it continues to Pine-tree hill (8545). The statement that it occurs in Penang is an error as far as it is based upon the Singapore herbarium, where a specimen from Taiping hills has been mislabelled "Penang."

Vaccinium bancanum, Miq.: King & Gamble, Mat., 74, pt. 2, p. 64: J. J. Smith in Meded. Dept. Landbouw, 18, p. 159: Merrill, p. 465. A small tree found in the Malay Peninsula, in Bancka, in Borneo and Billiton and in a variety in Java. It occurs at Fraser Hill upon the vein-quartz ridges and was in flower (8928). In the Peninsula it grows on the Taiping hills, on the Main range about the Semangkok pass, and on Mt. Ophir.

MYRSINACEAE.

Maesa perakensis, Ridl. in Jour. F. M. S. Mus. 4, p. 45. A bush, endemic and montane, distributed in the Taiping hills and upon the Main range from the mountains of Telom to the Semangkok pass. At Fraser Hill and in the upper Tras valley below it, it is not at all uncommon and was in flower and in fruit (s.n.)

Embelia Ribes, Burm. f.: King & Gamble, Mat., 74, pt. 2, p 104: Koorders, 3, p. 30: Merrill, p. 476. A woody climber, of wide distribution, extending from the central Himalaya to Ceylon and from southern China down into Malaysia in Sumatra, the Peninsula west Java and northern Borneo. In the Peninsula it is through the low country: it ascends into the mountains of Telom, and was found in fruit at Fraser Hill (8619).

Labisia pumila, Benth. & Hook. f.: King & Gamble, Mat., 74, pt. 2, p. 115: Koorders, 3, p. 30: Merrill, p. 473. A half-woody herb, variable, and of rather general distribution in Indo-china and through Malaysia, from Sumatra, through the Peninsula, and Java, in Borneo and to the Philippines: it is in all parts of the Peninsula down to Singapore, and in the Dutch islands south of Singapore and in the Taiping hills and Main range is developed into the variety *alata*. It is very common at Fraser Hill, (8450), but at the season of our visit generally sterile.

Labisia longistyla, King & Gamble, Mat., 74, pt. 2, p. 117. A half-woody herb, endemic and montane, very restricted apparently on the Main range where it has been collected only on the section between G. Kerbau and the mountains of Telom and the Semangkok pass. At Fraser Hill it is much less common than *L. pumila*, but in ascending to Pine-tree hill it gradually increases in abundance (8538), until it has replaced the other. Its leaves are of a lighter green than those of *L. pumila*, and its fruits a trifle larger.

Ardisia retinervia, Ridl. in Jour. Linn: Soc. Bot. 38, p. 315. A shrub, endemic and montane, described upon specimens collected on G. Tahan above 5000 ft., and now its range is extended to Fraser Hill, where it is one of the species growing upon the vein-quartz ridges (7833).

Ardisia chrysophyllifolia, King & Gamble, Mat., 74, pt. 2, p. 123. A small shrubby plant, endemic and local, found on the Main range from G. Kerbau and Ridley's G. Berumban and G. Batu puteh to G. Ulu Semangkok. It is frequent at Fraser Hill, in flower (8528), as well as in fruit (8559), and was found on the south east side of the Gap upon G. Ulu Semangkok.

Ardisia colorata, Roxb.: King & Gamble, Mat., 74, pt. 2, p. 130: Koorders, 3, p. 28: Merrill, p. 470. A small tree of rather wide distribution,—from north-eastern India through Burma into Sumatra, the Peninsula and Borneo, and to mid Java: in the Peninsula it is general in the low country and upon the mountains normally at any rate to 2000 ft.: it ascends higher also— thus to the crest of the hills in Penang at 2500 ft., on the Taiping hills, and on the Main range on G. Kerbau, on Ridley's G. Berumban and elsewhere and at Fraser Hill it is abundant about 4000 ft. and attains 50 ft. in height. It is at the Padang Batu on Mt. Ophir. Our no. (8514) is the type and our no. (8698) is the variety *complanata.* The Malays call it Nielo utan.

Ardisia rosea, King & Gamble, Mat., 74, pt. 2, p. 150. A small shrub, endemic and montane, distributed on the Taiping hills, on G. Tahan and on the Main range from the mountains of Telom to the G. Ulu Semangkok, where we got it in flower (8891).

Ardisia Maingayi, King & Gamble, Mat., 74, pt. 2, p. 151. An undershrub, of 2-3 ft., endemic and apparently montane, occurring on G. Tahan, on the Main range from the mountains of Telom to G. Ulu Semangkok, and then on Mt. Ophir (Maingay's "Malacca" specimens doubtless being thence). We found it at Fraser Hill (8410), and on G. Ulu Semangkok (8874).

SAPOTACEAE.

Payena? A Sapotacea occurs on the ridge of Fraser Hill, possibly of this genus, a tree 100 ft. high (7766) of which no more than the foliage could be obtained.

EBENACEAE.

Diospyros Scortechinii, King & Gamble, Mat., 74, pt. 2, p. 212. A tree, endemic, montane except that it appears to occur low down in P. Tiuman off the east coast: in Penang, in the Taiping hills, and on G. Bubu, in the Main range from G. Bujong Malaka to Ginting Bidai east of Kuala Lumpur. It was collected in fruit on G. Ulu Semangkok (8883).

Maba perakensis, King & Gamble, Mat., 74, pt. 2, p. 205. A small tree, recorded only from Perak (no exact locality). At Fraser Hill about 30 ft. high, with blackish bark and small fruits (7855).

Maba sp. A small tree, resembling the preceding, apparently hitherto undescribed (7851).

STYRACEAE.

Symplocos ophirensis, C. B. Clarke: King & Gamble, Mat., 74, pt. 2, p. 246. A bush, endemic and montane, occurring on G. Bubu on the Main range from the Semangkok pass southwards to G. Mengkuang lebar between 3800 and 5000 ft., and on Mt. Ophir. We found it at the Trigonometrical station immediately south-east of the Gap of the Semangkok pass in fruit (8873). Its flowers have been obtained in December and May-June on Mt. Ophir; in January-February on G. Mengkuang lebar; and in August-September in the Semangkok pass.

Symplocos rubiginosa, Wall.: King & Gamble Mat., 74, pt. 2, p. 247: Merrill, p. 488. A tree, distributed in the interior of western Malaysia,—in Sumatra, in the Peninsula and in Borneo. In the Peninsula it occurs in the hilly districts in the north, but descends to the sea-level in the south. It was found in fruit at 4000 ft. (8597).

Symplocos sp. A species of this genus near *S. perakensis*, King & Gamble, was found about Fraser Hill (7780, 8614). It differs from *S. perakensis* in the calyx and in the presence of teeth along the leaf margin

OLEACEAE.

Jasminum Griffithii, C. B. Clarke: King & Gamble, Mat., 74, pt. 2, p. 257. A woody climber, endemic, occurring from Penang, down to Singapore upon the west side of the Peninsula, and now found in the Main range at Fraser Hill in fruit (7817).

Jasminum Scortechinii, King & Gamble, Mat., 74, pt. 2, p. 264. A woody climber endemic and montane, occurring on the crest of the hills in Penang, on the Taiping hills from 1500 to 4000 ft., and now recorded from Fraser Hill where it is plentiful, but it was not seen in the direction of Pine-tree hill, where the land rises above 4300 ft. It was in flower (8403), its flowers very fragrant, and also, but rarely, in fruit (8954).

APOCYNACEAE.

Alyxia pumila, Hook. f.: Gamble, Mat., 74, pt. 2, p. 420. A climber, thick leaved, endemic, occurring in the Main range from G. Bujong Malaka to the Semangkok pass and perhaps on Mt. Ophir, found in flower at Fraser Hill (8566, 8575), and at the Trigonometrical station immediately above the Gap on its south-east side (8871).

Alyxia Forbesii, King & Gamble: Gamble, Mat., 74, pt. 2, p. 420. A climber occurring in Sumatra and in the Malay Peninsula and in Java; montane, in Penang (formerly, but perhaps no longer) on the Taiping hills, on the Main range from the mountains of Telom to G. Mengkuang lebar, on Benom, and on G. Pulai in Johore. It was obtained at Fraser Hill at 4300 ft. (7839).

ASCLEPIADACEAE.

Dischidia astephana, Scortechini: Gamble, Mat., 74, pt. 2, p. 582. A herbaceous epiphyte, endemic, and montane, occurring in the Taiping hills from 3600 ft. upwards, on G. Tahan, on the main range from G. Bujong Malaka to Bukit Etam, on Benom, and lastly in Ulu Kuantan at a fairly low level. It occurs at Fraser Hill and forward to the summit of Pine-tree hill at 4800 ft. (8530) in flower and in fruit.

Dischidia albida, Griff.: Gamble, Mat., 74, pt. 2, p. 588. A herbaceous epiphyte, endemic, occurring on the Taiping hills, on G. Tahan, on the Main range from G. Batu puteh to the Semangkok pass, on Mt. Ophir and on G. Pulai. It was got near Pine- tree hill at 4600 ft. (8643) carrying its greenish white flowers.

Dischidia Scortechinii, Gamble, Mat., 74, pt. 2, p. 592. A herbaceous epiphyte, endemic and assuredly montane, but the locality whence the type came is unrecorded. We obtained it at Fraser Hill (8411) bearing its creamy white flowers.

Dischidia rosea, Ridl., in Jour. St. Br. Roy. As. Soc., 61, p. 31. A herbaceous epiphyte, endemic and local: the type came from the neighbourhood of Fraser Hill, where we found it carrying its pretty rose-pink flowers (8652).

LOGANIACEAE.

Fagraea oblonga, King & Gamble; King, Mat., 74, pt. 2, p. 612. A woody epiphyte, endemic and montane, distributed in the Taiping hills, and on the Main range from the mountains of Telom to the Semangkok pass. It was obtained at Fraser Hill in fruit (7861).

Fagraea sp. A shrub in half-ripe fruit, differing from the only specimen of *F. lanceolata* Blume, which we have seen, in having more mucronate leaves. *F. lanceolata* occurs in the Malay Peninsula only in Perak; and it is in Java. The Fraser Hill specimens bear the no. 7821.

Strychnos Scortechinii, A. W. Hill in Kew Bull. 1917, p. 168. A woody climber, endemic and montane, or submontane; it occurs under the west slope of the Taiping hills, and under the west slope of the Main range in Perak and Selangor as far south as Kuala Lumpur. We obtained it in the Valley at Fraser Hill (8675) carrying its grey-green fruits.

Gaertnera intermedia, Ridl. in Jour. F. M. S. Mus. VI, p. 163. A shrub, endemic and montane, quite local: the type came from the Semangkok pass, and we found it in flower and in fruit at Fraser Hill and forward to Pine-tree hill (7823, 8608, 8521, 8864 and s.n.) in flower and in fruit.

Gaertnera Koenigii, Wight: King, Mat., 74, pt. 2, p. 623: Koorders, 3, p. 276. A large shrub, with a broken distribution, in

Ceylon, where it is very common from sea-level up to 3000 ft., and in the Malay Peninsula on Kedah peak, on the Taiping hills, on the Main range from G. Kerbau and the mountains of Telom to G. Mengkuang lebar: it was obtained a century age in Singapore. C. B. Clarke, who of Malayan material had the Singapore specimen alone before him named it as a variety *oxyphylla* in Sir Joseph Hooker's Flora of British India 4. p. 91. Koorders states that its record for Java is an error. The flowers are very fragrant (8552, 8579).

BORAGINACEAE.

Tournefortia Wallichii, D. C.: King, Mat., 74, pt. 2, p. 280; A half-woody herb, occurring in the Nicobars, and in the Malay Peninsula from Lower Siam down to Singapore, in Sumatra and perhaps also in Java: found below Fraser Hill in the mined area of the upper Tras valley (7862), in flower.

CONVOLVULACEAE.

Lettsomia adpressa, Miq.: Prain, Mat., 74, pt. 2, p. 324. A woody climber, endemic, occurring in the lowlands of the Peninsula from Penang to Malacca; and found at the Gap in the Semangkok pass by the roadside as if a recent intruder, in flower (8884).

Lettsomia penangiana, Miq.: Prain, Mat., 74, pt. 2, p. 325. A woody climbing endemic, montane and submontane in the Peninsula, occurring in Penang to the crests of the hills, in the Taiping hills up to 4000 ft., and now found on the Main range at Fraser Hill up to 4000 ft. (7770, 8629). It carried its flowers and its magenta fruit, and occurred in cleared places.

SOLANACEAE.

Solanum nigrum, Linn.: Prain, Mat., 74, pt. 2, p. 329. Koorders, 3, p. 164. A herb, pantropic and extending into temperate countries all round the World. In the Peninsula scattered chiefly about the more cultivated regions. It is not yet recorded as present in Borneo. At Fraser Hill and in the mined area of the upper Tras valley it occurs plentifully, and was both in flower and in fruit.

Solanum verbascifolium, Linn.: Prain, Mat., 74, pt. 2, p. 329: Koorders, 3, p. 165: Merrill, p. 522. A half-woody herbaceous shrub, pantropic. In the Peninsula here and there throughout the more cultivated regions. At Fraser Hill a result of the interference of man, and plentiful in the old mines.

SCROPHULARIACEAE.

Scoparia dulcis, Linn.: Prain, Mat., 74, pt. 2, p. 362: Koorders, 3, p. 180: Merrill, p. 525. An American herb rapidly be-

coming pantropic: in the Peninsula not uncommon in the lowlands, where most settled. At Fraser Hill found by the old dam which is at 4100 ft.

GESNERACEAE.

Cyrtandra pilosa, Blume: Ridley, Mat., 74, pt. 2, p. 791. Kooders, 3, p. 200. A herb about 3 ft. high, occurring in Tenasserim, Sumatra the Malay Peninsula and in west Java. In the Peninsula found in Penang, on the Taiping hills, on the Main range from the neighbourhood of the Semangkok pass to Bukit Sutu in Negri-Sembilan, and on G. Pantai and G. Pulai in Johore. At Fraser Hill it occurs not as a shrub as described in the Flora of British India, but as a half-woody herb about 3 ft. high; and is found in gullies by water: it was in flower and with half ripe fruit (7890, 8615, 8950).

Agalmyla staminea, Blume: Ridley, Mat., 74, pt. 2, p. 738: Koorders, 3, p. 195. A beautiful epiphytic herb, distributed from Sumatra, into the Malay Peninsula and in west and mid Java. In the Peninsula it occurs from 1000 to 3500 ft. on the Taiping hills, and on the Main range it occurs from G. Kerbau, and G. Bujong Malaka to the Semangkok pass. Its elevation in Java is from 4300 to 5000 ft. At Fraser Hill it is common, but it was rarely in flower (8587).

Aeschynanthus perakensis, Ridl.: Ridley, Mat., 74, pt. 2, p. 734. An epiphyte and also on rocks, herbaceous, endemic, occurring on the Taiping hills and on the Main range from G. Kerbau and the mountains of Telom to the Semangkok pass. It was found by us at Fraser Hill (7888) and in the upper Tras valley at 3600 ft. (8859) in flower.

Aeschynanthus longicalyx, Ridl.: Ridley, Mat., 74, pt. 2, p. 735. A beautiful herbaceous epiphyte, endemic and confined to the Main range from G. Kerbau and the mountains of Telom to G. Mengkuang lebar. It occurs at Fraser Hill (Hose 46) and was found by us at Pine-tree hill (8531) in flower.

Aeschynanthus lobbiana, Hook.: Ridley, Mat., 74, pt. 2, p. 735: Koorders, 3, p. 194: *Trichosporum lobbianum*, O. Kze. Merrill p. 550. An epiphyte, herbaceous, distributed in the interior of western Malaysia, Sumatra, the Peninsula, and Borneo, and recorded as occurring in Java, but the record is not properly authenticated. In the Peninsula on G. Raya in Lankawi, on Kedah peak, on the Taiping hills: on the Main range from G. Kerbau to the neighbourhood of Kuala Lumpur, on Mt. Ophir, and on G. Pulai in Johore, also on the east coast from Kuantan and down to Singapore and at a low level at Ayer Panas in Malacca. It was in flower on Pine-tree hill (8549), its flowers very large.

Aeschynanthus sp. A common epiphyte about Fraser Hill found in flower (8418 and s.n.) and appearing to be a species new to the Peninsula.

Cyrtandromoea megaphylla, Hemsl.: Ridley, Mat., 74, pt. 2, p. 788. A rather coarse herb, endemic, found on Kedah peak, on the Taiping hills, on the Main range from the mountains of Telom to Ginting Peras in Selangor. It was found, 4-5 ft. high at Fraser Hill on cleared ground at 4100 ft. (8560) carrying its large white flowers well under the leaves.

Didymocarpus flavescens, Ridl.: Ridley, Mat., 74, pt. 2, p. 749. A herb, endemic and local, occurring only about the Semangkok pass, and once collected under it near Kuala Kubu. It was both in bud and in fruit (8637).

Didymocarpus sp., intermediate between *D. flavescens* and *D. hirta*, with the leaves of the former and the large flowers of the latter was collected (8440).

Didymocarpus crinita, Ridl.: Ridley, Mat., 74, pt. 2,p. 748: A herb relatively tall among the Didymocarps, endemic and local, known only from the neighbourhood of the Semangkok pass. It was plentiful and in flower (8404, 8572, 8580, 8670) at Fraser Hill.

Didymocarpus malayana, Hook.: Ridley, Mat., 74, pt. 2, p. 752. A herb with beautiful yellow flowers, endemic, and apparently confined to the Main range, whereon it occurs from G. Kerbau and G. Bujong Malaka to Ginting Bidai. It occurs in some abundance about Fraser Hill and was in flower and rarely in fruit (8640).

Didymocarpus platypus, C. B. Clarke: Ridley, Mat., 74, pt. 2, p. 757: A white-flowered herb, distributed in Sumatra and the Malay Peninsula. In the Main range it occurs from G. Batu Puteh southwards to G. Angsi, descending the slopes to quite low levels, and in the south of the peninsula it reaches sea-level at Singapore. It was not easily found at Fraser Hill, but carried flowers (8949).

Didymocarpus quinquevulnera, Ridl.: Ridley, Mat., 74, pt. 2, p. 758. A rather untidy herb with a very pretty flower, endemic, occurring on G. Tahan, and upon the Main range from G. Kerbau to the neighbourhood of Kuala Lumpur where it descends to quite low levels. About Fraser Hill it was at the time of our visit the most evident of the Didymocarps upon the slopes of the ridges, generally with violet flowers, the throat white (8610), but sometimes with white flowers (8611).

Didymocarpus crinita, Ridl.: Ridley, Mat., 74, pt. 2, p. 748: Merrill, p. 527. A herb, montane and submontane in the Peninsula, extending to Borneo. In the Peninsula occurring on Kedah peak, on the Penang hills, on the Taiping hills, on the Main range from G. Kerbau and near Tapah to Bukit Tangga near Seremban and down the slopes on the west side almost to the base, at Temerloh in Pahang and on G. Pulai in Johore. At Fraser Hill it is common in the variety *Curtisii*, and carried deep violet flowers (8563, 8652).

Didymocarpus venusta, Ridl.: Ridley, Mat., 74, pt. 2, p. 760. A pretty white flowered herb, endemic and montane, restricted to the Main range from G. Bujong Malaka and the mountains of Telom to the Semangkok pass. It was just coming into flower at 4300 ft. (7894) in damp places at Fraser Hill.

Didymocarpus pumila, Ridl.: Ridley, Mat., 74, pt. 2 p. 763. A small herb, with a pretty deep violet flower, which is endemic and local. It was described from the Semangkok pass and occurs at Fraser Hill on one of the vein-quartz ridges (8657). It was in flower and in fruit.

ACANTHACEAE.

Thunbergia alata, Sims: C. B. Clarke, Mat., 74, pt. 2, p. 632: Koorders, 3, p. 213: Merrill, p. 538. An african herbaceous climber, which is gradually becoming pantropic: in the Peninsula as yet only in a few places. It occurs on the roadside near the Gap.

Staurogyne subglabra, C. B. Clarke, Mat., 74, pt 2, p. 640. A half woody herb, endemic, found on Kedah peak, on the Taiping hills and on the Main range from the mountains of Telom to the Semangkok pass. We found it in the valley at Fraser Hill in flower (7781).

Strobilanthes hirtisepalus, C. B. Clarke, Mat., 74, pt. 2, p. 656. A weak shrub, endemic, occurring on Kedah peak, on the Taiping hills and on the Main range in the mountains of Telom. We found what is believed to be it, flowerless, at Fraser Hill in forest (8616).

Filetia hirta, Ridl. in Jour. Str. Br. Roy. As. Soc. 61, p. 35. A creeping herb, endemic and local found only upon the Main range in the neighbourhood of the Semangkok pass. It is quite common at Fraser Hill with lemon yellow flowers (8408, 8576) or with salmon yellow flowers (8577). The Hon'ble Mr. G. Hose obtained it in flower in July, and Mr. Ridley in August.

Filetia paniculata, C. B. Clarke Mat., 74, pt. 2, p. 670. A tall herb, endemic, and of restricted distribution upon the Main range, having been collected by Scortechini at some unrecorded part of Perak, and by Ridley near the Semangkok pass. It was found by us 6 ft. high in forest at Fraser Hill (8601) with pale yellow flowers.

Justicia subalternans, C. B. Clarke, Mat., 74, pt. 2, p. 685. A herb, endemic and local, described from specimens collected about the foot of the Main range in Perak. The specimens from Fraser Hill diverge slightly, and therefore some doubt exists as to the determination of our specimens: they bear the number 8441. They carried pale yellow flowers and a few fruits.

VERBENACEAE.

Vitex gamosepala, Griff.: Gamble, Mat., 74, pt. 2, p. 855. Merrill, p. 514. A small tree occurring in Sumatra, the Malay

Peninsula and Borneo: in the Peninsula it is mostly submontane: it is found from Lower Siam (Tomoh) to Singapore down both sides of the Peninsula: how far it ascends the hills is not yet to be recorded. It was found at Fraser Hill upon the edge of forest; but would scarcely owe its presence in the station to the clearing by man (7793), in flower.

Clerodendron deflexum, Wall.: Gamble Mat., 74, pt. 2, p. 828. A small shrub, in distribution endemic, in the north of the Peninsula montane or submontane, but descending low in the south: it occurs on Kedah peak at 1500 and 3500 ft., on the Penang hills from 500 ft. upwards; on the Taiping hills, on G. Tahan on the Main range from the mountains of Telom to the neighbourhood of Kuala Lumpur, on Benom, in Malacca, Johore and Singapore as well as on the coast of Pahang. At Fraser Hill in flower (7819).

Clerodendron diversifolium, Blume: Gamble, Mat., 74, pt. 2, p. 829: Koorders, 3, p. 137: Merrill, p. 516. A shrub, distributed through western Malaysia, Sumatra, the Peninsula, Java, and Borneo. In the Peninsula throughout at low levels, and on the mountains, though little observed. It was found not uncommonly ascending to 4300 ft. at Fraser Hill, in flower (7782).

Clerodendron paniculatum, Linn.: Gamble, Mat., 74, pt. 2, p. 838. A tall herb extending from Siam through the low country of the Malay Peninsula to Singapore, found under Fraser Hill in the upper Tras valley at about 3300 ft. (8861).

LABIATAE.

Hyptis brevipes, Poit.: Prain, Mat., 74, pt. 2, p. 704: Koorders, 3, p. 153: Merrill, p. 520. A herb of American origin, now pantropic, found in the more thickly populated parts of the lowlands of the Peninsula, and occurring at 3300 ft. under Fraser Hill in the direction of the Gap by new buildings (7773) in fruit.

Gomphostemma sp. near *G. oblongum* Wall., but with a white corolla, was found at Fraser Hill in deep shade (8650).

PLANTAGINACEAE.

Plantago major, Linn.: Prain Mat., 74, pt. 2, p. 727: Koorders, 3, p. 231: Merrill, p. 543. A herb, common round the World in temperate countries, and invading the tropics with the help of man, persisting with a little encouragement about villages even in Singapore island. At Fraser Hill observed at 4100 ft. and under Fraser Hill in the mine area of the upper Tras valley.

AMARANTACEAE.

Amaranthus viridis, Linn.: Gamble, Mat., 75, p. 11: Koorders 2, p. 197: Merrill, p. 246. A pantropic herbaceous weed, frequent through the Malay Peninsula, and found under Fraser Hill at 3300 ft. in flower and fruit, by new buildings.

POLYGONACEAE.

Polygonum chinense, Linn., Gamble, Mat., 75, p. 22: Koorders, 2, p. 184: Merrill, p. 245. A herb occurring on the mountains of southern India and Ceylon; in the Himalaya and through China to Japan, southwards through Burma and Siam to Malaysia, where it occurs in Sumatra, the Peninsula. Borneo, Java, Timor, and the Philippines. It occurs throughout Java both high and low: in the Peninsula it is montane but descends cool mountain streams to the edge of the low country along the Main range from G. Kerbau and the mountains of Telom to the Semangkok pass. At Fraser Hill it is common near the old mines, and newer clearings, (8424), and about the old mines in the upper Tras valley.

NEPENTHACEAE.

Nepenthes sanguinea, Lindl.: Macfarlane, Mat., 75, p. 283: Merrill, p. 285. A half woody climber, occurring in the Peninsula and in Borneo: in the Peninsula found on the Taiping hills and G. Bubu, on G. Tahan, on the Main range from G. Bujong Malaka and the mountains of Telom to Bukit Etam, on Benom and on Mt. Ophir. At Fraser Hill it is by no means uncommon from below at 3500 ft. almost to the summit of Pine-tree hill at 4800 ft. It was in flower and in fruit at 4200 ft. (8630), but not balow (7878).

PIPERACEAE.

Piper stylosum, Miq.: C. de Candolle, Mat., 75, p. 302: Merrill, p. 209. A herb, extending through the interior of western Malaysia,—Sumatra, the Malay Peninsula and Borneo. In the Peninsula it is chiefly montane, occurring in the Taiping hills, on G. Tahan, on the Main range from G. Bujong Malaka, and the mountains of Telom to G. Tampin; and at low levels elsewhere particularly in Selangor, and Johore and on P. Tiuman. It is common at Fraser Hill (8439), carrying its white flowers.

Piper semangkoanum, C. de Candolle, Mat., 75, p. 304. A herb, endemic and restricted to the Taiping hills, and the neighbourhood of the Semangkok pass: however on G. Tahan there is a closely allied plant (Md. Haniff & Md. Nur, 8150). At Fraser Hill it occurs sporadic in the forest (8438, 8544), and carried white flowers as well as nearly ripe fruit.

MYRISTICACEAE.

Horsfieldia lemanniana, Warb.: Gamble, Mat., 75, p. 219. A tree, endemic, found chiefly in the lowlands of the west side of the Peninsula but recorded from the Taiping hills, and the lower slopes of the Main range in Perak. It was found at Fraser Hill as a small tree branching like a *Garcinia*, *i.e.* with long stiff side branches, and was in fruit (8679).

LAURACEAE.

Dehaasia? A rather tall tree in fruit with leaves 9 x 3.5 cm. which dry brown (7833), at Fraser Hill.

Cinnamomum rhynchophyllum, Miq.: Gamble, Mat., 75, p. 78. A small tree, occurring in Sumatra and locally in the Malay Peninsula, submontane as in Larut and at Tapah in Perak. This tree, up to 20 ft. high, is plentiful at Fraser Hill: it has been identified from descriptions. It smells strongly of camphor, and carried flowers and young fruit (7758, 8447, 8801).

Cinnamomum mollissimum, Hook. f.: Gamble Mat., 75, p. 82. A tree, endemic, occurring in Penang, on the Taiping hills, on G. Tahan and down the Main range from near Gopeng to Negri Sembilan. At Fraser Hill it occurred as a big tree, with remarkably fragrant bark and white wood (8700), sterile.

Cinnamomum aureofulvum, Gamble, Mat., 75, p. 84. A small tree, endemic and strictly local. It occurs at Fraser Hill on one of the vein-quartz ridges (8940), being sterile in September; it was collected in 1904 by Mr. Ridley on G. Ulu Semangkok; and a somewhat similar plant has been obtained on G. Ulu Kali, a mountain which is again a little further south.

Phoebe cuneata, Blume: Gamble Mat., 75, p. 109: Koorders, 2, p. 265. A tree occurring in the Malay Peninsula and in west Java; found in the Peninsula in the lowlands from Province Wellesley to Singapore, but montane also, as it has been obtained at 4100 ft. on the Taiping hills, and on the Main range at G. Batu puteh. Our Fraser Hill specimens were got with fruit at 4200 ft. (7807), and not altogether agreeing with the lowland plant may prove when the flower is collected to differ. The fruit is green and its pedicel red.

Litsea citrata, Blume: Gamble, Mat., 75, p. 146: Koorders, 2, p. 272: Merrill, p. 276. A small tree widely distributed from the Himalaya and southern China to Malaysia, where it is in Sumatra, the Peninsula, Borneo and Java. In the Peninsula it is montane occurring on the Taiping hills and on the Main range from the mountains of Telom to the Semangkok pass. On the Taiping hills it occurs at 3000 ft. About Fraser Hill it is common on cleared ground and was found in flower at 4000 ft. (s.n.); and it occurs about the old mines in the upper Tras valley. Its white flowers are fragrant. Its smooth green bark is characteristic. It appears suitable for sowing on elevated abandoned mine-areas.

Litsea penangiana, Hook. f: Gamble, Mat., 75, p. 154. A small tree, and montane, occurring in Sumatra and on the crest of the hills in Penang, on G. Bubu, and on the Main range from G. Batu puteh down to the neighbourhood of Kuala Lumpur where it descends to a low level. At Fraser Hill it is common and was in flower and with half ripe fruit (7804, 8448, 8699).

Litsea castanea, Hook. f.: Gamble, Mat., 75, p. 155. A bush or small tree, endemic, occurring in the low country from Larut through Selangor to Malacca; and now found at 4200 ft. at Fraser Hill (7884).

Litsea machilifolia, Gamble, Mat., 75, p. 171. A small tree, endemic, montane or submontane, occurring on the Penang hills at 1000 ft., on the Taiping hills down to the base, on the Main range from G. Batu Puteh to G. Tampin, and in the low country of Malacca and on to Singapore. At Fraser Hill it is common in the forest right to the tops of the hills at 4300 ft., carrying flowers and more commonly its large marble-like green fruits on swollen orange pedicels (7784, 8667, 8809).

Litsea sp. A tree of 60 ft. in height, with some affinity to *L. cordata*, Hook. f., the leaves measuring up to 18 x 9 cm., at Fraser Hill in fruit (7762).

Litsea sp. A small tree in flower and in fruit with leaves measuring up to 11 x 4 cm., at Fraser Hill (s.n.).

Litsea sp. A small tree with harsh leaves measuring up to 14 x 6 cm. in flower on a vein-quartz ridge (8931).

Lindera malaccensis, Hook. f.: Gamble, Mat., 75, p. 194: Merrill, p. 197. A small tree distributed from the Malay Peninsula to Borneo. In the Peninsula from the Larut plains to Singapore at low levels: and this is the first record of its occurrence at some elevation. It was got at 4200 ft. (8689).

Lindera Wrayii, Gamble, Mat., 75, p. 196. A bush, endemic, and in the Peninsula confined to the Taiping hills, and the Main range from the mountains of Telom to the Semangkok pass. We found it as a bush up to 10 ft. in height, both in flower and with fruit (8565, 8569, 8642), and again on G. Ulu Semangkok (8879).

Lindera caesia, Boerl.: Gamble, Mat., 75, p. 200: Merrill, p. 279. A small tree found in the Malay Peninsula, Borneo and Java. In the Peninsula it occurs on the Taiping hills, on G. Tahan, in the Main range near the Semangkok pass and south to G. Mengkuang lebar, its limits being as far as known 3000 and 5000 ft. It was found at Fraser Hill just inside the edge of a gully, in flower (7881) and again in fruit (7769).

Lindera? A tree (7837), found at 4200 ft. appears also to be another species of *Lindera.*

Lindera?. A tree 80 ft. high, and 60 ft. to the first branch was found at 4200 ft. with fruit going pink, which is thought to be a *Lindera* (7857).

CHLORANTHACEAE.

Chloranthus officinalis, Blume: Gamble, Mat., 75, p. 33: Koorders, 2, p. 40: Merrill, p. 209. A half-woody herb, distributed

from the eastern Himalaya and south-western China southwards through Burma the Andamans, and through Malaysia to the Philippines and New Guinea: in Java it occurs from 900 ft. to 6000 ft. In the Peninsula it is found in the lowlands in Penang and elsewhere, and is on the Main range. Below Fraser Hill it was found at 3500 ft. towards the Gap in fruit (7772).

Chloranthus brachystachys, Blume: Gamble, Mat., 75, p. 34: Koorders, 2, p. 41: Merrill, p. 209. A half-woody plant, rather more montane than *C. officinalis*, distributed from southern India and Ceylon and from Japan and the mountains of Assam, southwards through Burma to Malaysia where it occurs in Sumatra the Peninsula, Lingga, west and mid Java and north Borneo. In the Peninsula it is found in Penang, and on the Main range from the mountains of Telom and G. Bujong Malaka to the Semangkok pass. At Fraser Hill it is common and we found it also at the Trigonometrical Station immediately over the Gap on the south-east side (8889) carrying its yellow unripe and red ripe berries.

THYMELAEACEAE

Daphne composita, Gilg: Gamble, Mat., 75, p. 257: Koorders, 2, p. 657. A small shrub, found in Burma, Sumatra, the Malay Peninsula and Java. In the Peninsula it is montane, occurring in the Taiping hills, and the Main range from G. Bujong Malaka to Bukit Kutu. It was found at Fraser Hill (s.n.) in flower.

Wikstroemia candolleana, Meissn.: Gamble, Mat., 75, p. 259: *W. indica*, Mey. Koorders, 2, p. 656. A small shrub distributed in the Malay Peninsula, through Java and in Madura in an unusual way. In the Peninsula it occurs on Kedah peak, the Taiping hills, G. Tahan and G. Bubu (as a variety), the Main range from the mountains of Telom to G. Mengkuang lebar, and on Benom. At Fraser Hill it was found in flower (8932) on the poor soil of one of the vein-quartz ridges.

LORANTHACEAE.

Loranthus pentapetalus, Roxb.: Gamble, Mat., 75, p. 355: Koorders, 2, p. 158: Merrill, p. 259. A woody parasite, distributed from the eastern Himalaya through Burma and Siam to Sumatra, the Malay Peninsula, Borneo, Java and the Philippines. In the Peninsula it occurs at low levels; and the records for the mountains are few: it has, however, been collected on G. Batu puteh at 4000 ft. It was in flower at 4200 ft. at Fraser Hill (7813).

Loranthus coccineus, Jack: Gamble, Mat., 75, p. 356: Merrill, p. 236. A woody parasite, distributed from north-eastern India through Burma, in the Andaman islands, the Malay Peninsula, Bancka and Borneo. In the Peninsula it is fairly general at low levels, and on the lower slopes of the mountains; but its

discovery at Fraser Hill adds greatly to the altitude at which it is known to occur. It was parasitic upon a *Maesa* and in flower (8648).

Loranthus Lobbii, Hook. f.: Gamble, Mat., 75, p. 358. A woody parasite, endemic and not uncommon in the Peninsula at low levels and up to 4000 ft. It has been collected from Kedah peak, Penang, the Taiping hills, on G. Tahan, the Main chain from Perak to G. Mengkuang lebar. It has been said to occur also in Borneo, but apparently in error. It was obtained at Fraser Hill in flower (8687).

Elytranthe formosa, Don: Gamble, Mat., 75, p. 372: Koorders, 2, p. 164. A woody parasite, distributed from Tenasserim, south through the Peninsula, and to west Java. In the Peninsula it is montane and restricted to the Main range from G. Bujong Malaka and G. Batu puteh to G. Mengkuang lebar, and also it has been obtained at Temerloh in Pahang. At Fraser Hill it was upon an undetermined tree at 4200 ft. (8925) coming into flower, and also at Pine-tree hill.

Elytranthe globosa, G. Don: Gamble, Mat., 75, p. 377: Koorders, 2, p. 164. A woody parasite on various trees, distributed from the central Himalaya through Burma, to the Malay Peninsula and to Java. In the Peninsula it is a lowland plant from the north down to Singapore, and this is its first record for the mountains. It was found at Fraser Hill (s.n.) at 4200 ft.

Lepeostegeres Kingii, Gamble, Mat., 75, p. 382. A woody parasite occurring in the Malay Peninsula and Borneo: in the north of the Peninsula montane, in the south descending to sea-level: the mountains upon which it occurs are Kedah peak, the Taiping hills, G. Tahan, the Main range from Ulu Batang Padang to Fraser Hill, Bukit Sedanan in Malacca which just attains 1000 ft., and then in southern Johore it is down near the coast. At Fraser Hill we found it exceedingly common, its very large flowers littering the paths, tattered by birds hunting honey (8692).

SANTALACEAE,

Henslowia buxifolia, Blume: Gamble, Mat., 75, p. 274: Merrill, p. 241. A woody parasite found in the Peninsula, Bancka and Borneo: in the Peninsula at low elevations from Perlis and Penang to Singapore and on the mountains of Kedah peak, the Main range at Fraser Hill, Benom and Mt. Ophir. We found it in flower (7812) at 4300 ft.

Henslowia sp. A woody climber with leaves broadly elliptic, 5.5 x 3.5 cm., of the affinity of *H. Ridleyi*, Gamble, but not it, was got on a vein-quartz ridge at Fraser Hill (8923).

BALANOPHORACEAE.

Balanophora multibracteata, Fawcett: Gamble, Mat., 75, p. 397. A herbaceous parasite occurring in Sumatra and in the Malay Peninsula. In the Peninsula occurring in the Taiping hills and in the Main range from the mountains of Telom to the Semangkok pass. At Fraser Hill it is frequent and was newly in flower: it was traced to the roots of a big woody climber thought to be a Rubiacea (7786).

EUPHORBIACEAE.

Glochidion sericeum, Hook. f., Fl. Brit. Ind. V. p. 326. Koorders, 2. p. 473: Merrill, p. 329. A shrub, distributed in Sumatra, down the Malay Peninsula, in Banka, western Java and Borneo: in the Peninsula it is a lowland plant from Perak and Penang to Singapore on both sides of the Peninsula, and ascending the mountains to some extent. At Fraser Hill it was found on a clearing at 4200 ft. (8944). This is higher than its record for Java of 3700 ft.

Glochidion coronatum, Hook. f., Fl. Brit. Ind. V. p. 326. A shrub occurring in Tenasserim and southwards to Singapore mostly at low elevations but collected along the Main range. At Fraser Hill it carried its pink fruits (8854).

Breynia coronata, Hook. f., Fl. Brit. Ind. V. p. 330. A small tree, endemic, found in Perak first at Ulu Bubong and now got at Fraser Hill in a clearing (7775).

Baccaurea bracteata, Muell.-Arg.: Hook. f., Fl. Brit. Ind. V, p. 372: Merrill, p. 330. A tree distributed in western Malaysia from Sumatra into the Malay Peninsula and to Borneo: in the Peninsula at low elevations in Perak, Pahang and Negri Sembilan: found flowerless at Fraser Hill (7883) and the identification consequently doubtful. The Malays called it Taban burong or bird's gutta-percha.

Antidesma velutinosum, Bl.: Hook. Fl. Brit. Ind. 5, p. 356. A large bush with claret fruits found between Fraser Hill and Pine-tree hill (8515) and again with flowers on G. Ulu Semangkok (8878).

Antidesma fallax, Muell.-Arg.; Hook. f., Fl. Brit. Ind. V, p. 359. A shrub 20 ft. high, endemic, occurring freely at low elevations, submontanely from Lower Siam (Kantang) to Singapore, and ascending the mountains, at any rate the Main range, whereon it has been got on G. Mengkuang lebar at 5000 ft. It occurs at Fraser Hill as a bush up to 4200 ft. (8655).

Macaranga Hullettii, King: Hook. f., Fl. Brit. Ind. V. p. 452: A very quick-growing tree, endemic, occurring down the west side of the Peninsula in swamps and swampy forest, from Perak to Malacca, and now found to be common on Fraser Hill in forest

at 4000 to 4300 ft. (8518): and what is most interesting, it regenerates itself in the one hundred feet high forest. These Fraser Hill specimens have unusually large leaves.

Macaranga puncticulata, Gage. A tree at Fraser Hill up to 50 ft. in height and on Pine-tree hill up to 15 ft. in height, is common in the forest where it is able to regenerate and was in fruit (8522, 8658).

Homalanthus populneus, Pax: Koorders, 2, 506: Merrill, p. 347. *Homalanthus populifolius*, Grah.: Hook. f., Fl. Brit. Ind. V, p. 469. A shrub, distributed from Ceylon (possibly wrong) in Sumatra, the Malay Peninsula, Java, Borneo, Celebes, the Philippines and to north Australia: in the Peninsula occurring in the lowlands from Penang to Selangor, and in Pahang including P. Tiuman. It is in the mountains of Telom: and is common at Fraser Hill, as well as in cleared mine land below it.

ULMACEAE.

Trema orientalis, Blume: Hook. f., Fl. Brit. Ind. 5, p. 484; Koorders, 2, p. 77: Merrill, p. 217. A small tree, widely distributed from India both north and south and from China to Sumatra, the Malay Peninsula, Java, Borneo, and other islands of Malaysia and to Australia and the Pacific, quick to take advantage of the clearings of man, and in the Peninsula wide. At Fraser Hill it occurred near the houses, both in the type (s.n.), and (8632) in the variety *amboinensis*. (*T. amboinensis*, Blume: Hook. f., Fl. Brit. Ind. 5, p. 484).

MORACEAE.*

Ficus rostrata, Lamk.: Hook. f., Fl. Brit. Ind. 5, p. 520: Koorders, 2, p. 110: Merrill, p. 227. A small shrub, distributed from the eastern Himalaya through Burma to the Malay Peninsula, Borneo, Java: and found at Fraser Hill in exposed places, carrying small bright red figs (8599).

Ficus pedunculosa, Miq., reaching ten feet in height with reddish figs (8802) at Fraser Hill.

Ficus diversifolia, Blume: Hook. f., Fl. Brit. Ind. 5, p. 529: Koorders, 2, p. 116: Merrill, p. 529. A small bush distributed from Sumatra through the Peninsula to Borneo, and Java: in the Peninsula it occurs from low levels up to 5000 ft. and it was found at Fraser Hill as a bush up to 10 ft. high in fruit (8920, 8654).

Ficus Burkillii, Ridl. n. sp. A bush with acute leaves, but otherwise near to *F. diversifolia*, at Fraser Hill (8900) and at Pine-tree hill (8529).

Ficus fistulosa, Reinw.: Hook. Fl. Brit. Ind., 5, p. 525: Koorders, 2, p. 120: Merrill, p. 223. A small tree growing in a gully at Fraser Hill in fruit, and with hollowed stems (7886).

*In cosequence of the genus **Ficus** being under revision in Calcutta and the collection belonging to the Singapore Herbarium being on loan the Fraser Hill species cannot be determined fully.

Ficus patens, Ridl., a coarse hairy bush occurring at Fraser Hill in the valley (7776).

Ficus sp. A stiff pubescent bush, with bright red fruits, at Fraser Hill (s.n.).

Ficus fulva, Reinw.: Hook. Fl. Brit. Ind., 5, p. 531: Koorders, 2, p. 117: Merrill, p. 223. A coarse small tree about 20 ft. high with orange to livid figs, in the mined lands of the upper Tras valley about 3500 ft. (7864).

Ficus globosa, Bl.: Hook. Fl. Brit. Ind., 5, p. 503: Koorders, 2, p. 103: Merrill, p. 224. A small tree with big figs, found in the mine area of the upper Tras valley (7872).

Ficus chartacea, Wall.: Hook. Fl. Brit. Ind., 5, p. 533. A bush eight feet high with orange-red figs upon upright branches, at Fraser Hill (7789).

Ficus sp. A pyramidal bush six feet high with brown fruits (8555).

Conocephalus suaveolens, Blume: Hook. f., Fl. Brit. Ind. 5, p. 545: Koorders, 2, p. 122: Merrill. p. 229. A big woody climber, distributed from the eastern Himalaya and Indo-China southwards to Sumatra, the Malay Peninsula, Java, Borneo, and the Philippines: in the Peninsula common widely. At Fraser Hill plentiful.

URTICACEAE.

Pouzolzia viminea, Wedd. Hook. Fl. Brit. Ind., 5, p. 581: Kooders, 2, p. 144: Merrill, p. 233. Shrub about 8 ft. high upon a clearing at 4200 ft. (8948).

JUGLANDACEAE.

Engelhardtia spicata, Blume: Hook. f., Fl. Brit. Ind. V, p. 595: Koorders, 2, p. 51: Merrill, p. 210. A tree, distributed from the central Himalaya, south through Indo-China into the Malay Peninsula, Java, Borneo and to the Philippines. In the Peninsula it is only on the Main range of Perak. At Fraser Hill it is frequent and so also on G. Ulu Semangkok. Ripe fruits were falling.

FAGACEAE.

Quercus sp. near *Q. semiserrata*, Roxb., collected flowerless, a tree about 50 ft. high upon a north slope at Fraser Hill (7753).

Quercus turbinata, Blume: Gamble, Mat., 75, p. 410: Koorders, 2, p. 60. A tree, occurring in Sumatra and in the Malay Peninsula: in the Peninsula found in Penang and on the Main range in Ulu Batang-padang and now at Fraser Hill (8661). It should be collected more for a better understanding.

Quercus cyrtorhyncha, Miq.: Merrill, p. 212: *Pasania cyrtorhyncha*, Gamble, Mat., 75, p. 432. A tree, distributed from Sumatra through the Malay Peninsula and Borneo to Mindanao in the Philippines. In the Peninsula occurring submontanely from

Perak southwards, and to Singapore. At Fraser Hill and below towards the Gap, an oak without flowers and without fruit was found which appears as if this (7783, 7836).

Quercus rassa, Miq.: Koorders, 2, p. 59: Merrill, p. 215: *Pasania Rassa*, Gamble, Mat., 75, p. 436. A tree distributed in western Malaysia from Sumatra, the Malay Peninsula, to west Java and to Borneo. In the Peninsula montane, occurring on Penang, on the Taiping hills, on G. Tahan, on the Main range from Fraser Hill into Negri Sembilan, on Benom, and then at low levels in southern Johore. It reaches 6000 ft. on G. Tahan. At Fraser hill it is common tree (s.n.).

Quercus lucida, Roxb.: *Pasania lucida,* Gamble, Mat., 75, p. 440. A tree, endemic, very common in Penang and extending thence southwards to Singapore, ascending the mountains and recorded as upon G. Batu puteh at 3000 ft. It occurred at Fraser Hill on the ridges, but as the acorns were fallen ones not attached to the parent, there is a trifle of doubt as to the determination (s.n.).

Quercus encleisacarpa, Korth.: *Pasania encleisacarpa,* Gamble, Mat., 75, p. 449. A tree with a wide top and brittle wood, occurring in Sumatra and in the Malay Peninsula: in the Peninsula it occurs at low levels from Penang and Province Wellesley to Singapore. At Fraser Hill it was common in the variety *aperta* (8695).

Quercus beccariana, Benth: Merrill, p. 211: *Pasania beccariana,* Gamble, Mat., 75, p. 453. A tree, with brittle wood, occurring in the Malay Peninsula and in Borneo: in the Peninsula it is said once to have been abundant in Singapore, and it is recorded for Penang. The Fraser Hill specimens have depressed globose acorns (7795) and consequently the identification is somewhat doubtful.

Quercus sp. with very large acorns and cupules covered with processes as in *Q. Wrayi*, found at Fraser Hill (s.n.).

Quercus sp. A tree which was neither in fruit nor in flower (8805).

TAXACEAE.

Dacrydium Beccarii, Parl.: Merrill, p. 30. A small tree occurring in the Malay Peninsula and in Borneo. In the Peninsula it occurs on G. Tahan, on the Main range from G. Bujong Malaka to Pine-tree hill near Fraser Hill (8536), and on Mt. Ophir. On Pine-tree hill it occurs about and on the very top as a tree of 20 ft.

Dacrydium elatum, Wall.: Hook. f., Fl. Brit. Ind., 5, p. 648: Merrill, p. 30. A lofty tree, occurring from Burma and Tonkin to Sumatra, down the Malay Peninsula, in Borneo, the Philippines and in Fiji: in the Peninsula occurring in Penang, on Kedah peak at 3000 ft., on G. Tahan on the Main range in the mountains of Telom, on Mt. Ophir, and on G. Chenik in Pahang. Under Fraser

Hill at about 3400 ft. it occurred as a magnificent tree with a clean straight bole of eighty feet to the first branch, and a total height of one hundred feet and more: it was found also upon G. Ulu Semangkok.

Dacrydium falciforme, Pilger: Merrill, p. 30. A tree, distributed from the Malay Peninsula, in Lingga, through north Borneo to Mindoro in the Philippine islands: in the Peninsula occurring on G. Tahan, and on the Main range in the neighbourhood of the Semangkok pass. It is a most common tree on the vein-quartz ridges of Fraser Hill (8556, 8929), and also elsewhere sometimes sparingly, sometimes in some measure of plenty: ascending above the level of Fraser Hill towards Pine-tree hill: below Fraser Hill it occurs down to 3300 ft. at least and it is on G. Ulu Semangkok. Regeneration appears to be quite free. The Malays call it Kahuwa.

Podocarpus neriifolia, Don.: Hook. f., Fl. Brit. Ind., 5, p. 649: Koorders, 1, p. 65: Merrill, p. 31. A tree, distributed from the Central Himalaya and southern China, to Sumatra, the Malay Peninsula, Borneo, Java, Celebes, the Moluccas, Philippines and to New Guinea. In the Peninsula it occurs as a montane plant in Perang, on G. Tahan as a variety or subspecies, on the Main range from Perak south to Bukit Etam, and on Mt. Ophir. In Java it descends as low as 1200 ft.: but in Penang it exists lower than this. At Fraser Hill it is by no means uncommon (7841, 7856, 8877).

Agathis alba, Foxw.: Koorders, 1, p. 67: Merrill, p. 32: *A. loranthifolia*, Salisb.: Hook. f., Fl. Brit. Ind. 5, p. 650. A lofty tree, distributed in Cochin-china and through the interior of Malaysia, in Sumatra, the Malay Peninsula, Borneo, Java, Celebes, the Moluccas, and the Philippines: in the Peninsula on Kedah peak, in Penang, where it is becoming very scarce, on the Taiping hills, on G. Tahan, on the Main range from near the Semangkok pass, and on G. Chenik in Pahang. Under Fraser Hill it was observed no higher than 3300 ft. upon the west side of the waterparting.

BURMANNIACEAE.

Burmannia longifolia, Becc.: Ridl., Mat., Mono., 2, p. 70: Merrill, p. 133. A herb of mossy places, occurring in the Malay Peninsula and through Borneo to the Philippines and New Guinea: in the Peninsula it occurs on the Taiping hills, on G. Tahan, on the Main range from G. Kerbau and the mountains of Telom to Bukit Etam and on Benom. At Fraser Hill it occurs sporadic, but quite plentifully and was going into fruit (8510): it was also found on G. Ulu Semangkok.

ORCHIDACEAE.

Oberonia pendula, Ridl. in Jour. Str. Br. Roy. As. Soc., 61, p. 38. An epiphyte, endemic and local. It was collected from the neighbourhood of Fraser Hill by Mr. Ridley in 1911 where we got it (7825) in flower and in fruit.

Oberonia spathulata, Lindl. J. J. Smith, p. 238. Distribution in Java, Sumatra, Borneo; occurring as an epiphyte at Fraser Hill (8634).

Liparis compressa, Lindl.: Ridl., Mat., Mono., 1, p. 25: J. J. Smith, p. 280: Ames, p. 153. A herbaceous plant, distributed from Sumatra, in the Malay Peninsula, Borneo, Java Celebes and the Philippines: in the Peninsula occurring in the Taiping hills, and on the Main range from G. Batu puteh to Fraser Hill, where it was found in flower (8893).

Liparis purpureoviridis, Ridl. n. sp. A not uncommon terrestrial plant in the forest (8422) with green purple-veined flowers.

Platyclinis odorata, Ridl., Mat., Mono., 1, p. 28. An epiphyte or on rocks, endemic, occurring on G. Bubu, and on the Main range about Fraser Hill on trees (8423) and below in the upper Tras valley at 3500 ft. on rocks in the sun (8853), plentiful and just in flower.

Dendrobium Kelsalii, Ridl., Mat., Mono., 1, p. 36. A herbaceous epiphyte, endemic, occurring on Kedah peak, apparently in Penang, on the Taiping hills, on G. Tahan, on the Main range from Fraser Hill (8690) to Bukit Etam, on Benom and on Mt. Ophir also on P. Aor off the east coast.

Dendrobium flabellum, Reichb. f.: Ridl., Mat., Mono., 1, p. 36. J. J. Smith, p. 315: Ames p. 189. A herbaceous epiphyte, distributed from Siam to Singapore, in Java and in Borneo, but in need of further study, as being apparently a species in process of breaking up. It is an orchid with flowers that are open for a few hours only in accurate response to some climatic phenomenon: and it is evident that an acceleration or retardation of the rapidity with which the stage between the stimulus and the flowering is passed through, stands for the production of new species as intercrossing is prevented. This seems to be happening: and there seem to be in the Peninsula three subspecies of *D. flabellum*, (1) the plant of Singapore and southern Johore with cream-coloured flowers, the sepals and petals marked with pink spots, the lip cream-coloured with rosy side-lobes (2) the plant of the north with pale green flowers, the sepals and petals spotted with purple, the lip wholly cream and (3) the Fraser Hill plant with the sepals and petals cream-coloured suffused with purple and the lip with the mid-lobe orange. Both the second and the third appeared to have smaller flowers than the first.

Dendrobium atrorubens, Ridl. Mat., Mono. 1, p. 41. A herbaceous epiphyte with a dull cherry-red flower, endemic, found in the Peninsula on Kedah peak, on the Taiping hills, on G. Tahan, on the Main range at Fraser Hill (8672) and on Benom.

Dendrobium hymenopterum, Hook. f.: Ridl. Mat., Mono. 1, p. 52. A herbaceous epiphyte, endemic, on G. Raya in Lankawi, on Kedah peak, on G. Tahan, on the Main range from G. Batu puteh and G. Bujong Malaka to Fraser Hill (8592) and on Benom It was abundantly in flower.

Dendrobium albicolor, Ridl. in Jour. Linn. Soc. Bot. 32, p. 250. A herbaceous epiphyte, known from Lower Siam (Pungah) and now in a pinkish variety from Fraser Hill (7790).

Dendrobium rupicolum, Ridl. in Jour. F. M. S. Mus. 1, p. 184. A small herbaceous epiphyte, occurring on G. Tahan, on the Main range at Fraser Hill (8516) and southwards on Bukit Etam, and on Benom. It was found in flower.

Dendrobium sp. apparently new, a herbaceous wide creeping hirsute epiphyte of a peculiar appearance (7799).

Dendrobium geminatum, Hook. f.: Ridl. Mat., 1, p. 35: J. J. Smith, 346. An epiphyte and on rocks occurring in the Malay Peninsula and in Java: in the Peninsula found on Kedah peak and on the Taiping hills, on G. Tahan, and on the Main range from Ulu Batu Padang to Fraser Hill (7876). Its flowers are of a dull yellow, marked with purple.

Bulbophyllum patens, Hook. f.: Ridl. Mat., Mono. 1, p. 62. A herbaceous epiphyte, endemic, which may be represented by our no. 7792, which was found in fruit upon an oak at Fraser Hill. Until flowers are forthcoming however its occurrence must be doubtful. *B. patens* is in the Peninsula, at low levels from Penang to Singapore.

Bulbophyllum uniflorum, Hassk.: J. J. Smith, p. 443: *B. galbinum*, Ridl.: Mat., Mono. 1, p. 64. A herbaceous epiphyte, in Sumatra, the Malay Peninsula and west Java: in the Peninsula found in the Taiping hills, on G. Tahan at 3300 ft. and on the Main range from the neighbourhood of the Semangkok pass to Bukit Etam: it was found at Fraser Hill in flower (8504).

Bulbophyllum capitatum, Lindl.: Ridl. Mat., 1, p. 73: J. J. Smith, p. 437. Ames, p. 184. A herbaceous epiphyte occurring in Sumatra, in the Malay Peninsula, Borneo and west Java where it is common, being found both at high and low elevations. In the Peninsula it is recorded from Penang, the Taiping hills, G. Tahan, the Main chain from the mountains of Telom to G. Mengkuang lebar, on Benom and on the 1000-feet-high hills near Batu Pahat in Johore. It was found at Fraser Hill (8810) carrying its flame-coloured or yellow flowers.

Bulbophyllum montigenum, Ridl. Mat., 1, p. 76: Ames, p. 188. A herbaceous epiphyte of the Peninsula and Borneo: in the Peninsula hitherto recorded only from Benom, and now recorded also from the Main chain at Fraser Hill (8417), where it was obtained carrying its green flowers.

Bulbophyllum pedicellatum, Ridl. in Jour. Linn. Soc. Bot., 31, p. 278. A herbaceous epiphyte, endemic, occurring in Lower Siam at Poongah and at Khasum, and now found on the Main range at Fraser Hill (7891) coming into flower.

Bulbophyllum minutulum, Ridl. n. sp., a small running herbaceous epiphyte, with straw coloured flowers, found at Fraser Hill (7797).

Bulbophyllum nematocaulon, Ridl. n. sp., a small running herbaceous epiphyte with pale green flowers, found at Fraser Hill (8955).

Bulbophyllum sp, apparently a new species, a small running herbaceous epiphyte near *B. tinea*, Ridl., but differing in having slightly smaller flowers and narrower leaves (8676).

Bulbophyllum sp. Apparently a new species (7822).

Ceratostylis gracilis, Blume: Ridl. Mat., Mono. 1, p. 109: J. J. Smith, p. 300. A small herbaceous epiphyte found in the Malay Peninsula and in west Java: in the Peninsula it occurs on Kedah peak, on Bukit Serava which adjoins Bukit Mertajam in Province Wellesley, on the Taiping hills and G. Bubu, on G. Tahan, on the Main range from G. Kerbau and the mountains of Telom to G. Angsi; and then down upon the coast in southern Johore. At Fraser Hill it is probably the commonest of all orchids (8449, 8517). The figure in the *Icones Plantarum*, 2098, was drawn from an immature flower, and the spur should be twice as long.

Ceratostylis clathrata, Hook. f.: Ridl., Mat., Mono., 1, p. 111. A small peculiarly tough epiphyte, endemic occurring on the Main range from Ulu Batang Badang to Fraser Hill (7800) and also on Benom.

Calanthe angustifolia, Lindl.: Ridl. Mat., Mono. 1, p. 121: J. J. Smith, p. 205. A terrestrial herb of forests found in Sumatra, the Malay Peninsula and in west Java: found in the Peninsula on Kedah peak, on the Taiping hills, on the Main range from the mountains of Telom to the Semangkok pass and on Benom. At Fraser Hill it occurs sporadic upon the crests of the ridges (8525), and was newly in flower. It was found higher than Fraser Hill towards Pine-tree hill, and in the other direction on G. Ulu Semangkok.

Eria latifolia, J. J. Smith, p. 394: *E. iridifolia*, Hook. f.: Ridl. Mat., Mono. 1, p. 90. A herbaceous epiphyte, in Sumatra, the Malay Peninsula and Java: in the Peninsula found only upon the Main range from G. Bujong Malaka and G. Batu puteh to Fraser Hill (7830), in flower.

Eria major, Ridl. Mat., 1, p. 90: Merrill, p. 172. A herbaceous epiphyte distributed from the Malay Peninsula through Borneo to the Philippines. There are two varieties of it at Fraser Hill one with short leaves (8402) and the other with long leaves (s.n.). The short leaved variety occurs in the Taiping hills. The long-leaved variety occurs there also, and on the Main range from G. Kerbau to the Semangkok pass, and also on Benom. They were obtained in flower, and from Fraser Hill extended towards Pine tree hill.

Eria longifolia, Hook. f.: Ridl. Mat., 1, p. 91. A herbaceous epiphte, montane, found in Sumatra, in the Taiping hills, on G. Tahan, and on the Main range from the mountains of Telom to the Semangkok pass, and also it is on Benom. It is very common at Fraser Hill (8419), and carried its snow-white flowers.

Eria pilifera, Ridl. Mat., Mono., 1, p. 92. A herbaceous epiphyte, in Sumatra, and in the Peninsula before this known only from the Taiping hills, found on the Main range at Fraser Hill (7871), in flower.

Eria pauciflora, Blume: J. J. Smith, p. 387: *E. monticola,* Hook. f.: Ridl. Mat. Mono., 1, p. 95. A herbaceous epiphyte, distributed in west Java and the Malay Peninsula: occurring on Kedah peak, on the Taiping hills, on G. Tahan, on the Main range from Fraser Hill to Bukit Etam, and on Mt. Ophir; then again on P. Aor off the east coast. At Fraser Hill it is very abundant (8416, 8638) and it was found also on G. Ulu Semangkok (8881) in flower everywhere.

Eria floribunda, Lindl.: Ridl. Mat. Mono., 1, p. 96: J. J. Smith, p. 400: Merrill, p. 170. A herbaceous epiphyte, distributed from Tenasserim to the Malay Peninsula in Sumatra, Borneo and through Java. In the Peninsula it occurs in Lower Siam, and down the west coast to Singapore; then again it is on the mountains *e.g.* Kedah peak, the Taiping hills, G. Tahan, and the Main range at Fraser Hill (8406) where it attains twice the size of mangrove-swamp examples.

Eria teretifolia, Griff.: Ridl. Mat. Mono., 1, p. 100: Merrill, p. 174. A herbaceous epiphyte, found in the Malay Peninsula and Borneo: in the Peninsula montane, occurring on Kedah peak, in Penang, on the Taiping hills, on G. Tahan, on the Main range from G. Batu puteh and in the mountains of Telom to G. Tampin, and on Mt. Ophir. At Fraser Hill it is very plentiful (7844, 8595), and was in flower.

Phreatia crassifolia, Ridl. in Journ. F. M. S. Mus., 4, p. 69. A very small epiphyte which is endemic and montane, and has been obtained on the Taiping hills, and on the Main range in the mountains of Telom, and now at Fraser Hill where it was upon a Quercus (7798) in flower.

Spathoglottis plicata, Blume: Ridl., Mat., Mono., 1, p. 117: J. J. Smith, p. 219: Merrill, p. 182. A terrestrial herb, distributed from Sumatra, the Malay Peninsula, Java, Borneo, Celebes, the Moluccas to the Philippines, New Guinea, the Solomon islands and Samoa: in the Peninsula it occurs from Tomoh in Lower Siam down to Singapore at low levels and ascends the mountains somewhat. But Fraser Hill in the valley at 4,000 ft. (7778), the neighbourhood of Fraser Hill at 3,500 ft. towards the Gap, and 3,600 ft. in the upper Tras valley are greater altitudes than others have recorded: however it occurs high in Java. The Fraser Hill plant has the small lip usual in the Peninsula.

Spathoglottis aurea, Lindl.: Ridl., Mat., Mono., 1, p. 118: J. J. Smith, p. 218: Merrill, p. 182. A terrestrial herb, distributed in Sumatra, the Malay Peninsula, Borneo, west and mid Java and the Philippines: in the Peninsula it is montane and occurs on Kedah peak, on the Taiping hills, on G. Tahan, on the Main range

from G. Kerbau, G. Batu Puteh to Bukit Etam, and on Mt. Ophir. At Fraser hill it was collected on the face of a landslide (7771), which occurrences are apparently the means by which it persists.

Phaius callosus, Lindl.: Ridl., Mat., Mono., 1, p. 119: J. J. Smith, p. 196. A terrestrial herb of forests by water, found in the Malay Peninsula and in west Java: occurring in the Peninsula on the Taiping hills and on the Main range at Fraser Hill (7820), in flower.

Agrostophyllum callosum, Reichb. f.: Ridl., Mat., Mono., 1, p. 108. A herb of rocks or an epiphyte distributed from the central Himalaya through Burma to the Malay Peninsula, montane; occurring in the Peninsula on Kedah peak, and in the Main range from near Fraser Hill to Bukit Etam. Under Fraser Hill it was found in the old mines of the upper Tras valley (7877), in fruit.

Agrostophyllum bicuspidatum, J. J. Sm.: *Podochilus callosa,* Schlechter: Ridl. Mat. Mono., 1, p. 197: J. J. Smith, p. 286: Ames, p. 76. A herbaceous orchid of mossy places, distributed from Tenasserim, in Sumatra, the Malay Peninsula, Java, Borneo and Celebes; in the Peninsula montane in the north, as on Penang hills, on the Taiping hills, on G. Tahan, on the Main range from the mountains of Telom to Bukit Sutu in Negri-Sembilan, and on Mt. Ophir: then at low levels in Johore and Singapore. It was collected near Pine-tree hill (8523) in flower.

Ceratostylis cryptantha, Ridl. Mat. Mono., 1, p. 110. A small epiphyte, endemic, occurring in Penang, on the Taiping hills, and the Main range near the Semangkok pass. The plant collected by us is larger (8511), and constitutes a variety.

Coelogyne carnea, Hook. f.: Ridl. Mat. Mono., 1, p. 134. A herbaceous epiphyte, endemic, occurring in the Taiping hills, on G. Tahan, and on the Main range from G. Kerbau and the mountains of Telom to G. Mengkuang lebar and also on Benom. At Fraser Hill it is abundant (8501, 8626), and up to Pine tree hill (8644), and also upon G. Ulu Semangkok.

Coelogyne speciosa, Lindl.: Ridl. Mat. Mono., 1, p. 132: J. J. Smith, p. 138: Ames, p. 145. An epiphytic herb, distributed from Sumatra to the Malay Peninsula, to Borneo and through Java: in the Peninsula occurring on Western hill, Penang, on the Taiping Hills, on G. Tahan, on the Main range from the mountains of Telom to the Semangkok pass, and then almost at sea-level in the island of Singapore and in southern Johore. It occurs in Java also at low levels, as well as high. It was found at Fraser Hill not uncommonly (8512).

Renanthera matutina, Lindl.: Ridl. Mat. Mono., 1, p. 156: J. J. Smith, p. 587. A tough epiphyte, but able to use stoney ground under the trees, occurring in Sumatra, the Malay Peninsula and in Java: in the Peninsula found on the Main range from the mountains of Telom to the neighbourhood of the Semangkok pass. At Fraser Hill it was found on a vein-quartz ridge (8938) in flower.

Saccolabium bigibbum, Ridl. in Mat., 1, p. 164, but not of Hook. f. A herbaceous epiphyte endemic and montane found on the Taiping hills, on G. Tahan, on the Main range at Fraser Hill (8503) and on Benom. This orchid wants a new name. It was in flower.

Appendicula, apparently a new species, found as a rigidly erect plant of a bronze colour upon the ground in the mined area of the upper Tras valley at about 3600 ft. (8856).

Anoectochilus Reinwardtii, Blume: Ridl. Mat. Mono., 1, p. 312: J. J. Smith, p. 96. A terrestrial herb of the floor of the forest, distributed in Sumatra, the Malay Peninsula, in west Java and Amboyna: in the Peninsula found on Kedah peak, on the Taiping hills, and on the Main range from the mountains of Telom to Fraser Hill (8550, 8621).

Anoectochilus sp. An orchid with the habit of the last, apparently undescribed. It was collected at Fraser Hill (7803) and has been collected by Napier at the Semangkok pass.

Cryptostylis arachnites, Blume: Ridl. Mat. Mono., 1, p. 225: J. J. Smith, p. 59: Ames, p. 139. A terrestrial herb, of wide distribution, in Ceylon, in the hills of Assam and down south in the Malay Peninsula, Borneo, Java and the Philippines: in the Peninsula it occurs on Kedah peak, in Penang, on the Taiping hills, on G. Tahan, and on the Main range from G. Batu puteh to Bukit Etam; then southwards at low levels from Malacca to Singapore. At Fraser Hill it was found towards Pine-tree hill (8506), in fruit.

ZINGIBERACEAE.

Globba aurantiaca, Miq.: Ridl. Mat. Mono., 2, p. 7: Merrill, p. 123. A herb, distributed through the interior of western Malaysia, Sumatra, the Malay Peninsula and Borneo: in the Peninsula it occurs in Penang from 1000 ft. upwards, on the Taiping hills, on the Main range from Fraser Hill to G. Tampin and under it on the west side: then in the south of the Peninsula at low levels to the Straits of Johore. At Fraser Hill it is not uncommon (8429).

Globba cernua, Baker: Ridl. Mat. Mono., 2, p. 8. A herb, endemic and montane, occurring in the south of Lower Siam, on the Taiping hills, on the Main range from the mountains of Telom and G. Kerbau to G. Angsi. It was found in flower between Fraser Hill and Pine-tree hill (8431).

Camptandra ovata, Ridl. Mat. Mono., 2, p. 12. A small herb of the floor of the forest, endemic, and confined to the Main range from G. Kerbau to G. Mengkuang lebar. It is common at Fraser Hill (8639) and its pure white flowers open in the late afternoon, closing again before dawn.

Hedychium malayanum, Ridl. n. sp. A herb, undescribed, which was collected first a couple of years ago by Mrs. Ferguson-Davie at Fraser Hill, and was obtained by us in the upper Tras valley under Fraser Hill (7875) in an area which had been mined.

Amomum ochreum, Ridl. Mat. Mono., 2, p. 32. A herb, endemic, found upon the Main range in the upper Tras valley under Fraser Hill (8862) upon a mine area at 3300 ft. at Ginting Bidai west of Kuala Lumpur, and on Bukit Galing near Kuantan. It was in flower.

Hornstedtia grandis, Ridl. Mat., 2, p. 36. A giant herb, 20 feet high, endemic, occurring in the Taiping hills, and on the Main range from the mountains of Telom to Fraser Hill (8584). There is just so much doubt about this identification as is due to the want of corollas, as the flowers were all over.

Zingiber spectabile, Griff.: Ridl. Mat., 2, p. 26. A herb, found in Sumatra and the Malay Peninsula, occurring in the Peninsula in the lowlands all down the west side from Perlis and Penang to Malacca, and lately found in north-eastern Pahang. It has not been obtained before this as high in the mountains as Fraser Hill (8666). It is used by the Malays locally as a flavouring, calling it Tepus tundok or nodding ginger.

Zingiber gracile, Jack: Ridl. Mat. Mono., 2, p. 29. A herb, more or less montane in the north of the Peninsula, where it occurs in Penang, on the Taiping hills, on G. Tahan, and on the Main range from Fraser Hill to G. Tampin and on Mt. Ophir: it occurs down to the foot of the hills, and southwards on G. Pulai and in Singapore island. It is not uncommon about Fraser Hill, with yellow bracts when in flower (8806) and these redden in fruit-ripening (8633).

Zingiber Griffithii, Baker: Ridl. Mat. Mono., 2, p. 29. A herb, endemic, occurring in the low country from Penang to Singapore, and on the lower slopes of the hills Its occurrence at Fraser Hill (8808) adds greatly to its recorded spread upwards. It was found in fruit, with reddish magenta bracts.

Alpinia Murdochii, Ridl. Mat. Mono., 2, p. 50. A herb, endemic, occurring on G. Tahan, and on the Main range in the neighbourhood of the Semangkok pass. At Fraser Hill it was found in flower (8671), and between the Gap and G. Ulu Semangkok it was found in fruit (8868).

Alpinia petiolata, Baker; Ridl. Mat. Mono., 2, p. 53. A herb, endemic, distributed in the Peninsula in the Taiping hills, on G. Tahan, and on the Main range from G. Horan and Fraser Hill to G. Tampin. At Fraser Hill it is very common, but was only rarely in flower or in fruit (8434, 8596).

Geostachys secunda, Ridl. Mat. Mono., 2, p. 44. A herb, endemic, found on the Main range from G. Bujong Malaka to the Semangkok pass; very common at Fraser Hill (8636) and in flower. This species is replaced by very closely allied species upon other ranges on the Peninsula.

MUSACEAE.

Musa violascens, Ridl. Mat. Mono., 2, p. 64: Merrill, 120. A giant herb, distributed in Sumatra, the Malay Peninsula and in Borneo: in the Peninsula common at low elevations down both

sides and ascending the mountains to about 4000 ft. At Fraser Hill it is very common (8598). It is called Pisang toh.

Musa malaccensis, Ridl. Mat. Mono., 2, p. 63: A giant herb, endemic, and rather larger than the last, also a little more of a woodland plant, endemic, occurring in the Peninsula commonly in hill lands down both sides from Pulau Adang, Kedah and Kuantan southwards. It is very common at Fraser Hill and carried flowers and fruit (8858). It is called Pisang jahit or thread plantain.

AMARYLLIDACEAE.

Curculigo latifolia, Dryand.: Ridl. Mat. Mono., 2, p. 66. Merrill, p. 117. A herb found in Burma, the Andamans, the Malay Peninsula and Borneo: in the Peninsula it occurs all down both sides to Singapore: it occurs also on G. Kerbau and in the mountains of Telom and southwards along the Main range to G. Angsi. It is not uncommon at Fraser Hill (s.n.).

TACCACEAE.

Tacca cristata, Jack: Ridl. Mat. Mono., 2, p. 77. A herb distributed from Tenasserim to Sumatra and the Malay Peninsula, in the Peninsula occurring in the low country down to Singapore, but it has not been collected from the low country on the east side: it occurs in the mountains of Telom and doubtless in the mountains elsewhere. Under Fraser Hill it was found towards the Gap at 3500 ft. in flower (7765). The hill plants are larger than the plains plants.

DIOSCOREACEAE.

Dioscorea laurifolia, Wall.: Ridl. in Mat. Mono., 2, p. 83. A herbaceous climber, endemic occurring in the Peninsula from Penang to Singapore, preferring the tops of hills, but also descending to sea-level in well-drained places. At Fraser Hill it is very common following clearing, and not rare in the undisturbed forest; its pleasantly scented flower-spikes were to be seen in great abundance (8401, 8433).

Dioscorea sp. with the appearance of *D. pyrifolia*, Kunth, but with large tubers that carry a brown tanning or tinctorial substance and called therefore Gadong Sanak by the Malays who make some use of them. This Dioscorea reaches 4000 ft. at Fraser Hill but is somewhat more easily found in hollows by water at lower levels both towards the Gap and in the upper Tras valley, where it bore flowers (7860, 7889, 8432, 8945).

LILIACEAE.

Smilax calophylla, Wall.: Ridl. Mat., 2, p. 102. A climber, endemic, a montane species in the north of the Peninsula, occurring on Kedah peak, on the Taiping hills, from 1000 to 1500 ft., on G. Tahan, on the Main range about the Semangkok pass, and to G. Menekuang lebar, on Benom and on Mt. Ophir, then in the lowlands of Johore and Singapore. It was observed to be not uncommon on G. Ulu Semangkok, and down to the Gap (8867).

Smilax laevis, Wall.: Ridl. Mat. Mono., 2, p. 103: Merrill, p. 116. A climber occurring in China and down to the Malay Peninsula, and Borneo: in the Peninsula montane occurring on Kedah peak, in Penang, on the Taiping hills, on G. Keledang near Ipoh, on the Main range from the mountains of Telom to G. Mengkuang lebar, and on Mt. Ophir. At Fraser Hill it was in fruit (8578).

COMMELINACEAE.

Commelina nudiflora, Linn.: Ridl. Mat. Mono., 2, p. 115: Koorders, 1, p. 277: Merrill p. 112. A pantropic herb, which grows freely at the Gap but appears not to have ascended yet further in the direction of Fraser Hill (s.n.).

Forrestia gracilis, Ridl. Mat. Mono., 2, p. 123. A herb, endemic, a lowland plant occurring from Kedah and Pahang to Singapore. It is not uncommon at Fraser Hill up to 4200 ft. (8869) and in fruit.

PALMAE.

Nenga macrocarpa, Scortechini: Ridl. Mat., 2, p. 145. A palm of moderate size, endemic and in the north of the Peninsula montane occurring on Koh Gah in Lower Siam, on Kedah peak, in Penang upon the very tops of the hills, on the Taiping hills, on G. Tahan and under it, on the Main range from G. Bujong Malaka to G. Tampin, on G. Keledang over Ipoh, on G. Pantai and also in Johore down to sea level. At Fraser Hill by no means uncommon (8609).

Pinanga Scortechinii, Becc.: Ridl. Mat. Mono., 2, p. 138. A palm of about 10 ft. in height, endemic and montane: it occurs in Penang, on the Taiping hills, on Bukit Kapayang near Sungei Siput, on G. Tahan, on the Main range from G. Kerbau and the mountains of Telom to Negri Sembilan; then down at the coast in southern Johore. It occurs freely at Fraser Hill and carried its cherry-red fruits (7885).

Pinanga polymorpha, Becc.: Ridl. Mat. Mono., 2, p. 138. A rather small palm, endemic, and montane, occurring on the Taiping hills, and on the Main range from the mountains of Telom to Bukit Etam. It is plentiful at Fraser Hill (8592, 8617); and with fruit ripening the peduncle becomes a brilliant scarlet.

Pinanga paradoxa, Scheff.: Ridl. Mat. Mono., 2, p. 141. An endemic palm, montane and submontane, occurring on Kedah peak, on the Taiping hills, on the Main range from G. Batu puteh to G. Angsi, on Mt. Ophir and on G. Pantai. It is common at Fraser Hill and the peduncle, which goes a brilliant red as the fruit ripens, makes it conspicuous (8618).

Caryota obtusa, Griff. Ridl. Mat. Mono, 2, p. 157. A beautiful tall palm, endemic in the Peninsula on the Taiping hills, the Main range from G. Batu puteh to the neighbourhood of Kuala Lumpur, and on G. Pantai in Johore. At Fraser Hill it occurs in hollows certainly up to 4200 ft.; and about 3300 ft. some very fine examples were seen.

Licuala pusilla, Becc.: Ridl. Mat. Mono., 2, p. 164. A small palm, endemic, occurring on the Taiping hills, on G. Tahan and on the Main range about Ulu Bubong and the Semangkok pass. At Fraser Hill it is very common (7842, 8426) it was in flower and in fruit, and produced stems attaining 2 ft.

Calamus javensis, Blume: Koorders, 1, p. 234: Merrill, p. 75: *C. penicillatus,* Roxb.: Ridl. Mat. Mono., 2, p. 191. A rattan distributed in Sumatra, the Malay Peninsula, Borneo and west and mid Java: in the Peninsula it is montane in the north, on G. Raya in Lankawi, Penang, the Taiping hills, the Main range from G. Batu puteh and the mountains of Telom to G. Angsi, and southwards both on hills and down to sea level in Singapore island. At Fraser Hill it seems uncommon: it occurs (7814) in the variety *peninsularis,* which is characteristic of the Peninsula.

Calamus luridus, Becc.: Ridl. Mat. Mono., 2, p. 198: Merrill, p. 75. A rattan of about 25 ft. in length occurring in the Malay Peninsula and in Borneo: in the Peninsula it is usually found at low levels from Taiping to Singapore. At Fraser Hill it was collected as no. 8807: but there is just a little doubt in regard to the determination. The Malays with us called it Rotan lilin or wax rattan.

Calamus perakensis, Becc.: Ridl. Mat. Mono., 2, p. 202. A rattan about 20 ft. long, which is endemic, and (including part of *C. lanata,* Ridl. in it) has the following distribution:—Bukit Kapayang near Sungei Siput, and the Main range from the mountains of Telom to Bukit Etam. It was found at Fraser Hill in flower (7757) and in fruit (8421).

Calamus distichus, Ridl. Mat. Mono., 2, p. 206. A rattan of about 15 ft. in length, endemic and local: at Fraser Hill not uncommon, carrying its curiously long (5 ft.) inflorescences (8683 and s.n.).

Calamus brevispadix, Ridl. Mat. Mono., 2, p. 207. A small very spiny rattan only a few feet high, endemic and local. At Fraser Hill it is plentiful and was in flower (8420, 8551).

Daemonorrhops sp. A species of this genus occurs, but has not been determined (7785).

Plectocomia sp. possibly *P. Griffithii,* Becc., is not uncommon about Fraser Hill as it appears to be in the mountains of Telom.

FLAGELLARIACEAE.

Joinvillea borneensis, Becc.: Merrill, p. 109: *J. malayana,* Ridl. Mat. Mono., 3, p. 151. A big grass-like plant 6-8 ft. high occurring in the Malay Peninsula, Borneo and Palawan: in the Peninsula occurring in the Taiping hills, and on the Main range from G. Kerbau and the mountains of Telom to the Semangkok pass.. It occurs at Fraser Hill at 4000 ft. (8649).

PANDANACEAE.

Pandanus collinus, Ridl. Mat. Mono., 2, p. 228. A small tree, endemic and montane in the Peninsula, occurring on Kedah

peak, and on the Main range from the mountains of Telom to the Semangkok pass. At Fraser Hill it was not identified; but it was got in fruit on G. Ulu Semangkok (8876).

Freycinetia lucens, Ridl. Mat. Mono., 2. p. 233. A woody climber, endemic, chiefly of the low country along the west side of the Taiping hills and the Main range from Perak to Singapore, now found in flower upon the summit of Pine-tree hill at 4800 ft. (8546), and sterile between that hill and Fraser Hill.

ARACEAE.

Arisaema Scortechinii, Hook. f.: Ridl. Mat. Mono., 3, p. 8. A herb, endemic, montane, occurring in Penang, and on the Main range from G. Bujong Malaka to G. Tampin. At Fraser Hill it is not uncommon (8665), and was newly in flower.

Amorphophallus sp. The leaves of a species of this genus were seen not uncommonly in the forest at Fraser Hill.

Alocasia Beccarii, Engl.: Ridl. Mat. Mono., 3, p. 16: Merrill, p. 104. A herb of deep shade found in Sumatra, the Malay Peninsula and in Borneo: in the Peninsula montane occurring in the Taiping hills, and on the Main chain from the mountains of Telom to Bukit Etam. At Fraser Hill not uncommon and generally in fruit (8425).

Alocasia Lowii, Hook. f.: Ridl., Mat., Mono., 3, p. 18: Merrill, p. 105. A herb, distributed in the Malay Peninsula, Borneo and Java: in the Peninsula in Perlis, and down the Main range from Perak to the south end, and in Malacca; also in P. Tiuman. Below Fraser Hill it occurs at 3300 ft. on the road to the Gap and at 3800 ft. in the upper Tras valley.

Colocasia esculentum, Schott: Merrill, p. 106: *C. antiquorum*, Schott: Ridl., Mat. Mono., 3, p. 16: Koorders, 1, p. 136. A herb, widely cultivated and wild in tropical Asia: run wild in Sumatra, the Peninsula, Borneo and other parts of Malaysia. In the upper Tras valley to about 3800 ft. it is plentiful.

Homalonema humilis, Hook. f.: Ridl. Mat. Mono., 3, p. 25: Merrill, p. 94. A small herb, occurring in the Malay Peninsula and in Borneo: in the Peninsula montane and submontane, in Penang, on the Taiping hills, on the Main range from the mountains of Telom to the neighbourhood of Kuala Lumpur and in the low country under the hills. At the Semangkok pass in the vicinity of the Gap it occurs (7879) in a race which approximates to *H. pumila*, Hook. f.

Schismatoglottis sp. What seems to be an unnamed plant of the Main range and the Taiping hills was obtained (8696).

Anadendrum montanum, Schott.: Ridl. Mat. Mono., 3, p. 36: Koorders, 1, p. 252: Merrill, p. 88. An epiphyte, more or less herbaceous, found in Tenasserim, and Siam, Sumatra, the Malay Peninsula, Borneo, Java, Celebes: in the Peninsula it occurs on G. Raya in Lankawi, on Kedah peak, in Penang, on the Taiping hills, on the hills over Ipoh and Sungei Siput, on the Main range from the mountains of Telom to G. Tampin, and at low levels further south to Singapore. At Fraser Hill it was found in flower.

Raphidophora Korthalsii, Schott: Ridl. Mat. Mono., 3. p. 45: Koorders, 1, p. 255: Merrill, p. 89. An epiphyte of considerable size, distributed chiefly in the interior of western Malaysia *i.e.* in the Peninsula and in Borneo but reaching west Java in one place: in the Peninsula it occurs in Penang, but has not been collected there in recent years, on the Taiping hills, in the Main range about the Semangkok pass, on P. Tinggi and in Singapore island. It was found between Fraser Hill and the Gap at 3500 ft. in the edge of a gully, in flower (7761).

Raphidophora Wrayii, Hook. f.: Ridl. Mat. Mono., 3. p. 42. An epiphyte of some size, endemic, occurring in Penang, on the Taiping hills, and on the Main range from G. Batu puteh and the mountains of Telom to Fraser Hill (7859) where it is not uncommon and was in flower and fruit.

Pothos salicifolia, Ridley sp. nov. with almost linear leaves and dull yellow fruit (7827) at Fraser Hill.

Scindapsus Scortechinii, Hook. f.: Ridl. Mat. Mono., 3, p. 38. A big epiphyte, endemic, and montane, occurring in the Bandon province of Siam at 4000 ft., on Kedah peak, in the Taiping hills, and on the Main range from G. Bujong Malaka and the mountains of Telom to Bukit Etam. At Fraser Hill it was in flower and fruit (8659, 8934) and extended to the summit of Pine-tree hill (8547).

CYPERACEAE.

Cyperus rotundus, Linn.: Ridl. Mat. Mono., 3, p. 68: Merrill, p. 56: *C. rotundatus,* Linn.: Koorders, 1, p. 190. A herb, pantropic, in the Peninsula occurring here and there. At Fraser Hill not common (7893).

Kyllingia brevifolia, Rottb.: Ridl. Mat. Mono., 3. p. 58: Merrill, p. 58: *Cyperus brevifolius,* Suringar: Koorders, 1, p. 185. A small herb, pantropic and into warm regions generally except south Europe: in the Peninsula general in the low country, but except that it has been collected before on the top of the hills in Penang and at 4000 ft. on G. Kerbau with no montane records, but to be expected at all elevation as the result of the invasion of man. At Fraser Hill it is found about the mined area (7853).

Fimbristylis annua, R. and S.: Merrill, p. 60: *F. diphylla,* Vahl: Ridl. Mat. Mono., 3, p. 91: Koorders, 1, p. 199. A herb, pantropic, very common through the Peninsula and reaching Fraser Hill (8953) as a new intruder, being found chiefly upon bullock-droppings.

Hypolytrum latifolium, L. C. Rich.: Ridl. Mat. Mono., 3, p. 100: Koorders, 1, p. 184: Merrill, p. 54. A herb, distributed in southern India and Ceylon, in north eastern India and China and southwards to the Malay Peninsula, Borneo, west Java and to Australia and parts of Polynesia: in the Peninsula it is common through the low country and has been collected at 2000 and 3500 ft. on G. Kerbau, on Hermitage hill and on the Penang hills. It was not found at Fraser Hill but at 3000 ft. near the Gap (8885) in young fruit.

Gahnia javanica, Moritzi: Ridl. Mat. Mono., 3, p. 99: Koorders, 1, p. 202: Merrill, p. 63. A herb, distributed from Sumatra through the Peninsula, Borneo, west and mid Java to New Caledonia and Fiji: in the Peninsula montane found on Kedah peak, in Penang at 2500 ft., on the Taiping hills, on G. Tahan, on the Main range from G. Kerbau and G. Batu puteh to Bukit Etam, on Mt. Ophir, and in Johore upon quite low hills, even on Bukit Panggerang at the extreme south. At Fraser Hill it is exceedingly common in cleared places (7768), but very rarely in flower.

GRAMINEAE.

Paspalum conjugatum, Berg. Ridl. Mat. Mono., 3, p. 124: Koorders, 1, p. 121. A herb, pantropic, in the Peninsula very common at low elevations; but of its occurrence in the hills there seems to be but two records which are both Mr. Ridley's, one of his finding it at Padang Batu on Mt. Ophir and the second of finding it on Sakai clearings in the mountains of Telom. At Fraser Hill it is the commonest of all grasses about the houses (s.n.).

Paspalum sanguinale, Lam.: Ridl. Mat. Mono., 3, p. 125: Koorders, 1, p. 127. A pantropic herb, in the Peninsula common at low elevations, but scarcely recorded as in the hills. At Fraser Hill it is rare at present, and the place in which it is found is bullock-droppings upon the roads (8952).

Paspalum longiflorum, Rôtz. Ridl. Mat. Mono., 3, p. 126: Kooders, 1, p. 121: Merrill, p. 43. A herbaceous weed of wide distribution through the warm parts of the Old World: in the Peninsula said to be common. At Fraser Hill a weed in the vegetable garden (7849).

Panicum indicum, Linn.: Ridl. Mat. Mono., 3, p. 134: Koorders, 1, p. 132. A herb distributed from India in general to the Pacific: in the Peninsula a common weed, which has been recorded as reaching 3000 ft. on G. Kerbau. At Fraser Hill it is abundant on cleared ground (7845).

Panicum plicatum, Lam.: Ridl. Mat. Mono., 3, p. 136: *P. palmifolium*, Koen.: Koorders, 1, p. 135. A herb, in Ceylon, in the moister Himalaya, China and southward to the Malay Peninsula, Java: in the Peninsula it occurs not uncommonly at low levels. Under Fraser Hill it was found at 3500 ft. in the mined area of the upper Tras valley.

Isachne albens, Trin. The second in abundance of the intruding grasses of Fraser Hill. It occurs on G. Tahan and on G. Hijau, in the Taiping hills, and has probably reached Fraser Hill in vegetable seeds from the Taiping hill-garden. It is now common on roadsides at Fraser Hill (7767).

Imperata cylindrica, Bauv: Merrill, p. 38: *I. arundinacea,* Cyrillo: Ridl. Mat. Mono., 3, p. 152: Koorders, 1, p. 102. A pantropic grass, everywhere in the Peninsula. This—the tall lallang

grass probably reached the neighbourhood of Fraser's bungalow many years ago; but it does not thrive to the exclusion of everything else there, and though common in that part of Fraser Hill is not general: it is more plentiful in the upper Tras valley.

Pogonatherum paniceum, Hack.: Merrill, p. 40: *P. saccharoidium*, Brauv., Ridl. Mat. Mono., 3, p. 154: Koorders, p. 107. A small grass widely distributed from India to Japan and southwards to Malaysia, where it is wide spread. Under Fraser Hill in the mined lands of the upper Tras valley it is plentiful.

Sporobolus indicus, R. Br.: Ridl. Mat. Mono., 3, p. 171: Koorders, 1, p. 146. A pantropic herb; in the Peninsula sporadic through the lowlands. At Fraser Hill it is not uncommon about clearings (s.n.).

Eleusine indica, Gaertin.: Ridl. Mat. Mono., 3, p. 174: Koorders, 1, p. 153: Merrill, p. 50. A pantropic weed, common in the lower country of the Malay Peninsula. At Fraser Hill invading the roads from the droppings of bullocks.

Phragmites Karka, Trin.: Ridl. Mat. Mono., 3, p. 175: Koorders, 1, p. 156: Merrill, p. 50. A large grass widely distributed through the tropics of the Old World. In the upper Tras valley over mined lands at 3300-3800 ft.

Lophatherum gracile, Brongn: Ridl. Mat. Mono., 3, p. 181: Koorders, 1, p. 160: Merrill, p. 52. A grass distributed in southern India and Ceylon, in the eastern Himalaya and to Japan, southwards through Burma to the Malay Peninsula, Borneo, the Philippines and New Guinea: in the Peninsula found widely in the South; but in the north montane, being on Chong in west Siam at 2500 ft., on Kedah peak and on the Taiping hills. At Fraser Hill it is not uncommon.

Dendrocalamus pendulus, Ridl Mat. Mono., 3, p. 192. A graceful bamboo, half sprawling occurring in the Main range from the mountains of Telom to the neighbourhood of Kuala Lumpur. At Fraser Hill it reaches 4100 ft. (7892), but as it was not in flower doubt attaches to the identification.

Schizostachyum latifolium, Gamble: Ridl. Mat. Mono., 3, p 190: Koorders, 1, p.179. A rather short bamboo distributed in the Peninsula and thought that it may be possibly in Java: in the Peninsula it occurs on G. Tahan, and on the Main range from G. Kerbau to the Semangkok pass and at low level in Malacca. Under Fraser Hill it ascends to 3500 ft. on the Selangor side of the range (7774).

CRYPTOGAMS.

The nomenclature of the ferns is that adopted by van Alderwerelt. Distributions of mosses are taken from Brotherus' monograph on the Bryales in Engler's *Pflanzenfamilien* (I, 3). The works quoted under each species are:—

Van Alderwerelt van Rosenburgh, C. R. W. K., *Handbook to the ferns of the Malay Islands,* Batavia 1908; *Supplement,* 1917; quoted as van Alderwerelt.

Ridley, H. N., A list of the ferns of the Malay Peninsula, *Jour. Straits Branch, R. Asiatic Society* No. 50, 1908; quoted as Ridley.

Ridley, H. N., The Fern-Allies and Characeae of the Malay Peninsula, *Jour. Straits Branch, R. Asiatic Society* No. 80, 1919; quoted as Ridley Fern-Allies.

Beddome, R. H., *Handbook to the ferns of British India,* Calcutta, 1883, with Supplement; quoted as Beddome.

FERNS.

Gleichenia glauca Hk.; van Alderwerelt p. 58, Ridley p. 6, Beddome p. 2. On the Himalayas at 4000-7000 feet, in southern China and Japan, extending through Malaysia to the Philippines, Polynesia and Australia, and in Central America. In Java and in the Peninsula it is a montane species, abundant on the hills from about 1000 feet upwards. Common at Fraser Hill, in the open and in moderate shade (8778).

Gleichenia linearis Clarke; van Alderwerelt p. 59; Ridley p. 7; Beddome p. 4.

Tropical and subtropical, throughout the world. Very common everywhere in the Peninsula. At Fraser Hill quite as abundant as at lower altitudes. A very large form was found by the valley path (8777).

Cyathea moluccana R. Br.; van Alderwerelt p. 15; *C. brunonis* Wall. Ridley p. 7.

Confined to the Malaysian region and the Philippines. In the Peninsula it is common in forests at low altitudes, the highest record being 3300 feet on G. Tahan. It does not occur at Fraser Hill, but is common by roadsides at the Gap (8826).

Alsophila dubia Beddome Suppl. p. 4, van Alderwerelt p. 31, Ridley p. 9.

This species is recorded from Java, Sumatra and Borneo; in the Peninsula it has been collected on the Taiping Hills and on G. Bubu, on G. Tahan, and on the main range from G. Kerbau to Fraser Hill, where it is fairly common in more open places in the jungle (8797, 8813).

Alsophila obscura Scort.; van Alderwerelt p. 34; Ridley p. 9.

Probably endemic. This species was originally found by Scortechini on the Taiping Hills; specimens collected subsequently at other localities appear to be identical with it, but have been referred to *A. comosa* Hk. They are, however, quite distinct from specimens of the latter species from Perak, named at Calcutta, which also agree with Hooker's description and figure (Spec. Fil. Vol. I, p. 53, Pl. 20). Including these specimens which appear

erroneously to have been referred to Hooker's species. *A. obscura* occurs in Penang, on the Taiping Hills, on the main range from Telom to G. Angsi, on Mt. Austin in Johore and on Singapore Island. Some of the fronds from Singapore differ more or less from the typical form of the species, being paler and less coriaceous. At Fraser Hill, it is one of the smaller tree ferns, fairly abundant. (8779, 8796).

Alsophila commutata Mett.: van Alderwerelt p. 34; Ridley p. 8; Beddome p. 14.

Known only from Batjan and Borneo (van Alderwerelt, Supplement p. 59) outside the Peninsula. A montane species, occurring on Kedah peak, Taiping Hills, on the main range from Bujong Malacca to Bukit Kutu, and on Mt. Ophir. A small tree fern, growing on Fraser Hill in partly cleared forest (8793), and in low forest on G. Ulu Semangkok (8912), where it was not found fertile. A curious feature, not mentioned by the authors quoted, but shewn also by Ridley's specimens from Bujong Malacca and Bukit Hitam, is the presence of several much reduced pinnae at the bases of the stipes (cf. a similar feature in *Cyathea Beyrichiana*, figured in Christ, *Geographie der Farne*, Jena 1910, p. 45).

Alsophila Kingii Clarke: van Alderwerelt p. 36; Ridley p. 9; Beddome p. 475.

Endemic. Originally collected on G. Bubu at 5000 feet, and since found on G. Tahan, and on G. Pantai in Johore, (Ridley), but we have no specimen from the last-named locality. Found in a rather open situation on the quartz slope below Reservoir Crest, and not noticed elsewhere (8492). The fertile pinnules are very much reduced.

Alsophila latebrosa Wall.: van Alderwerelt p. 38, Suppl. p. 51; Ridley p. 8; Beddome p. 11.

Occurs on the mountains of southern India from 3000 to 7000 feet, and in northern India from 3500 to 5000 feet, throughout Malaysia to the Philippines and in southern China. On the Peninsula "the commonest tree fern in the low country" (Ridley). It has been found up to 5000 feet on the Taiping Hills, on Penang Island, and at numerous localities in Selangor, Malacca, Negri Sembilan, Johore and Singapore Island. In Java very common up to the middle mountain zone. At Fraser Hill, probably the commonest of the smaller tree ferns (8825, 8794).

Alsophila glauca, J. Sm.: van Alderwerelt p. 41; Ridley p. 8; Beddome p. 12.

Distributed from the hills of northern India and Burma throughout the Malaysian region to the Philippines. In the Peninsula it is a montane species, occurring on G. Raya, Lankawi, the Taiping Hills, on the top of Penang hill, on the main range south to G. Angsi, and on Bukit Soga in Johore. It has also been collected on Pulau Tiuman. The largest tree fern in the

Fraser Hill area, frequent in open places in the jungle and especially abundant in the valley which had been formerly cleared for tin mining (8812).

Cibotium barometz J. Sm.; van Alderwerelt p. 48; Ridley p. 10; Beddome p. 24.

Distributed probably throughout Malaysia, in the Philippines, Assam and southern China. In the Peninsula "in woods at no elevation, not rare" (Ridley). It has been collected on Kedah peak at 1100 feet, on the Taiping Hills, at various points on the main range from G. Kerbau to Bukit Kutu, at Klang Gates and on Penang Island. Abundant in cleared places and also in moderate shade, the fronds sometimes as much as 15 feet in length, including the stipe.

Hymenophyllum australe Willd.; van Alderwerelt p. 69 and 797; *H. javanicum* Spr., Ridley p. 11, Beddome p. 32.

Extends from the Himalayas through Malaysia to Australia and New Zealand. In the Peninsula it has been collected on the Taiping Hills, on the main range at Telom and Ginting Sempah, on Mt. Ophir and on G. Pulai in Johore. It was found at Fraser Hill by Mrs. Smith.

Hymenophyllum Blumeanum Spr.; van Alderwerelt p. 71; *H. polyanthos* Sw., Ridley p. 10, Beddome p. 30.

Generally distributed through the rain forest regions of tropical Asia. In the Peninsula found at many localities, on the hills in the north and at lower altitudes in Johore and Singapore. At Fraser Hill this species was collected by Mrs. Smith; the fronds are broad, and do not correspond to Beddome's *H. polyanthos* v. *Blumeanum*.

Hymenophyllum formosum Brack.; van Alderwerelt p. 72; *H. dilatatum* Sw., Ridley p. 11, Beddome Suppl. p. 7.

Extends from Malaysia into the Pacific, to Australia and New Zealand. In the Peninsula it has previously been collected on the Taiping Hills only. It is represented in Mrs. Smith's collection.

Hymenophyllum serrulatum C. Chr.; van Alderwerelt p. 79; *H. Smithii* Hk., Ridley p. 11, Beddome p. 34.

A Malaysian species, extending to New Guinea. In the Peninsula it has been found on the Taiping Hills, on the main range from Bujong Malacca to Bukit Hitam in Selangor, on Penang Hill, G. Benom, and in Johore and Singapore. At Fraser Hill, it is very abundant on trees in the jungle (8451).

Hymenophyllum Neesii Hk.; van Alderwerelt p. 81, Ridley p. 11, Beddome p. 35.

Occurs in Ceylon and Malaysia. In the Peninsula "common on trees, low country up to 4000 feet" (Ridley); it has been collected from numerous localities, including Singapore. At Fraser Hill it is very abundant (8413, 8415).

Trichomanes sublimatum K. Müll.; van Alderwerelt p. 86; *T. muscoides* Sw. var. *sublimatum*, Ridley p. 12.

On the Khasya Hills and through Malaysia to New Guinea. In the Peninsula it is probably widely distributed, and has been found on Bujong Malacca, Mt. Ophir, in the Telok Reserve near Klang, and in Singapore Island. At Fraser Hill it was seen twice, on deeply shaded wet rocks by small streams (9180).

Trichomanes digitatum Sw., van Alderwerelt p. 89, Ridley p. 12; Beddome p. 39.

Found in the Mascarenes, Ceylon, and through Malaysia to Polynesia and Australia. In the north of Peninsula it is only recorded from the hills (Taiping Hills, main range from G. Kerbau to Bukit Kutu, G. Tahan at 4000-5000 feet) but it is found on Singapore Island. At Fraser Hill it is common on tree trunks near the ground, in the forest (8770).

Trichomanes proliferum Bl.; van Alderwerelt p. 90, Ridley p. 13; Beddome p. 39.

On the hills of Ceylon and southern India, in Malaysia and the Philippines. In the Peninsula it has only been recorded from the Taiping Hills, up to 4000 feet. At Fraser Hill found on tree trunks in the forest (8836).

Trichomanes bipunctatum Poir.; van Alderwerelt p. 95, Ridley p. 13, Beddome p. 41.

Occurs in tropical Africa, tropical Asia, Polynesia and Australia. It has been collected in both low and high country, certainly up to 4000 feet, in various parts of the Peninsula, and in Singapore Island. At Fraser Hill it is one of the less abundant species. It is possible that the specimen should be referred to *T. bilabiatum*, an allied species with a more restricted distribution (8833).

Trichomanes maximum Bl.; van Alderwerelt p. 99, Ridley p. 14; Beddome Suppl. p. 10.

A species common to Malaysia, Polynesia and northern Australia. It has been collected on the hills in the Peninsula from G. Kerbau to Johore, but not in the low country. At Fraser Hill collected once only, on shaded rocks above the stream in the valley (8903).

Trichomanes rigidum Sw.; van Alderwerelt p. 102, Ridley p. 13; Beddome p. 44.

A pantropical species, in the Peninsula collected especially from the hill forests, but also found in Singapore Island. At Fraser Hill it is one of the few species which are found in full shade on the ground in the forest, and is abundant (8465).

Trichomanes pluma Hk.; van Alderwerelt p. 106, Ridley p. 14; Beddome Suppl. p. 11.

In Malaysia and Polynesia, extending to New Caledonia. Found in hill forests in the Peninsula on the Taiping Hills, on the main range from G. Berumban to Ginting Bidai, on G. Tahan

and Mt. Ophir, the highest record being 6000 feet on G. Kerbau. At Fraser Hilll it is a fairly common species of the forest floor, occasionally found on the bases of tree trunks (8734).

Oleandra neriiformis Cav.; van Alderwerelt p. 152. Ridley p. 40; Beddome p. 285.

This species is found in tropical Africa and America, on the eastern Himalayas at 2000-5000 feet, through Malaysia to New Guinea and Polynesia. In the Peninsula it is montane, and has been found at nearly all localities where collections have been made. It has a decidedly xerophytic habit and at Fraser Hill was sometimes found in the fern thickets in open places, though usually growing in the jungle, climbing some distance up the tree (8497). The form collected differs somewhat from typical *O. neriiformis*, in that the stipes, which are always very short, are jointed at the base of the lamina. In other respects it agrees with *O. neriiformis* rather than with *O. colubrina*.

Nephrolepis acuminata, Kuhn.; van Alderwerelt, p. 159; *N. davallioides* Kze., Ridley p. 39, Beddome Suppl. p. 81.

Confined to Malaysia and New Guinea. In Java it is a common epiphyte, from the low country to the middle forest zone of the mountains. In the Peninsula it has been collected on the Taiping Hills at 3600-4000 feet, at Telom, and on Bukit Hitam at 4000 feet. At Fraser Hill it is a common epiphyte, growing luxuriantly on the trunks of trees in the jungle, the fronds up to 2 m. in length. It occurs also on the rocks in the open mining valley (8848, 8494).

Nephrolepis cordifolia, Pr.; van Alderwerelt, p. 160, Beddome p. 282.

A pantropical species, occurring throughout the Indian region up to 5000 feet elevation, and in Java a common ground fern in not too deeply shaded or quite open places up to 8000 feet. There are no specimens from the Peninsula in the Singapore herbarium and Ridley does not record it. At Fraser Hill it was found on bare ground, quite in the open (8495).

Nephrolepis exaltata, Schott.; van Alderwerelt, p. 161, Ridley p. 39, Beddome p. 282.

A pantropical species. Abundant at low altitudes at least in the south of the Peninsula, but little collected in the north, except at Penang. It often grows on trees and rocks, with long pendulous fronds. The present writer cannot certainly say what is its frequency and habit at Fraser Hill, but it is probably abundant. Mrs. Smith's specimen in labelled "open space, jungle."

Nephrolepis biserrata, Schott.; van Alderwerelt, p. 162; *N. acuta*, Pr., Ridley p. 39, Beddome p. 284.

A pantropical species. It is very abundant in the south of the Peninsula where secondary growth is beginning to replace cleared jungle; it has hardly been collected in the north except on Penang Island. At Fraser Hill comparatively small plants were noted on cleared ground.

Dryopteris crassifolia, O. Kze.; van Alderwerelt, p. 182; *Lastraea crassifolia*, Ridley p. 35, Beddome p. 238.

Burmah and Malaysia, extending to the Philippines. In the Peninsula it is probably general in the forests of the low country and on the hills to at least 4000 feet. It has been collected on Singapore Island and in the lowland forests of Johore and Malacca, and also on Mt. Ophir and the Taiping Hills. A ground fern of the jungle, noticed only on South Ridge (8765).

Dryopteris calcarata, O. Kze.: van Alderwerelt, p. 185; *Lastraea calcarata*, Beddome p. 235, Ridley p.35.

General throughout southern tropical Asia, Malaysia and the Philippines, extending into Polynesia. In the Peninsula the typical form of the species has only been collected on the Taiping Hills, on G. Kerbau and Ulu Semangkok. At Fraser Hill it is a common ground fern of the jungle, the stem sometimes projecting nearly a foot above the surface of the ground (8736, 8790).

Dryopteris singalanensis, C. Chr.: van Alderwerelt, p. 192; *Lastraea singalanensis* Beddome Suppl. p. 54, Ridley p. 35.

Previously known from the Taiping Hills at 3500-4000 feet, and from Mt. Singalan in Sumatra. At Fraser Hill collected once only, on the open valley-side (8811).

Dryopteris ferox, O. Kze.; van Alderwerelt, p. 221; *Nephrodium ferox* Moore, Beddome p. 279, Ridley p. 38.

In northern India, Malaysia and the Philippines. In the Peninsula it has been collected only on the Taiping Hills at 2000 feet, at Fraser Hill and on Penang Hill. Only one mature specimen was seen (8795), in partially cleared jungle on the valley side, but young plants, probably of this species, were abundant near by.

Dryopteris parasitica, O. Kze.; van Alderwerelt, p. 224; *Nephrodium molle* R. Br., Ridley p. 37, Beddome p. 277.

Pantropical. Common throughout the Peninsula, in the low country and on the hills (8901).

Dryopteris truncata, O. Kze.; van Alderwerelt, p. 227; *Nephrodium truncatum* Pr., Ridley p. 38, Beddome p. 280.

Extends to Madagascar and to Polynesia and Australia. In the Peninsula it has been collected in low country in Perak, and also on the Taiping Hills and on G. Kerbau at 5000 feet, and at low altitudes in Selangor, Johore and Singapore. It was found by Mrs. Smith at Fraser Hill.

Dryopteris heterocarpa, O. Kze.; van Alderwerelt, p. 228; *Nephrodium heterocarpum* Moore, Ridley p. 38, Beddome Suppl. p. 78.

A western Malaysian species, collected in the Peninsula on the Taiping Hills at 2500-3000 feet, at Telom in Pahang, in Negri Sembilan and on the Islands of Penang and Singapore. At Fraser Hill it was only found below 4000 feet, abundantly by the forest path down to the Gap and in the mining valley (8814, 8763).

Mesochlaena larutensis, (Bedd.) van Alderwerelt, p. 232; *Nephrodium larutense* Beddome, Suppl. p. 73, Ridley p. 38.

Reported only from Borneo (Copeland) outside the Peninsula. The species was originally collected on the Taiping Hills, and has since been found at Telom and Ginting Sempah on the main range. It was not noticed at Fraser Hill, but was found once only in the forest at the foot of G. Ulu Semangkok, just above the Gap (8913).

Aspidium pachyphyllum, Kze.: van Alderwerelt, p. 252, Ridley p. 33, Beddome Suppl. p. 46.

A Malaysian and Polynesian species, previously collected in Perak at altitudes from 100 to 1500 feet. At Fraser Hill it was only found by the present writers by the valley path in the edge of the jungle (just below 4000 feet) and always sterile. Mrs. Smith, however, sent a fertile frond, collected at about 4000 feet.

Odontosoria chinensis, J. Sm.; van Alderwerelt, p. 259; *Stenoloma chinensis* Bedd., Ridley p. 19, Beddome p. 70.

In Madagascar, Ceylon and southern India on the mountains, northern India to southern China and Japan, and through Malaysia to the Philippines and Polynesia. In the Peninsula "on banks at considerable altitudes, this plant seems to prefer stiff yellow clays" (Ridley). It has been collected at Jor in Perak, on the main range at the Semangkok pass and Ginting Bidai, by the Tahan river and on Penang Hill. At Fraser Hill abundant in open places on the clay, not usually among the first plants on bare ground (8496).

Lindsaya pectinata, Bl.: van Alderwerelt, p. 269.

Distributed from Assam through Malaysia to the Philippines. This species is hardly distinguishable from *L. scandens* on the one hand and from *L. repens* (with which it is included by Beddome) on the other: the present specimen has exactly the form and habit of *L. scandens* except for a slight lobing of the edge of the leaflets, and consequent interruption of the sori, while specimens from elsewhere with less decurved lower margins of the leaflets grade into *L. repens.* All are creeping or climbing ferns of the jungle and are widely distributed in the Peninsula. *L. pectinata* is common at Fraser Hill (8452); *L. scandens* proper was not noticed.

Lindsaya orbiculata, Mett.; van Alderwerelt, p. 270, Ridley, p. 20, Beddome p. 75.

In Ceylon and southern India, northern India to southern China, and through Malaysia to Australia. In the Peninsula it is a ground fern of the forest, chiefly montane. It has been collected on Kedah Peak at 1000 feet, on the Taiping Hills, on the main range from Bujong Malacca to G. Angsi, on G. Tahan, and on Penang Island. At Fraser Hill it is one of the most constant ground ferns, occurring in quite deep shade (8400).

L. orbiculata var. **polymorpha,** Hk.

No. 8762. This form is equally abundant with the typical form of the species, and in some cases shows transitions to the

latter. The only other specimens of this variety in the Singapore herbarium are from Penang.

Lindsaya decomposita, Willd.; van Alderwerelt, p. 274; *Schizoloma lobata* Beddome, p. 77, Ridley p. 21.

In Ceylon and southern India, through Malaysia to Polynesia and Australia. In the Peninsula not confined to the mountains, at least in the south, being found at low altitudes in Johore and Negri Sembilan. It is difficult to separate this species from *L. davallioides.* At Fraser Hill it occurs along with *L. orbiculata* (8707, 8474). Some specimens show little or no anastomosis of veins.

Humata repens, Diels; van Alderwerelt, p. 288; *H. pedata,* J. Sm., Ridley p. 16, Beddome p. 48.

In the Mascarenes, Ceylon and southern India at 3000-4000 feet, the eastern Himalayas and southern China, and through Malaysia to Australia. In the Peninsula it is not confined to the mountains and has been collected at numerous localities. At Fraser Hill it is a common epiphyte, the fronds frequently rather small (8463).

Davallia bullata, Wall.; van Alderwerelt, p. 303, Ridley, p. 17, Beddome p, 61.

Found on the mountains of southern India, on the eastern Himalayas to 6000 feet, in Burmah, southern China and Japan, Malaysia and the Philippines. In the Peninsula it is montane, occurring on Kedah Peak at 3000-4000 feet, on the Taiping Hills, and on the main range from G. Berumban to Ginting Bidai. At Fraser Hill, a fairly common epiphyte (8706).

Davallia divaricata, Bl.; van Alderwerelt, p. 305, Ridley, p. 17, Beddome p. 60.

Found on the eastern Himalayas and in southern China, Malaysia and the Philippines. In Java it is a common epiphyte, from sea level to the lower forest zone; in the Peninsula it has previously been collected only on the Taiping Hills at 3000 feet. At Fraser Hill, found only at about 3500 feet, in the old mining valley, on granite boulders near the stream (8846).

Tapeinidium pinnatum, C. Chr.; van Alderwerelt, p. 314; *Microlepia pinnata* J. Sm., Ridley p. 18. Beddome p. 64.

In southern India and spread through Malaysia to Polynesia. In the Peninsula it has been found on the Taiping Hills at 2000-3000 feet, on the main range from Telom to G. Tampin, on G. Tahan at 3000 feet, on Penang Hill, Mt. Ophir and G. Pulai, and in Singapore Island. At Fraser Hill collected by Mrs. Smith at about 4000 feet.

Dennstaedtia moluccana Moore, var. **sinuata** Bonaparte; van Alderwerelt p. 146.

A scrambling fern with aculeate rachis found on the cleared hilltop of South Summits at Fraser Hill in a thicket of Pteridium, Gleichenia, etc. (8817) has been identified as above by H. H. Prince

R. Bonaparte. *D. moluccana* has a distribution in Malaysia, Fiji and Formosa; no other record of it from the Peninsula is known.

Hypolepis tenuifolia, Bernh.; van Alderwerelt, p. 336.

This species is distributed from Malaysia to Australia, Polynesia and New Zealand, and occurs also in southern China. The only specimens in the Singapore herbarium from the Peninsula are from Fraser Hill, collected by Mr. Hose, Mrs. Smith and the present writers (8498). It appears doubtful however whether Beddome's *H. punctata* from the Taiping Hills (Beddome, Suppl. p. 19) is really distinct from the present species, as the only difference seems to be in the character of the hairs on the rachis and leaflets. *H. tenuifolia* from Fraser Hill is rather densely covered with viscid glandular hairs.

Histiopteris incisa, J. Sm.; van Alderwerelt, p. 349; *Litobrochia incisa* Pr., Ridley p. 25, Beddome p. 120.

Pantropical. In Ceylon and southern India it occurs on the hills at 3-4000 feet, and on the Khasya Hills to 6500 feet. In Java it extends from the plains to the highest summits. In the Peninsula it has been collected on the Taiping Hills, G. Kerbau, Kedah Peak, and on the Islands of Penang and Singapore. At Fraser Hill it is abundant in the open, young plants being very abundant by the paths, and both the typical form and Beddome's var. *integrifolia* (8499) occur. The latter variety has only been collected previously in Perak.

Pteridium aquilinum (L.) Kuhn.: van Alderwerelt, p. 377: *Pteris aquilina* L., Ridley p. 24, Beddome p. 115.

Distribution worldwide. Abundant in open places all over the Peninsula at all altitudes. At Fraser Hill forming dense thickets, with *Gleichenia* and other ferns, on the cleared hilltops.

Blechnum orientale, L.: van Alderwerelt, p. 387, Ridley, p. 26, Beddome p. 132.

Distributed generally through tropical Asia and through Malaysia to Polynesia and Australia. In southern India it is found on the hills up to 6000 feet, and in Java from sea level up to the summit of G. Gedeh. In the Peninsula it grows only in the open, and is very common almost everywhere. At Fraser Hill young plants are very abundant on newly cleared ground, especially by paths in the jungle (8493).

Diplazium subserratum, Moore; van Alderwerelt, p. 400, Ridley p. 29, Beddome p. 174.

Known only from the Peninsula, Java and Borneo. In Java it is a ground fern of the lower forest zone (3000-5000 feet); in the Peninsula it has been collected on the Taiping Hills, on the main range from Telom south to Ginting Bidai, and on Penang Island. At Fraser Hill, a ground fern of the forest, noticed once only (8902).

Diplazium sylvaticum, Sw.; van Alderwerelt, p. 402, Ridley, p. 30, Beddome p. 177.

A pantropical species. In Java, Raciborski records it from the woods of the low country only. It has been found on the Lankawi Islands, on the Taiping Hills, on the main range at G. Berumban and Bukit Kutu, and at lower altitudes in Pahang, Selangor, Malacca and in Singapore Island. At Fraser Hill it is of local occurrence, a ground fern of the jungle (8818).

Diplazium bantamense, Bl.; van Alderwerelt, p. 405, Ridley, p. 30, Beddome p. 177.

In southern and northern India and southern China, and through Malaysia to the Philippines and the New Hebrides. In Java it is a common ground fern of the lower and middle forest zones, rare in the low country; in the Peninsula it occurs on the Taiping Hills at 3000 feet, on the main range from Perak to Negri Sembilan, in Pahang, and at lower altitudes in Malacca and Singapore. A ground fern of the forest (10018).

Diplazium tomentosum, Bl.; van Alderwerelt, p. 414, Ridley p. 30, Beddome p. 179.

Confined to Burmah and western Malaysia. In the Peninsula it is widely distributed in the lowlands, and also in the hills from Perak to Johore, and in Singapore Island; a ground fern of the forest. Locally abundant at Fraser Hill (8816).

Diplazium speciosum, Bl.; van Alderwerelt, p. 415, Ridley, p. 30, Beddome p. 178.

A Malaysian species (occurring also in Indo-China?), widely distributed in the Peninsula from Kedah to Singapore, both at low altitudes and on the hills, in forests (10019).

Diplazium polypodioides, Bl.; van Alderwerelt, p. 419, Beddome p. 184; *D. asperum* var. *polypodioides*, Ridley p. 31.

Distributed from Ceylon, southern and northern India through Malaysia to the Philippines and to Australia. The distinction between this species and *D. asperum* as found in the Peninsula is not very marked; Ridley has included both as varieties of the same species, though Beddome separates them and considers *D. polypodioides* to be an extreme form of *D. latifolium*. The present specimen (8844), found in the valley near the stream, appears to be nearer typical *D. polypodioides* than others collected in the Peninsula, but has a decidedly rough stipe. The two species together have been found in Penang Island, at Ulu Bubong in Perak, and on the main range at Ulu Temengo and Ginting Sempah.

Diplazium cordifolium, Bl.; van Alderwerelt, p. 422; *Anisogonium cordifolium* Bedd.; Ridley p. 31, Beddome p. 191.

Distributed from tropical Africa through India and Malaysia to Polynesia. In the Peninsula it has been collected chiefly on the hills, in Perak up to 5000 feet and on the main range at several points, but also at lower altitudes in Selangor and on Singapore Island. A ground fern of the jungle, found once only, just below 4000 feet by the valley path (8850).

Diplazium fraxinifolium, Pr.; van Alderwerelt, p. 423; *Anisogonium lineolatum* Mett., Ridley p. 31, Beddome p. 191.

Distributed through Malaysia and the Philippines, and also in Japan (van Alderwerelt). In the Peninsula it is a montane species, collected on the Taiping Hills at 3000-4000 feet, on the main range at Telom and G. Batu Puteh (2000-3000 feet) and on Penang Hill. At Fraser Hill a ground fern of the jungle (8799).

Diplazium proliferum, Thouars v. **accedens** (Bl.); van Alderwerelt p. 424; *Anisogonium decussatum* Beddome, Suppl. p. 40, Ridley p. 31.

Found in tropical Africa and Madagascar, through Malaysia to Polynesia and northern Australia, but not in India. The only other records from the Peninsula are from the Taiping Hills up to 4500 feet and from Telom. Found once only, in moist ground by the valley path, rather in the open (8780).

Asplenium nidus, L.; van Alderwerelt, p. 439; *Thamnopteris nidus* Pr., Ridley p. 26, Beddome p. 137.

Occurs in Madagascar, in tropical Asia generally, and through Malaysia to Australia. It is common on trees throughout the Peninsula, and was of occasional occurrence at Fraser Hill.

Asplenium Scortechini, Beddome, Suppl., p. 27, Ridley, p. 27, van Alderwerelt p. 443.

Endemic and montane, previously collected on the Taiping Hills at 3000-4000 feet, and on the main range at G. Berumban in Pahang. An epiphyte, on tree trunks in the forest, not common (8776).

Asplenium normale, Don; van Alderwerelt, p. 453, Ridley, p. 27, Beddome p. 144.

On the mountains of southern India and Ceylon at 3000-6000 feet, the eastern Himalayas and Khasya Hills, in southern China, and through Malaysia to the Philippines and islands of the Pacific. In the Peninsula found on Kedah Peak, on the Taiping Hills at 3000 feet, and on the main range at Telom. At Fraser Hill fairly common on the ground and on trees near the ground (8464).

Asplenium tenerum, Forst.; van Alderwerelt, p. 458, Ridley, p. 28; Beddome p. 147.

In tropical Africa, Ceylon, and through Malaysia to the Philippines, New Guinea, and Polynesia. In the Peninsula widely distributed and not confined to the hills, found also on Singapore Island. At Fraser Hill it grows on the ground and on trees in the jungle (10020).

Asplenium caudatum, Forst.; van Alderwerelt, p. 460, Ridley, p. 28; Beddome p. 151.

A pantropical species. In the Peninsula it appears to be montane and has only been collected from the Taiping Hills at 2500-4000 feet. At Fraser Hill not common, an epiphyte in the jungle (10021).

Asplenium praemorsum, Sw.; van Alderwerelt, p. 470; *A. furcatum* Thb., Beddome p. 157.

A pantropical species, occurring on the mountains of southern India and Ceylon at 5-7000 feet, and in Java above 7000 feet. It has not previously been recorded from the Peninsula, but a single specimen growing epiphytically at Fraser Hill (8485) seems to be nearer to it than to any other species of Asplenium.

Asplenium nitidum, Sw.; van Alderwerelt, p. 471, Ridley, p. 29, Beddome p. 157.

Occurs in the forests of Ceylon and south India, on the Khasya Hills at 1000-4000 feet altitude, through Malaysia to the Philippines and in the Mascarenes. In Java it is found in the lower and middle forest zones up to 6000 feet. In the Peninsula it has been collected on the Taiping Hills up to 4000 feet, on the Tahan river, on Pulau Tiuman, and at various localities in Johore and on Singapore Island. At Fraser Hill it is epiphytic, and not common (8905).

Phegopteris laserpitiifolia, Beddome, Suppl., p. 84, Ridley, p. 40, van Alderwerelt p. 494.

Endemic and montane. Collected only in Perak (no locality) and on the main range at Telom. A ground fern of the forest, found only once, on Lower North Ridge (8798).

Dipteris conjugata, Reinw.; van Alderwerelt, p. 523; *D. Horsfieldii*, Beddome p. 336, Ridley p. 44.

Throughout Malaysia, extending to the Philippines, New Guinea and Polynesia, and also in Formosa. In the Peninsula "on rocks by the sea, and also on mountain tops" (Ridley). It is found on all the hills in open places at about 3000 feet and upwards, and also on the shores of Singapore Island. At Fraser Hill it was found abundantly in exposed situations both below 4000 feet and on the summit of Pine-tree Hill (8738) the highest point reached (4800 feet). Young plants were noticeable in many places by the forest paths.

Ceropteris calomelanos, Und.; van Alderwerelt, p. 528; *Gymnogramme calomelanos* Klf., Ridley p. 48.

This fern is said to have been introduced into Malaysia through cultivation, its original home being tropical America and Africa. It has been collected at many widely separated localities in the Peninsula, the highest altitude recorded being 4000 feet on G. Kerbau. At Fraser Hill it grows abundantly in open places, and is one of the first vascular plants to establish itself on bare ground (8483).

Monogramme paradoxa, Beddome, p. 375, van Alderwerelt, p. 552; *M. junghuhnii* Hk., Ridley p. 48.

On the mountains of Ceylon and southern India, and through Malaysia to Polynesia and Australia. The only other specimens in the Singapore herbarium are from Penang and Singapore. At Fraser Hill it was collected once only, an epiphyte in the forest (8835), but may have been overlooked on account of its small size.

Vittaria elongata, Sw.: van Alderwerelt, p. 556, Ridley, p. 51, Beddome p. 404.

An epiphyte of the rain forests of tropical Africa and Asia, extending through Malaysia to Polynesia and Australia. In Java it does not occur above 5500 feet. In the Peninsula it is common everywhere, in the low country and the hills, probably up to the upper limit of forest. At Fraser Hill it is one of the most abundant epiphytic ferns, and as usual rather variable (8471).

Vittaria pusilla, Bl.; van Alderwerelt, p. 560; *V. falcata,* Kze., Ridley p. 51, Beddome p. 406.

Occurs in Ceylon, Malaysia, the Philippines and Australia. In Java it is an epiphyte of the middle and upper forest zones, amongst moss, and in the Peninsula it appears to be montane, having been found on the main range at G. Berumban in Pahang and Bujong Malacca, on G. Tahan, G. Benom and Mt. Ophir. At Fraser Hill it is a not uncommon epiphyte, sometimes found with fertile fronds less than 5 cm. in length (8461).

Taenitis blechnoides, Sw.; van Alderwerelt, p. 563, Ridley, p. 52, Beddome p. 410.

Occurs in Ceylon and in northern India, and through Malaysia to the Philippines, New Guinea and Polynesia. "Common in woods all over the Peninsula and very variable" (Ridley). At Fraser Hill it is very abundant, especially by paths in the forest, the simple form being most frequent and large pinnate fronds rare (8735).

Polypodium hirtellum, Bl.; van Alderwerelt, p. 582, Ridley, p. 41, Beddome, p. 305.

Found in Ceylon, Malaysia, the Philippines, and New Caledonia. In the Peninsula and in Java it is montane, an epiphyte of mossy tree trunks; it has been collected on Kedah Peak at 2,500 feet, on the main range at G. Berumban and G. Batu Puteh (6,000 feet), on G. Tahan and Mt. Ophir. At Fraser Hill it was found only once (8767).

Polypodium cucullatum, Nees and Bl.; van Alderwerelt, p. 589, Ridley, p. 42, Beddome, p. 307.

Occurs on the hills of Ceylon and southern India at 3,000-5,000 feet, in Malaysia and Polynesia. In Java it is found as an epiphyte from the middle forest zone up to 9,000 feet. In the Peninsula it has been found on the Taiping Hills at 3,000 feet, and on the main range at Bujong Malacca and Bukit Kutu; the specimens so named from G. Tahan appear distinctly different. At Fraser Hill it was noticed only twice (8740), but is easily overlooked on account of its small size.

Polypodium subpinnatifidum, Bl.; van Alderwerelt, p. 590, Ridley, p. 42, Beddome Suppl., p. 86.

Recorded from the Peninsula, Java, and the Philippines (Copeland). In the Peninsula it has only been found on G. Kerbau, Ulu Semangkok and G. Tahan, but the distinction from

P. cornigerum does not seem well-marked. At Fraser Hill an epiphyte in the forest, abundant near Pine-tree Hill and at the highest point reached on G. Ulu Semangkok (8729).

Polypodium obliquatum, Bl.; van Alderwerelt, p. 600, Ridley, p. 42, Beddome, p. 311.

A common epiphyte in Ceylon, in southern India at 4,000-5,000 feet, in Malaysia and the Philippines. In the Peninsula apparently montane, having been collected on the Taiping Hills at 3,000 feet, at Temengo and Telom. At Fraser Hill it is an epiphyte in the forest (8782); observations as to its frequency are inadequate.

Polypodium mollicomum, Nees and Bl.; van Alderwerelt, p. 601; *P. fuscatum,* Bl., Ridley, p. 42, Beddome, p. 311.

This species is recorded from Ceylon and Malaysia. The specimens from Fraser Hill come nearest to it, but differ markedly from those from other localities, in the thinner translucent texture and great development of spreading hairs over the whole plant. Ferns from G. Tahan referred to *P. malaccanum* are in close agreement, differing from the type of the latter species from the top of Mt. Ophir. Other specimens referred to *P. mollicomum* are from G. Bubu and Kedah Peak. At Fraser Hill a fairly common epiphyte (8731).

Polypodium khasyanum, Hk.; van Alderwerelt, p. 603, Ridley, p. 42, Beddome, p. 308.

This species occurs on the Khasya Hills and in Assam at 3,000-4,000 feet, and in the Peninsula has been collected on the Taiping Hills at 4,000 feet, and on G. Pulai in Johore. At Fraser Hill it is an epiphyte, collected once only but possibly not infrequent (8486).

Polypodium serraeforme, J. Sm.; van Alderwerelt, p. 615; *Prosaptia Emersoni,* Pr., Ridley, p. 16, Beddome, p. 56.

Found on the hills of southern India and Ceylon, and through Malaysia to the Philippines and to Samoa. In the Peninsula it has been widely collected on the hills from Kedah Peak to G. Pulai in Johore, and at lower altitudes in Malacca and Selangor. At Fraser Hill collected by Mrs. Smith.

Polypodium contiguum, J. Sm.; van Alderwerelt, p. 616; *Prosaptia contigua,* Sw., Ridley, p. 17, Beddome, p. 56.

On the mountains of Ceylon and southern India and through Malaysia to Polynesia. In the Peninsula it has been collected on the Taiping Hills at 3,500 feet, at Telom, on Penang Hill at 2,000 feet, on G. Tahan, by the Tahan river and in Sungei Ujong. At Fraser Hill a fairly common epiphyte (8487).

Polypodium verrucosum, Wall.; van Alderwerelt, p. 619; *Goniophlebium verrucosum,* J. Sm., Ridley, p. 43, Beddome, p. 324.

Through Malaysia and the Philippines to New Guinea and Australia. In the Peninsula not confined to the hills, but collected from few localities. At Fraser Hill it is fairly common as an

epiphyte (8760), sometimes found growing beneath a larger fern, *Asplenium nidus* or *Pleopeltis heraclea*.

Polypodium argutum, Wall.; van Alderwerelt, p. 621; *Goniophlebium argutum*, Wall., Beddome, p. 323.

This species has a distribution in northern India and Luzon. Specimens collected at Fraser Hill in 1919 by Mr. C. Hose and at the Semangkok pass by Mr. Ridley have fewer pinnae than is normal but appear to be referable to it rather than to *P. amaenum* Wall.

Pleopeltis accedens, Bl.: van Alderwerelt, Suppl., p. 376, Ridley, p. 45, Beddome, p. 345.

From Malaysia to New Guinea and Polynesia. In the Peninsula an epiphyte of the hill forests, collected on the Taiping Hills at 3,000 feet, and on the main range from G. Kerbau to Ginting Sempah. At Fraser Hill it was found a few times, growing with *P. Wrayi* and *P. stenophylla* (10022).

Pleopeltis Wrayi, Beddome, Suppl., p. 93, van Alderwerelt, Suppl., p. 376, Ridley, p. 45.

This species has been recorded only from Sumatra and Borneo outside the Peninsula. It occurs on the Taiping Hills at 4,000-5000 feet on the main range from G. Kerbau to Fraser Hill, on G. Tahan and G. Benom. At Fraser Hill it is a common epiphyte (8462, 8488, 8733).

Pleopeltis peltata, Scort.; van Alderwerelt, Suppl., p. 376.

An endemic and montane species, closely allied to *P. superficiale* Bl., and no doubt originated locally from it. *P. peltata* has been found on the Taiping Hills at 3,000-4,000 feet, and on the main range at Telom and on G. Batu Puteh. At Fraser Hill it grows epiphytically in the forest, and was noticed two or three times only (8732).

Pleopeltis stenophylla, Moore.: van Alderwerelt, Suppl., p. 379, Ridley, p. 45, Beddome, p. 348.

In Malaysia, the Philippines and Fiji; in Java an epiphyte of the lower forest zone. In the Peninsula "high up on lofty trees in the low country, on rocks and low trees in the hills" (Ridley). It has been collected on Kedah Peak, on the Taiping Hills at 3,000 feet, at the Semangkok pass, in Johore and on the Islands of Penang and Singapore. At Fraser Hill a common epiphyte (8828).

Pleopeltis subcaudiformis, v. A. v. R., Suppl., p. 384. *Polypodium heterocarpum*, Mett. var. *abbreviatum*, v. A. v. R., p. 677.

Distribution, Malaya (van Alderwerelt). In the Peninsula collected only at Fraser Hill where it is one of the less common epiphytes. The identification is from description only (8834).

Pleopeltis platyphylla, Beddome, Suppl., p. 94, van Alderwerelt, Suppl., p. 386, Ridley, p. 46.

Confined to western Malaysia. In the Peninsula it is montane, having been collected on Kedah Peak, on the Taiping Hills, and

on the main range at Telom and Ginting Sempah. At Fraser Hill it was found once as an epiphyte (a small sterile specimen) and abundantly on the rocks of the mining valley near the stream (8768).

Pleopeltis rupestris, Moore; van Alderwerelt, Suppl., p. 387, Ridley, p. 46, Beddome, Suppl., p. 94.

An epiphyte, confined to Malaysia and the Philippines. In the Peninsula it has been collected only on the Taiping Hills at 3,000 feet and on G. Inas in Perak at 5,000 feet. At Fraser Hill only one small specimen was collected.

Pleopeltis incurvata, Moore; van Alderwerelt, Suppl., p. 399, Ridley, p. 47, Beddome, p. 364.

An epiphyte, confined to Malaysia and the Philippines. In Java it occurs in the lower forest zone. In the Peninsula it is montane, and has been found on Kedah Peak, the Taiping Hills, on the main range from Bujong Malacca to Bukit Hitam in Selangor, and on G. Tahan. At Fraser Hill it is abundant (8484).

Pleopeltis laciniata, Beddome, Suppl., p. 97, Ridley, p. 47, van Alderwerelt, Suppl., p. 399.

Confined to western Malaysia and Celebes. In Java it is an epiphyte of the lower and middle forest zones. In the Peninsula it has been found on the Taiping Hills at 3,500-5,000 feet, and on G. Tahan at 5,000-6,000 feet. At Fraser Hill it was found once only, on South Summits, on the ground in the forest (8815), but probably it is usually epiphytic.

Pleopeltis sp. nov. ? No. 8789. An epiphyte, found once only. It has a pinnatifid frond, like that of *P. laciniata,* but with more distant segments, and scattered superficial sori. Represented also in Mr. Hose's collection.

Pleopeltis heraclea, (Kze.); van Alderwerelt, Suppl., p. 403; *Drynaria heracleum,* Moore, Ridley, p. 45, Beddome, Suppl., p. 93.

Occurs throughout Malaysia and in New Guinea. In Java it is a common epiphyte of the lower, and less common in the middle forest zone. In the Peninsula it has been collected on the Taiping Hills at 3,000-4,000 feet, and on Penang Hill. At Fraser Hill it is a common epiphyte (8764), and was found also creeping over the rocks in the cleared mining valley.

Lecanopteris carnosa, Bl.; van Alderwerelt, Suppl., p. 407, Ridley, p. 10.

Confined to Malaysia and the Philippines. In the Peninsula this species is montane, and has been found on the Taiping Hills at 3,000-5,000 feet, on the Telom ridge, and on G. Tahan at 3,000-5,000 feet. Specimens from Singapore referred to this species have scaly rhizomes and medial sori, characteristic of *L. lomarioides.* At Fraser Hill branches of trees were frequently seen covered with the black tuberculous rhizome of this myrmecophilous fern, but well-developed fertile fronds were not often found (8728).

Cyclophorus flocciger, Pr.; van Alderwerelt, p. 687; *Niphobolus fissus*, Beddome, p. 330.

This species occurs on the hills of southern India and Ceylon, in northern India and Malaysia to the Philippines. It has not been definitely recorded from the Peninsula, and the present specimens (8470, 8769), whose fertile fronds are immature, are referred rather doubtfully to it.

Stenochlaena sorbifolia, J. Sm.; Ridley, p. 53, Beddome, p. 423.

A pantropical species, remarkable for the small and variable much-divided sterile leaves which are usually borne by the lower part of the climbing stem. It is distributed throughout the Peninsula and is very abundant at Fraser Hill (8459), but was never found with fertile leaves.

Hymenolepis spicata, Pr.; van Alderwerelt, p. 728; *Gymnopteris spicata*, Beddome, p. 432, Ridley, p. 54.

In Madagascar, Ceylon and southern India, northern India at 4,000-7,000 feet, to southern China, and through Malaysia to Polynesia and Australia. In Java it is found up to 10,000 feet. In the Peninsula it has been found on the Taiping Hills at 3-4,000 feet, on Kedah Peak, on the main range from Telom to Fraser Hill, and on Penang Island and Pulau Tiuman. At Fraser Hill it one of the less frequent epiphytes (8766).

Photinopteris speciosa Bl.; van Alderwerelt, p. 731; *P. rigida* Bedd; Ridley p. 55, Beddome p. 442.

Confined to Malaysia and the Philippines. In Java it is an epiphyte of the lower forest zone, at 1500 to 4000 feet. In the Peninsula "on boughs of trees, overhanging rivers and mangrove swamps" (Ridley); it has been collecteed in Singapore and Johore, on Penang Hill, and on the Taiping Hills at 300-2000 feet. At Fraser Hill it was found only in the mining valley, on rocks in the open (8845).

Cheiropleuria bicuspis Pr.; van Alderwerelt p. 732; *Chrysodium bicuspe* Hk., Ridley p. 55.

Occurring throughout Malaysia, extends to the Philippines, Formosa and New Guinea. In Java it is a rare ground fern, found at 5000 feet; in the Peninsula it is found on the Taiping Hills, on the main range from G. Kerbau to Fraser Hill, on G. Tahan and Mt. Ophir. At Fraser Hill found once only (8482), on the ground in the forest on North Ridge.

Leptochilus heteroclitus C. Chr.; van Alderwerelt p. 739; *Gymnopteris flagellifera* Beddome, p. 433, Ridley p. 54.

Generally distributed through tropical Asia, and through Malaysia to the Pacific. In the Peninsula found at low altitudes in Johore and Singapore, at Goping in Perak, and in Penang and Lankawi Islands; it grows in wet ground in forests. Mrs. Smith sent a small fertile specimen from Fraser Hill labelled "on log over stream, 4000 feet," which is probably referable to this species.

Ophioglossum pendulum L.; van Alderwerelt p. 777, Ridley p. 59, Beddome p. 465.

Occurs throughout southern Asia, Malaysia, Polynesia and northern Australia. In the Peninsula it is probably of general occurrence, but has only been collected on the Islands of Singapore and Penang, at Rawang in Selangor, and on G. Batu Puteh. At Fraser Hill it was noticed only twice, once hanging below *Asplenium nidus* (8761).

Angiopteris evecta Hoffm.; van Alderwerelt p. 762, Ridley p .58, Beddome p. 460.

Distrbuted from Madagascar, Ceylon and southern India, through northern India to southern China and Japan, and through Malaysia to Polynesia and Australia. In Java it is a common ground fern of the lower forest zone, and in the Peninsula is probably of general occurrence, but has only been collected on the Taiping Hills (up to 3000 feet), at Temengo and Telom, at Pekan, and on Singapore Island. At Fraser Hill, found only in the mining valley below 4000 feet, in shady places, becoming abundant at about 3500 feet (8847).

FERN ALLIES.

Selaginella atroviridis Spring; Ridley Fern Allies p. 153.

Distributed from British India and China to New Guinea, and collected from many localities in the Peninsula, from Perak to Singapore, not confined to the hills. At Fraser Hill it is abundant on the ground in the forest (8453).

Selaginella brachystachya Spring; Ridley Fern Allies p. 159.

In south India and Ceylon, and in western Malaysia. In the Peninsula it appears to be montane, being found on the Taiping Hills, at Telom, and on G. Tahan. At Fraser Hill noticed only by the path to the Gap. (8822).

Selaginella Wallichii Spring; Ridley Fern Allies p. 153.

Distributed from Assam through Malaysia to New Guinea. In the Peninsula collected at many localities in lowland forests, and on the hills up to 3-4000 feet. At Fraser Hill not abundant (8819).

Lycopodium cernuum L.; Ridley Fern Allies p. 144.

A species of worldwide distribution, abundant everywhere in the Peninsula. It is one of the first vascular plants to establish itself on new ground in exposed places, notably on levelled house-sites.

Lycopodium phlegmaria L.; Ridley Fern Allies p. 143.

Paleotropical, and in Queensland and New Zealand. In the Peninsula it has been found in many localities, at altitudes up to 5000 feet (G. Kerbau). At Fraser Hill it is frequent, but not abundant (8788).

MOSSES.

Acanthocladium scabrifolium Broth. No. 8730. "Agrees with the description quite well. It has only been found once before, in Java; cf. Hedwig. LX, 327 (1819). The fruit has never been described." (Dixon).

Braunfelsia sp. nov. No. 8838. The leaves are closely imbricated, and the plant having a tufted habit was saturated with water like a sponge. Found on a tree by the path to Pine-tree Hill.

Ctenidium sp. nov. No. 8715 d. Closely allied to *C. stereodontoides* Dixon from S. India.

Dicranoloma sumatrana Broth. This species, otherwise only known from Sumatra, was collected by Mr. Ridley at Sempang mines

Distichophyllum Mittenii Bry. jav. Nos. 8708, 8712. Distribution; Ceylon, Java, New Caledonia. Previously found on the Taiping Hills and Ulu Temengo in Perak, and at Kukub in Johore. On a log in deep shade in Reservoir Valley.

Ectropothecium Moritzii (C.M.) Jaeg. No. 8713. Distribution; Java, Borneo, Celebes. Collected also on Penang Hill and G. Tampin.

Endotrichella elegans (Doz. & Molk.) Fl. No. 8821. Distribution; Sumatra, Java, Celebes, Philippines. Previously found on the main range at G. Kerbau and Telom.

Isopterygium albescens (Schwaeg.) Jaeg. No. 9181. Distribution; Nilghiris, Himalayas from Nepal to Assam, Java, Borneo, Celebes, Japan. Previously found at Batu Caves, Selangor, and in the Botanic Gardens, Singapore.

Pogonatum convolutum (L.) var. **cirratum** (Brid.) Par. No. 8469. A new record for the Peninsula.

Pogonatum macrophyllum Bry. jav. No. 8467. Distribution; Java, Sumatra, Batjan. Apparently a montane species in the Peninsula being found on the Taiping Hills, on the main range from G. Berumban and Bujong Malacca to Bukit Hitam, on G. Benom, Mt. Ophir and the hills of Penang. Abundant at Fraser Hill

Pogonatum Neesii C. M. Nos. 8458, 8716. Found by Mr. Ridley at or near Fraser Hill, this species has not been recorded elsewhere in the Peninsula; it is known from the Nilghiris and Java. It is the first plant to colonise the bare ground of levelled house-sites and is very abundant.

Rhacelopus pilifer D. & M. No. 8772. Distribution; Tonkin, Java, Borneo, Batjan, New Guinea. This species is recorded from the Taiping Hills and from several points on the main range from Perak to G. Tampin. Not uncommon in the jungle on rocks and also on bare ground by paths.

Rhizognium spiniforme (L.) Bruch. No. 8468. Occurs everywhere in mountain forests of the tropics and subtropics, and

is widely distributed in the Peninsula from Kedah to Singapore, not confined to the hills.

Schistomitrium apiculatum D. & M. No. 8823. A Malaysian species, not recorded from other localities in the Peninsula. Collected on a tree in the forest on South Summits.

Sematophyllum sp. nov. No. 8711. Found on a tree in Reservoir Valley.

Sematophyllum secundum (Rw. and Hornsch.) var. **angustifolium** Fl. Nos. 8398, 8715 e, 8741, 8910. This variety occurs also on G. Raya, Lankawi Islands; at Fraser Hill it was abundantly fruiting. *S. secundum* is a Malaysian species, and has been found on G. Kerbau and Penang Hill.

Sematophyllum sigmatodontium (C. M.) Jaeg. Distribution; Java, Sumatra, New Guinea. This species was found by Mr. Ridley at or near Fraser Hill, and has also been collected on Penang Hill and on G. Tunduk, Malacca.

Taxithelium capillipes (Bry. jav.) Broth. No. 8454. Distribution; Sumatra, Java. It has been found on Penang Hill and in mangrove, amongst *Acrostichum aureum*, at Port Swettenham.

Trichosteleum Boschii (D. & M.) Jaeg. Nos. 8715 b, 8783. Distribution; Siam and western Malaysia. This species has been collected on the hills of Perak and Penang, in the Telok Reserve, Klang, and on G. Pantai in Johore.

Trichosteleum hamatum (D. & M.) Jaeg. Nos. 8709, 8715c, 8781. Distribution; Malaysia and the Philippines. New to the Singapore collection.

Trichosteleum sp. nov. No. 8715a. Found in Reservoir Valley, in a tuft consisting of *T. Boschii*, *T. hamatum*, etc.

Trismegistia rigida (Rw. & H.) Broth. No. 8399. A Malaysian species, extending to New Guinea and New Caledonia; it has also been found on G. Raya, Lankawi.

I. H. Burkill.
R. E. Holttum.

RAINFALL

at the Director's house, Botanic Gardens, Singapore, during the first half year, 1921.

Readings taken always at 8 a.m. and credited to the date in which the twenty-four hours began.

Date	January.	Feb.	March.	April.	May.	June.
1	.14	.02	nil	.87	.58	.38
2	.23	nil	..	.78	.10	.60
3	.64	.01	..	1.24	.65	.39
4	.02	.03	.11	nil	trace	.02
5	1.98	.97	.48	..	2.13	.47
6	.17	.17	.17	.85	nil	.11
7	.01	1.52	.09	.29	..	.02
8	1.35	.13	.06	.24	.15	.18
9	4.93	.05	1.60	.43	.79	.01
10	.78	.20	1.40	nil	.94	.03
11	.23	.13	.03	.07	.01	1.15
12	nil	2.92	1.55	.04	.01	.09
13	.01	.23	.53	trace	.02	.05
14	.23	.01	1.24	nil	trace	nil
15	.01	1.03	trace	.02	.44	..
16	nil	.01	nil	trace	.02	.11
17	..	trace	..	nil	.45	nil
18	.53	nil	..	1.11	.41	..
19	1.93	.02	..	.21	nil	..
20	1.12	.02	..	.55	1.58	..
21	1.27	nil	.10	.55	.29	..
22	.01	..	nil	nil	.23	.18
23	.01	trace	.52	..	.18	nil
24	nil	.18	.07	2.24	nil	.42
25	.13	.08	nil	.05	..	.02
26	nil	nil	.48	.55	.28	nil
27	..	..	.10	1.64	.02	.18
28	..	..	..	.03	nil	.05
29	.29		.30	.05	.01	nil
30	8.77		.02	.04	nil	..
31	.01		nil		nil	
	24.80	7.73	8.85	11.85	9.29	4.46

RAINFALL

at the Director's house, Botanic Gardens, Singapore, during the second half year, 1921.

Readings taken always at 8 a.m. and credited to the date in which the twenty-four hours began.

Date	July.	August.	Sept.	October.	Nov.	Dec.
1	nil	nil	1.86	trace	.07	.02
2	trace	..	1.08	nil	trace	nil
3	nil	trace	.58	trace	..	.37
4	..	.01	.02	nil	.28	.65
5	nil	.07	.03	..	2.74	.37
6	.91	nil	nil	..	trace	.39
7	.03	..	.06	..	nil	nil
8	.73	..	nil	..	.14	.05
9	.02	..	..	.62	trace	nil
10	trace	..	.27	2.26	nil	..
11	..	..	.03	nil	..	..
12	nil	.83	.05	.15	1.67	..
13	.51	nil	.02	nil	.37	..
14	2.49	.42	.03	.17	nil	.03
15	.06	.03	.22	nil	.29	.15
16	.02	nil	.01	.89	.40	.09
17	trace	1.04	.01	.06	.90	.08
18	nil	.06	.02	.91	trace	.48
19	..	2.15	2.07	1.42	..	nil
20	..	trace	trace	.15	2.03	1.05
21	..	.13	nil	.28	.03	nil
22	..	.01	..	nil	.03	trace
23	trace	nil	.29	.19	.06	nil
24	nil	.01	.07	nil	nil	..
25	..	.03	.57	.09	.36	.64
26	..	.11	trace	.08	.64	.03
27	.37	nil	1.20	.66	.33	trace
28	trace	..	1.50	.16	1.19	.12
29	nil	.01	.42	.87	.12	.03
30	..	1.56	nil	.06	trace	.38
31	..	.32		4.92		.23
	5.14	6.79	10.41	13.94	11.65	5.16

RAINFALL

at the Director's house, Botanic Gardens, Singapore, during the first half year, 1922.

Readings taken always at 8 a.m. and credited to the date in which the twenty-four hours began.

Date	January.	Feb.	March.	April.	May.	June.
1	.01	1.12	.11	nil	.01	.52
2	nil	.24	.96	.11	nil	1.57
3	.04	.09	.01	nil	trace	nil
4	.44	nil	.16	.06	.06	..
5	.12	1.04	.08	nil	trace	..
6	.02	nil	nil	trace	nil	trace
7	.64	..	..	1.01	..	nil
8	trace	.49	.20	nil	..	.01
9	.23	.34	.12	..	2.76	nil
10	nil	.49	.84	.11	.24	.21
11	.62	2.69	.07	.11	nil	.01
12	.01	.02	nil	1.24	trace	trace
13	nil	1.06	.81	.06	.06	.09
14	.11	.07	.07	.36	.01	.01
15	.32	nil	nil	1.26	.77	.18
16	trace	..	..	.15	trace	.19
17	..	trace	.47	1.38	.06	trace
18	.53	nil	.14	.04	3.06	.09
19	.10	..	nil	.29	.02	.04
20	1.39	..	.02	nil	1.08	.32
21	1.02	..	.04	trace	nil	.11
22	.21	..	.10	nil	.07	.03
23	.12	trace	.88	trace	.50	3.89
24	.93	.01	.39	nil	trace	.02
25	.10	.08	1.84	..	.18	trace
26	nil	.07	.02	..	nil	nil
27	..	.20	.32	..	1.49	trace
28	trace	.20	.01	..	.03	nil
29	nil	..	.20	..	.01	..
30	..	..	trace	.17	trace	..
31	..	..	nil	..	nil	..
	6.96	8.21	7.86	6.35	10.41	7.29

RAINFALL

at the Director's house, Botanic Gardens, Singapore, during the second half year, 1922.

Readings taken always at 8 a.m. and credited to the date in which the twenty-four hours began.

Date	July.	August.	Sept.	October.	Nov.	Dec.
1	nil	.14	nil	1.05	1.00	.01
2	..	.26	trace	.05	.09	.06
3	.05	nil	1.96	.31	.93	.62
4	.50	..	trace	.04	trace	nil
5	.06	..	nil	1.35	.11	..
6	.01	.43	.16	.09	.78	1.49
7	.90	trace	trace	.01	.05	1.12
8	.02	nil	1.53	.18	nil	trace
9	.08	.41	.04	trace	.04	nil
10	.03	nil	nil	nil	.07	.65
11	nil	.09	.02	.04	.25	.07
12	..	.47	nil	nil	.01	nil
13	.02	.16	..	..	.23	.23
14	.23	.92	..	..	nil	.01
15	.82	.15	..	..	..	.08
16	nil	.05	..	..	..	.91
17	..	.61	..	.68	.27	.03
18	.28	nil	..	nil	2.91	.20
19	.01	..	..	..	.11	1.05
20	nil	.08	..	.02	.43	.01
21	..	.80	..	.34	trace	.41
22	trace	.53	..	.40	nil	.16
23	nil	1.73	..	1.45	.02	nil
24	..	.52	.52	.74	2.39	.59
25	trace	3.72	.86	nil	trace	nil
26	nil	2.66	nil	.09	.81	..
27	..	.02	1.56	.08	.35	.01
28	..	.19	trace	trace	.35	nil
29	..	.04	1.48	nil	.72	..
30	..	1.10	1.28	..	1.33	..
31	..	.08	..	.40	..	.59
	3.01	15.16	9.41	7.32	13.25	8.30

RAINFALL

at the head of the Waterfall Gardens, Penang, during the first half year, 1921.

Readings taken at 8 a.m. and credited to the date in which the twenty-four hours began; the registration kindly put at the service of the Gardens by the Municipality of George Town, Penang.

Date.	January.	Feb.	March.	April.	May.	June.
1	nil	.05	nil	.06	nil	.15
2	.70	1.12	..	nil	.15	.75
3	.14	.03	.14	..	.35	.03
4	.04	nil	.18	..	1.60	nil
5	.10	.43	nil	..	.92	2.07
6	.06	nil	..	..	.42	.03
7	.10	..	.10	..	.11	nil
8	.08	..	.19	..	.10	..
9	.03	..	.04	..	nil	1.86
10	nil	..	1.82	..	.70	nil
11	.04	..	.57	.46	.33	..
12	1.73	..	1.05	2.20	nil	.03
13	nil	..	1.24	.15	1.46	nil
14	1.83	..	.25	.72	1.05	..
15	nil	1.43	.23	nil	1.97	.04
16	..	nil	.33	.65	.50	.82
17	..	..	.22	1.99	3.14	nil
18	.25	..	.08	.62	.58	..
19	.06	..	2.60	.16	1.83	..
20	nil	1.59	.42	.04	.17	..
21	..	nil	1.98	nil	.16	..
22	..	..	.12	..	.06	.06
23	..	..	.53	..	nil	nil
24	..	..	.03	..	.02	..
25	..	..	.76	..	1.09	.34
26	..	..	.05	..	nil	.03
27	..	..	.16	1.30	.12	nil
28	..	..	.07	.19	..	..
29	.88		nil	.84	..	..
30	.06		..	.04	.05	..
31	nil		.57		.09	
	6.10	4.65	13.73	9.42	16.97	6.21

RAINFALL

at the head of the Waterfall Gardens, Penang, during the second half of the year, 1921.

Readings taken at 8 a.m. and credited to the date in which the twenty-four hours began; the registration kindly put at the service of the Gardens by the Municipality of George Town, Penang.

Date.	July.	August.	Sept.	October.	Nov.	Dec.
1	.05	.53	.82	.10	.62	nil
2	nil	.10	2.25	.23	2.50	..
3	..	nil	nil	.01	nil	..
4	.05	1.46	..	.07	..	1.69
5	5.02	.07	..	.07	.28	..
6	.33	nil	.97	1.68	.03	.19
7	nil	..	nil	nil	.18	nil
8	.22	..	..	.10	.04	..
9	.04	..	..	.02	.16	..
10	.14	..	..	.04	2.42	.32
11	nil	..	..	nil	.72	nil
12	1.56	..	3.60	.44	.02	..
13	.30	..	.11	.21	..	..
14	1.07	.95	.67	.33	1.38	..
15	.39	.68	5.66	.72	nil	..
16	.56	3.50	.31	1.87	..	..
17	.60	1.12	.36	1.02	..	..
18	nil	.02	2.55	1.79	.21	..
19	..	.59	2.85	1.44	.03	.41
20	.03	nil	1.33	nil	.20	.36
21	nil	..	nil	..	.08	nil
22	..	..	.25	.70	nil	..
23	..	..	.13	.96	..	..
24	..	..	nil	.43	.14	..
25	..	.58	.03	.19	.06	..
26	..	nil	1.89	.23	nil	.77
27	.06	.06	1.08	.42	..	.42
28	.80	.08	1.60	nil	.15	.20
29	nil	1.55	nil	1.84	nil	.05
30	.30	2.45	.01	.52	.22	nil
31	1.63	4.82		.81		..
	13.15	18.56	26.47	16.24	9.44	4.41

RAINFALL

at the head of the Waterfall Gardens, Penang, during the first half year, 1922.

Readings taken at 8 a.m. and credited to the date in which the twenty-four hours began; the registration kindly put at the service of the Gardens by the Municipality of George Town, Penang.

Date.	January.	Feb.	March.	April.	May.	June.
1	nil	.07	.91	nil	1.60	.19
2	..	.12	.06	..	.76	nil
3	..	.48	.51	..	.02	.35
4	.77	.06	.79	..	.74	.18
5	nil	.30	nil	.03	.85	.96
6	..	nil	.83	nil	nil	.05
7	..	..	nil	1.40	3.94	nil
8	..	..	.16	.11	2.95	..
9	.13	.15	nil	.69	.60	..
10	nil	.39	..	.04	.02	..
11	.11	nil	..	.80	1.62	..
12	nil	.30	..	.21	.05	..
13	..	nil	.01	.30	.42	.64
14	..	..	.03	.34	.05	.07
15	.81	..	.90	.22	.54	.29
16	nil	..	.60	.50	nil	2.15
17	.90	..	1.06	.13	.13	1.18
18	.04	..	.57	.46	.43	2.28
19	.27	..	.13	nil	.19	1.70
20	nil	..	.01	..	.03	.31
21	.07	..	2.43	..	.02	.12
22	.04	..	.02	..	nil	.35
23	nil	.20	1.25	.10	.12	nil
24	..	nil	1.29	nil	nil	..
25	..	.27	.22	..	.58	..
26	..	.21	nil	..	nil	..
27	..	.41	..	..	.49	..
28	..	nil	..	..	.02	..
29	..		..	.03	.16	.48
30	..	..	..	.22	nil	.07
31	..		..		1.92	..
	3.14	2.96	11.78	5.58	18.25	11.37

RAINFALL

at the head of the Waterfall Gardens, Penang, during the second half of the year, 1922.

Readings taken at 8 a.m. and credited to the date in which the twenty-four hours began; the registration kindly put at the service of the Gardens by the Municipality of George Town, Penang.

Date.	July.	August.	Sept.	October.	Nov.	Dec.
1	.05	nil	.36	1.14	.10	nil
2	2.17	..	1.55	.02	.50	1.05
3	nil	..	.77	.27	.90	.08
4	.18	..	.29	.55	1.22	.58
5	.02	.21	nil	.03	.40	.09
6	nil	.03	..	.32	.08	1.37
7	.10	.04	1.30	.03	.35	nil
8	nil	nil	.50	.23	.23	..
9	..	..	.45	.25	.14	..
10	.17	3.24	nil	.60	.23	.22
11	nil	1.73	.23	.17	1.25	.17
12	.56	.33	1.11	2.56	.62	nil
13	1.62	.07	.32	.04	5.66	.25
14	.02	nil	nil	.10	.53	nil
15	nil	1.00	.82	.02	.32	.24
16	.52	.05	.42	.47	.77	1.62
17	.96	nil	.41	.08	.04	.07
18	.11	..	1.14	.66	nil	.75
19	nil	.55	nil	nil	.25	1.80
20	..	4.30	..	..	..	1.00
21	..	nil	..	.55	..	1.03
22	..	.02	..	.56	.05	.50
23	.20	.32	.92	.08	.22	nil
24	nil	.12	2.06	.38	.10	.70
25	..	nil	2.60	.16	nil	nil
26	..	.43	2.53	.29	.20	.12
27	..	nil	2.09	.27	.42	nil
28	..	1.44	.35	.87	nil	.06
29	..	nil	nil	.09	..	.92
30	..	..	.91	nil	.66	nil
31	..	..		..		1.70
	6.68	13.88	21.13	10.79	15.24	14.32

SUMMARY OF RAINFALL, 1921.

	SINGAPORE.			PENANG.		
	No. of rainy days.	Amount of rain in inches.	Longest Spell without rain.	No. of rainy days.	Amount of rain in inches.	Longest Spell without rain.
January ..	24	24.80	3	15	6.10	9
February ..	19	7.73	3	6	4.65	9
March ..	18	8.85	5	25	13.73	2
April ..	21	11.85	2	14	9.42	9
May ..	21	9.29	2	24	16 97	2
June ..	19	4.46	5	12	6.21	5
July ..	9	5.14	10	18	13.15	6
August ..	16	6.79	6	16	18.56	8
September ..	22	10.41	3	19	26.47	5
October ..	17	13.94	8	26	16.24	2
November ..	18	11.65	3	19	9.44	3
December ..	18	5.16	5	9	4.41	8
Total ..	222	120.07	..	203	145.35	..

Greatest amount in 24 hours ..	8.77	5.66
do. do. 48 do. ..	9.06	7.27
do. do. 72 do. ..	9.07	8.82

Excessively rainy periods, more than 5.00 in. having fallen in 72 hours. (both in January)	.. 2	5 (March, July, August) (twice) and September)
No. of days when the condition existed	.. 6	15
Periods of comparative drought, less than 0.02 in. having fallen in 120 hours (Feb, June, June-July, July, July-August, September, October, December.)	.. 8	12 (every month except May, October and Nov.)
No. of days when condition persisted	.. 22	36
Longest of the dry spells	.. 10 days	10 days.

SUMMARY OF RAINFALL, 1922.

	SINGAPORE.			PENANG.		
	No. of rainy days.	Amount of rain in inches.	Longest spell without rain.	No. of rainy days.	Amount of rain in inches.	Longest Spell without rain.
January ..	19	6.96	6	9	3.14	9
February ..	16	8.21	9	12	2.96	10
March ..	23	7.86	2	19	11.78	10
April ..	14	6.35	10	16	5.58	5
May ..	17	10.41	4	25	18.25	1
June ..	16	7.29	6	17	11.37	6
July ..	13	3.01	12	13	6.68	12 (to Aug. 4)
August ..	23	15.16	2	16	13.88	3
September ..	10	9.41	12	21	21.13	4
October ..	18	7.32	5	27	10.79	2
November ..	22	13.25	3	24	15.24	2
December ..	20	8.30	3	21	14.32	3
Total ..	211	103.53	..	220	135.12	..

Greatest amount in	24	hours ..	3.89	5.66	
do. do.	48	do. ..	6.38	6.89	
do. do.	72	do. ..	6.91	7.53	
Excessively rainy periods, more than 5.00 in. having fallen in 72 hours ..			1	5 (May, June, August September, November)	
No. of days when the condition existed ..			3	10.	
Periods of comparative drought, less than 0.02 in. having fallen in 120 hours ..			8	7 (January, February, March, April. April, June (2), July-August).	
(Jan., Feb., April, June (2), July, Sept, Oct.)					
No. of days over which the condition existed			35	30.	
Longest of the spells ..			12 days.	12 days.	

Departmental Notices.

A list of plants which can be purchased at the Botanic Gardens, in Singapore and in Penang, can be had upon application. The same list appears at intervals in the Government Gazette.

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The
Gardens' Bulletin
STRAITS SETTLEMENTS

Vol. III April 15, 1924 Nos. 4—6

A List of Oriental Vernacular Names

of the

GENUS DIOSCOREA.

To be purchased at the Botanic Gardens, Singapore

Singapore:
Printed at the Methodist Publishing House,
1924.

MAP NO. 1

Map 1. The distribution in Asia of Dioscoreas of the section Enantiophyllum, a section of edible species furnishing in *D. alata* and *D. opposita* two important cultivated plants. There are five areas in Asia of greatest abundance, (1) Malabaria, (2) Circars-Chota Nagpur, (3) the Assam-Burmese hills, (4) South-eastern China and (5) Western Malaysia with the Philippine islands.

THE

GARDENS' BULLETIN,

STRAITS SETTLEMENTS.

Vol. III Issued April 15, 1924. Nos. 4-6.

A list of Oriental Vernacular Names of the genus Dioscorea.

Compiled by I. H. Burkill.

For a considerable period the writer of these pages has been engaged on a botanic and economic study of the oriental species of the genus *Dioscorea,* and has collected at first, and at second hand, much native opinion upon them. In the course of doing this, the following list of their oriental names has been compiled. It is printed in the belief that used as a quarry of statements meant for examination it can be of considerable ethnological value. It is, in its present form, uncritical; for it contains names as heard from the lips of untutored men speaking a variety of distinct languages; and, obviously, it embodies what a purist would consider their mistakes. But languages are largely made up of mistakes persisting and it is not a purpose of the list to hide them, but to lead to an explanation of them.

As a consequence of its second-hand sources, it is unavoidedly inconsistent in the values of letters; but contains a number of explanatory cross-entries. In the names from Dutch sources " oe " has been turned into " u " " dj " into " j," and " tj " into " ch: " in northern Indian names, á has its Hunterian value: c, k and q have been gathered together: cross-references give the Portuguese values of some of the consonants of Fijian; a phonetic spelling (English values) is given for Chinese ideograms; but it has not been thought well to make any change in the French spelling of the names from New Caledonia, etc. Mistakes such as arise from a Burman using Hindustani, or a Sakai using his clipped Malay are, when recognised, explained.

It is a matter of regret to the writer, that the list does not cover the names of all starchy tubers used as food in the East; but of Dioscoreas only. However, Dioscorea in *D. alata* yields one of the most important of these foods, and has long done so: it supplies in *D. opposita*[1] a sub-tropical tuber of importance: it furnishes in *D. esculenta*[2] another tropical food; and in the edible cultivated races of *D. bulbifera* and *D. pentaphylla* are two more useful plants. All bear the marks of selection and improvement by human agency. It is indubitable that the improvement has been directed in the East. Besides these cultivated yams, thirty more wild species of the genus are proved to be turned to account as famine foods, and as knowledge grows that number is likely to be doubled.

In comparison with the use as food, the other uses which oriental Dioscoreas have, are relatively unimportant. There is the medicinal use of some species in China and elsewhere; there is the tanning use of *D. rhipogonoides* and *D. cirrhosa* on the coasts of southern China, Tonkin and Annam; and there is the use of *D. deltoidea* in the North-western Himalaya for wool-washing. The species which serve man as food-plants, are serviceable in very varying degree: *D. alata* returns on cultivation a considerable harvest, which is in the highest degree palatable: *D. opposita* and *D. esculenta* yield freely, and what they return is also wholely palatable: cultivated races of *D. bulbifera* and *D. pentaphylla* possibly return not grudgingly, but no European has tried to ascertain their yield per acre: the wild species of the section Enantiophyllum root deep and therefore return little to those seeking and getting them; but the root tubers when got are palatable: the wild and nauseous species of the sections Opsophyton and Lasiophyton have to be eaten with caution, and are only used in want: and, lastly, the tuber of *D. hispida*[3] is virulently poisonous, but the poison can be eliminated and a food extract made from it when greatly needed. The wide range in utility evident through this series gives abundant cause for discriminating names. Primitive man particularises: he may be expected to apply a different noun to each yam that he recognises. As his tribe advances, generalisation comes in; a noun is adopted for "yam:" and in a further generalisation a noun for "tuber." Doubtless this explains how related languages are often remarkably far apart in their words of generic rank *e.g.* for "yam" and for "tuber," for one tribe would take the noun of this species of yam and apply it to yams in general; and another tribe would take the noun of that yam. The nouns for "yam" and still more the nouns for "tuber" will be seen in these pages most diverse.

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1 *D. opposita*, Thunb., is the oldest name for the Chinese yam, and must be given preference to the better known name, *D. Batatas*, Decne.

2 *D. esculenta*, Burk., is the proper name to give to the Lesser yam, which is *D. fasciculata*, Roxb., and the *D. spinosa* of various authors, and also one of the species which have been called *D. aculeata*.

3 *D. hispida*, Dennst., is the most acceptable name for the yam often called *D. daemona*, Roxb., and which is one of the species that have been called *D. triphylla*.

MAP NO. 2

Map 2. The distribution in Asia of the section Combilium, that is to say of the cultivated and edible *Dioscorea esculenta*. Also (at S.) the distribution of the section Shannicorea.

The writer's interest is in man's gradual appropriation of the products of the jungle, and conversion of those that were pliable into cultivated plants. He hopes that etymologists upon their side can make use of the names which he has gathered together, and will find interest in revising them.

It would entrench the conclusions derived from studying the names of Dioscoreas to make a list covering all the oriental starchy food-roots, so that such as may have been transferred to Dioscoreas from aroids and from other useful plants, should appear with a suggestion whence they came: but to have made it would have entailed large digressions from the purpose in hand.

Climate circumscribes the area of the Dioscoreas in the East in a very marked way by means of deserts; for they are plants of summer-growth under a rainfall ranging from abundance to great abundance: and in consequence of this the regions about Persia, Arabia, Turkestan and in general all the parts of western Asia, are inimical to them, as well as the great plateau of the centre of the Continent and most of Australia.

Although it has grown abundantly clear of recent years that western Asia during, let us say the last third of the time since the Glacial period, has undergone a drying up from a more moist climate than it has now, and that therefore it may have been more suited or it were better to say, nearer to being suited to yams, it is so hopelessly impossible for them now, and so slow have been the climatic changes, that, brought into the same view as living languages, the climate towards the genus becomes permanent; and it is reasonable to assume that the absence of edible yams west of lines which can be realised in a moment from the accompanying maps, carries with it the certainty that living yam-names, even as misapplied names, are absent.

Of the maps Nos. 1 and 2 are the most important: No. 1 is of the species of the section *Enantiophyllum* of *Dioscorea,* whereof over 90 per cent furnish innocuous edible tubers: No. 2 gives the distribution of the section *Combilium,* which is as useful, (together with a section of unknown use): No. 3 is of the two sections *Opsophyton* and *Lasiophyton,* which furnish the most important oriental famine substitutes: and No. 4 is of the inedible species of the sections *Stenophora* and *Paramecocarpa.*[1] The reader will observe that the western limits of the sections on the first three maps are very similar,—namely a line from the Gulf of Cambay to the upper Ganges, with in two of them a bay westwards along the Himalaya. West of these limits it is unnecessary to search in Asia for any intimate knowledge of the *food*-Dioscoreas. Yet confident, as we may well be, that pre-European traffic or human migration westwards by land from the monsoon area of Asia has not stabilised

1 *Paramecocarpa* is a new name for a section created to contain the species, *D. flabellifolia,* Prain and Burkill, *D. piscatorum,* Prain and Burkill, and a couple more which are closely allied. *D. piscatorum* is that species which is referred to as "tuba-ubi" in the Journal of the Asiatic Society of Bengal N.S. 10, (1914) p. 13.

any knowledge of yams in the direction of Europe, we must recognise, that peoples wandering westwards by sea, between India and the African coasts have been able to transport them. These peoples were firstly that Malayo-polynesian stock, which settled in prehistoric times in Madagascar reaching it assuredly by water, and secondly the Egyptian, Semitic, Indian, Arab and Chinese traders, who navigated the Indian Ocean prior to 1500 A.D.; for they must be assumed to have provisioned their vessels with yams.

It is reserved for workers in Africa to investigate this. They must ascertain what Asiatic yams are in cultivation within east Africa, and by recording their vernacular names seek tracks of the races which transported them. The whole field lies open, and if some student of plants and man can be found to take in hand the enquiry, results with this list should be obtainable rapidly.

It is interesting that the cultivation of the Guinea coast *D. cayenensis* (African in spite of its name) and *D. rotundata* has not been recorded in east Africa and it appears as if they can never have been there and available for transport eastwards.

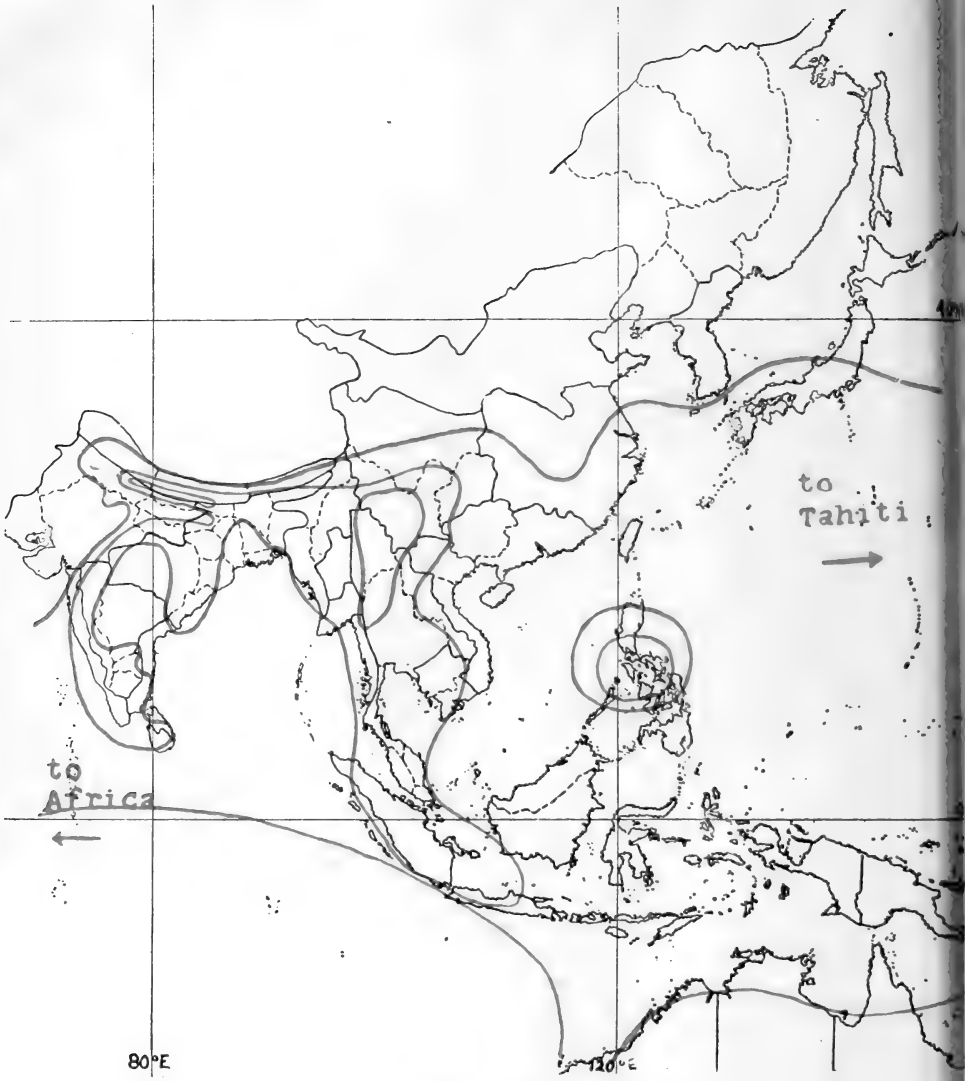
As to Madagascar, the familiarity of the Malayo-Polynesians who settled in it, with yams, is clearly demonstrated by the abundant yam-names commencing with o v i which are already recorded thence, and may be found in the list. That these people used and carried *D. alata* seems to have been the case, and it appears not at all improbable that they used also *D. esculenta*.

Barbaric conquests are often done by men moving forward, unaccompanied by women, destroying the men of their enemies and making captive their women; whereon a mongrel race is raised which derives its words of the chase from the conquering fathers but the words of the hearth from the captivated mothers. In this way words for weapons move whither words for foods do not, and by a comparison of the two, interesting ethnologic observations can be brought out. This list of words for food-plants may therefore serve usefully some ethnologist who will compile a contrasting list of words for weapons.

It is now necessary to plough across it in a sort of review; but a summary of results is very difficult to present clearly. One means of approaching clearness, however, seems to lie in considering first such words as are used adjectively, and after that has been done, to turn to the nouns.

These nouns sometimes indicate a particular species, sometimes a whole group of Dioscoreas, and sometimes have the meaning of "tuber" or "tuberous plant." When they indicate a group of species of Dioscorea, that is to say when they are more or less generic, in these pages they will be translated by "yam."

This word "yam" came into the English language from west Africa through the portuguese, and the readiness with which it was adopted by writers in the sixteenth and seventeenth centuries shows



Map No. 3

Map 3. The distribution in Asia of the sections Opsophyton and Lasiophyton taken together. There are three centres in Asia of greatest development (1) in the north-western Himalaya, (2) in south-western China and (3) in Luzon. These two sections yield the most important famine foods.

that there was a need for it. The voyagers of those centuries who brought it back, had set sail with turnips, carrots, parsnips, etc., in their stores; and at the further end had replenished their boats with diverse tubers for which they needed new names: in the main they adopted two, the one was potato, and the other was yam. Size was the feature by which they distinguished the two: and the smaller Sweet potato or batata, lent its name to the Andine potato when that later became known; while the larger Dioscoreas they gradually came to keep distinct as yams. This idea of a difference in size still holds good in our language; but in these pages it is necessary to extend the use of the word "yam" to all Dioscoreas, large or small, and even to be yet still looser; for the peoples of the East in the main have not held the idea that large and small food-tubers such as potatoes and yams should be distinguished; *e.g.* a l u in Hindustani, u b i in Malay etc., cover both, with cassava as well. Therefore where here the word "yam" is used as the equivalent of these oriental nouns, it is to be understood that not the least contrast with the word "potato" is intended thereby.

Adjectives of size.

Very naturally *D. alata* as being the most liberal of all the Dioscoreas obtains the name of "big yam," sometimes as a species, but more commonly in a race which is conspicuously large; and so it happens that we meet with words meaning "big yam" for it (in Japan) as d a i - j o, (in N.-E. India) as b a r a a l u in Sylhet, s a n g i a a l u in Jessore, p u r i a l u in Bogra and Darrang: (in S. India) p e r u v a l l i k i l a n g u in Tanjore, p e r u (mallai) k i l a n g u in Travancore: (in Burma) m y a u k g y i: and (in Malaysia) u b i g e d e and u b i r a m e in Java. In all the districts, Japan excepted, whence these names have been received, *D. alata* is grown in several races, and, in general it is the largest race of those locally known which is the "big yam:" but in southern India where *D. esculenta* is familiar, and often known as the "little yam," there is perhaps an implied contrast between it and *D. alata,* not in one variety, but as a species.

In Celebes big and little *D. esculenta* may be distinguished as s a y u r u s e l a and s a y u r u r i n t e k; but the noun s a y u r u is not quite the equivalent of "yam."

Sanskrit literature possesses in a medical work of perhaps 600 B.C. the name h a s t y a l u k a, meaning "elephant yam," and Dallana writing in the twelfth century interpreted the word "elephant" as "very large," saying that h a s t y a l u k a was a very large k a s t a l u k a. Now the word h a s t y a l u k a does not seem to have left any modern descendent; but k a s t a l u k a has, in k a t h a l u, k a t h a r u, k a t h a r u a, k a t h a r and k a t h a r k a n d which like it mean "woody yam:" in the Lakhimpur district of Assam k a t h a l u appears to be a race of *D. alata* and in the districts of Mirzapur k a t h a r and k a t h a r k a n d are certainly applied to this species: but k a t h a r u and

katharua in the districts of Behar and in Chota Nagpur are applied to *D. glabra,* and to *D. esculenta*: and every one of these species is as tender and edible as the others, so that the modern words do not indicate what the sanskrit hasty aluka was.

"Small yam" is the name applied to a race of *D. alata* in Sikkim in Lepcha as bok kap, or in Nepalese as sana ghar torul: and again the meaning of the Shan name man awn which is a race of *D. alata,* is "small yam." "Small yam" as already said, is *D. esculenta* in southern India, where widely it is siru kilangu or in Malabar cheru kilangu. Duri alu, with the same meaning, is used in Chota Nagpur and northwards, to denote such wild yams as *D. aculeata, D. glabra, D. belophylla, D. pentaphylla,* as well as *D. esculenta.* "Grudging yam" or phan rain is *D. Hamiltonii* in the Khasia hills.

Adjectives of shape.

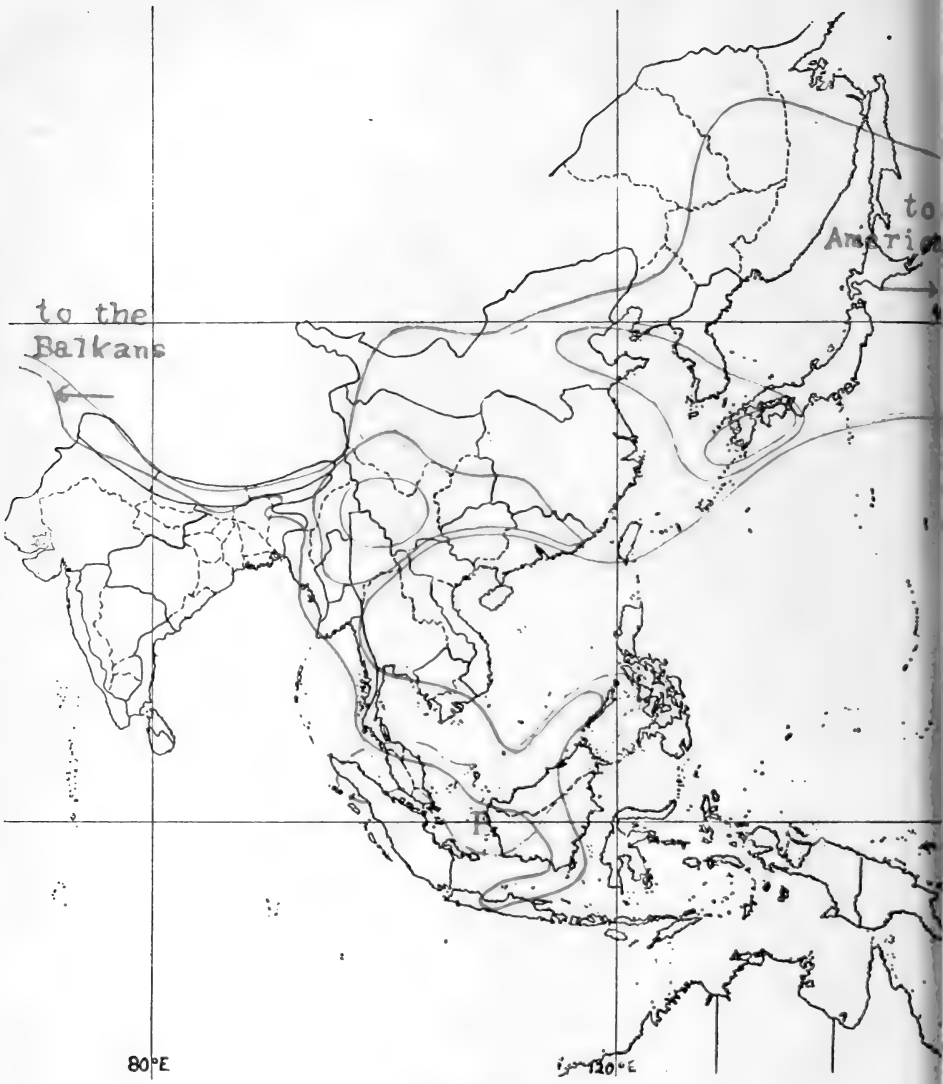
Out of the adjectives easily explained and descriptive of the shape of a tuber eighty-five in this list are found in names which are applied to *D. alata.*

There are races of *D. alata* with elongated tubers that are called by such appropriate names as the following:—"peg yam" or gojalu, "guran-pole yam" or guraniya alu, and "pillar yam" or kham alu in Bengal; "post yam" or puraia alu in Assam; "walking-stick yam" or rui chin among the Mikirs: "going-straight deep yam" or twinzouk myouk in Tenasserim; "pillar yam" or ubi rembu in the Malay Peninsula; and "pipe yam" or ubi teropong in Malay, huwi teropong in Sundanese: and "post yam" or huwi tihâng in Sundanese also.

The following also indicate races which have elongated tubers of characteristic form:—"spinning wheel post yam" or chakarkhuta alu in Sylhet, and "club yam" or chulijhinka alu in Orissa.

There are races of *D. alata* with short round tubers described as "basket yam" or chubri alu in Bengal, as "lime pot yam" or chungat alu in Sylhet, as "globose yam" or gol ratalu in the Ganges valley, as "cooking pot yam" or handia alu in Orissa, as "coconut yam" or huwi klapa in Sundanese, ubi klapa in Malay or gadong ur in Achinese, as "goblet yam" or man nam tow in the Shan Hills, as "round yam" or mundia alu in Orissa and pem bok in Sikkim, as "water pot yam" or myouk ye o in Burma, and as "calabash yam" or ubi kalabasa in Java.

It is not unlikely that the Tanjore name of "thick yam" or muttaik kavalli indicates a race of *D. alata* of somewhat similar appearance to the above. Whether the ovoid bunch of male flowers at the end of a banana inflorescence is the object of comparison in the name "banana-bunch yam" or rui labong



MAP No. 4

Map 4. The distribution of the poisonous sections, Stenophora and (P) Paramecocarpa. The section Stenophora has in Asia two centres of greatest development (1) in south-western China and (2) in Japan: it consists of plants of more temperate climates than those of the sections whose distribution is given on the preceeding maps; and in past times as a consequence has been able to gain access to lands upon either side of the Pacific (via the Behring Straits bridge) and to reach the Caucasus and the Balkans, which the other sections do not.

of the Mikirs or the bananas themselves is not known to the writer. The wide-spread name "ginger yam," in Burmese myouk gyin, in Javanese ubi jahe and in Amboinese ubi hahiya and in Hainan kiu-tu would seem to be derived from the shape of the root rather than from any other attributes of the root of ginger.

A good name for a profusely branched yam is that of "antler yam" or harinpada alu used in Bengal.

Three Javanese names indicate tubers which have a very slight tendency to curve and are more of less pointed towards the apex, viz.—"snout yam" or ubi hidung, "bill of bird yam" or ubi patok and ubi kepler sampi.

"Cucumber yam" or man yawn hta is a name for a race of *D. alata* in the Shan Hills.

The races of *D. alata* which do not grow down into the soil, but recurve, are denoted by names such as "elephant tusk yam" or hathidanta alu used in the Narsingpur district of the Central Provinces of India, hatidatia used in the Brahmaputra valley and khoainga used in Annam, as "lock of hair yam" or kaisali alu used in the Bakarganj district of Lower Bengal, as "snake yam" or naga valli kilangu among the Tamils of Ceylon and ubi ular in Malay, as "sickle yam" or ubi arit in Java, as "horn yam" or man khow wo in Shan and ubi tanduk in Java, and as "extruding yam" or ubi klesik in Java.

Flattened tubers, which likewise often have a tendency to recurve, possess the following names:—"flat-oar yam" or bathar potia alu in the Brahmaputra valley, "flat yam" or chapti ratalu in the Ganges plains, "fan yam" or ubi badak, uwi badak and huwi badak in various parts of Java, and ubi kipas in Malay, "hand yam" or ubi tangan in Java, "fingered yam" or ubi sounlaun in Amboyna, ubi jari in Java, and ubi bajari in the Moluccas, "Artocarpus-leaf yam" or ubi keledang in Malay as well as ubi daun sukun in eastern Malaysia, "threshing board yam" or pat alu in Lower Bengal, "flat spreading yam" or phan tangkara in the Khasia Hills, and "human yam" or ubi manusiya in Celebes.

It appears not improbable that the "excentric yam" or pazien bok of Sikkim is somewhat as the last named.

Races with more than one tuber have names such as:—"several tubers yam" or binna jhar alu in Bengal, "five snout yam" or panch mukhi alu in Orissa, "thousand snouted yam" or sahasra mukhi alu also in Orissa, "seven brothers yam" or sat bhaya alu in the Balasore district of Bengal, "twin yam" which is both ubi kurubut and ubi tumpuk in Java as well as ait alu in Sylhet.

It seems that the names from the Shan Hills of "small plum yam" or m a n a w n k w a h and "small egg yam" or m a n l e i t k a i indicate a lobing of the tubers which approaches subdivision into several. The Lepchas of Sikkim have a "plum yam" or m u j i b b o k.

A wilder fancy gives rise to the following names:—"buffalo's-teeth yam" or b h a i n s d e t h i k a n d a in the Central Provinces of India, "bullock's tail yam" or e d d u t o k a d u m p a in the Circars, "elephant's foot-print yam" or h a t i k u j i a a l u in Assam, "elephant's foot yam" or h a t i p a i a l u in the Murshedabad district of Bengal, and m a n t i n g s a n g among the Shans, "bear's foot yam" or m a n t i n m i in the Shan Hills, "fowl's yam" or u b i a y a m in Malay, "deer's yam" or u b i b a n t e n g and u b i m a n j a n g a n in Java, "crocodile yam" or u b i b o a y a in Java, "dragon's yam" or u b i n a g a in Java, and "turtle's foot yam" or m a n t i n g t o w in the Shan Hills.

Names such as those above are useful as indications of the distribution of yams of different form in cultivation.

D. esculenta possesses one name which compares it to ginger, a comparison which was found to be made also in the case of *D. alata*. In the case of *D. esculenta* the name appears as "ginger finger yam" or e d a t h e n g a l i a a l u and is used in the Sibsagar district of Assam. In this case much more clearly than in the case of *D. alata* it is made obvious that the quality in which the yam and ginger are compared is the shape. There is another Assamese name for this species derived from the same quality, *e.g.* that of "bitch's teats yam" or k u k u r p o a t i from the Darrang district. Rumph in the Herbarium Amboinense lib. 9 cap. 13 described a tuber of *D. esculenta* which suggested a suckling sow, and the small tubers round it its litter.

The commonest of all Burmese names for *D. esculenta* is "letter-d yam" or t a h - d w e u, and it is interpreted as derived from seeing the double curves of that letter, as written by the Burmese, in the tubers which then must be lobed. It is not an altogether satisfactory interpretation and search should be made for one more obscure and less fanciful (see p. 155 forward). The tubers are in some races lobed, otherwise it would be impossible to get the two names of e d a t h e n g a l i a a l u and k u k u r p o a t i, but most of them are not: and t a h - d w e u is as frequently applied by a Burman to a race with tubers that are not lobed as to one with tubers that are lobed.

D. esculenta is compared to a Shan drum in the Shan name m a n k a w n g; but it is not quite clear why. Nor is it clear why a race of it should be called in Amboyna k o m b i l i c h e m p e d a h a or "yam like (? the fruit of) *Artocarpus polyphemia*."

D. opposita receives in Japan the names of:—"stumpy yam" or d a i k o r o i m o, "hammer yam" or k i n e i m o, "long yam" or n a g a i m o, "lever yam" or t e k o i m o, and "crushed yam" or t s u k n e i m o in different races.

D. oppositifolia from going deep gets the names of p o d h a l i v a l l i k i l a n g u and j a m b u r a l l a in Ceylon, while *D. belophylla* from the same character may be called in South Canara p a d a v a l l i g a d d e.

D. bulbifera as will be seen later obtains a widely used name g e n t h wherein its bulbils, if the interpretation be true, are likened to small bells: it seems as if these bulbils are what obtains for it the names of "nutmeg yam" or s a t i k k a v a l l i in Tanjore. It is possible that they, though more probable that the root tubers, get for it in Formosa the name of "heart tuber" or s i m s h u.

D. hispida is called the "round yam" or p h a n s o l a k and "round bitter yam" or p h a n s o l a k k t h a n g in the Khasia Hills. It is also the "solitary yam" or p h a n l y n g k h i.

D. pentaphylla is compared in Bengal to the ovoid bunch of male flowers that terminates the inflorescence of a banana, and so obtains the name of m o c h a a l u.

The dense covering of bristly roots which coats the tuber of this species combined with the usual shape suggests a pig's snout and so procures the names m u k a k a c c h e l, m u k a k e s h a n g o, p a n d i m u k h a t e g a, and p u n d a m o h r a g u d d a, which are found over a wide part of the peninsula of India.

Adjectives of Thorniness.

D. esculenta is peculiar among all the oriental yams on account of its sharp thorns which are metamorphosed lateral roots on feeder roots lying near the surface of the soil above the tubers. By reason of them it is the "tiger claw yam" and "tiger paw yam," b a g h t h a p a a l u and b a g h h a t a a l u, of several of the districts, which extend north of the Ganges delta from Purneah to Maimensingh: and it is the "cock's (spur) yam" or k u k u l a l l a of Ceylon and in Java the u b i l a n d a k or "porcupine yam." Under the idea that these thorns prevent the wild pigs from uprooting the tubers, the Burmese of central Burma call it the "pig cut-off yam" or w e t - k a u.

Adjectives of Season.

The season of use is indicated in such names for *D. alata* as "september yam" or b i n n a a l l a in Ceylon, and for *D. spicata* as "may yam" or e e d a v a k i l a n g u in Travancore. M a r g o d i g a i, used by the Savaras of the Northern Circars for *D. esculenta* has been interpreted as "rains yam."

The Japanese have a quickly growing race of *D. opposita* which they call "yam that ripens in one year" or i c h o n e n i m o. The name "every year yam" or u b i t a u n t a u n which Rumph gives for a race of *D. alata* has the same meaning. N e e d i k i l a n g u meaning "long-living yam," a race of *D. alata* on the Malabar coast, would seem to mean the reverse.

Adjectives of Quality.

D. alata receives only one derogatory adjective in this list; and that is k a t h or woody which is found in the names k a t h a l u, k a t h a r and k a t h a r k a n d, and they are descendants of the sanskrit k a s t a l u k a, the application of which is uncertain. That *D. alata* should never have worse spoken of it than this, indicates its great importance in the East.

D. esculenta, which in some races is particularly sweet to the taste has the name of "sweet yam" in m o h u a l u, m o a a l u, m o w a a l u, m a u a l u, m a u s a r i, or m a o l i, over a very wide area in northern India: and it may be taken that these names came from the sanskrit m a d h v a l u k a, which we find in the Charaka Samita of about 600 B.C.; but there is no reason other than the modern application of the derivative names for stating that m a d h v a l u k a was *D. esculenta*. This species is the "superior yam" or p a r a r u of the Unao district in the Gangetic plains.

D. Hamiltonii has the name of "excellent yam" or b o k y u n g in Sikkim.

D. Arachidna is the "savoury yam" or r u i d o k of the Mikirs.

A certain range of variation in flavour in *D. alata* exists. There is for instance a race k a m o d i a in the neighbourhood of Bombay with that peculiar mousy flavour appreciated in the East and found in Kamod rice—the name meaning "Kamod-like:" there are differences in the degree of starchiness or glutinosity, not seasonal; and there is a greater measure of sweetness in some races. The names found in the Ganges plains and in Java respectively, of m i t h i r a t a l u or "sweet ratalu"[1] and h u w i b a d a k m a n i s or "sweet fan yam" point to the sweetness; so also does u b i m a n i s or "sweet yam" in Java, and s a k k a r a v a l l i k i l a n g u or "sugar yam" in the Tanjore district of the Madras Presidency. Burma possesses a race m y a u k m w e z o u k credited with fragrance: while the following names are suggestive of excellence:—

a k a s h k a n d a or "heavenly yam" in the Raipur district of the Central Provinces of India,
m a h a l k a n d a or "palace yam" in the same district,
m o h a n k a n d or "pleasant yam" in Berar,
r a j a a l l a or "king's yam" in Ceylon.

To them may perhaps be added:—

u b i t u n k u or the prince's yam in Sarawak,
u b i s e n e u r or "senhor's yam" in Java, and
r a j a m o h a n d u m p a or "King Mohan's yam" in the Circars.

The "superior yam" or p h a n k y r s i e w of the Khasia Hills is the cultivated *D. pentaphylla*.

1 For r a t a l u see p. 143 forward.

Palatability and nauseousness are brought into strangely sharp contrast within two species of *Dioscorea,* namely *D. pentaphylla* and *D. bulbifera*: with foliage and flowers identical, and roots not always shaped diversely, races of either species offer to him who would eat them materially in one good, in another worse than indifferent. The inevitable consequence of such conditions must be that adjectives indicating the relationship to the palate appear in the names of these races. In consequence the edible *D. bulbifera* in North Kanara is "sweet yam" or h e g g e n a s u and "sweet genth"[1] or m i t h i g e n t h i in the North-western Himalaya, while wild and nauseous races of that species obtain the following names which mean "bitter yam" or "bitter genth," k a r u k a n d a widely through the Central Provinces and Central India, k a r w i g e n t h i in the North-western Himalaya, p i t a a l u commonly in Orissa, p i t k a n d a or p i t h k a n d a in the edge of the Central Provinces towards Orissa, and t i t i g e t h i like k a r w i g e n t h i in the North-western Himalaya. This species is also the "insipid yam" or u b i b l i c h i k of the sundanese language; and its effects on the human system are expressed very strongly in the calling of it the "mad yam" or p a g l a a l u in Chittagong and the "poison yam" (one of them) in Java, where it is h u w i u p a s and u w i u p a s.

D. pentaphylla in races that are good to eat is the "sweet hairy yam" or m o u a j h a p r a a l u in Assam, and the "treacle thread yam" or j a g e r i n u r e n k i l a n g u in Travancore: it is suspected that it is at the same time the "sugar yam" of s h i n i v a l l i k i l a n g u among the Tamils in Ceylon. In contrast the wild and nauseous plant may be called "deadly yam" or m a r a k e s h a n g o in Travancore. It has the name of "inferior yam" or s i l i b o k among the Lepchas of Sikkim.

D. hispida which is always poisonous,—so poisonous that it may be used to poison a carcase left as a bait for tigers,—is the "deadly strangle cake" or m a r p a s h p o l i of the Bombay Ghats. This name is sometimes reduced to "strangle cake" or p a s h p o l i.

"Benumbing yam" or h i r i t a l l a is a name which in Ceylon is ascribed to *D. oppositifolia,* and perhaps raw its flesh may, like other species, benumb the fingers—an effect not explained,—but enquiries as to its incidence should be made. "Sweet tuber" or m i t h i k a n d is a name for it in the Saugor district of the Central Provinces; and it is much sought as food both there and in all the neighbouring parts of the country.

"Bitter yam" or p i t h a r u is ascribed to *D. aculeata*[2] in Chota Nagpur. K a s a a l u, with the same meaning, is also ascribed to it in the districts of Angul and Balasore. It is a muddled

1 For g e n t h see p. 144 forward.

2 The name *D. aculeata* is here used for the species called *D. Wallichii* in the Flora of British India. The reasons for the change are to be found in the Kew Bulletin, 1919, p. 352.

name and may be muddled in its application. The name of "yam like a Colocasia (in taste)" or k o c h a d i a a l u is another name for the species received from the district of Angul.

Adjectives of Colour and Texture.

Tubers of *D. alata* may possess a crimson colouring matter or may be without it. The colour of those without it causes the following names to be given:—

"white yam" or s a f e d r a t a l u in the Ganges plains,
d h a u l a a l u in northern Chota Nagpur,
m y o u k u p y u in Burma,
u b i p u t e h in Malaysia,

"milk yam" or d u d h a a l u in Chota Nagpur,
m e r o m t u a r s a n g a among the Kols of Chota Nagpur,
k i r i v e l a l l a in Ceylon, and
u b i s u s u q in Java,

"lime yam" or u b i k a p o r in Java,

"rice (like) yam" or u b i n a s i in the Malay Peninsula,
s a m o a n n a s i in Bali,

"fish yam" or m a c h a l u, m a c h u a a l u, and m a s a l u in various parts of Bengal,
m a c h r a n g a a l u (fish-colour yam) in Bengal,
h a l g u j i a a l u (Hal-fish yam) in Assam,
m y o u k n g a c h e i k (sticky fish yam) in Burma,

"bright yam" or u j l a r a t a l u in the Ganges plains,
u j l a m a c h a l u in the Santal Pergunnahs of Bengal,

"salt (coloured) yam" or p h a n m l u h in the Khasia Hills.

Upon the other hand the races with the crimson colouring matter in them possess the following names:—

"red yam" or r a t o t o r u l in Nepal,
r a k t a a l u in Bengal,
r a h t a l a in Chittagong,
s a n g l a l in Chota Nagpur,
m y o u k n i in Burma,
m a n l e n g in the Shan Hills,
u b i m e r a h in the Malay Peninsula,
k o m b i l i m e r a h in Java,
u b i a b a n g in Java,
u b i g e n d o l a in Bali,
u b i l a h a in Celebes,

"henna yam" or a l t a a l u in Bengal,

"henna-leaf yam" or a l t a p a t t i a l u in Bengal,

"yam as (seed of) Melastoma malabathricum" or u b i k e n d u d u k in the Malay Peninsula.

To these the sanskrit r a k t a l u k a should be added, for without doubt over two thousand years ago it indicated a crimson-fleshed *D. alata;* its modern descendents have lost the exact point of the name. Also a Javanese name u b i b u l o n g or "blue yam" may refer to a crimson-fleshed race, but it is more probable that the author, who has recorded the use of the adjective bulong, meant butung (see p. 159).

The cultivated *D. pentaphylla* has in Bengal a name g a n g a-j a l i a l u which means "Ganges-water yam," possibly because it boils to the grey colour of the river Ganges.

Among the names for *D. alata,* above, have been given several which compare it to fish, and they have been said to be used for white-fleshed races of *D. alata,* but it is to be recognised that the glutinosity of the boiled yam equally suggests the flesh of fish. This glutinosity gives rise to the following further names:—

"glutinous yam" or m y o u k k a u k h n y i n c h i e k in Burma,
u b i l i k a t in Sundanese,
h u w i p u t u n in Sundanese (perhaps),

"wax yam" or m o m a l u in the Central Provinces of India,
u b i l i l i n in Sundanese,
h u w i l i l i n and u w i l i l i n in Javanese,

"cold yam" or m a n k a t in the Shan Hills,
"frog yam" or m y o u k h p a e i n g in Burma.

The flesh of *D. alata* is never really yellow, but at the most is of the white of ivory: but one dutch writer has stated h u w i b a d a k k u n i n g or "yellow fan yam" to be a javanese name for a race of this species. The writer is inclined to consider it as an error.

Yellow flesh is however characteristic of some of the species of the section Lasiophyton, and we get for *D. hispida,* in Java, g a d o n g k u n i n g or "yellow gadong" and for *D. pentaphylla* in Assam e d a l u or "ginger yam" in which the colour of the root of ginger seems to be the quality referred to; and we get in Sundanese h u w i j a h e or "ginger yam" also, which becomes s a m o a n j a h e in Bali.

D. assamica possesses a name among the Mikirs r u i r i n g which is translated as "bluish yam."

Not to the colour of the flesh, but to the hard skin of the tuber of *D. bulbifera* are due the names for it which mean "black yam" *e.g.* k a l a k a n d in the Central Provinces of India, and k a l g e n a s u in Malabar.

But this same species in cultivation gets names which call it "white yam" in u b i p u t e h in Java, h u e l y a p u t e h in the island of Saparua, Moluccas, and e l a n p u t e h in the island of Ceram.

Fibres running through the flesh cause names which mean "thready yam" to be applied to *D. aculeata* such as n a r e t e g a l u and n a r e t e g a in the Circars, n a r e g e n a s u in Malabar and n a r i g a d d i in Travancore. Again such names are applied to *D. tomentosa* in n u l u t e g a, n u l u d u m p a, n u l u g o d d a l u and n u l v a l l i k i l a n g u in various parts of the Madras Presidency, and in s u t a a l u which is used in Orissa.

Thirdly *D. pentaphylla* gets corresponding names which it shares with others, s u t a l u in Orissa, n u r a n k i l a n g u in Travancore and b u w i s a w a t in Sundanese.

N u l i k i l a n g u or "fibrous tuber" has been received attached to a specimen of *D. oppositifolia,* but it is not an applicable name, and seems to have been attached in error.

S u n a g e n a s u or "lime yam" is an unidentified Dioscorea of Kanara. C h u n a l u which name also means "lime yam" is *D. Hamiltonii* in the Mayurbhanj State of Orissa. B h a t a l u or "boiled rice yam" is *D. glabra* in northern Bengal and in the Brahmaputra valley, and is a not-inapplicable name. But why *D. pentaphylla* should possess the names of d h a n a l u or "grain yam" in the district of Birbhum, western Bengal, and s a m o a n n a s i or "cooked rice yam" in the island of Bali is not clear.

D. anguina is called h a l d i a a l u or "turmeric yam" in Assam, doubtless from the presence of orange-colour in the older parts of the tuber.

Deprecatory names.

It is a common thing in language to assign inferior plants to familiar animals, as our dog-rose, horse-chestnut, pig-nut, sheeps-parsley: and *Dioscorea* in the East offers illustrations. Sometimes the assignment as in the case of dog-rose is purely figurative; and sometimes as in the word pig-nut there is appropriateness in it. We shall find *Dioscorea* assigned in both degrees. It is in its inferior species most commonly assigned to the wild pig, and not without reason for the wild pigs very largely feed upon the wild yams.

Nauseous *D. pentaphylla, D. bulbifera,* and the poisonous *D. hispida* are so assigned in the following names:—b a r a k a n d a, b a r a i k a n d, b a r a h i k a n d, b a d a k a n d which are used in Western Hindi and from the borders of this language into the Central Provinces of India here and there for all three. But b a r o g a i in Savara and b u r d i g a d d i in Telegu are applied to *D. tomentosa.* The names d a k u r k a n d, d u k u r k a n d and d u k e l k a n d also mean "pig's yam" and are used in the Central Province of India to the south of b a r a k a n d: they are applied to wild *D. pentaphylla.* D u k k a p e n d a l a m that is "pig's pendalam"—(*D. alata* is the usual

meaning of pendalam) is a name for *D. pentaphylla* received from the Vizagapatam district of the Circars. The name p e d r a k a n d a for nauseous *D. pentaphylla* in the Damoh district of the Central Provinces seems to mean likewise "pig's yam." In Java the name c h a n a r b a b i or "pig's Smilax" is applied to *D. polyclades, D. deflexa,* and perhaps to other species.

Once or twice *D. belophylla* has in the writer's experience been pointed out in the peninsula of India as "pig's yam" under one or another of the above names; but by misapplication.

Interesting names are such as s u r a l u, s u a r a l u, s u a r i a a l u, and s u a r e h a l u which are applied to *D. bulbifera* widely in Bengal, s u r a a l u and s u r i a l u which are used in Eastern Hindi for *D. pentaphylla,* s u r k a and s u m r i for the same in the Jhansi district, s u r e n d i k a n d in the Bilaspur district, and s u p n o r k a n d in the Raipur district. The men who use the words in most cases connect them with the hindi word for a "pig" and would translate them as "pig's yam" like the several already mentioned; but there is a sanskrit verb "sur" to hurt, and in it probably the real origin lies; their name once having been "hurtful yam" and not as now "pig's yam."

D. bulbifera is the "dog's yam" or k u k u r t o r u l of Nepal, and k u k u r a l u of Lower Bengal; nauseous *D. pentaphylla* is also the "dog's yam" or k u k u r a l u of Lower Bengal; and *D. sikkimensis* is another "dog's yam" or k u k u r t o r u l of Nepal.

Monkeys have yams assigned to them in the names b a n d r i a l u or b a n d o r e h a l u, used for nauseous *D. pentaphylla* in the Ganges plains, from the districts of Monghyr and Bhaghalpur for some distance westward, and also in the name a k a r m a w a s, which means the orang-utan's creeper, and is applied to *D. pyrifolia* in Malacca.

To the jackal, k o l o k a n d may be considered as assigned: but there is some reason for thinking that an older word may be in the name. K o l o k a n d, k u l u k a n d, k u l u s a n g a, k o l k i, k u l i a, k u l i k a, and k o l h u a are forms of this applied to *D. hispida* in Orissa, Chota Nagpur and westward to the Melghat.

To the tiger is assigned that same species in the names b a g h a l u or b a g h r a a l u which are used in Orissa. In b a g h t o r u l, a name used in Nepal and Sikkim, it is *D. glabra* which is the "tiger's yam."

To the elephant is assigned *D. bulbifera* and *D. pentaphylla* in the name h a t h i a k a n d used in the Shahabad district, Bengal. The name h a s t y a l u k a has been mentioned already with the suggestion that "elephant yam" in that case means "very big yam"; but again it may not have meant this.

The ant is connected with *D. pyrifolia* in the name c h a n a r s e m u t of "ant's Smilax" used in western Java.

C h a m a r a l u or "flesher's yam" is a brahminical name for nauseous *D. pentaphylla* received from the neighbourhood of Calcutta.

Names from the fragrance of the flowers.

The fragrance of the flowers has caught the pleasing malay fancy so that a series of names exists connected with it, such as a k a r b u n g a k e m i n i y a n or "benzoin-flower creeper" which is curtailed into a k a r k e m i n i y a n, a k a r k a m i y a n, a k a r k a m o y a n, a k a r k a m a y a n, a k a r k u m o y a n, a k a r k a m a h a n g and apparently a k a r m a n u j a n and a k a r m u m u j a n,—all meant for "benzoin creeper." Or a word for yam may be substituted for the word for creeper, so that we get h u w i k a w a i y u n g and h u w i k a w o y a n g, u b i k a w a y o n g and u w i k a w a y o n g which are likewise to be translated as "benzoin yam." These names are used in the Malay Peninsula, the Menengkabau region of Sumatra and in Java, and denote such wild Dioscoreas as *D. pyrifolia, D. laurifolia, D. filiformis,* and probably others, indeed perhaps all wild species of the section Enantiophyllum.

The scent of the flowers of *D. hispida* earns for it the name of g a d o n g k a s t u r i or "musk gadong" in Bali and o n d o t k a s t u r i in Ceram, and also of g a d o n g m a l a t i or "jasmine gadong" in Bali.

B a b r a k a n d or "acacia yam" for *D. bulbifera* in the Chanda district of the Central Provinces of India would seem also to be earned by the scent of the male flowers, unless it is a corruption of bara kand or hog's yam.

Confusion with Smilax.

The similarity of Dioscoreas and species of Smilax leads in the Malay Peninsula and Java to the use of such names as a k a r k e l o n a, u b i k e l o n a, a r o i c h a n u r and c h a n a r for various wild Dioscoreas. Kelona or klana in the Malay Peninsula usually means a *Smilax*, just as chanar does in Java. The Japanese also compare it with *Smilax* (see p. 140 forward).

Names suggesting transportation.

Yam-names only in a very small measure suggest transport. There is a race of *D. alata* which in the Malay Peninsula has the name of "java yam" or u b i j a w a as if it had been carried that small distance. There is another in Java known as the "indian merchant's yam" or u b i k u j a, kuja or kwaja being the master of an indian trading ship, suggesting in its name that it reached the Malay region from India.

The origin of the edible *D. pentaphylla* is not indicated by any oriental names, but there are two names which suggest its introduction into the places where they are used: one of them is given by Rumpf and is that of "Priaman yam" or u b i p a r i a m a n said by him to be used in Ternate, Priaman being

in Sumatra: the other is "Menado yam" or ubi mangindano used in north Celebes, the Menado region being in the north of that island. This same yam has been called to the writer "foreign yam" or belat myouk-u in Lower Burma by a man using the corrupt hindustani word belat for foreign in association with the Burmese term for *D. alata*.

The cultivated *D. bulbifera* is known in India among europeans as the Otaheiti potato. It is sometimes called "spanish yam" or ubi kastela in the Malay Peninsula and "chinese yam" or ubi china in the Dutch Indies.

Religious use.

In the Gangetic plains in certain parts, to eat *D. esculenta* on fast days is permitted; and throughout the northern part of the Central Provinces it is likewise lawful on these occasions to eat a meal called bechandi made from certain wild yams. A religious meaning has not been demonstrated in the names applied in India; but in Java, in regard to edible *D. pentaphylla* and to one species of the Section *Enantiophyllum* vernacular names suggest a religious use. These names are huwidewata, katakdewot, and huwimantri meaning "sacred yam" and "priest's yam." Now the words, which in these names qualify the word for yam, are of sanskritic origin, and the first of these yams, also in the same part of Java, is called huwi paturi or "princess' yam", the word paturi or putri being sanskritic. Like the several sanskritic court words and words for the trappings of elephants in the Malay language these yam names must have come into existence, where they persist, from the old Indian kingdoms which in Java left the hindu religion and the magnificent temple of Borobodoer; and it would be in connection with observances of such a court that they were applied. The obvious suggestion is that these Dioscoreas were once used in Java as *D. hispida* is upon the west side of Bengal and *D. esculenta* in the Gangetic plains, to supply a food permitted on fast days. Now hinduism found a refuge, from persecution in Java by flight to Bali and it would be most interesting to have enquiry made there among the descendents of immigrants from Java as to the use if any, that they make of *D. pentaphylla* and other Dioscoreas, and the names that they apply to them.

The nouns for yams.

Nouns used as names for yams possess a vastly greater interest than the adjectives coupled with them; but they are more difficult to deal with, as being often the flotsam of a lost language. The reader in consideration of them should keep in mind that these food yams may be held as of six groups:—

1. the cultivated yams of the section *Enantiophyllum, i.e. D. alata* and *D. opposita,*
2. the cultivated yam of the section *Combilium, i.e. D. esculenta,*

3. other cultivated yams, being in Asia derived from *D. bulbifera* and *D. pentaphylla,*
4. the wild edible yams of the section *Enantiophyllum,*
5. the uncultivated species of the sections *Opsophyton* and *Lasiophyton* together, without *D. hispida,*
6. *D. hispida* alone.

The areas that the first three of these six groups occupy are indicated on the map on p. 166. The distribution of *Enantiophylla* is on map 1: and of *Opsophyton* with *Lasiophyton* on map 3.

Races of D. alata distinguished by nouns.

The natives of the Konkan coast of India go so far in distinguishing yams as to call even the varieties of *D. alata* by words used as nouns, *e.g.* b h u s a r a, c h a i n a or c h i n i, d e n n i, k a m o d i a, k o n, p a n d r a, t a l b a d a, t a m r a, etc. They do in fact what an English gardener does when he speaks of a Gloire de Dijon or a Marechal Niel, and expects to be understood without using the word rose after each name. Not so the peoples of other parts of India proper, nor of any peoples upon the west side of the Philippines, where again we meet with this manner of speaking. Then again we get it in New Guinea, New Caledonia and in Fiji. It indicates a great familiarity with yams as food.

Whereas in the names used upon the Konkan coast a meaning can be read, Mr. C. Harold Wright says of the names used in Fiji that he has "been quite unable to find out from Fijians any meaning in most." Those islanders, he adds, would find it pedantic if the word u v i for yam should be placed in speaking before the words d a m u n i, t a n i e l a, k o r e n g u, etc., by which they indicate the races. A people that so subdivides *D. alata* is likely to distinguish very clearly the widely different species such as *D. pentaphylla, D. bulbifera* or *D. hispida,* as this illustrates. A very emphatic abusive name for *D. hispida* occurs, as already mentioned, among the upper strata of the population towards Bombay, namely m a r p a s h p o l i or "deadly strangle cake"; and from Bombay for quite a considerable way southwards s h e n d w e l and its variants indicate *D. pentaphylla,* while k a r a n d a and its variants indicate *D. bulbifera.* In the Philippine islands apart from Malay words, either in the Tagalog or the Visayan language, such names as b a l l o l o n g, b i n i n a g, d i n o g o, t a m i s, t u b a y a n or t u m i t o k denote races of *D. alata.*

The following are all Fijian names for races of *D. alata*:— d a k u l a v u, d a v u n i k o k a, d a m u n i, d i k a m a, g a, g o ṇ e, k a s o k a s o, k a u m a i l e, k o r e n g u, k o t o, k u k u, k u r u k u r u, l o k a l o k a, m a t a w a i, m b a t i, m b o r o n i l i g a, m b o t i a, m b u t i, n a i s e v u, n i s e, r a u s i k u l a, r a u s i v u l a, r a u s i, s a b a l a v u, s o s i, t a m b u l a t a w a, t a n i e l a, t i k a u s i v a r o, t o g o n i w a k a y a, v e i w a, v o l i, and y a r i s i.

They are enumerated here to show how they are scattered through the alphabet, as would be expected of borrowed and probably distorted nouns and adjectival words become nouns.

In Fiji *D. pentaphylla* is known as k a i l e and *D. bulbifera* as b u l o.

On pp. 173-177 below, three lists are given: one is of instances wherein *D. hispida* is admitted as of the genus of *D. alata*; the second is of instances wherein *D. pentaphylla* is admitted, and the third is of instances wherein *D. bulbifera* is admitted. The generic word found to be most common in these is k a n d or k a n d a. It is a sanskritic word. It stands nine times for *D. hispida*, twelve times for *D. pentaphylla* and twenty-four times for *D. bulbifera*. Now there are 67 names in all in the list wherein k a n d or k a n d a occur, and 61 per cent of them go to these three species; and of names not in the list because they are not applied to Dioscoreas several with k a n d in them can be quoted, *e.g. Pueraria tuberosa* yields a k a n d and so does *Nelumbium speciosum, Zehneria umbellata,* and the Sweet potato also. It is evident that k a n d much more approximates to "tuber" than to "yam" and is so translated below.

Second to k a n d, and also sanskritic, comes a l u, which occurs once under *D. hispida,* nine times under *D. pentaphylla,* and sixteen time under *D. bulbifera*. Its derivatives, m a t a r u which occurs twice under *D. hispida* and once under *D. bulbifera,* g e d d a l u which occurs once under *D. hispida,* and p e n d a l a m, which occurs once under *D. pentaphylla* and twice under *D. bulbifera,* make up the total thirty-three, which is only 16 per cent of all the names containing a l u.

Third comes u b i, with u v i, u w i, etc. It stands applied to *D. hispida* twelve times, to *D. pentaphylla* eight times and to *D. bulbifera* nine times, making a total of twenty-nine, and giving a percentage of 15.

A l u and u b i are good instances of what it seems reasonable to translate into English by the word "yam."

Nouns in a Geographic Sequence more or less by sub-regions in the Plant-world.

The nouns will now be taken in an arrangement which is suggested by the distribution of the plants to which they apply, commencing from the north-east of Asia.

Japanese Names.

In Japan, *D. opposita* is cultivated, and before the introduction of the potato, was second to *Colocasia antiquorum* in importance among starchy tubers. Both these esculents the Japanese place under the noun i m o; and they logically extend the use of i m o to the wild Enantiophyllous *D. japonica,* as well as to the potato,

artichoke and sweet potato. On the other hand they designate the Dioscoreas of the section *Stenophora* as logically by the noun t o k o r o or d o k o r o but extend the use of the word to plants which do not come within the genus. *D. hispida* and *D. pentaphylla* do not occur in Japan: but *D. bulbifera* does, and has got itself classed both as an i m o in the names k a s h i u i m o, b e n k e i i m o and n a r i i m o, and as a d o k o r o in the name m a r u d o k o r o or m a r u b a d o k o r o, obviously on account of its intermediate characters. Were there no other names, it would be possible to argue from this uncertainty a modern introduction; but it is called by the curious and probably old nouns z e m b u and s e p p u, which possibly have interesting origins. No influence from without appears obvious in them nor in any of the above names; but in literary Japanese the name k a i is used, and is of the interesting group of words of the K-group collected together on the map No. 8 facing p. 156.

K a s h i u in Japanese stands for *Smilax,* and k a s h i u i m o may be translated "Smilax yam."

D a i j o and j i n e n j o are contrasting words for a cultivated (big) and for a wild edible yam, namely one said to be *D. alata* and the other *D. japonica.*

Names of Liu-kiu islands.

In these islands the K-group of nouns, which has just been commented on as present in Japan in k a i, occurs in k u - which is the commencing syllable of k u g w a [i m o] for *D esculenta,* and k u r u for *D. rhipogonoides.*

Indigenous names of Manchuria, Corea and Formosa unknown.

From Formosa we have only Chinese names, and from Corea none.

One species of the section *Stenophora* is common in the Amur sub-region and Manchuria, but what it is called is unrecorded. Enantiophyllous yams do not go so far north upon the mainland of Asia.

Chinese names.

In China the words u h and y u appear to be the equal of the Japanese i m o: they indicate *Colocasia antiquorum* in the first place, and after that *D. alata* or *D. opposita* according to climate. As s h a n y u and s h a n u h or "hill yam," they indicate species of Enantiophyllous yams occurring wild, which also, because they are used medicinally, may be called s h a n y a o. The word s h u which is "tuber" rather than "yam," is used for the tinctorial *D. rhipogonoides* as well as for edible Dioscoreas; so also the word t s u means tuber. For Dioscoreas of the section *Stenophora* the Chinese, as far as records go, have no collective name. *D. bulbifera*


teguna
tena
teoni
tiwan
inuri
talu
tarri
terer
torul
ti
tha
thi
thi
80°E
120°E

Map No. 5.

according to one authority is m a o y u t s e or "hairy Colocasia," and *D. kamoonensis*,—a species a little better upon the whole for eating, is m a o s h u t i n or "hairy tuber creeper." *D. hispida* is almost absent from China, and no name for it is to be expected.

K a i is used in Kwangtung as in Japan: and k a - l a u recorded as for *D. bulbifera* in the Honam islands of that province carries that noun.

Possibly a special interest is buried in h u a i s h a n y u, a medicine which has a big use in China and is made from tubers of one or more Enantiophyllous Dioscoreas. This medicine, when it reaches Tonkin, is called k h o a i s h a n y u; and it looks about as probable that the word k a i (= k h o a i) is in the Chinese name, as that the Chinese so designate the drug from the mart of Huai-shien, which is only one of very many places where the drug is dealt with. The name accordingly has been entered on to the map of the K-group of yam-names.

Caucasus and Balkans.

Dioscoreas in the section *Stenophora* extend to the Caucasus and to the Balkans, but there is nothing to record regarding them.

Names in the Western Himalaya beginning with TA, etc.

From as far west in the Himalaya as Enantiophyllous Dioscoreas go, eastward to Sikkim, a word for yam is one of a series commencing with T., *e.g.* t a r r i, t a r a r, t a r a r i, t a r u r and t o r u l. Onto the plains under the North-west and Central Himalaya, this T-group in no clear way spreads: but it is otherwise under the Eastern Himalaya, where t h a is the Bodo word of old Assam for yam; and as such it commences the names of all readily edible Dioscoreas among the Garos. East of the Garos on the other side of the Khasias in the Cachari language t h a -, and more commonly t a -, are used, as in t h a n a i r a n g, t a m i s i, t a r e m and t a s h e p. T h a i r e n g (sometimes d a i r e n g) is a race of *D. alata*. T h a g u n a is the sweet Potato. T a m a l o as a name for *D. bulbifera* has been received from the Katha district of upper Burma. It is possible further that the Burmese names t h a d u t, t h i n d o u k, t h i n - o n and t h i n - g y a t may carry it and that again the t h i - of some of the Tonkin names is the same. To them a place will be given later: here under "Himalaya" they are mentioned to indicate the extent of the T-group of names, (see the map No. 5 opposite). *D. bulbifera* is not as a rule a t a r r i or t o r u l in the North-west Himalaya, nor is *D. pentaphylla*: but the latter has a well known name beginning with T,—t e g u n a used all along the Himalaya from Almora and Naini Tal to the Nepal hills over Champaran; and under the hills in the Eastern Hindi and Behari languages this is turned to t e n a, t e o n a, or t e o n i. It is not clear that it contains the pahari word for yam, but it is applied like torul to useful plants, for it designates edible and not nauseous *D. pentaphylla*.

The nauseous and poisonous yams in the Himalaya.

Westward of where t e g u n a is used, *D. pentaphylla* has the names of d e b b a r, d h a i v a or d r a i g a r h: whether this is applied to nauseous *D. pentaphylla* alone, or to edible as well, has not been established: and it must suffice to call attention to the name. In some part of the Himalaya, *D. bulbifera* appears to have the name k h i t t a, and the poisonous *D. deltoidea* has a very well known series of names,—k r i t s, k r i s, k r i s h, k r i t h i, k i n s, k i t h i, or k i l d r i. It is exceedingly probable (*a*) that k h i t t a has a common origin with k r i t s: (*b*) that k h i t t a would not be applied by a discerning person to cultivated *D. bulbifera;* and (*c*) it is evident that they have nothing in common with the T-group of names.

There is an infiltration into the hills of sanskritic words, so that a l u is known, and for *D. bulbifera* words of the g e n t h-series are used locally. It is to be asked if the words used for *D. pentaphylla* in the Himalaya of Almora and Naini Tal, *e.g.* g h a j i r and g h a n j i r, are in origin hill-words, and if the name g h a n d i a l i, recorded for *D. belophylla* as well for *D. alata* in the Kangra district, is also. The last particularly suggests g e n t h.

Quite distinct is the well established name—m a n g a y a, m a g i y a, m u n i y a for *D. kamoonensis*: and so is the Paharia b e g u r for edible *D. pentaphylla*.

Atkinson recorded the name g u n for *D. deltoidea*: it stands at present unsupported. Equally unsupported is another name for it,—s h i n g l i.

Perhaps it is well to summarise these names, and it may be done thus:—

edible and pleasant yams	.. nouns of the T-group
edible *D. pentaphylla*	.. teguna which is perhaps a noun of the same group, begur
edible *D. kamoonensis*	.. nouns like mungaya
nauseous *D. pentaphylla* and *D. bulbifera*	.. debbar, draigar, dhaiva, ghajir, ghanjir, khitta
poisonous *D. deltoidea*	.. krits, etc., gun, shingli.

The names in the Eastern Himalaya.

The Lepchas of Sikkim use b o k for t o r u l: they call *D. bulbifera* k a c h i n g: *D. melanophyma* is t u k j h o k and *D. hispida* r u g l u or r o f l u. An edible variety of *D. pentaphylla,* which is not uncommon in their hills they admit as a b o k under the name of s u l i b o k or "inferior yam," calling the species also k u s s o k. There is nothing in common between these and the words of the North-west Himalaya beyond the degree in which species of different utility are named apart.

Little is recorded from the Himalaya east of the Lepchas, beyond the name t o w o which is said to be bhutanese for *D. pentaphylla,* and may be part of the T-group mentioned above; n a c h a y k y u said to be bhutanese for *D. belophylla;* and j i n g j i n g or j e - n g i n said to be an Abor word for a *Dioscorea.*

Names in North-western India and Sanskritic names.

The proper word for yam through north-western India is a l u; and it was written a l u k a in sanskrit. The Aryans brought its ancestry into India, and in apparently the last two thousand years it has developed in a rather interesting way. To those who wrote sanskrit there were several kinds of yams under a l u k a: we find them recorded for instance in the Susruta Samhita in a place where diet is discussed.

The Susruta Samhita is a sanskrit work on medicine of about 600 B.C.; supposed to have originated in Benares. It makes mention of h a s t y a l u k a, k a s t a l u k a, m a d h y a l u k a, p i n d a l u k a, r a k t a l u k a and s a n k a l u k a. Of these six names, four are represented in current language: *e.g.* by k a t h a l u or k a t h a r u a, m a t a l u, m a t a r u or m a t h a r u, m a u a l u, m o h a a l u, m o a a l u, m o w a a l u, m a o l i etc., p e n d a l u, p e n d i a, p i n d h i, and p e n d a l a m, and r a t a l u: and from the application of these modern names to *D. alata* and to *D. esculenta,* it might be assumed that when the Susruta Samhita was written, a l u k a indicated the cultivated Dioscoreas: but unfortunately for such an assumption, there exist the names in Chota Nagpur of p i t h a r u, k a t h a r u and p h a r a r u applied to wild though edible yams: and a r u being akin to a l u k a, it is left possible that a l u k a had a wider significance than the cultivated yams.

Before passing on attention may be directed to the word p a n g a r u used also in Chota Nagpur; for it is evidently sanskritic meaning "delicate yam" and is applied to a race of the cultivated *D. alata,* a good contrasting word to k a t h a r u or "woody yam." Of these names from the Susruta Samhita p i n d a l u k a or something similar, reaching the Circars, gave rise to p e n d a l a m,—a word no longer of the narrow meaning which it must have had originally, but used for all races of *D. alata,* and the same or something similar reaching Berar, seems there to have given rise to p e n d i a or p i n d h i which is applied to *D. esculenta.*

It is an interesting and obvious circumstances that r a k t a l u k a as used by those who wrote sanskrit and r a t a l u as used by the enormous number of those who eat it to-day, are not synonymous: in the two and a half millenia which have intervened it has ceased to indicate a red-fleshed *D. alata,* and has come to indicate any *D. alata,* so that the tautology becomes necessary and exists of l a l r a t a l u. Similarly other names may have changed and the application of p e n d a l a m to *D. alata,* while p e n d i a is

D. esculenta, suggests a similar happening. To which of the two did p i n d a l u k a apply? Dallana, the commentator on the Susruta Samhita of the twelfth century, wrote that p i n d a l u k a was a downy plant, and it appears therefore that *D. esculenta* was meant by him: there is also another reason why this should be the case. The word p i n d carries a religious meaning;—p i n d - p u s h p is the Asoka tree; p i n d - t a i l a k is olibanum, p i n d g e s is myrrh and to this day *D. esculenta* is a permitted food on fast days in parts of the United Provinces of upper India. P i n d a l u k a, therefore appears to be the sanskrit for *D. esculenta;* and if so, then the inhabitants of the Circars who possibly did not receive the word until the time of Asoka, misapplied it, and so got p e n d a l a m.

Pursuing these names further, if p i n d a l u k a stood for *D. esculenta,* did m a d h v a l u k a do so also? Possibly: for there are sweet and scarcely sweet races of it. But, m a t a r u an obvious offspring of m a d h v a l u k a, equally with m o a a l u, is *D. alata* just as, very widely in Bengal, m i t h i a l u is: and it is necessary to keep an open mind.

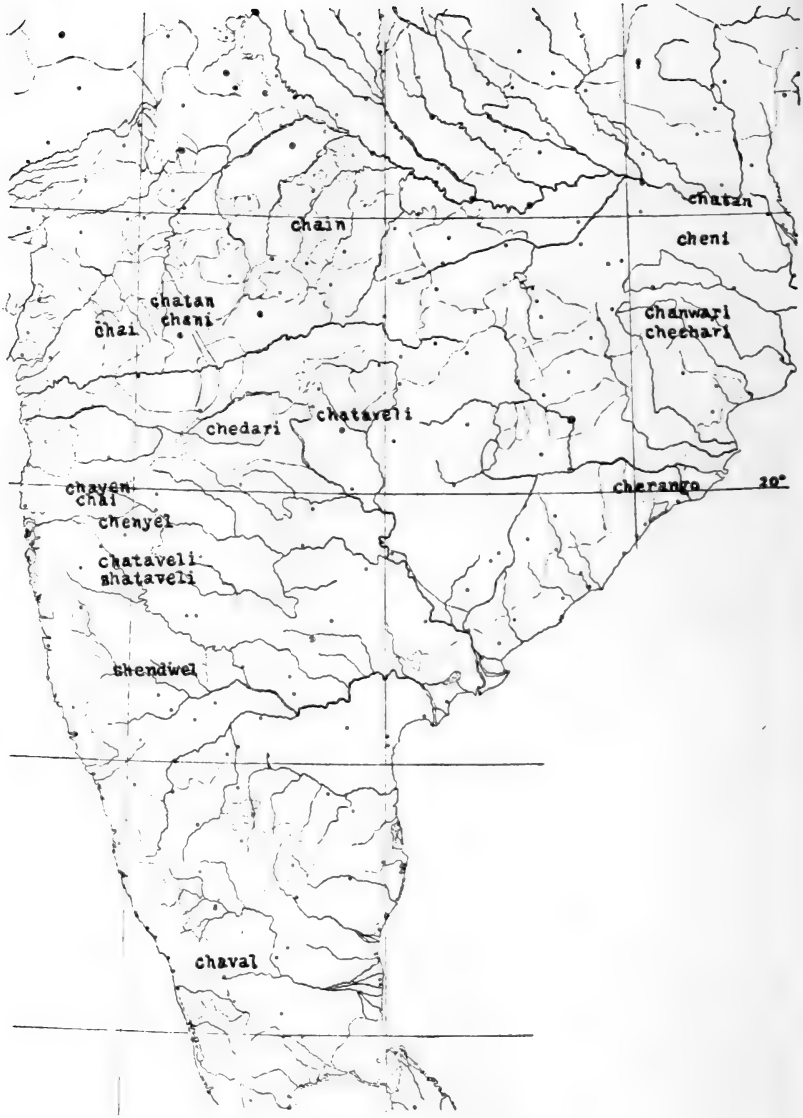
There is current in northern India for *D. bulbifera,* a very considerable series of names connected with the word "gendi", of sanskritic origin and meaning a "little ball." Without doubt these names originated in the resemblance of the bulbils, as already mentioned, to small balls. The series begins with g e n t h which is used in the foot-hills of the Himalaya where it is quite well-known and with g e t a in Behari. The absence of *D. bulbifera* in the centre of the Gangetic plain causes it not to appear there; but it spreads upon the south of the plains where *D. bulbifera* occurs; and from Lolitpur eastwards to the Sontal country it is well-known though it gradually departs from it proper form into curious modifications: it also penetrates through the wilds and wastes which fence the Deccan on the north into the Central Provinces administration, in doing so rather losing itself. The forms that it takes are:—g e n t h, g e n t h i, g e t h i, a n g e t h i, a g i t h a, g h i t a, g h i t a t o r u l, g a t h a l u, g h e n t i, g i t a, g a t h o u r k a n d, g i t o r a k a n d a, g i r c h i k a n d (misapplied to *D. anguina*), a n a t h i k a n d a, and probably g h a r i a l u. Although we appear to have no direct evidence that those who wrote sanskrit used a word of this series; it is clearly extremely probable or more than probable that they did; and what is of interest is that *D. bulbifera* was excluded from the genus a l u k a. Before passing on the geographic extremes of the use of names of this series may be set down:—they are the districts of:—

g e t h i, Almora and Naini Tal, Mirzapur, Monghyr, Sontal pergunnahs, Hazaribagh, Ranchi, Palamau; also apparently Nepal.
g e n t h, Gorakhpur.
g e n t h i Champaran, Palamau.
g h e n t e, Manbhum.

ghenthi, Mirzapur.
ganthi, Hazaribagh.
gonthi, Hazaribagh.
gete, Champaran.
ghita, Nepal.
gita, Darjeeling, and general in the Behari language.
githa, Champaran.
gethi, Gorakhpur, Baghelkand.
gethri, Hazaribagh,
ghari, Saugor.
gitora, Bilaspur.
githora, Mandla.
gircha, Jabalpur and Raipur.
gath, Saugor.
gathalu, Nimar, Amraoti
gatalu, Amraoti.
gathour, Narsingpur state.
angethi, Etah, Monghyr.
angitha, Baghelkand.
agitha, Jhansi, Bandelkhand, Narsingpur, Balaghat, Mandla and Jabalpur.
agetha, Balaghat
anathi, Monghyr, Hazaribagh.

For nauseous *D. pentaphylla* there exist the names which as suggested on p. 135, may be connected with the sanskrit verb "sur—to hurt". These are surka used in the Jhansi district, sumri used in the Jabalpur district, supnor kanda used in the Raipur district, sur kanda in the same district, surendi kand in the Bilaspur district, and without doubt suri alu or sura alu extending through Western and Eastern Hindi from the borders of Bombay to the borders of Bengal, and sur alu, suar alu, suaria alu and suareh alu in Bengal. Superficially these names appear to be connected with the words for "pig"; but the connection in the mind with the pig is doubtless secondary; and it is probably responsible for the adding of alu or kand to the first part of the name if so, then those who wrote sanskrit should not be thought of as admitting *D. pentaphylla* to be an aluka.

For edible *D. pentaphylla*, extending from the district of Palamau, through those of Gaya, Monghyr, and Shahabad into Baghelkand, there exists the name khaneya, khanewa or khania kand. Such a name has been received from the Jhansi district, further west, attached to *D. bulbifera*, very probably by misapplication. But kanuwa, khanuwa or khinuwa in the northern districts of the Central Provinces administration is a race of *D. alata;* and the name is also so used



MAP No. 6

Distribution of Ch. names in India.

in Baghelkand. It does not appear profitable to say more upon these, except to call attention to the use of kikare or kinkari for edible *D. pentaphylla* as well as the edible *D. oppositifolia* in the Ali-Rajpur State of southern Rajputana, especially to bring to notice that in the Seoni district kirachkand, and in the Balaghat district kirchi kand and kircha are applied to *D. oppositifolia* and lead to the Gondi kiras mati of the same application, in a way which suggests that the names kikare and kinkari should rather be attached with kras mati, to *D. oppositifolia* than to edible *D. pentaphylla*.

With the sanskritic noun kand or kanda a note on p. 139 has dealt sufficiently.

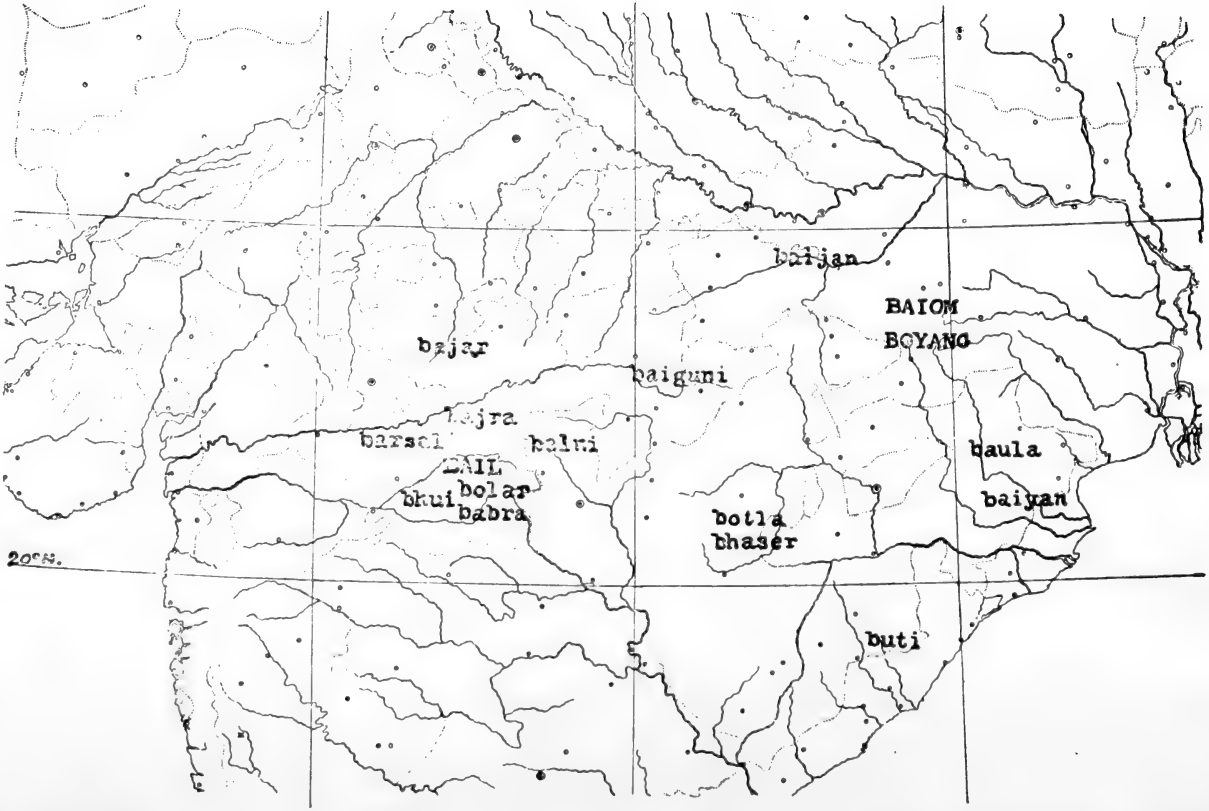
Names in the northern part of the Deccan—penetration of Sanskritic names.

It is well-known that more or less upon the line of the tropic-of-Cancer, India presents a barrier of partial wastes: these were the wastes which made it difficult for the Moghal empire to conquer the Deccan, and they must have offered in like manner though perhaps in lesser degree obstacles to penetration by earlier organised states. There is a central way through the wastes past Khandwa and the fort of Asirgarh. Upon the west of that way the non-Aryan Bhils have been able to maintain themselves; and eastward many non-Aryan tribes persist. Among these tribes sanskritic languages have now obtained a certain position, the result of which as regards yam-names is confusion. The most useful course in regard to the area is to bring to notice these names, and to hope that investigation may be induced thereby. One exceedingly obvious result of this infiltration of sanskritic elements is the appending of kand or kanda by way of explanation to a distorted non-Aryan, presumedly Kolarian, noun.

Down the line of easiest invasion, that is to say past Asirgarh, sanskritic names have penetrated most. It was by this way doubtless than pendaluka gave origin to pendhia and pindh, and madhvaluka to mataru, matharu and matalu: in much more modern times alu, aru and ratalu have become established on it.

L-names, north and north-east of Bombay.

There is an L-name for nauseous *D. pentaphylla* used by the Warlis of the forests north and east of Bombay,—londi or lundi, which appears to be rightly identified with the word loli used on Mount Abu in Rajputana, not for *D. pentaphylla*, but for *D. bulbifera*, and also with lowar and lurga used for *D. pentaphylla* in the Jabalpur district. Southwards, but as far south as Belgaum, lokheri is met with for edible *D. belophylla* and *D. oppositifolia*: it is not sound however to connect it with the above names. The Warlis call edible *D. pentaphylla* alshi or ulshi. Kushi has been received as a distortion of it.



MAP No. 7

Distribution in India of the group of B-names which are connected with Bail and Baiom.

B-names, across India (see the map opposite).

There is a B-group for nauseous *D. bulbifera* where, proceeding to the eastward, the Korkus are met with: it appears variously as b a i l, b a y a l, b e l i y a, and b a i - i l i: and there is another B-group for nauseous *D. pentaphylla* among the Kols and Santals of the Chota Nagpur area, as b o i a n g, b o i o m, b y a m and b y a n g s a n g a. The last word s a n g a means "yam." In as much as nauseous *D. pentaphylla* and nauseous *D. bulbifera* have, as regards primitive man, the same utility, a connection between the two names b a i l and b a i o m is possible.

From various districts of the Central Provinces administration, Central India and the northern escarpments, have come to the following names:—b a i g u n i a l u for *D. hispida* in the Mandla district, b a i j a n k a n d a for the same in the Mirzapur district, b a j a r for the same in the Kotah state, b h a s e r k a n d in the Raipur district, b h u i k a n d in Berar, b a j r a k a n d for nauseous *D. pentaphylla* in the Hoshangabad district, b a y a n a l u for the same in the Balasore district, b e l n i k a n d for the same in the Betul district, b h a s e r k a n d for it in Baghelkand, b h u s a or b u r s a in the southern districts where Eastern Hindi is spoken, and b u t i g a i in Savara: b i h i k a n d is ascribed to *D. bulbifera* in the Raipur and Damoh districts, b o l a r k a n d and b a r a k a n d in the Amraoti district, and b o t l a k a n d a in the Raipur district. It is tempting to connect all these with either b a i l or b a i o m.

Through a large part of the area whence these B-names have been collected, a ceremonial meal is used by men of high caste, which they call b e c h a n d i, eating it on fast days as a sort of pennance. This meal is made from the nauseous yams; and there is not a little reason for seeing in the first syllable of the name an indication of b a i l or b a i o m, the latter the more probable from geographic considerations.

Through the Birbhum and Midnapur districts of western Bengal, *D. bulbifera* possesses a series of B-names, b a m l a, b a m l i and b a w l a,—names quite well-known, and as b a u l a a l u spreading into the Balasore district. Attention to them might possibly bring out some result of interest.

The Bhars of Gorakhpur use b a n k for *D. hispida,* and this word is slightly similar to the word b a r l a n g which has been received from the foot of the Sikkim Himalaya as denoting that same poisonous species.

Ch-names, across India (see the map on p. 146).

There is a Ch-series over the area under discussion of very wide distribution, and applied mostly to the poisonous *D. hispida,* but sometimes to the nauseous varieties of *D. pentaphylla* and to *D. bulbifera.* This name appears as c h a i, c h a i n, c h a y e n, c h a i n k a n d a, c h a n i, c h a t a i and c h a t a n k a n d. It is

met with from the Thana district near Bombay to the district of Monghyr. Ch e d a r i k a n d reported from the Akola district, as applied to *D. bulbifera,* is possibly a derivative.

Ko-names for D. hispida.

There is yet another wide-spread set of names for the poisonous *D. hispida*: it is k o l o k a n d, k u l u k a n d, k u l u s a n g a, k o l k i, k u l i a, k u l i k a and k o l h u a. These names overlap the Ch group, and extend through Orissa beyond it, but fail to reach its western extremes, for they end with the Melghat. K o l o k a n d means jackal's tuber, but that in its origin the group had anything to do with the Hindi word "kola—a jackal" is extremely doubtful.

With the B-group, the Ch-group, and this Ko-group we find three groups of names for nauseous or poisonous yams, spread across India in the belt of wastes and quite unlike any names found in or near the Himalaya unless b a n k and b a r l a n g can be of the B-group.

Various disconnected names.

Edible *D. pentaphylla* among the Korkus is called g o b a d u; and this name has been obtained from the Buldana and the Amraoti districts, in the form g o g d u, applied both to *D. bulbifera* and to the edible *D. aculeata*: again from as far away as the South Kanara district has been received a name g o k a r u for edible *D. pentaphylla* of similar sound.

W a j, w a z, or v a j is an isolated name for *D. hispida* used in southern Rajputana, and neighbouring districts of the Bombay Presidency: it seems to be a Bhil word. S a p l a i is another isolated name for the same species, received from the Kotah state.

P a d r i is a third isolated name, attached to edible *D. pentaphylla* in Baghelkand. P i ɟ a s i is a fourth, attached to *D. bulbifera* in Singbhum, but quite possibly it is connected with the Uriya adjective "pita—bitter."

These are a few further disconnected names:—

a m a n for *D. anguina* in southern Rajputana
a n k u l for edible *D. pentaphylla* in Belgaum
b u d h for *D. hispida* in Thana
g a j a r i a or g a j a r for *D. pentaphylla* in Jhansi
g a l e l u a for a tuberous plant perhaps a Dioscorea in Jhansi
g o t a for *D. hispida* in southern Rajputana
m a n m o u r for *D. belophylla* in Jhansi
s e n r h, s e r h, or s i a r for *D. anguina* in Jhansi

Mati—a Gond word.

The Gonds stand out among the tribes of the belt of wastes, as having been able to achieve some small measure of organisation, and no doubt their language become more logical from that ability. Their noun m a t i stands for "yam" in a few names:—h i r m a t i has not been identified: k r a s m a t i or k i r a s m a t i stands for *D. oppositifolia* in the districts of Hoshangabad and Balaghat:

nunmati is an unidentified *Dioscorea* of the Narsinghpur district; poturumati stands for *D. anguina* in the Hoshangabad district. Krishnamati for *D. oppositifolia* in the Betul and Hoshangabad districts must surely stand for krasmati. Mati appears not to be applied to nauseous and poisonous species: and therefore while Hindi-speaking people may convert krasmati into kraskand, or in other names with mati, substitute kand, it is not the exact equivalent of kand.

Names of the Malabar coast, and the land behind it.

Mention has been made of the names waz for *D. hispida,* and loli for *D. bulbifera* as possibly Bhil names: oria for *D. oppositifolia* in Khandesh is perhaps of the same language.

Manokand has been received as for *D. bulbifera* in the Surat district. Mention has been made of the names used by the Warlis,—alshi for edible *D. pentaphylla,* and londi for nauseous *D. pentaphylla.* Mention has been made also of the way in which even the races of *D. alata* are known by nouns about Bombay, and that thereabouts *D. bulbifera* is known by the name karanda. This name, departing from karanda, varies to karandas, karandi, karinda, and karanza. As "carandi" it appears in Rheede's *Hortus malabaricus* of 1686-1703; presumedly his staff, the chief of whom was Casearius, had met with the name in Malabar.

Rheede's staff, called *D. pentaphylla* both dava karandi and tilocarandi, the latter being edible. It is suspected that the karanda-group of names does not get applied to other than *D. bulbifera* until its southern extreme, where its usage is becoming vague. Rheede's staff recorded karodi as a Malabar name for *D. hispida.* Metz, Hohenacker's collector, sent out from Malabar *D. oppositifolia* as kurudu, and *D. tomentosa* as kurudupu. It must be assumed that these names belong to a K-group, especially as kuru kand can be heard in the Nasik district for karanda kand. Kedoni met within the Travancore state for edible *D. pentaphylla,* may be called to notice as perhaps having a connection also. But what the relationship of these can be to kon, which is a race of *D. alata* in Bombay, and konaghar which is *D. esculenta,* is a matter for investigation.

Kanji is said to be applied to *D. oppositifolia* in Travancore; but from the districts near Bombay to Goa kanji, kangia, kanangi, kangar, kanang, kankari, *always* qualified by the adjectives kanti or katta indicate *D. esculenta.* This adjective means in these combinations "less sweet," and is necessary because kangi unqualified is the introduced Sweet potato. It is very interesting that the plant which must have been the longer established should be that requiring a distinctive adjective.

In the Marathi language shataveli or chataveli[1] stands for edible *D. pentaphylla*: and these words in the south of

1 -veli or -wel and all the similar terminations of this series indicate climber, from near Bombay to Ceylon, and on the Coromandel coast.

the Bombay presidency are changed to shendwel, shendowel and shendorvail. They are names well established.

The name chenyel recorded by Dymock as indicating *D. tomentosa* is of the group. Dymock was excellent as regards languages, but he was not always fortunate in his determinations of Dioscoreas; so that his spelling of the name may be accepted, but his statement that it belongs to *D. tomentosa* doubted.

In Travancore chaval or chavalli occurs and belongs to *D. pentaphylla* at least in part. It seems to be a name of the same series; and this is interesting because with it we have:—karanda, possibly appearing in Travancore as kedoni, and shendwel appearing as chaval, both looking as if derived from pre-marathi or pre-malayalam words. It is permissible to recall the Ch-group of the belt of westes, and to suggest that the first part of chataveli, etc., contains it, the second indicating climber. If it should be so, then the Ch-group is carried right from Monghyr to Travancore as on map No. 6, its absence from the Nizam's dominions and other adjacent parts being only an accompaniment of the rarity of yams therein.

Kavalli is a word in sound near to chataveli, but probably very distinct. It is applied to edible Dioscoreas chiefly in the Tanjore district, but passes through to Malabar. In Tanjore it indicates *D. alata* almost always: but satik kavalli indicates cultivated *D. bulbifera*. On the Malabar side it is less strictly,—one might say less accurately,—applied, so that Rheede's staff ascribed it as kavalli kacchel to *D. oppositifolia*, and as nath kavalli it is *D. belophylla*, both these being edible wild yams.

Kacchel is applied to edible yams in Travancore: and there are nine instances in the following list. Kaju or kachu replaces it in the Nilgiris. Kondol has the same meaning in Ceylon.

The Tamil word kilangu is quite distinct in meaning, and must be translated "tuber": but as valli kilangu it means "yam." Utterly inedible bulbs etc., are kilangus. This word also passes a little to the Malabar side: but gadde and genasu, respectively in Malayalam and Kanarese stand for "tuber," and hold their own against it.

Further names in Ceylon.

The word kondol has been mentioned: alla replaces it in the Cinghalese language. Kilangu for "tuber" penetrates into Ceylon with the Tamil language.

Names of the Coromandel coast.

Kilangu is a very common word; and so is valli kilangu—the equivalent of yam plant: *D. alata* is vetti lai valli kilangu or "the yam plant with a leaf like Piper

Betle." Such a periphrasis for a plant of undoubted familiarity is interesting, and its very length forbids its universal use, so that peru valli kilangu that is "large yam," pedu chari valli kilangu or "Pondicherry yam plant," sakkara valli kilangu or "sugar yam plant," etc. seem to suffice to denote races of *D. alata* without the use of the descriptive part about Betle-leaf. *D. esculenta* is defined as siru valli kilangu or "small yam plant" and as mullu velli kilangu or "thorny yam plant": *D. bulbifera* and *D. pentaphylla* receive the names of kaduvalli kilangu which means "wild yam" and of mallai valli kilangu or "hill yam": *D. tomentosa* is the nulvalli kilangu or "fibrous yam."

It can easily be seen from the list that in the names from the Malabar side containing kilangu less intelligence, with probably more jungle-lore, is displayed, than in the names from the Coromandel side.

Numerous words through the Circars.

Proceeding northwards Tamil gives way to the Telegu language, and Telegu to Uriya, while at the back of them occur languages such as Savara, the whole interacting in a complicated way. In the Cuddapah district *D. tomentosa* is nulugoddalu; edible *D. pentaphylla* is yella gaddalu; *D. oppositifolia* is yella gaddi and *D. tomentosa* is said to be burdi gaddi. In the Kurnul district yella gaddi is *D. oppositifolia*. In the Warangal district, the same in the case; also a *Dioscorea* supposed to be *D. pentaphylla* is chunchugudda; *D. hispida* is sunna gudda and nulla sunna gudda. In the Chanda district *D. bulbifera* is said to be nulla godda and nauseous *D. pentaphylla* is punda mohra gudda. In the Godaveri district nulu geddalu is used for *D. tomentosa*. Passing over the Vizagapatam district, nulla ginni geddalu is *D. bulbifera* in Ganjam, and *D. hispida* is tella ginni geddalu. At the back of the Ganjam district the Savaras call Dioscorea gai, so that we get among them, adabgai for nauseous *D. pentaphylla*, butigai for *D. bulbifera*, barogai for *D. tomentosa*, gadigai for *D. oppositifolia*, margodigai for *D. esculenta*, parogai for *D. glabra* and tumangai for *D. aculeata*. It is possibly best to translate all these G-nouns by tuber.

Beginning with the Godaveri district dumpa is met with. In that district tega dumpa is *D. alata;* vypa dumpa is nauseous *D. pentaphylla*, nuladumpa is *D. tomentosa*. In the Vizagapatam district pedumpa is *D. hispida*, sisidumpa is *D. bulbifera*, rajamohandumpa and eddutokadumpa are evidently *D. alata*. Dumpa is also to be translated by tuber.

Tega, meaning a climbing plant, is used as a noun for Dioscoreas; and as regards the names in this list, with one exception, is only within the two districts of Vizagapatam and Ganjam; billa tega is *D. glabra;* muragada tega is *D.*

esculenta; n u l a t e g a is *D. tomentosa,* p a n d i m u k h a t e g a is nauseous *D. pentaphylla,* t i v v a t e g a (the words meaning wild climber) is the same, and v a i n u r t e g a is *D. hispida.*

P a l l e r u t e g a, a name recorded by Elliott in his Flora Andhrica, has not been identified.

P e n d a l a m, as said, from a sanskritic language and descended from a word near p i n d a l u k a, is used only in the area where t e g a is current. In the main it designates *D. alata,* but not entirely, as k a y a p e n d a l a m, meaning " vegetable pendalam," is *D. bulbifera,* and so is m a l a k a k a y u p e n d a l a m and m a l l a i k a y a p e n d a l a m, while cultivated *D. pentaphylla* has the name m o y y a k u p e n d a l a m, which is obviously the same as m a l a k a p e n d a l a m. Further Elliott has a name r a d r a k s h a p e n d a l a m which he ascribes to *D. bulbifera,* the similarity of the bulbils to radraksha fruits (*Elaeocarpus Ganitrus*) giving rise to it.

It seems as if t e g a and p e n d a l a m are used as more or less contrasting nouns; and if so, then t e g a d u m p a occurs in the Godaveri district because the application of t e g a is somewhat altered: it was found to indicate *D. alata,* which is the species that p e n d a l a m in the districts to the north indicates. If this view is correct then it is of considerable interest that over those two districts, Vizagapatam and Ganjam, the people should distinguish by nouns the cultivated from the wild Dioscoreas, whereas south of them the one noun covers both; and this is just as another noun does to the north. This last noun is the sanskritic a l u which in Orissa has a wide application: and there p e n d a l a m has no place. The isolation of p e n d a l a m is then like the isolation of the Burmese m y o u k.

If m a l a k a p e n d a l a m and m a l l a i p e n d a l a m could have, as has been suggested by one writer, any connection with the Straits of Malacca, these names would possess a great interest, but it may be assumed that they have none.

Further names in Orissa and Chota Nagpur.

Ch e r a n g o and n a r e n j a, n a r i n g a, or n a d a n g a are nouns of this part of India. The first extends from the district of Ganjam into the district of Puri and changing to ch e r a n g a k a n d appears also in the district of Raipur. It is applied to *D. aculeata.* N a r e n j a is applied to *D. oppositifolia* in the district of Cuttack, n a r i n g a and n a d a n g a to *D. tomentosa* in Ganjam, and can be traced in the names n a r e t a g a l u or n a r i t e g a for *D. aculeata* in the Vizagapatam district, n a r e g e n a s u in the Malabar district and n a r i g a d d i in the state of Travancore also for *D. aculeata.* As *D. oppositifolia* is not unlike *D. aculeata* there is little surprising in the application of this N-name to both species. But what is the origin of the name? It has got the range of the Ch-series discussed on p. 149 and to which ch e r a n g o probably has to be added.

It is possible that the Ganjam application to *D. tomentosa* is incorrect,—a confusion with the adjective "nuli—thready." The appearance is that an Na-group of names for wild edible Enantiophyllous yams, exists with a wide distribution through India, so forgotten that what once were nouns are now used as if adjectives. N u n e t y a recorded for the Ganjam district as belonging to *D. tomentosa,* belongs on the other hand to the "nuli—thready" group of names and not to this (see p. 134). But b a r g o n a r i may contain a word of the series: it is ascribed to *D. bulbifera* in Manbhum.

Orissa and Chota Nagpur offer little more of interest than has already been noticed. M a s i h a or m o s i a is an Uriya word for yam. S a n g a is the Kol word for "yam" and s a n g is its Santali equivalent: there are several combinations of s a n g a in the following list; but it is to be said of them that they are not very discriminatingly applied.

J a h r e n g is edible *D. pentaphylla* in the Ranchi district.

K a r b a, k a r a b a or k o r b a is nauseous *D. pentaphylla* in the several districts of Orissa. G a r a b a, said to be *D. bulbifera* in the Cuttack district, and h a r a d b h u, said to be used in the Ranchi district for the same, appear distortions of k a r a b a.

N a k o e, n a k u a, or n a k w a is *D. tomentosa* or *D. pentaphylla* in Chota Nagpur, Mirzapur and Baghelkand. P i s k a, and p i t a s i are names for *D. bulbifera* among the Santals; and p i t a s i is the same in the Singbhum district, either Kol words, or connected with "pita—bitter."

T a m a l i a is *D. oppositifolia* in the Cuttack district.

An isolated name in Tirhuti and Behari.

In Tirhut and Behar one very isolated and possibly interesting name exists: it is s u t h n i used generally for *D. esculenta*, and it is quite unexplained.

Throughout Bengal and the plains of Assam a l u is the general word in Bengali and Assamese for yam, and all the species occurring are classed by adjectives under it.

Names of the Andaman islands.

We know no more than g o n a among the Bea and Balawa tribes, m i n a, among the Yeras and k o n u d a among the Bojgyahs for *D. vexans;* for *D. pentaphylla* k o r n m u among the Yeras, and ch a r o d i among the Bojgyahs:—names extremely diverse.

The borderland of the Assam-Burma hills.

The hills between Assam and Burma contain four distinct groups of words for yam. In the first place there are the words of the T-group which, as already mentioned, occur as t h a in the Garo language, as t h a or t a in Cachari, and seem to pass down the western side of Burma in t h i n. Next there is the p h a n

of the Khasias. Thirdly there is the r u i of the Mikirs or r e of the western Nagas. Lastly t s u or d z u occurs in the Naga language in t s u p r e p y a d z u and m a n j e d z u for races of *D. alata*. What there is further eastward is not known: south-eastwards is a land of the K-words, and it is convenient to proceed with them next.

The K-group of words of Indo-China, etc.

The map following gives a number of these words; one of them is met with in Japan; another in the Liu-kiu islands; and China, it has been remarked, possesses them in a secondary degree. The Mon-Khmer k h o a i is at the present day the most wide-spread word among them. Of words closely akin we find these limits:—there is h a u a i among the Kamees of Arakan; and h u k a i as well as k h a i a l u in the Sylhet district of India seem to represent it: h r a in Chin and h o in Shan represent it. As h r a it approaches the r e of the Nagas. The Burmese are believed to have burst into their country from the north: they may, then, be held to have burst into the area of these K-names, which being foreign to them, they misused: k h o a i or something like it, gave them their word k y w e which now means *D. hispida*: a compound of k h o a i or a word of the group gave them k a d u which universally denotes *D. bulbifera;* h r a gave them k a l e t which denotes *D. aculeata* and seeing that k a d w e - u is sometimes used for t a h d w e - u denoting *D. esculenta,* it is possible that the series gave them this last. The Siamese who pushed down parallel to the Burmese from the north, use of this group the words k o i and k l o i.§ In Burmese, where u is tuber, a Burman commonly appends u to the yam-names given: a Siamese adds m u n in the same way, m u n being the Siamese word for tuber.

Van Lijnden in the Natuurkundig Tijdschrift voor Nederlandsche Indie, 39 (1874) p. 314 stated that the word k h o a i is used for "yam" in the island of Solor. In the Watubela islands of the Banda Sea k u w i which is very near, is used; and Rumpf gave k a e e as indicating *D. pentaphylla* in the island of Sumbawa.

A word of the K-group is to be found, it seems, among the negrito tribes of the north of the Malay Peninsula. The mixed negrito-proto-Malays, such as the North Sakais and Besisi, use b e k o i, b a k o i and b e k o y a as well as k u o i, k u o e, and k i e, as do the Sakais of Perak and central Pahang. Now these folk pick up and clip Malay words so that with them 'be- may stand for the Malay u b i: it is therefore a matter for someone to investigate, whether the words b e k o i, b a k o i and b e k o y a are attempts at u b i k o i that would be yam-yam,—the exact equivalent of the Siamese m u n k o i, or are not.

§ Perhaps the insertion of 'l' by the Siamese into k o i so that they make it k l o i, is to be accounted just as the 'l' in the Samang words k l a b for *D. hispida* and k l a w o n g for an undetermined wild yam.


hukai
khah
kha
ho
haoai
kywe
huai-shan-yu
khoai
koi
kaee
khoai
kowuie
80°E
120°E

Map No. 8

Hoi for *D. bulbifera* in the Hawaiian islands, though so remote seems the same: from Hawaii, it has been taken to Tahiti and the Friendly islands, apparently in the last century.

There are a number of words through Malaysia appearing to have connection with the above, so many indeed that they have not a little interest. The following have near sounds:—katak for *D. pentaphylla* and perhaps another Dioscorea in Javanese; kapo, kapu, kapots and kaput for various species in northern Celebes; kayus for *D. alata* or *D. hispida* or *D. pentaphylla,* and kalut, kolot, kulot, karot, karoti and orkot for *D. hispida* widely in the Philippine Islands including the Sulu archipelago: katama for *D. warburgiana* in Celebes: kayuru apparently for *D. hispida* in Java: kapak in the Sasak language of Lombok and kasimun in Timor for the same species: kamangeg for *D. luzonensis* in Ilocano and kamiging for *D. esculenta* in the Bikol language of the Philippines; kasi for *D. pentaphylla* in the Igorot language: kaeo in Bima; kawai for *D. esculenta* and kaile for *D. pentaphylla* in Fiji. Karondu stands for yam in the Kangean islands, which are between Celebes and Java.

There are numerous other names commencing with the same sound:—konuda and kornmu in the Andaman islands: keladi and kombili, widely in Malaysia; kuduk in Borneo; kobag, kirini, kiroi, kinampai in the Philippines chiefly in Tagalog: kowui in Solor; and kutabi and ketabi in Sumba: kou in New Caledonia: kowar, karro and kurijanga in Queensland: kuri in Lord North's island; kuku, korengu and karokaro in Fiji: and lastly it may be remarked that kumaa is found by the side of umaa for the Sweet potato in the Pacific.

The ubi-group of words.

South of the lands where words near khoai chiefly run for yams are the words of the U-group on the map overleaf. Whether connected with the Burmese u or not it is impossible to discuss; the similarity however can well be indicated. Uvi is to be translated "yam"; but sometimes as in Fiji it almost means *D. alata.* As ovi it appears in Madagascar, and as ufi it occurs in Tahiti,—very wide limits for what is essentially one word. Search for a sign of it in Ceylon and Southern India gives no results. It is most curious how a proto-Malaysian stock reached Madagascar without leaving more distinct marks in Ceylon: but Mr. James Hornell in the Memoirs of the Asiatic Society of Bengal, 7 (1920) p. 234, states that the designs of boats upon the Indian coasts carry the marks of their passing, and suggests that there is proto-Malaysian blood in some of the tribes as instanced by the shape of the skull. As they carried their word ovi to Madagascar, then if they established themselves on the coasts of southern India or Ceylon, they carried ovi thither also. Why has it not persisted? Not equally do we look in vain in Java for signs of Sanskritic invasion.


40°N
uh
uh in Rotuma
uvi in Fiji
ufi in Tahiti
N. Caledonia,
u
ubai
uke
owe
uve
ubi
ove
owi
wili
luwi
obi
ovi in
Madagascar
80°E
120°E

Map No. 9

In Malaysia there are two further series of B-names, which may have greater interest. The first contains b a g a i for *D. hispida* in Mangyane; b a o n g and b a n a g a n for *D. bulbifera* in the Visayan of Luzon and Negros; b a y a n g k a n for *D. pentaphylla;* b a n a n for *D. nummularia;* b a l i a k a g for *D. luzonensis* in Tagalog; b a l l o l o n g for *D. alata;* and b o g a, b u g a, b o d o t, b o r o t, b o l o t for *D. esculenta* in Ilocano and Visayan: b o h a y a n for a *Dioscorea* in Visayan and b u l o i for *D. divaricata* in Tagalog. The second is found in b u, b u a r, b u k o which stand for yam in parts of Sarawak, and in b u l u or b u t u common in Javanese. It must suffice to call attention to these words, adding in reference to b u l u or b u t u, that commonly some word for yam is prefaced to it my way of explanation, and suggesting that among Malays, where it appears as u b i b u t u n g, among Sundanese where it appears as h u w i b u t u n g, h u w i d u d u n g and h u w i t u t u n g, in Makassar where it appears as l a m e b u t u n g and in the Moluccas where it appears as k o m b i l i b u l u the original meaning of b u l u, etc., has become quite forgotten. Rumpf explained u b i b u l u as originating in the habit of the Butonese of growing certain races down bamboos (a bamboo being bulu in Malay, and see p. 169); but such an explanation is not acceptable.

A series of names should next be mentioned of rather wide use in eastern Malaysia. They are a b a u, a b o b o, a b u b o, a b u b u, a h u h u, o h u h u, a h u a, and a h u o. These are applied usually to the inferior species of *Dioscorea,* such as *D. pentaphylla* and *D. bulbifera,* as well as *D. hispida.* Celebes is their westernmost island and eastwards they spread through the Moluccas. A h e i and a h e y which Rumpf ascribes as Amboinese names to *D. pentaphylla*: i a e which he gives for Lochon island: e l a n or a ë l a n or a y l a n or m e l a n or m a ë l a n which stand for yam in south Ceram approach each other and a b a u though a h u a. A y w e l used in Amboina for *D. pentaphylla* is of the group. Further eastward comes a y a n for yam in New Guinea, and e n, e ë r and a y e r for yam in the Kei islands.

The peculiar Burmese word Myouk.

Throughout Burma m y o u k - u is the tuber of *D. alata.* The word is changed to m r o u k in Arakanese. It is as peculiar as it is universal among the Burmese and Arakanese, and unlike the K-nouns it does not occur among the surrounding non-Burmese tribes. So special a name suggests that the Burmese upon coming into their country from where such a plant as *D. alata* was unknown, after making an abrupt acquaintance with it, set great store by it.

Peculiar words in Malaysia for D. hispida.

Just as the Burmese distinguish *D. hispida* sharply from the other Dioscoreas, so do the Malays. The Burmese call it k y w e, a word which looks as if it is the equivalent of "yam" taken

from the language of the conquered, and applied to that one yam upon which the conquered were driven to subsist. The Malays call it g a d o n g, whether they be the Malays of Sumatra or their offshoots in the Malay Peninsula. It is said by Warneck in his Tobabatasch-Deutsche Wörterbuch (and someone should confirm and extend the statement) that all yams are g a d o n g to the Toba-Bataks, even the very best, so that the verb "menggadong" means "to eat yams" and even at times "to eat"; thus Warneck indicates for g a d o n g a wider application than the Malays give, just in the same way as the Laos folk give to k h o a i wider application than the Burmese give to k y w e, in both cases *D. hispida* being the species designated in the narrower application: and, if g a d o n g can mean among the Tobas any yam as well as the sweet potato, it quite lacks the suggestion of poison which is usually in the word and can be considered as still in it when used as g a d u n g k a y u, that is "stick gadung" (according to de Clercq), for the Tapioca in Achin which plant also can be poisonous, and as g a d u n g t i k u s, that is "rat gadung," for *Smilax Helferi* and as g a d u n g c h i n a that is "China gadung" for *Smilax China*, the drug, in the Malay Peninsula and in Java and in Madura (teste Ridley in Journal of the Straits Branch of the Royal Asiatic Society, 38, 1902, and de Clercq, op. cit.). Marsden has g a d u n g k a s t u r i that is "musk gadung," as an orchid, certainly inedible.

It would be most interesting to be able to show that the words k y w e and g a d o n g have a parallel history and a measure of origin in common. G o w i used in Nias is intermediate. G a d o n g changes to g a d u n g, g a d u e n g, g a d h u n g, g h a d u n g, g a d u and g a n r o n g. The Sakais of northern Perak, northern Pahang and Kelantan use a name g a k n, g a n g and g o n g for some edible tuber, probably of a higher grade than *D. hispida*. It is impossible to be sure that this use is degraded and not ancestral until more information is gathered. There is a name g a d o applied to *D. esculenta* in the Marianne islands; but as those islands are so far away, it scarcely helps towards an understanding. G a n d u y is a word picked up by Father Kamel in Luzon about 1700 A.D. and applied to *D. luzonensis*. G a y o s is a Visayan word for *D. hispida* and in it the G has come from a K,—k a y o s (see p. 163 forward).* The Javanese name for *D. hispida*, k a y u r u, the Lombok name, k a p a k, and the Timor name k a s i m u n, after the initial letter are remote from each other.

The Bali name d i a n g g a or j a n g g a is remote from any other name recorded. S e a p a, recorded for *D. hispida* in Celebes, will need mention later. U l i b i t a or u h u l i b e t a used in the Moluccas stands remote also from other names, and so do m a m o used in the Bikol language, n a m i or n a m e, a name in use in Tagalog in Luzon and in Mindoro, and o n d o or o n d o t used in Ceram, or o r o t used in Visayan.

* So Kombili gives g e m b i l i in Java.

Some isolated nouns of Western Malaysia.

For *D. pentaphylla,* the Sakais have a peculiar word: they call it j a b b e t, j a y a t, or j a y a. No near name is known, none nearer than r a b e t which is used in the island of Madura in an equally isolated way for *D. pentaphylla* and *D. bulbifera,* in conjunction with another noun or an adjective appended by way of distinguishing which r a b e t is indicated. By the side of r a b e t, in Madura, another word is applied to *D. bulbifera*: it is k a b u r a n; but the exact incidence is doubtful, and it would be well for someone residing in that island to sort out the application of r a b e t and k a b u r a n. K a b u r a n is near to k a b u r o or k a s u v o which means *D. bulbifera* in Ternate.

The Pangan of the Malay Peninsula use s o or s o d in a way which is not satisfactorily known: and among them as well as allied tribes are words commencing with T., to which attention should be directed likewise. They occur alongside the clipped Malay words that these tribes use; and are:—t a k o b a "kind of yam" eaten by the Pangan of Teliang; t a k u for a root apparently the same among the Pangan of Ulu Patani or t a k o among the Pangan of south Ligeh; and t a k o b, a word used by the Semang of Kedah. Other nouns commencing with the same sound are t a l i s perhaps for the Sweet potato among the Semang in Perak, t e l a or k a t e l a h among the Semang of Perak which becomes t i l a with the Mentera, Belandas and Jakuns, and t e g a k which is the tapioca among the Kenaboi. There is also a tuber called t a w i among the Senoi of Pahang, a Caladium called t o - l a m b o among the Semang of Kedah, and the Sweet potato seems to be t o a n a among the Jakuns of Malacca. T e l a and t i l a as from u b i k a s t e l a through k a t e l a are the only words of these which can be explained easily.

It may be mentioned here that "yam" is t i r a at Krokong in Sarawak and t i s in northern Celebes.

In Java s e n k a is a word the application of which is doubtful, and which may have been the z e n k a or y e n k a of Celebes where it is *D. esculenta.*

G h u w a k is applied to *D. alata* in the Kangean islands.

S-names in Eastern Malaysia.

The island of Bali uses the words s a m o a n, s a m o w a n, and s a m w a n for *D. pentaphylla.*

There is an interesting concentration of S-names in eastern Malaysia which may have a cause. There are:—(1) s i k a r i for *D. hispida* in Bali alongside s a m o a n; (2) s i k a p a, s i y a p a, s e a p a or s i k a p a n g in Celebes for the same; (3) s i a h i, s i a f f u, s i a v u or s a h u for *D. esculenta* in Amboina; and (4) s a y a w u, s a y a f u, s a y a b u, s a y a h u, s a y a h u l, s i y a u and s i y a p u for the same in Celebes and in Ternate and the

Moluccas. Can s u (ç u), for yam in Tonkin contain the same root, the words s a m p i t s u k u and s a h e for yam in Sarawak, and the word s a p a n g for *D. pentaphylla* in Luzon? If so, then s e n k a and s i k a p a used in Celebes are allied, as well as s u n d a or s u d a which indicates a *Dioscorea*, probably *D. nummularia*, in east Java and Bali.

Some perhaps intermediate names of Western Malaysia.

H e r i and h e l i in the Moluccas indicate *D. alata*, and as h e r i p u t e h or white heri *D. bulbifera*, perhaps in the cultivated state. I m a, i m a h and i m a t i indicate *D. alata* in Ternate, where i m a k a s t e l a or "Spanish ima" is the Sweet potato.

Names of D. esculenta in the Philippines.

In the Philippine islands t u q u i, t u g i, t o g u i n g, t u g u i, t o n g o, t u n g o and d o g u e indicate *D. esculenta* in the Tagalog and Ilocano languages. Except that the word appears to have reached New Caledonia, and unless the Tonkin t u - s u is, as it may be, the same, it stands isolated. The Philippine yam-names usually begin with a B or with a K.: *D. esculenta*, however, has no recorded Philippine name commencing with a K, except k a m i g i n g in the language of Bikol; though of names commencing with B it possesses such well-known ones as b o d o t, b o r o t, b o l o t in the Visayan language and b o g a in the Ilocano language. Of the three languages Tagalog had in the 16th century less civilisation or outer influence than Visayan, but now possesses more.

L u t t u is recorded as an Ibanag name for *D. esculenta*, and the word is very similar to l u k t u which is an Ifugao name for *D. alata* and to l u t u which belongs to the latter according to Rumpf in Banda.

But the Ifugaos and Ibanags are hill-folk of the centre of northern Luzon; so that the resemblance of those two words of theirs to that from Banda is probably accidental.

Other Philippine names.

There is a great divergence between the words of the three predominating western Philippine languages,—Ilocano in the north, Tagalog in the centre and Visayan in the south. In all three languages the Malay word u b i is used for *D. alata;* but races get nouns applied to them which need no generic word, such as u b i, to complete them: b a l l o l o n g, b i n i n a g, d i n o g o, t a m i s, t u b a y a n, t i n u k e and t u m u k t o k are such names; and it is to be suspected that k i n a m p a i and h a m p a s t a g b a l a n g are others: but while it is known that one of two of these are Visayan, it may be that others are Tagalog. It will be noticed that several of them commence with the letter T, *i.e.* the initial

letter of the Tagalog name t u g u i for *D. esculenta.* The diversity of the languages in the names for other species of *Dioscorea* may be put into a Table,

	Ilocano	Tagalog	Visayan
bulbifera	aribukbuk	ubi-ubihan utong-utongan	pologan, pulugan or pugang baong, banagan, bohayan or bayang-kan
pentaphylla and like species	—	lima-lima	sapang
hispida	karot	kalut, kayos nami	kolot, gayos, orkot, orot
wild *Enantiophyllous* species		baliacag, buloi kiroi, kobag, or kirini	baliacag orot
	dulian or durian	—	—
	kamangeg	—	—
	aribubu	—	—
	—	pakit	—
	ganduy	ubag and ubing basoh	
		mayatbang	

On doing this the K-names appear to be more conspicuous in Tagalog, but extended through all three in reference to *D. hispida,* and in Visayan now peculiarly departing from their probable original.

The Igorots of the mountains of northern Luzon call *D. alata* i p o i and *D. nummularia* k a s i. The Bikol language contains the words p u l u g a n for *D. bulbifera* in which it is like Visayan, and m a m o for *D. hispida.* The Bagobos of Mindanao have d a d a k a n for *D. bulbifera,* p a r i for *D. Cumingii,* and b a n a n for *D. nummularia.* Of other languages, d u y a n in Pangasinan is almost the Ilocano word d u l i a n and is used similarly and m a l a b a l u k b u k for *D. nummularia* possesses a certain resemblance to the Ilocano word a r i b u k b u k. K a r o t i is used in Sulu as k o l o t is in Visayan.

Complexity of names in Borneo, New Guinea and Australia.

Borneo, as far as we know anything of the names used for yams in it, helps very little: it has B- and K- names; and there is the word t i r a which is possibly of a common origin with the word t i s used for yam in Minahasa.

New Guinea is at present too little known, and the enormous linguistic complexity there will long render comparisons uncertain. F a r k i a is a quite isolated word for yam obtained thence; and the few words out of the Hanuabada language here recorded, suggest that the Papuans of the south coasts of British New Guinea apply very different words to various species of *Dioscorea*. The words to be found here are:—b a k u t a for *D. pentaphylla,* and b o k u apparently for *D. nummularia;* d i b a for *D. esculenta;* k a u for *D. bulbifera;* l e b e t a for *D. pentaphylla;* m a k o d a and m o i v a for wild races of *D. alata,* and m a l o a for *D. pentaphylla;* and t a i l u k a w a for *D. esculenta.*

The Queensland names are similarly diverse. In these pages will be found a m p u for *D. transversa;* a n y o r b i l for *D. bulbifera;* d a i p e r i for the same; g u i a b a or g y a h for *D. transversa;* k a l k u r and k a r r o and k u r i j a n g a for *D. bulbifera;* k o w a r for *D. transversa;* u n w u and w o k a i for *D. bulbifera.* The names of the rivers upon which they are used can be ascertained from the list; and it is to be remarked what diversity is in them.

Western Australia supplies the following names:—k o w a r, m j a r r a h and w a r r a n, all for *D. hastifolia.*

With the names from New Caledonia it is at present impossible to deal: specimens for accurate determination of each of the very many yams enumerated thence should be obtained. When this is done it will probably be found that almost three-quarters of the words are used to indicate varieties of *D. alata.*

Names in the Pacific.

In the western Pacific lie the Marianne islands, at the south of which is Guam island. In these islands d a g a, d a g o, or d a g u stands for yam. G a d o in Guam for *D. esculenta* looks like the same word. N i k a however seems the general word for this species.

In Fiji seven known names for Dioscoreas commence with MB- (written as B), eight with K., and if t i and t i v o u be counted one, seven with T. U b i is used for yam, and so is t i; and in the Nadroga language v i t u a is "yam": t i k a u supersedes u b i in places. T i has been explained as a young yam, and as *D. Seemannii.* Most of the recorded names stand for *D. alata,* as has been stated on p. 138: but there is an MB- or B-name for *D. pentaphylla,* namely m b u l o, and a T-name, t o k a t o l u, which may appear as k a i l e t o k a t o l u: and *D. bulbifera* may be called k a i l e without any qualification. There is a K-name for *D. esculenta,* k a w a i, which is the nearest approach to k h o a i in

the Pacific, and probably closely related to it. S a r a u and h a r a u are used in the Nadroga language for *D. esculenta*: r a u v a is ascribed to *D. Seemannii.*

In the Samoan group, l e g a is *D. pentaphylla,* and so is p i l i t a.

In the eastern Pacific, the Tahitians use u f i for yam and the interesting word h o i is among them, probably having been brought not so very long ago from Hawaii, whence as is well-known the natives made most wonderful voyages This same word is also in the Friendly islands. *D. alata* does not go so far north as *D. bulbifera,* and in Hawaii it yields place to *D. bulbifera,* so the word h o i on reaching the Tahitians and the Friendly islanders who live in the belt of *D. alata,* denotes *D. bulbifera.*

The words p a t a r a, p a r a a r a, p a n a r a or p a a n a r a denote *D. pentaphylla* in Tahiti: they seem to be akin to the word p i l i t a of Samoa which has been mentioned and to the first part of p u a u h i used in the Marquesas islands.

There is recorded a Hawaiian word for yam n a l a which either stands apart, or might equal the Fijian word n d a l a.

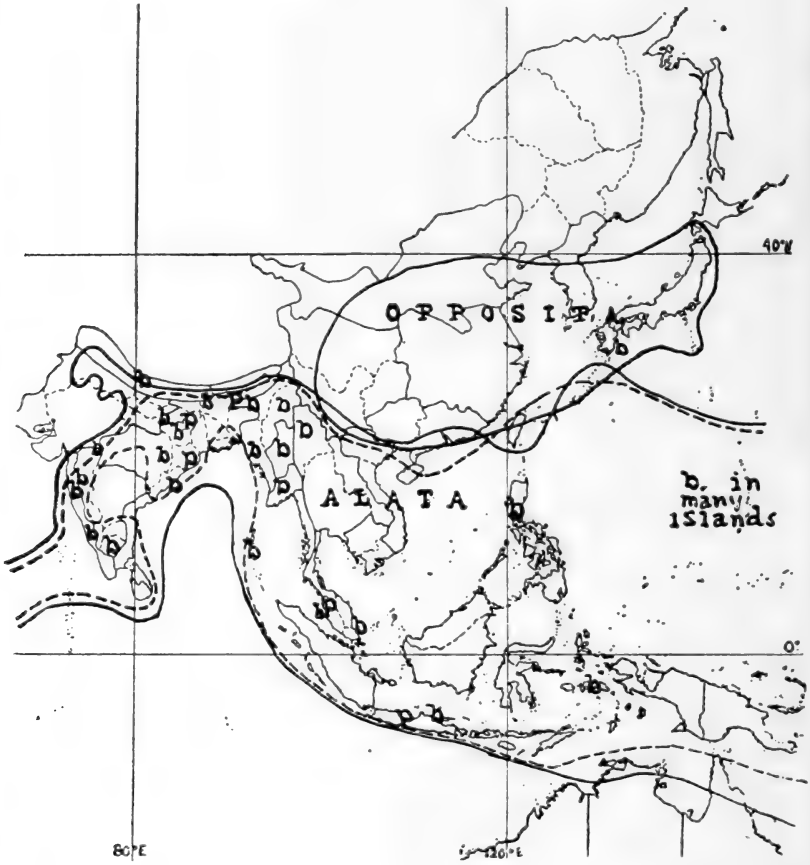
It seems well to call attention to the " ala " which recurs in the Pacific in several other words. It is in a l a - a l a used for the bulbils of *D. bulbifera* in Hawaii; in the Fijian names for a race of *D. alata* a l a k o r a and m o a l a, while *Colocasia* is n d a l a and the Sweet potato k u m a l a: but it must be said that n d a l a is often n d a l o, and k u m a l a becomes k u m a a in the Marquesas islands. In Shortland island, one of the Solomon group, is the word a l a p a, but the similarity of the word is probably without historical value.

Origin and adoption of D. alata and D. opposita.

One hopes out of the collecting of vernacular names to be able to learn something of the past history of cultivated plants, which as regards Dioscoreas means of the five species *D. alata, D. opposita, D. esculenta, D. pentaphylla* and *D. bulbifera,* whose present asiatic distribution is indicated upon the map on page 166. But for that purpose the wanderings of tribes and peoples must be not unknown, lest the bringing of a name to a cultivated plant be confused with the bringing of a cultivated plant to a name. Unfortunately only a few of these wanderings are adequately clear.

Botanical considerations indicate that *D. alata* came into the service of man in Eastern Asia about lat. 15-25° N. and *D. opposita* to the north of it: but as *D. opposita* is far less developed in cultivation than *D. alata,* it may have come into cultivation much later. The reasons for so placing the origins are as follows. In the first place it must be recorded of *D. alata* that when found wild it is never beyond the suspicion of having persisted from cultivation: and that it cannot persist indefinitely without aid appears more than probable. It is what Professor L. H. Bailey calls a cultigen or product of culture: and therefore it is necessary

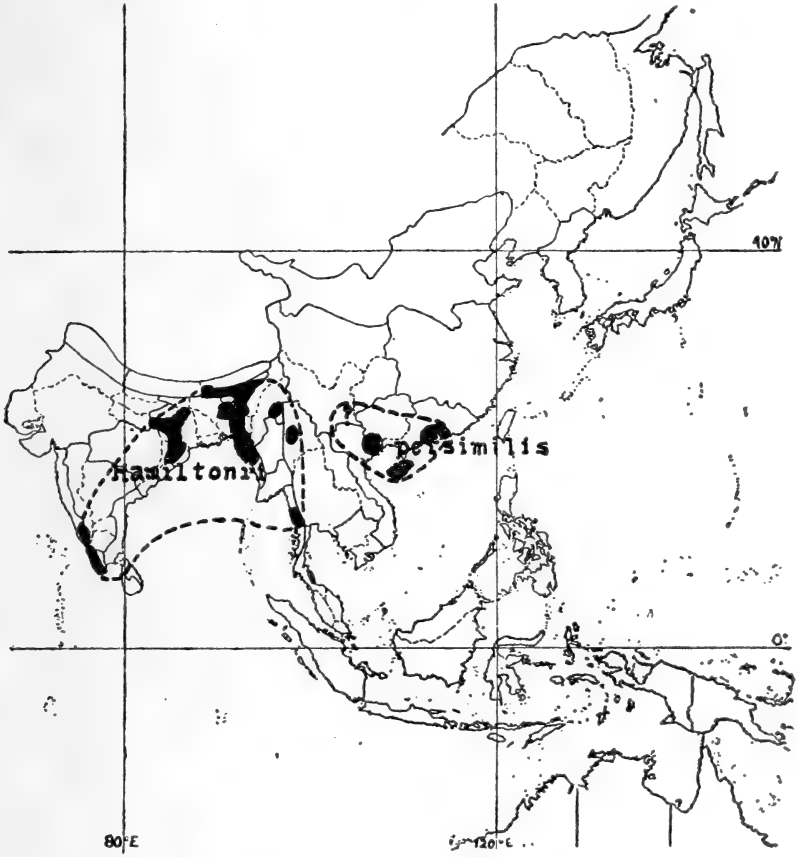
to look for its ancestry not in the finding of wild representatives of it, but in allied species. Upon doing so we find its closest allies to be the two species *D. Hamiltonii* and *D. persimilis,* found over the hilly parts of Asia indicated in map No. 11; and it would be more or less within the area of their distribution that *D. alata* arose, whether from the one or the other, or from both or from a common ancestry. A further consideration makes an origin to the southward look improbable. The reader should turn to map No. 1 where the dis-



Map No. 10. Area in Asia of the cultivation of *D. alata* (continuous line makes boundary), of *D. esculenta* (broken line makes boundary), and of *D. opposita.* Places where *D. bulbifera* is known to be cultivated are marked (b), and where *D. pentaphylla* is (p.).

tribution of the Enantiophyllous Dioscoreas is given, in order to understand the argument. In that map it is shown that the western Malay islands are a large centre for the harbourage, (and presumedly have been a large centre for the development) of

species of the section, and that southern India with Ceylon afford a second centre, and further that there are three centres in a line to



Map No. 11. Distribution of *Dioscorea Hamiltonii* and *D. persimilis*.

the north. Now because the perennial humidity of the Malaysian centre, leads to long growth in its species, and to less storage of food against an abrupt and vigorous push in a new season than the climates of marked seasons, the Malaysian stock would promise less to man than the stock of lat. 15-25° N.; and as the same may be said though in a less measure of the southern India with Ceylon centre, a theory of the origin of *D. alata* in the north of the Indo-China region is seen to be reasonable.

Far back in time the regions now India and China emerge out of the mist of early history in the process of a conquest from primitive folk by peoples out of western Asia, from beyond the area of food-Dioscoreas. One of these conquering peoples, the Chinese, destroyed with habitual thoroughness the primitive folk of northern

and middle China and then pushed south: the other, the Aryans, destroyed similarly the earlier inhabitants of Persia, and drove a wedge down the plains of northern India. Ultimately both reached the sea, and took to the use of it lightly, but enough for the Chinese to sail the China sea, and for the Aryans to sail the Bay of Bengal, and go forward into southern Indo-China and western Malaysia: then they met but that barely two thousand years ago. In the long succession of centuries before the meeting: the alphabet of the Aryans had penetrated north and east into Thibet, Burma, Siam, to the Shans and to the Cambodgians, while the writing of China has spread north-east into Japan, the Liu-kiu islands, Corea and south only into Annam. It is clear that when history dawns there was a belt of relative barbarians between the two horns more influenced by the southern than the northern culture.

These barbarians, one locates in or about the presumed original home of *D. alata*. But the other species, *D. opposita* took origin in or beyond the northern culture.

Out of the welter between the horns, various tribes emerged into history; the Annamites seem to have given way southwards a little, and are probably typical of what happened in general; but the Burmese seem to have leaped from far back in Asia, and when they had established themselves in the climate where Dioscoreas grow, they called the important one,—*D. alata*—by a name peculiar to themselves, namely m y o u k, but took names beginning with K for the others. If this theory is correct that they burst into an area of K-names, and if the K-names on map No. 8 are rightly put together, then the very wideness of the range of these names points to the former existence,—pre-Burmese,—of inhabitants in Indo-China who were not so barbarous as to be cut up into small communities, but had a wide-flung language or group of languages. They are demonstrated by these names conversant with yams and may be held as considerable consumers of *D. alata*.

Earlier than these, it is impossible to see: but the origins of *D. alata* are undoubtedly earlier.

The peoples who gave to *D. alata* its widest extension prior to European influence, were, however, not these inhabitants of its country of origin, but the Malayo-Polynesians, who migrated along the tropics, carrying it in the one direction to Madagascar, and using it in the other in the farthest islands of Polynesia, Hawaii excepted. That they carried it, is demonstrated by the occurrence of o v i in the former, and u f i in the latter as forms of what a Malay calls u b i, denoting "yam" thereby, and chiefly *D. alata*. Cultivated had they got it, and by cultivation alone they maintained it in regions where supposing it sufficiently safe from wild animals, the vast growth of tropical vegetation would not have left it room to persist. They must have been the first to take it to Madagascar, though they may not have been the first to take it to Tahiti, etc. But whether first or not, they would transport new races to new places.

Unfortunately we do not know when the one or two or perhaps more, waves of Malaya-Polynesian migrants went west past Ceylon to Madagascar: though the closeness to each other of the words makes it not exceedingly remote; but as no sanskrit appears in Madagascar, the last wave was before Aryan rulers made kingdoms in contact with these adventurous voyagers, *i.e.* before our era.

One must suppose it an important food for voyagers to all the several nations who sailed the Indian Ocean later. Whether those of Asia extended its range or did not, is at present uncertain (see p. 124); but after the sixteenth century had come in, the Portuguese carried it to the Guinea coast of Africa and thence to the New World: and in the last century the need of yams for provisioning ships, chiefly whalers, in the Pacific, stimulated its growth in the islands of that Ocean, and may have led to a little extension. Races which keep got preference from the voyagers, and the reputation for keeping of that which in the West Indies is called the "Lisbon yam" and its transportation thither are connected. We also learn that *D. opposita* was somewhat grown for the whaling trade.

Man's first preoccupation in regard to *D. alata* would be to get bulk, and to make the tuber form near to the surface of the soil. Much later the tenderness of a deeply-earthed tuber would appeal to him, and if living in conditions sufficiently comfortable, he would afford the labour of the deep digging that the tenderer tubers required. His efforts thereafter had divergent directions,—to get bulky races, and to get delicate races, the latter normally going deep.

Rumpf tells an appropriate story of the way in which the cultivators of Buton who he adds glory in their knowledge of how to grow yams, endeavour to amalgamate the two directions: they bury a split bamboo horizontally in the soil, he says, having taken a yam-set of a race which grows two feet long, and they direct the yam tuber down this bamboo, thus they obtain a long tuber and can dig it at little cost. The wish that stimulated this device, has led to the selection of the peculiar group of varieties which recurve in the soil and even extrude unless earthed up. Most of the extremely recurving races occur in the Philippine islands and in Eastern Malaysia, which suggests that they are of comparatively recent development in that part of the East. Diligent collecting of their vernacular names is by no means unlikely to throw light on them; it is a more hopeful quest, indeed, than the seeking for the origins of races longer in cultivation. Westward these recurving long-tubered races have recently been traced as far as the Malay Peninsula: eastward into the Pacific they do not appear to go, at least not as far as Fiji, whence a fairly complete knowledge of yams has been obtained. There is nothing in the Malay name u b i u l a r common to Amboina and the Malay Peninsula which indicates the direction of their spreading: and the Philippine names are at present unexplained. From Malaysia, into India, races extend which curve in the soil, but not to the extent of

extruding; such races were figured in the Gardens Bulletin II, plate 3 of number 1. These also seem to be absent from the Pacific. Probably neither the short recurving races, nor the long recurving and extruding races are in Madagascar. Let that be proved, and fix the date of the Malayo-Polynesian invasions of Madagascar, also ascertain how far towards the East they go, and the dates of opportunities of going East, then it will be possible to demonstrate fairly clearly where these races were selected. At a guess one would say in Eastern Malaysia including therein the Philippine islands.

Origin of D. opposita.

D. opposita is so nearly related to the Japanese *D. japonica*, that a common origin is certain, and it may be that the former is derived from the latter; but there are curious races or varieties of these in the interior of China little known which are alternative parents. If an origin from *D. japonica* be favoured, its birthplace would be in or somewhere near Japan, and its extension southwards merely a parallel to that of several cultivated plants, which with a northern origin, have been induced to grow to order by Chinese selection in warmer parts than their homes. This on the whole seems most probable. It is also induced to grow further north than *D. japonica*.

It has relatively few races, and did not get brought out of the Far East until 1850.

The origin and adoption of D. esculenta.

The history of *D. esculenta* is rendered more obscure than that of *D. alata* by reason of no clear affinities being demonstrable: it is a species demanding almost the same conditions as *D. alata*, and it has been carried equally round the Tropics. But probably because the small tubers keep doubtfully, it has been little demanded either for provisioning boats, or replenishing the village stores. It has therefore travelled less. It has been demonstrated present on the continent of Asia, to Tahiti, and in the Seychelles and Mauritius: it is reported to be grown in Madagascar: it has been found to be the "Hausa potato" of the Guinea coast, and has been shown to be in the West Indies in an obscure way but in more than one race. Its more general distribution in the fields and gardens of the Monsoon area of Asia suggests that it originated in it: its presence in central Madagascar, if correctly reported, suggests that the Malayo-Polynesians transported it thither: its presence west of the Cape of Good Hope would be the work of the Portuguese. So that in many ways it has had the history of *D. alata*.

There is an interesting race of it in Luzon, reported not uncommonly as wild; but because it does not produce female flowers, and because the tubers are grown upon long stalks which carry them beyond the range of the protecting thorns in what would seem not to be an original feature of the species, it does not seem by any

means truly wild, but to be one of man's selections which finds itself able to persist alone for a time: and it does not demonstrate in the present state of our knowledge that Luzon is the home of the species.

Ancient cultivation is accompanied by a dissimilarity of the names used in different parts of a plant's distribution. Among the names belonging to *D. esculenta* none from the East has any resemblance to the word m a v o n d r o recorded as its in central Madagascar: in Behar and Tirhut it possesses the wholly unexplained name s u t h n i: in western Burma it is one of the few species with a thi-name, in one part of Malaysia it is well known as k o m b i l i, in another as s a y u r u, s a y a f u, s i a f f u, etc., and in a third as t u g u i; and while the Tagalogs call it by this last name, the Ilocanos call it b o g a or b u g a. Fiji while possessing the name k a w a i for it, which name has the look of having come from the eastern edge of Asia, calls it also in the Nadroga language by the very dissimilar name of s a r a u. Such diversity does not help towards the tracing of the wanderings of the species in cultivation, but attests to the ancientness of it. The Aryans when they made acquaintance with *D. esculenta,* apparently called it m a d h v a l u k a, a name distinctly appreciatory, and persisting to this day in m o a a l u etc., while more or less Aryan descendents have devised for it the parallel name c h i n i a l u or sugar yam.

C h i n i a l u appears in the wrong form c h i n a a l u or "Chinese yam" sometimes; and this latter is not to be taken as evidence of any wandering into Assam from China, but on the other hand it is possible that the race known as j a v a l l a in northern Ceylon, may have been (but in late days) brought thither from Malaysia. It does not prove that Ceylon had not the species from other sources and earlier.

Now-a-days, *D. esculenta* is more to the tribes of the Philippines and New Guinea than to most of the dwellers in the East; but it has a very great importance locally in Tirhut, where there stands in the fields crop after crop of a race which appears to be as much modified by man from the original plant, as are any races. It has however, lost ground greatly in Bengal, and appears likely to go out of cultivation, because the potato has entered its markets, as a supplement to sufficient rice.

Origins of D. bulbifera.

The letter b. on the map No. 10 indicates the places where *D. bulbifera* is known to be cultivated. The varieties or races in cultivation, more than one, are not greatly modified from the wild originals; a multiple origin of them is very probable, and assuredly a completely distinct origin is to be ascribed to the cultivated var. *latifolia* of West Africa and the New World. Rumpf when living in Amboina in the second half of the seventeenth century, recorded that cultivated *D. bulbifera* showed many variations; apparently he meant gradations towards the inferior wild plant, and he gave it no name other than that by which wild *D. bulbifera* was known.

It is possible that the early Portuguese took it up as a vegetable for ships' use in those days when anything that would arrest scurvy was like gold, its bulbils keeping particularly well, and the interesting name u b i k a s t e l a or Castile yam (that is either Spanish or Portuguese yam) found in Singapore island would arise therefrom. But caution is necessary for the sweet potato is u b i k a t e l a, u b i k e t e l a, k e t e l a, k a t i l a, k a t e l a, k e s e l a, k a h i t e l a, i m a k a s t i l a, etc. in eastern Malaya, and the name may have been transferred. If the portuguese used it, its occurrence in southern India could have come from them: and then if it can be found on the Guinea coast, as for instance in San Thome island, this supposition will be established. But the Guinea coast plant is *D. bulbifera,* var. *latifolia,* which we know was transported by the Portuguese across the Atlantic, and evidently used by them. That they used var. *latifolia* is, of course, a circumstance making recourse to the corresponding edible Asiatic varieties probable, although not proving it. Some years ago the authorities of the Penal Settlement at Port Blair in the Andaman islands, obtained from an unrecorded source a cultivated race of *D. bulbifera* under the name of Otaheiti potato. Every possible enquiry has been made regarding the origin of the name in the hope of therein discovering the origin of the race: but it can be traced from the Andaman islands to India and no further.

Origin of cultivated D. pentaphylla.

The letter p. on the map shows the few places where *D. pentaphylla* has been found in cultivation. In northern India it is grown in a variety named *hortorum,* and is a very rare vegetable of western Bengal and Assam. What seems to be the same has been found in the Myaungmya district of the Irrawaddy delta; and there a hybrid name b e l a t m y o u k was given indicating that it had been brought recently from the direction of Bengal. In the south of India it is grown in a different variety, var. *Rheedei,* which, though rare, is found over a wide area. In the Malay Peninsula it is cultivated in the variety *malaica,* and in the Philippine islands in the variety *palmata*: there is also the variety *sacerdotalis* cultivated in Java, a race or variety in Amboina and also in Fiji. Surely these varieties have had separate origins.

D. pentaphylla is an extraordinary species in regard to its tubers, for it varies in them from a harmless and edible condition to one of considerable nauseousness. There is in it therefore just what would give to primitive man the incentive to cultivation; and that would seem to be what has happened and is happening to-day. We see in it a species actually giving rise to cultivated races; but one which without doubt has been doing so fatuously through the centuries.

The varieties being little changed, in appearance, their names are descriptive only.

The place of yams.

Rumpf was probably right in placing yam-cultivation as the resort of tribes not able to raise sufficient rice for themselves, and having no sago to put into its place. He was writing of Malaysia: but his generalisation appears of wider application, and most particularly as it is seen that the wet rice-land of the wide plains is not really yam-country. Were the peoples who came to call even the races of *D. alata* by nouns, such as could not raise cereals enough for their requirements?

Of New World crops, potatoes and manioc, usually called among the oriental eaters of yams by whatever their common noun for yam may be, are the real rivals of the oriental species of *Dioscorea* for they appear exactly to fit the same niche. Did they in America come into man's service where the cereal crops (that would mean maize crops) failed to meet the population's needs? This appears probable. Both are species evolved by man,—cultigens—like *D. alata*. This then becomes are axiom, that the plains are for the cereals of the world: and man has been obliged to increase his reliance on starchy tubers in hilly regions. It may be considered not unreasonably, therefore, that hill-folk have had more to do with the creation of *D. alata*, and also with the modification of other Dioscoreas, than plains-folk.

List 1 in which *D. hispida* is recognised as of the same genus as *D. alata*.

baesi gudda in the Chanda district.
bagh alu in Orissa.
baiguni kand in the Mandla district.
baijan kand in the Mirzapur district.
bara kand in Baghelkand.
bechandi kand in Chota Nagpur.
bhui kand in Berar.
bhaser kand in the Raipur district.
gadong among the Bataks.
ho koi in the Shan hills.
huwi gadung in Java.
huwi sawat in Java.
jangli mataru in the Chanda district.
kapu kayu in Celebes (but doubtful).
khoai dian nan in Cochin-China.
kolo kand in Chota Nagpur.
mankat in the Shan Hills.
nulla sunna gudda in the Nizam's Dominions
pe dumpa in the Vizagapatam district.
phan lyngkhi in the Khasia Hills.
phan solak in the Khasia Hills also.
podavi kelengu on the Malabar coast (slightly doubtful).
puti dumpa in the Vizagapatam district.
saeva kand in the Betul district.

sunna gudda in the Nizam's Dominions.
tak-aru in the Chanda District (but doubtfully connected with aru which equals alu).

tella ginnigeddalu in the Ganjam district.
tella sunna gudda in the Nizam's Dominions, and as thella sunna gadda in the Chanda District.

ubi akas in Perak.
ubi arah among Sakais.
ubi gadis (probably correctly ubi gadong), among Bataks.
ubi gadung (rare) in the Malay Peninsula.
ubi sabut in Java.
undai kavalli in the Tanjore District.
uwi alis in Java.
uwi chayu in Celebes.
uwi dudung in Java.
uwi sawut jahe in Java.
uwi tutung in Java.
vainu tega in the Vizagapatam District.
zamin kand in Kotah and Gwalior.

The localities of these names are not in or north of the Ganges plains; but are numerous in the northern part of the Peninsula immediately to the south of the Gangetic plains: the Khasia Hills alone represents Assam, the Shan Hills have one name; and in the Malaysian region there are several.

List 2 in which *D. pentaphylla* is admitted into the genus of *D. alata;* when proved nauseous an asterisk is prefixed.

* bajra kand in the Hoshangabad District.
* ban ratalu in the Betul District.
* bandri alu along the south of the Gangetic plain.
* bara kanda in the Bilaspur District.
* bayan alu in the Balasore District.
bechandi kand in Chota Nagpur.
* belni kand in the Betul District
* bhaser kand in Bandelkhand.
* byang sanga (? rare) in Chota Nagpur
* chamar alu near Calcutta.
charka alu in the Midnapur district.
* chola sanga among the Hos in Balasore district.
chunchu gudda in the Nizam's Dominions.
* daigun alu in the Cuttack District.
* dakur kand widely in the Central Provinces of India.
dava karandi in the south-west of India.
dhan alu (doubtful name) in the Birbhum district.
* dukka pendalam in the Vizagapatam District.

guti alu in the Sibsagar District.
haser sanga in the Districts of Hazaribagh and Singbhum.
hathia kand in the Shahabad District.
* huwi chekker in Java.
huwi jahe in Java.
huwi sawat in Java and huwi sawat jahe.
kapu sayor in Celebes (probably not nauseous).
katawala in Ceylon.
katu kilangu in South India and katu nuren kilangu.
* koranie genassu in the Malabar District.
* kukur alu near Calcutta.
* kurudu gaddi in the Madras Presidency
man hing in the Shan Hills (perhaps not nauseous).
* mara keshango in Travancore.
mocha alu in the Mymensingh District.
mohan kand in the Akola District (but assuredly not nauseous).
mullukilangu in Travancore.
nain'byen among the Kachins.
nuran kilangu and nurai genassu in places where Malayalam is spoken.
* odorah alu in the Balasore District.
* pandimukha tega in the Vizagapatam District.
patha alu near Calcutta and south-westwards.
* pedra kanda in the Damoh District.
phan sujab in the Khasia language.
piralu under the Sikkim Himalaya.
* punda mohra gudda in the Chanda District.
* ribe alu in the Balasore District.
* rui nang in the Mikir language.
* sher kand in the Bhandara District.
* sirka alu in the Midnapur District.
* suker alu near Calcutta.
* supnor kanda in the Raipur District.
* sur alu widely in Bengal.
* sura alu and suri alu in Eastern and Western Hindi.
* surendi kand in the Bilaspur District.
* suta alu in the Angul District.
* tiva tega in the Vizagapatam District.
* ubi jabbet among the Sakais.
ubi pasir in the Malay Peninsula and Java.
* ubi sabut in Java.
* ubi taun-taun in Eastern Malaysia.
* vypa dumpa in the Godaveri District.

If the above list be compared with that given for *D. hispida*, it will be noticed immediately that *D. pentaphylla* is not infrequently admitted to be an alu where *D. hispida* is not. The localities for the inclusion of it within the genus alu are in the lower part of the Ganges plains, in the Gangetic Delta where the languages are

Eastern and Western Hindi and Bengali, in Assam where the kindred language Assamese is spoken, and to the south of the Ganges down into Orissa and in the Central Provinces of India. Many of the names are connected with the sanskritic root of the verb "to hurt" and their great abundance and wide spread indicate in a remarkable manner that some name or group of names out of which they have come, have long been current. *D. pentaphylla* is also in one name admitted as a s a n g a or s a n g which word the K o l s and S a n t a l s otherwise restrict to good edible yams; but there is some possibility that the usage is not well founded: it is also a p e n d a l a m in one name and a r a t a l u in another.

List 3 in which *D. bulbifera* is admitted as of the same genus as *D. alata*.

a d i v i k o n d d u m p a l u in the Vizagapatam District.
a n a t h i k a n d in Chota Nagpur and the Monghyr District.
b a b r a k a n d in the Amraoti District.
b a r a k a n d a in the Central Provinces of India.
b a u l a a l u in the Balasore District
b i h i k a n d in the Raipur District
b o l a r k a n d in the Amraoti District
b o t l a k a n d a in the Raipur District.
b u n a a l u in the Districts of Dinajpur and Bogra.
c h a i n k a n d in the Central Provinces of India.
c h e d a r u k a n d in the Akola District.
c h e d u d u m p a in the Vizagapatam District
d a n g k a n d a in the Raipur District.
d o d d a k u r u d u from some parts of the Madras Presidency.
d u k u r k a n d in the Betul District.
g a i c h a a l u in eastern Bengal.
g a t h a l u among Marathas.
g a t h o u r k a n d in the Narsinghpur State.
g h a r i a l u in the District of Sangor.
g i t o r a k a n d a in the Bilaspur and Mandla Districts.
h a t h i a k a n d in the Shahabad District.
h r a t o w in the Chin language.
h e r i p u t i h in Amboina (but the use of the adjective "white" suggests that it is the cultivated plant).
h i w u w a r a in Eastern Malaysia.
h o k h o in the Shan language.
h u w i u p a s in the Sundanese language.
j a n g l i a l u in several districts of Bengal.
j a n g l i g a t h a l u in the Raipur District.
j a n g l i m a t a r u in the Bhandara District.
j h u m a l u in the Chittagong District
k a l g e n a s u in the Malabar District.
k a l a k a n d in Nimar and in adjoining Districts.
k a r u k a n d a widely in the Central Provinces and in Central India.
k a t u k a c c h e l in south-west India.

katukilangu in south India.
kauhaia kand in the Balaghat District.
kaya pendalam in the Circars.
ke-imo in Japan (but probably edible *D. bulbifera*).
keai kand in the Chindwara District.
kedro kand in the Surat District.
koppa kavalli in the Tanjore District.
kukur alu near Calcutta.
kukur torul in Nepal.
kunti genasi in Kanara.
kuru kand in the Nasik District.
manokand in the Surat District.
matawar kand in the Balaghat District
muka keshango and muka kacchel in Travancore.
nai kalu among the Kachins.
nulla ginni geddalu in the Ganjam District
nulla godda in the Chanda District.
owi behas among the Dyaks of south Borneo.
pagla alu in the Chittagong District.
paicha alu in the Mymensingh District.
?panukonda in southern Ceylon.
patti kacchal in Travancore.
phan kthang in the Khasia language.
phan lakhar in the Khasia language.
phan lyngkhi in the Khasia language.
phan pylleng in the Khasia language.
pit kanda in the Raipur District.
radraksha pendalam in the Circars.
raht alu in Chittagong.
ribsoni kand in the Jhansi District
satik kavalli in the Tanjore District
sharbutra kanda in the Raipur District.
sim shu in Formosa.
sisi dumpa in the Vizagapatam District.
suker alu near Calcutta.
sur alu widely in Bengal.
thuli kacchal in Malabar and Travancore.
ubi da-are in Halmaheira, eastern Malaysia.
ubi ipit in Bali.
ubi kule in eastern Malaysia.
ubi kumili utan in the Malay Peninsula.
ubi ondo in Celebes.
ubi puteh in the Malay Peninsula.
un-kau-tsu, a Chinese name.
uwi upas in Java.
vara kilangu in Travancore.
venni kilangu in the Malabar District.

Just as *D. pentaphylla* so is *D. bulbifera* considered an alu, and in two names it is admitted as a pendalam. It is quite widely and naturally a kand and a kilangu.

The List of Names.

Abau, Abobo, Abubo, Abubu; Ahuhu, Ohuhu, Ahua, Ahoea, used in the eastern Malay islands for *D. bulbifera* and for *D. pentaphylla,* and the first also possibly for *D. hispida.* Abau is used in Solor; Abobu and Abubu in Ternate (Kamel); Abubo in Celebes (Rumpf).

Adabgai, a Savara name for nauseous *D. pentaphylla,* Circars.

Addar in the Vizagapatam district, Circars, for nauseous *D. pentaphylla;* probably from Adabgai.

Adivi = wild in Telegu.

Adivi chara dumpa = wild *D. alata* in the Godaveri district.

Adivi genusu gadda = wild sweet yam, edible *D. pentaphylla* in the Cuddapah district.

Adivi genesu alla = wild sweet yam, the same in North Arcot.

Adivi konda dumpalu, either *D. bulbifera* or *D. hispida* in the Vizagapatam district.

Aelan or **Elan,** for yam in south Ceram.

Agitha or **Angitha,** common forms of Genth (q.v.) in Western Hindi and not unknown in Eastern Hindi.

Aharu alu, a tautologic form of Ratalu from the Dinajpur district, Bengal, for *D. alata.*

Ahei or **Ahey** (Rumpf), for *D. pentaphylla* in Amboina; and as Iae (Rumpf), in Lochon.

Ahua, Ahuo, or **Ahuhu,** used in Ceram and in Haruku which is near Amboina. See Abau. Rumpf used the second word.

Ait alu = ? bunched yam, for a race of *D. alata* in the Sylhet District of Assam.

Akar = climber, in Malay, and also root. It and the next as regards Dioscoreas, are applied to species whose deep-buried tubers are unfamiliar, not being sought for food.

Akar bunga kamayan = benzoin flower creeper, for *D. pyrifolia* at Priaman in Sumatra.

Akar bunga keminiyan = benzoin flower creeper, is *D. pyrifolia* in South Sumatra or *D. laurifolia* in Malacca and Negri Sembilan.

Akar guluno (Alvins), probably meant for akar gulung or twining creeper, from Negri Sembilan, for *D. pyrifolia.*

Akar jangot kulonak = bearded (?) Smilax creeper, for *D. pyrifolia* or *D. orbiculata* in Negri Sembilan. The legitimacy of translating kulonak by Smilax may be questioned, but no alternative seems better.

Akar kakop (Alvins), from Malacca for *D. orbiculata.*

Akar kamahang (Alvins) = benzoin creeper for *D. pyrifolia* or *D. laurifolia* in Malacca.

Akar kamiyan, akar kamoyan, akar kamayan, and ***akar kumoyan,*** for *D. pyrifolia* in Menangkabau Sumatra.

Akar kelona or ***akar klana*** = Smilax creeper, for Dioscoreas not used as food, in Malacca and in Negri Sembilan.

Akar keminiyan paya = marsh benzoin creeper, the same.

Akar keminiyan hantu = ghost's benzoin creeper, the same both in Malacca and Priaman, Sumatra.

Akar kowat, for *D. Havilandii* in Sarawak.

Akar kumili = Kombili creeper, for *D. bulbifera* in Malacca or Negri Sembilan.

Akar manujan or ***akar mamujan*** (Alvins), doubtless a variant of *akar keminiyan*.

Akar mawas (Alvins) = the Mias' or Orang-utan's creeper, for *D. pyrifolia* in Malacca.

Akar prung = ? clearing yam, for *D. pyrifolia* in Palinanan.

Akar seruting (Alvins) = Seruting (a Javanese dish) creeper, for *D. laurifolia* in Malacca.

Akar ubi pasir = sand yam creeper, for *D. Scortechinii* in Perak. The Javanese use of Ubi pasir is very similar.

Akash kanda = heavenly yam, a race of *D. alata* in Raipur, Central Provinces of India.

Ala-ala in the Hawaiian islands for the bulbils of *D. bulbifera*.

Ala-koro, a Fijian race of *D. alata*.

Ala-pa in the Shortlands island, Solomon group, for *D. bulbifera*.

Alea (Rumpf) for fingered *D. alata* in Malay.

Alshi, see **Ulshi.**

Altapatti alu or ***Alta alu*** = henna yam, a race of *D. alata* in the Murshedabad district, Bengal.

Alu (hindustani) from **Alucha** (sanskrit) = yam. Probably the Aryan invaders who introduced the sanskritic languages into India brought this name with them, but they came from a region where edible Dioscoreas would have been unknown. Alua and Alora are used for Alu in the Sontal Pergunnahs, and Alu kanda is a tautologic form found in the Raipur district of the Central Provinces.

Aman for *D. anguina* in Alirajpur, W. India.

Amdalata, for *D. bulbifera* in Chittagong.

Ampu for *D. transversa* in Queensland (Bailey).

Anathi kand, a corruption of Angethi used for *D. bulbifera* in Chota Nagpur and the adjoining Monghyr district.

An = prefixed to the names of several Dioscoreas in the Sakalava and Hova languages, Madagascar.

Angaroka for edible *D. ovinala,* in Sakalava.

Angetrika for a *Dioscorea* in Hova.

Angona for *D. fimbriata* in Madagascar.

Antakara for the same.

Antaly, for *D. Antaly* and *D. sp.* in Sakalova and Hova.

Anayod, a race of *D. alata* in the Philippine islands.

Anda, Andi or **Andi kand** = ? tuber yam, for *D. oppositifolia* in the districts of Nimar and Amraoti, Central Provinces of India, and also reported as *D. esculenta* in Nimar.

Andut kacchel, for cultivated *D. bulbifera* in Travancore.

Aneg, an Ibanag name for *D. esculenta.*

Ane genasu, for a race of *D. alata* in Canara, W. India.

Angethi, equivalent in Western Hindi and Behari to Genth.

Angilir alla, or ***angilis alla,*** for a race of *D. alata* in Ceylon.

Ankul, for edible *D. pentaphylla* in the Belgaum district, W. India.

Anyorbil, for *D. bulbifera* in Queensland, on the Palmer river.

Aoui (awi), a perfumed yam (? race of *D. alata*) in N. Caledonia in the Voi and Ati languages.

Appa guddi, a wild yam in Berar.

Ar, Aru or **Arua,** equivalent to alu in some Indian districts where Eastern Hindi, Western Hindi and Behari are the prevailing languages; and when unqualified indicating *D. alata.*

Aribubu, for *D. luzonensis* in the Ilocano language, but appearing to be the same word as the next.

Aribukbuk, an Ilocano name for *D. bulbifera.*

Aritega, avitega or ***avitenga tega,*** names for *D. oppositifolia* or for *D. tomentosa* in the Vizagapatam district, Circars.

Aroi = creeper in Javanese, like akar.

Aroi chanur mentzek = Smilax creeper, probably for *D. pyrifolia.*

Aroi gadong, for *D. hispida* on the Salak, Java (Blume).

Aroi huwi churuk, snout yam creeper, for *D. myriantha* and perhaps other species.

Aroi seselan, for *D. gedensis* in Java.

Arvi, in Hyderabad, Deccan, apparently the same as the next.

Arwa, for arua, in the Ballia and Gorakhpur districts of the Gangetic plains.

Asiahu, indicates yam, in South Ceram; cf. Abau.

Atar, for Ratalu, q.v., in south-west Behar, Gangetic plains.

Athi kilangu or ***athi kanni*** = early yam, for *D. oppositifolia* and *D. spicata* in Travancore.

Ato sang (Watt), as a Santali name, doubtless for haser sang, q.v.

Attu kavalai, for *D. bulbifera* or *D. alata* in the Tanjore district, Madras.

Avatenga tega, see Aritega.

Ayan = yam, on the north coast of East N. Guinea, the same as En.

Ayer, for yam, on the Kei islands.

Aylan, for yam, in South Ceram.

Aylohun ubi, given by Rumpf as a name for *D. nummularia* in Amboina.

Ay-panan, for *D. grata* in Luzon. Cf. Ayan and Aywel.

Aywel or **Ywel,** for *D. pentaphylla* in Amboina.

Babo, general in Madagascar for yam (Heckel).

Babra kand = acacia yam, for *D. bulbifera* in the Amraoti district, Berar, doubtless now on account of the fragrance of its flowers: but there is a possible origin from Bamla and also from Bara kanda.

Bada kanda = see Bara kanda.

Baesi gudda, for *D. hispida* in the Chanda district, Central Provinces of India.

Bagai, for *D. hispida* in Mangyane.

Bagh alu or ***baghra alu*** = tiger's yam, for *D. hispida* through Orissa.

Bagh hata alu = tiger paw yam, used in the district of Mymensingh, for *D. esculenta.*

Bagh thapa alu = tiger-claw yam, for *D. esculenta* in the districts of Purneah, Dinajpur and Jalpaiguri, Bengal.

Bahmuria alu, a race of *D. alata* in the Brahmaputra Valley.

Bai or **Bai kay,** Chin or Shandu words indicating some *Dioscorea* probably *D. hispida.* Kay suggests Khoai, and the Burmese Kywe, which is pronounced as Chwey.

Bai alu = ? deep going yam, or more likely connected with the last, for *D. anguina* in the district of Sylhet, Assam.

Baiguni kand, for *D. hispida* in the district of Mandla, Central provinces of India, Cf. Bail.

Baijan kanda, for *D. hispida* in the district of Mirzapur, Ganges valley. It would seem to be a distortion of Byang sanga; see Boiang.

Bail, Bayal, Beliya, Bai-ili, common Korku words for *D. bulbifera* and sometimes for *D. oppositifolia* or *D. aculeata.* Men who are not Korkus, but live in contact with them, affix "kand" doubtless wrongly. The last two and the next two names and Baesi gudda may be connected. The Chin Bai is strikingly similar.

Bajar, for *D. hispida* in the Kotah state, W. India.

Bajra kand, for nauseous *D. pentaphylla* in the Hoshangabad district, Central Provinces of India.

Bakoi, see Bekoi.

Bakuta, for *D. pentaphylla* in the Hanuabada language of Papua.

Balebale, recorded by Hazlewood as a Fijian name for (? a race of) *D. alata,* but apparently an error.

Baliala (N. N. Banerjee), as a tuber eaten in Cuttack, seems to be derived from Bail.

Balikag, for *D. luzonensis* or for *D. divaricata* in the Visayan language, Luzon.

Ballolong, a race of upgrowing *D. alata* in Luzon.

Bamla, Bamli or **Bawla,** for *D. bulbifera* in the districts of Birbhum and Midnapur, Bengal, which may mean "clustered," but is probably of Munda origin, see Bolai kanda.

Ban = wild in Hindi and kindred languages.

Ban alu for *D. bulbifera* in Bengal.

Ban aru = wild yam, used for several, if not all, wild yams in Chota Nagpur and the Sontal Pergunnahs.

Ban babla = wild acacia, for *D. bulbifera* in the Bankura district of Bengal, possibly on account of the scent of its flowers, but probably Babla = Bamla.

Ban gethi = wild genth, for wild *D. bulbifera* in the N.-W. Himalaya, where this species is also cultivated.

Ban ratalu = wild ratalu, for nauseous *D. pentaphylla* in the Betul district, Central Provinces of India.

Ban tarur = wild tarur, for edible *D. pentaphylla* and for *D. belophylla* in the Almora and Naini Tal districts of the N.-W. Himalaya.

Ban torul = wild torul, in Sikkim and adjoining Nepal for wild *D. alata, D. belophylla* and probably other (? edible) species.

Banagan (Usteri), for *D. bulbifera* in the island of Negros, Philippine Islands. See Baong.

Banaghor, for a flat race of *D. alata* in the district of Jessore, Bengal.

Banan, for *D. nummularia* in Bagobe, Mindanao. Cf. Banagan.

Banar, for *D. zollingeriana* in Palembang, Sumatra. Can it be an error for Chanar?

Bandri alu or ***Bandoreh alu*** = monkey's yam, for nauseous *D. pentaphylla* in the Ganges plains from the districts of Monghyr and Baghalpur for some distance westward, and for *D. bulbifera* in Bengal.

Bango, said to be used for *D. anguina* in the Midnapur district, Bengal.

Bank, for *D. hispida* in the Gorakhpur district, Gangetic plains.

Baong, Bayangkan, Banagan, Bohayan, Visayan names for *D. bulbifera,* whence Bayag cabayo has been derived. Bayangkan may also be misapplied to *D. pentaphylla.*

Bara alu = big yam, for a race of *D. alata* in Sylhet.

Bara kanda, Barai kand, Barahi kand, Bada kanda = hog's yam, for several wild Dioscoreas in the Western Hindi language, *e.g.* for *D. belophylla* in the Damoh and Jabalpur districts and in Baghelkhand, *D. hispida* and *D. bulbifera* in the Jhansi district and for nauseous *D. pentaphylla* widely in the Central Provinces.

Bargo nari, said to be *D. bulbifera* in the Manbhum district.

Barha kand, see Bara kanda.

Barlang, for *D. hispida* in the Darjeeling district.

Barmuria, for *D. pentaphylla* in the Brahmaputra valley, cf. Bahmuria alu.

Barogai, a Savara name for *D. tomentosa,* Circars.

Barsai kanda, for *D. belophylla* in the Nimar district, Central Provinces of India.

Batharpatia alu or ***Bothapotia alu*** = flat oar yam, a race of *D. alata* in the Darrang district, Assam.

Bathraj, for *D. bulbifera* in the Bogra district, Bengal.

Bati, a Fijian race of *D. alata,* probably for Botia.

Baula alu, for *D. bulbifera* in the Balasore district, Bengal, the same word as Bamla.

Bayag cabayo = horse's testicles, for *D. bulbifera* in Luzon indicating the bulbils, but obviously a distorted recent name cf. Baong.

Bayan alu, for nauseous *D. pentaphylla* in the Balasore district, Bengal.

Bayangkan, see Baong.

Bayuni alu, an undetermined Dioscorea in the Murshedabad district, Bengal.

Bechandi kand = the tuber which yields bechandi. Bechandi is a coarse meal prepared from *D. hispida,* and perhaps also from *D. pentaphylla,* which a certain section of Hindus in Chota Nagpur, and adjacent parts of the Central Provinces and Bengal, permit themselves to eat on fast days, that is to say, they allow themselves the food of the poorest. Thus Bechandi kand means *D. hispida.* The origin of the word is not clear, but Bail is suggested in the first syllable.

Begur, for edible *D. pentaphylla* in Eastern Nepal and in Sikkim in the Paharia language.

Bekoi, Bakoi, Bekoya = yam, among the N. Sakais of the Pahang-Kelantan border, or tautologically as ubi bekoi in N. Pahang. Bakhoi chyung and bakhoi logn are words collected from Besisi in Malacca, the application uncertain. Bekoi suggests the Mon word Khoai, and almost certainly "be" stands for ubi.

Bakuta, for *D. pentaphylla* or an allied species, in the Hanuabada language of Papua.

Belat myouk u = foreign yam, for cultivated *D. pentaphylla* in the Myaungmya district of Lower Burma, a hybrid name from Hindustani and Burmese.

Belni kand, either nauseous *D. pentaphylla* or *D. oppositifolia* in the Betul district, Central Provinces of India. Probably the same as Beliya kand, see Bail.

Belog, stated to be a yam among the Senoi of ? upper Pahang, though perhaps indicating the tapioca plant, cf. under Bekoi, the name Bakhoi logn.

Bemandry, for edible *Dioscorea Bemandry,* edible *D. Sosa* and *D. trichopoda* among the Sakalava in Madagascar (Heckel).

Benai alu or ***Benia alu,*** a race of *D. alata* in the Murshedabad district, Bengal, possibly from the yam suggesting a lock of hair: cf. Kaisali.

Beng-chapa alu = frog's skin yam, for *D. esculenta,* used along with Bagh-thapa alu in the same districts and in the same way.

Bengo alu, an edible yam of Lohardaga, Chota Nagpur.

Benkei-imo, for cultivated *D. bulbifera* in Japan.

Berar, a Shandu word for yam, Arakan (Gwynne Hughes), possibly for Bai-hra.

Betule, for *D. hispida* in Celebes (Rumpf). In Ternate Bete is *Colocasia.*

Betzy or ***Bitzy,*** as Chinese names for *D. esculenta* (Rumpf); they appear distortions ending with tsu which means tuber.

Bhag torul = tiger's yam, for *D. glabra* in eastern Nepal and Sikkim.

Bhains dethi = buffalo's teeth, a race of *D. alata* in the Raipur district of the Central Provinces of India, but also for *D. anguina* in the Raipur and Balaghat districts.

Bhas alu, for *D. bulbifera* in the Chittagong district.

Bhaser kand, for nauseous *D. pentaphylla* in Bandelkhand, or for the still more nauseous *D. hispida* in the Raipur district. See Bhusa.

Bhat alu or ***Bhata alu*** = boiled rice yam, for *D. glabra* in the districts of Malda, Bengal, and Nowgong, Assam. The Malay name Ubi nasi contains the same idea of colour.

Bhiya gond, for *D. alata* from the Purneah district. Gond is probably a distortion of Kand.

Bhui kand, for *D. hispida* in Berar, India.

Bhuiya alu, for *D. alata* in the neighbourhood of Calcutta.

Bhumia mati, for *D. oppositifolia* in the district of Betul, Central Provinces of India.

Bhusa or ***Bursa,*** for nauseous *D. pentaphylla* in the southern dialects of Eastern Hindi.

Bhusara, a race of *D. alata* grown in the Surat District, Bombay.

Biau, for *D. esculenta* in the island of Bali.

Bigap or **Bigop,** used by Sakais in Perak, and as **Gap** by Orang Tanjong at Kuala Langat, Selangor, possibly for yam; the Malay word Ubi may be in it, the first syllable having been dropped in the same way, as Sakai cut down Ubi benggala into ngala. The sound is in Bekoi and Belog, q.v.

Bihang = yam, among the Belanda of Kuala Langat, Selangor (Blagden).

Bihaun, for *D. esculenta* in Bali.

Bihi kand, for *D. bulbifera* in the districts of Raipur and Damoh, Central Provinces of India, and perhaps the same as Bhui kand.

Bili, an abbreviation of Kombili for *D. esculenta* in the Madioen Residency, Java.

Billa tega, for *D. glabra* in the Ganjam district, Circars.

Binang, a race of *D. alata* in the Philippine islands.

Bininag, a race of *D. alata* in Luzon.

Binnar alla or ***Bindhar alla*** = September yam, a race of *D. alata* in Ceylon.

Binna jhar alu = several tubers yam, a race of *D. alata* in the Jessore and Bakarganj districts of Bengal.

Binurag, a race of *D. alata* in the Philippine islands.

Bir sanga or ***Biru sanga,*** a Santali and Kol name for several edible yams, *e.g. D. esculenta, D. glabra* and *D. Hamiltonii.*

Bis = yam at Singhi, Sarawak (Moulton).

Bitule, for *D. hispida* in Menado, Celebes.

Blant-kayu, for yam at Bugan, Sarawak (Moulton).

Bodot, Borot or **Bolot,** a Visayan name for *D. esculenta,* Luzon.

Boga or **Buga,** an Ilocano name for *D. esculenta.*

Boga alu, for *D. Hamiltonii* at Tezpur, Assam.

Bohayan, a Visayan name for a *Dioscorea,* Luzon; see Baong.

Boiang, Boiom, Byam or **Byang sanga,** the common name among the Kols and Santals for nauseous *D. pentaphylla,* and once met with applied to cultivated *D. pentaphylla* in the district of Murshedabad, Bengal.

Bok, in the Lepcha language indicates *D. alata* and the closely allied *D. Hamiltonii;* but is also met with in Sikkim with an adjective for other Dioscoreas:—see Buka bok, Chimeotendeo bok, Kacheo bok, Kachma bok, Kancheong bok, Lum bok, Mecha bok, Mujib bok, Padum bok, Palam bok, Pamir bok, Panu bok, Pari bok, Pasok bok, Pazien bok, Pem bok, Phaleo bok, Puri bok, Shimo bok, Siddhiu bok, Singul bok, Sizu bok, Soum bok, and Sung bok.

Bok dung, a race of *D. alata.*

Bok dung kap = little bok dung, a race of *D. alata.*

Bok hyrh = red yam, a race of *D. alata.*

Bok kap = little yam, a race of *D. alata.*

Bok up, a race of *D. alata.*

Bok yung = excellent yam, for *D. Hamiltonii.*

Boka, for *D. alata* in Fiji by misapplication from Colocasia and probably quite erroneously used.

Boku, in the Hanuabada language of Papua, a yam near *D. nummularia.*

Bolar, in Korku, and ***Bolar kand,*** as a hybrid with Hindi, for *D. bulbifera* and *D. oppositifolia,* chiefly the latter, in the Amraoti district of Berar.

Bolwai gadda, for *D. hispida* in the Madras presidency.

Bonderi alla, for a race of *D. alata* in Ceylon.

Bon alu = ban alu or wild yam in parts of Bengal.

Boounden, a yam of N. Caledonia in the Voi language.

Boroniliga, a race of *D. alata* in Fiji (Wright).

Boti, for *D. hispida* in Roti island.

Botia, a race of *D. alata* in Fiji (Wright).

Botla kanda, for *D. bulbifera* in the Raipur district of the Central Provinces of India. Cf. Bolar kand.

Bouaou, a yam of N. Caledonia in the Voi and Ati languages.

Boutanhenn, a yam of N. Caledonia in the Voi language, the same as Kutanham, q.v.

Braron, a yam of N. Caledonia in the Ati language, the same as Founambouat.

Bu, Buar or **Buko** = yam, respectively at Kajan Rijang, Tabun and Matu, Sarawak (Moulton).

Buga, a race of *D. esculenta* in Luzon, see Boga.

Buka bok, a Lepcha name for a *Dioscorea,* Sikkim.

Budh, for *D. hispida* in the Thana district, Bombay.

Bukaw, used for yam in Melano (Tamat).

Bulo, for *D. pentaphylla* in Fiji (Wright).

Buloi, a Tagalog name for *D. divaricata.*

Bulu or **Butu,** for yam in Java and several islands of the Malay Archipelago. See Butu.

Buna alu, for *D. bulbifera* in the Dinajpur and Bogra districts of Bengal.

Bunga meraya, for *D. hispida* in Menado, Celebes.

Burdi gaddi, a Telegu name similar to the Savara Barogai or hog's yam, for *D. tomentosa* in the district of Cuddapah, Madras.

Buru aru, for *D. belophylla* in the districts of Ranchi and Singbhum. Cf. Bir sanga.

Buti, a race of *D. alata* in Fiji, probably for Botia.

Buti gai, a Savara name for *D. bulbifera* in the Ganjam district, Madras.

Butu, also **Bulu,** a common Javanese name for *D. alata* more frequently as Huwi buton, and if Malay is the language as Ubi butung: or huwi butu in Savu and Lame butung in Makassar: not uncommonly as Dudung, and sometimes as Huwi dudung or Huwi tutung. It is suspected that Ubi bulong is but a mistake for the second one of these. Kombili bulu in the Moluccas suggests it too. Though commonly associated with the vulgar word *butoh,* a more obscure origin is suggested by its variability. It seems quite possible that the word is not Javanese, nor Sundanese nor of the other languages which use it, but has been incorporated from some undetected source, and thence the many variations.

It is worth remark that where these names are used, *bulu* is not the name used to indicate a bamboo, as it is in Sumatra, the Malay Peninsula, Bali and parts of Celebes.

Caboui, see **Kabui.**

Cabuvo or **Casuvo,** see **Kabuvo.**

Caironi, see **Kaironi.**

Camangiy, see **Kamangiy.**

Camarire, see **Kamarire.**

Carando (Rheede), used for Karandas, q.v.

Cambare-Maron, in Mauritius for *D. bulbifera.*

Carot, see **Kalut.**

Cathia, see **Kathia.**

Cayos, see **Kayos,**

Chai, Chain, Chayen, *Chain kand,* Chani, Chatai or ***Chatan kand,*** a series of names used from the district of Monghyr, Bengal, on the east, to the district of Thana, Bombay, on the west, usually for *D. hispida,* but sometimes for other species, *e.g. D. pentaphylla* in Thana, *D. bulbifera* in Kotah and Hoshangabad, or *D. anguina* in Bhopal.

Chaina, a not uncommon name for *D. alata* along the Bombay coast becoming China and Chini northwards in Baroda. Unqualified in the State of Sawantwadi China is a race of *D. alata* with a short flat tuber, and magenta skin.

Chako pindi, for *D. tomentosa* in Travancore.

Chakun, a Cachari name for *D. glabra.* Cf. Khakun and Thakun.

Chakya machalu, a race of *D. alata* in the Sontal Pergunnahs.

Chalia kham alu = kham alu with a thick skin, a race of *D. alata* in the Midnapur district, Bengal.

Chalu valli kilangu, for *D. tomentosa* in Travancore.

Chamar alu = flesher's yam, for nauseous *D. pentaphylla* near Calcutta.

Chanar (or in dutch spelling tjanar), means in western Java *Smilax* and certain rather similar Dioscoreas.

Chanar babi = pig's Smilax, for *D. polyclades* or *D. deflexa*.

Chanar bulan or moon Smilax, for *D. pubera* in west Java.

Chanar potyung, for *D. pyrifolia* in Sundanese.

Chanar semut = ant's Smilax, for *D. pyrifolia*.

Chan yu = hill or jungle colocasia, and Chan yao, hill or jungle medicine; see Shan yu and Shan yao.

Chanwari aru, for *D. belophylla* in the district of Ranchi, Chota Nagpur.

Chapti ratalu = flat ratalu, a race of *D. alata* in Rai Bareilly, Gangetic Plains.

Charka alu, for *D. pentaphylla* in the district of Midnapur, Bengal.

Charkarkhuta alu = spinning wheel post yam, a race of *D. alata* in Sylhet, Assam.

Charodi, for *D. pentaphylla* in the Baygyat language, Andaman islands.

Charon chaval, for *D. tomentosa* in Travancore. See Chaval.

Chataveli (Marathi), for Shendwel, q.v.

Chaval, Chavalli or ***Chavala kilangu,*** for *D. aculeata* or *D. pentaphylla* in Travancore and the Malabar district.

Chechari, for *D. belophylla* in the district of Ranchi, Chota Nagpur.

Chedari kand, for *D. bulbifera* in the Akola district, Berar.

Chedu dumpa or ***Chedu haddu dumpa*** = bitter yam or bitter climbing yam, for *D. bulbifera* in the Vizagapatam district, Circars.

Cheilpani kanda, a race of *D. alata* in the district of Raipur, Central Provinces of India.

Chemna alu, for *D. glabra* in the Birbhum district, Bengal.

Chena gaddi, apparently for *D. bulbifera*, in southern Berar.

Chenchu gadda, a race of *D. alata* in the district of Kurnul, Madras.

Chengka, for *D. esculenta* in Buginese.

Cheni aru, for *D. glabra* in the Sontal Pergunnahs.

Chenyel, for *D. tomentosa* (Dymock) intended for Shendvel, q.v.

Cheranga or **Cherango,** for *D. aculeata* in the districts of Puri, Orissa, and Ganjam, Circars, becoming Cheranga kanda in the district of Raipur, Central Provinces of India.

Cheru kilangu = small yam, for *D. esculenta* in the district of Malabar, W. India.

Chhilpen kanda, a race of *D. alata* in the Raipur district, India.

Chien shan yao, see Shan yao.

Chili alu, a race of *D. alata* in the district of Angul.

Chimeo tendeo bok, for *D. glabra* or *D. lepcharum* in Sikkim.

Chinga alu, for a race of *D. alata* in the Chittagong district.

Chini, see **Chaina.**

China alu and ***Chini alu*** = Chinese yam or sugar yam, a race of *D. esculenta* in the Brahmaputra valley, and also similarly used in the Balasore district, Bengal.

Chola sanga, for nauseous *D. pentaphylla* among the Kols in the Balasore district and westwards.

C'houn, a yam of N. Caledonia in the Voi language.

Chubri alu or ***Chupri alu*** = basket yam, a race of *D. alata* about Calcutta and westwards.

Chuli jhinka alu = club shaped yam, a race of *D. alata* from Cuttack, Orissa.

Chulia kham alu = ? Tamil post-yam, for a race of *D. alata* in Orissa.

Chun alu = lime yam, a Khediya name for *D. Hamiltonii* in the Mayurbhanj state, Orissa.

Chunchu gudda, for a Dioscorea possibly *D. pentaphylla,* in the Warangal district of the Nizam's Dominions, largely eaten by Gonds.

Chunchuni kand, for edible *D. pentaphylla* in the Balaghat district of the Central Provinces of India.

Chunghat alu = lime-pot yam, a race of *D. alata* in the Sylhet district, Assam.

Chwey (phonetic), for **Kywe.**

Cobag and ***Cobag na quiroy*** (Blanco), see **Kobag.**

Cocathi, see **Kokathi.**

Colot, Corot or **Calut,** see **Kalut.**

Combili, see **Kombili.**

Connette (Rheede), for edible *D. pentaphylla* in S. W. India, apparently from Kanda, as are Kon, Konda, etc.

Coubar or **Coupar,** see **Kubar.**

Coumandioh, see **Kumandioh.**

Coutanham, see **Kutanham.**

Cu = yam, in Tonkin, = Khoai.

Cu-cai, a cultivated race of *D. alata* in Tonkin.

Cu-cai-mo, for Khoai mo, a race of *D. alata* in Tonkin.

Cu-coc-gian, for a race of *D. alata* in Tonkin.

Cu-mai, for Khoai mai in Tonkin, a race of *D. persimilis.*

Cu-nao, and ***Cu-nao-do,*** for *D. cirrhosa* in Tonkin.

Cu-o-giong = dragons nest yam, for *D. cirrhosa* in Tonkin.

Cu-tu, and ***Cu-tu trang,*** for *D. esculenta* in Tonkin.

Dadakan, a name for *D. bulbifera* in Bagobo, Mindanao.

Daga, Dago or **Dagu** = yam, among the Marianne islands, perhaps particularly *D. alata.*

Dagu aniti (Gaudichaud), inedible.

Dagu apaka, for *D. esculenta.*

Dagu apleyang (Gaudichaud).

Dagu cochon (Gaudichaud).

Dagu fanighi (Gaudichaud).

Dagu hago, a race of *D. alata* in Guam.

Dagu kwezlytail and ***Dagu quegleytaie,*** (Gaudichaud).

Dagu maissa houlon, (Gaudichaud).

Dagu manbila, (Gaudichaud).

Dagu manila, (Gaudichaud).

Dahambou, a yam of N. Caledonia in the Voi language.

Daigun alu, for nauseous *D. pentaphylla* = Baiguni, q.v.

Daikoro imo = stumpy yam, a race of *D. opposita,* in Japan.

Dai peri, a Queensland name for *D. bulbifera* on the Batavia river.

Daijo = big jo, said to be for *D. alata* in Japan.

Dakulevu, a race of *D. alata* in Fiji (Wright).

Dakur kand, Dukar kand, or ***Dukel kand*** = pig's yam, for nauseous *D. pentaphylla* in the Bhandara and Chanda districts of the Central Provinces of India.

Dam = for certain yams in Cambodia.

Dam-long-chevra cham, for a race of *D. alata,* the same as Khoai mo.

Dam long phluk, for *D. cirrhosa,* according to one authority, but according to another, and probably correctly for a race of *D. alata.*

Damuni or ***Daumini,*** a race of *D. alata* in Fiji (Hazlewood and Seemann).

Damuni masira, a race of *D. alata* in Fiji (Wright).

Dangkanda, for *D. bulbifera* in the Raipur district of the Central Provinces of India.

Dannini (Hazlewood and Seemann), by error for Damuni, q.v.

Dardi or ***Dardi kanda,*** for *D. oppositifolia* in the Amraoti district and for *D. belophylla* in the Amraoti and Betul districts, Berar and Central Provinces of India.

Daun apostema given by Rumpf as = Daun bisol, in Amboina.

Daun bisol, given by Rumph as a name for a *Dioscorea* which cannot be recognised, but of the section Enantiophyllum, in Amboina.

Daun kepeng-kepeng = coin leaf, for *D. nummularia* in Amboina.

Daun pitis-pitis = coin leaf, for *D. nummularia* in Amboina.

Daun ubi = leaf yam, a name given by Rumpf as for *D. nummularia.*

Dava karandi (Rheede), for *D. pentaphylla* in S.-W. India.

Davunikoka, a race of *D. alata* in Fiji (Wright).

Day-su-van, for *D. bulbifera* in Tonkin.

Debbar, said to be a hill name for *D. pentaphylla* in the Dehra Dun district, N. W. Himalaya.

Debir ashan alu = Durga's seal yam, a race of *D. alata* in the district of Maimensingh, Bengal.

De-emi, a yam of N. Caledonia in the Ate language.

Deh-enh or **Deh-eno,** a yam of Caledonia in the Voi and Ate language.

Denni or **Dhenni,** either *D. aculeata* or *D. alata* in the State of Travancore.

Dere sanga, for *D. glabra* in the Ranchi district, Chota Nagpur.

Desa pendalam, a race of *D. alata* in the Ganjam district, Circars.

Desavalli pendalam, country pendalam, for a race of *D. alata* in the Circars.

Desi alu = country yam, a race of *D. alata* in the Narsinghpur district, of the Central Provinces of India.

Desmonan, for *D. bulbifera* in N. Caledonia (de Lanessan).

Dhaiva, in the Naini Tal district for Debbar, q.v.

Dhan alu = grain yam, a doubtful name for *D. pentaphylla* in the district of Birbhum, Bengal.

Dhan mocha alu = grain bundle yam, from the balls of straw in which grain is stored, a race of *D. alata* in the Mymensingh district, Eastern Bengal.

Dhaula alu = white yam, for a race or races of *D. alata* in northern Chota Nagpur.

Dhuru kanda = for *D. belophylla* in the Mirzapur district, Gangetic plains, probably a distortion of Dakur kand.

Diangga, for *D. hispida* in Bali.

Diba, for a race of *D. esculenta* in the Hanuabada language, Papua.

Die-nambue, a yam of N. Caledonia in the Voi language.

Dikama, a race of *D. alata* in Fiji (Wright).

Dila, a yam of N. Caledonia in the Voi and Ate languages.

Diomali, a yam of N. Caledonia in the Ate language.

Dinogo, a race of *D. alata* in Luzon.

Dipou, a yam of N. Caledonia in the Voi and Ate languages.

Do khnoch, for *D. hispida* among the Khmers in Cochin China (Pierre).

Dodda kurudu, for *D. bulbifera*, received from the Madras presidency.

Dogue, in Luzon for Tugui, q.v.

Dokoro or **Tokoro,** for Dioscoreas of the section Stenophora in Japan.

Dondeli kand, for *D. belophylla* in the Balaghat district of the Central Provinces of India.

Draigarh, a doubtful name for edible *D. pentaphylla* received from Suket State in the N.-W. Himalaya and possibly a distortion of debbar.

Dsojo, given by Kaempfer as a literary or borrowed Japanese name for *D. japonica*: cf. Daijo and Tsu ubi.

Dudh alu or ***Dudhi alu*** = milk yam a race of *D. alata* in the districts of Ranchi and Hazaribagh, Chota Nagpur. Also *dudhia aru,* for the same in the district of Etawah, Gangetic plains.

Dudung, for *D. myriantha* in Javanese; but see Butu.

Dukai, an Itaveg (Luzon) name for *D. esculenta.*

Dukka pendalam = pig's yam, for nauseous *D. pentaphylla* in the Vizagapatam district, Circars. See Dakur kand.

Dukur kand = pig's yam, for *D. bulbifera* in the Betul district of the Central Provinces of India.

Dulian or **Durian,** Ilocano names, Luzon, for *D. luzonensis* or *D. divaricata*: cf. Duyan.

Dunichi kanda, for *D. belophylla* in the Damoh district of the Central Provinces of India.

Duppe genasu, for a race of *D. alata* in the South Kanara district, W. India.

Dura alu, Duri sanga or ***Dur sanga*** = small yam, applied in the districts of Monghyr, Dinajpur, the Sontal Pergunnahs and through Chota Nagpur to more than one yam; it is *D. esculenta* in the first two, but either *D. aculeata* or *D. belophylla* or *D. glabra* or edible *D. pentaphylla* in the others, all of the species serving as food and growing wild.

Durga chali alu = Durga's seat yam, a race of *D. alata* in the Murshedabad district, Bengal.

Duru aru, for *D. belophylla,* in Gangpur State, Chota Nagpur.

Duyan, the Pangasinan equivalent of Dulian, q.v.

Ed alu = ginger yam, for cultivated *D. pentaphylla* in the Darrang district of Assam.

Eda thengalia alu = ginger finger yam, for *D. esculenta* in the Sibsagar district of Assam.

Eddu toka dumpa = bullock's tail yam (Elliott), a yam of the Circars, probably a race of *D. alata.*

Eedava kilangu = May yam, for *D. spicata* in the State of Travancore.

Eenthi kacchel = date-fruit yam, for *D. tomentosa* in the State of Travancore.

Eër = yam, in the Kei islands; cf. Iwi.

En = yam, in the Kei islands, = Ayan.

Ein-myouk = garden yam, a general Burmese name for cultivated races of *D. alata.*

Elan, see Aelan.

Elan putih or ***Maelan putih*** = white Elan, is *D. bulbifera* in South Ceram.

Elos elos hci (Leschenault), ascribed to *D. myriantha* and intended for Huwi elos, q.v.

Erusumeri, for *D. alata* in Northern Arakan.

Eyamcha vetti lai kilangu, a race of *D. alata* in the Madras Presidency.

Fanganga or **Fangaga,** in the Betsilo language, Madagascar, for *D. Macahiba* (Heckel).

Fanna dakka (Leiden herbarium), as a Japanese name for *D. quinqueloba,* not recognised, but the second part evidently dokoro.

Farkia = yam, in New Guinea at Numforen.

Femafar, a yam of N. Caledonia in the Voi language.

Fena alu, a wild Dioscorea of the Darrang district, Assam, where it is sold and marketed for eating.

Founambouat, a yam of N. Caledonia in the Voi language.

Fouapendo, a yam of N. Caledonia in the Voi and Ate languages.

Ga, a race of *D. alata* in Fiji (Wright).

Gadi-gai, for *D. oppositifolia* among the Savaras in the Ganjam district, Circars.

Gado, applied to *D. esculenta* in the Island of Guam, Marianne Is. It is Dago twisted round.

Gadong, Gadung, Gadueng, Gadhung, Ghadung, Gadu, Ganrong, a very interesting series of names which unqualified are applied to *D. hispida* where Malay is spoken. Gadong samak in the Malay Peninsula is *D. laurifolia* locally. Among the Bataks of Sumatra where there is a verb mengadong = to plant yams, Gadong has a wider and more generic meaning. Eight kinds of yam pass as Gadong among these Bataks, and three are recorded for Achin. Elsewhere two are more usually recognised. It is possible, perhaps, that two names may in most places belong to *D. hispida,* and then the balance must belong to other Dioscoreas, except that sometimes *Smilax spp.* are termed Gadong *e.g* Gadong China—Chinese Gadong, and Gadong tikus—rat Gadong. The form Ganrong comes from the Dyaks of S. E. Borneo: Gadu from Bima: Gadueng from Menangkabau, Sumatra.

Gadung adong = black gadong, in Achin.

Gadong belaka, among the Bataks.

Gadung bodas = white gadung for *D. bulbifera* in the Preanger Residency of Java.

Gadong goya, among the Bataks.

Gadong holiholi, among the Bataks.

Gadong jae, in the Sembiran dialect of Bali.

Gadong jalor, among the Bataks.

Gadung kasturi = musk gadung, in Bali.

Gadung ketan, in Java.

Gadung kuning = yellow gadung, in Java.

Gadong lekat = glutinous gadong in Achin.

Gadung malati = jasmine gadung, in Bali.

Gadung pira na manuk, among the Bataks probably *D. alata.*

Gadong ranek, among the Bataks.

Gadong rambe, among the Bataks.

Gadung ramping, among the Bataks, probably *D. alata.*

Gadung rimbo = forest gadung, for *D. hispida* in S. W. Sumatra.

Gadong samak = dyeing gadong, for *D. laurifolia* in the Malay Peninsula.

Gadung si apur, among the Bataks, probably *D. alata.*

Gadong tombong, in Bali.

Gadong ur = Coconut gadong, in Achin.

Gadungan, see **Werung.**

Gagarubro, a Naga name for *D. Hamiltonii.*

Gai = yam, in Savara, see Adabgai, Butigai, Barogai, Gadigai, Margodi gai, Parogai, Tumangai.

Gaibol, for *D. anguina* in North Cachar.

Gaicha alu or ***Gachua alu*** = yam of thickets, for *D. bulbifera* in the districts of Dacca and Mymensingh, Bengal.

Gajaria or **Gajar,** for *D. pentaphylla* in the Jhansi district.

Gakn or **Gang** or **Gong,** for some edible root either a *Dioscorea* or *Ipomoea Batatas* (which is of course American) among the Sakais of N. Perak, N. Pahang and Kelantan. As the Sakais clip Malay words greatly Gadong is possible in it.

Galelua, apparently used in Jhansi for a Dioscorea.

Ganduy, for *D. luzonensis* in Luzon (Kamel).

Ganesh alu, for *D. anguina* in the Midnapur district, Bengal.

Gangajali alu = Ganges water yam, from the colour, for cultivated *D. pentaphylla* in the Murshedabad district, Bengal.

Gangarua, a race for *D. alata* in the Kangra district of the N.-W. Himalaya.

Ganjir or **Gajir,** edible *D. pentaphylla* in the North West Himalaya = Gajaria and Ghajir.

Gap, see Bigap.

Garaba, said to be used in the Cuttack district, Orissa, for *D. bulbifera.*

Garania alu = yam like a guran wood pole, a race of *D. alata* in Lower Bengal.

Gath alu, for *D. bulbifera* among Marathas, doubtless from Genth.

Gathour kand, for *D. bulbifera* in the Narsinghpur State of S. Rajputana, from Genth.

Gayos, for *D. hispida* in the Visayan language, Luzon (Blanco), = Kayos in Tagalog.

Gedi-stara or ***Gedi-sara,*** for *D. alata* in the Vizagapatam district, Circars.

Gembili, Gembilim, Gembiliem, Javanese forms of Kombili, for *D. esculenta.*

Gembolo, for *D. bulbifera* in Java, the same word as Kambubu.

Genasu = yam, in Kanarese; and standing alone may refer to *D. esculenta.* Genasu muli = thorny genasu the same: genasu mudi.

Genth, Genthi, Gethi = ? a small ball, for *D. bulbifera* in allusion to the bulbils, a wide spread name in western Hindi, the Pahari, Bihari and to some extent eastern Hindi dialects, and giving rise to modifications in other languages *e.g.* Angetha, Agitha, Ghita torul, Gath alu, Ghenti gath gathour kand, and probably Geta torul.

Gere arg-alla, for a race of *D. alata* in Ceylon.

Geta torul, for ? *D. bulbifera* in Nepal.

Ghadung, see **Gadong,** of which it is a form used in Madoera.

Ghajir or **Ghanjir,** for edible *D. pentaphylla* in the districts of Almora and Naini Tal, N.-W. Himalaya, and Gajaria in Western Hindi.

Ghandiali, for *D. alata* and *D. belophylla* in the Kangra district of the N.-W. Himalaya.

Ghar = domestic, in Hindi, etc.

Ghar alu = domestic yam, for *D. alata* in the Murshedabad district, Bengal.

Ghar genthi or ***Ghar gethi*** or ***Ghar gita*** = domestic gethi, for cultivated *D. bulbifera* in the N.-W. Himalaya, see Genth.

Ghar tarur = domestic tarur, for *D. alata* in the Dehra Dun district, N.-W. Himalaya.

Ghar torul = domestic torul, in the paharia dialect for all cultivated yams.

Ghari alu or ***Gari,*** for *D. bulbifera* in the districts of Saugor, Betul and Hoshangabad in the Central Provinces of India. Also in the last named district *D. belophylla* is confused under it.

Ghas alu = grass yam, for *D. aculeata* in Chittagong.

Ghelehati or **Gheleath,** a yam of N. Caledonia in the Voi and Ate languages.

Ghenti, in Chota Nagpur, for Genth q.v.

Ghita torui, in Sikkim *D. bulbifera* or by misapplication *D. belophylla.*

Ghuwak, for *D. alata* in the Kangean islands, east of Madoera.

Giay nan, for *D. hispida* in Cochin China (Pierre) : possibly Kywe nan.

Gin bik pya, a very doubtful name from Prome, Lower Burma for *D. birmanica.*

Girchi kand, for *D. anguina* in the district of Jabalpur and Raipur, Central Provinces of India.

Gita or **Githa,** for *D. bulbifera* in the Behari language from the district of Gorakhpur to the Sikkim Himalaya at least among Nepali settlers. Cf. Genth.

Gitora kanda, for *D. bulbifera* in the Bilaspur and Mandla districts of the Central Provinces of India.

Gobadu, for edible *D. pentaphylla* among the Korkus of the Ellichpur district, Berar.

Gcemi rotto rotto, according to Rumpf the Ternate equivalent of Tali babounji.

Gogdu, for *D. bulbifera* in the districts of Buldana and Amraoti, Berar, and also for *D. aculeata* and *D. belophylla.* Is the word the same as the last but one?

Goin, a yam of N. Caledonia in the Voi and Ate languages.

Goinchi alu, a yam of the Malda district, Bengal.

Gointia alu, ascribed to *D. aculeata* by Heinig, in the Chittagong district.

Goj alu or ***Guz alu*** = peg yam, a race of *D. alata* commonly used in Bengal. Also *goj lal alu* = red peg yam.

Gokaru, for edible *D. pentaphylla* in South Kanara.

Gol ratalu = round ratalu, a race of *D. alata* in the Ganges plains.

Gon alla, either for *D. pentaphylla* or for *D. spicata* or for *D. intermedia* in Ceylon.

Gona, for *D. vexans* in the Andaman islands among the Beas and Balawas.

Gone, a race of *D. alata* in Fiji (Wright).

Gong or **Gang** (Sakai), see Gakn.

Gonthi, for Genth in the district of Hazaribagh, Chota Nagpur.

Gora = sweet (Marathi), and doubtless the origin of the Anglo-Indian name "Goa potato" for *D. esculenta* lies in the word.

Gor-adu, a well known race of *D. alata* from Bombay east to Amraoti and Poona.

Gora karandas, edible *D. bulbifera* all along the coast from Surat to Goa.

Gor-kan, the same as the last and with it.

Gorabu alu, a race of *D. alata* in Jessore, Bengal.

Gota, for *D. hispida* in the Kotah State, W. India.

Gowi = yam, in the island of Nias, west of Sumatra. If the G. can have come from K., we have here the equivalent of Khoai.

Grabon, a yam of N. Caledonia in the Ate language.

Gu boh shu tin = ox-tail tuber creeper, a central Chinese name for *D. acerifolia* (Diels).

Guiaba, Gyaba or **Gyah,** for *D. acerifolia* (Diels).

Gulakiri wel-alla, for a race of *D. alata* in Ceylon.

Gumma ratalu, a race of *D. alata* in the Mainpuri and Etawah districts of the Ganges plains.

Gun, for *D. deltoidea* in the Kamaon Himalaya.

Guna pendalam, round *D. alata* in the Circars (Elliott).

Gunga, for *D. aculeata* in Sylhet, Assam.

Gur alu = molasses yam, formerly used for *D. esculenta* in Bombay like Goa potato: and used now for a race of *D. alata* in the Murshedabad district, Bengal.

Guraniya alu = yam like a guran pole, a common name for a race of *D. alata* in Lower Bengal.

Gurarya kand, for *D. anguina* in the State of Barwani, Rajputana.

Guri, for *D. belophylla* among the Korkus.

Guti alu = little ball yam, for *D. pentaphylla* in the Sibsagar district, Assam, probably in allusion to the bulbils, and having the meaning of Genth.

Haldia alu = orange-coloured yam, for *D. anguina* in the districts of Nowgong and Darrang, Assam.

Halgujia alu or ***Haljukia alu*** = Hal-fish yam, a race of *D. alata* in the Brahmaputra valley.

Hampas tagbalang, said to be a yam in the Philippine islands.

Handia alu = cooking pot yam, a race of *D. alata* in the Cuttack district, Orissa.

Hanki genasu, for *D. belophylla* in the district of Malabar, Western India.

Hanla alu, a race of *D. alata* in Sylhet, Assam.

Harame baireo, a Naga name for *D. anguina.*

Harad bhu, for *D. bulbifera* in the Ranchi district, Chota Nagpur.

Harau, for *D. esculenta* in the Nadroga language of Fiji (Wright).

Hari imo, used by Japanese botanists for *D. esculenta.*

Harin khuray alu, a race of *D. alata* in the Bankura district, Bengal.

Harin pala alu = antler yam, a race of *D. alata* in Bengal.

Haser sanga, for *D. pentaphylla* and sometimes for *D. belophylla* in the districts of Hazaribagh and Singhbum.

Hasila = yam, at Oya in Sarawak (Moulton).

Hastyaluka (sanskrit) = elephant yam, probably for a race of *D. alata*. Dallana in the 12th century said it was a large form of Kasthaluka.

Hathigorwa alu, a race of *D. alata* in the Ranchi district, Chota Nagpur.

Hathidanta alu = elephant tusk yam, a race of *D. alata* in the Narsinghpur district, Central Provinces of India, and ***Hathidatia,*** of the same meaning in the Brahmaputra valley.

Hati kujia alu = elephant's foot print yam, a race of *D. alata* in the Darrang district, Assam.

Hathi muria, a race of *D. alata* in the Darrang district, Assam. Bahmuria is also *D. alata.*

Hati pae alu = elephant's foot yam, a race of *D. alata* in the Murshedabad district, Bengal.

Hathia kand = elephant's yam, for *D. bulbifera* and *D. pentaphylla* in the Shahabad district, Bengal.

Hau or **Ha-u** = yam, among the Pangan in Ligeh State, Lower Siam and the Semang in Kedah (Blagden). Cf. Khoai.

Hauw sina, given by Teijsmann as perhaps a *Dioscorea,* and in use in Timor.

Hayuru, Hayuro, Hayule, for *D. hispida* in the Molucca Is.

Heg genasu = sweet genasu, for edible *D. bulbifera* in North Kanara.

Heli, Heri = yam, or often *D. alata,* in some of the Molucca islands. Cf. Huwi.

Heli and ***Heri assapin*** = finger yam, for a race of *D. alata* in Amboina (Rumpf).

Heli and ***Heri makalaun*** or ***Heli maki laun*** = artocarpus leaf yam similarly used.

Heli malonia, for a race of *D. alata* in Banda Is.

Heri manu, for red fleshed *D. alata* in S. Ceram and Amboina.

Heli nya or ***Heri nya*** = snake yam, for a race of *D. alata* in Amboina (Rumpf).

Heri puti = white yam, for *D. bulbifera* in Amboina and the Uliassers.

Heri soun laun = artocarpus leaf yam, for a race of *D. alata* in Amboina.

Heofika or **Hofika,** Sakalava and Hova names, Madagascar, for *D. heteropoda* and *D. Hoffa.* Cf. Ofika, and recall Blagden's suggestion that Hubi in Sakai is possibly older than Ubi in Malay.

Hepe, a yam of N. Caledonia in the Voi and Ate languages.

Hibag-ye, said to be *D. oppositifolia* in the Poona district, W. India.

Him kukul alla = little cock's yam, a Cinghalese name for *D. esculenta,* on account of the spur like thorns on the roots.

Himboueh, a yam of N. Caledonia in the Ate language.

Hime tokoro = small tokoro, a Japanese name for *D. tenuipes.*

Hingur alla, for a race of *D. alata* in Ceylon.

Hiritala = benumbing yam, a Cinghalese name for *D. oppositifolia.*

Hirmati, a Gond name for an undetermined Dioscorea, the same as Pidi kanda.

Hituu, for *D. pentaphylla* in Pete, Moluccas (Rumpf).

Hiwu = yam, in the island of Savu, near Timor.

Hiwu butu, for *D. alata.* See Butu.

Huwi wara, for *D. bulbifera.*

Hiyahu, for *D. esculenta* in the island of Halmaheira.

Hkad-hkyo, a well known Burmese name for *D. birmanica.*

Hkadhkyo pyu = white Hkad-hkyo, for *D. membranacea* in the Pakokku Hills.

Ho, the Shan word for yam.

Ho-kho, for *D. bulbifera.*

Ho-koi, for *D. hispida.*

Ho-man-kawk, for a wild edible Dioscorea, apparently *D. alata.*

Ho-wuk, for a wild edible Dioscorea.

Hofikara, for a Dioscorea in the Hova language of Madagascar.

Hoi, for *D. bulbifera* in the Hawaiian Is., Friendly Is. and Tahiti.

Honda, a yam of N. Caledonia in the Voi and Ate languages.

Hone sanga, for *D. belophylla* in Singbhum.

How-wai, for a yam in the Kamee language, Arakan (Gwynne-Hughes). It suggests Khoai.

Hputsa or **Hputsa-u,** a well known Burmese name for nauseous *D. pentaphylla.*

Hra or **Khah,** the Chin word for yam, connected with khoai.

Hra burr, a race of *D. alata.*

Hra hnim, for edible *D. pentaphylla.*

Hra let, for *D. esculenta.*

Hra lien, for a race of *D. alata.*

Hra parr, a race of *D. alata.*

Hra pree, a race of *D. alata.*

Hra tow, for *D. bulbifera.*

Hra trol, a race of *D. alata.*

Hua, in Laos for some yams, = Khoai.

Hua kathal, said to be for *D. esculenta* in Laos, being the same as Khoai lo.

Hua man phao, for a race of *D. alata* in Laos.

Hua pao, for *D. bulbifera* in Laos..

Hua thuck, for a race of *D. alata* in Laos.

Huai chan yao = Huai hill medicine or ? hill medicine of Huai shien, unidentified *Dioscoreas* used medicinally of origin in Shensi and adjoining provinces of China. Huai perhaps = Khoai.

Huang chiang = yellow ginger, a central Chinese name for more than one Dioscorea, *e.g. D. zingiberensis* (Henry) and as huang chiang teng, for *D. japonica* (Rosthorn), and as huang chiang tou teng, for what Diels calls *D. glabra*. Huang tou teng is ascribed by Diels further to *D. bulbifera* with a question mark.

Huang yao = yellow medicine, may belong to a Dioscorea, in Szechuan (Hosie).

Hubi = yam, in Sakai. Blagden suggests that hubi is older than the Malay ubi: but the form of the word in Madagascar is without the h in most cases.

Hubi gak, used by Soman, a mixed negrito tribe of N. Perak speaking a mixture of Malay and Sakai, would seem to be *Ipomoea Batatas*: see Gakn.

Huelyo or **Hueelyo** = yam in the islands of the Uliassers, Amboina group.

Huelyo putih = white yam, for *D. bulbifera* on the island of Saparua.

Huelyo puil, for *D. bulbifera* in Nussa Laut of the Uliassers.

Hukai, for *D. anguina* in Sylhet, Assam, suggesting Khoai.

Hulahaya kanda, for *D. hispida* in the district of Raipur, Central Provinces of India.

Hura, said to be applied to *D. oppositifolia* in the Sika language of Flores; but it is probable that *D. alata* is meant.

Huwi = yam, in Sundanese.

Huwi badak kuning = yellow fan yam, a race of *D. alata.*

Huwi badak manis = sweet fan yam, a race of *D. alata.*

Huwi buah = fruit yam, said to be *D. hispida,* but *D. pentaphylla* is probable.

Huwi butun or ***Huwi butcn,*** a race of *D. alata.* Cf. Butu.

Huwi chekker, for *D. pentaphylla.*

Huwi churuk, for *D. myriantha.*

Huwi dewata = divine yam, for edible *D. pentaphylla.*

Huwi dudung or ***Huwi tutung,*** for *D. anguina*: see Butu.

Huwi elos, for *D. alata* and *D. myriantha.*

Huwi gadung, for *D. hispida.*

Huwi jahe = ginger yam, for *D. pentaphylla* and the very closely allied *D. Blumei.*

Huwi klapa = coconut yam, for a race of *D. alata.*

Huwi kawaiyung or ***Huwi kawoyang*** = benzoin yam, for *D. pyrifolia* apparently.

Huwi landak, for *D. esculenta.*

Huwi lilin = wax yam, a race of *D. alata.*

Huwi mamayung, a variant of Huwi kawaiyung.

Huwi mantri = priest's yam, for edible *D. pentaphylla.*

Huwi mengareh = jungle yam, for a race of *D. alata.*

Huwi ohe ai and ***Huwi ohe padang,*** races of *D. alata.*

Huwi orei, a race of *D. alata* in Java.

Huwi panjang, long yam, for a race of *D. alata* in Java.
Huwi pulun = sticky yam, a race of *D. alata.*
Huwi sawat or ***Huwi sawut*** = fibrous yam for *D. pentaphylla* or *D. hispida.*
Huwi sawut jahe = fibrous ginger yam, for *D. pentaphylla.*
Huwi saut ketam, for *D. Blumei.*
Huwi teropong = pipe yam, probably for a race of *D. alata.*
Huwi tihang = post yam, and ***huwi tihang merah*** = red post yam, for races of *D. alata.*
Huwi upas = poison yam, for *D. bulbifera.*

Iaë, for *D. pentaphylla* in the island of Lochon, Moluccas (Rumpf). Cf. Ahey.

Iamme imo, Kaempfer's spelling of Yama imo.

Ibi = yam, in the Tooensawan dialect of the Alfuri language of Minahassa.

Ichi nen imo = annual yam, a watery inferior race of *D. opposita* in Japan, quick to mature.

Icho imo = wood yam, a race of *D. opposita* in Japan.

Ie-chay-io (for ? Ye shan yu), a wild yam eaten in the Chinese province of Kwei-chow (Esquirol).

Ihu = yam for Huwi in Ceram.

Ima, Imah or **Imati** = yam chiefly, but for *D. alata* in Ternate.
Imah kastela = Castile yam is *Ipomoea Batatas.*
Ima pariaman, is surely a race of *D. alata.*

Imo = yam, in Japanese.

Indapan, a race of *D. alata* in the Philippine islands.

In dioh, a yam of N. Caledonia in the Ate language, the same as Femafar.

Iniog, a race of *D. alata* in the Philippine islands.

Invod, for a race of *D. esculenta* in Palawan island.

Ipoi, an Igorot name for *D. alata.*

Iribani, a race of *D. alata* in Fiji (Wright).

Isahu and **Isiyahu,** for *D. esculenta* in the island of Ceram. Cf. Siyahu, etc.

Ise-imo = yam of Ise, a race of *D. opposita* in Japan.

Itulad sanga, for *D. pentaphylla* among the Kols.

Iwi, yam, in Sumba island. Iwi, Hiwu, Wohiu, Wiwi and Wili make an interesting group of names.

Jabbet, for *D. pentaphylla* among the Sakais; and as Ubi jabbet.

Jaawa-al, see **Jav-alla.**

Jangalia alu = jungle yam, in the Jalpaiguri district, Bengal.

Jahreng, for edible *D. pentaphylla* in the Ranchi district of Chota Nagpur.

Jambur alla = deep-going yam, a Cinghalese name for a Dioscorea which if not *D. oppositifolia* is very near to it.

Jagalia alu, for *D. oppositifolia* in the Ali Rajpur state, W. India.

Jangga, for *D. hispida* in Bali.

Jangli alu = jungle yam, for *D. bulbifera* in the Dinajpur, Jalpaiguri and Mymensingh districts, Bengal.

Jangli mataru, similarly used in the district of Bhandara, Central Provinces of India, and for *D. hispida* in the Chanda district.

Jangli gethi = jungle genth in the Raipur district, Central Provinces of India.

Jangli ratalu = jungle ratalu, wild *D. alata* in the Betul district of the Central Provinces of India.

Janun sanga, for *D. glabra* among the Kols in the States near Balasore, Orissa.

Japana alla = Jaffna yam, a race of *D. alata* in N. Ceylon.

Japara alu = hairy yam, a race of *D. alata* in the Brahmaputra valley.

Jari kanda, a Dioscorea of the Raipur district, Central Provinces of India.

Jav-alla or ***Jaawa al,*** for *D. esculenta* in Ceylon.

Jaya or **Jayat,** obtained from Sakais and Mentera in the territory of Malacca: ? = Jabbet.

Jebubug basu and **Jebubug endog,** for *D. bulbifera* in Java.

Jechi imo, a race of *D. opposita* in Japan.

Jehu gale, either yam or tapioca, among Sakais of Ulu Bertang in Perak (Blagden).

Jhum alu = clearing yam, for *D. bulbifera* in the Chittagong district.

Jiari khoda alu, for *D. glabra* in the Sibsagar district, Assam.

Jinenjo, for *D. japonica* in Japan (jinen = wild); cf. Daijo.

Jingjing, an Abor name for a Dioscorea.

Jugur kanda, for *D. aculeata* in the district of Bilaspur, Central Provinces of India.

Ka aing myouk, a Burmese name for a race of *D. alata* in Northern Arakan.

Ka-lau, for *D. bulbifera* in the Honam islands, Kwangtung Province, China.

Ka shru, for *D. alata* at Jowai in the Jaintea hills, and perhaps for other plants.

- ***Ka shru lieh,*** the white yam.
- ***Ka shru mynshong***
- ***Ka shru saw,*** the red yam.
- ***Ka zung she,*** a Kuki name for *D. assamica.*

Kabaloi, a race of *D. alata* in the Philippine islands.

Kabui, a yam of N. Caledonia in the Ati language.

Kaburan, said to be *D. bulbifera* in Madoera, with the following kinds whose names however suggest that Kaburan is more than one species.

- ***Kaburan bhabang.***
- ***Kaburan chena.***
- ***Kaburan chechek.***
- ***Kaburan ghadjam.***
- ***Kaburan tekes.***

Kabuvo or **Kasuvo,** for *D. bulbifera* in Ternate and in Celebes (Rumpf).

Kacchel kilangu, for Dioscoreas in Travancore.

Kacheo, a Lepcha name for a variety of *D. bulbifera,* Sikkim Himalaya.

Kacheo bok differs, and is another variety.

Kaching or **Katching,** a Lepcha name for *D. bulbifera* covering all its varieties, Sikkim Himalaya.

Kachkachia = ? hard yam, for *D. glabra* in the district of Birbhum, Bengal.

Kachma bok, for *D. lepcharum* in the Sikkim Himalaya.

Kachu, for Kacheo bok at the foot of the Sikkim Himalaya.

Kadat, the general Burmese name for *D. aculeata.* It may be that Khoai is in the first syllable.

Kadu = wild in Kanarese.

Kadu kilangu, for several wild yams. The missionary Metz who collected Hohenacker's Malabar plants wrote the name Kadu keringu, and this spelling has received a circulation.

Kadu karandas, for the wild varieties of *D. bulbifera* from Bombay southwards in contrast to Gora karandas.

Kadu-u, a general Burmese name for *D. bulbifera.* Khoai may be in the first syllable.

Kadwe-u, for tahdwe-u.

Kaede dokoro = several-pointed tokoro, for *D. quinqueloba* in Japan. Cf. Kai.

Kaeo, for *D. pentaphylla* in Bima (Rumpf). But kaio in Tarawan I. in the Pacific stands for an Aroid, probably Colocasia.

Kaha fa-alla, for a race of *D. alata* in Ceylon.

Kaju or **Kachu,** for a yam in the Nilgiri hills, see Nadu kaju and Thavai kaju.

Kai or **Ke-imo,** a literary, that is a borrowed name of Japan. Kaempfer gives this as for *D. quinquefolia* but at the same time states that it is edible, so belying himself; Siebold, however, for a cultivated edible Dioscorea which he calls *D. sativa,* and which seems to be *D. bulbifera.*

Kai chan tang, for *D. Benthamii* in the Kwangtung province.

Kaile, for *D. bulbifera* in Fiji, whether with nauseous or with edible bulbils.

Kaile tokatolu, for *D. pentaphylla* in Fiji (Wright).

Kaio, for yam in the Gilbert islands.

Kaironi, for *D. Loheri* in Tagalog (Blanco).

Kaisali = yam like a lock of hair, for a race of *D. alata* in the Bakarganj district of Lower Bengal.

Kala kand = black yam, for *D. bulbifera* in the district of Nimar and in adjoining parts of the Central Provinces of India.

Kalai alu = bulbil yam, for *D. anguina* in the Birbhum district of Bengal.

Kalar mura = yam with the plantain-root, for a race of *D. alata* in Sylhet, Assam.

Kal genasu = black genasu, for *D. bulbifera* in the Malabar district S.-W. India.

Kalkur = *D. bulbifera* var. *elongata* at Cooktown, Queensland.

Kalla kacchel, a race of *D. alata* in Travancore.

Kalue, for Kolo, q.v., about Khurda, western Bengal.

Kalut, Karot, Karoti, Kolot, Korot, Kulot or **Orot** or **Orkot,** names for *D. hispida,* the first in the language of Tagalog, and Pampangan, the second of Ilocano, the third in Sulu, the fourth and fifth in Visayan, and the last in Visayan. Kayos is the same name doubtless.

Kamala kilangu, for *D. spicata* in the Malabar district, W. India.

Kamangeg, for *D. luzonensis* in the Ilocano language, North Luzon.

Kamarire, for *D. grata* in Luzon.

Kambubu, for *D. bulbifera* in the island of Madoera.

Kamiging, a Bikol name for *D. esculenta,* Luzon.

Kamodia = scented like kamod rice, a race of *D. alata* in the Surat district, Bombay.

Kanasi torul, a race of *D. alata* in Nepal and Sikkim, marked by its autumn sprouts.

Kancheong or ***Kanchen bok,*** for *D. sikkimensis* among the Lepchas of the Sikkim Himalaya, perhaps misapplied to *D. belophylla.*

Kand or **Kanda** = yam in Hindi, but unqualified in Kandesh and adjoining parts of the Bombay presidency indicating *D. bulbifera,* or in Behar *D. alata.*

Kand kariya, see Karu kanda.

Kandmul, a hybrid Hindi-sanskritic word applied to *D. bulbifera* in the Jhansi district of the Central Provinces of India.

Kangar, seems to be *D. esculenta* in the Poona district.

Kangta alu (Buchanan-Hamilton), as used in the Rangpur district for *D. esculenta;* probably meant for Kanta alu.

Kanji, for *D. oppositifolia* in the State of Travancore, see Kanti Kanji.

Kanta alu = thorny yam, may be, now one species, now another, Central Provinces of Bengal.

Kanti kanji, Kanti kangia, Kanti kangar, Kanti kanang, Kanti kankari and ***Kanti konaghar*** for *D. esculenta,* from Bombay to Goa, where Kanji now is *Ipomoea Batatas.*

Kanuwa, Khanuwa or **Khinuwa,** for a race of *D. alata* in several districts of the Central Provinces of India and in Baghelkand; once applied to *D. bulbifera* in the Jhansi district. Cf. Khaneya.

Kao, for *D. pentaphylla* in Bima.

Kapak = Sasak (Lombok) name, for *D. hispida,* apparently connected with the next.

Kapo, Kapu, Kapots and **Kaput** = yam, in Minahassa, often applied to *Ipomoea Batatas.*

Kapu antadun or ***Kapu an talun,*** apparently a race of *D. alata.*

Kapu gu, for *D. myriantha.*

Kapu kayu, for *D. hispida,* but the name would fit tapioca better.

Kaput laka, a race of *D. alata.*

Kaput loken or ***Kaput lokon,*** a race of *D. alata.*

Kaput na wiyo, for a Dioscorea probably *D. nummularia.*

Kapu rangdang or ***Kapu rundang,*** for a race of *D. alata.*

Kapu sayawu, for *D. esculenta*: see Sayawu.

Kapu sayor = vegetable Kapu for *D. pentaphylla* doubtless an edible race or the name is the same as the last.

Kapu wuol, said to be for *D. esculenta* in Celebes.

Kappa kavalli, for a race of *D. alata* in the Tanjore district.

Kappan kachel = ship yam, a race of *D. alata* in Travancore and also the tapioca plant, perhaps misapplied to *D. alata.*

Kapu or **Kaput,** see Kapo.

Kapu, for *D. bulbifera* or *D. anguina* in the Sontal Pergunnahs.

Karamisan, a race of *D. alata* in the Philippine islands.

Karba, Karaba or **Korba,** for nauseous *D. pentaphylla* in the several districts of Orissa.

Karanda, Karandas, Karandi, Karinda and **Karanza,** Marathi names for *D. bulbifera* from the district of Khandesh southwards to that of Poona. Under the spelling Carandi, Rheede got it, presumedly in Malabar, and ascribed it to *D. pentaphylla,* perhaps mis-applied. See Karu kanda.

Karat, for *D. esculenta* in Pangasinan, Luzon, perhaps misapplied.

Karnamul alu or ***Karnamuli alu*** = ear yam, for *D. esculenta* in the Bardwan and Bankura districts of Bengal.

Karodi, ascribed by Rheede to *D. hispida* in Malabar.

Karondu = yam in the Kangean Is., east of Madoera.

Karroo, for *D. bulbifera* in Queensland on the Mitchell river.

Karu kanda or ***Karawa kand*** = bitter yam, for *D. bulbifera* commonly all through the Central provinces where Eastern Hindi is spoken and in the Central Provinces and Central India where Western Hindi is spoken and into Khandesh; the origin of the Marathi Karanda, q.v.

Karu pendalam, for *D. esculenta* or any other little known yam in the Circars.

Karu pendalam dumpa, Elliott recorded this mixture of Hindi and Telegu as indicating several wild Dioscoreas in the Circars.

Karulmati, the Gond form of Karu kanda, for *D. bulbifera.*

Karunai valli kilangu = twining stick yam, for *D. oppositifolia* in the Salem district, Madras.

Karwi genthi or ***Karwi gethi*** = astringent genth, for wild *D. bulbifera* in the N.-W. Himalaya.

Kasa alu = ? bitter yam, for *D. anguina* in the districts of Angul and Balasore.

Kashiu dokoro or ***Kashiu imo*** = yam of Kashiu, Japanese names for cultivated *D. bulbifera.*

Kasi, for *D. pentaphylla* in the Igorot language, Luzon.

Kasimun, for *D. hispida* among Malays in Timor.

Kasokaso (erroneously also as Kasoni), a race of *D. alata* in Fiji.

Kassok, for *D. pentaphylla* in the Lepcha language, Sikkim in two forms.

Kassok ding.

Kassok tuk zhok.

Kasthaluka (sanskrit), doubtless for a *Dioscorea,* probably *D. alata,* the origin of kathalu.

Katak, the Shan name for *D. birmanica.*

Katak, for *D. pentaphylla* and *D. bulbifera,* etc. in Javanese.

Katak bedak or ***Katak bledek,*** for *D. bulbifera* in the Madioen Residency of Java.

Katak bunga or ***Katak wunga*** = flowery katak in Java.

Katak dewot = sacred katak, in Java for an undetermined Dioscorea of the section Enantiophyllum.

Katak gulug, for *D. bulbifera* in the Residency of Java at Ngarengan.

Katak lawe, in Java.

Katama, for *D. warburgiana* in Celebes.

Katawalla = wild yam, for *D. pentaphylla* and perhaps for other wild yams in Ceylon. It was used in 1684 for *D. bulbifera* as Katuwala.

Katching or ***Kaching,*** for *D. bulbifera* among the Lepchas, Sikkim Himalaya, with the following varieties distinguished.

Katching simbha, for var. *Simbha.*

Katching katcheo.

Katching simpat.

Kath alu = woody yam, apparenty for a race of *D. alata* in the district of Lakhimpur, Assam.

Kath aru, Katha aroo or ***Katharua,*** for *D. glabra* in the Ranchi district, in Gangpur State, Chota Nagpur, and for *D. esculenta* in Behar, Gangetic plains: from Kasthaluka, q.v., but neither of these species being hard fleshed, they may not have been the original Kasthaluka.

Kathar or ***Kathar kand,*** a race of *D. alata* in the district of Mirzapur, Gangetic plains: and sometimes used as = Ratalu.

Kathia, for a yam in the Voi and Ate languages of N. Caledonia.

Katsjil kelangu, Rheede's spelling of Kacchel kilangu, q.v.

Katilin, for *D. esculenta* in the island of Ceram.

Katu = wild, in Malayalam of S.-W. India and Cingalese. Cf. Katawalla.

Katu arg-alla, for a race of *D. alata* in Ceylon.

Katu kacchel, for *D. bulbifera* in S. W. India, and perhaps for other species. This is the name which Rheede spells Katu katsjil.

Katu kavathu kilangu, for *D. Hamiltonii* in Malabar.

Katu kilangu = wild tuber, for *D. aculeata, D. bulbifera, D. tomentosa, D. pentaphylla* and probably other species in S. India.

Katu kukul alla = wild cock's yam, for *D. esculenta* in Ceylon.

Katu nuren kilengu = wild fibrous yam, for *D. pentaphylla* in Malabar.

Katu valli kilangu = wild tuberous plant, for edible *D. pentaphylla* and *D. oppositifolia* in the districts of Trichinopoly and Salem, Madras.

Katu wella, for *D. pentaphylla* and *D. bulbifera* in Ceylon.

Kau, for edible *D. bulbifera* in the south-east of New Guinea (Garia),—possibly var. *sativa.*

Kauhaia kand or ***Kauhia kand,*** for *D. bulbifera* and for *D. belophylla* in the Balaghat district, Central Provinces of India. Keai kanda is doubtless of common origin, and both are connected with Khaneya.

Kaumaile, a race of *D. alata* in Fiji (Wright).

Kavalli, in combination with the Telegu word godda in N. Arcot for *D. alata;* with the Malayalam word kacchel in Travancore for *D. oppositifolia*; and with the Tamil word kilangu generally in S. India for *D. alata.*

Kawai, for *D. esculenta* in Fiji, doubtless from Khoai.

Kawuie, for yam in Solor.

Kaya pendalam, for *D. bulbifera* in the districts of Vizagapatam and Ganjam, Circars.

Kayin myouk, a Burmese name for a race of *D. alata* from Northern Arakan, possibly distorted, and meaning Kachin myouk. Kayin ni myouk of the Salween district is a red fleshed race of the same.

Kayos, for *D. alata* in Tagalog, Luzon, and for *D. hispida* and *D. pentaphylla.*

Kayuru, said to be *D. pubera* by van den Burg in Java but he seems always to designate *D. hispida* in that way.

Keai, for Kai.

Keai kanda = literally hand yam, but connected with Kauhaia kand, for *D. bulbifera* in the Chindwara district of the Central Provinces of India.

Ke imo or ***Kei*** = said to mean hairy yam, but Ke seems to have come from the Chinese and to be connected with Khoai, for *D. bulbifera* in Japan: the word imo suggests cultivation.

Kedoni, for edible *D. pentaphylla* in the State of Travancore.

Kedro kand, for *D. bulbifera* in the Surat district, Bombay.

Kehna, said to be *D. hispida* in the Raipur district of the Central Provinces of India.

Keladi, the Malay word for *Ipomoea Batatas,* the sweet potato, mentioned here only because in print it has been said by van den Burg that Keladi leuweung and Keladi sayor are *D. hispida.* This is certainly wrong: as that writer often was.

Kelona, see Akar kelona.

Kelibang or ***Keribang,*** for *D. alata* in West Borneo; abbreviations of Ubi kelibang.

Kemhang, among the Semang of Kedah, an abbreviation of Akar keminiyan, q.v.

Kemarung, among Sakai of Pahang either for a Dioscorea or for *Ipomoea Batatas,* the sweet potato: cf. Kemhang.

Kembili, used in Java for Kombili, q.v.

Kemili, used by Sakais in Pahang for *Ipomoea Batatas,* the sweet potato, and possibly also for yams, as if it is derived from Kombili.

Kenchung, for *D. sikkimensis* among the Lepchas, Sikkim Himalaya = Kanchong.

Keoma, said to be *D. tomentosa* in the district of Arrah, Gangetic plains.

Kerung, see Werung.

Ketabi or **Kutabi** ,= yam in Sumba Is., Timor Sea.

Keu, erroneously for a race of *D. alata* in Fiji in Hazlewood's Dictionary.

Ke-uchiwa dokoro, a Japanese botanists' name for *D. nipponica.*

Khah or **Hra,** a Chin word for yam. See Hra.

Khai alu, a race of *D. alata* in the Chittagong district. The first word may be from Khoai.

Khalait, for *D. bulbifera* in the Andaman islands doubtless from the Burmese Kalet, and probably a newly introduced word.

Khalet-u, for *D. bulbifera* in Burmese in the Pakokku Chin hills, and the same word as Hra let.

Kham alu or ***Khambalu*** = pillar yam, a well known name for a race of *D. alata* in Lower Bengal, and the use of which extends to the eastern districts of the Central Provinces. It becomes Kham Karua and Khambarua in Behar and Khamra alu, in the Purneah district, Gangetic plains.

Khambarua, in eastern Behar for Kham alu.

Khaneya, Khanewa or ***Khania kand,*** for edible *D. pentaphylla* in the districts of Arrah, Shahabad, Monghyr, Palamau, Gaya and extending into Baghelkand in Central India.

Khanti, for edible *D. pentaphylla* in the Gonda district and Balrampur State, Gangetic plains, and also for *D. belophylla.*

Khas alu, a race of *D. alata* in the Chittagong District.

Khat-cho, phonetic spelling of Hkad-hkyo, q.v.

Khatu-u-kyee and ***Khatu-u-pyu,*** races of *D. esculenta* in the Toungu district, Lower Burma.

Khirkand, for *D. anguina* in the districts of Amraoti and Akola, Berar. Cf. Kikare and Kirchi kand.

Khitta, for *D. bulbifera* in the Suket State, N.-W. Himalaya.

Khoai, the Mon-Khmer word for yam. There are traces of it in the Arakan Hills, see How-wai, and possibly in Sylhet see Hukai and Khai: it is apparently in Northern Sakai in Kuwi and Bekoi. The invaders of the Mon-Annam kingdoms took it up, the Burmese in Kywe, and perhaps in other yam-names, the Siamese as Koi or Kloi. It seems to have found a place in Fiji as Kawai, and in China in Huai.

Khoai bua or ***Khoai bua ydnon,*** for a race of *D. esculenta* in Annam.

Khoai buu, Loureiro's name for his *Oncus esculentus* which is *D. esculenta.*

Khoai chach, for a race of *D. esculenta* in Saigon.

Khoai dian nan, for *D. hispida* in Cochin-China.

Khoai leng (Loureiro), for *D. cirrhosa* in Annam.

Khoai lia, a race of *D. alata* in Indo-China.

Khoai lo, said by Loureiro to be the same as Combilium and therefore *D. esculenta,* but his description belies this statement, and the name as used in Indo-China is doubtful. de Lanessan quotes it for *D. esculenta.*

Khoai mai, for a wild race of *D. alata* in Annam and Cochin-China or for *D. persimilis.*

Khoai mo, for a race of *D. alata* in Annam.

Khoai mohai, for a race of *D. alata* in Saigon (Pierre).

Khoai nga = elephant-tusk yam, for a race of *D. alata* in Annam.

Khoai noc trang, for a race of *D. alata* in Saigon.

Khoai shan = Huai shan (yao), in Tonkin the Annamese of that Chinese name (Regnault).

Khoai siam, a race of *D. alata* in Saigon.

Khoai son = mountain yam, for *D. persimilis* or for a race of *D. alata* in Tonkin.

Khoai tia, a race of *D. alata* in Annam.

Khoai tiem, a race of *D. alata* in Saigon.

Khoai tir, for *D. esculenta* in Annam and Cochin-China.

Khoai tu bua, a race of *D. esculenta* in Siagon.

Khurmalu, for a race of *D. alata* in the Bhagalpur district of Bengal, apparently a distortion of Kham alu.

Kibaratasy, for *D. hexagona* in the Betsimisaraka language, Madagascar.

Kidetite, a yam of N. Caledonia in the Voi language.

Ki-e = yam, in the Sakai dialect of Central Pahang. See Kuoi.

Kikare or **Kinkari,** for *D. oppositifolia* or for edible *D. pentaphylla* in the Ali Rajpur State of W. India.

Kikim, for yam in the Lampongs, Sumatra.

Kikuba dokora = hand-like tokoro, for *D. quinqueloba* in Japan, referring to the leaf.

Kilangu, in Tamil, for tuber.

Kinampai, a Bikol name (Luzon) for *D. alata.*

Kimampu, for *D. alata* in Cebu, Philippine islands (Blanco).

Kina pendalam, a race of *D. alata* in the Godaveri district, Madras.

Kine imo = hammer yam, a race of *D. opposita* in Japan.

Kinkari, see Kikare.

Kirach kand, as the next used in the Seoni district.

Kirchi kand or ***Kircha,*** for *D. oppositifolia* in the Balaghat, Mandla and Saugor districts of the Central Provinces of India, probably of common origin with Kras kand.

Kiri imo = cutting yam, a Japanese name for *D. opposita.*

Kiri kondal, a race of *D. alata* in Ceylon.

Kirini, for *D. luzonensis* in the Tagalog language.

Kiri vel alla = milky stick yam, a race of *D. alata* in Ceylon.

Kiroi, Kiru, for *D. divaricata* and *D. myriantha* in the Tagalog language, Luzon.

Kitaotao, for *D. hexagona* in the Hova language, Madagascar.

Kiu tu = ginger tuber, for *D. Owenii* in Hainan.

Kla-wong, a Semang word for a wild yam.

Klab, a Semang word for *D. hispida,* in Kedah.

Kloi, see Koi.

Koadi, a Jakun word from Jassin, Malacca, for ? yam: but can it be Keladi distorted?

Kobag, a Tagalog name variously applied, e.g. to *D. alata, D. luzonensis, D. Loheri, D. divaricata* and *D. myriantha,* the last two about Los Banos and the two before them according to Blanco's Flora.

Kochadia alu = the yam like Colocasia, ? in taste, for *D. anguina* the district of Angul, Orissa.

Kodi kavalli = creeper yam, for *D. alata* in the Tanjore district, Madras.

Kohata alla, a race of *D. alata* in Ceylon.

Koi or **Kloi** = yam, in Siamese. Sometimes heard as Mun kloi and among the Laos as Koi-i (Kerr).

Koi velli, for a race of *D. alata* in the Chingleput district, Madras. Is it Kavalli?

Kokathi, a yam of New Caledonia in the Voi and Ate languages.

Kolhua, for *D. hispida* in the Narsingpur district of the Central Provinces of India, connected with the last.

Kolo kand, Kulu kand, Kulu sanga, Kolki, Kulia or ***Kulika*** = jackal's tuber, for *D. hispida* through Orissa and Chota Nagpur, and westwards to the Melghat in Berar.

Kolot, Korot or **Kalut,** names in Ilocano and Visayan, Luzon, for *D. hispida.* Colot was obtained by Eusebius about 1650 and rightly assigned by Rumpf.

Kombili, for *D. esculenta* in the Moluccas becoming Kembili and Gembili in Java, and also Gembiliem; and found among the Sakais of the Pahang-Kelantan border as Kemili.

Kombili bulu, a race of *D. esculenta* in the Moluccas. See Bulu.

Kombili champadaka = chempedak-like yam, a race of the same named by Rumpf. The chempedak is *Artocarpus polyphemia.*

Kombili fanfuri, also a race of the same.

Kombili merah = red Kombili, for *D. alata* (v. d. Burg).

Kombu valli kilangu = antler stick yam, for *D. intermedia* in Tamil as used in Ceylon.

Komori dokoro, for *D. nipponica* in Japan.

Kon, a race of *D. alata* in the neighbourhood of Bombay.

Konaghar and ***Kanti konaghar,*** for *D. esculenta* from Bombay to Ratnagiri.

Konda gummadu = hill gummadu, for *D. pentaphylla* in the Circars (Elliott).

Konda pendalam, a race of *D. alata* in the district of Ganjam, Circars.

Konta alu = thorny yam, for *D. glabra* generally in Orissa.

Kondap, a yam of N. Caledonia in the Voi and Ate languages.

Konuda, for *D. vexans* in the Bojgyah language, Andaman Is.

Koppa kavalli = rubbish-heap yam, a race of *D. alata* and also applied to *D. bulbifera* in the Tanjore district, Madras.

Korani genasu, for nauseous *D. pentaphylla* in the district of Malabar, W. India.

Koregu pronounced ***Korengu,*** a race of *D. alata* in Fiji (Wright).

Kornapidan, for nauseous *D. pentaphylla* in the State of Travancore.

Kornmu, for *D. pentaphylla* among the Yeras of the Andaman Is.

Kosa kanda, a race of *D. alata* in the Raipur district.

Koto, a race of *D. alata* in Fiji (Wright).

Kou, for yam in N. Caledonia (de Lanessan).

Kowui, for yam in Solor Is. (van Lijnden). Cf. Kuwi, Khoai, as well as Owi.

Kowar, for *D. transversa* in Central Queensland.

Kozikan, for *D. oppositifolia* in the Buldana district, Central Provinces of India.

Kras kand, Kras mati or ***Kiras mati,*** for *D. oppositifolia* in the districts of Hoshangabad and Balaghat, Central Provinces of India.

Krin mrouk, for *D. Hamiltonii* in Arakanese, doubtless = Kayin myouk.

Krishna mati, for *D. oppositifolia* in the districts of Betul and Hoshangabad, and doubtless a distortion of the Gond name Krasmati.

Krits, Kris, Krish, Krithi, Kins, Kithi or **Kildri,** for *D. deltoidea* in Kashmir.

Kuari alu = queen yam, a race of *D. alata* in the Lakhimpur district of Assam.

Kubar or **Kupar,** a yam of N. Caledonia in the Voi or Ate languages.

Kudai kand, for *D. oppositifolia* in the Raipur district of the Central Provinces of India.

Kuduk = yam, in Sarawak among the Land-Dyaks (Chambers).

Ku gwa imo (Kou-kiu-imo), a Liu-kiu name for *D. esculenta.*

Kukare sanga, for *D. anguina* among the Kols in Chota Nagpur.

Kuku, a race of *D. alata* in Fiji.

Kukui, see Kukare.

Kukul alla = cock's yam, for *D. esculenta* in Ceylon.

Kukur alu = dog's yam, for nauseous *D. pentaphylla* and for *D. bulbifera* near Calcutta.

Kukur torul, for *D. sikkimensis* and *D. bulbifera* in Nepal.

Kukur poati = bitch's teats, for *D. esculenta* in the Darrang district of Assam. Cf. Rumpf's account of a similarly shaped yam in Amboina.

Kumaa, may perhaps be used in some of the Pacific islands for yam, but more properly indicates the Sweet Potato, *Ipomoea Batatas*. The word varies to Kumala and Umaa, etc.

Kumandioh, a yam of N. Caledonia in the Voi and Ate languages.

Kumiria alu, for *D. aculeata* in Chittagong.

Kummara baddu gumpa, said by Elliott to indicate in the Circars Wights "D. aculeata" which is *D. alata*.

Kunchong, for *D. bulbifera* in the Sikkim Himalaya.

Kundri, Kondre or **Kanri,** apparently a Dioscorea in Chota Nagpur which is eaten freely: the name becomes Kundru kanda in Raipur.

Kunjanga, for *D. bulbifera* in Queensland at Butcher's hill.

Kunti genasu, perhaps for *D. bulbifera* in Kanara, W. India, and meaning jasmine yam, just as Ubi malati does in Javanese.

Kuoi, Kuoe and **Ki-e** = yam, the first two among the Sakais of Perak and the last among the Sakais of Central Pahang. Cf. Khoai and Bakoi.

Kurda genasu godda, for *D. oppositifolia* in the Cuddapah district Madras. Cf. Kurudu.

Kuri = yam, in Tobi or Lord North's Island.

Kurijanga, for *D. bulbifera* in Queensland.

Kuru kand, *i.e.* ***Karanda kand,*** for *D. bulbifera* in the Nasik district, Bombay.

Kurudu, for *D. oppositifolia* in the neighbourhood of Mangalore, W. India (Metz, Hohenacker's collector).

Kurudu gaddi, for nauseous *D. pentaphylla* in the Madras Presidency.

Kurudu-pu, for *D. tomentosa* in the neighbourhood of Mangalore, W. India (Metz, Hohenacker's collector).

Kuru-kuru, a race of *D. alata* in Fiji (Wright).

Kurula alu, a race of *D. alata* in the Nowgong district of Assam.

Kushi, for edible *D. pentaphylla* in the Thana district, Bombay.

Kussok, for *D. pentaphylla* in the Sikkim Himalaya, see Kassok.

Kutabi, for yam in Sumba island = Ketabi.

Kutanham, a yam of N. Caledonia in the Ate language, the same as Boutanhenn.

Kuuroo or ***Kuro,*** for *D. rhipogonioides* on the island of Yaeyama, Liukiu Is. The word suggests Quiroi.

Kuwi = yam, in the Watubela Is. of the Banda Sea. Cf. Huwi.

Kwai, a Talaing form of Kywe, q.v.

Kwinampai, a race of *D. alata* in the Philippine islands.

Kwinoro, a race of *D. alata* in the Philippine islands.

Kwei nang mo, for *D. hispida* in the Shan Hills, the first word being derived from Khoai.

Kywe, for *D. hispida* universally through Burma, the pronunciation being "chwe." It is Khoai = yam, applied to one yam only.

Lae, Lahi or **Lua,** for *D. pentaphylla* in the islands of Luhon and Buron (Rumpf).

Lahan mati, for *D. belophylla* in the Balaghat district of the Central provinces of India.

Lakfui, for various yams in Timor (Teijsmann). Cf. Laku.

Laku, for yam in Timor.

Lakuda imo, for a race of *D. opposita* in Japan.

Lal = red, a word of persian origin, common in N. India, and in combination with ratalu (from rata the sanskrit word for red and aluka = yam) interesting as showing the word "ratalu" to have lost the restricted application proper to it.

- ***Lal lambi ratalu*** = long red ratalu, for a race of *D. alata* in the Rai Bareilly district, Gangetic plains.
- ***Lal phal alu*** = red bulbil yam, for a race of the same in the Bankura district, Bengal.
- ***Lal ratalu*** = red ratalu, in Western Hindi generally for *D. alata* with red flesh.

Laliya kand, for *D. anguina* in the district of Banda, Gangetic plains.

Lame or **Lami** = yam in Makassar where lamung means to plant, and in Buginese.

- ***Lame aju,*** for *D. pentaphylla* in Celebes.
- ***Lame butung,*** a race of *D. alata*: cf. Butu.
- ***Lame chengka,*** said to be for *D. esculenta.*
- ***Lame java,*** cf. Ubi jawa.
- ***Lame kamummu,***
- ***Lame kandora,***
- ***Lame tau,*** a race of *D. alata.*

Latar or **Lataru,** not uncommon distortions of Ratar and Ratalu in the lower districts of the Gangetic plains.

Lava, recorded by Hazlewood as a race of *D. alata* in Fiji, but apparently an error.

Lebeta, for *D. pentaphylla* in the Hanuabada language of Papua.

Lede, for *D. hispida* in Bima.

Lei, for *D. hispida* in the Kei islands and in Wetan, of the Serwatti islands; probably the same word as Lae.

Lega, for *D. pentaphylla* in the island of Tutuila, Samoa.

Lek ghar torui, a race of *D. alata* in Sikkim. See Lowki ghar torul.

Leko lamèlame = wild yams near Makassar, Celebes.

Leliem, for *D. hispida* among the Chins, Burma.

Lima-lima = fives, from the leaflets, a Tagalog name for *D. pentaphylla* and also for other closely allied species in Luzon. Like Ubi in the Philippine islands, it is Malay.

Lin = yam, in Dhirmal, N.-E. India.

Lingurella, a race of *D. alata* in Ceylon.

Llop, a yam of N. Caledonia in the Voi language, the yam that is called Tugui in the Ate language.

Loang-foan-pan, for *D. Benthamii* in Kwantung.

Lofika, for *D. heteropoda, D. trichantha* and perhaps for other species in the Sakalava language of Madagascar. See Hofika.

Lokaloka, a race of *D. alata* in Fiji with magenta flesh.

Lokheri, for *D. belophylla* and *D. oppositifolia* in the Belgaum district, and adjoining parts of the Bombay presidency.

Loli, for *D. bulbifera* on Mt. Abu, S. Rajputana.

Londi or **Lundi,** for nauseous *D. pentaphylla* in the country behind and to the north of Bombay.

Lowar, for nauseous *D. pentaphylla* in the Jabalpur district of the Central Provinces of India.

Lowki ghar torul, for a race of *D. alata* in Sikkim, a Nepali name.

Lua, for *D. alata* in Sumba Island, Banda Sea, or for *D. pentaphylla.* See Lae.

Luktu, an Ifugao name for *D. alata,* connected with Luttu.

Lum bok, a Dioscorea among the Lepchas.

Lurga, for nauseous *D. pentaphylla* in the Jabalpur district of the Central Provinces of India.

Lutu, for *D. alata* in Banda (Rumpf).

Luttu, an Ibanag name for *D. esculenta,* northern Luzon.

Macahiba, for bitter *D. Macahiba* in the Sakalava language, Madagascar.

Mach alu, Mas alu, Machua alu = fish yam, a race of *D. alata* or more than one race, in north and north-eastern Bengal.

Machranga alu = fish coloured or fish-relish yam, a race of *D. alata* in the Jessore district, Bengal.

Maciba or **Malita,** for edible *D. Maciba* in the Sakalava language, Madagascar.

Madhvaluka (sanskrit) = sweet yam, possibly for *D. esculenta* and the origin of Moa alu, and Mataru.

Maelan, in South Ceram for Aelan, q.v.

Maha kukul alu = big cock's yam, for a race of *D. esculenta* in Ceylon, but is not this "maha" from madh originally.

Maha paru valli codi = greatest (? longest) yam creeper, for *D. oppositifolia* in Madras; or "maha" from madh.

Mahal kanda = palace yam, a race of *D. alata* in the Raipur districts of the Central Provinces of India.

Mahoari, see Mau.

Mak hko hton, for *D. bulbifera* among the Shans.

Makoda, for wild *D. alata* in the Hanuabada language of Papua.

Malabalukbuk-dagis, for *D. nummularia* in Pampangan.

Malaka kaya pendalam = Malacca vegetable yam, for cultivated *D. bulbifera* in the Circars. The origin of the name is probably not in Malacca (for the Malay Peninsula) but in Moyyaku pendalam.

Malay kaya pendalam (Mukharji), for cultivated *D. bulbifera* in the Circars. The meaning is obscure, but perhaps from mallai = hill.

Malita (Sakalava), see Maciba.

Mallai kilangu = hill yam, for *D. bulbifera* in the Tanjore district or for edible *D. pentaphylla* in the Trichinopoly district, Madras.

Maloa, for *D. pentaphylla* in the Hanuabada language of Papua.

Mamba dokoro, a yam of Japan.

Mamo, for *D. hispida* in Bikol, Luzon.

Man, for tuber, but usually for *D. alata,* in Shan, though apparently not in Laos.

Man awn = small yam, a race of *D. alata,* in the Shan hills.

Man awn kwah = small plum yam, a race of *D. alata,* in the Shan hills.

Man hkak, a race of *D. alata,* in the Shan hills.

Man hkam, for a race of *D. alata* ? in the Shan hills.

Man khow wo = ox-horn yam, a race of *D. alata,* in the Shan hills.

Man leit kai = small egg yam, a race of *D. alata,* in the Shan hills.

Man lien, for *D. cirrhosa* in Laos, or more likely for a race of *D. alata.*

Man long or ***Man lung*** = red yam, a race of *D. alata,* in the Shan hills.

Man nam tow = goblet yam, a race of *D. alata,* in the Shan hills.

Man hing = bell yam, for *D. pentaphylla* or else *D. esculenta,* in the Shan hills.

Man kat = cold yam, for *D. hispida,* in the Shan hills.

Man kawng = drum yam, for *D. esculenta,* in the Shan hills.

Man nam or ***Man nim,*** for *D. decipiens,* in the Shan hills.

Man on, for *D. esculenta* in Laos.

Man tin mi = bear's foot yam, a race of *D. alata,* in the Shan hills.

Man ting sang = elephant's foot yam, a race of *D. alata,* in the Shan hills.

Man ting tow = turtle's foot yam, a race of *D. alata,* in the Shan hills.

Man yawn htan = cucumber yam, a race of *D. alata,* in the Shan hills.

Man ye in du, for *D. bulbifera* in the district of Akyab, Arakan.

Mandengen = yam, in Buru Island.

Mandengen boti, for *D. bulbifera.*

Mandengen meha, for *D. alata.*

Mangat, a Malayan word for yam or potato, perhaps usually *Ipomoea Batatas.*

Mangaya, Mangiya, Muniya, Mungaya or **Mengwa,** for *D. melanophyma* in the N. W. Himalaya.

Mangri ghorkan, a race of *D. alata* in the Ratnagiri district, Bombay.

Manmour, for *D. belophylla* in the district of Jhansi, Central India.

Manokand, for *D. bulbifera* in the district of Surat, Bombay.

Maoli, see Mau.

Mao shu tin = hairy tuber creeper, for a Dioscorea probably *D. kamoonensis* in central China (Diels).

Mao yu tse = hairy arum, for *D. kamoonensis* in the Chinese province of Szechuan.

Mar pashpoli or ***Pashpoli*** = deadly strangle cake or strangle cake, for *D. hispida* in the Bombay Ghats, though referred erroneously to *D. oppositifolia* (Graham).

Mara keshango = deadly keshango, said to be *D. pentaphylla* in Travancore, but *D. hispida* is more probable.

Margodi gai = rains yam, for *D. esculenta* among the Savaras of the Ganjam district, Circars.

Maroda kanda, for *D. alata* in the Raipur district of the Central Provinces of India..

Maru dokoro or ***Maruba dokoro*** = round (leaved) tokoro, for wild *D. bulbifera* in Japan.

Mas alu, see Mach alu.

Masiha or **Mosia,** for yam in Orissa.

Mataru, Matharu, Matalu and **Mataru kanda,** for several edible and cultivated yams in the Central Provinces of India, *e.g. D. alata, D. esculenta* and edible *D. bulbifera.*

Matawai, a race of *D. alata* in Fiji—a dubious name.

Matawar kand, for *D. bulbifera* in the Balaghat district of the Central Provinces of India, from Mataru.

Matia alu = earth yam, for *D. alata* in the district of Jalpaiguri, N. Bengal and southwards, abundantly to the mouth of the Ganges.

Mati, a Gondi word, see Bhumia mati, Karulmati, Krasmati, Krishnamati, Lahanmati, Nanmati, and Poturumati.

Matoh, a yam of N. Caledonia in the Voi and Ate languages.

Mattu kilangu = hard yam, a race of *D. alata* in the Trichinopoly district, Madras.

Mau alu, Mohu alu, Moa alu, Mowa alu = sweet yam, names for *D. esculenta* in Bengal and Assam from the sanskrit Madhvaluka and changed to Mausari and Maoli towards the centre of India.

Mavondro, for a Dioscorea thought to be *D. esculenta* in Betsimisiraka, Madagascar.

Mayatbang, for *D. luzonensis* in the Tagalog language, Province of Rizal, Luzon.

Mbale-mbale, Fijian pronunciation of Bale-bale, q.v.

Mboka, Fijian pronunciation of Boka, q.v.

Mbotia, Fijian pronunciation of Botia, q.v.

Mecha bok, a *Dioscorea* among the Lepchas of Sikkim.

Melan or **Maelan,** for Aelan in South Ceram.

Mengwa = Mangaya.

Menje dzu, for *D. alata* among the Nagas.

Menjiri, for nauseous *D. pentaphylla* in Sylhet, Assam.

Merom tuar sanga = goat's milk yam, for *D. anguina* and sometimes for *D. alata* among the Kols of Chota Nagpur.

Mina, for *D. vexans* in the Yera language of the Andaman Is.

Mitha kand = sweet tuber, for *D. oppositifolia* in the Saugor district of the Central Provinces.

Mithi alu = sweet yam, for *D. alata* in the districts of Bogra and Mymensingh, Bengal.

Mithi genthi or ***Mithi gethi*** = sweet genth, for cultivated *D. bulbifera* in the N.-W. Himalaya.

Mithi ratalu = sweet ratalu, for a race of *D. alata* in the Rai Bareilly district, Gangetic plains.

Mitua, a perfumed yam of N. Caledonia in the Ate language; the same as Aoui.

Mjarrah, for *D. transversa* on the Tweed River, N. S. Wales.

Moa alu, see Mau alu.

Moala, for a race of *D. alata* in Fiji. Can it be from Mau alu?

Mocha alu = yam like the flower cone of a banana-plant, for *D. pentaphylla* in the Mymensingh district, Bengal.

Mohan kand or ***Mohona kand*** = pleasant yam, for a race of *D. alata* and also applied to *D. pentaphylla* in the Akola district, Berar.

Moindah, a yam of N. Caledonia in the Voi and Ate languages.

Moiva, for wild *D. alata* in the Hanuabada language of Papua.

Mom alu or ***Momna alu*** = wax yam, for *D. alata* in the Central Provinces of India, a not uncommon name.

Momiji dokoro or ***Momidi dokoro*** = seven-point tokoro, for *D. septemloba* in Japan, in referrence to the leaf.

Morsu kavalli = twining yam, a race of *D. alata* in the Tanjore district, Madras.

Mou-enne, a yam of N. Caledonia in the Voi language the same as Taqui oua.

Moyyaku pendalam, for cultivated *D. pentaphylla* in the Ganjam district of the Circars. It suggests Malaka kayu pendalam, but is differently applied, and suggests Muka keshango, which is similarly applied.

Mrouk, the Arakanese equivalent of Myouk.

Mua jhapra alu = sweet hairy yam, for cultivated *D. pentaphylla* in the Darrang district of Assam.

Mudi genassu, for a race of *D. alata* in Kanara, W. India.

Muka keshango or ***Muka kacchel*** = snout yam, for *D. bulbifera* in Travancore.

Muragada tega, for *D. esculenta* in the Vizagapatam district, Circars, probably from Margodi.

Mullu = thorny, in Kanarese and Tamil.

Mullu genasu = thorny yam, for *D. esculenta.*

Mullu kilangu = thorny yam, for several Dioscoreas including *D. esculenta,* but especially for *D. pentaphylla* in Travancore.

Mullu pendalam, said by Elliott to be *D. pentaphylla* in the Circars.

Mullu valli kilangu = thorny stick yam, commonly for *D. esculenta* in S. India.

Mujib bok = plum yam, for a race of *D. alata* in the Sikkim Himalaya among the Lepchas.

Mukago, in Japanese for the edible bulbils of *D. opposita.*

Mun = tuber, in Siamese, sometimes combined with Koi, q.v. and see Man.

Mundia alu = round yam, a race of *D. alata* in the Angul district, Orissa.

Mungaya or **Muniya,** see Mangaya.

Muragada tega, for *D. esculenta* in the Vizagapatam district, Circars, probably from Margodi.

Murkanda, for *D. oppositifolia* and for *D. belophylla* in the Bhandara district of the Central Provinces of India.

Murom kacchel, for edible *D. pentaphylla* in Travancore.

Musillam valli kilangu, for *D. esculenta* in the district of Tanjore, Madras.

Muttaik kavalli = thick yam, for a race of *D. alata* in the district of Tanjore, Madras.

Mutur sang, for *D. belophylla* among the Santals.

Myouk, in Burmese for *D. alata* as contrasted with all other species of Dioscorea, except in Myouk leik-u which also appears as Myit leik-u, and Myouk pwe-dok.

Myouk eingdaing = garden *D. alata,* general in Burma.

Myouk gyi nwe lein, for a race in the Shan States.

Myouk gyin = ginger *D. alata,* for a race in the Minbu district.

Myouk gyi u = big tuber *D. alata,* a race in the Shan States.

Myouk hgnet, a race in the Tavoy and Salween districts.

Myouk hpa eing = garden frog yam *D. alata,* for a race in lower Burma.

Myouk kauk-hnyin-cheik = glutinous *D. alata,* for a race in the districts of Tavoy and Mergui.

Myouk khoung, for a race in the district of Hanthawaddy.

Myouk kya, for a race in the districts of Salween and Tavoy.

Myouk leik-u, for *D. glabra* in Pegu district.

Myouk long, for a race in the district of Katha, N. Burma.

Myouk ma, for a race in the district of Katha, N. Burma.

Myouk mwe-sout, for a yam in the Kyaukse district.

Myouk mwe zouk, for a fragrant race grown in central Burma.

Myouk nga-cheik = sticky fish *D. alata,* a common name for a race in Lower Burma.

Myouk ni or ***Myouk-u-ahni*** = red *D. alata,* a common name in Burma.

Myouk ni kun-pa, for a race in the district of Mergui.

Myouk ni kwam-ye, for a race in the district of Mergui.

Myouk nwa-gye, for a race in Lower Burma with tuber shaped like an ox-horn.

Myouk nwe, a name recorded by Kurz for Lower Burma, and found in a Working plan for the Yonbin reserve in Pyinmana, ascribed to *D. glabra,* but its incidence not prooved: however there is a Myouk-nwe in the Salween district which may be a small *D. alata.*

Myouk nyo, a yam of the Kyaukse district of great size, a race of *D. alata.*

Myouk palin, a race in the Akyab district.

Myouk pha-aing, a race in the Pegu district.

Myouk sa, a race sparingly cultivated in the Bassein district.

Myouk shin, for a race in the district of Tavoy.

Myouk shin the, for a race in the district of Myingyan.

Myouk sin gyi don, a race in the Henzada district.

Myouk taing, for a race in the district of Tavoy.

Myouk thamein oh ahni, for a race in Northern Arakan.

Myouk the, for a race in the Shan States.

Myouk thin-u, for a race in the district of Myingyan.

Myouk thwe, a name said to be used in the Toungu district as Myouk nwe is in Pyinmana.

Myouk u-gnet, for a race in Tavoy.

Myouk u ni or ***Myouk u ahni*** = red-tuber *D. alata,* a common name in Burma.

Myouk u pyu or ***Myouk u ahpyu*** = white-tuber *D. alata,* a common name in Burma.

Myouk u sat, a race in the Bassein district.

Myouk ye-oh = water-pot *D. alata,* a race in Upper Burma.

Myouk yin, a race in dry central Burma.

Myaun ne myouk, a race of *D. alata* in the district of Shwebo, central Burma.

Myit-leik-u, a doubtful name for *D. glabra* in lower Burma.

Nachai kyu, a Bhutanese name for *D. belophylla.*

Nadu kaju or ***Nadu kachu,*** for *D. esculenta* or *D. alata* in the Nilgiri Hills, Madras.

Naga china, a race of *D. alata* in the State of Sawantwadi, W. India.

Naga dokoro = long dokoro, for *D. Tokoro* in Japan.

Naga imo = long imo or yam, for an inferior race of *D. opposita* in Japan.

Naga valli (kilangu) = snake stick yam, a race of *D. alata* in N. Ceylon.

Nagal kanda, a race of *D. alata* in the Raipur district of the Central Provinces of India, and *D. oppositifolia* in Nimar and then the same as Nagweli kand.

Nagali dumpa, (Elliott) for a yam in the Circars.

Nagweli kand, for *D. oppositifolia* in the Akola district, Berar.

Nai = yam, among the Kachins.

Nai chu-nai, for a cultivated *D. pentaphylla.*

Nai hkai, for *D. glabra.*
Nai kalu, for *D. bulbifera.*
Nai labong, for a race of *D. alata.*
Nai n'byen or ***Nai n'pyen,*** for *D. pentaphylla.*
Nai neim krang, for a race of *D. alata.*
Nai pum, for a race of *D. alata.*
Nai tong or ***nai tung,*** for a race of *D. alata.*
Nai u-kung, for a race of *D. alata.*

Naisevu, a race of *D. alata* in Fiji (Wright).

Nakaan, a yam of N. Caledonia, in the Voi and Ate languages.

Nakago, in Japanese for the edible bulbils of *D. opposita.*

Nakoe, Nakua or **Nakwa,** for *D. tomentosa* or for *D. pentaphylla* in Chota Nagpur, the Mirzapur district and Baghelkhand.

Nala = yam in the Hawaiian Is. (Marblech).

Name or **Nami,** for *D. hispida* in the Tagalog language on Luzon and in Mindoro.

Namula, recorded as if for a race of *D. alata* in Fiji by Hazlewood, but probably in error.

Nan kand, a substitute for the next in the Bhandara district of the Central Provinces of India.

Nanmati, Nandmati or ***Nanamati,*** for *D. oppositifolia* and also for *D. belophylla* in the following districts of the Central Provinces of India,—Bhandara, Saugor, Narsinghpur, Hoshangabad; but in the districts of Balaghat and Hoshangabad also applied to *D. bulbifera.*

Nana kilangu = bamboo yam, for *D. esculenta* in the districts of Malabar and the State of Travancore.

Nangri ghor kan, a race of *D. alata* in the district of Ratnagiri, Bombay.

Narenja, for *D. oppositifolia* in the Cuttack district, Orissa. Cf. Naringa.

Nare tagalu or ***Nari tega*** = fibre yam, for *D. aculeata* in the Vizagapatam district, Circars.

Nare genasu = fibre yam, for *D. aculeata* in Malabar district, Bombay.

Nari gaddi = fibre yam, for *D. aculeata* in the State of Travancore.

Nari imo, for cultivated *D. bulbifera* in Japan.

Naringa or **Nadanga,** for *D. tomentosa* in the district of Ganjam, Circars. Cf. Narenza.

Nat myouk, a race of *D. alata* in Northern Arakan.

Natt alu (Macmillan), as a name used in Ceylon.

Nattu kavalli, for *D. belophylla* in Malabar.

Nau-do, see Cu-nau.

Nau-non, a Dioscorea of Tonkin.

Nau-rua, a Dioscorea of Tonkin.

Ndamuni, Fijian pronunciation of Damuni, q.v.

Ndhe, a yam of N. Caledonia in the Ate language.

Needi kilangu = long-lived yam, a race of *D. alata* in the Malabar district, W. India.

Nemu, a race of *D. esculenta* in the Hanuabada language of Papua.

Neya, for *D. esculenta* on the Malabar coast (Rheede).

Nga-cheik myouk u = sticky fish yam, a race of *D. alata* in the Shan States.

Niga gashiu, for wild *D. bulbifera* in Japan.

Nika, for *D. esculenta* in the island of Guam, Marianne Is. If wild it is Nika commaron.

Niluvi pendalam = upright yam, a race of *D. alata* in the Circars.

Nin wei shao teng, ascribed with a query to *D. doryophora* by Rosthorn who obtained the name in central China.

Nise, a race of *D. alata* in Fiji (Wright).

Nomei or **Nomol** = yam in the Babar Is. of the Banda sea.

Note, a yam of N. Caledonia (de Lanessan).

Nuli = fibrous, for *D. tomentosa* in Travancore.

Nuli kilangu = fibrous yam, for *D. oppositifolia* in the Salem district of Madras.

Nulla ginni geddalu, for *D. bulbifera* in the Ganjam district, Circars.

Nulla godda, a Telegu name for *D. bulbifera* in the Chanda district of the Central Provinces of India.

Nulla goddalu, said to be a race of *D. alata* in the Cuddapah district, Madras, but doubtless a mistake.

Nulla sunna gudda or ***Sunna gudda,*** for *D. hispida* in the Warangal district of the Nizam's dominions.

Nulu tega or ***Nulu dumpa*** or ***Nulu goddalu*** = thread yam, for *D. tomentosa* in the districts of Godaveri and Cuddapah.

Nulvalli kilangu = thready stick yam, for *D. tomentosa* in the Salem district, Madras

Nunetya, for *D. tomentosa* in the Ganjam district, Madras.

Nunmati, the name for *D. anguina* in the Saugor district, Central Provinces, and for some similar Dioscorea in the Narsingpur state.

Nuran kilangu, Nureavan, Nurai genassu or ***Nurai kaju,*** all meaning thready yam, for *D. pentaphylla* where Malayalam is spoken, or the last in the Nilgiri Hills.

Nuta genasu, for edible *D. pentaphylla* in the Malabar district, W. India. But is it correct?

Nuta kilangu, a race of *D. alata* in the Malabar district, W. India.

Nwe ye myouk u, a race of *D. alata* in Central Burma.

Obi = yam in Western Malaya, here and there and particularly in the island of Madoera.

Obi kasuaris, for a *Dioscorea* in Flores (Teijsmann).

Obi kembili, used in Flores and doubtless for *D. esculenta.*

Obi manusia, for a *Dioscorea* in Flores (Teijsmann).

Odorah alu, for nauseous *D. pentaphylla* in the district of Balasore, Orissa, probably from Addar.

Ofika or **Ofaka,** for *D. heteropoda* and *D. Hoffa* in the language of the Betsimisaraka and in Hova, Madagascar.

Ohu or **Ohuhu** = yam, in Flores, South Ceram and central Celebes and particularly for *D. bulbifera.* Cf. Abau.

Olo, for Kolokand as a name for *D. hispida* in the Sontal Pergunnahs.

Olor tuwo, for *D. Scortechinii* in the Simalur islands off Sumatra.

Ondo or **Ondot,** for *D. hispida* in Ceram, the Uliassers, and Amboina.

Ondo kasturi = musk ondo.

Ondot-i-lawanan, in Menado, Celebes.

Oni dokoro = giant tokoro, for *D. Tokoro* in Japan.

Onombitio, a yam of N. Caledonia in the Ate and Voi languages.

Opou-ali, a yam of N. Caledonia in the Voi language.

Oppa, for *D. esculenta* in Buton (Rumpf) and as **Opa** in Buginese and Makassarese.

Oria, for *D. oppositifolia* in Khandesh, Bombay.

Orot, for *D. hispida* in the Visayan language of Luzon, and apparently the same word as Ondot. See Ondo.

Otiyal kacchel, a race of *D. alata* in Travancore.

Ouacoulouta, a yam of N. Caledonia in the Voi and Ate languages.

Ouitoupita, a yam of N. Caledonia in the Voi language.

Oundi, a yam of N. Caledonia in the Voi language.

Ovi or **Owi,** for Ubi in the Dyak language.

Owi bawoi, a Dyak name from S. E. Borneo ascribed to *D. oppositifolia* and perhaps designating *D. nummularia.*

Owi behas, a Dyak name of S. Borneo for *D. bulbifera.*

Owi kulo, for *D. bulbifera* in North Celebes.

Owi suman, for *D. alata* among the Dyaks of S.-E. Borneo.

Ovi = yam, in the Hova language of Madagascar, equal to Ubi, and including the potato.

Ovibe, for *D. seriflora.*

Ovifantaka, for *D. seriflora.*

Ovifotsy, for edible *D. seriflora* in the Sakalava language.

Ovifohy, for *D. seriflora.*

Ovihariua, for *D. alata.*

Ovihazo, for, it is suggested, *D. cayenensis.*

Ovi marika, for a *Dioscorea.*

Ovi tantry, for a *Dioscorea.*

Ovisangana, for a *Dioscorea.*

Ovinala, for *D. Orinala* in the language of Betsileo or Betsimi-saraka.

Oyot weron, for *D. pubera* in Samarang, Java, and the same as Werung.

Paa, for *D. pentaphylla* in N. Caledonia. Cf. Patara.

Pada valli gadde = going deep stick yam, for *D. belophylla* in the S. Kanara district, Madras.

Padri, for edible *D. pentaphylla* in Baghelkhand, Central India.

Padum bok, Papum bok or ***Parum bok,*** for a Dioscorea in the Lepcha language of the Sikkim Himalaya.

Pahari ratalu = hill ratalu, a race of *D. alata* in the Rai Bareilly and Allahabad districts, Gangetic plains.

Paharia phal alu = hill fruit yam, for *D. bulbifera* in the Bankura district, Bengal.

Pagla alu = mad yam, for *D. bulbifera* in the Chittagong district.

Paicha alu, for *D. bulbifera* in the Mymensingh district, Bengal.

Pai shao = said to be for a cultivated race of *D. japonica* in China.

Pakit, a Tagalog name for *D. nummularia, D. divaricata* and *D. luzonensis,* perhaps also for *D. alata.*

Pakwit, see Pakit.

Pakzyok bok, a race of *D. alata* in the Lepcha language of the Sikkim Himalaya, perhaps for Pasok bok.

Palam bok or ***Pu-um bok,*** for *D. Hamiltonii* and *D. Wattii* among the Lepchas of the Sikkim Himalaya.

Palau = yam, in the Marquesas islands (Mosblech).

Palleru tega, a Dioscorea in the Circars (Elliott).

Pamir bok, for a *Dioscorea* among the Lepchas in the Sikkim Himalaya.

Pan alu, the same as Pani alu in the Mayurbhanj state, Orissa.

Panch mukhi alu = five snouts yam, a race of *D. alata* in the district of Angul, Orissa.

Panch mukhi pedalu = five snouted pedalu, a distortion of Pandi mukhi pendalam or pig's snout yam, received from Darjeeling to which district such a name does not actually belong.

Pandi mukha tega = pig's snout yam, for nauseous *D. pentaphylla* in the Vizagapatam district, Circars.

Pandra, a race of *D. alata* near Bombay.

Panggi = yam in the Sulu Is.

Panglang or ***Pangla torul,*** for *D. anguina* in the Sikkim Himalaya.

Pangaru = delicate yam, a race of *D. alata* in the Ranchi district, Chota Nagpur.

Pangil, for *D. bulbifera* among the Chins.

Pani alu, probably = Pan-leaf or Betle pepper leaf yam, for *D. oppositifolia, D. pubera* and *D. aculeata* in the districts of Angul, Balasore and Cuttack, etc., Orissa.

Pani torul, for *D. alata* and for *D. lepcharum* in the Darjeeling Himalaya, probably by distortion from Panu torul.

Panji kurudu, said to stand for *D. bulbifera* in the Madras Presidency.

Pannu kilangu, in the Anamallai hills for *D. bulbifera.*

Panpatica = betle leaf yam, for *D. oppositifolia* in the district of Balasore, Bengal.

Panu bok or ***Panu torul,*** for *D. belophylla* and for *D. alata* in the Sikkim Himalaya.

Panukelathun kacchil, for *D. alata* or *D. oppositifolia* in Travancore.

Panu kondal = wormy yam, for *D. bulbifera* in Southern Ceylon.

Papum bok, for a *Dioscorea* in the Sikkim Himalaya.

Paquit, see Pakit, Pakwit.

Par aru = superior yam, for *D. esculenta* in the Unao district, Gangetic plains.

Pari, a name for *D. Cumingii* in Bagobo, Mindanao.

Pari bok, a race of *D. alata* in the Sikkim Himalaya.

Pariya kanni, for *D. oppositifolia* in Travancore.

Parogai, for *D. glabra* among the Savaras of the Circars.

Pasok bok or ***Pazok bok*** = wild yam, for *D. belophylla, D. Hamiltonii* and probably other species among the Lepchas of the Sikkim Himalaya.

Paspoli, see Mar pashpoli.

Pat alu or ***Pata alu*** = threshing board yam, a race of *D. alata* in Lower Bengal with flat tubers.

Patal konda, appears in the Report of the Bengal Department of Agriculture for 1886, as a yam.

Patara, Paraara, Panara or **Paanara,** for *D. pentaphylla* in Tahiti. The "Providence's" officers obtained the third form of the name in 1792.

Patha alu, for *D. pentaphylla* near Calcutta and towards Orissa

Patti kacchal, for *D. bulbifera* in Travancore.

Paynut, recorded as a name for *D. flabellifolia* in Luzon.

Pazien bok = excentric yam, a race of *D. alata* in the Sikkim Himalaya.

Pe dumpa, for *D. hispida* in the Vizagapatam district, Circars.

Pedgo, for *D. esculenta* in the Sontal Pergunnahs.

Pedra kanda = ? pigs yam, for nauseous *D. pentaphylla* in the Damoh district of the Central Provinces of India.

Pein-u, properly Alocasia in Burma, but sometimes misapplied to a Dioscorea *e.g.* Pein myouk khoung (Kurz).

Pem bok = round yam, a race of *D. alata* in the Sikkim Himalaya.

Pen hru, for nauseous *D. pentaphylla* among the Chins. The name is possibly incorrect.

Pendalam, a Telegu word for yam and almost always for *D. alata,* obviously derived from the sanskrit Pindhaluka which in a most interesting way has given the word Pindi applied not to *D. alata* but to *D. esculenta.*

Pendi and **Pendia,** a form of Pendalam from Akola in Berar approaching Pindhi.

Peru mallai (kilangu) = large mountain yam, for *D. anguina* in Travancore and also for *D. alata.*

Peru valli kilangu = large stick yam, a race of *D. alata* in the Tanjore district Madras.

Pete, for *D. pentaphylla* in Hitua island (Rumpf).

Phal alu = fruit yam, for some Dioscoreas noticeable by their bulbils, *e.g. D. anguina* in the Birbhum district, Bengal, *D. pentaphylla* and races of *D. alata* widely where Hindi, both eastern and western, are spoken.

Phaleo *bok,* a Dioscorea among the Lepchas.

Phan = yam, in the Khasia language.

Phan dukalah, a wild yam.

Phan garo = garo yam, a race of *D. alata.*

Phan jar, a cultivated yam.

Phan jugan, a cultivated yam.

Phan klau = wild yam, races of *D. alata*, wild in the Khasia hills, or perhaps for *D. melanophyma*.

Phan kthang, bitter yam, for *D. bulbifera*.

Phan kyrsiu = helper or deliverer yam, for edible *D. pentaphylla* or for cultivated *D. bulbifera*.

Phan kyrsiu somthiah, for edible *D. pentaphylla*.

Phan lakhar, for *D. bulbifera*, meaning yam with leaves like the lekhar-tree.

Phan lengar, a race of *D. alata*. Lengar is a place name.

Phan lyngkhi = solitary yam, for *D. bulbifera* or *D. hispida*.

Phan lyngshaw = gourd shaped yam, for a race of *D. alata*.

Phan mluh = salt (coloured) yam, either for *D. alata* or *D. esculenta*.

Phan pylleng = egg yam, for *D. bulbifera*.

Phan rain = grudging or dwarf yam, for *D. Hamiltonii*.

Phan saw = red yam, for a race of *D. alata*.

Phan shriew = cachew-like yam, for a race of *D. alata*.

Phan shynreh = buffalo or big yam.

Phan skong = bamboo yam, for *D. glabra*.

Phan solak = potato yam, for *D. hispida*.

Phan solak kthang = round potato yam, for edible *D. bulbifera*.

Phan sujab, for *D. pentaphylla*.

Phan suri = wolf's yam, for a race of *D. alata*.

Phan tangkara = flat spreading yam, a race of *D. alata*.

Phan tem = yellow yam, for a race of *D. alata*.

Phan thiang, = sweet yam, for a cultivated *Dioscorea*.

Phan thied = root yam, for *D. glabra*.

Phan til, a race of *D. alata*.

Phan tieng = woody yam, for an unidentified Dioscorea.

Phan um = water-yam, for *D. assamica*.

Phar, in Tirhut, for Ratalu, q.v.

Phararu, Phorawa, or **Phararwa** = bulbil yam, for bulbil-bearing *D. alata* in the districts of Darbhanga, Bhagalpur, Gangetic plains, and Ranchi, Chota Nagpur.

Phurui = yam, in the Mikir language, in compounds abbreviated to Rui, q.v.

Pidi thumpa, for *D. belophylla* in the Vizagapatam district, Circars.

Pidi kanda, a Dioscorea in the Raipur district.

Pilita, for *D. pentaphylla* in Samoa. Cf. Pirita.

Pindaluka, for a Dioscorea in sanskrit, either for a race of *D. alata* whence the application of the word Pendalam or for *D. esculenta* whence the words Pindhalu, Pindhi, Pirhi, Pendi, etc.

Pindhalu, Pindhi or ***Pendi alu***, for *D. esculenta* commonly in the Central Provinces of India, and thought to arise from the tubers being of the same size as the little cakes called pendi, but doubtless really from Pindaluka.

Pindi parimi baddu, a name for a yam in the Circars (Elliott).

Pinot, for *D. nummularia* in the Tagalog language.

Pintur, a word of the north of Celebes ascribed to *D. hispida, Mucuna reticulata* and an *Ipomoea,* plants which have nothing in common but a climbing habit. Therefore it is to be asked if it does not mean "climber."

Piralu, perhaps for *D. pentaphylla* under the Sikkim Himalaya.

Pirhi, equivalent to Pindi in the Jabalpur district of the Central Provinces of India.

Pirieh bok or ***Piriyeh bok,*** for wild *D. alata* in the Sikkim Himalaya.

Pirsi or ***Persa,*** for *D. oppositifolia* in the Belgaum district, W. India.

Piska or **Pisika,** for *D. bulbifera* generally among the Sontals.

Pistalu, for *D. alata* in Dacca, Bengal.

Pita alu = bitter yam, the common Uriya name for *D. bulbifera.*

Pit kanda or ***Pith kanda*** = bitter tuber, for *D. bulbifera,* and applied also but not reasonably to *D. oppositifolia,* in the Raipur district of the Central Provinces of India.

Pita masia, the same as Pita alu.

Pitasi, for *D. bulbifera* in Singbhum.

Pitharu = bitter yam, for *D. aculeata* in the Ranchi district, Chota Nagpur.

Poconta, a yam of N. Caledonia in the Voi and Ate languages.

Poda alu or ***Pada alu*** = flat yam, a race of *D. alata* in the Chittagong district.

Podavi kelangu, given by Rheede as *D. hispida,* but very similar names are used for other wild yams *e.g.* Pada valli gadde for *D. belophylla* and Poturu mati for *D. anguina.*

Podhali valli kilangu = deep-growing stick yam, for *D. oppositifolia* or some very similar yam in Ceylon.

Polog, a race of *D. alata* in the Philippine islands.

Pologon, see Pulugan.

Pora alu, said to mean burnt yam, from the method of cooking, for *D. esculenta* in Chittagong. The name is close to Pura alu.

Poti kelangu, for *D. esculenta* in Malabar, W. India.

Poturu mati, for *D. anguina* in the Hoshangabad district of the Central Provinces of India.

Pouan, a yam of N. Caledonia in the Voi and Ate languages.

Pua-uhi = yam, in the Marquesas Is. (Christian). Cf. Paa.

Pua-uhi kua = red yam, doubtless *D. alata.*

Pua-uhi maoi = white yam, doubtless *D. alata.*

Pua-uhi peai.

Pua-uhi tea.

Puari alu, for a race of *D. alata* in the Darrang district, Assam, possibly the same as Puraia alu.

Puati, a Dioscorea of Sylhet, see Kukur-puati.

Puducheri valli kilangu = Pondicherry tuber plant, a race of *D. alata* in the districts of Cuddapah and Chinglepet, Madras.

Pugang, a race of *D. alata* in the Philippine islands.

Puli mora dumpa, for a Dioscorea in the Circars (Elliott).

Pulugan, Pologan or **Pugang,** a name for *D. bulbifera* in Bikol and Visayan.

Punda mohra gudda = pig's snout yam, for nauseous *D. pentaphylla* in the Chanda district of the Central Provinces of India.

Puno-oh bok, for a race of *D. alata* among the Lepchas with a long very large purple-fleshed tuber.

Pura alu = ? big yam or else = Puraia alu, a race of *D. alata* in the Bogra district, Bengal and the Darrang district, Assam.

Puraia alu = ? post yam, a race of *D. alata* in the Nowgong district, Assam.

Puraia fesuka alu, a race of *D. alata* in the Nowgong district, Assam.

Purang bok, a race of *D. alata* among the Lepchas.

Puri bok or ***Purung bok,*** a red fleshed race or races of *D. alata* in the Sikkim Himalaya.

Puti dumpa or ***Puti sara,*** for *D. hispida* in the Vizagapatam district, Circars, and also referred to *D. bulbifera.*

Quimanpu, for *D. alata* in Cebu, Philippine Is. (Blanco).

Quiroi, Quireot or **Quiroe,** for *D. divaricata* and *D. myriantha* in the Tagalog language of Luzon. The first syllable suggests Khoai.

Quru quru, a race of *D. alata* in Fiji (Wright).

Rabet, applied to *D. bulbifera* and *D. pentaphylla* in Madoera island.

Rabet abua, to *D. bulbifera,* cf. Abau.

Rabet abubu, to *D. pentaphylla.*

Rabet bangkat, to *D. pentaphylla.*

Rabet elos, to *D. pentaphylla.*

Rabet pangkat, for a race of *D. pentaphylla.*

Rabet sosyan or ***Rabet soseyan,*** to *D. bulbifera.*

Rabi or **Ravikand,** for *D. oppositifolia* in the Balaghat and Bilaspur districts of the Central Provinces of India.

Radraksha pendalam = Elaeocarpus seed yam or necklace yam, for *D. bulbifera* in the Circars (Elliott).

Raht alu = red yam, said to be *D. bulbifera* in Chittagong.

Raja alla = princely yam, a race of *D. alata* in Ceylon.

Raja alu = princely yam, a race of *D. alata* in Darrang district, Assam.

Raja Mohan dumpa = Raja Mohan's yam, for a Dioscorea in the Circars. Cf. Mohan kand.

Raja valli kilangu, a race of *D. alata* in North Ceylon. Cf. Raja alla.

Rakta alu = red yam, for *D. alata* in the Bhagalpur district, Gangetic plains.

Raktaluka = red yam (sanskrit), doubtless for *D. alata* with red sap.

Rakto garania alu = red penetrating yam, for a race of *D. alata* about Calcutta. See Garania alu.

Ranahak, for *D. Hamiltonii* among the Kukis of the hills of N. Cachar, Assam.

Rani begur, for *D. pentaphylla* in the Sikkim Himalaya.

Rarepin, for *D. alata* in eastern Malaya.

Rata kondol = foreign yam, a race of *D. alata* in Ceylon. The name however Moon quotes as Ratakodol and seems to assign to *D. bulbifera,* probably in error.

Rata vel alla = foreign stick yam or red stick yam, for a race of *D. alata* in Ceylon.

Ratalu, from Raktaluka q.v., and indicating nowadays, the meaning of the first syllable having been forgotten, *D. alata* whether with red sap or without, wherever Hindi is spoken. Outside the region of Hindi southwards the name is sometimes applied to Dioscoreas other than *D. alata e.g. D. aculeata* in the Betul district or *D. anguina* in the Hoshangabad district. Ratalu in Behar varies to Ratar, Atar, Latar, Kathar and Phar; but Kathar does not come like the others from it direct but from Kathaluka.

Ratar or **Rataru,** are forms of Ratalu used in the districts of Gorakhpur, Champaran, and Shahabad, Gangetic plains, always for *D. alata.*

Ratoa alu, a race of *D. alata* in the Sontal Pergunnahs.

Ratha aru, used (? misused) for *D. glabra* in the Ranchi district, Chota Nagpur.

Ratha alla, a race of *D. alata* in Ceylon.

Ratna alu, for a race of *D. alata* in Gangpur State, Chota Nagpur.

Rato torul = red yam, for *D. alata* with red sap in Nepal.

Rausi, for a race of *D. alata* in Fiji.

Rausi kula, a race of *D. alata* in Fiji (Wright).

Rausi vula, a race of *D. alata* in Fiji (Wright).

Rauva, for *D. Seemanni* in Fiji (Wright).

Rayungshoie, for *D. assamica* in North Cachar.

Re- = yam among the western Nagas. Cf. Rui.

Re-ozen, for *D. assamica.*

Re-pre piri, for a race of *D. alata.*

Rerepin, for *D. alata* in the Tounsea dialect of Menado, Celebes.

Ribe alu, for nauseous *D. pentaphylla* in the Balasore district, Orissa.

Ribsoni kand, for *D. bulbifera* in the Jhansi district of the Central Provinces of India.

Roflu, Ruglu or ***Ruklu,*** for *D. hispida* among the Lepchas of the Sikkim Himalaya.

Rui- abbreviated from Phurui = yam in the Mikir language of the Nowgong district, Assam.

Rui-chin = walking stick yam, a race of *D. alata.*

Rui-dok = savoury yam, *D. arachidna.*

Rui hang, for nauseous *D. pentaphylla.*

Rui labong = banana-bunch yam, a race of *D. alata.*

Rui oyath, for *D. glabra.*
Rui ping or ***Rui peng,*** for *D. pentaphylla.*
Rui re, for *D. anguina.*
Rui ring = ? blueish yam, for *D. assamica.*
Rui-un = capable yam, for either *D. lepcharum* or *D. glabra.*
Rui vat, for *D. Hamiltonii.*

Sabalavu, a race of *D. alata* in Fiji (Wright).

Saeva kand or ***Saira kand,*** for *D. hispida* in the Betul district of the Central Provinces of India, and as Suor kand for nauseous *D. pentaphylla* in the Saugor district. See Sur alu.

Safed ratalu = white ratalu. See Ratalu.

Sahasra mukhi alu = thousand snouted yam, a race of *D. alata* in the district of Cuttack, Orissa.

Sahdwe-u, for Tahdwe-u, q.v.

Sahe = yam, in Borneo at Ukit (Moulton) : cf. Sayawu.

Sakharua, Sakhowa or ***Sankaru,*** for *D. alata* in the Sontal Pergunnahs and apparently from Sankaluka.

Sakkara valli (kilangu) = sweet stick yam, a race of *D. alata* in the Tanjore district, Madras.

Sambong tulang = mend bones, a name quoted by Rumph as equalling daun bisol.

Samiya, for *D. anguina* in the district of Jhansi.

Samoan, Samowan or ***Samwan,*** for *D. pentaphylla* in Bali Island, with the following recorded as races.

Samoan jae = ginger samoan.
Samoan nasi = rice samoan.
Samoan sambuk.

Sampit = yam at Malohkalis in Borneo (Moulton).

San yao, a form of Shan yao, q.v.

San-yu, a form of Shan yu, q.v.

Sana ghar torul = small garden yam, the Nepali equivalent of the Lepcha's Bok kap, a race of *D. alata* in the eastern Himalaya.

Sanga = yam, particularly the yams good to eat, in the Kol language of Chota Nagpur. **Sang** in Sontali.

Sanga kuria alu, a race of *D. alata* in the district of Darrang, Assam, the same as Haljukia alu.

Sangia alu = heavy or bulky yam, a race of *D. alata* in the district of Jessore, Bengal.

Sanglal = red sanga, a hybrid name for red *D. alata* in the Sontal Pergunnahs.

Sanjukera, a race of *D. alata* in the Darrang district, Assam; also as Surja kera, q.v.

Sankaru or **Sakhowa,** a race of *D. alata* in the Sontal Pergunnahs.

Sankhaluka, (sanskrit) a Dioscorea, probably *D. alata.*

Sapang, for *D. pentaphylla* in the Visayan language, Philippine islands.

Saplai, for *D. hispida* in the Kotah State, Central India.

Saru, for *D. esculenta* in the Nadroga language of Fiji (Wright).

Sat-bhaya alu = seven brothers yam, a race of *D. alata* in the Balasore district, Bengal.

Satik kavalli = nutmeg yam, for *D. bulbifera* in the Tanjore district, Madras.

Satni, met with in the Bogra district for Sutni.

Sayawu, Sayafu, Sayabu, Sayahu, Sayahul, Siyau, Siyaou, for *D. esculenta* in Celebes and in Ternate, and the Moluccas.

Sayuwu rintek = small sayuwu.

Sayuwu sela = large sayuwu.

Seapa, for *D. hispida* in Celebes about Macassar.

Sebu, a race of *D. alata* in Fiji (Wright).

Sedre, pronounced Sendre, for a race of *D. alata* in Fiji (Hazlewood and Seemann), but in error.

Seem kwati, said to be *D. oppositifolia* in the Hoshangabad district of the Central Provinces of India. Mati is probably in the second word.

Semal kand = Bombax yam or cotton-tree yam, said to be used in the Nimar district of the Central Provinces of India for *D. belophylla,* but probably an error.

Senali kilangu, for edible *D. pentaphylla* in the Madras Presidency.

Senka, said by van den Burg to be a name for a Dioscorea.

Senrh, Serh or **Siar,** for *D. anguina* in the district of Jhansi, centre of India.

Sepp or **Seppy,** for cultivated *D. bulbifera* in Japan.

Sharbutra kanda, for *D. bulbifera* in the Raipur district of the Central Provinces of India.

Shan yao, literally = hill or jungle medicine, the Chinese name primarily it would seem for those species of Dioscorea whose tubers are used medicinally, but extended to those which serve as foods. *Huai shan yao* is said to be the shan yao from Huai-cheng (a town in Shensi), and is prepared in the provinces of Shensi, Honan, Chili, Hupeh and perhaps elsewhere. But can it not be from Khoai q.v. Shan yao t'ou is said to be broken Shan yao from the second, third and fourth of these provinces. Chien shan yao is prepared in the provinces of Kwantung, Fukien, Hupeh and Szechuan. The exact botanical sources are unknown. Shan-yao tsai of Formosa is *D. japonica* var. *officinalis.*

Shan yu, = hill or jungle colocasia, often used in the place of Shan yao especially for the edible species of Dioscorea such as *D. Batatas.* As this Dioscorea is neither wild nor anything like a Colocasia, the application is extraordinary, though well vouched for.

Shan-yu-tsai, see under Shan-yao.

Shataveli, used in parts of the Bombay presidency for Shendwel q.v.

Shaval kelangu, in the Anamallai hills for *D. bulbifera.*

Sheeni valli kelangu = sugar stick yam, but the first word is probably connected with shendwel; it is a name from Ceylon.

Shendwel, Shendowel or **Shendorvail,** commonly used for edible *D. pentaphylla* in the districts of Satara and Belgaum, Bombay presidency.

Sher kand or ***Sherkandi*** = tiger's yam, for nauseous *D. pentaphylla* in the Bhandara district, Central Provinces of India.

Shi genasu, for a Dioscorea in Kanara, W. India.

Shimo bok, the same as Chimeo tendeo bok, q.v.

Shingli, for *D. deltoidea* in Kulu, N.-W. Himalaya.

Shisen imo, a race of *D. opposita* in Japan.

Shora alu, a common name for *D. glabra* near Calcutta.

Shoro valli kilangu = gourd stick yam, for *D. esculenta* in North Ceylon.

Shu = yam or tuber in Chinese, whether edible or not.

Shu lang or ***Shu liong,*** for *D. rhipogonoides* and *D. cirrhosa.*

Shu pin = tuber sprouts, for a Dioscorea (Matsumura).

Shu tow = tuber head, for *D. opposita* (Giles).

Shu yao = tuber medicine, said to be *D. japonica* (Matsumura).

Shu yu = tuber Colocasia, for *D. opposita, D. alata* and the "*D. sativa*" of Bretschneider, which is probably *D. opposita.*

Siaho, Siaffu, Siavu and **Sahu,** for *D. esculenta* in Amboina and Banda and Ternate, cf. Sayawu.

Siar, for *D. anguina* in the district of Jhansi, centre of India. See Senrh.

Siddhiu bok, Siddhu bok, Siddihu bok or ***Siddhu-u bok*** or ***Sindu bok,*** for *D. esculenta* among the Lepchas in the Sikkim Himalaya.

Sikapa, Siyapa or **Sikapang,** for *D. hispida* in Celebes among the allied Buginese and Makassarese = Seapa. It is changed to Sikari in Bali.

Sikari, for *D. hispida* in the island of Bali.

Sikri alu = root yam, for a Dioscorea in the district of Dinajpur, Bengal.

Simbha, the bitterest *D. bulbifera* known to the Lepchas.

Simpat, see Kaching simpat.

Sim-shu = heart tuber, for *D. bulbifera* in Formosa (Henry).

Sinanto, a race of *D. alata* in Luzon, Philippine Is.

Sin che myouk, Burmese for a race of *D. alata* in the Shan States.

Singul bok, for *D. bulbifera, D. belophylla* and *D. lepcharum* among the Lepchas in the Sikkim Himalaya.

Sinthi, a doubtful name for *D. pentaphylla* in the Darjeeling district, Sikkim Himalaya.

Sirka alu = vinegar yam, but probably from the sanskritic root sur = to hurt, for nauseous *D. pentaphylla* in the Midnapur district of Bengal.

Siru kilangu = small yam, for *D. esculenta* in the south of India and in Ceylon: also as Siru valli kilangu.

Sisi dumpa, for *D. bulbifera* in the Vizagapatam district, Circars.

Siyapu, for *D. esculenta* in Halmaheira.

Siyau, for *D. esculenta* in the island of Loda.

Sizu bok, for Siddhiu bok, q.v.

So, Sod, Suk = yam, among the Pangan and among the north Sakais of the Siamese-Malay States and into north Pahang; but mostly applied to the sweet potato, *Ipomoea Batatas.*

Soda alu, for *D. Kalkapershadii* in the State of Mayurbhanj, Orissa.

Soi, used in Samoa for Hoi, q.v. (Safford).

Soka alu, a wild Dioscorea of the Darrang district, Assam, where it is eaten to some extent.

Solomoni, a race of *D. alata* in Fiji (Wright).

Somemono imo, used by Japanese botanists for *D. rhipogonoides.*

Son duoc, a name given for *D. persimilis* or for a race of *D. alata* by Loureiro. Son means mountain.

Soni valli kavalli = torrent stick yam, for a race of *D. alata* in the district of Tanjore, Madras.

Sosi, a race of *D. alata* in Fiji (Wright).

Soso, for edible *D. Soso* in the Sakalawa language of Madagascar.

So-um bok, a Lepcha name for a Dioscorea.

Sounda or **Souda,** for a *Dioscorea* probably *D. nummularia* in east Java and in Bali.

Su, yam in Tankin, and apparently the same word as khoai. The French write it Cu.

Su-kai, a race of *D. alata.*

Su-kai-mo, a race of *D. alata,* and the same as Khoai-mo.

Su-kok-gian, a race of *D. alata.*

Su-nao and ***Su nao-do,*** for *D. cirrhosa.*

Su mai, for *D. persimilis* or for a race of *D. alata* in Tonkin.

Su-o-giong or ***Su-o-rong*** = dragon's nest yam, for a race of *D. alata* in Tonkin.

Su-tu and ***Su-tu-trang,*** for *D. esculenta.*

Suaria alu or ***Suareh alu.*** See Sur alu.

Subba dumpa, given by Elliott as for *D. tomentosa* in the Circars.

Sukdi babra, for nauseous *D. pentaphylla* in the Melghat, Berar.

Suker alu = pig's yam literally but undoubtedly from the sanskritic root sur = to hurt, for nauseous *D. pentaphylla* and *D. bulbifera* near Calcutta. See Sur alu.

Suku = yam at Manyan, Borneo (Moulton).

Suli bok = inferior yam, for an edible variety of *D. pentaphylla* which grows in the Sikkim Himalaya, in the Lepcha language.

Sumri, for nauseous *D. pentaphylla* in the Jabalpur district of the Central Provinces of India, doubtless of common origin with the name Sur alu.

Suna genasu = lime yam, for a *Dioscorea* in Kanara, W. India.

Sunna gudda, for *D. hispida* in the Warangal district of the Nizam's Dominions.

Sung bok or ***Su-om bok,*** for *D. anguina* among the Lepchas in the Sikkim Himalaya.

Sungul bck or ***Sunger bck,*** *D. belophylla* or an allied plant among the Lepchas.

Suor kand, for nauseous *D. pentaphylla* in the Saugor district.

Supnor kanda, a form of Sur kanda from the Raipur district of the Central Provinces of India.

Sur alu, Suar alu, Suaria alu, Svareh alu, for nauseous *D. pentaphylla* and for *D. bulbifera* widely in Bengal, having their origin in the sanskritic root sur = to hurt.

Sura alu or ***Suri alu,*** for nauseous *D. pentaphylla* widely, the first where eastern Hindi is spoken, the second where western Hindi is spoken, *i.e.* from the borders of Bengal to the borders of Bombay.

Surendi kand, for nauseous *D. pentaphylla* in the Bilaspur district, Central Provinces of India,—a form of the above.

Surja kera, by distortion for the race of *D. alata* called also Haljukia.

Surka, for nauseous *D. pentaphylla* in the Jhansi district in Central India. Cf. Sur alu.

Suta alu = thread yam, for nauseous *D. pentaphylla* in the Angul district, Orissa, and also for *D. tomentosa* in Orissa. Sometimes for *D. oppositifolia.*

Sutia kand, for *D. oppositifolia* in the Akola district, Berar.

Suthna (Buchanan-Hamilton), mentioned as a Behari name contrasting with the next.

Suthni alu, a very well known Behari name for *D. esculenta* of unexplained derivation, the use of which, torul being substituted for alu, extends into Nepal. It has been suggested that the name refers to the cultivation being without supports.

Swa-uh, Hokkien for Shan yu, q.v.

Swa yo, Hokkien for Shan yao, q.v.

Swinzi myouk, a race of *D. alata* in the district of Salween, Burma.

Ta-, for yam in Cachari = Tha in Garo, etc. and sometimes also in Cachari.

Ta-iyung, for *D. alata* in North Cachar.

Ta-misi or ***ta-mshi,*** for nauseous *D. pentaphylla.*

Ta-rem, for *D. Hamiltonii.*

Ta-shep, for *D. anguina.*

Tabulatawa (pronounced Tambula tawa), a race of *D. alata* in Fiji.

Tach imo kadsura or ***Tachi dokoro*** = slender kadsura yam or slender tokoro, for *D. gracillima* in Japan.

Tachi dokoro = slender yam for *D. gracillima* in Japan, alluding to stems.

Taguhetti, a yam of N. Caledonia in the Voi language.

Tah-dwe u = letter "d" yam, a widely used name for *D. esculenta* in Burma, said particularly to be descriptive of a race with

lobed tubers: but it is difficult to rest satisfied with this explanation of the name.

Tah-dwe letwa = palmate tah dwe, a race of *D. esculenta* in the Tavoy district.

Taisei imo, used by Japanese botanists for Formosan *Dioscorea opposita*.

Tai shu = big yam, used in China for the yams which serve as food *e.g. D. opposita* and *D. alata* and perhaps also *D. japonica*.

Taitukava, a race of *D. esculenta* in the Hanuabada language of Papua.

Takaru, for *D. hispida* in the Chanda district, Central Provinces of India.

Takasago tokoro, a name given by Japanese botanists to *D. doryophora*.

Takob or **Taku,** for some particular Yam, among the Pangan and Semang of the Siamese-Malay States and Kedah,—a name which Blagden thinks may have come from an old Negrito language.

Talbada, a race of *D. alata* in the Surat district, Bombay.

Tali babounji = crackling string, a name given by Rumph for *D. nummularia,* for another species and for some species of *Vitis*.

Talî cupang = coin-rope, for *D. nummularia* in Amboina (Rumpf). Rumpf writes it Taly cupan. The name refers to the leaves.

Talis, for some edible root among the Semang, usage uncertain.

Talri, for *D. belophylla* in the Simla Hill States, N.-W. Himalaya, a form of Tarri, q.v.

Tamalia, for *D. oppositifolia* in the Cuttack district, Orissa, erroneously as Tambulai alu in Jajpur, Cuttack.

Tamalo, said to be used for *D. bulbifera* in the Katha district, Burma.

Tamis, a race of *D. alata* in Luzon in the Visayan language.

Tamra, a race of *D. alata* near Bombay.

Taniela, races of *D. alata* in Fiji (Wright).

Taniela danu = red taniela.

Taniela vula = white taniela.

Tanneh, a yam of N. Caledonia in the Voi and Ate languages, the same as Tha-ate.

Tanoa, a yam of N. Caledonia in the Voi and Ate languages.

Tapouar, a yam of N. Caledonia in the Voi and Ate languages.

Taqui oua, a yam of N. Caledonia in the Ate language the same as Mouenne.

Tarar, Tarari or **Tarri,** a Pahari word widely used along the N.-W. Himalaya as equivalent to Yam. It most commonly indicates *D. belophylla* and *D. alata*. Eastwards it changes into Tarur and then into Torul, q.v.

Tarur, the Central Pahari form of Tarar, indicating yam in the Himalaya of Dehra Dun, Almora and Naini Tal. Ghar tarur = domestic yam, is *D. alata;* Ban tarur or wild yam

is generally *D. belophylla* and *D. pentaphylla; D. bulbifera* having its special appelation Genth, is excluded.

Taung keor myouk, a race of *D. alata* in the Akyab district, Arakan.

Taw = wild, in Burma.

Taw kadat = wild kadat, for nauseous *D. pentaphylla* in the Akyab district, Arakan.

Taw myouk = wild *D. alata,* generally through Burma for *D. alata* persisting from cultivation or for *D. Hamiltonii;* also received from the Andaman islands attached (? by a convict) to *D. vexans.*

Taw myouk kawng, used not by Burmese, but by Burmese-speaking Karens in the Salween district for *D. pentaphylla,*—an usage that a Burman would not admit.

Taw thinba u, literally wild foreign yam, *i.e.* wild cassava, for *D. aculeata* in the Akyab and Kyaukpyu districts, doubtless from the length of the tuber.

Tawi, for a yam among the Senoi of upper Pahang.

Tega = climbing plant in Telegu.

Tega dumpa, for *D. alata* in the Godaveri district, Madras, or for *D. tomentosa,* in the Nagpur district of the Central Provinces of India.

Tega pendalam, for *D. alata* in the Nellore and Tanjore districts of Madras.

Teguna, a well known name for edible *D. pentaphylla* all along the Himalaya from Almora and Naini Tal to above Champaran.

Teinha, a yam of N. Caledonia in the Voi and Ate languages.

Teko imo = lever yam, a race of *D. opposita* in Japan.

Tella gini geddalu, for *D. hispida* in the Ganjam district, Circars.

Tella sunna gudda, apparently *D. hispida,* in the Nizam's Dominions.

Tena, Teona or **Teoni,** commonly in Eastern Hindi and Behari indicates edible *D. pentaphylla*: once met with as Tewna. Probably connected with Teguna.

Tena genasu = edible yam, for *D. alata* in South Kanara, S. W. India.

Tepta alu = ? flat yam, for edible *D. pentaphylla* in the Malda district of Bengal.

Tete, for yam in the Manggarai language of western Flores.

Tha = yam, in Bodo, Assam.

Thabalchu, for *D. esculenta* among the Garos.

Thaja, for *D. anguina* among the Garos.

Thaijong, for *D. alata* among the Garos.

Thaireng, for a race of *D. alata* in the Nowgong district.

Tha-kun, for a wild edible yam among the Garos.

Thakin, for a wild edible yam among the Garos.

Thamatchi, for *D. esculenta* among the Garos.

Thanairang or **Thanairoh,** for *D. assamica* in Cachar.

Tha-ate, a yam of N. Caledonia in the Voi language.

Thadut-ni, Thadut or **Thadot,** an unidentified wild tuber of Lower Burma, well known to the Burmese however, possibly *D. decipiens.*

Thana kacha, received from Madras as indicating edible *D. pentaphylla.*

Thara aru, for a race of *D. alata* in Gangpur State, Chota Nagpur.

Thavai kachchu or ***thavai kaju,*** for *D. oppositifolia* in the Nilgiri hills.

The myouk, for *D. glabra* in the district of Tavoy, Tenasserim.

Thella sunna gadda, for *D. hispida* in the district of Chanda, Central Provinces of India. Cf. Nulla sunna godda.

Themban, a race of *D. alata* in Travancore.

Thi-ang-dam, a Dioscorea of Tonkin, equal to Nau-rua.

Thi-ang-day or ***Thi-ang-dia,*** a Dioscorea of Tonkin, equal to Nau-non.

Thikona alu, a wild yam of the Darrang district, Assam.

Thin-douk u, a common Burmese name for *D. decipiens.*

Thin on u, for *D. esculenta* in the districts of Myingyan and Pakokku, Burma.

Thin gyat, for *D. assamica* in the district of Sandoway, Arakan.

Thuja, for *D. anguina* among the Garos. Cf. Tha.

Thuli kacchal, for *D. bulbifera* or for *D. esculenta* in the district of Malabar and the State of Travancore.

Thuri, Aitchison gave this for *D. ? belophylla* at Hoshiarpur. Cf. Tarar.

Ti, a Fijian word for yams not yet well explained: perhaps = sprout.

Ti-vou, vou indicates new growth; and so ti-vou is a very young yam.

Ti voli, said to stand for *D. Seemannii,* Voli alone indicating a race of *D. alata.*

Tiagandioh, a yam of N. Caledonia in the Ate language, the same as Taguhetti.

Tie-on-chao, recorded as a name for *D. Collettii* in the Chinese province of Yunnan.

Tikae, a yam of N. Caledonia in the Voi and Ate languages.

Tikani, for *D. esculenta* in the Sontal Pergunnahs.

Tikaosivaro, a race of *D. alata* in Fiji (Wright).

Tikari or **Takaru,** for *D. hispida* in the Chanda district of the Central Provinces of India.

Tikau = yam, superseding Uvi in some Fijian dialects.

Tilo carandi, for edible *D. pentaphylla* in S. W. India (Rheede).

Tin hpew u, for a race of *D. alata* in the Shan States, a hybrid name.

Tinukue, a race of *D. alata* in Luzon, with recurving tubers.

Ti-oman, a yam of N. Caledonia in the Voi and Ate languages.

Tira, yam at Krokong, Sarawak (Moulton).

Tiragali pendalam or ***Tiragada pendalam,*** for a yam in the Circars (Elliott).

Tis = yam, in the Tounsawang dialect of Minahassa.

Tis pawatoan or ***Tis pawatohan,*** probably for *D. nummularia.*

Titi gethi = bitter genth, for wild *D. bulbifera* through the N.-W. Himalaya. See Genth.

Tiva tega, Teva tega or ***Tippa tega*** = wild yam, for nauseous *D. pentaphylla* and also to some extent for other species of Dioscorea in the Vizagapatam district, Circars.

Tivou, (misspelled tivvu by Seemann) and **Tivoli,** see Ti.

Tiwan, for edible *D. pentaphylla* in the Gorakhpur district, Gangetic plains.

Toganiwakaya, a race of *D. alata* in Fiji (Wright).

Tokatolu or ***Kaile tokatolu,*** for *D. pentaphylla* in Fiji.

Tokoro or **Dokoro,** indicates the Dioscoreas of the section Stenophora in Japan.

Tokuro kadsura, for *D. quinqueloba* in Japan (Leiden herbarium), the first word is tokoro or dokoro.

Tongo or **Tungo,** for *D. esculenta* in Luzon, forms of Tuqui used by the Tagalog.

Topondon, a yam of N. Caledonia in the Ate language, the same as Toundoo-onn.

Toralia, for *D. anguina* in the Hoshangabad district of the Central Provinces of India.

Torul = yam, in Nepal. See Tarar.

Toundoo-onn, a yam of N. Caledonia in the Voi language the same as Topondon.

Towo, for *D. hispida* or *D. pentaphylla* in Bhutan.

Tsai-mey-tse, recorded as a name for *D. Collettii* in the Chinese province of Kwei-chow.

Tsie chou hoa, recorded for *D. melanophyma* in Yunnan, China.

Tsjageri nuren (kilangu) = sweet fibrous yam, (Rheede) applied to *D. pentaphylla,* var. *Rheedei,* a cultivated variety.

Tsu = tuber in Chinese. Tsu-uh and Tsu-guh are quoted by Matsumura as names for *D. japonica,* see Shu.

Tsu pre pyadzu, for *D. bulbifera* among the Nagas.

T'u-uh = ground arum, for *D. bulbifera* in Chinese (Matsumura).

Tsukne imo = crushed yam, for a superior race of *D. opposita* in Japan, the tuber of which is short, like the crushed foot of a Chinese lady.

Tu-su (Tu Cu), for *D. esculenta* in Indo-China.

Tual = yam, in Tenimbar Island.

Tubayan, a race of *D. alata* in Luzon.

Tugi, Tugui, Tuqui, Dogue, Toguing, Tungo or **Tongo,** well-known names for *D. esculenta* in the Tagalog and Ilocano languages of Luzon. Sometimes, it appears, they may be misapplied to *D. alata;* and perhaps that is how there comes to exist a name Tugupulu = red tugui, although red *D. esculenta* is unknown, but it is noteworthy nevertheless that Rumph describes a red *D. esculenta.* The word Tugui has reached N. Caledonia and is in the Ate language, but it is uncertain how it is applied.

Tukjhok, for *D. kamoonensis* among the Lepchas in the Sikkim Himalaya.

Tuma, said to be nauseous *D. pentaphylla* in the Vizagapatam district, Circars.

Tuma genasu, a race of *D. alata* in South Kanara, S. W. India.

Tumangai, for *D. aculeata* among the Savaras in the Circars, cf. Tuma.

Tumuktok, a race of *D. alata* in Luzon, with recurving tubers.

Tunga gudda, for *D. aculeata* in the Chanda district of the Central Provinces of India, used as Tunga alu in Orissa, and Angul and as Tungam sanga by the Kols in Singbhum.

Tungam sanga, for *D. aculeata* among the Kols, cf. Tuma.

Tungo or **Tongao,** see Tugui.

Twinzauk myouk = going straight down yam, for *D. Hamiltonii* and deep rooting races of *D. alata* in Tavoy and Mergui, Tenasserim.

U is tuber in Burmese.

U-myin-u, stated to be used in the Tharrawaddy district for a wild Enantiophyllous Dioscorea.

Ual or **Uar,** for *D. esculenta* at Balade and Yate respectively, N. Caledonia.

Ubag, said to be used for a race of *D. alata* in Luzon, and more certainly for *D. luzonensis* and *D. divaricata* in Tagalog, sometimes as Ubag manahan. Cf. Kobag.

Ubai, for Ubi in Sarawak.

Ubai tunku = prince's yam, for a yam in Sarawak.

Ubi = yam in Malaysia widely. It appears as Hubi as well as Ubi in the Sakai language; and occurs as Ubi from Sumatra to Sarawak, west Java, Celebes, the Moluccas, the Philippine islands (in most of the languages of the Christian tribes) and to N. Caledonia, mixed with other words for yam east of the Malay Peninsula. In Sarawak it is changed in places into Ubih, Ube, Ubei and Ubai. The "b" becomes "v," and it is Uvi in Fiji and Uve in Sarawak. The "b" may become "w" and it is Huwi in Sundanese generally though also Uwi; it is Uwi also in Celebes, and in N. Zealand where Uwhi occurs also (Williams). The "b" becomes "f" sometimes in Rotti and N. Caledonia and gives Ufi: so also in Tahiti. The "b" becomes "h" and the word is Uhi in various parts of Celebes, and in the islands east of Celebes, the Moluccas, and in Tahiti. In Rotuma along with Uhi occurs Uh. Uke and Uki are recorded by Moulton as occurring in Sarawak. The first letter is changed to "o" sporadically through the western parts of Malaya, and seems to particularly to be so in Madoera. Ovi and Ove occur in Sarawak; and Owi may replace Uwi in south-east Borneo; while Owe occurs in Gajoland, North Sumatra and in Sarawak.

Ubi ajag, for a race of *D. alata* in Java.

Ubi akas, for *D. hispida* in Perak.

Ubi arah (arah is a fig), for *D. hispida* among the Sakais.
Ubi arit = sickle yam, a race of *D. alata* in Java.
Ubi aung, a race of *D. alata* in Java and once seen applied to *D. esculenta*.
Ubi ayam = fowl's yam, from the red flesh perhaps, a race of *D. alata* in Java.
Ubi babua, for *D. alata* in Amboina (Rumpf).
Ubi badak = fan yam, for a race of *D. alata* in Java.
Ubi badigul = twin yam, for a race of *D. alata* in Java.
Ubi bajari = finger yam, for a race of *D. alata* among the Malays of the Moluccas.
Ubi banteng = Banteng's yam, for a race of *D. alata* in Java.
Ubi blichik = insipid yam, for an edible variety of *D. bulbifera* in Java.
Ubi boaya = crocodile yam, a race of *D. alata* in Java.
Ubi bontal = ball-yam, for *D. bulbifera* in the Malay of Amboina.
Ubi bulong = blue yam, a race of *D. alata* in Java, or for Ubi butong.
Ubi buah = fruit yam, for cultivated *D. bulbifera* in Java.
Ubi butong = a race of *D. alata* in Java, or *D. alata* in general. See Bulu.
Ubi butul, for *D. esculenta* in Java.
Ubi calebassa, described by Rumpf as if a race of *D. esculenta* which it can hardly be.
Ubi chabuk, for a race of *D. pentaphylla* in the Residency of Java. The Sakai word Jabbet is suggested by this name.
Ubi china = China yam, for *D. bulbifera* (de Clerq) in Malay.
Ubi chuchuk = snout yam, a race of *D. alata* in Java.
Ubi chiabet, see Jabbet.
Ubi da-are, for *D. bulbifera* in Halmaheira.
Ubi dago, for *D. alata* in the Philippine islands (Kamel) being tautological. See Daga.
Ubi dasawala, a race of *D. alata* in Halmaheira.
Ubi elos, commonly for *D. alata* in eastern Java and Madoera.
Ubi gadis = virgin yam, but evidently in error for Gadong, for *D. hispida* among the Bataks, Sumatra.
Ubi gadog, a race of *D. alata* in Java.
Ubi gadung and ***Ubi gadueng***, for *D. hispida* in the Malay Peninsula and in Menangkabau, Sumatra: but Gadung is expressive enough by itself.
Ubi gede = big yam, a race of *D. alata* in Java.
Ubi gendola = red yam, a race of *D. alata* in Bali.
Ubi hahipiang, a race of *D. alata* in Celebes, Bantik district in Minahassa.
Ubi haliya = ginger yam, a race of *D. alata* in Amboina.
Ubi heulang, a race of *D. alata* in Java.
Ubi hidung = snout yam, a race of *D. alata* in Java.
Ubi ipit, for *D. bulbifera* in Bali.
Ubi jabbet, for *D. pentaphylla* among the Sakais. See Jabbet.

Ubi jahe = ginger yam, a race of *D. alata* in Java and a race of *D. esculenta*.

Ubi jantong = male yam, a race of *D. alata* in Java. Cf. Ubi butong.

Ubi jarar, a yam among the Bataks, Sumatra.

Ubi jari = finger yam, a race of *D. alata* in Java.

Ubi jawa = Java yam, a race of *D. alata* in the Malay Peninsula, and in Java.

Ubi jububug, for *D. bulbifera* in Java.

Ubi junjong = pole yam, a race of *D. alata* in the Malay Peninsula.

Ubi kalebasa = Calabash yam, a race of *D. alata* in eastern Malaya.

Ubi kapur = chalk yam, a race of *D. alata* in Java.

Ubi kastela = Castile yam, for *D. bulbifera* in Singapore.

Ubi kamayong and ***Ubi kawayong jahe*** = benzoin yam and benzoin ginger yam, for *D. filiformis* or some deep rooting yam in Java. The same name as Akar keminiyan. Also applied to *D. esculenta*.

Ubi kayu = stick yam, means tapioca always in western Malaya, but said in north Celebes to be used for *D. hispida* (assuredly a mistake).

Ubi kelibang = the Artocarpus lanceaefolia yam, a race of *D. alata* in Malaya, the tuber lobed as an Artocarpus leaf.

Ubi kelona = the smilax yam, for some wild *Dioscorea* in Malay.

Ubi kenduduk = yam, purple in colour like senduduk fruit (Melastoma malabathricum), a race of *D. alata* in Singapore.

Ubi kepler sampi = penis bovis yam, a race of *D. alata* in Java.

Ubi kiara, a race of *D. alata* in Java.

Ubi kipas = fan yam, a race of *D. alata* in Malay.

Ubi klapa = coconut yam, a race of *D. alata* in Java.

Ubi klapa molis, a race of *D. alata* in Java fruit yam.

Ubi klesih = ? extruding yam, a race of *D. alata* in Bali.

Ubi klinting, for a race of *D. esculenta* in Banjoemas, Java.

Ubi kuja = Indian merchant's yam (from khuwajah, a master or rich merchant, a name in Malaya for Indian merchants) a race of *D. alata* in Java.

Ubi kulo, for *D. bulbifera* in eastern Malaya.

Ubi kumili utan = wild kombili yam, for *D. bulbifera* in Malacca (Alvins).

Ubi kurubut = group yam, a race of *D. alata* in Java.

Ubi lakilaki = male yam, a race of *D. alata* with long tubers in Malaya (? where). Cf. Butu.

Ubi landak = porcupine yam for *D. esculenta* in Java.

Ubi likit = glutinous yam, a race of *D. alata* in Java.

Ubi lilin = wax yam, a race of *D. alata* in Java.

Ubi lubang = hole yam, a race of *D. alata* in Java.

Ubi mangindano = Menado yam, from Menado in Celebes, ascribed to *D. pentaphylla* locally in Celebes.
Ubi manis = sweet yam, a race of *D. alata* in Java.
Ubi menjangan kuning = yellow deer yam (the deer being Cervulus muntjac), a race of *D. alata* in Java.
Ubi menjangan merah = red deer yam, a race of *D. alata* in Java.
Ubi menjangan putih = white deer yam, a race of *D. alata* in Java.
Ubi manusiya and ***Ubi manusiya merah*** = human yam and red human yam (from the shape), races of *D. alata* in north Celebes.
Ubi mengari = curry yam, a race of *D. alata* in Java.
Ubi merah = red yam, races of *D. alata* in Singapore and in north Celebes.
Ubi naga = dragon yam, a race of *D. alata* in Java.
Ubi nasi = rice yam, a race of *D. alata* in Singapore or for *D. alata* in a general way.
Ubi ondo, for *D. bulbifera* in Celebes. See Ondo.
Ubi opang, ascribed to *D. esculenta* in Java.
Ubi orai, a race of *D. alata* in Java.
Ubi pagar = fence yam, a race of *D. alata* in Java.
Ubi paha kerbau = buffalo-thigh yam, a race of *D. alata* in the Malay peninsula.
Ubi pandang = Pandanus yam, for a race of *D. alata* in the Malay Peninsula.
Ubi pariaman = Priaman yam, from Priaman in Sumatra, for *D. pentaphylla* in Ternate (Rumpf).
Ubi pasir = sand yam, for *D. pentaphylla* in Java and also similarly applied by Sakais in the Malay Peninsula (Ridley).
Ubi patok = bill of bird yam, a race of *D. alata* in Java.
Ubi putih = white yam, a common Malay name for *D. bulbifera* and as Uwi putih in north Celebes with the same application.
Ubi radhin, for *D. alata* in Madoera.
Ubi rame = big yam, a race of *D. alata* in Java.
Ubi rembu = ? post yam, probably for a race of *D. alata,* in the Malay Peninsula.
Ubi sabut or ***Ubi sawut,*** for *D. hispida* and *D. pentaphylla* in Java, and perhaps also for *D. polyclades* (Zollinger).
Ubi salaki = twin yam, a race of *D. alata* in Java.
Ubi salamprit, a race of *D. alata* in Java.
Ubi sekok, a race of *D. alata* in the Malay Peninsula.
Ubi senggani, a race of *D. alata* in Java.
Ubi seneur = the Senhor's yam, a race of *D. alata* in Java.
Ubi sisisamping, a race of *D. alata* in Java.
Ubi sukun or ***Ubi daun sukun,*** the yam shaped like the leaf of the Bread-fruit tree, a race of *D. alata* in eastern Malaya.
Ubi susug = milk yam, a race of *D. alata* in Java.

Ubi tanduk = horn yam, a race of *D. alata* in Java.

Ubi tangan = hand yam, a race of *D. alata* in Java, and the Moluccas.

Ubi tanjong = headland yam, an unidentified yam eaten by the Semangs of the Malay Peninsula (Blagden).

Ubi taun-taun or ***Ubi tahun-tahun*** = yearly yam, a race of *D. alata* in eastern Malaya and possibly also *D. pentaphylla* (Rumpf).

Ubi tirai, for a yam in Sarawak (Moulton).

Ubi tiyang, a race of *D. alata* in Java.

Ubi torak = ? spool yam, a race of *D. esculenta* in the Malay Peninsula.

Ubi torana, the same as Ubi taun-taun.

Ubi tropong or ***Ubi trobong*** = pipe yam, a race of *D. alata* in Singapore, but ascribed wrongly perhaps to *D. esculenta* in Java.

Ubi tumpuk = group yam, a race of *D. alata* in Java.

Ubi upas = poison yam, for wild *D. bulbifera* in Java.

Ubi ular = snake yam, a race of *D. alata* in Malaya.

Ubi utan = jungle yam, for several wild yams through the Malay region here and there *e.g. D. pentaphylla, D. Blumei, D. hispida, D. glabra,* etc.

Ubi utang, for a Dioscorea in Banda.

Ubich, among the Land Dyaks of Sarawak for Ubi, q.v.

Ubing-basol, for *D. nummularia* in the Tagalog language, Luzon.

Ubi-ubihan, a name for *D. bulbifera* in Tagalog. The reduplication suggests that it is applied to a race with many or conspicuous bulbils, and possibly one of the edible races.

Uchiwa dokoro = fan yam, for *D. nipponica* in Japan, alluding to leaf.

Udella or ***Uda alla*** = top-side yam, for cultivated *D. bulbifera* in Ceylon, its aerial bulbils being the food and not the terrestrial tuber.

Ufi, variant of Ubi, used in Tahiti.

Ufi hoi, for *D. esculenta* and *D. bulbifera.*

Ufi mene-mene, for a race of *D. alata.*

Ufi opura, for a race of *D. alata.*

Ufi paparatea, for a race of *D. alata.*

Ufi patara, for *D. pentaphylla.* Cf. Patara.

Ufi taho-taho, for a race of *D. alata.* Cf. Ubi tahun-tahun.

Ufi tiauu, for a race of *D. alata.*

Uh, in Chinese unqualified for *Colocasia esculentum,* but qualified denotes various esculent tuberous plants, and as Swa uh or Shan-yu, indicates various Dioscoreas.

Uh = yam, in Rotuma and Ubi also in Rotuma and in Salayer and Amboina. See Ubi.

Ujla machalu = bright fish yam, a race of *D. alata* in the Sontal Pergunnahs.

Ujla ratalu = bright ratalu, a race of *D. alata* in the Unao district, Gangetic plains.

Ulibita or **Uhulibita,** for *D. hispida* in the Moluccas.
Ulitholi kacchel, a race of *D. alata* in Travancore.
Ulshi, for edible *D. pentaphylla* in the district of Thana, Bombay.
Umaa = yam, in the Marquesas Islands, a form of Kumaa.
Umi genasu, for a *Dioscorea* in Kanara, W. India.
Unaniya kham alu, a race of *D. alata* in the Bankura district, Bengal.
Unar sanga, for *D. belophylla* and *D. glabra* among the Kols of Singbhum.
Un-kau-tou, a Chinese name for *D. bulbifera* (Diels).
Un-tok, the same.
Undai kavalli = globose yam, for *D. hispida* in the Tanjore district Madras.
Unka alu, a race of *D. alata* in the Sontal Pergunnahs and the districts of Hazaribagh and Ranchi, Chota Nagpur.
Un-woo, a Queensland (Red Island) name for *D. bulbifera.*
Upka aru, a race of *D. alata* in the district of Ranchi, Chota Nagpur.
Urlaha = yam in the Aru islands.
Urulai kilangu = globular yam, a common Tamil name for the potato which is sometimes misapplied to the Dioscoreas.
Uththate kacchel, a race of *D. alata* in Travancore.
Utong-utongan, a name for *D. bulbifera* in Tagalog, Luzon, perhaps used like Ubi-ubihan.
Uvi, for Ubi in Fiji, but restricted to *D. alata.*
Uvi kaboa, a race of *D. alata* in Fiji.
Uvi kaluwo, a race of *D. alata* in Fiji.
Uvi ni vavalagi (pronounced uvi ngi vavalagi) = foreign yam, a race of *D. alata* in Fiji (Wright).
Uvi ni gau (pronounced uvi ngi gau), for a race of *D. alata* in Fiji, but in error.
Uvi ni vutuna (pronounced uvi ngi vutuna), a race of *D. alata* in Fiji (Wright).
Uvi votuna, said to be a race of *D. alata* in Fiji, but the name appears more appropriate to *Colocasia esculentum* (Wright).
Uwi, chiefly in Javanese, for Ubi, q.v.
Uwi abang = red yam, a race of *D. alata* in Java.
Ubi alas = jungle yam, for *D. hispida* and for *D. nummularia* in Java.
Uwi alus = slender yam, a race of *D. alata* in Java.
Uwi badak = fan yam, a race of *D. alata* in Java.
Uwi chayu, said to be for *D. hispida* in north Celebes, but can it be for tapioca?
Uwi cheker = handful yam, a yam of Java.
Uwi churuk, a yam of Java.
Uwi dudung, said to be *D. hispida;* but cf. Butu.
Uwi gadung, for *D. hispida* in Java.
Uwi intuwa, Uwi intuwa rintek and ***Uwi intuwa alus,*** ascribed to *D. glabra,* but belonging perhaps to *D. nummularia* in north Celebes.

Uwi kawayong = benzoin yam, doubtless for *Dioscorea pyrifolia*, in Java.

Uwi klapa = coconut yam, for *D. bulbifera* in the Batavia Residency of Java.

Uwi laka = red yam, for a race of *D. alata* in north Celebes.

Uwi labang = red yam, for a race of *D. alata* in Java.

Uwi lilin = wax yam, for a race of *D. alata* in Java.

Uwi putun, for *D. alata* in Java. Cf. Butu.

Uwi paturi = princess' yam, for *D. pentaphylla* in Java.

Uwi putih = white yam, for a race of *D. alata* in Java.

Uwi raindang, a race of *D. alata* in north Celebes.

Uwi sawut jahe, for *D. hispida* in Java.

Uwi senggani, a race of *D. alata* in Java.

Uwi sayavu, for *D. esculenta* in North Celebes.

Uwi tutung, for *D. hispida* in Java; but see Butu.

Uwi upas = poison yam, for *D. bulbifera* in Java.

Uwi wilus, a race of *D. alata* in Java, the same as Ubi alus.

Uwhikaho, for yam in N. Zealand when grown to supply the ships between 1820 and 1845. Cf. Uvi, and cf. Kau and Kaumaile.

Uyalla = thread yam, for *D. tomentosa* in Ceylon.

Vainur tega, for *D. hispida* in the Vizagapatam district, Circars.

Vaj, see Waj: it occurs also in the Surat district as Vaj-no-kand or Vaj-kand.

Vale, a name said to belong to *D. aculeata* in the State of Travancore, perhaps Valli torn from Kilangu.

Van aru, for *D. anguina* in the Bhandara district of the Central Provinces of India.

Vara kilangu = wild yam, for *D. bulbifera* and *D. aculeata* in Travancore.

Velliala valli kilangu, recorded as a name for *D. oppositifolia* in the Kallimalai hills, Madras.

Velwa, a race of *D. alata* in Fiji (Wright).

Venni kilangu = twining yam, for *D. bulbifera* in the Malabar district and for *D. alata* and *D. Hamiltonii* in the State of Travancore.

Verri pendalam, a race of ? *D. alata* in the Circars.

Vetti lai valli kilangu = betel-leaf yam, a very widely used name for *D. alata* through southern India, but sometimes used for other species, *e.g.* for *D. spicata* in Travancore and for *D. oppositifolia* in the Salem district.

Vitua = yam in the Nadroga language, Fiji (Wright).

Voli, a race of *D. alata* in Fiji. Ti-voli differs.

Volikula, a race of *D. alata* in Fiji (Wright).

Vor khdnoch, for *D. hispida* among the Khmers in Cochin China (Pierre). Do khdnoch is given by the same botanist also.

Vurai, a race of *D. alata* in Fiji.

Vurai tabua (pronounced Vurai tambua), a race of *D. alata* in Fiji, the name requiring verification.

Vypa dumpa, for nauseous *D. pentaphylla* in the Godaveri district, Madras.

Wadan = yam, in the Watubela islands of the Banda Sea.

Wadu dang, for *D. esculenta* among the Kachins of Burma.

Wainisucu, a race of *D. alata* in Fiji (Wright).

Waj, Waz or **Vaj,** for *D. hispida* in southern Rajputana and the neighbouring districts of Bombay and also sometimes for *D. bulbifera.*

Waka dua, a race of *D. alata* in Fiji.

Wakat *(waccat),* recorded by Rumpf as indicating a race of *D. pentaphylla* in Bali.

Wakmato, for *D. esculenta* in the Northern Shan States.

Waloini = yam, in the Sermata islands of the Banda Sea.

Wardi, for *D. oppositifolia* in the Melghat, Berar.

Wari lottu lottu, according to Rumph an amboinese equivalent for Tali babounji.

Warran, for *D. hastifolia* in Western Australia.

Ware, a yam of N. Caledonia in the Ate language, the same as Oundi.

Wat-wek, for *D. Hamiltonii* on the Pichoung, Arakan, among the Chins. Cf. Wet-we.

Wel alla, a race of *D. alata* in Ceylon.

Werung or **Werungan, Kerung** or **Gadungan,** for *D. pubera* and *D. polyclades* in Java, the first in the Residencies of Paseroean, Samarang and Pekalongan, the last two in the island of Madoera.

Wet-ka u = pig cut off yam, for *D. esculenta* in central Burma.

Wet ma u = sow yam, for *D. esculenta,* perhaps in error for Wet ka u; but the resemblance of the tuber to a sow is sometimes evident. Cf. Kukur poati.

Wet yan u, for the same in the Kyaukse district, Burma.

Wet-we, for *D. alata* or some other *Dioscorea* among the Chins of the Gangaw valley in the Pakokku Chin hills. Cf. Wat-Wek.

Wi, yam, in Java perhaps imported, as an abbreviation of Iwi.

Wi-ka, for *D. bulbifera* in Queensland on the Morehead river.

Wili, Wiwi and **Wiwiwak** = yam in New Guinea, N. Celebes and the Aru islands.

Wilus, sometimes stands alone in the place of Uwi wilus for *D. alata,* and if this is a well established usage then another interpretation of Ubi wilus than slender yam is to be found. Leschenault a century ago recorded the name as *"ubium willous gonou."*

Wingao, Winto or **Wintog,** for *D. laurifolia* in north Celebes.

Wi sudo, for *D. esculenta* in east Java, and evidently connected with Sunda or Suda, q.v.

Wiwi or **Wiwiwak,** see Wiwi.

Wohiu, for yam in Solor.

Wokai, *D. bulbifera* at Cooktown, Queensland.

Xan yo, Loureiro's spelling of Shan yu, q.v.: recorded by him as for *D. persimilis* or for a race of *D. alata*.

Yama imo or ***Yama no imo*** = hill yam, for *D. japonica* in Japan.

Yarisi, a race of *D. alata* in Fiji (Wright).

Yarisi damu, a race of *D. alata* in Fiji (Wright).

Yarisa vula, a race of *D. alata* in Fiji (Wright).

Yeh-shu = wild tuber, for *D. japonica* in Chinese (Henry).

Yella gaddalu, for edible *D. pentaphylla* and for *D. tomentosa* in the Cuddapah district.

Yella gadda, for *D. oppositifolia* in the districts of Kurnul and Cuddapah, Madras, and in the Nizam's dominions.

Yu is *Colocasia antiquorum*, but qualified by Shan stands for Dioscorea in Chinese.

Yu than, a name for a race of *D. alata* recorded by Loureiro as Chinese.

Ywel, see Aywel.

Zaminkand, that is earth tuber, for *D. hispida* sometimes in the Kotah and Gwalior States, but the name really belongs to *Amorphophallus*.

Zembu, for cultivated *D. bulbifera* in Japan.

Zenka, for *D. esculenta* in Celebes (Rumpf): van den Burg spells it Jenka *i.e.* Yenka.

Zilya ratalu, a race of *D. alata* in the districts of Jhansi and Unao, United Provinces of Agra and Oudh.

Departmental Notices.

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To be purchased at the Botanic Gardens, Singapore

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Summit of Gunong Belumut, with shoulder-high scrub containing Matonia.

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THE

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THE VEGETATION OF GUNONG BELUMUT IN JOHORE.

The present paper is an attempt to describe the vegetation on the upper part of Gunong Belumut, a mountain situated in the south of the Malay Peninsula, about the middle of the State of Johore. The summit is 3,321 feet above sea level, and the area here dealt with is that lying between an altitude of about 2,800 feet and the summit. The writer visited this locality in May 1923, in company with Mr. G. R. Fulton, Assistant Government Geologist, to whom he wishes to express his very cordial thanks for the opportunity of making the expedition.

The route followed was that made by Mr. J. G. Watson, Conservator of Forests, Johore, who had ascended the mountain a short time previously. Except a few plants obtained by Mr. Watson, no collections had been made on the mountain. The jungle track starts from about the 14th mile on the Kluang-Mersing road. From this point to the Sungei Berhidong at the foot of G. Belumut is about 11 or 12 miles, the track crossing the ridge of G. Chemundong at a height of 1,265 feet. From the camp by S. Berhidong, at 450 ft. above sea, to the summit of the mountain is about three miles.

The lower part of the ascent is through rather dry Dipterocarp forest, with Bertam (*Eugeissonia*) as the chief undergrowth. At about 2,500 ft. a transition begins to occur to a forest of crowded trees of much lower stature, gradually more and more covered with liverworts and mosses. Within about 300 ft. the change is complete from a fairly high forest to the mossy elfin forest which

covers most of the area between 2,800 ft. and the summit. On the northern slope however the mossy forest is replaced by an open scrub in which for the most part *Matonia pectinata* is dominant, with stunted shrubs and trees growing above it at intervals (Plate I). The transition from the forest to the scrub is very sharp near the summit, but less so at lower altitudes. The name Belumut is descriptive of the mossy condition of the summit.

A camp was made on the summit of the mountain, and seven days spent there. As complete a collection as possible was made both of flowering plants and cryptogams, and the writer is greatly indebted to Mr. I. H. Burkill for the determination of the former, and to Mr. H. N. Dixon for the determination of mosses. The writer is responsible for naming the Pteridophytes and has attempted to identify the more important of the Liverworts which form such a conspicuous feature of the vegetation.

Climatic conditions.

During the seven days spent on the upper part of the mountain, the summit was covered with cloud every night, but either in the morning or later in the day the cloud lifted, forming again about sunset or earlier. One evening light clouds were formed on the summit about sunset (6 p.m.), but soon disappeared; and no more came till about 9 p.m. Every morning, whether there had been rain or not, the bryophytes on the trees and ground were saturated with water from the clouds. Rain occurred on four days out of the seven, but only once at all heavily. On the finest day the bryophytes were very much dried up, except in the most sheltered places, and the leaves of Hymenophyllums were distinctly shrivelled.

Unfortunately no daily record was kept of the direction of winds, but on those days on which the facts were noted the evening winds forming the clouds came from the south-west. This is probably a seasonal matter, dependent on the monsoons. Lying to the south and south-west of G. Belumut are two or three other lower ridges stretching east and west. Lines of cloud formed first on these ridges, but did not pass on as such to Belumut. The wind blew up the southern slopes of the mountain, forming cloud as it ascended, and the summit was soon covered with thick mist. Judging by the appearance of cloud formation as observed on the other ridges, the cloud was continually added to from the south and dissipated by the continuing wind towards the north. In these circumstances the southern slope would receive most of the moisture, and no doubt this condition prevails throughout the south-west monsoon. During the north-east monsoon there may be heavier rain and more continuous clouding, affecting the south slope considerably as well as the north.

Observations of temperature were not made. When sunny it was quite hot on the summit, probably not much cooler than the low

At the junction of the Matonia-scrub with the mossy forest, on the western ridge Gunong Belumut.

country, but in the cloud and at night it was much cooler, probably down to about 15° C.

Geology; Soil conditions.

The writer is indebted to Mr. G. R. Fulton for particulars of the geological nature of the country round G. Belumut. This mountain and the ridges south of it (of which the nearest, G. Berchuak, was ascended) are formed of hornblende granite, while the ridge to the north, of which G. Berhidong forms the highest part, is of rhyolite.

On the eastern ridge of G. Belumut, just below the summit, in the forest, there were nearly 30 cm. of dark soil above the weathered granite which formed a yellowish clay with much grit. The upper layers of the soil contained many small roots but very little of undecomposed plant material. The lower layers contained less organic matter and were more gritty. Granite of this character may weather to a stiff clay, but it is possible that in such exposed positions as these ridges the silicates may be first weathered and partly washed away before the grains of silica are decomposed, the result being a more or less sandy soil. On the north face, in more open places in the Matonia scrub, the soil is very sandy and has a much thinner layer containing humus. On the south face, where the slope is steep with many large boulders, the soil is largely present in hollows and crevices between the rocks, which are themselves covered with a more or less thick mat of vegetation, at least of bryophytes and ferns.

The rhyolite of G. Berhidong gives a fine clay soil with hardly any sand, and it would be interesting to know whether the vegetation on its summit shows any difference from that on G. Belumut. Unfortunately an attempt to make the ascent failed, and time was not available to make a second.

The Mossy Forest.

1. General.

The best development of the mossy forest is on the south slope. This is far steeper than that to the north, with very large boulders of granite. The trees here are fully 30 ft. in height. Their trunks up to almost shoulder height are thickly covered with masses of liverworts and, less abundantly, mosses. Higher up, the covering of bryophytes is thinner, and different species are found. The uppermost part of the tree often bears lichens, which sometimes encroach on the mosses, and phanerogamic epiphytes. On the ground (here very uneven) is a carpet of mosses; herbaceous vegetation is not well developed, but several species occur, as well as pandans, a few palms, and ferns. Locally a bamboo (*Dendrocalamus flagellifer?*) is quite abundant. As one climbs up on to the ridge there is a sudden dwarfing and much closer growth of the trees, most of which are here not more than 25 feet, the bases still covered with enormous spongy masses of liverworts. Continuing over the ridge on to the north slope, one comes out into the open scrub (See Plate II).

2. The Trees.

Walking in the forest down the ridge westwards from the summit, the following were noted as the largest trees seen. Only those of 30 cm. or more in girth were measured.

Number measured.	Species.	Maximum girth.
8	Calophyllum canum	46 cm.
6	Tetractonia n. sp.	68.5
5	Podocarpus neriifolius	91
4	Gordonia imbricata	56
3	Tristania merguensis	46
3	Eugenia caudata (?)	76
2	Parinarium parviflorum	45
2	Eugenia oblata (?)	43
1	Garcinia sp.	38
1	Quercus rassa	38

The *Tristania* was not seen flowering, so that its identification is not certain, but it is most probably the species named, which is abundant on Mt. Ophir.

An area of about 20 feet (6.1 m.) square was selected, situated on the top of the south slope, one edge being almost along the summit of the western ridge, near the summit of the mountain. In this all woody plants (rattans excepted) above 2 m. in height were measured as regards diameter at breast height, and their total height estimated.

The following is a summary of the measurements made in the selected area. Many of the trees were not flowering or fruiting, and their identification is consequently somewhat doubtful, especially in the case of Eugenia.

No. of individuals.	Species.	Diameter. Max.	Diameter. Mean.	Max. height.
14	Eugenia caudata	10.2 cm.	4.3 cm.	7 m.
14	Eugenia oblata	11.4	3.8	9
10	Eugenia microcalyx	6.4	3.6	9
5	Calophyllum canum	10.2	6.9	10.5
5	Adinandra sp.	4.3	2.8	7.5
4	Garcinia diversifolia	12.7	5.1	9
3	Eugenia subdecussata	7.6	4.3	7.5
3	Wikstroemia Candolleana	3.8	2.8	3.5
3	Symplocos adenophylla	8.1	4.3	9
3	Pandanus sp.			5
3	Elaeocarpus petiolatus	1.3	1.3	2.5
3	Ilex Griffithii	4.8	3.6	7.5
3	Pinanga disticha			2.5
3	Xanthophyllum Wrayi	11.4	4.8	7.5
3	Daphniphyllum laurinum	11.4	8.1	9
2	Eugenia venulosa	10.2	7.6	7.5
2	Quercus Rassa	7.6	5.6	9

No. of individuals.	Species.	Diameter. Max.	Mean.	Max. height.
2	Myrsine Porteriana	8.7	5.6	7.5
2	Lasianthus sp.	3.3	2.2	5.5
1	Eugenia bracteolata	4.6		6
1	Microtropis ophirensis	2		2.5
1	Eugenia claviflora	4.6		3.5
1	Quercus Wenzigiana	2.2		3.5
1	Elaeocarpus parvifolius	2		3
1	Gaertnera Königii	2		2.5
1	Timonius penangensis	4.6		6
1	Vaccinium Teysmanni	1.3		2.5
1	Tristania merguensis	1		2
1	Ardisia sp.	2		4.5
1	Tetractonia sp.	7.6		10.5
1	Podocarpus neriifolius	28		9
1	Palaquium obovatum	15.2		10.5
1	Parinarium parviflorum	8.7		9
1	Lindera bibracteata	2		2.5

Mean diameter of all trees measured 4.5 cm.

Only one specimen of *Podocarpus neriifolius* was present in this plot, being a very old tree lying over obliquely, its topmost shoots reaching about 9 m. vertically above the ground. This species was quite abundant in the mossy forest, though probably less so than in the Matonia scrub and when one looked at the slopes of the mountain from the summit or from the neighbouring peak of G. Berchuak, its pale yellow-green foliage showed up strikingly. The disappearance of the Podocarp on the lower slopes was practically coincident with the lower limit of the mossy forest.

Gordonia imbricata and *Tetractonia* sp. have very much the same habit and form of leaf, and it was not found possible to distinguish the two with certainty from a distance. Both are taller than the majority of the other trees and have a very open mode of branching, with few large rounded leaves. On looking along the ridge from the summit of the mountain one was at once struck with the way in which these two trees both projected above the general level of the forest. They were also both prominent among the isolated trees in the Matonia scrub, and grew taller there also than any others. It was not possible to decide which was the more numerous, but it is thought that the *Tetractonia* is probably so, at least in the scrub.

Calophyllum canum was one of the most striking trees as one walked through the forest, on account of its very straight growing trunks. The smaller leaved *C. venustum* was less abundant.

Tristania merguensis was found particularly in the scrub, but also in the forest, especially on the ridge. There were often very old trees in the transition zone between forest and scrub, with very thick bushy branches, some apparently dead.

The above were the most noticeable of the larger trees; of smaller trees the list shows that Eugenias make up a large proportion.

It is very noticeable that all the trees are of xerophytic character, with small simple usually entire coriaceous leaves.

The mean diameter of 4.5 cm. indicates that the forest is of close growing slender trees. On approximately 400 square feet (37 sq. metres) 103 woody plants of more than 2 m. in height were recorded, giving an average distance apart of about 2 ft. (60 cm.) The thick growth of liverworts round the bases of all plants increased the apparent closeness of the trees. The oldest trees were sometimes fallen over obliquely, one being noticed almost fallen to the ground with several upright branches growing from it. For the most part the small trees grow fairly straight. There is little or nothing of the formation of aerial supporting roots, described as characteristic of the mossy forest on Mt. Maquiling, Luzon. On the south slope where the mossy forest is best developed the steepness and the presence of large granite boulders prevent the trees from growing so closely, but here, being more protected, they are on the whole taller and have larger crowns; the bamboo is also more abundant. A slender *Pandanus* is fairly frequent in the forest, and is often quite tall, while small plants of a broad leaved species, possibly *P. atrocarpus*, were found quite near the summit of the mountain.

Plate III shows a typical part of the forest close to the area in which the trees were measured.

Undershrubs were few. The following were collected: *Allomorphia exigua, Memecylon Hullettii, Gelonium glomerulatum, Daphniphyllum* sp., *Ardisia* sp., *Goniothalamus macrophyllus, Elaeocarpus petiolatus.* These are all quite large leaved in comparison with the trees of the forest, and the leaves less coriaceous.

Finanga disticha was fairly frequent, and also a rattan, *Calamus brevispadix* Ridl. A second *Calamus* and a *Daemonorhops* were not so common. *Freycinetia valida* was present.

3. Ground vegetation.

(*a*) ***Herbaceous flowering plants.*** These were never very abundant. The following were the most abundant species, and, with seedlings of woody plants, formed the chief ground vegetation: *Sonerila bicolor, Paraboea pyrolaefolia, Didymocarpus platypus, Pentaphragma sp., Argostemma spinulosum, Cephaelis cuneata, Zingiber puberula, Alpinia rafflesiana* (occasional). *Loxocarpus* sp. and *Sonerila erecta* were found chiefly on granite boulders where only a thin covering of mosses was present. *Balanophora multibracteata* was locally quite common. In the more open parts, especially in the broader transition zone between forest and scrub at somewhat lower altitudes (about 3000 ft.) *Cypripedium barbatum* was very abundant, being the most frequent herbaceous plant.

Typical mossy forest, near the summit of Gunong Belumut, upon the south face.

(*b*) ***Pteridophytes.*** These were not so abundant as might have been expected. Of small species, *Selaginella plumea* Spr. and *S. acutangula* Spr. (?) were frequent, *S. Wattii* Bak. being found chiefly on rocks and among liverworts on tree trunks. The following ferns were frequently seen: *Taenitis blechnoides* (nearly always with simple leaves), *Schizoloma divergens* (less abundantly than at lower altitudes), *Lindsaya repens* (mostly small sterile plants), small plants of *Trichomanes rigidum,* and an *Alsophila* (a species found also on Mt. Ophir, possibly undescribed) the stems of which reached several feet in height. Young plants of the last named were also common. In one place several plants of *Cheiropleuria bicuspis* (Bl.) were found, in the shelter of a large rock. *Tapeinidium biserratum* v. A. v. R. (*Davallia biserrata* and *D. gracilis* Bl.), both less and more divided forms, were found in more open places on the south slope. *Gleichenia linearis, G. laevigata* (Willd.) *G. glauca* (Thb.), and *G. hirta* Bl. were occasional throughout the forest, usually with long petioles which carried the leaves up among the branches of the trees. *Lycopodium casuarinoides* Spr. had the same habit, often with stems several yards long, especially on the ridges; its thickly tufted leafy branches, bearing very numerous strobili, were very abundant amongst the bushes close to the summit. *L. cernuum* was also present, but not in such quantity.

(*c*) ***Bryophytes.*** A large part of the ground surface had some growth of mosses or liverworts, in addition to those present on the trees. It was difficult to estimate the relative abundance of these, as the writer was not familiar with the different kinds. Conspicuous were *Leucobryum javense* (Brid.) Mitt. and *L. Bowringii* Mitt., and thick tufts of *Rhizogonium latifolium* Bry. Jav.; *Sematophyllum secundum* (Hornsch. and Reinw.) was also frequent. No doubt other smaller mosses were equally abundant. *Trichosteleum Boschii* (Doz. and Molk.) Jaeg., *Trismegistia rigida* (H. and Rw.) and *Isopterygium albescens* (Schwaegr.) Jaeg. were also found on the ground. Liverworts were not so numerous as on the trees, but species of *Metzgeria* and *Aneura* were common both on the ground and on the bases of the trees.

4. Epiphytes.

(*a*) ***Bryophytes.*** The liverworts present in greatest quantity were *Mastigophora diclados* (Brid.) Nees, which was present everywhere and appeared to withstand considerable dessication, and a large species of *Bazzania.* The *Mastigophora* formed almost pure cushions, sometimes several inches in thickness, round the bases of many of the trees. Mixed with it were small quantities of more delicate species of *Frullania,* and various other plants which appear referable to the genera *Bazzania, Chiloscyphus* and *Plagiochila. Lepidozia subintegra* Lindenb. (?), a very fine hair-like species with minute leaves, was often present in masses, sometimes mixed with *Mastigophora diclados. Trichocolea tomentella* (Huds.) Nees, was also fairly abundant.

Of the less abundant species a handsome large-leaved *Schistochila* was very noticeable. A *Pleurozia* was found chiefly on the upper part of tree trunks, where no other species would grow. Its habit of growing very closely appressed to the surface of the bark is no doubt an advantage in such situations. Where it was most exposed it was often deep red in colour. It was often fertile.

Of Mosses *Sematophyllum secundum* and *S. rigens* Broth. (previously collected only on Mt. Ophir) were recorded as present on the lower parts of tree trunks. On the upper branches of the trees, in very exposed situations, were found large compact cushions of *Syrrhopodon borneensis* (Hpe.) Jaeg.

The upper branches of the trees had also lichens on them, but these were not collected. One of the lichens was often seen growing over and apparently smothering bryophytes growing in rather exposed positions.

(*b*) ***Pteridophytes.*** The most abundant epiphytic fern was *Hymenophyllum serrulatum* (Pr.), an unusually slender form. *H. denticulatum* Sw. was also common. A very small species, apparently closely allied to *H. borneense* Hk., was found twice only. These all grew among the liverworts on the tree trunks. Usually somewhat higher up, also among bryophytes, the following were quite common: *Polypodium decorum* Brack., *P. malaicum* v. A. v. R., and a small species near to *P. cornigerum* Bak.; *Scleroglossum sulcatum* (Mett.) v. A. v. R. was not so frequently noticed, and *Polypodium cucullatum* Nees and Bl. was seen once only. On still higher branches *Humata repens* (L. fil.) was occasionally present: and *H. heterophylla* (Sw.) and *Oleandra neriiformis* Cav. (both sterile) were each seen once. One plant of *Lycopodium phlegmaria* was found in a very exposed position on the upper branch of a tree in the scrub; it was very stunted.

(*c*) ***Phanerogams.*** Epiphytic flowering plants were not very numerous. They were found on trees both in the forest and in the scrub. The most striking were *Pachycentria tuberculata, Medinilla Clarkei* (also on rocks on summit) and another *Medinilla. Dendrobium uniflorum* and *Ceratostylis gracilis* were the only orchids at all abundant in exposed positions; in the forest, on lower branches, *Podochilus sciuroides* was frequent. *Eria poculata* was occasional, also *Bulbophyllum* and *Coelogyne* sp., not in flower. *Rhododendron jasmini florum, R. longiflorum, Elytranthe retusa* and *Hydnophytum formicarum* were occasional, also a small *Dischidia. Corysanthes mucronata* was found in several places growing in the masses of liverworts on the tree trunks, apparently just come into flower. Its tubers and roots were embedded in the spongy substratum, the small solitary leaves and flowers showing just above the surface. Some of the plants were exceedingly minute.

Of climbers, *Nepenthes ampullaria, N. Rafflesiana* (?) and *Smilax laevis* were frequent, but more usually present in the more open scrub.

The Matonia scrub.

Near the summit of the mountain, this vegetation consists typically of a close shoulder-high growth of *Matonia pectinata*, associated with various plants of similar stature, and isolated trees and shrubs of varying size. The most important of the former are *Pandanus ornatus, Gahnia javanica, Lepidospermum chinense* and *Dipteris conjugata*. *Dipteris* is not found in the most exposed places, being obviously less xerophilous than *Matonia*, and though almost always present was never seen dominant. The orchids *Spathoglottis aurea* and *Bromheadia palustris* were quite abundant; and *Euthemis leucocarpa* was occasionally seen. Underneath the *Matonia*, and especially round the bases of trees and shrubs, mosses and liverworts covered the ground as in the forest.

In the most open places, on very sandy soil, *Gleichenia circinata* and *Actinoschoenus filiformis* were the dominant plants, and here also on the ground were noticed the more xerophytic liverworts and *Leucobryum* spp.

The following trailing and climbing plants were frequent: *Nepenthes ampullaria, N. ? Rafflesiana, Dissochaeta annulata, Vitis gracilis, Smilax laevis,* and *Lycopodium casuarinoides*. *Gleichenia linearis* was present, but never abundant.

The most conspicuous trees also present in the mossy forest were; *Tetractonia, Gordonia, Podocarpus, Calophyllum* spp., *Tristania*. *Podocarpus* was very abundant, including many small plants, and its yellowish foliage made it conspicuous. All the trees were somewhat dwarfed as compared with their growth in the forest, *Calophyllum* most markedly, *Tetractonia* and *Gordonia* least so. The larger trees had a very weather-beaten appearance. Epiphytes were few, and stunted owing to exposure.

Other woody plants noted as frequent were *Quercus Rassa* (producing fruit at a height of only 3 feet) *Timonius pinangensis, Symplocos adenophylla, Melastoma* sp., *Elaeocarpus reticosus, Adinandra dumosa, Hedyotis congesta, Ardisia Barnesii*. On the very summit, surrounding the few huge granite boulders, was a very dense growth of shrubs, with some *Matonia*. *Freycinetia valida* was climbing on these, and *Scleria* sp. was collected. Under the shade of the rocks grew a *Lophatherum*. On the boulders were a few epiphytes, including *Medinilla Clarkei, Sonerila erecta, Bulbophyllum* sp., and *Humata repens*.

Some 300-400 feet below the summit, on the western ridge, the trees in the scrub were much larger and closer, and the *Matonia* much less, and a broad transition zone between scrub and forest developed, in which *Cypripedium barbatum* was very abundant. The transition from scrub to mid-mountain forest was not seen.

The same scrub was found on the northern face of Gunong Berchuak to the S. E. of Belumut. This hill has twin summits close together, both about 3,000 ft. above sea, and it was interesting to find that on the northern side of the southern summit there was still open Matonia scrub.

Comparison with other descriptions of mossy forest.

There are various references in Mr. Ridley's papers to mossy forest on the mountains of the Malay Peninsula, but no detailed account anywhere. It seems probable that everywhere in the cloud belt dwarfed mossy forest prevails, while the tops of the highest peaks in the main range are covered with a xerophilous scrub in which Matonia is usually present. On isolated hills such as Kedah Peak* the mossy forest is found at much lower altitudes than on the mass of the main range, and the same is true of Belumut. The peculiarity of Belumut in having mossy forest on the south slope only must be due to local conditions of weather and topography. The scrub and forest on Belumut appear to correspond with the open rock vegetation and the valley woods of the Padang of Gunong Tahan as described by Ridley.[1] There is no detailed description of the vegetation of the top of Mt. Ophir, (distant 66 miles from Belumut) but most of the species collected on Belumut have been found also on Mt. Ophir.[2] The writer cannot however attempt a floristic comparison in the present paper.

The Belumut mossy forest appears to be very similar in general organisation and appearance to that described by Miss L. S. Gibbs on Mt. Kinabalu in British North Borneo,[3] though most of the species are different. Miss Gibbs' Pl. 6 fig. 3 shows a tree of *Leptospermum flavescens* which has a very similar habit to the *Tristania* on Belumut. In another paper Miss Gibbs has short notes on similar forest on the ridges of the Arfak Mountains in New Guinea.[4]

The mossy forest on Mt. Maquiling in Luzon described by Brown[5] differs in various respects, but it is said that all such vegetation on the Philippines is not quite of the same type (p. 102). The differences from Belumut are principally in the prevalence of plants with aerial roots, and in the greater abundance of tree ferns and herbaceous ground vegetation. On Mt. Maquiling the growth of woody plants was about as dense as on Belumut, 157 individuals representing 17 species being recorded on 50 sq. metres; on Belumut 106 individuals representing about 30 species were found on 37 sq. metres. On Mt. Maquiling there was a bigger proportion of plants with non-entire leaves on the summit than at lower altitudes, whereas on Belumut the only tree with noticeably toothed leaves was *Parinarium parvifolium*. On both mountains trees of the mossy forest all have simple and rather small leaves.

The brothers Sarasin give brief descriptions of mossy forest on the mountains of Celebes,[6] and some photographs.

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*See Ridley, *Journ. S.B.R Asiatic Society* No. 34 pp. 23-30 (1900).

1. *F.M.S. Museums Journ.* Vol. 6. p. 132. (1915).
2. See Ridley's paper in *Journ. S B.R. Asiatic Society*. No. 35 pp. 1-28 (1901).
3. *Journ. Linn. Soc. Bot.* Vol. 42 pp. 1-240 (1914).
4. *A contribution to the phytogeography and flora of the Arfak Mountains* etc. (Read before the British Assn. 1916) Taylor and Francis, London.
5. Brown, W. H.; *Vegetation of Philipine Mountains.* Manila, Bureau of Science publication No. 13 (1919).
6. Sarasin, P. & F. *Reisen in Celebes.* Wiesbaden, 1905.

Giesenhagen (*Ann. Jard. Bot. Buitenzorg,* 3rd. Suppl. pp. 711-789, 1910) gives a description of the conditions under which a great development of moss growth occurs in various localities in Java and Sumatra, with a discussion of the growth-forms which mosses assume. He does not deal with the conditions under which the different growth-forms appear. There is a reference to this, however, in a short paper recently published by W. Seifriz (*Journ. of Ecology,* Vol. 12, pp. 307-313, 1924) in which the altitudinal distribution of mosses and lichens on G. Gedeh in Java is discussed. From about 5500 to 7000 feet there is a moss zone, in which the pendent type is very abundant; this is the zone of *Podocarpus imbricatus.* The next zone, from 7000 to 8900 feet is "very open in character, with a prolific growth of herbs on the forest floor. Mosses and lichens are very poorly represented." The highest zone, 8000 to 9200 feet, is "a foggy, windswept region typified by small gnarled trees, mostly of the genus Vaccinium." In the lower part of this zone there is much moss growth, but entirely of compact tufted forms, clinging close to the tree trunks; the cause of the difference between this and the lower moss zone is ascribed to the great force of the winds in the higher zone, accentuated by the lower stature of the trees. In the upper part of this zone the vegetation is more open, and the consequent greater light and reduced humidity account for the replacement of mosses by lichens. The conditions on G. Belumut are quite different, probably owing to the limited range in altitude of the cloud zone. There is nothing comparable to the great development of the pendent type of moss found in the fairly high Podocarpus forest on G. Gedeh. It needs more protection from wind than is found in the dwarf forest on Belumut. Closer growing mosses are found, but again not exclusively, as in the upper zone on G. Gedeh. The great preponderance of liverworts is not described at all from G. Gedeh; there must be on G. Belumut conditions favourable for the growth of liverworts, particularly of *Mastigophora diclados,* which are absent from the upper zone on G. Gedeh.

Regarding the biology of liverworts, a paper of Goebel's is of importance (*Ann. Jard. Bot. Buitenzorg.* 7. pp. 21-69, 1888). He describes the various water-holding lobes present on the leaves of many species, distinguishing three types; species possessing these are all epiphytic. The only notable species on Belumut that comes under any of his categories is the Pleurozia (Physotium), which is among the most specialised of all. It occurs in exposed places on the upper parts of tree trunks, where its large water sacs are of great service. Frullanias were not found abundantly on Belumut; two species grew amongst the Mastigophora, no doubt partly protected by it. Mastigophora itself possesses no water sacs; its finely divided small leaves are able to hold a certain amount of water, but it will dry up fairly easily. Probably its habit of growing in large spongy masses prevents complete dessication of the whole plant.

Karsten (*Ann. Jard. Bot. Buitenzorg,* 12, pp. 119-122, 1892) gives a list of liverworts found in Amboyna, on mountains 1250 and 1050 m. (4100 and 3450 feet). At about 700 m. Agathis was found, and above the Agathis a dwarf forest of Leptospermum, Vaccinium, Podocarpus etc., the trees being overed with bryophytes. He mentions particularly very fine species of Schistochila (*S. sciurea*) and Pleurozia species of which were also among the most conspicuous liverworts on Belumut. He gives a list of species, including *Mastigophora diclados,* but this is not mentioned as specially abundant.

Causes of the development of mossy forest.

Brown states that mossy forest is confined to the cloud belt (l. c., p. 103), and this appears to be well borne out by all other records. The great abundance of mosses, liverworts and Hymenophyllaceae, in varying proportions, is a feature which probably could only occur in such situations. It does not seem to have been pointed out, however, by previous writers, that these plants may have frequently to stand a considerable degree of dessication, as was undoubtedly the case on Belumut. The second feature which all these forests have in common is the dwarfing of tree growth. The heavy growth of epiphytes has been suggested as one cause, but this alone cannot be responsible, since trees in the open scrub on Belumut were more dwarfed than the same species in the forest. Brown, by careful correlation of many measurements of environment conditions at different altitudes on Mt. Maquiling, concludes that the dwarfing is due to a combination of lowered temperature and decrease in light intensity as compared with conditions on the lower slopes of the mountain.

Miss Gibbs' suggestion (Kinabalu, p. 47) that mossy forest may be due to edaphic factors, leading to the conclusion that it is a secondary formation, does not seem to be well founded, though doubtless edaphic factors are responsible for variations in its composition and physiognomy. Brown remarks that mossy forest probably does not constitute a single homogeneous type, but that our present knowledge does not suffice to classify the various forms it may adopt, and this seems a very reasonable conclusion.

The pioneer vegetation on the summit of Gunong Belumut must have been of a xerophilous nature, owing to the fact that clouding is not continuous and that there are intervals of considerable insolation. Matonia scrub therefore probably represents an early stage in the development history of the summit vegetation, becoming transformed gradually into mossy forest in those parts where clouding was most frequent. The condition of the north slope thus represents as arrested early phase in the development, which is doubtless in equilibrium, having reached as advanced a stage as conditions will permit. Edaphic factors may be partly responsible for this arrest in development, but observations made up to the present are too limited for any definite opinion to be given.

Considering the mossy forest as the climax plant association of the cloud zone, it is interesting to compare it with climax associations of temperate regions. The most striking fact which is at once evident is that we have here no single dominant species. We appear rather to have present a number of species of about equal stature no one of which has sufficient advantage over the others to approach dominance. All have rather small simple leaves decidedly coriaceous in texture. The most numerous appear to be various species of *Eugenia*. In their variety these trees agree rather with the second storey of the Dipterocarp forest than with the upper storey, in which there appears to be definite dominance of one or a few species. *Gordonia* and *Tetractonia* and possibly others certainly project above the bulk of their neighbours, but it is doubtful whether they protect the other trees in any way.

R. E. Holttum.

TWO HYBRID TREES OF HEVEA BRASILIENSIS×H. CONFUSA.

In the Gardens Bulletin, II (1919) p. 113, an account was given of a *Hevea* tree found in the Economic Garden, and determined to be *Hevea confusa*. That species is known to be a very inferior producer of rubber, and a danger to rubber-cultivation where its presence can lead to hybridisation. For that reason the tree was destroyed at once. It had newly fruited and seedlings had been raised of which two were kept for observation in a remote part of the Botanic Garden.

Those two have just flowered at the age of five years, and been destroyed in their turn, so that nothing of the objectionable type persists. They had been under observation through their growth, and their flowers have been very carefully examined: the result has been a complete demonstration that both trees were hybrids with H. *brasiliensis* as the male parent.

This demonstration of cross-pollination between the two species is not as interesting as another given by Mr. H. C. Pearson in the *India Rubber World* for October 1st, 1919, p. 46, for in that, seed of a fine *H. brasiliensis* in Trinidad produced plants which showed *H. confusa* in their constitution originating from a tree one-hundred yards away, the distance between the two parents having been very much less in the Singapore. But it is interesting as a demonstration of the great degree to which cross-fertilisation is carried in the Rubber tree. It is a cross in the opposite direction to Mr. Pearson's namely of male *H. brasiliensis* on female *H. confusa*. It is also a lesson that from a plantation of even pure *H. brasiliensis*, if first class seed is wanted, the inferior yielders should be removed, as cross-pollination occurs to such a great extent.

The two hybrid trees of the Botanic Gardens differed between themselves. The one had darker bark than the other, and leaves with more of the arching in them that characterises *H. obtusa*. Both had the white latex of *H. brasiliensis*, but that meagre as in *H. confusa*. When the flowers appeared, the males were found intermediate in shape, and to face earthwards as in *H. confusa*, and were softly downy outside, but the anthers were as in *H. brasiliensis*. Female flowers were very few, probably because the trees were flowering while still too young for full reproductiveness.

I. H. Burkill.

VARIETIES OF DIOSCOREA PENTAPHYLLA IN MALAYSIA.

This widely distributed species occurs in several varieties in Malaysia and with our present knowledge five may be defined. They are:—

Tubers elongated: rusty hair abundant on the above-ground parts: the leaflets broad .. .. *malaica*

Tubers not elongated: so that their length is not twice their greatest diameter:

Tubers not flattened, abundantly covered with roots, much lobed: rusty hair abundant on the above-ground parts: leaflets broad:

Leaflets large, up to 20 cm. by 6 cm.: flowers large: numerous large simple leaves produced among them .. .. .. *papuana*

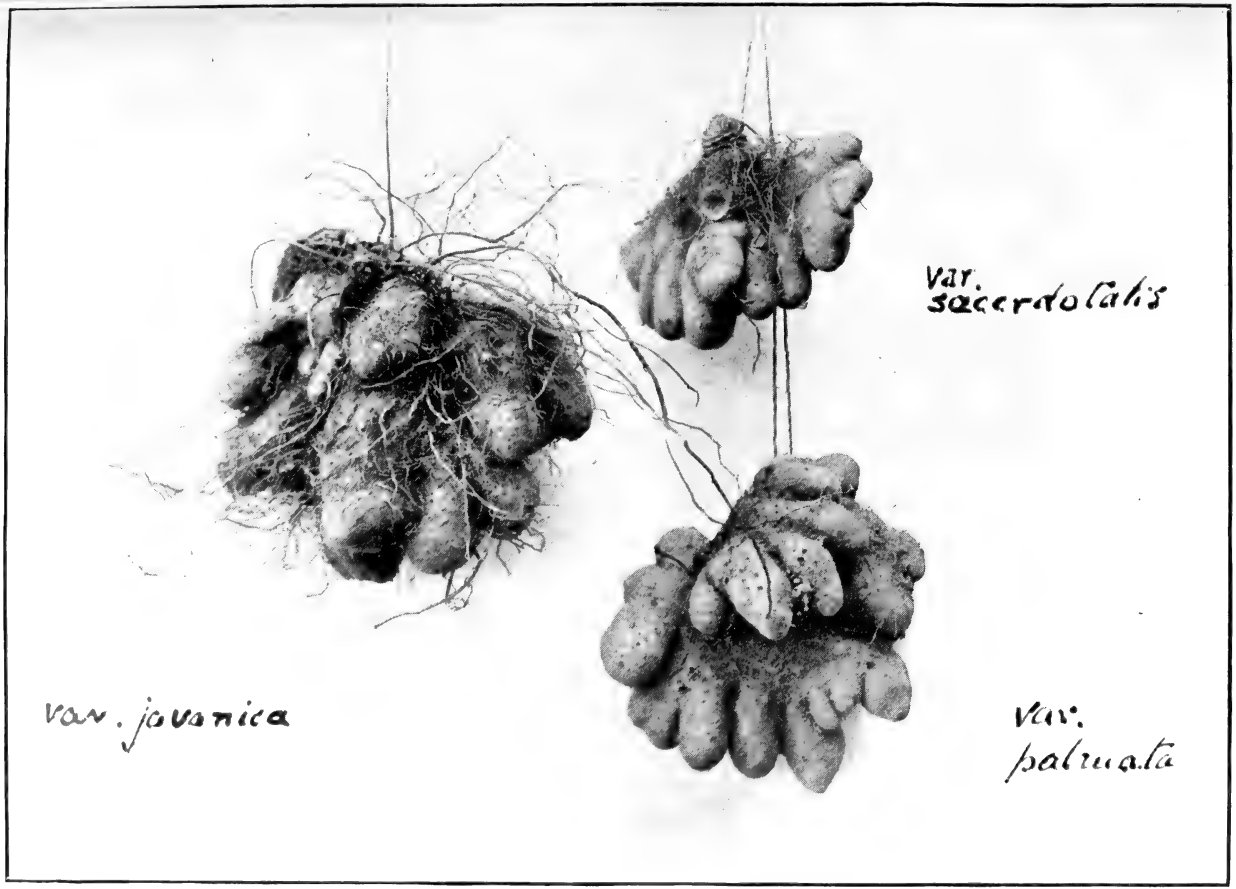
Leaflets smaller, up to 10 cm. by 3.5 cm.: flowers small: simple leaves about 2 cm. by 2 cm. .. .. *javanica*

Tubers conspicuously flattened and relatively free from roots, much lobed: grey hairs present in the place of rusty red hairs;

Leaflets relatively large, up to 20 cm. by 4 cm.; flowers rather large: tubers as far as seen larger than in the next .. *palmata*

Leaflets relatively small, up to 14 cm. by 3.5 cm.: flowers relatively small: tuber as far as seen smaller than in the last .. *sacerdotalis*

The variety *malaica* is that which furnishes the "ubi jabbet" of the Sakais in the centre of the Malay Peninsula, and they not only eat it from wild sources but plant tubers in the neighbourhood of their houses. The Sakais of Northern Perak have another name



Tubers of three varieties of Dioscorea pentaphylla.

for it, *i.e.* "kasu," and they too eat it. The variety *papuana* furnishes a food eaten in the neighbourhood of Port Moresby, where it grows wild, and is considered as of two kinds called "maloa" and "bakuta." The variety *javanica* is the wild plant of Java. The variety *palmata* occurs in cultivation in the Philippine islands, and the variety *sacerdotalis* in cultivation in Java.

As a help towards the definition of these varieties the plate opposite gives figures of three of them. Four tubers of the variety *malaica* were figured in this Bulletin in the plate in no. 3 of volume II, opposite p. 92.

The writer has eaten *D. pentaphylla*, var. *palmata* and found it good. As yet the variety *sacerdotalis* has not been eaten. The tubers of the other three varieties are certainly nauseous.

There is a kind in Papua near Port Moresby known as "lebeta" which seems to differ from the above, and needs more study.

With the knowledge to hand at present it is impossible to identify the three forms of *D. pentaphylla* which Rumpf described in his *Herbarium Amboinense*, lib. ix., cap. xiv. He called them "the white," "the red" and "the fusc."

The white, he stated produces the largest tubers: they have the outline of a hood or cape, that is to say expanding downwards: and the lower margin ends in lobes. The upper part carries too much fibrous tissue to be eaten: the lower part is softer and can be eaten, but possesses a vile flavour. The red, he described as smaller, and a better food. The fusc colours the water in which it is boiled blackish and boils black itself. All three were to be found in the island of Bima i.e. Sumbawa: the red was also in Buru and Bali: one or another was also in Celebes, Amboina and the Moluccas, but he does not specify which. His figure more nearly suggests var. *javanica* than the others. It appears then that to fully understand Rumpf attention must be turned to Sumbawa.

In the last issue of this Bulletin, on p. 137, attention was called to certain interesting sanskritic names applied in Java to *Dioscorea pentaphylla*, and it was suggested that they indicate a religious use of the tuber as a food for fast days, similar to the use by the Hindus of Upper and Central India of *Dioscorea esculenta*, and of a meal made from *Dioscorea hispida*. These sanskritic names belong to the variety *sacerdotalis;* but there is no indication that the Hindus brought the variety into their kingdoms in Java with their religion; they found it probably in Malaysia and adopted it.

I. H. Burkill.

DIOSCOREA PISCATORUM OR TUBA-UBI, A FISH-POISON.

Dioscorea piscatorum, Prain and Burkill, is a newly published name for a plant which appeared in Mr. Ridley's *Materials for a Flora of the Malay Peninsula, Monocotyledons*, 2, (1907) p. 84, as *Dioscorea* sp. He had made acquaintance with it from a sterile herbarium specimen collected by Mr. A. D. Machado of the Kemuning Estate in Perak; and then about the same time a reward was offered at an Agri-Horticultural exhibition in Kuala Lumpur for a collection of such fish-poisons as act like Derris; and in one of the competing exhibits was a tuber labelled "tuba-ubi" which Mr. Ridley, acquiring it for the Botanic Gardens, Singapore, identified as the Dioscorea collected by Machado (*Agric. Bull. Straits and F. M. S.*, 7, 1908, p. 443). He grew it until 1912; but it did not flower and no specimens were preserved. In 1915 a plant was found on Pulau Tiuman with the characters of Machado's; but it was impossible to get it into cultivation as it was in full growth. In 1921 herbarium specimens and tubers, corresponding closely, were got from Sibolangit in Sumatra. These are in cultivation in the Singapore Botanic Garden, and the piscicidal properties have been proved, as the following note shows. A tuber from Sibolangit was figured in this Bulletin in the plate opposite p. 4 of the current volume, under the title of "a spiny yam from Sumatra."

Half of a tuber about 15 cm. long was pounded up with water. The tuber was very fibrous and light reddish in colour; the juice was slightly milky, with a soapy froth, and of the same colour as the flesh. It was poured into a vessel 60 by 38 cm., into which water had been run to a depth of 10 cm. Eight fish of the species *Puntius binotatus* (Cuv. and Val.) of length varying from 6.5 to 10.5 cm., freshly caught from the Gardens lake, had previously been placed in the vessel, and were swimming about vigorously. When the juice of the tuber was poured in, the fish at once appeared uneasy. They swam round and round the vessel rapidly, and frequently came to the surface with open mouths; then their movements gradually became less and in under ten minutes they turned over, floating motionless for a few seconds at a time, showing their white lower surface. The quiescent periods grew longer, and after a few more minutes active motion was occasional, and only by slight vibrations of fins and tail. When in this condition they were transferred to fresh water, but the poison had gone too far to admit of recovery and in a few minutes more they were quite dead.

We are indebted to Mr. F. N. Chasen of the Raffles Museum for the identification of the fish.

I. H. Burkill.

R. E. Holttum.

A STUDY OF THE COCONUT FLOWER AND ITS RELATION TO FRUIT PRODUCTION.

Introduction.

The literature on the biology of pollination and fruit production of coconuts is extremely sparse and what little is available is distributed in numerous books and periodicals so that investigators have experienced great difficulties in consulting them. An attempt is made here to bring together all the available studies on the subject, including my own observations, a part of which have already been published in the *Poona Agricultural College Magazine* and the *Agricultural Journal of India* ([10]).

I am indebted to Mr. I. H. Burkill for the information quoted in this paper from the German and Dutch books and to Mr. F. N. Chasen for the identification of some of the insect visitors to coconut flowers.

The Inflorescence.

Coconut inflorescences are formed in the axils of every leaf of a bearing tree and not of every third leaf as some writers have supposed ([8]) & ([17]). It is true that some axils fail to throw out any inflorescences, but this is because these inflorescences have become abortive; and even then these aborted inflorescences do not bear any definite relation to the others which grow so as to justify the statement that the inflorescences are produced in the axil of every third leaf. A very prolific tree will produce twelve or more inflorescences per annum or approximately one per month. There are records of trees having produced sixteen inflorescences per year ([2]) & ([17]).

As the flowers appear in the axils of leaves, it will be worth while to know that the leaves are arranged on the stem in the form of a spiral so that every sixth leaf opens, nearly above the first one, that is, each leaf opens according to the calculation of Sampson in India ([21]), at an angle of approximately 142° round the circumference of the tree from the previous leaf. In Goa the coconut harvester divides the coconut trees under two classes, the right- and left-handed ones, according as the spirals formed by the leaves and, therefore, by the inflorescences, are right or left. Both Costa ([8]) and Loyola ([17]) who maintain that the coconut inflorescences arise in the axils of every third leaf give correct diagrams of the phyllotaxis of the coconut inflorescences. They were probably misled in their observations on the orientation of the coconut inflorescence by their mistaken view that the coconut leaves are arranged in concentric circles and not in a spiral.

The inflorescences first appears enclosed in a thick, fibrous sheath called the spathe which is again protected during its early life by one more yellow sheath of somewhat flat nature and of softer fibres. This outer sheath stops growing very early in the life of the inner spathe so that the latter punctures it with its hard point on

its ventral side (*i.e.* the side towards the subtending leaf) and comes out erect as a yellow somewhat flattened cone, which later on as it grows, turns green, curves a little outwards and becomes more round than flat. In course of time when the spathe is of full grown, the development and distension of the inflorescence within causes a great pressure on the walls of the spathe with the result that it ruptures longitudinally along a groove usually on its ventral side and the flowering branch eventually emerges: sometimes, however, the rupturing of the spathe takes place on its dorsal side but then the spadix turns round till the inflorescence within falls out. The process of splitting is very slow, the slit which appears at first at a point about an inch and half from the apex, takes about twenty-four or more hours to reach down and give egress to the inflorescence. It is at first yellowish white in colour, but later on it turns greenish and also inclines downwards from its vertical position.

The cocount is essentially a monoecious plant, that is, stamens and pistils are produced in separate flowers on the same tree and in the case of coconuts in the same inflorescence, and, though some coconut palms will at times show a very marked tendency to produce spadices with all florets male, spadices are not usually produced in coconuts where all flowers are female and none male. The tendency to produce completely male inflorescences is particularly apparent when the palm produces the spathe for the first time in its life. There is a great variation in such trees: some will produce their second or third inflorescence with female flowers, while others will bear no female flowers even in the sixth inflorescence. If this variation is due to hereditary qualities, then this factor has also to be taken into consideration in selecting seed-nuts. The tendency to produce completely male inflorescences is at times manifested by trees which are given rest after a prolonged period of tapping for toddy.

The inflorescence itself consists of many flower-bearing ramifications or spikelets situated on a fleshy peduncle: hence the inflorescence is termed a spadix. Its size varies from two and half to six feet in length from the tip to the base, depending upon the vigour and individuality of the palm. Each branch is fringed with numerous male florets from tip downwards and lower down bears one or more female flowers, all the flowers being sessile or subsessile as Aldaba calls it. At times, however, some of these ramifications become spathulate and then partially or wholly sterile. Some of the branches in an inflorescence may produce secondary branches. As far as my observations stands, such inflorescences rarely produce female flowers which may be produced even on the secondary branches. Most of these inflorescences were noticed on trees heavily manured with nitrogenous manures, but I was not able to ascertain whether the manure was responsible for the branching and reduced fertility of these spadices.

The Male Flower.

The male flowers always exceed the number of female flowers in the same spadix and may vary from a few hundreds to thousands, depending upon the number of ramifications in the spadix and the length of the flower-bearing regions in them. Each male floret has six yellow perianth leaves arranged in two whorls, the inner three alternating with others which are about one-third of the former in size. Enclosed in this floral envelope there are six hammer-shaped stamens which yield large quantities of powdery yellow pollen. Aldaba ([1]) has estimated that each male flower carries about 272, 358, 504 pollen grains. In the centre of each male floret there is a rudimentary pistil which divides at its apex into three teeth, each bearing a gland, the nectar of which attracts ants, bees and other creatures. Rarely this rudimentary pistil is absent ([19]). A case has been noted where these abortive ovaries were stimulated to grow so that the coconut palm bore, "instead of the few ordinary fruits at the base of the spadix, great numbers of small, crowded, narrow, quite banana-like fruits." ([25]) The male florets start opening from the tip downwards and liberate pollen, though sometimes a few flowers may open out of order. This opening of male flowers and shedding of the pollen lasts about a month, the inflorescences with secondary branches taking a little more than the usual period.

The Female Flower.

The female flower are comparatively extremely few, their number in each spadix varying from zero to over 300 and being dependent upon the strain, treatment, etc. They are always produced towards the basal portions of the spikelets. Many of the yellow-nut-producing varieties from the Konkan (West Coast of India), for instance, are usually very shy in bearing, while the dwarfish varieties of Goa (the *Benauly* seed) or dwarf varieties of Malaya enjoy the reputation of being heavy producers.

Prior to its opening, the female flower is a small spherical body of about half an inch in diameter with a great resemblance to a small nut. These female flowers consist of six floral leaves which are arranged as in the male flowers and which completely envelope the pistil; but these are much larger and stiffer than those in the male florets, and the outer three are almost equal in size to the inner ones. Apart from these six perianth members, there are two more just at the point of attachment of the flowers to the stalk, resembling the others in colour and texture, but differing from them in that they are broader and shorter. These two may be termed prophylls or bracteoles. Usually there is a male flower on each side of the female resting on the same cushion on which the female is seated. The pistil is a small whitish body consisting principally of embryonic tissue of husk. From its tip there extend downwards three ridges which make the whole ovary look globosely three-sided, each side being provided at its tip with a groove. These three grooves meet in the centre and are the parts of the stigma. It will

be seen by cross-sectioning the pistil that just above the thalamus there is the ovary (embryonic nut) with its three carpels, two of which normally become abortive even at this early stage. Sometimes, however, all three ovules get developed and when fertilised produce a trilocular-nut which on germination gives a tree commonly mistaken for a branched coconut palm.

Pollination and Fertilization.

Before proceeding any further a distinction between Pollination and Fertilization may be made with advantage so as to avoid confusion on this matter. Among the fruit culturists, the term pollination is often applied to designate all the influences concerned in the setting of fruits; and the term fertilization is often given the same significance. In botanical usage, however, pollination means simply transference of pollen grains to the stigma, while fertilization is the fusion of the male element from the pollen with the female element in the ovule, and therefore, conveys the idea that, prior to this fusion, the stigma has to be pollinated and the male element must reach the ovum through the pores in the stigma. Cases, however, may occur where these two stages previous to the fertilization may take place and stimulate the pistil to grow and yet the actual fusion may not eventuate producing seeds destitute of any of embryo. The coconut fruits known as "barren" "imperfect," "male," "man" or "seedless" coconuts are probably a result of such a phenomenon. Such nuts have been observed by me in India and Burma, have been recorded from Jamaica ([16]) and British Guinea ([3]), and probably occur in most places where coconuts are grown. They can usually be distinguished from others by being narrower, and inside have shell-substance and a cavity and sometimes even a diminutive nut with or without some kernel, but no embryo. Apparently the stimulus of pollen is not even necessary for such a development in coconuts, for Bailey ([4]) has written that "Coconuts, like many other fruits, often grow to a considerable size without pollination, and then perish." It must not be ignored, however, that a fruit without an embryo may be the consequence of actual fertilization, but that it does not contain any embryo, because the embryo ceased to grow soon after the fusion of male and female element in the ovule without thereby arresting the development of the fruit. A comparative study of these abnormal coconuts and normal ones from Jamaica made by Kupfer ([16]), indicated that the substance which usually goes to the formation of seed was, in the case of seedless nuts, devoted to increasing the bulk of husk. "Since no trace of fungus, insect, or bacterial activity could be found, no direct evidence as to the cause of the condition of the defective fruits could be produced. The probability is, however, that the responsibility for this state of the fruiting organs is to be laid against none of these agents, but is the result of the failure on the part of flower to effect pollination."

Some coconut trees produce "male" nuts habitually in all seasons of the year and others in certain seasons only of every year

or after a number of years; and still others do not produce male nuts at all or produce only this kind of fruit all their life. Might not this quality be associated with hereditary factors? In many plants, for instance, the production of sterile pollen grains and ovules is due to an inherent factor, though influences such as climate may modify these qualities to a slight extent. On the other hand, there is the possibility that the inability of ova being fertilized lies in the fact that the nutrition is defective; for it has been shown by experiments that weak and poorly nourished orchard trees often produce ineffective pollen, or unfavourable weather conditions cause great losses by preventing the proper maturity of the pollen or pistil. Aldaba (1) has shown that desiccating influences reduce the vitality of pollen, while it is a matter of common belief among planters that heavy downpours of rains excessive cold, heat and winds, or prolonged droughts interfere with setting of nuts.

When it began to be realised by coconut planters that ordinarily fertilization was necessary to produce coconut fruits, it was customary to consider all the female flowers, even when they were not ripe to receive pollen, as fertilized or at least pollinated flowers. Thus in 1898 the late J. M. de Sa (20), then a District Administrator of the Village Associations of Goa, wrote in his book "O Coqueiro" that he had seen pollinated or fertilized flowers even in unopened spathes: and the same idea was repeated about 14 years later by L. C. Brown (5), late Inspector of Coconut Estates in the F. M. S. in a communication made to Mr. H. H. Smith, the senior author of the *Consols of the East.* On this view Fredholm (9), who, as far as I am able to make out, was the first man to correct the view, remarked thus:—"But when you state that pollination takes place to a certain extent before the actual full opening of the sheath, so that young fruit, which may or may not properly set, is observed half-formed as soon as the flower-spike comes into view, then you are wrong. You have evidently mistaken the female flower bud for the young fruit (the fertilized ovum). In this plant in-breeding is so exceptionally well guarded against that it is well-nigh impossible, the pollen grains and the ovules of one and the same inflorescence never arriving at maturity simultaneously. On this point I write, in my articles, as follows:—In-breeding or close-breeding is guarded against as much as possible in nature. It is prevented, in the case of the coconut palm, by a difference in the time of expansion of the male and female flowers on the same spadix, and as a palm rarely has more than one inflorescence at a time with open flowers, the pollination of the female flowers is generally brought about by pollen from the staminate flowers of another palm. Thus cross-pollination is the rule. The pistillate flowers do not expand before the staminates of the same spadix have shed their pollen and fallen out. Until that time the gynaecium remains completely covered by the perianth leaves."

Observations made by various other investigators such as Petch (18) in Ceylon, Sampson (21) in India, and Jepson (13) in Fiji, confirmed those of Fredholm's. But though the conclusions

of Fredholm appear to hold good in most of the countries where coconuts are grown, they are not universally true. Not only is there the possibility of exceptions occurring in places where normally the female flowers open when all of male flowers have been shed ([10]), but in certain places as in the warm, humid lowlands of Malaya "the female phase not only begins, but most frequently ends before, or at the same time as, the male phase, thus rendering self-pollination the rule instead of being an occasional chance occurrence ([12])." Messrs. Jack and Sands from whom the above quotation is taken have succeeded in obtaining fruits by bagging an unopened coconut inflorescence, and my observations on the dwarf varieties in the Botanic Gardens, Singapore, lend support to their conclusions. This behaviour of the palms in the F. M. S. may be due to some hereditary qualities; but is also possible to attribute this variation in the anthesis of coconut flowers to climatic conditions and the fact that Van der Wolk ([24]) has shown that the ripening of female flowers is hastened by covering them with black paper so as to reduce light and warmth, may be invoked in support of this

The mode in which the coconut flower presents its stigma for the reception of the pollen is quite different from that of most of our garden flowers. In the latter the petals become loose as the stigma matures, open out exposing the stigma and then after a time wither and drop off. Such however, is not the case with the members of the perianth of the coconut flower. They never drop off unless the ovary or the fruit itself is detached and when young they form a very tight case in which the pistil is protected. The perianth leaves grow extremely slowly attaining the final length of about two to three centimetres, whereas the pistil inside grows comparatively at an enormous rate so that it forces them apart and extrudes the stigma-bearing region, on the ripening of which the stigmatic grooves become exposed to receive pollen. There is a secretion of nectar both from these grooves as well as from the region surrounding them. The period during which the female flower remains receptive varies in different places. At Akyab ([10]) and at Peradeniya ([18]), for instance, it is about 24 hours, while in Los Banos ([1]) and Singapore it is about 2 to 3 days.

Biology of Pollen.

Pollen grains of the coconut are spherical and smooth, without any asperities, but on exposure of a few seconds they turn ellipsoidal with a single meridian groove or suture which, according to Kerner ([14]), is characteristic of palms. On wetting the grains resume their original shape, the longitudinal fold disappearing. This groove seems to point out that coconut pollen belongs to the type adapted to be transported by insects rather than to the type easily wafted by winds. There are two kinds of pollen grains, fertile and infertile, the latter are about half the size of the former. Aldaba's ([1]) countings show that infertile pollen grains vary in the

Philippines from 3 to 33 per cent, but in Singapore the abortive grains appear to be very few.

It is the general belief that pollen grains of palms, when kept in dry condition, retain their fertilizing properties unimpaired for a very long time so that they can be exported to distant countries for the purpose of pollinating certain varieties which are desired to be crossed, and Kerner ([14]) quotes a tradition which says that the pollen of Date-palms together with that of Hemp and Maize, can be used effectively for artificial pollination even after a lapse of eighteen years. Hence I made pollen culture in cane sugar solutions to ascertain whether there was any possibility of female flowers being fertilized in nature with the pollen from the same inflorescence. At the time I started my studies I had come across only a few exceptions at Akyab where female flowers ripened before the male flowers in the same inflorescence had finished shedding their pollen, but had not seen the paper by Aldaba on the subject, nor did I know of the studies made by Jack and Sands which show that in Malaya self-pollination is the rule rather than the exception. Hence I duplicated many of the results obtained by others. In these studies I obtained the best results with 20% cane-sugar solution, and it was found that every day more and more pollen grains lost their vitality when kept under ordinary conditions till on the seventh day only 3% showed any germination and after that period no grains were seen germinating. Aldaba's ([1]) findings show that in Los Banos, 25 to 30% are the best cane-sugar solutions for effecting germination of pollen grains of the coconut, that pollen remains viable for two to nine days, and that pollen grains from different trees do not maintain their viability for the same length of time.

Now we have seen above that in many places the staminate flowers fall off before the stigmas of the female flowers in the same inflorescence become receptive and it is usual among the planters to argue that where this occurs in-breeding or fertilization by the pollen from the same inflorescence is impossible and that emasculation of the inflorescence of which female flowers only are to be used is unnecessary. That this way of arguing is fallacious is shown by the above results which show that pollen may, under ordinary conditions, retain its vitality even for nine days. Added to this there is the danger of female flowers ripening earlier than usual and, thereby, of their getting self-pollinated, thanks to the reduction of light and warmth caused by the bags used to protect the flowers from foreign pollen; for in the above referred experiments with black paper Van der Wolk ([24]) was able to secure self-pollinated nuts from trees where under ordinary conditions self-pollination was impossible.

When, instead of being kept exposed to ordinary atmospheric conditions, the pollen grains were preserved in celluloid capsules such as are used in administering quinine powder to patients, and the capsules were coated with melted tallow, a greater percentage of pollen grains were found to remain viable. Sampson ([21])

writes in his *Coconut Palm* that coconut pollen can be preserved for several days in hermetically sealed tubes without losing its vitality. But further investigations in this matter are needed so that a system of artificial pollination may be evolved which will insure the rapid improvement of so important a crop as the coconut. It should also be such as to render it easy for planters to know not only the maternity but also the paternity of the seeds chosen. "If pollen grains are wetted," writes Sampson ([21]), "they at once assume a rounded shape and commence to disintegrate within the space of two or three hours. It is thus evident that, in the moist tropical climate which favours the growth of the coconut palm, there is no chance of the shed pollen grains remaining dormant till the female flowers are open and receptive." We have seen that when exposed to ordinary conditions in a laboratory in Singapore pollen remained viable for even seven days. But to test how long the vitality of pollen may remain when it is exposed to an atmosphere saturated with moisture, some was dusted on to a slide kept on a cell and put into a closed petri dish partly filled with water. It was found that had after 6½ hours exposure to such saturated atmosphere the pollen had not lost its vitality, but after 12 hours exposure to such conditions more than 75% of the grains had lost their vitality.

Pollinating Agents.

In most countries, as has been explained above, there is very little chance of the female flowers being fertilized by the pollen from the same inflorescence. This means, therefore, that they have to depend for pollen upon other inflorescences, either from the same tree or from others. The chances of obtaining pollen from an inflorescence on the same tree are very much reduced by the fact that it is only occasionally that a fresh inflorescence opens before the previous one has finished flowering, and this in spite of the vigour and prolificness of some trees. This means that a large number of female flowers have to depend for their pollen on other trees. This explains why in most countries there is so much variation in the seedlings raised from the nuts of the same tree or even from the same inflorescence, when seedlings raised from dwarf coconuts of Malaya where cross-pollination is an occasional chance occurrence behave so like their parent palms ([12]).

Since the stamens and pistils are borne in separate flowers, the pollination in nature can only take place with the pollen brought by winds, or by insects and other creatures that are attracted to them because of their peculiar scent, colour, nectar etc. Knuth ([15]) remarks that the coconut is pollinated through the agency of wind, but quotes Fr. Dahl who noticed the birds *Charmosyna subplacens* Scl.,*Cinnyris frenata* S. Mull. and *C. corinna* Salvad. as the frequent visitors of coconut flowers in the Bismarck Archipelago. According to Petch ([18]), pollination is effected chiefly by bees and hornets in Ceylon, though from the structure of the flower, he admits that the wind may be also responsible for the transference to a great

extent. Hunger states that the coconut is pollinated by wind as well as by insects, and among these figure wasp (*wespen*), bee (*begin*), fly (*vliegen*), beetle (*kevers*), and ant (*mieren*). Aldaba (1) working in the Philippines found so little pollen carried by wind from one tree to another that he attaches very little importance to cross-pollination by this agent. The principal insects observed by him as probable pollinating agents are the house fly (*Musca domestica* Linn.) several species of *Lucilia* (Diptera), *Vespa luctuosa* Sauss., *Sarcophaga* sp. *Rhynchium atrum* Sauss., *Apis indica, Trigona biroi* (Hymenoptera) and *Prionecerus caeruleipennis* Perty (Coleoptera). Sampson from the peculiar structure of the flower and the honey glands infers that nature has intended that the coconut flowers should be fertilised by the aid if insects. Burkill (6) has noted *Apis dorsata* and *A. indica* on coconuts in Singapore, but remarks that this genus is often found in the Malay Peninsula on palms overwhelmingly "on male flowers, or on flowers in their male stage, obtaining food without giving what would seem to be an adequate return" and that only *Apis indica* has been seen behaving in that manner in Singapore. The observations of Jack and Sands (12), on the pollination of coconuts in the Malay Peninsula are of unique interest. "In three unopened inflorescences which were bagged in muslin bags, self-pollination was effected naturally and fruits were formed, while in three other inflorescences which were emasculated immediately on opening, no pollination took place and no fruits were formed, though the female flowers behaved normally and although male flowers on adjacent trees were in full bloom. In a similar connection, it has been observed that odd isolated coconut trees growing even under bad conditions produce fruit so that self-pollination must take place. When coconut flowers are in full bloom, at about 10 a.m., when the dew has dried up and when the gentle breezes frequently begin, clouds of pollen can be seen floating away in sunlight. In a very slight breeze these pollen clouds do not travel far owing to the weight of the pollen but it is highly probable that with the strengthening of the breeze as the day advances the pollen clouds are carried to considerable distance and thus cross-pollination is effected." From this it would appear that insects play an unimportant part in the pollination or rather cross-pollination of coconut flowers in the Malay Peninsula. However, as said above, in most countries where coconuts are grown the coconut flowers behave differently. Aldaba's (1) results support the view held by many planters outside the Peninsula that an isolated tree does not bear fruit if male flowers in the succeeding cluster do not shed pollen during the period when the stigmas of the female flowers below are yet in a receptive condition, and that a tree in a grove under the same conditions bears fruit. Jepson (13) who paid a special attention to the insects beneficial or otherwise to coconuts, after saying that pollination of coconuts in Fiji is dependent on wind and insects, among which he noticed bees and some black hymenoptera, attributes the dropping in many districts of Fiji of female flowers in large numbers, resulting in poor yield, to the

great scarcity of insect life in the vicinity of an open inflorescence. He corroborates his view by the observation that, on estates where bees are present in large numbers owing to artificial rearing or otherwise, the yield of nuts is very remarkable high. On these grounds he advises the planters in Fiji to introduce bees on their coconut estates with the view of increasing their crops.

My own studies on this subject have not been very extensive, but they throw some further light on the various points raised by the previous investigators. Regarding the ant as pollintor Petch (18) writes: "In considering the potential insect vistors to flowers in the Tropics one has always to take into consideration the ubiquitous ant. At first sight it seems possible that this insect may take part in the conveyance of pollen from male to the female flower, especially when the periods of the inflorescences overlap. In that case they might convey pollen from one inflorescence to another on the same tree. But it is improbable that they should convey pollen from one tree to another, because the journeys of this species, as a rule, do not extend to two trees.

"There is, however, a special provision on the female flower of the coconut which more or less effectually excludes ants from the work of pollination. The region below the stigma, almost the whole of the area which is exposed when the female flower opens, bears a large number of pores. When the flower is ripe these exude a quantity of moisture which, at least in fine weather, forms a ring of liquid round the stigma and prevents the ants reaching the latter. It is not uncommon to see a crowd of black ants congregated round the edge of this ring. It is probable that, as is usual in cases of this kind, the liquid contains some sugar, so that the ants obtain what they want without robbing the stigma. In any case, it keeps the ants away from the stigma. The position of these water pores can be clearly seen on the young fruit where they are indicated by small whitish spots. These spots owe their colour to masses of minute crystal which are deposited by the liquid."

In the Botanic Gardens, Singapore, I have not found the secretion is in sufficient quantities as to exclude the ant from the stigmas. Hunger has included ants among the pollinators of coconut flowers, and Aldaba admits the possibility of pollination by ants when he presumes the conveyance of pollen by ants as the probable reason for the development of a nut in an emasculated bagged inflorescence. However it may be that the climate of Peradeniya is favourable for the accumulation of the liquid in such large quantities. In places, therefore, like Singapore, where secretion is not in sufficient quantities as to exclude the ant from the work of pollination, it will play an important part particularly with coconuts where male and female flowers ripen together so as to insure self-pollination.

The insects that seem to do yeoman service in pollination or cross-pollination of coconuts in Singapore are some species of *Melipona* (the *dammar* bees), *Apis dorsata,* and some *Muscidae*

principally *Musca* very near *nebulo* (the common, Oriental housefly), *Lucilia* sp., and *Pycnosoma* sp. These were seen visiting freely both the male and female flowers, though the flies seem to engage themselves more in sipping the honey from the female flowers than in feeding on the pollen or honey in the male flowers. *Apis indica* was a rare visitor to the male flowers, but this bee, according to Burkill, does not give an adequate return for the food it obtains from the flowers of palms. Wasps do not appear so useful as the bees in pollination as they visit the flowers mostly for the purpose of preying on the bees and other insects which are usually beneficial to the pollination of palms. *Vespa cincta* was frequently observed hunting insects and only on one occasion it was observed alighting on male flowers. *Cyrtostomus pectoralis* Hors., was seen but once sipping the honey from the female flowers of a coconut and according to Mr. Chasen of the Raffles Museum, Singapore, *Anthreptes malaccensis* is the sunbird which is almost invariably associated with coconuts in the Malay Peninsula. Various other birds were also seen in the vicinity of coconut inflorescences, but it must be borne in mind that even those birds which possess especial adaptations in their beak for extracting nectar from various kinds of flowers, often visit the flowers for the purpose of capturing insects for their prey and hence the utility of birds in places where there are insects such as bees to pollinate the flowers, is, like that of wasps, doubtful.

My emasculation experiments on dwarf varieties gave results which differ from those obtained by Jack and Sands in the F. M. S. in that I have been able to obtain nuts even though the nearest tree from which pollen could be brought was about 50 yards away from the tree, and though the inflorescences looked sickly and the nectar secretion was reduced because of the injury resulting from the emasculation. Further I have seen nuts developing on those few inflorescences where female flowers became receptive only after the falling of the male flowers. It makes me wonder therefore, whether the failure in F. M. S. to obtain fruit from emasculated inflorescences was not due to the injury resulting from the emasculation or to the absence or scarcity of insect life useful in the pollination of coconut flowers. By keeping unpollinated emasculated inflorescences side by side with the emasculated but artificially pollinated ones it would be possible to throw considerable light on this point.

Influence of Manures.

It is a known fact in horticulture that application of too much nitrogenous manures causes the plants to vegetate at the expense of flowers and fruits, while lime and phosphates tend to divert this energy in the opposite direction, namely to the production of flowers and fruits. Does the same thing occur in coconuts? What manures exert beneficial influence on the flower production in coconuts and what others act detrimentally? Unfortunatelly coconuts have received very little attention in this line from the in-

vestigators and hence our knowledge is at present very limited. We only know that tillage and manures increase the yield and that coconuts require more potash, and probably salt also, than many other fruit crops. However, it must be understood that to study the influence of manures on flower production is not an easy matter in the case of coconuts especially because the immediate effect of manures on estate is often to increase the vegetative growth and to reduce the yield of crops. In making such experiments due consideration has to be given to the fact that the yield in coconuts can be increased in a number of ways, the following being the principal ones:—

1. By the increase in the number of female flowers in each spadix;

2. By causing to grow the spadices that otherwise would have been dormant or abortive;

3. By the rapid production of leaves and inflorescences, due to increase in the number of leaves produced during a given time.

4. By increasing the ability of the ovary to be fertilized even under adverse conditions or increasing the vigour of pollen so that it may be effective in fertilizing the ovum.

5. By reducing the fall of immature nuts due to malt-nutrition of the plant.

All such points have to be considered in a study of the effect of manures before anything can be definitely said about their influence on the production of flowers. Copeland ([7]) has shown that in the Philippines the leaves take one and a half years from their first appearance until their full development, and that another one and half years are required for fruits to mature in their axils. This period, no doubt, will vary according to the local conditions; but, at any rate it gives us an idea how long the effects of a treatment will last considering that the present treatment will, to a great extent, determine the nature of the embryonic leaves and inflorescences and, therefore, the future crop. Let us assume by way of illustration, that we have started cultivating a very neglected coconut tree. The first effect of this treatment may be that the suppression of many inflorescences and a considerable improvement in the general aspect of the tree. The next symptom of this treatment may be the reduction in dropping of immature nuts, later on the annual number of leaves produced may increase and with them the number of inflorescences, then the number of abortive spadices may gradually be lessened and lastly it may occur that the inflorescences produced may be longer, bearing a greater number of female flowers. Many of these flowers may at first drop because the palms are too weak to produce a sufficient quantity of good pollen. The various changes may not take place in the order mentioned above; but the illustration will, I think, show the necessity of making very careful records for a number of years and herein lies the chief difficulty of experiments. Judging, however, from indirect evidence it can be said that good treatment does increase the

number of inflorescences on a tree and of female flowers in each inflorescences. Many of the villagers' holdings in Goa are situated at the foot of laterite hills, far away from any human habitations and they do not usually receive any attention from their owners. The coconuts trees in such holdings have, as a rule, many spadices aborted, those that are produced have a stunted growth, each bearing ordinarily not more than four or six female flowers; while on holdings which are under a more careful cultivator or near a well or cattle byre the trees produce more spathes and more female flowers in each spadix. Sampson ([21]) is also of opinion that manuring does induce to an appreciable extent, the rapid development of new bunches of flowers, drawing a basis for his assertion from the better behaviour of coconut trees near a dwelling than that of those growing at a distance from where plant food is plentiful in the soil.

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BRANCHED COCONUT PALMS AND THEIR FERTILITY.

Apropos of the note on the *Fertility of Branched Coconut Palms* by Mr. Burkill, published on page 1-2 of Vol. III of this *Bulletin*, the following may not be without interest to readers.

Normally one coconut fruit gives rise to one shoot and this in its turn to one stem. It is not infrequently, however, that one meets with wide deviations from this normal phenomenon. A nut, for instance, may on germination, give rise to more than one shoot, each arising from a separate carpel in the nut. The writer has not come across an instance where a nut had more than two fertile carpels; but it must be remembered that the coconut has a trilocular ovary wherein normally two of the locules become abortive. Cases, therefore, may occur where all three carpels may be stimulated to become fertile as in some species related to *Cocos nucifera*. Forbes reports of "a nut with three cells separated by leathery walls." Sampson ([16]) appears to have seen cases where the septa separating the ovules were hard and not leathery. Forbes, in his article above referred to writes: "I have seen also nuts with cells ranging from four to eight and ten. I send you a rough outline sketch of a tree which has come up from a nut of fourteen cells, all of which germinating, producing a tree with fourteen stems

united at the base." If Forbes' conclusions as to the occurrence of more than three cells in a nut are correct, then the phenomenon concerned might be a case of vegetative multiplication of carpels. If, on the other hand, his conclusions were based merely on the number of shoots that appeared on germination of a nut, then these alternatives are possible (1) that the numerous shoots are due either to the occurrence of polyembryony as in mango, citrus, onion, etc., or (2) to the fasciation of the plumule, or (3) to the monopodial branching with very much abbreviated axis. All these phenomena are loosely described as "branching" although only in the last two cases the true phenomenon of branching occurs. In all other cases, the shoots are distinct individuals, though due to a close adhesion among themselves they may appear to start from single point. The references about the occurrence of polyembryony or more than three carpels in coconuts are not clear, and, therefore, the subject demands further investigations.

The ramification of the main shoot in coconuts is not restricted to the young age only. There are numerous instances where adult coconut palms have branched. The phenomenon concerned in branching palms has been discussed by Mr. Ridley, ([15]) the late Director of the Botanic Gardens, Singapore. He appears to hold the view that true dichotomy never occurs in palms. If this view is correct then the phenomenon of fasciation also never occurs in palms, since fasciation and dichotomy are essentially one and the same phenomenon with the difference that, while in the latter there appears only two shoots, in the former they are always more than two. But the view that true dichotomy never occurs in palms is not absolutely true. Schoute ([17]) has observed the phenomenon of fasciation in stems of some abnormal palms, and that of "true dichotomy of the stem, *as a normal feature*, in *Hyphaene*, an African palm. It (dichotomy) arose as follows: 'The apical meristem ceased to grow, and in place of it, at equal lateral distances therefrom, two new ones appeared.' From this it is obvious that there was no division of the apical meristem into two, and yet true dichotomy is present: because the two lateral branches did not arise owing to injury to the stem-apex: because they are not axillary to any leaves; and because an 'angle-leaf' is present opposite the fork as is the case in dichotomyzing stems of Cryptogams. Moreover, the two branches bore lateral buds in the axils of every leaf. Velenovsky ([17]) has also established by personal observation that true dichotomy occurs in *Chamaedorea Martiana*." Worsdell ([21]) cites a case where the plumule of the palm *Pinanga maculata* in the Kew Gardens, was branched down to the extreme base, the branches being subtended by a common basal sheath. The case was one where it was not easy to decide whether the phenomenon concerned was a true dichotomy or not.

There is another phenomenon which might be confused with the true branching. On the Noakhally Plantation, Akyab, Burma, I was shown plants which were considered as cases of bud-rot and these plants had their central leaves decaying and in some

cases giving disagreable smell. Though a special watch was not kept on the plantation for the disease, yet it was customary to kill and burn all such plants that came to the notice of the manager and spray the neighbouring ones with copper sulphate. It was said that the disease was never seen in the Estate on plants older than ten or twelve years and that the cases were always sporadic, the attacked trees never occurring in groups or bearing any definite relation to the old cases. All this information coupled with my observation of the fact that numerous plants showing similar symptoms, escaped the notice of the man in charge of the plantation and that the disease neither killed these untreated plants nor did it seem to spread from these to the neighbouring trees led me to the conclusion that the trouble in question was other than the suspected bud-rot, genuine cases of which disease I never met on the plantation during my six months stay there. Further observations showed that the pathological condition in most cases could be traced as the consequences of the injury to the palm by the much-prevalent rhinoceros beetles. When the injury to the cabbage reached the apex, the latter was stimulated to change its direction of growth with the result that the young leaves produced previous to this change were starved to death and started to decay. Now the idea that this change of direction of growing apex could be mistaken for true branching would never have occurred to me were it not for the fact, that, through the criticisms by Petch and Gadd, my attention was drawn to such views entertained by Sharples and Lambourne. The former writers have discussed the matter at sufficient length in the *Annals of Botany*, Vol. 37, July 1923, pp. 445-450, and shown that the cases which are considered as genuine cases of lateral branching by the latter (vide *Annals*, Vol. 36, Jan. 1922) are most probably the ones where a change in the direction of growth of the apical bud from vertical to horizontal is involved.

There is yet another phenomenon commonly called "branching", though strictly speaking it is a case which ought to go under the title of chloranthy or proliferation. It consists in the metamorphosis of an inflorescence shoot and usually the trees start producing these abnormal structures when it is of the age to produce normal inflorescences and it continues to produce them till its death. Ridley, ([15]) Petch ([13]) Iyengar ([10]) and Burkill ([2]) have discussed this abnormality in some detail. From the perusal of the literature consulted and from my own observations I am led to conclude that these "bulbils", for so they are termed by Ridley, are never persistent, though Forbes, from his observations made in the Cocos Keeling Islands, was inclined to believe them so. No doubt these outgrowths have usually a much longer life than normal inflorescences, or the leaves of the trees. In one case I observed these abnormal inflorescences grew for more than five years. But even if their life was prolonged for more years I do not think they would give rise to the permanently branched palm, at least the phenomenon concerned would be very different from that of the ordinary ramification in palms. (cf. Burkill's paper).

The peduncle that bears these abnormal structures is essentially of the type of the normal inflorescences: clean, and fibrous for a foot or less from the base, while the structure of the branches from the point of fork is of the type of the stem. The peduncle does not increase in size much more than the peduncle of normal inflorescences, and, like the peduncle of normal inflorescences, has a tendency to form abscise layer and separate form the main axis. Some of these bulbils bear minute inflorescences consisting of tiny male florets and no female. In the cases observed by me these flowers were borne by secondary shoots produced on the bulbils. The bulbils do not show any tendency to form roots in artificial media ([5]) & ([10]).

Dr. Pulney Andy ([1]) has described a monstrosity which consisted in the phyllody of the greater portion of the female flowers in the spadix, and not of the whole inflorescence itself. Here too "the flower-bud cannot, by such metamorphosis, give rise to ramification in a palm without a true axillary leaf-bud."

Fertility.

In the above discussion it becomes clear that the term "branching" is loosely applied to various phenomena, including some that cannot be classed as branching. And it is possible that the conception that the true branched palms are permanently infertile has orginated from the confusion which exists as to the meaning of the term "branched" coconut palms, that is, by transference to others of the conception derived from some special case or phenomena. Otherwise the prevalence of the idea that the branched palms are permanently unproductive is really unfounded.

I have seen a coconut "branching" at the base bearing fruits; and there are numerous references which show that branched coconuts are not infertile. Morris, ([11]) for instance, reports a fruit in the Kew Museum from a branched coconut tree of the Fiji Islands. According to Scott, ([18]) there was a tree in the vicinity of Calcutta with five fruit-bearing branches. Henry ([8]) makes mention of a coconut tree in the Marquezas Islands, which at the age of eighteen branched into two, both heads starting to bear fruits after two years from the occurrence of the forking. Among these cases there are at least two references which are of interest to Malaya. The frontispiece of the treatise on coconut by Munro and Brown ([12]) is of a coconut tree branching out near the top into five distinct stems, each of which is carrying fruit. The second is of a coconut tree in Penang which had six branches, each of which were "loaded with nuts." ([3]) Apart from these, the *Consols of the East* by Smith and Pape ([20]) and Hunger's *Cocos nucifera* ([9]) have photographs of branched coconut palms bearing fruits. In fact considering the presence of the photographs in the above quoted standard treatises on coconut, one cannot understand the reputed prevalence in Malaya of the view that branched coconut palms are sterile.

By this I do not wish to be understood to say that all truly branched coconut palms are productive. Cases may occur where branched coconuts may not start yielding for a very long period; but in such cases, before one can draw conclusions, it has to be ascertained whether the unproductiveness is due to want of proper care, to the fact that the tree has not yet finished branching, or to some other cause.

A very interesting point in connection with these abnormal palms is to know how their progeny behave and it is very astonishing that nobody has yet tried to solve this question. It is not yet known, for instance, whether seeds of these palms will keep true to the abnormal character or return to the character of the parents to these abnormal ones; whether all of the seeds will do so or only a part of them, and how large a part. In carrying investigations in these lines care has to be taken to prevent cross-fertilisation with the pollen from other plants. This will probably be an easy matter with the dwarf coconuts in Malaya where normally the male and female flowers ripen in a manner as to ensure self-pollination if protected by a bag from foreign pollen. If, however, the inflorescences of these abnormal palms are protandrous, then the female flowers will have to be artificially fertilised with the pollen from the male flowers in the same tree. The branches of palms subject to heavy winds and, therefore, liable to be broken, may be induced to form aerial roots on stems by marcottage and then detached and planted in a place convenient to carry on with the observations. The crown of a palm thus detached has been observed by me to grow when planted out and this practice, it appears, is sometimes resorted to by the gardeners in Malabar, India. ([6])

In cases where the inflorescences foliate I have not come across a single reference stating that such trees or their bulbils have borne fruits. In the case described by Dr. Pulney Andy the tree does not produce a perfect fruit. And probably these are the only two phenomena of the ones described above which are infertile. These cases however should not be confused with the ones where coconut fruits, instead of falling when mature and dry, remain on the stalk and under certain conditions germinate on the tree. Guppy ([7]) saw a case where a seedling thus germinated was about eighteen inches high.

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A CHINESE BELIEF REGARDING PHYLLOCACTUS HOOKERI, WALP.

It is not possible that *Phyllocactus Hookeri,* a Brazilian member of the Cactus family, can be a plant which was treasured in China in the time of the Sung Dynasty (960 to 1278 A. D.); but from information very kindly supplied to the Gardens by Mr. Tan Tang Niah, J. P., President of the Chong Cheng School in Singapore, it seems that in his native Amoy it is now identified with the " Kheng-fa " plant of the Chinese classics.

" The Kheng-fa was held a very precious plant in the time of the Sung dynasty, and there was known but a single individual of it which grew in the Hau-tho-chhi temple in Yang-chow, where, they said, it had been planted during the Tang dynasty (618 to 954 A. D.). Its leaves were by report tender and smooth, with a shining brightness, and its petals thick and pale yellow. Its fragrance was exceptionally sweet. This treasure the emperor Yan-chung, of the Sung dynasty, removed to his forbidden garden, where after a year it showed symptoms of death: but when it was taken back to Yang-chow it revived. Finally during the Chi-yuan years of the Yuan dynasty which followed the Sung dynasty it withered and died. A priest Kam-yu-sui planted in its place a Chu-pat-sin plant; and so during this dynasty what was known as the Kheng-fa was in truth the Chu-pat-sin."

Now, let it be remarked that at the end of the Sung dynasty the chief occupation of the Taoist priesthood in China was a search for medicinal herbs which would bestow immortality: and it is reasonable to consider the above story as connected therewith.

Mr. Tan Tang Niah flowered the plant of *Phyllocactus Hookeri* that he had received from Amoy, in May 1922. Since then others have obtained Phyllocactus plants in Singapore, who offer the flowers as a drug of immense value. In their belief of its value is probably another echo of the long-ago search for a drug bestowing immortality.

A medicinal value of any kind however is extremely questionable; and the repute of it rests in all probability on no more than the plant's slow growth.

I. H. Burkill.

CLEOME CHELIDONII, LINN. F., IN THE MALAY PENINSULA.

In the larger towns of the Malay Peninsula Chinese are to be found who prescribe various fresh herbs to such sick as may consult them; and recently in the shop of one of these in Penang two species of Cleome were detected by Mr. Mohamed Haniff, the owner distinguishing them as " lek tau chhau " and " it tau chhau." The first proved to be *Cleome viscosa,* a plant whose virtues are known in the East. The other proved to be *Cleome chelidonii;*

and a critical examination of the herbarium material preserved in Singapore showed that it is not a new-comer to Penang, for it was collected by Mr. C. Curtis in that island at Pulau Tikus in 1893, and had been obtained previously in 1890 at Prai in Province Wellesley.

Cleome chelidonii occurs in India from the Santal hills, Orissa and Gujarat, southwards, as a weed by no means uncommon. It is found also in Java.

It is possible that it has reached Malaysia by the agency of man: but whether that be so or not, it must now be added to the lists of Malayan plants.

I. H. Burkill.

OBSERVATIONS ON THE EXPANSION OF DICTYOPHORA INDUSIATA, DESV.

Though there are excellent accounts of Phalloids from Ceylon and Java, so that probably nearly all the species are known, very few observations have been made in Malaya, and in the literature at the writer's disposal there is no detailed account of the expansion of *Dictyophora indusiata,* one of the commonest tropical species. Fischer, in his account of the group in Engler's *Pflanzenfamilien* (Teil I, Abt. 1** p. 278), records that the maximum rate of expansion observed was 5mm. in a minute (in Brazil) : C. G. Lloyd (*Synopsis of the known Phalloids,* Cincinnati 1909) records an observation of 4 cm. in a minute. The present writer recently had the opportunity of observing the expansion of this species, and the notes made appear to be worth placing on record.

Petch (*Ann. R. Bot. Gard. Peradeniya* Vol. IV pp. 145-151) states that at Peradeniya he could always find specimens fully expanded with the veil still rigid between 8 and 9 a.m., and suggests that expansion probably takes place about 6 a.m., the time of maximum humidity there. Möller in Brazil found expansion to occur between 2 and 7 a.m. In Singapore the time would appear to be as in Ceylon, or occasionally even later. On one occasion fully expanded specimens were found at 8 a.m. but those on which the observations here recorded were made expanded between 8 and 9 a.m.

On May 30th at about 8.15 a.m. my attention was called to three specimens growing on bare ground in a shady place near the Gardens Office. Their condition at this time was as follows:

A. Stalk elongated but veil not yet expanded, the edge just beginning to free itself below the cap.

B. A smaller specimen, in a slightly earlier stage of development, the veil completely hidden by the cap.

C. An unbroken egg.

These were brought into the laboratory and supported in earth under a bell glass. During this operation the edge of the veil of A continued to expand, even though for a few minutes it was lying on the bench. The early stages of expansion were observed in the specimen C, and the later stages in A. and B. C did not properly complete its development. The complete history given in the following paragraph was therefore not observed in a single individual.

After the egg had broken at the apex, the splitting of the volva continued slowly. After about 20 minutes the cap was protruding slightly and the egg was split nearly to the base. Then suddenly the stalk began to expand, growing to a length of about 10 cm. in about 15 seconds. Unfortunately the observer had no time to make an accurate measurement of the time taken in this process, which was exceedingly rapid. Extension continued gradually till about 30 minutes later the total length was about 15 cm. During this period the edge of the veil began to expand slightly from underneath the cap, extending downwards at most 5 cm. Specimen C did not expand beyond this point, the inner surface of the cap not freeing itself properly from the folded veil. In specimens A and B, when the edge of the veil had slightly unfolded, the cap began to move, owing to the further extension of the portion of the stalk above the point of attachment of the veil (hidden by the cap). This extension was from 2 to 3 cm. and in specimen B was complete in two minutes. The extension was accompanied by slight movements of rotation, as if the cap were consciously wriggling to set itself free from the veil. When the extension was complete the folded mass of the veil was completely exposed, and began at once to expand. The unfolding process occupied about 20 minutes in both A and B, the veil reaching down quite to the surface of the soil in which the bases of the eggs were embedded. The total time of expansion was therefore about 70 minutes, possibly as much as 90 minutes, from the breaking of the egg to the complete unfolding of the veil.

The gleba was quite dry when the cap first appeared, and gradually became viscid during the course of expansion. At the same time the veil beneath the cap gradually became separated from it. In specimen C it was observed that in those parts where the under surface of the cap remained adhering to the veil the gleba on the upper surface failed to liquefy; possibly the same source which provides water for the liquefaction of the gleba also causes a wetting and consequent lubrication of the surfaces of contact of the veil and cap, allowing of their separation.

The exceedingly rapid expansion of the fructification is made possible by the mesh structure of the wall of the hollow stalk; the process must be regarded as in the nature of the expansion of a spring which has been placed under pressure and then released. The pressure is presumably due to the turgidity of the cells of the stalk and veil. It is obvious that no further water can be supplied to these cells during the process

of expansion, and it is therefore essential that expansion should take place rapidly and in a humid atmosphere. Under the bell jar the veils remained fairly rigid for three or four hours, and the stalks for 24 hours.

R. E. Holttum.

MOSQUITO LARVAE IN THE PITCHERS OF NEPENTHES.

In the *Journal of the Straits Branch, R. Asiatic Society,* No. 22 p. 430 (1890) Mr. H. N. Ridley published a note stating that he had observed mosquito larvae in the pitchers of *Nepenthes ampullaria* growing in the Gardens Jungle, and that he had reared some of these to maturity in the pitcher. This was probably the first record of such an occurrence. The fact was subsequently confirmed by Mr. Percy Groom (*Annals of Botany* Vol. 7. p. 231). The presence of digestive enzymes in the water contained in the pitchers makes it remarkable that the larvae are able to develop to maturity in such a medium. It is perhaps noteworthy that the pitchers of *N. ampullaria* have a small lid which is bent back, so that more rain water is able to enter than into the pitchers of some other species; this additional water would cause a dilution of the enzymes present. However, Mr. Burkill has observed on Penang Hill that mosquito larvae are easily found in the large lidded pitchers of *Nepenthes albomarginata*. In the paper quoted in the next paragraph there is no reference to the species of Nepenthes concerned.

Since Mr. Ridley's observation there have been numerous similar records, and in a recent number of the *Bulletin of Entomological Research* (Vol. 14 pt. 1 pp. 1-2) Mr. F. W. Edwards gives a list of species of mosquitos which have been found breeding in Nepenthes pitchers in the Oriental Region. Most of the records are from the Malay Peninsula and the total number of species is sixteen. A new record in this paper is the collection of *Megarhinus metallicus* in Nepenthes pitchers on Cameron's Highlands by Dr. H. P. Hacker.

R. E. Holttum.

THE FLORAS OF THE MALAY PENINSULA, BORNEO AND THE PHILIPPINE ISLANDS.

Volumes 1, 2 and 3 of Mr. H. N. Ridley's *Flora of the Malay Peninsula* (London, 1922—1924) have appeared, and volumes 2 and 3 of Mr. E. D. Merrill's *Enumeration of Philippine Flowering Plants* (Manila, 1923). Further the latter's *Bibliographic Index of Bornean plants* (Journal of the Straits Branch of the Royal Asiatic Society, special number, 1921) is available. With these

three a comparison of the natural orders of the Dicotyledons as they occur in the Malay Peninsula, in Borneo, and in the Philippine islands becomes possible; and the following count of the species within them has been made. The sequence of the enumeration is Mr. Ridley's: differences in limits as regards the orders are sufficiently brought out in the column of ordinal names. As the northern end of the Philippines is in the latitude of Calcutta, and the southern in that of Taiping i.e. 5° N., differences are to be expected due to their northward extension, the Peninsula for the purpose of the Flora not going further north than the 7th. degree: also because cultivation has in the Philippines a longer continuous history, they are fuller of weeds than the Peninsula and than Borneo. The total number of Dicotyledons enumerated, for the Malay Peninsula by Mr. Ridley is 4832: by Mr. Merrill for Borneo 3345, and for the Philippine islands 6074. These proportions are nearly 4: 3: 5. Exclude from the Philippine figure the balance over and above the Peninsular figure and the remainder may be regarded as the true Malaysian Flora, which spreads through the three with genera in general in common, but species diverse. Its focus is in Borneo, where the Dipterocarpaceae and Nepenthaceae are in the largest numbers. But the low total of 3345 for Borneo is an indication of a very large amount of collecting yet to be done in that island. In the list clarendon type and italics are used to call attention to totals which are widely in excess or deficit of the proportion 4: 3: 5. The result is that:—

1. In the Malay Peninsula 22 orders have more than their proportion of species:—Violaceae, Flacourtiaceae, Guttiferae, Olacaceae, Celastraceae, Staphyleaceae, Anacardiaceae, Connaraceae, Hamamelidaceae, Anisophyllaceae, Combretaceae, Cornaceae, Ebenaceae, Asclepiadaceae, Apocynaceae, Loganiaceae, Scrophulariaceae, Lentibulariaceae, Acanthaceae, Lauraceae, Proteaceae, and Santalaceae:

2. In Borneo the following 18 have more than their proportion of species:—Dilleniaceae, Menispermaceae, Hypericaceae, Dipterocarpaceae, Gonostylaceae, Linaceae, Ochnaceae, Ilicaceae, Ampelidaceae, Melastomataceae, Cucurbitaceae, Ericaceae, Epacridaceae, Sapotaceae, Rafflesiaceae, Nepenthaceae, Casuarinaceae and Cupuliferae:

3. The Philippine islands have more than their proportion of the following 30:—Ranunculaceae, Anonaceae, Berberidaceae, Pittosporaceae, Malpighiaceae, Balsaminaceae, Rutaceae, Simarubaceae, Burseraceae, Meliaceae, Sapindaceae, Rosaceae, Saxifragaceae, Samydaceae, Begoniaceae, Araliaceae, Compositae, Lobeliaceae, Vacciniaceae, Primulaceae, Boraginaceae, Solanaceae, Labiatae, Polygonaceae, Piperaceae, Monimiaceae, Hernandiaceae, Thymelaeaceae, Loranthaceae and the Urticeae of the Urticaceae.

In the following five orders, which are proportionally most numerous in Borneo, the Philippine islands are relatively poorer than the Malay Peninsula:—Dilleniaceae, Dipterocarpaceae, Ochn-

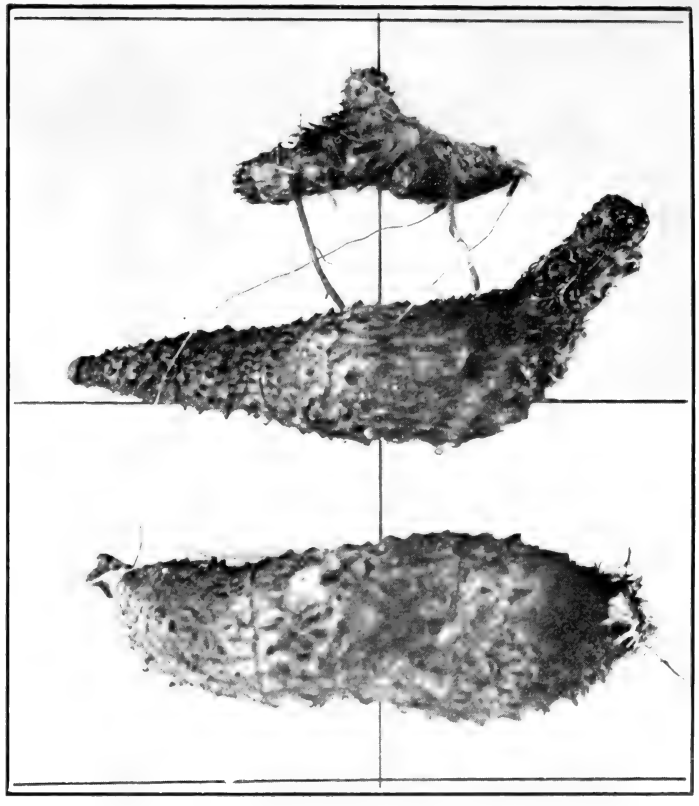
aceae, Nepenthaceae, and Cupuliferae: whereas in only the numerically small Gonostylaceae is the Malay Peninsula relatively poorer than the Philippine islands. These are indications of the closer affinity, well known, of the flora of Borneo to that of the Malay Peninsula than to that of the Philippines.

		Malay Peninsula.	Borneo.	Philippine Islands.	
1.	Ranunculaceae	*3*	4	**12**	Some Northern types in P. I.
2.	Dilleniaceae without Saurauia	25	**30**	18	
3.	Magnoliaceae	11	4	10	
4.	Winteraceae	2	2	3	
5.	Schizandraceae	3	1	5	
6.	Anonaceae	81	54	**144**	
7.	Menispermaceae	26	**26**	35	
8.	Berberidaceae	0	0	**2**	northern influence
9.	Nymphaeaceae	6	3	*3*	Barclaya absent from P. I.
10.	Papaveraceae	0	0	1	weed
11.	Cruciferae	1	0	5	weeds
12.	Capparidaceae	16	*5*	24	several weeds
13.	Violaceae	**21**	9	18	Alsodeia week, but Viola strong in P. I.
14.	Pittosporaceae	2	1	**15**	Pittosporum strong in P. I.
15.	Polygalaceae	33	25	*22*	M. P. strong in Xanthophyllum
16.	Caryophyllaceae	1	0	9	several weeds
17.	Portulacaceae	2	1	4	
18.	Hypericaceae	6	**7**	7	
19.	Flacourtiaceae without Samydaceae	**24**	7	19	
20.	Guttiferae without Hypericum	**73**	47	60	
21.	Ternstroemiaceae with Saurauia	*40*	50	81	Saurauia strong in P. I.
22.	Dipterocarpaceae	89	**103**	*50*	
23.	Ancistrocladaceae	1	0	0	
24.	Elatinaceae	0	0	2	
25.	Bixaceae	1	1	1	
26.	Malvaceae with Bombacaceae	*29*	35	54	
27.	Sterculiaceae	53	37	57	
28.	Tiliaceae with Elaeocarpaceae	73	*41*	97	Pentace not in B.

		Malay Peninsula.	Borneo.	Philippine Islands.	
29.	Gonostylaceae	*1*	**5**	4	
30.	Linaceae with Erythroxylaceae	5	**7**	6	
31.	Malpighiaceae	5	4	**17**	
32.	Zygophyllaceae	0	0	1	weed
33.	Geraniaceae	0	0	1	weed
34.	Oxalidaceae	16	10	*7*	
35.	Balsaminaceae	14	6	**25**	
36.	Rutaceae	44	*19*	**83**	northern influence in P. I.
37.	Simarubaceae	8	3	**15**	
38.	Ochnaceae	8	**19**	*6*	
39.	Burseraceae	30	24	**56**	Canarium strong in P. I.
40.	Meliaceae	87	*52*	137	Dysoxylum and Aglaia strong in P. I.
41.	Chailletiaceae	8	*2*	13	
42.	Olacaceae with Icacinaceae	39	24	*38*	
43.	Ilicaceae	17	**16**	21	
44.	Celastraceae	**50**	*14*	45	
45.	Stackhousiaceae	0	0	1	
46.	Rhamnaceae	20	*5*	27	B. has but one sp. of 5 genera
47.	Ampelidaceae	50	**45**	67	
48.	Sapindaceae with Aceraceae	56	49	**127**	
49.	Staphyleaceae	3	1	1	
50.	Sabiaceae	10	8	18	
51.	Anacardiaceae	**72**	34	50	Mangifera strong in M. P.
52.	Coriariaceae	0	0	1	
53.	Moringaceae	0	0	1	introduced
54.	Connaraceae	**27**	14	27	
55.	Leguminosae	261	174	*248*	
56.	Rosaceae	*37*	24	**59**	a northern element in P. I.
57.	Saxifragaceae	15	8	34	a northern and montane element in. P. I.
58.	Droseraceae	2	3	4	
59.	Crassulaceae	1	1	4	
60.	Hamamelidaceae	**5**	0	2	
61.	Halorrhagidaceae	*0*	2	6	
62.	Rhizophoraceae	8	8	8	

		Malay Peninsula.	Borneo.	Philippine Islands.	
63.	Legnotidaceae	10	9	8	
64.	Anisophyllaeaceae	**6**	3	*0*	
65.	Combretaceae	**23**	11	*21*	
66.	Myrtaceae	149	122	199	
67.	Melastomataceae	174	**171**	234	
68.	Lythraceae, with Sonneratiaceae and Crypteroniaceae	14	7	19	
69.	Punicaceae	(1)	0	1	
70.	Onagraceae	7	4	8	
71.	Samydaceae	20	15	**35**	
72.	Turneraceae	2	1	*0*	
73.	Passifloraceae	9	6	9	
74.	Cucurbitaceae	23	**28**	34	
75.	Caricaceae	1	1	1	
76.	Begoniaceae	34	26	**89**	Begonia strong in P. I.
77.	Datiscaceae	1	1	1	
78.	Cactaceae	1	0	5	introduced american plants
79.	Aizoaceae	3	1	5	
80.	Umbelliferae	6	5	11	
81.	Araliaceae	48	*22*	**105**	Boerlagiodendron & Schefflera strong in P. I.
82.	Cornaceae, with Alangiaceae	**17**	7	*5*	
83.	Caprifoliaceae	5	4	11	
84.	Rubiaceae	466	333	529	
85.	Compositae	45	38	**142**	a northern element in P. I.
86.	Stylidiaceae	1	0	1	
87.	Goodeniaceae	*1*	2	8	
88.	Lobeliaceae	2	1	6	
89.	Campanulaceae without Lobeliaceae	6	4	9	
90.	Vacciniaceae	20	17	**37**	Vaccinium strong in P. I.
91.	Ericaceae, with Clethraceae	33	**55**	36	Rhododendron strong in B.
92.	Monotropaceae	1	0	0	
93.	Epacridaceae	1	**4**	1	
94.	Primulaceae	0	0	**6**	northern element in P. I.
95.	Plumbaginaceae	1	0	3	
96.	Plantaginaceae	1	1	2	

		Malay Peninsula.	Borneo.	Philippine Islands	
97.	Myrsinaceae	95	81	141	
98.	Sapotaceae	61	**57**	69	
99.	Ebenaceae	**50**	29	*37*	
100.	Styracaceae with Symplocaceae	35	25	42	
101.	Oleaceae	28	20	33	
102.	Apocynaceae	**120**	71	95	
103.	Asclepiadaceae	**112**	*48*	113	
104.	Loganiaceae	**54**	30	*45*	Gaertnera is absent from P. I.
105.	Gentianaceae	10	*5*	15	
106.	Hydrophyllaceae	1	0	1	
107.	Boraginaceae	11	*3*	**23**	
108.	Convolvulaceae	24	*26*	59	
109.	Cardiopteridaceae	2	1	1	
110.	Solanaceae	18	11	**38**	several introduced plants in P. I.
111.	Scrophulariaceae	**44**	26	45	
112.	Orobanchaceae	2	1	2	
113.	Lentibulariaceae	**15**	7	9	
114.	Gesneraceae	161	112	*135*	Didymocarpus strong in M. P.
115.	Bignoniaceae	10	*3*	19	
116.	Pedaliaceae	1	1	1	
117.	Acanthaceae	**168**	*51*	129	
118.	Verbenaceae	75	47	105	
119.	Labiatae	30	19	**60**	Coleus strong in P. I.
120.	Nyctaginaceae	4	0	8	some introdecued plants in P. I list
121.	Amarantaceae	15	10	22	weeds or of rather N. type
122.	Chenopodiaceae	0	0	3	northern type
123.	Basellaceae	(1)	0	2	introduced plants
124.	Phytolaccaceae	0	0	1	introduced plants
125.	Polygonaceae	9	7	**23**	northern element in P.I.
126.	Aristolochiaceae	10	6	13	
127.	Rafflesiaceae	2	**6**	2	Rafflesia only
128.	Nepenthaceae	10	**26**	*9*	Nepenthes only
129.	Piperaceae	83	*36*	**137**	Piper strong in P. I.
130.	Saururaceae	0	0	1	a rather northern and pacific type
131.	Chloranthaceae	2	2	6	
132.	Myristicaceae	45	37	*40*	



"TUBERS OF A STENOMERIS"

		Malay Peninsula.	Borneo.	Philippine Islands.	
133.	Monimiaceae	4	5	**17**	
134.	Lauraceae	**175**	74	*110*	
135.	Hernandiaceae	4	*1*	9	
136.	Proteaceae	**10**	3	*8*	
137.	Thymelaeaceae	*9*	9	**24**	Wikstroemia strong in P. I.
138.	Elaeagnaceae	1	0	1	
139.	Loranthaceae	*46*	47	**101**	Loranthus strong in P. I.
140.	Santalaceae	**14**	6	5	
141.	Opiliaceae	4	1	5	
142.	Balanophoraceae	6	4	5	
143.	Euphorbiaceae	**351**	*195*	385	
144.	Urticaceae				
	Celtideae or Ulmaceae	8	7	13	
	Moreae	*127*	116	203	
	Urticeae	*26*	46	**151**	Elatostema strong in P. I.
145.	Juglandaceae	3	1	5	Engelhardtia only
146.	Myricaceae	2	2	3	
147.	Casuarinaceae	1	**3**	3	
148.	Cupuliferae	51	**48**	*41*	
149.	Salicaceae	1	—	1	not native in M. P.
150.	Ceratophyllaceae	—	—	1	
		4832	3345	6074	

I. H. Burkill.

STENOMERIS IN THE MALAY PENINSULA.

In 1896, at Gua Batu or Batu Caves, not far from Kuala Lumpur, Mr. H. N. Ridley obtained a scrap of a *Stenomeris* in flower. This scrap he referred to *Stenomeris borneensis,* Oliv., in his *Materials for a Flora of the Malay Peninsula, Monocotyledons,* 2, 1907, p. 85, adding a remark to indicate that he had not material enough to be quite positive of its identity with the Bornean plant so named.

In March, 1922, the writer found sterile in the Bukit Raja forest a Dioscoreaceous plant which is considered to be the species found by Mr. Ridley; and in foliage it agrees with *S. borneensis* as figured in Hooker's *Icones Plantarum,* plate 2328. Its locality was visited again in Oct. 1922, Jan. 1923, Dec. 1923, and Sept. 1924,

without success in finding flowers, and it has been seen sterile at the 11th mile on the Kuala Lumpur—Klang road. It was found again in great abundance in the Pondok Tanjong forest reserve, Perak, sterile, in March 1924. It is disappointing that so far these attempts to make sure of the species have failed.

Its underground tubers are small, and horizontal—they are figured upon the adjoining plate from specimens dug up near Klang. Each consists of two or three internodes of stem tissue, swollen, and covered with weak processes of parenchymatous cells. In the plate the scars of the bracts at the nodes are clearly visible; and their presence is important in that we have by their means proof of the compound stem-nature of the tuber, an observation bearing on the disputed morphology of the underground parts in the allied genus *Dioscorea*.

The tubers of the Stenomeris are seen to be formed laterally as branches upon the white half-translucent underground part of the stem. They grow to a length of 2 to 3 inches and themselves give rise, as is seen in the lowest of the five tubers in the left hand half of the plate, to a new half-translucent stem—not from their tip but laterally. It is clear from the plate that this lateral production is a normal event: and it indicates the tubers as resting branches, suggesting that bulbil formation in Dioscorea may likewise be called the production of resting branches: or the tubers of this Stenomeris might equally be called underground bulbils without much misuse of the word "bulbil." It is interesting, apart from this, that renewed growth is lateral.

The interior of the tuber contains starch, of which only a little was seen: but as it was examined when the stems were in new and vigorous growth, the smallness of the amount is not surprising.

I. H. Burkill.

A NOTE ON SEMECARPUS CURTISII, KING.

It was pointed out to me by Mr. Burkill that in the specimens placed under *Semecarpus Curtisii*, King, in the Singapore Herbarium, there was a difference between those from the North and those from the South of the Peninsula. On examination, it was found that there was a distinct difference, almost enough to admit of a new species being erected, had there not been one plant (Ridley 10566, from Ulu Selangor) which was intermediate between the two forms both in locality and in character.

Semecarpus Curtisii, *King*,

Curtis 2930, type! Puket, Tongkah, Siam.
Burkill & Md. Haniff, 13318! Alor Star, Kedah
Ridley, 15186! Setul.
Annandale ! Kaw Suan Toon, Siam.
Ridley 10566! Ulu Selangor.

Semecarpus Curtisii, *King,* var. **brevipetiolata,** n.v.

Holttum 9521! Gunong Tampin, Negri Sembilan.
Alvins 885! Gaong Jalan, Negri Sembilan (or Malacca).
Burkill, 3230! Gunong Tampin, N. S.
Md. Nur, 1623! Bukit Kayu Arang, Tampin, N. S.

differs from typical *Curtisii* in the shorter petioles, which are 1.3 to 2 cm. long, in the glabrous disc of the male flower, and in the absence of white scales on the under side of the leaf, and in the slightly more pubescent panicle, though this is variable.

Ridley 10566 from Ulu Selangor, which I have put into typical *Curtisii,* seems to approach the var. *brevipetiolata* in the pubescence on the panicle, and in the absence of white scales on the under surface of the leaf, but it has a long and not a short petiole. The specimen, however, is a poor one.

Semecarpus Prainii, *King*

Md. Haniff & Md. Nur 3938! Pungah, Lower Siam.
Kunstler 7442! Larut, Perak.

This species has been omitted from Ridley's Flora of the Malay Peninsula.

M. R. Henderson.

NEW RECORDS OF SPECIES OF LYCOPODIUM FROM THE MALAY PENINSULA.

Since the publication of Mr. Ridley's "List of the Fern Allies and Characeae of the Malay Peninsula" (*Journ. S. B., R. Asiatic Society* No. 80, 1919, p. 139) the following species of Lycopodium not there recorded have been collected.

L. clavatum L. var. *divaricatum* (Wall.) This species is cosmopolitan, and the variety *divaricatum* has been found on mountains at various localities from the Himalayas through Malaysia to the Philippines. It was collected apparently for the first time in the Malay Peninsula below Fraser Hill, at an altitude of about 3800 feet, in an open place in a valley which had formerly been cleared for tin mining. (Gardens No. 11303).

L. verticillatum L. fil. Collected by M. R. Henderson at Robinson Falls, Cameron's Highlands, Pahang, 4800 feet. (F. M. S. Museums No. 11730). Distribution: Java and Borneo to Polynesia, Trop. America. South and East Africa, Mascarenes.

L. hippuris Desv. A living plant collected on Gunong Pulai, Johore, in June 1922, by G. A. Best, has since been in cultivation in the Gardens, and is freely fertile; it appears to belong to this species. Unnamed specimens in the Herbarium from Singapore (Sungei Sembawang, Ridley no. 6520) and the Taiping Hills (Long) agree with it. Distribution: Java and the Philippines to Samoa.

R. E. Holttum.

ORCHID NOTES

Oberonia fungum-olens,—a new Species.

In June 1924 an Oberonia was found in some plenty at the foot of the Main range of the Peninsula near Tanjong Malim, which in cultivation in Singapore produced flowers freely in September: it proves to be a species new to the Peninsula and appears to be undescribed. It is here named *O. fungum-olens* from the smell of its flowers being just such as is given out by species of *Fomes* and other similar fungi. The colour of these small but numerous flowers is likewise suggestive of these fungi.

Its affinity is with *O. anceps,* Lindl. and *O. spathulata,* Lindl. which are found rather widely in Eastern Malaysia. Ridley remarks of *O. anceps* that it is "the largest native species" (Mat. Fl. Mal. Penins. Monocots., I, 1908, p. 18); but this new one is larger: so also is *O. spathulata,* which was unrecorded for the Peninsula in 1908.

Flower of *Oberonia fungum-olens*, x 5.

Oberonia fungum-olens.

Caules dependentes, numerosissimi, 10—20 cm. longi, compressi, c. 15-foliati, cum foliis ad 2 cm. lati, internodiis 1 cm. longis vel paullulo longioribus. Folia alternatim bifaria, basi dimidio imbricantia, lateraliter admodum compressa, carina dorsale paullulo incurvata ad 4 cm. longa, marginibus subrectis vix 3 cm. longis, viridissima. Inflorescentia subsessilis, densiuscula, cylindrica, multiflora, ad 12 cm. longa, floribus forsan ad 300, basalibus spiraliter apicalibus verticillatim dispositis, istis serotinis. Rhachis scarioso-puberula, viridi-fuscescens aliquo modo profunde striata, striis tot quot floribus in verticillis. Flores melleo-fusci, fungum-olentes, aperti sepalo dorsale excepto plani, versus folia id est versus coelum respicientes. Sepalum dorsale suborbiculare, c. .75 mm. diametro, extus minutissime puberulum. Sepala lateralia late ovata, vix 1 mm. longa, apice obtusa, .5 mm. lata. Petala elliptica, obtusa .75 mm. longa. Labellum supra curvatum, basi excavatum; auriculae basales erectae, apice rotundatae, facie minutissime pustulatae, vix 1 mm. longae: lobi duo, irregulare subquadrato-rotundati, 1.5 mm. longi et lati. Gynostemium viride, ambitu triangulari-rotundatum.

Planta epiphytica, ex vivo in Horto Botanico Singapurensi descripta. Origo ejusdem in pede montium prope vicum Tanjong Malim principalii Perak.

A comparison of Coelogyne celebica and C. speciosa.

Coelogyne celebica, J. J. Sm., has recently flowered in the Botanic Gardens, Singapore, at the same time as *C. speciosa* Lindl.; and the opportunity was taken of figuring the flowers of the two side by side. The origin of *C. celebica* was Paloppo in the Island of Celebes; and the origin of *C. speciosa* the Taiping Hills, in the Malay Peninsula.

The first figures below (1 and 1a) are of the flowers of the two seen from above, drawn to show how the petals of *C. celebica* during the course of the life of the flower recurve so that their tips meet, whereas the petals of *C. speciosa* do not do so. The dorsal sepal in *C. celebica* is seen to be narrower than that of *C. speciosa.*

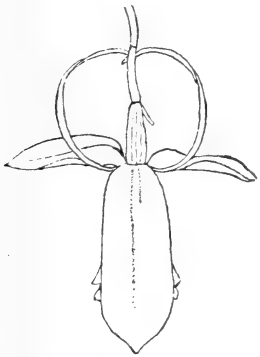


Fig. 1.

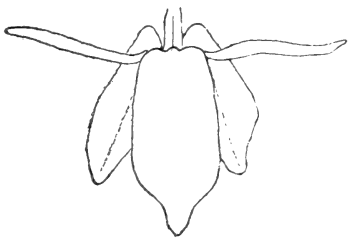


Fig. 1a.

Flowers of *Coelogyne celebica* (left) and *C. speciosa* (right) from above, × ½.

In the next pair of drawings (2 and 2a) it is shown that the dorsal sepal rises up in *C. celebica* a little more than in *C. speciosa.* The tip of the lip in both is equally curved backwards and cannot be seen in face view in either.

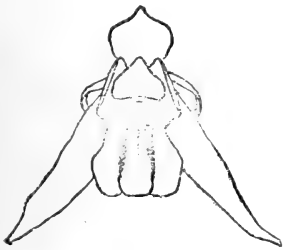


Fig. 2.

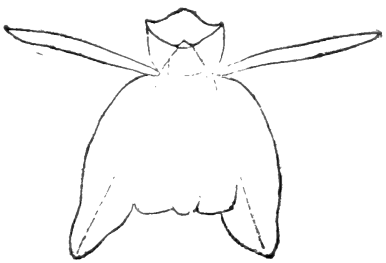


Fig. 2a.

Flowers of *Coelogyne celebica* (left) and *C. speciosa* (right) from in front, × ½.

There is a slight difference in the gynostemia of the two, as the following pair of drawings show (3 and 3a).

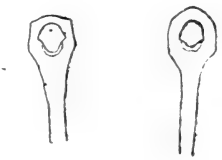


Fig. 3. Fig. 3a.

Gynostemium of *C. celebica* (left) and *C. speciosa* (right), x ½

There is a very great difference in the crests of the lip. The crest in *C. speciosa* (4a) is continuous with much sinuation: the crest in *C. celebica* (4) is toothed.

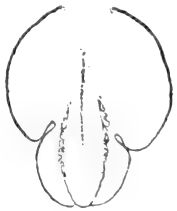
Fig. 4.

Fig. 4a.

Crests of the lips of *C. celebica* (above), and *C. speciosa* (below), x ½.

The lip of *C. celebica* is marbled with a rich brown: that of *C. speciosa* with purplish black. The rest of the flower of *C. celebica* is yellower than that of *C. speciosa,* wherein there is just the faintest suggestion of the salmon tint found in other species of its genus.

Fig. 5.



Lip of *C. celebica* flattened, ½ nat. size.

Fig. 5 shows the lip of *C. celebica* flattened out.

All figures are half natural size.

Dendrobium albicolor Ridl., in Penang.

In the Waterfall valley, Penang, upon a mango tree at a small distance from the gates of the Waterfall Gardens, the above named species of Dendrobium has been found. It was described in the Journal of the Linnean Society of London, 32, (1896) p. 250, upon specimens obtained by Mr. C. Curtis at Pungah in Lower Siam: and it is possible that he placed it upon the mango tree near to the Gardens, or it is possible that it has been carried by some nesting bird from the Gardens. The annexed drawings illustrate

the flower, which lacks the red spots described in Mr. Ridley's definition.

It is now in great abundance upon the tree.

Fig. 1.

Fig. 2.

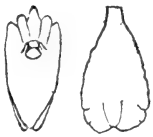


Fig. 3.

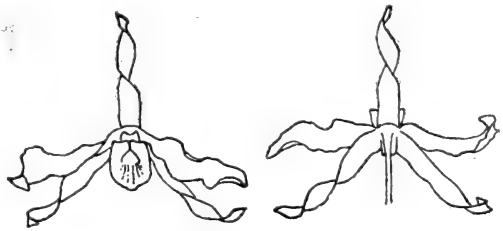
(1) Branch of Dendrobium albicolor X ½

(2) Flower in face view, nat. size.

(3) The upper half of the flower and the lip flattened, nat. size.

Dendrobium Haniffii, Ridley.

Dendrobium Haniffii was obtained by Mr. Mohamed Haniff in Kelantan upon the Lebir river, always on branches overhanging the water. It is an epiphyte, with green stem up to 40 cm. long, slightly swollen upwards. The leaves are about 10 cm. long by 1.5 cm. wide. The flowers are many in well-grown plants: their



A flower of *Dendrobium Haniffii*, ½ nat. size.

predominant colour is a very pale pinkish lilac, the sepals and lateral petals being uniformly thin. These are 4.5 to 5cm. long or a trifle longer; the sepals 7 mm. wide; the lateral petals at the middle 12 mm. wide. The dorsal sepal is twisted on itself as drawn: the lateral sepals, also—all in the same direction: but one of the latter seems to have less tendency in its lower half to twist than its partner. The spur is only 5 mm. long and dull yellow. The lip is folded on itself making a tube 1 cm. long, and in the 1.5 cm. above open upwards and forwards. If laid open entirely, it is as drawn, and is seen to have magenta marks at the base on either side in the positions indicated. There is also a very faint shade of magenta in lines on it.

The lip of *Dendrobium Haniffii*, nat. size.

The cap of the anther is magenta: the column below green passing into the dull yellow of the interior of the spur. Pollen masses are sessile.

I. H. Burkill.

RAINFALL at the Botanic Gardens, Singapore, during the first half of the year, 1923. Readings taken at 9 a.m. and expressed in inches.

Date	Jan.	Feb.	March	April	May	June
1	.68	—	—	.61	—	1.41
2	.53	—	—	—	—	.87
3	.25	—	—	.19	—	.53
4	trace	trace	.05	1.09	.12	.02
5	.14	—	.07	—	—	—
6	.15	—	.90	—	—	1.25
7	1.88	—	—	—	—	—
8	.71	—	—	—	trace	.03
9	.24	—	—	.01	.64	—
10	.42	.01	—	.06	.10	—
11	.03	—	.63	—	—	—
12	.08	—	—	—	—	.01
13	1.81	—	.01	—	.17	.78
14	—	.36	1.49	1.21	—	.01
15	.43	—	1.52	trace	—	.41
16	—	—	trace	—	—	.34
17	.51	.02	.06	—	.01	—
18	.59	1.28	.18	—	—	—
19	.03	trace	—	.74	—	—
20	—	—	—	—	.19	—
21	1.28	—	—	.35	1.38	—
22	.22	.01	—	.03	.25	—
23	.62	—	.23	.19	.03	.89
24	—	.01	.08	.12	—	trace
25	—	.02	.16	.46	.29	—
26	—	—	.39	.02	.25	.55
27	trace	—	—	.03	trace	.03
28	—	—	—	—	trace	.10
29	—		—	—	3.12	.04
30	—		—	—	.01	—
31	.01		1.40		.46	
Total	10.61	1.71	7.17	5.11	7.02	7.27

RAINFALL at the Botanic Gardens, Singapore, during the second half of the year 1923. Readings taken at 9 a.m. and expressed in inches.

Date	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	—	—	—	—	1.23	.46
2	—	—	—	.11	2.17	.73
3	.50	—	—	.04	.02	.56
4	.11	.01	.01	—	—	.26
5	—	—	—	trace	.03	.01
6	.14	—	.16	—	.84	—
7	.46	.63	—	—	.03	1.21
8	trace	—	.01	—	—	.02
9	.03	—	.19	.27	.11	—
10	2.08	.88	—	—	.24	.63
11	.95	.23	.01	.16	.44	—
12	.03	.08	.01	.07	.38	.46
13	.03	—	.02	.01	.01	1.00
14	—	.19	.02	—	—	.03
15	.32	—	.02	—	.07	.21
16	.36	.75	2.87	.35	—	.14
17	—	—	.16	.23	—	.07
18	1.06	.68	—	—	—	.01
19	.02	.08	—	—	—	.66
20	—	—	.79	—	—	.24
21	.21	—	—	.45	—	.01
22	trace	.02	.19	.21	—	—
23	.10	.64	—	—	.06	.12
24	trace	.07	.61	.09	.89	1.64
25	.01	—	.50	.35	.09	trace
26	3.34	—	trace	.11	1.96	—
27	.19	1.19	—	.09	.19	—
28	—	—	.01	—	.41	.07
29	—	trace	—	.04	.02	—
30	—	.12	—	—	.09	.29
31	.31	.36		trace		.07
Total	10.25	5.93	5.58	2.58	9.28	8.90

RAINFALL at the head of the Waterfall Gardens, Penang, during the first half of the year 1923, in inches.

Reading taken at 8 a.m. and credited to the date in which the twenty-four hours begin. Data kindly supplied by the Municipal Commissioners of George Town, Penang.

Date	Jan.	Feb.	March	April	May	June
1	—	—	—	.08	.07	.49
2	.52	—	—	.30	.39	—
3	.07	—	—	—	—	1.35
4	—	—	—	—	—	.90
5	—	—	.72	1.25	—	.02
6	.05	—	—	.23	.36	—
7	—	—	—	—	—	—
8	.38	—	.83	—	.19	.31
9	.34	—	1.60	1.17	.89	—
10	.28	—	.33	.03	1.15	—
11	—	—	.02	.05	.27	—
12	—	—	—	.26	.18	—
13	.24	—	—	.03	.20	2.20
14	—	.03	.06	—	.10	.63
15	—	.02	.20	.27	.77	1.79
16	—	—	.07	—	3.24	.87
17	—	2.06	.08	—	.78	—
18	.04	—	—	—	—	—
19	1.73	—	.07	.09	.47	—
20	.03	.04	—	—	.32	—
21	.08	1.27	—	.04	.02	—
22	.49	—	—	1.16	—	.30
23	—	—	—	.09	—	3.84
24	—	—	.20	1.82	.12	.30
25	—	—	—	1.16	1.25	.03
26	—	—	1.53	—	—	—
27	—	—	1.10	—	.65	.19
28	—	.02	—	—	.30	.05
29	—		.05	—	1.78	.94
30	—		—	—	.10	2.85
31	—		—		.05	
Total	4.25	3.44	6.86	8.03	13.65	17.06

RAINFALL at the head of the Waterfall Gardens, Penang, during the second half of the year 1923, in inches.

Reading taken at 8 a.m. and credited to the date in which the twenty-four hours begin. Data kindly supplied by the Municipal Commissioners of George Town, Penang.

Date	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	—	—	.29	.53	—	—
2	.03	—	.72	4.62	.01	—
3	2.15	—	—	2.86	1.85	—
4	—	.24	—	—	—	.19
5	—	—	.07	.96	.50	.01
6	.30	1.66	.17	.24	.04	—
7	.22	.10	.68	.34	.05	—
8	.02	—	2.70	1.29	.78	.05
9	—	2.36	.27	.37	5.31	.14
10	1.38	.18	2.12	2.24	2.25	1.89
11	1.13	1.47	7.90	1.19	.48	—
12	—	.11	1.15	.11	.05	.05
13	.54	—	.04	.95	.11	.37
14	—	.07	.72	.05	—	.03
15	—	—	.57	.24	.13	.04
16	—	—	1.38	.05	.07	.50
17	—	—	.48	.26	2.16	—
18	.90	.10	—	.26	.47	.03
19	.92	.28	1.55	.03	.03	.57
20	—	—	.13	1.43	.48	.68
21	.28	.39	.55	.07	.61	.03
22	—	.64	—	.07	—	—
23	—	.78	—	.34	.41	—
24	—	.55	.23	2.05	2.30	—
25	—	.15	2.74	.33	—	—
26	—	—	2.30	1.09	—	—
27	—	—	—	1.40	.19	.83
28	.40	.56	—	3.42	—	—
29	—	.23	1.63	1.78	1.33	—
30	—	.26	—	1.83	.79	—
31	—	.03		.62		—
Total	8.27	10.16	28.39	31.02	20.40	5.34

Relative Humidity of the air at the Botanic Gardens Singapore, calculated from wet and dry bulb hygrometer readings made daily at 9 a.m. during the year 1923.

Date	January	February	March	April	May	June	July	August	September	October	November	December
1	100	80	72	81	78	100	85	79	83	83	93	98
2	95	100	85	79	78	87	80	83	79	81	78	91
3	98	78	81	79	78	83	98	85	83	83	89	100
4	90	80	98	81	78	81	79	83	81	78	78	93
5	84	78	83	80	80	84	89	79	79	76	93	79
6	97	84	82	78	80	81	84	83	81	76	100	78
7	98	76	81	77	80	81	95	93	78	76	87	82
8	98	74	75	69	89	89	87	81	78	87	87	76
9	86	71	85	87	100	83	91	87	79	83	91	93
10	83	76	83	76	81	81	98	86	79	76	81	75
11	98	78	83	85	81	87	98	100	81	91	95	79
12	89	77	85	81	79	78	77	83	83	89	91	89
13	87	79	83	83	89	100	89	83	79	76	78	89
14	86	85	81	85	83	85	83	100	95	78	85	87
15	80	85	79	87	77	100	67	83	79	89	85	100
16	86	85	81	79	81	84	91	85	97	79	78	87
17	87	81	76	78	83	83	79	83	81	76	78	87
18	91	88	77	75	78	83	91	100	83	66	80	95
19	85	81	77	85	80	81	78	83	81	76	74	95
20	79	77	77	93	91	80	83	81	81	74	79	91
21	91	85	79	85	78	80	84	85	82	70	75	77
22	83	80	79	80	93	82	81	83	87	78	81	79
23	81	83	79	98	85	93	83	100	81	73	81	83
24	82	83	79	81	76	89	89	79	89	95	72	89
25	79	72	83	89	100	81	85	83	82	74	76	81
26	72	83	79	85	81	100	100	85	81	89	76	83
27	80	81	79	76	93	85	83	83	87	76	76	72
28	82	79	87	85	76	100	81	83	85	73	95	78
29	78		83	—	100	83	83	83	81	78	74	79
30	78		78	79	87	80	81	100	76	76	93	80
31	76		83		95		83	81		72		81
Average	86	81	81	82	84	86	86	89	82	79	83	85

Average for the year 83.8.

SUMMARY OF RAINFALL 1923.

	SINGAPORE.				PENANG.			
	No. of rainy days	Amount of rain in inches	mm.	Longest Spell without rain	No. of rainy days	Amount of rain in inches	mm.	Longest Spell without rain
January ...	22	10 61	270	3 days	12	4.25	108	9 } 22
February ...	9	1.71	42	5*	6	3.44	87	13 } days
March ...	15	7.17	185	4	14	6.86	174	4
April ...	15	5 11	130	4	16	8.03	204	6
May ...	17	7.02	178	3	23	13.65	346	3
June ...	17	7 27	184	6	17	17.06	433	5
July ...	22	10.25	260	3	12	8 27	210	6
August ...	16	5 93	150	3	19	10.16	258	3
September ...	17	5.58	142	3	22	28.39	721	2
October ...	17	2.58	66	3	30	31.02	788	1
November ...	20	9.28	235	7	23	20.40	518	2
December ...	23	8 90	226	3	15	5.34	136	5
Total ...	210	81.41	2068	...	209	156.87	3983	...

Greatest amount in 24 hours 3.34 ins. or 85 mm. ...		7.90 ins. or 200 mm.
Do. do. 48 do. 3 53 do. 90 mm. ...		10.02 254 mm.
Do. do. 72 do. 3 59 do. 91 mm. ...		11.17 283 mm.
Excessively rainy periods, more than 5 ins. having fallen in 72 hours	Nil	5 (Sept., Oct., Nov.)
No. of days when condition persisted ...	Nil	10
Periods of comparative drought, less than .02 ins. having fallen in 120 hours	12	7 (Jan.-Feb., Feb., Apr., June, July, July-Aug , Dec.).
(Jan.-Feb., Feb., Feb.-Mar., Apr., Apr.-May, June, Aug., Sept., Sept.-Oct., Oct., Nov.)		
No. of days when the condition occurred ...	37	7

* From Jan. 24 to Feb. 13 inclusive (21 days) there was only .02 ins. of rain.

Departmental Notices.

A list of plants which can be purchased at the Botanic Gardens, in Singapore and in Penang, can be had upon application. The same list appears at intervals in the Government Gazette.

The Gardens' Bulletin is published as material becomes available. Its price is fifty cents for each number, post free, or in advance for every volume of twelve numbers, post free:—

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The

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STRAITS SETTLEMENTS

Vol. III MARCH, 1925 Nos. 9—12

The Flowering Plants of Taiping, in the Malay Peninsula

By

I. H. BURKILL and M. R. HENDERSON

To be purchased at the Botanic Gardens, Singapore.

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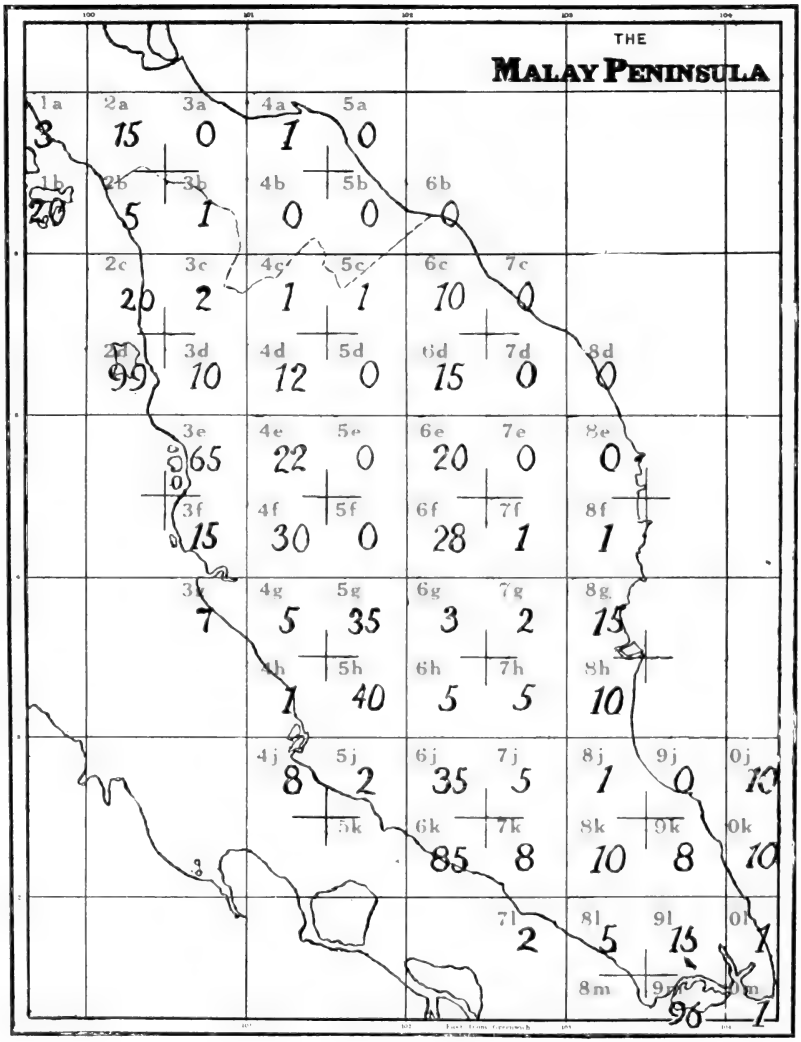
THE
MALAY PENINSULA
1a 3
2a 15
3a 0
4a 1
5a 0
1b 20
2b 5
3b 1
4b 0
5b 0
6b 0
2c 20
3c 2
4c 1
5c 1
6c 10
7c 0
2d 99
3d 10
4d 12
5d 0
6d 15
7d 0
8d 0
3e 65
4e 22
5e 0
6e 20
7e 0
8e 0
3f 15
4f 30
5f 0
6f 28
7f 1
8f 1
3g 7
4g 5
5g 35
6g 3
7g 2
8g 15
4h 1
5h 40
6h 5
7h 5
8h 10
4j 8
5j 2
6j 35
7j 5
8j 1
9j 0
0j 10
5k
6k 85
7k 8
8k 10
9k 8
0k 10
7l 2
8l 5
9l 15
0l 1
8m
9m 96
0m 1

Diagram No- 1

THE

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The Flowering Plants of Taiping, in the Malay Peninsula.

By

I. H. BURKILL and M. R. HENDERSON.

This is the first local Flora for any area within the Federated Malay States, and more also; for it gives in a very concentrated form a considerable amount of information about the distribution of the Higher plants in the Malay Peninsula. But it is not the first local Flora for any part of the Peninsula, as two exist. In the year 1894, Mr. C. Curtis published in the *Journal of the Straits Branch of the Royal Asiatic Society*, No. 25, a "Catalogue of the Flowering Plants and Ferns found growing wild in the Island of Penang"; and in the year 1900, Mr. H. N Ridley, in the same Journal, No. 33, published his "Flora of Singapore."

A catalogue of the Flowering plants of the territory of Malacca could be written up from the materials in the Herbarium of the Botanic Gardens, Singapore, and no doubt the time is not distant when it will be.

A few months ago, in order to answer an enquiry, a map of the Malay Peninsula was taken and divided between the lines of latitude and longitude, as opposite, so that squares of approximately 1500 square miles were formed; and for each of the squares an estimate of the number of species likely to occur was made: then the number of species proved to occur was calculated as a percentage of it. The percentages brought up to date have been inserted on the map: they suggest that the flora of the square *2d*, containing the island of Penang and the coast opposite, is that most thoroughly worked up, in as much as the number of the higher plants known to

occur in it appears to be 99 per cent of the probable quantity: the flora of square *9m*, containing the island of Singapore and some of the adjacent coasts, comes next at 96: Malacca follows at 85. The best known square of the rest of the Peninsula is *3e*, wherein is Taiping, Larut, much of Krian, with the hills, and back to the Perak river at Kuala Kangsar: its figure being 65. The enumeration which follows is for a part only of that square,—the part best known, i.e. the immediate neighbourhood of Taiping: it is of all the higher plants known to occur east of the Taiping-Kuala Kangsar and the Taiping-Batu Kurau roads, which make the western limit, and by curving round, indicate also the southern and northern limits: the eastern limit is along the summits of the Taiping Hills. The enumeration, perforce, stops at these summits, for nothing is known of the plants on the face towards the Perak river.

2. The materials for this Flora.

It is natural that the first local Flora for any area in the Federated Malay States should be for Taiping, as, after the opening of the States took place in 1874, no other place for a long time received similar attention from botanists.

To Taiping in 1877, Sir Hugh Low, after more than thirty-five years in Borneo, was called to be Resident: and in Taiping the enthusiasm for the study of plants which had caused him to send many beautiful Bornean species into cultivation, found expression in the organising of investigations. To him in 1877 Henry James Murton, Superintendent of the Botanic Gardens in Singapore, was sent that he might explore and report upon the available supplies of gutta-percha. Murton between October 18th and 22nd, in very bad weather, ascended the Taiping Hills and returned with collections of living plants which he despatched from the Larut river to Singapore. In a report on his tour (Straits Settlements Government Gazette for Feb. 22nd 1878) he mentions as found *Pinanga maculata* (a name for *P. disticha*, which species however, no subsequent collectors have found on the Taiping Hills), *Licuala acutifida* (which likewise has not been found there by anyone else), *Cissus porphyrophylla* (meaning *Piper porphyrophylla*), *Rhododendron javanicum*, *Rhododendron jasminiflorum*, *Nepenthes sanguinea*, *Calanthe curculigoides*, *Calanthe angustifolia*, *Anoectochilus setaceus*, *Anoectochilus Dawsonianus* (*Haemaria discolor*), and several ferns. Murton then proceeded to Kuala Kangsar and to Gunong Bubu; and did not return to do any more plant-hunting over Taiping. He probably misnamed the species that others have not collected.

Low in 1881 obtained the services of Leonard Wray for the purpose of opening up experimental gardens on the Hills; and Wray in 1883 was transferred to the post of Curator of the Perak State Museum, in Taiping, where he remained until 1908, collecting plants and building up a not inconsiderable herbarium.

In 1881 Dr. (afterwards Sir) George King, then Superintendent of the Royal Botanic Gardens, Calcutta, sent a collector, Hermann Kunstler, to Taiping, where we may well believe that Low directed his search for plants. And in 1882 the missionary, Father Benedetto Scortechini, came to Taiping on a long visit—a visit which lasted until his death in 1886, and during which he made considerable collections. Mr. Ridley states that he resided in Taiping at the Residency, and therefore it would be with Sir Hugh Low.

In 1889 Sir Hugh Low retired and Sir George King withdrew his collector.

Scortechini apparently failed in the art of ticketing material, and many of his localities are with difficulty recognisable: but Kunstler ticketed his with the greatest precision.

In the year after Scortechini's death, and when the Royal Botanic Gardens, Calcutta had acquired Scortechini's collections, it was proposed that Sir George King and Sir Joseph Hooker should collaborate in producing a book on "the Flowering Plants and Ferns of Perak, Penang, Singapore, and Malacca"; but Sir Joseph Hooker withdrew, pointing out that the time was not ripe, and Sir George King determined to produce "Materials for a Flora" instead. Thus it came about that from the Herbarium of the Royal Botanic Gardens, Calcutta, emanated in a long series of valuable papers the results of the work of the men who may be called Low's botanists.

Opportunities came at intervals for the Straits botanists to visit Taiping. Mr. Charles Curtis, of the Forest Service and Superintendent of the Waterfall Gardens, Penang, was there in December 1887, September 1889, May 1890, October 1892, June 1897, October 1900, and December 1901. These visits were short, and appear to have given 214 specimens. Mr. Walter Fox in 1899, during a period of acting for him, visited Taiping and collected 55 specimens. Mr. H. N. Ridley, as Director of Gardens, Straits Settlements, found his way to Taiping in March 1891, February and March 1892, June 1893, December 1902, February 1904, and August 1909—at least there exist herbarium specimens to the number of 663, so dated. Mr. Robert Derry, while serving in the Perak State at Kuala Kangsar, collected a little about Taiping in 1899, 1900 and 1902. Mr. James Webster Anderson, Assistant Curator of the Botanic Gardens, Singapore, in 1911 took a holiday in the Taiping Hills and collected. Mr. C. Boden Kloss in May 1909 collected also. In the year 1904 Bishop G. F. Hose collected about Taiping, and the Hon'ble Mr. E. S. Hose, now Colonial Secretary, Straits Settlements, collected on Gunong Hijau in 1917. A few specimens exist collected by Mr. D. F. A. Hervey, formerly Resident Councillor, Malacca, by Mrs. Bland, wife of a Resident Councillor of Penang, by Messrs. A. B. Stevens, B. H. F. Barnard, and other Forest officers, by Mr. A. R. Venning of the Administrative Service, Sir Graeme Elphinstone, the planter, Sir Walter Napier, the lawyer and at one time the Attorney-General, the late

Mr. C. Robertson-Glasgow, and Mr. W. R. Long. In February 1917, two members of the Straits Settlements Gardens Department, Mr. Mohamed Haniff, a Field-Assistant, and Mr. Mohamed Nur, Herbarium Assistant, were sent to the Taiping Hills for living and dried plants. In February 1924 one of the authors (I. H. B.) spent a fortnight on the hills, accompanied by Mr. Haniff, and collected 520 specimens; the other author (M. R. H.) was at the time stationed in Taiping and had been there for some months, using considerable opportunities chiefly for collecting at lower levels.

All the work of the collectors named is brought into one view in the following pages: and the writings of Sir George King, Mr. J. S. Gamble, and Mr. H. N. Ridley have been fully utilised. The result is a list of 1980 species.

3. The country.

A wide belt of mangrove forest, intersected by the muddy Larut river and by many creeks, extends from the Straits of Malacca half-way to Taiping town; and for the other half of the way the land rises almost imperceptibly: so that Taiping is but 70 feet above sea level. The lowland upon the west of Taiping is outside the area of the enumeration. On the eastern edge of Taiping the hills rise almost abruptly.

Apparently at one time by the dweller in the plains the hills were collectively designated Gunong Hijau, that is to say, the Green Mountain.§ But when paths began to be made into them, more accurate naming was necessary; and a clearing at 2000 feet (or 610 metres) was called the Tea Gardens from its purpose, and another between 3200 and 3700 feet, (or 975 and 1128 metres) was called Maxwell's Hill; two summits a little further off were named Birch's Hill and Caulfeild's Hill, and "Gunong Hijau" was applied to the highest and most remote summit. Birch's Hill reaches 4400 feet or 1340 metres, Caulfeild's Hill 4500 feet or 1372 metres, and Gunong Hijau 4750 feet or 1445 metres. From these three the Batu Kurau stream gets its waters, sinking into a deep hollow east of the spur whereon, facing west, is Maxwell's Hill clearing, the summit of the spur carrying a house called the Box at 4078 feet or 1240 metres. There are no greater heights over Taiping.

Murton tried by means of an anaëroid barometer to ascertain the heights which he reached, and got them too high. Too high also are the heights given on some of the labels of Curtis and Ridley. These, the authors have, as far as possible, corrected in their enumeration.

The Taiping Hills are of granite. They are the central part of a short range extending from 4° 30′ to 5° 45′, with conspicuous summits north and south of Taiping higher than Gunong Hijau, known as Gunong Bintang and Gunong Bubu. Both are botanically unknown. The map opposite indicates the geographic relation-

§ Gunong Ijok or Arenga Mountain offers an alternative origin.

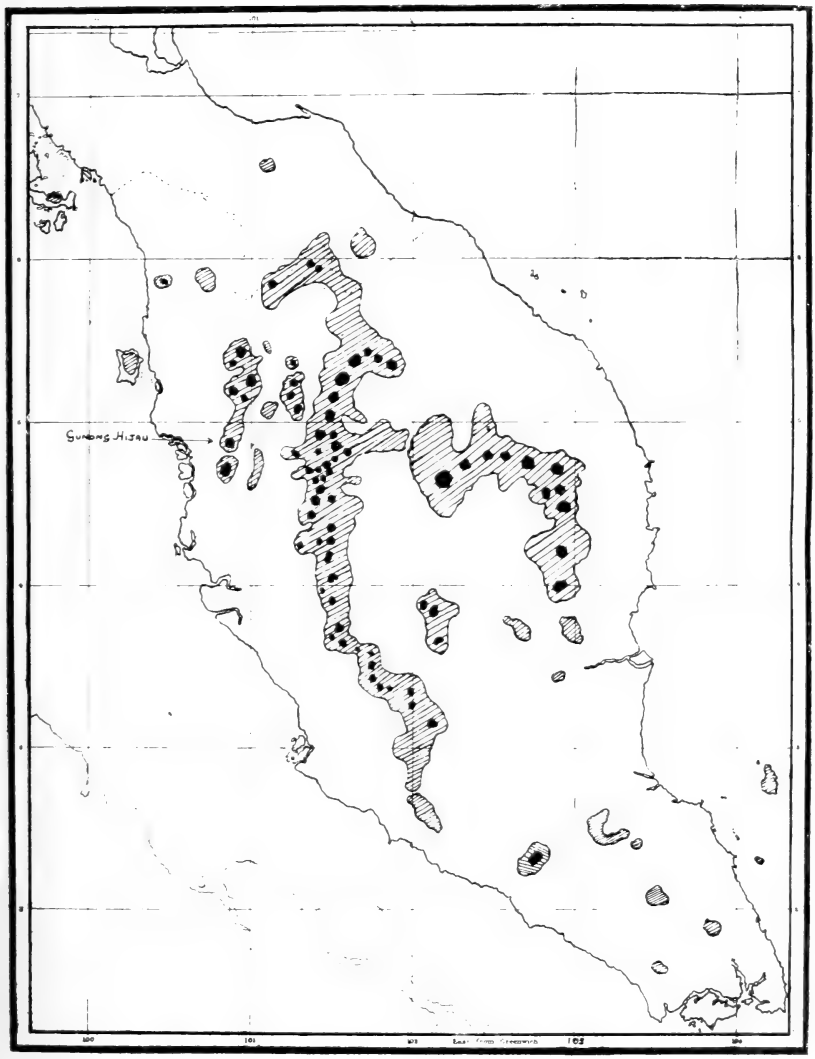


Diagram No. 2.—Mountains of the Malay Peninsula over 2,000 feet and over 4,000 feet.

ship of the Taiping Hills to all land exceeding 2000 feet or 610 metres and all land exceeding 4000 feet or 1220 metres. The nearest hills are (i) those of Penang, reaching 2724 feet or 837 metres, to the north-west and 50 miles away, (ii) Kedah Peak reaching 4000 feet or 1218 metres, 70 miles to the north-north-west. (iii) a lesser, much interrupted parallel range immediately east of the Perak river at no great distance, and (iv) at the distance of about 40 miles the Main range with numerous much higher summits. This part of the Main range happens to be the least known part; and most of the hills lying between the Main range and the Taiping Hills are botanically quite unknown. All are alike densely forested.

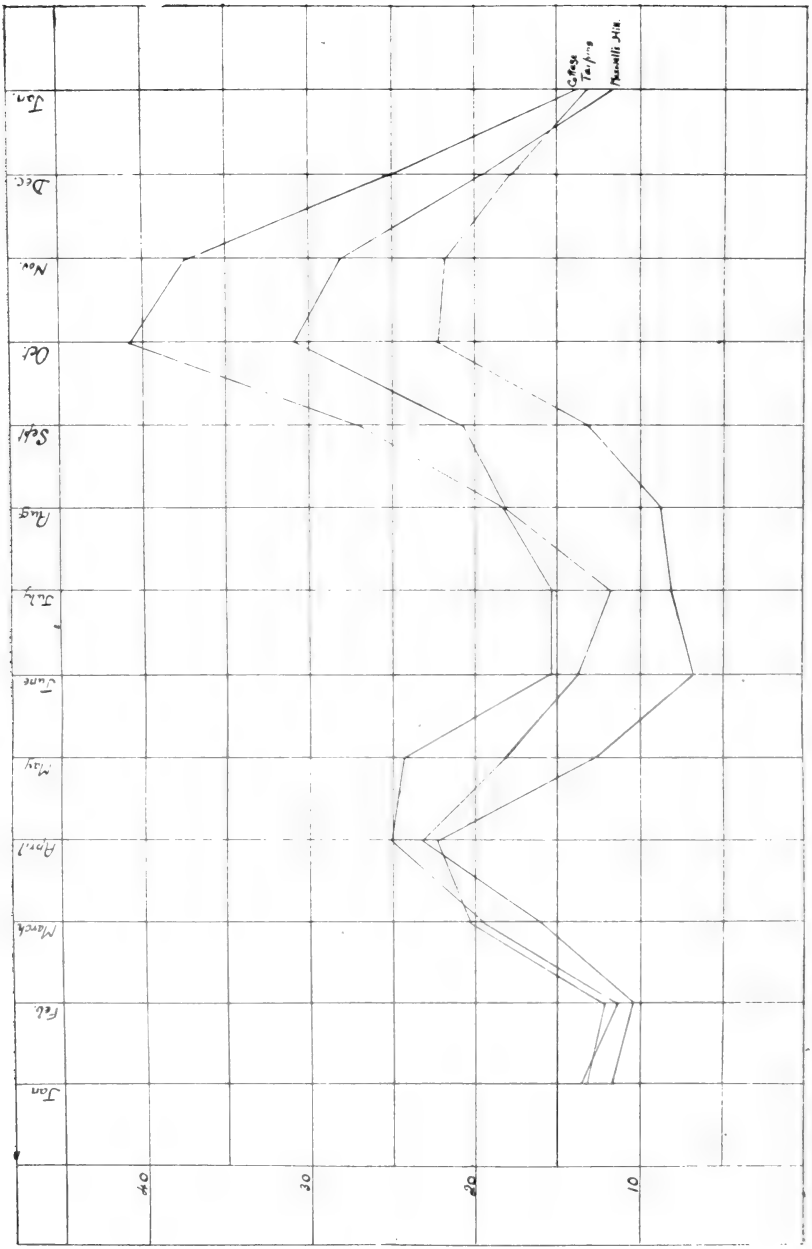
On the northern face of the summit of Gunong Hijau is a little patch of " Mossy forest," limited abruptly in a very interesting way. Elsewhere the forest changes type gradually from the tall lowland forest to the montane forest. The clearings in it are quite artificial. There are extensive continuous agricultural and mining clearings of the plain; the clearing known as the " Tea Gardens ": the considerable clearing of Maxwell's Hill, where much gardening is done and cattle are kept; clearings about a few higher houses; and the Trigonometrical Survey's clearing, for observation purposes, of the summit of Gunong Hijau. A demand for firewood is causing some enlargement of these clearings and the search for fodder for the cattle tends to the preservation of any patch of grass that can be cut.

Murton in 1877 found three clearings on the hills. There was one for cinchona, one of two acres made at Birch's orders which then was in the process of returning to secondary forest, and a small clearing made by squatters but newly abandoned. Abandoned clearings in these wet hills soon close up.

4. The Climate.

There are two periods of heavy rain in the year, occurring when the sun is overhead. At the autumnal equinox the rain is heavier than at the vernal equinox; and there is this great difference between the two periods, that during the inset of the rains of the vernal equinox, the wind being from the western side of the hills, the precipitation is similar at all elevations; but during the rains of the autumnal equinox, when the wind is blowing on the Taiping face of the hills, the higher levels receive a great deal more than the lower levels. At this time they are very wet, so wet that the sowing of peas, beet and some other temperate vegetables is useless, as they cannot be grown.

In diagram No. 4 the seasonal rainfall of Taiping town is contrasted with the seasonal rainfall of Penang (to which, from among the curves there given, it is most similar), of Kuala Lumpur, Malacca and Singapore. The rainfall of Calcutta is also given. It is clear from these curves that Taiping is a wet place. Botanists desire to know if the area constitutes a climatic island: but they



Rainfall at and over Taiping.

get very little help from meteorologists, as astonishingly meagre attention has been directed to the study of such phenomena in the Peninsula. We have examined as far as possible the phytologic evidence for such a view; and in default of meteorological facts a very non-committal attitude is necessary.

The altitude at which clouds form has not been recorded.

The dates of flowering given below suggest that February is the season of most flowers; and this indeed may well be the case. The records also suggest that towards the end of each rainy period there is a lull in flowering and that there is also a lull in July when rain is relatively light. We are not convinced that this is exactly the case: but there is certainly a lull in flowering in parts of the Malay Peninsula in June and July, such as might conceivably extend to the Taiping Hills. We make these remarks to encourage observation.

The rain about Maxwell's Hill makes it necessary in cultivation to keep a roof over plants of *Pelargonium zonale* (the Garden Geranium), *Dianthus caryophyllus* (the Carnation), and *Heliotropium peruvianum* × (Garden Heliotrope): and it may be partially responsible for a dwarfing of certain introduced weeds, such as *Poa annua, Stellaria uliginosa, Calamintha gracilis,* and *Andropogon aciculare* which commence flowering at a very early stage in their growth.

5. The Vegetation.

Pages 3-6 of Sir George Maxwell's "In Malay Forests," if not written of the Taiping Hills, give the most excellent idea of their beautiful forests. The plate in Sir Frank Swettenham's "British Malaya" which is opposite p. 118, is of the forests as they lie under the Cottage.

The lower forests contain a wealth of Dipterocarpaceae, and as many of the species are among the tallest of the trees, their conspicuousness is great. They disappear upwards; but an undetermined *Shorea* reaches 3700 feet. Species of *Palaquium, Swintonia* and *Sloetia* are obvious with them and disappear upwards too The lesser trees, the shrubs under them and the small woody plants exhibit the features typical of Malaysian forests. A few species of herbaceous genera, that are better developed at some altitude, appear quite low down, and are disappointing as being less showy than related species found higher; such for instance is *Camptandra parvula,* which keeps its flowers open all day, whereas the larger *Camptandra ovata* is a showy night-flowering plant: *Sonerila erecta* is the poorest of its genus, and descends low, but is not the only *Sonerila* low down; and *Didymocarpus albo-marginata* as found below 2000 feet is small-flowered.

In the upper forest, by reason of the somewhat lesser stature of the trees, which consequently admit more light to the ground—and this is especially so if the slopes are very steep—terrestrial herbs are more conspicuous. Several Sonerilas are found, several Didy-

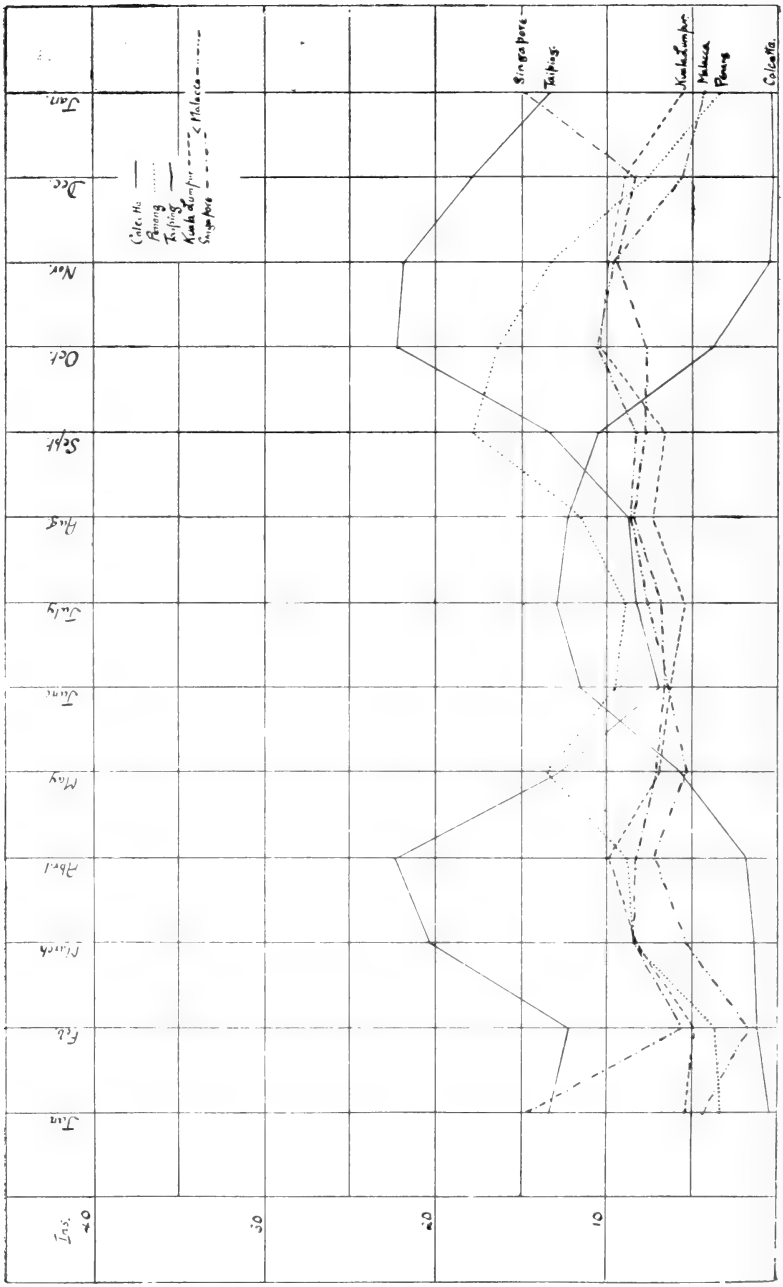

Singapore
Taiping
Kuala Lumpur
Malacca
Penang
Calcutta
Jan.
Feb.
March
April
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.
Jan.
Calcutta
Penang
Taiping
Kuala Lumpur
Singapore
Malacca
10
20
30
40
Inches

Diagram No. 4

mocarps, more than one *Argostemma,* Alocasias and Arisaemas. Some of them occur as a rule as isolated individuals: others make little groups: and on the south face of Gunong Hijau where the steep hillside almost becomes a cliff, so much light gets in that there is a bank of herbs.

Another feature of the upper forests is the "tree-gardens." Species of *Vaccinium, Rhododendron, Diplycosia,* ferns, orchids, and aroids, make them. They grow and grow until they destroy themselves by their own excessive weight in falling to the soil.

Ternstroemiaceae become more evident in the upper forests and then the Saxifragaceae come to notice.

Mosses both in the lower forests and the upper forests, where they are more numerous, are not on the soil, but on projections from the soil, such as tree-roots and stones, everywhere except in the one small patch of "Mossy forest" on Gunong Hijau. There they coat the soil, the change from opportunism in taking advantage of roots and stones to dominance in coating the soil being extraordinarily abrupt.

The aspect of the "Mossy forest" is towards the north; its altitude from 4650 to 4750 feet (1417 to 1445 metres). The most abundant tree is *Eugenia caudata,* which attains there 15 feet in height. Scattered individuals of *Weinmannia Blumei* growing with it attain 25 feet, and they are the tallest of the associated trees. *Illicium cambodianum, Gomphandra lanceolata, Melastoma sp., Ixora concinna, Pavetta indica, Lasianthus rhinocerotis, Wikstroemia Candolleana, Phyllanthus frondosus, Daphniphyllum laurinum, Ficus variolosa,* and *Pleomele elliptica* occur.

At the edge towards the clearing of the summit of Gunong Hijau *Rhododendron malayanum, Diplycosia microphylla* and *Eria vestita* are present as epiphytes; and *Gleichenia spp.* climb. In the moss upon the ground are the ferns *Dryopteris gracilescens, Diplazium sylvaticum, Lindsaya scandens,* an *Oleandra,* and *Trichomanes proliferum;* and the following lowly plants:—*Argostemma involucratum, Labisia pothoina, Loxocarpus coerulea, Piper penangiana,* the parasite *Balanophora ?multibrachiata,* a *Coelogyne,* a *Justicia,* and in great plenty *Phyllagathis hispida,* and a few palms of two species, one being a *Pinanga* and the other a *Licuala,* either *L. malayana* or *L. modesta.* Of climbers *Nepenthes sanguinea, Flagellaria indica, Dioscorea laurifolia, Smilax laevis, Rhaphidophora Korthalsii,* a *Vitis,* and a *Calamus* are present.

The low stature of the trees is undoubtedly one of the factors leading to the mossiness: but again the mossiness by creating an acid humus may determine the low stature of the trees. A more important cause for the mossiness appears to lie in the smallness of the leaves, which the overhead trees shed on the ground. It is found that *Eugenia caudata* is by no means confined to this "Mossy forest," but is quite common as a tree of the second rank under other trees, such as *Gordonia taipingensis, Schima Noronhae, Magnolia Maingayi, Barringtonia Scortechinii,* and *Quercus,* and that

when these trees are present no moss occurs upon the surface of the soil, but only upon projections from the soil such as roots and stones. From this it appears that the denser shade does not bring about the little-mossy condition: but that the nature of the leaf-fall produces it; for it occurs where the trees shower down upon the ground large leaves which do not decay very rapidly, but are beaten onto the surface of the soil by the heavy tropical rain and do not permit under them the growth of any thing depending for its life upon light, such as a moss protonema, but are only disturbed from their smothering effect by the stouter epicotyls of the vigorous seedlings of trees, etc., so frequently met with in these forests and backed by a considerable supply of reserve food.

The absence of large-leaved species of shading trees from the north aspect of the cone of Gunong Hijau probably in someway arises from the climatic conditions there, and should be studied. The abruptness of the change from "Mossy forest" to other forest suggests that the balance of nature has at this point got to an unstable position where a small cause can produce a big effect.

The condition of the contiguous clearing is worth study. The bracken fern, *Pteridium aquilinum*, is the commonest plant on the top, and second to it another fern, a *Nephrolepis*. With these are further ferns, e.g., *Dipteris conjugata*, *Blechnum orientale*, *Polypodium incurvatum*, *Alsophila glauca*, *Histiopteris incisa*, tied together with *Lygodium*, and run through with *Lycopodium cernuum*. Running through also are *Vitis trifolia*, *Nepenthes sanguineum*, *Isachne albens*, a *Rubus* and a *Smilax*. Standing in the tangle here and there are plants of *Curculigo latifolia*, *Dianella ensifolia*, *Gahnia javanica*, and *Imperata arundinacea*. Pushing themselves into prominence are young individuals of the woody plants *Weinmannia Blumei* and *Glochidion laevigatum*. Here and there are the herbs,—*Erechthites valerianifolia*, *Torenia atropurpurea*, *Spathoglottis aurea*, *Sporolobus indicus*: and of smaller weedy plants, *Sonerila erecta*, *Emilia sonchifolia*, *Kyllinga melanosperma*, *Scleria elata*, *Paspalum scrobiculatum*, *Paspalum conjugatum*, *Pogonatherum crinitum*, and there is a *Selaginella*, apparently *S. suberecta*.

The growth is less dense upon the side of the summit adjoining the "Mossy forest" than upon the other side of the Survey Beacon: and this is probably a consequence of the "Mossy forest" having occupied that side before the Survey cleared the hill-top.

This vegetation, which is a stage in a sere, or in less technical words, a transitional stage of returning forest, is not repeated upon the lower clearings. In them man's interference has been more continuous, and has led to the importation of a number of alien weeds. *Sagina apetala*, *Cardamine hirsuta*, *Galinsoga parviflora*, and *Poa annua* have probably arrived with European seeds: *Stellaria uliginosa* may have come from the same direction or from Japan: *Nasturtium indicum*, *Mimosa pudica*, *Blumea chinensis*, *Crepis japonica*, *Erigeron sumatrense*, *Spermacoce ocymoides*, *Solanum verbascifolium*, *Scoparia dulcis*, *Pilea muscosa*, etc. have only journeyed from the base of the hill. *Calamintha gracilis*

perhaps has come from Japan. These are all well established. *Oxalis corniculata* occurs. Commoner than any other weed at Maxwell's Hill is *Ageratum conyzoides;* and it exists in two forms. Exceedingly minute plants may be found in flower, but it reaches a quite normal size. *Impatiens Holstii,* a native of East Africa, is running wild. *Datura suaveolens* and *Tithonia diversifolia* are established. *Tritonia crocosmaeflora* appears to be spreading.

Towards the lowest parts of Maxwell's Hill where the clearing is of the longest duration bracken occurs in small quantities: and *Colocasia esculenta* has established itself. Higher up, the banks of the terraced cultivation are either covered with a rather coarse weedy growth: or if kept cut are largely coated with *Marchantia* mixed with minute weeds, and often with a quantity of *Hydrocotyle asiatica.*

Of the species enumerated, 34% are trees, 22% are climbers, 19% are shrubs, 18% are herbs, 10% are epiphytes, and 1% are parasites.

6. An analysis of the Flora geographically.

Malaysia from Moulmein, and with the Andaman islands, to New Guinea constitutes one of the "botanic regions" of the World. The Malay Peninsula, either from the Isthmus of Kra southwards or from some point south of the isthmus, Sumatra, Java, Borneo, and all the attendant isles about them up to Wallace's line constitute a "subregion," the Western Malaysian. This subregion can be divided again into sub-sub-regions, one of which is the Malay Peninsula: and when knowledge has grown enough, the Malay Peninsula will be found divisible into botanical sub-sub-sub-regions. We surmise that perhaps two of these meet in the Taiping area, one characterised by the features of what we may call the "Larut flora," and the other by features which mark the flora of the Central Montane area of the Peninsula; and we put forward the suggestion that these two exist, as one on which to work.

The number of species in the list is 1980: of them 41 have been introduced by man. Deducting these, the species known as natural to the Flora are 1939.

7. The endemic element, 860 species.

The geographic limit which Mr. Ridley accepted for his *Flora of the Malay Peninsula* is the 7th degree north: 819 of the species in this list, as we know them at present, do not occur outside Mr. Ridley's Malay Peninsula. But if the Isthmus of Kra, as is better, be taken for the limit northwards of the Malay Peninsula, 860 of the species in the list are endemic.§

§ Three of the species counted "endemic" to the Peninsula exist upon the Dutch Islands immediately south of Singapore. This extension beyond the political Peninsula is ignored here.

8. The local species, 196.

By local species we mean the species in the list which are not known to occur in the Peninsula anywhere except in squares *3e* and *3f*.

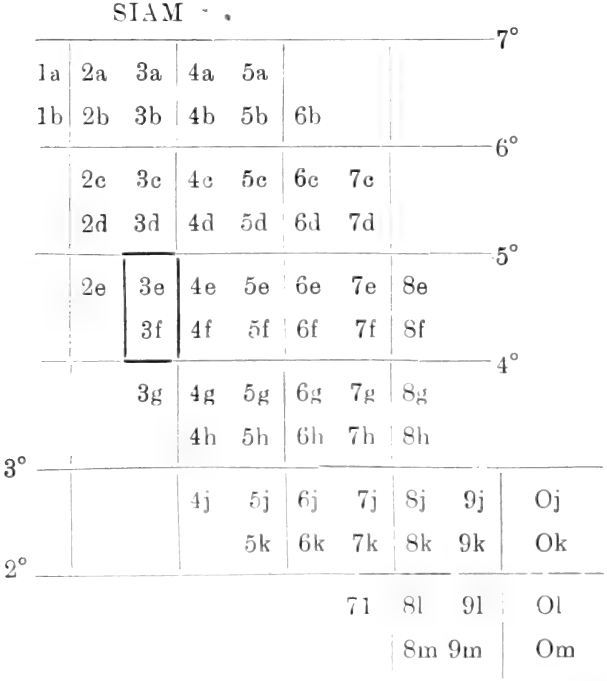


Diagram No. 5; the area for "local species," 196 in number.

Out of the 196 local species, four only are recorded at present as adding square *3f* to square *3e*, being *Synaptea perakensis, Synaptea Lowii, Aristolochia minutiflora and Mallotus Wrayi*—being Taiping plants which have been found in the Dindings. It seems reasonable to consider them as local; but their number is so small that it scarcely influences our discussion.

Out of the 196 species:—

? of them occur				
above	4500	feet		
26	between	4000	and	4500 feet
22	between	3500	and	4000 feet
39	between	3000	and	3500 feet
17	between	2500	and	3000 feet
15	between	2000	and	2500 feet
9	between	1500	and	2000 feet
16	between	1000	and	1500 feet
39	between	500	and	1000 feet
53	below	500	feet.	

These figures show very clearly that the local and endemic element is by no means exclusively a montane development: but that

on the other hand it is strongest in the lowest belt. They suggest the presence of endemic species belonging to two evolutionary areas, one, the local species which have originated at low levels; the other species requiring higher elevations and for which the lowlands are unsuitable.

The following is a list of the species known only to exist below the 2000 feet contour line:—

Griffithia cupularis
Polyalthia dumosa
Polyalthia macrantha
Polyalthia pachyphylla
Melodorum litsaefolium
Cyclea elegans
Alsodeia cinerea
Garcinia dumosa
Calophyllum subsessile
Shorea Kunstleri
Synaptea reticulata
Sterculia Kunstleri
Scaphium longiflorum
Brownlowia macrophylla
Pentace macrophylla
Pentace perakensis
Pentace strychnoidea
Eleocarpus Barnardii
Santiria macrocarpa
Chisocheton rubiginosa
Aglaia macrostigma
Lophopetalum Scortechinii
Salacia Wrayi
Colubrina anomala
Nephelium setosum
Semecarpus lucens
Melanochyla Kunstleri
Melanochyla densiflora
Agelaea pinnata
Crudia gracilis
Ormosia scandens
Kunstleria Kingii
Caesalpinia parviflora
Parinarium Kunstleri
Parinarium elatum
Eugenia Dyeriana
Eugenia Gageana
Eugenia Hoseana
Eugenia Koordersiana
Eugenia mollis
Eugenia nigricans
Eugenia Prainiana
Eugenia Pearsoniana
Eugenia quadrata
Eugenia setosa
Eugenia tecta
Barringtonia pauciflora
Memecylon epiphyticum
Memecylon floridum
Memecylon Curtisii
Momordica Clarkeana
Uncaria Kunstleri
Ardisia Wrayi
Bassia Kunstleri
Bassia longistyla
Melodinus citriformis
Phyllanthera perakensis
Genianthus rufo-velutinus
Erycibe magnifica
Erycibe strigosa
Didymocarpus serratifolia
Chirita Glasgovii
Staurogyne pauper
Gymnostachyum magis-nervatum
Phlogacanthus brevis
Premna sterculifolia
Piper Kotanum
Beilschmiedia insignis
Alseodaphne insignis
Alseodaphne paludosa
Alseodaphne Wrayi
Litsea claviflora
Litsea oblanceolata
Litsea patellaris

Litsea pustulata
Litsea Wrayi
Cinnamomum cinereum
Cinnamomum Kunstleri
Henslowia Wrayi
Helicia rufescens
Elytranthe diantha
Cleistanthus podocarpus
Coelodepas longifolium
Ptychopyxis Kingii
Bulbophyllum perakense
Alpinia macrostephana
Costus Kunstleri
Korthalsia tenuissima
Pothos Kingii
Pandanus Scortechinii
Mapania longispica
Homalonena nutans

The following is a list of the species known to occur above the 3000 feet contour line. (The species which occur both below the 2000 and above the 3000 feet contour lines, or occur only between them, are not listed).

Gordonia taipingensis
Megaphyllaea perakensis
Dysoxylum interruptum
Roureopsis Scortechinii
Polyosma grandis
Osbeckia perakensis
Melastoma sp.
Oxyspora floribunda
Campimia Wrayi
Impatiens Curtisii
Gardenia virescens
Amaracarpus caudatus
Psychotria Scortechinii
Lasianthus montanus
Antistrophe Curtisii
Symplocos Brandiana
Cleghornia gracilis
Microchites tubulosa
Toxocarpus Scortechinii
Genianthus Ridleyi
Dischidia sp.
Gaertnera oblanceolata
Lettsomia Scortechinii
Didissandra quercifolia
Chirita elata
Staurogyne macrantha
Justicia Clarkeana
Premna Derryana
Beilschmiedia Foxiana
Machilus Scortechinii
Actinodaphne montana
Litsea monticola
Daphniphyllum lancifolium
Ficus sp.
Pasania Scortechinii
Liparis atro-sanguinea
Liparis furcata
Liparis parvula
Dendrobium Foxii
Bulbophyllum ochranthum
Ceratostylis puncticulata
Anoectochilus ?calcaratus
Anoectochilus pectinatus
Goodyera gracilis
Geostachys decurvata
Curculigo megacarpa
Licuala modesta
Calamus viridispinus
Daemonorops aciculatus

It appears possible that the hot wet country between the montane flora of the Taiping range and the sea has served as the place for the genesis of the lowland local endemic species as a peculiar element giving recognisable characteristics to the Larut Flora.

9. Penang in relation to the Taiping Flora, with 34 restricted species.

Penang and Province Wellesley more or less constitute the land in square *2d*. Common to *2d* and the squares *3e* and *3f* are 34 endemic species, unknown from elsewhere.

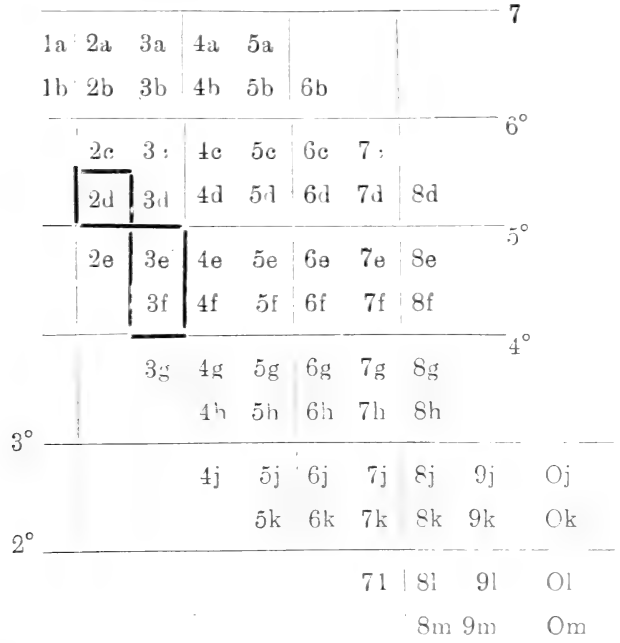


Diagram No. 6, of the area of the species of Penang with Taiping, 34 species.

These are their names, with a dagger against them if they are lowland species in the Taiping area, and a star if they are montane: but no mark if they are intermediate, or if they occur both below 2000 feet and above 3000 feet or if they are of unrecorded elevation.

Xanthophyllum Kunstleri†
Xanthophyllum pulchrum†
Adinandra maculosa*
Pachychlamys Hemsleyanus†
Byttneria Curtisii†
Glycosmis macrophylla†
Santiria longifolia†
Melanorrhoea inappendiculata
Melanochyla nitida†
Bauhinia lucida†
Anisophyllaea Curtisii
Anisophyllaea Gaudichaudiana†
Eugenia Kunstleri†
Memecylon Wallichii†
Uncaria trinervis†
Randia Curtisii†
Psychotria morindaefolia
Bassia Curtisii†
Diospyros apiculata†
Melodinus coriaceus†
Anodendron pauciflorum†
Trachelospermum Curtisii
Erycibe praecipua
Justicia Maingayi†
Litsea nidularis†
Rhopalocnemis ruficeps
Cleistanthus ellipticus†
Cleistanthus menbranaceus†

Cleistanthus pedicellatus	Bulbophyllum leptosepalum*
Antidesma pachystachys†	Globba Wallichii*
Claoxylon Wallichianum	Amorphophallus minor

There are five herbs among them, one being a parasite and another an epiphyte. All the species are forest plants. Measured by their occurrence on the Taiping hills are montane—not having been found below 3000 feet, and 22 are lowland, not having been found above 2000 feet.

10. Taiping and the mountains to the North-North-West.

The mountains north of Penang will next be discussed. The three, Kedah Peak (or Gunong Jerai), Penang and the Taiping Hills, in the present state of our knowledge, cannot be found to carry any single species which is not elsewhere; though common to two of them are a few species: for instance common to Kedah Peak and the Taiping Hills, but absent (as far as we know) elsewhere is *Talauma Kunstleri,* which descends at Taiping to 2500 feet: common to Gunong Raya in Langkawi and the Taiping Hills but absent elsewhere is *Gastrochilus albo-marginata*: common to Penang, Gunong Raya and the Taiping Hills but absent elsewhere are *Zizyphus affinis, Baccaurea Kingii,** and *Arisaema Kunstleri.** The last two are found high in the Taiping Hills.

There is no evidence in this meagre list suggesting that the area of the following diagram is a natural one as regards its high land.

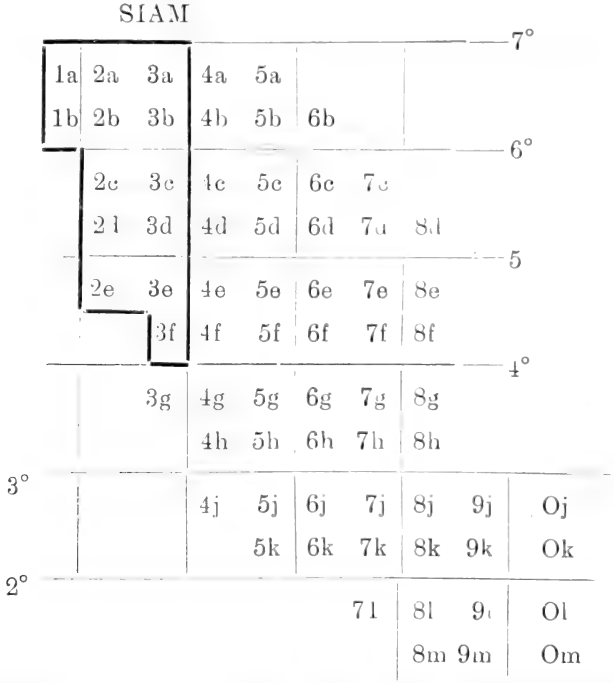


Diagram No. 7—the area north and north-north-west of Taiping, for which no more than 5 species are recorded.

11. The relationship of the vegetation of Upper Perak to that of Taiping.

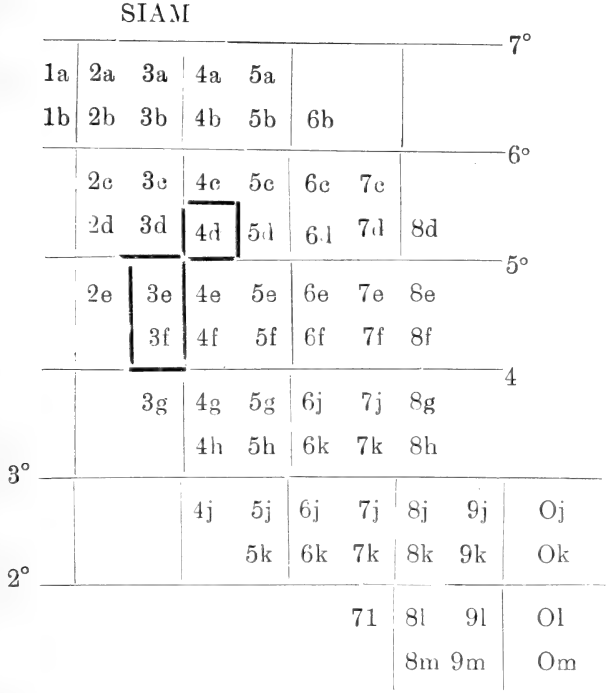


Diagram No. 8.—Taiping with Upper Perak, to which 11 species are confined. Upper Perak is chiefly contained in the square *4d*.

There are 11 species common the squares *3e* and *4d*—that is to say restricted to the Taiping area and the area immediately to the north-east of it. Of these *Antidesma gracillimum** and *Antidesma Kunstleri** are alike recorded for Maxwell's Hill and Gunong Inas, which is a high mountain of the Taiping range: two others, *Leea Curtisii*† *and Aerua Curtisii*† alike occur on the Waterloo Estate and at Lenggong: *Gomphandra nyssifolia,** *Didymocarpus urticaefolia** *and Piper longibractatum**—all found about the tops of the Taiping hills—were obtained by Mr. Ridley in Upper Perak on his visit to Temengoh the altitude of which is small, and *Zingiber chrysostachys** was got by Wray at 300 feet. The aroids *Homalomena trapezifolia* and *Schismatoglottis longifolia* occur on the Taiping hills both at high and at low elevations, and occur also at Temengoh. Whence in Upper Perak *Cinnamomum graciliflorum** came is uncertain. It is interesting that these few plants found high on the Taiping hills should be low down in upper Perak; but too little is the flora of square *4d* known for more to be said.

Two species are recorded as common to the three squares *2d*, *3e* and *4d*, but not wider; one is the small tree *Pajanelia multijuga*†

which is conspicuous at the very foot of the Taiping hills. The other is *Costus Kingii*,† which likewise occurs on the lower slopes.

12. The relation of the Taiping Flora to that of the Main range of the Perak-Pahang border.

The Main range of the Perak-Pahang border is contained in the four squares *4e, 4f, 5e,* and *5f;* but botanically *5e* and *5f* are unknown: they are included in the area of the following diagram, but they carry no effect whatsoever.

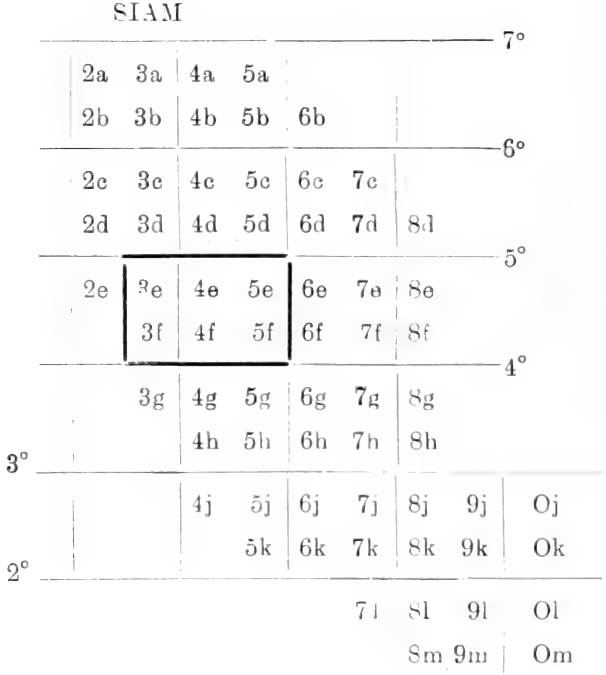


Diagram No. 9. The area of the Taiping hills and the montane area immediately to the eastward, with 49 species.

Common to *3e* and either *4e* or *4f* or both, but not at present known more widely are 49 species: 21 of them are found low down in the Taiping area, 18 of them high up, and 10 either occurring both below and above or of unknown elevation.

Those found low are:—

Hopea nervosa
Vatica Kunstleri
Garcinia opaca
Capparis larutensis
Millettia unifoliata
Eugenia perakensis
Melanochyla bracteata
Sonerila glabriflora
Medinilla scandens
Ardisia Kunstleri
Diospyros ellipsoidea
Paraboea capitata
Justicia ptychostoma
Beilschmeidia perakensis
Litsea hirsutissima
Breynia angustifolia
Cleistanthus Kingii
Ficus araneosa

Pasania Wrayi	Pothos macrocephalus
Rhaphidophora Kunstleri	

and those found high:—

Sonerila repens	Knema oblongifolia
Medinilla venusta	Bulbophyllum gigas
Schefflera lurida	Iguanura bicornis
Argostemma unifolioide	Iguanura ferruginea
Mycetia flava	Pandanus bidens
Didymocarpus alternans	Pandanus perakensis
Strobilanthes rufo-pauper	Arisaema anomalum
Aeschynanthus perakensis	Arisaema Wrayi
Piper Scortechinii	Gnetum Ridleyi

Beyond this area, to Penang, the following 8 species extend:— *Begonia Maxwelliana, Bassia Braceana,*† *Symplocos Curtisii, Cyrtandra dispar, Cinnamomum mollissimum,*† *Galearia subulata, Pasania grandifrons,* and *Oberonia rosea.** Unless it be *Oberonia rosea* no one of them occurs only above 3000 feet. The *Bassia* and the *Cinnamomum* belong to the hills below 2000 feet.

13. The relationship of the Taiping flora to that of the whole of the Main range, 118 species common to the two, or with 4d added, 126.

The area for comparison may be enlarged to comprise all the land within the heavy lines of the following diagram:—

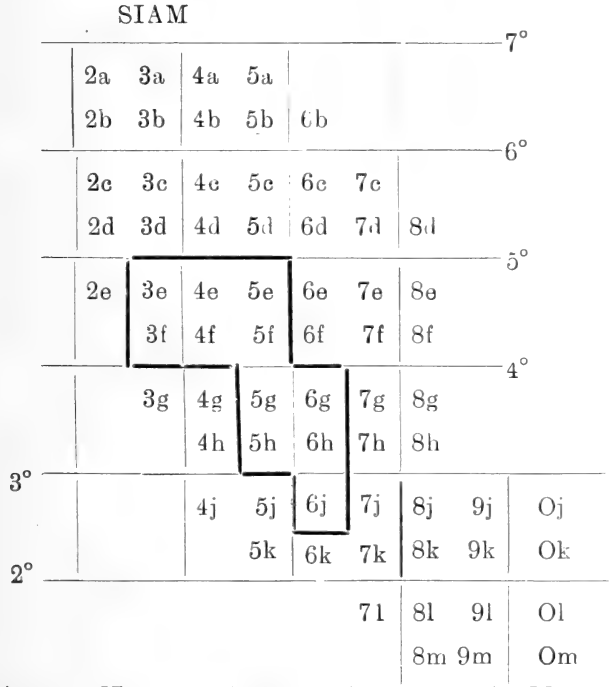


Diagram No. 10. Taiping with the whole Main range—a further 69 species, in addition to those of the northern part.

If the whole of the southern half of the Main range be added so that the area contains all the squares of diagram 10, and the species be assembled together which occur in it and the Taiping area, then we find the following 25 of them to occur at low elevations.

Cyathostemma Wrayi	Memecylon fruticosum
Goniothalamus Curtisii	Memecylon Kunstleri
Roydsia Scortechinii	Begonia taipingensis
Xanthophyllum bullatum	Diospyros subrhomboidea
Alsodeia Hookeriana	Diospyros toposiodes
Alsodeia pachycarpa	Jasminum Wrayi
Ternstroemia Scortechinii	Heterostemma piperifolium
Grewia erythrocarpa	Hoya citrina
Pentace Kunstleri	Boea paniculata
Dysoxylum rugulosum	Monophyllaea patens
Aglaia Kunstleri	Helicia Kingiana
Rhus perakensis	Calamus longispatha
Sonerila nidularia	Rhaphidophora crassifolia

while the following 33 of them are found high only:—

Aglaia cinerea	Lindera pipericarpa
Chisocheton macrothyrsus	Piper semangkoanum
Glyptopetalum quadrangulare	Piper magnibaccum
Sonerila integrifolia	Loranthus productus
Medinilla heterantha	Loranthus crassipetalus
Medinilla Scortechinii	Balanophora truncata
Eugenia corrugata	Dendrobium roseatum
Schefflera affinis	Eria bidens
Agapetes perakensis	Bulbophyllum oblanceolatum
Fagraea oblonga	Thelasis macrobulbon
Fagraea lanceolata	Hornstedtia grandis
Dischidia Scortechinii	Pinanga polymorpha
Lettsomia Curtisii	Calamus Curtisii
Torenia atropurpurea	Freycinetia montana
Didymocarpus sulphurea	Habenaria gigas
Didymocarpus parviflora	Carex perakensis
Nothaphoebe reticulata	

Intermediate between the two are *Dischidia cordifolia, Antistrophe caudata, Nothaphoebe fruticosa,* and *Musa truncata.* Extending into the two are *Cephaelis Ridleyi, Osmanthus Scortechinii, Didymocarpus albomarginatus, Didymocarpus malayanus, and Crytocarya Scortechinii.* And of unrecorded elevation are *Debregeasia squamata and Ficus obpyramidata.*

If the area be widened by the inclusion of the square *4d*, embracing Upper Perak, of high level plants are added *Diplospora Wrayi,* Didymocarpus hispida* and Staurogyne arcuata,** to low

level plants *Chirita caliginosa*,† *Ficus Lowii* and *Gastrochilus minor*, and to intermediate *Liparis comosa*, while *Diospyros* rigida has been found both high and low.

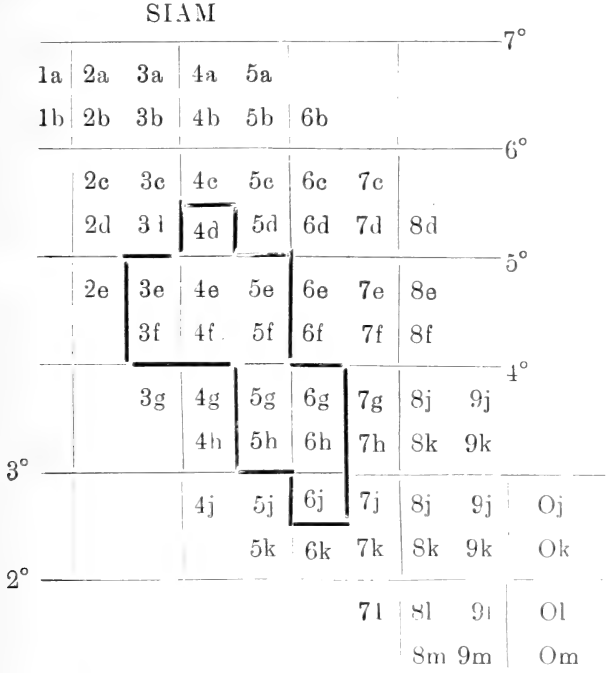


Diagram No. 11. Taiping, and the whole Main range with Upper Perak added, whereby 8 further species are included.

14. The relation of the Taiping Flora to the central mountains as a whole.

Proceeding, we next enlarge the area so as to contain Gunong Tahan and the north and south approaches to it: we include the square *4d* and so make the area to be as in the diagram on the next page.

Of them, the following 8 occur below 2000 feet in the Taiping hills:—

Artabotrys oxycarpus	Dissochaeta anomala
Shorea Ridleyana	Ophiorrhiza pallidula
Combretum nigrescens	Baccaurea malayana
Vitis Scortechinii	Hornstedtia triorgyale

and the following 13 occur high

Adinandra parvifolia	Gomphandra sp.

Sonerila brachyantha
Argostemma involucratum
Ardisia rosea
Dischidia astephana
Dendrobium longipes
Oberonia insectifera
Bulbophyllum galbinum
Eria ferox
Conamomum utriculosum
Dracaena robusta
Iguanura polymorpha

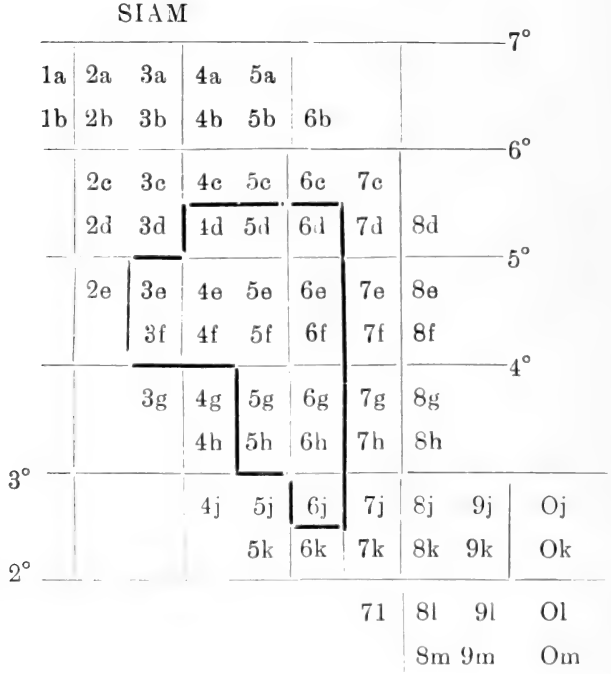


Diagram No. 12. The area of diagram 11 with Gunong Tahan added, producing the central montane area, whereby another 24 species are added.

15. Species of the central mountain area which appear to the north, but south of 7° N.

If the squares containing Penang (*2d*), Kedah Peak (*2c*) and Gunong Raya in Langkawi (*1b*) and all the land contiguous be added to the central montane area of diagram No. 12, species are

added to the number of 69, being 19 which do not pass to the south of the Main range and 49 which do so.

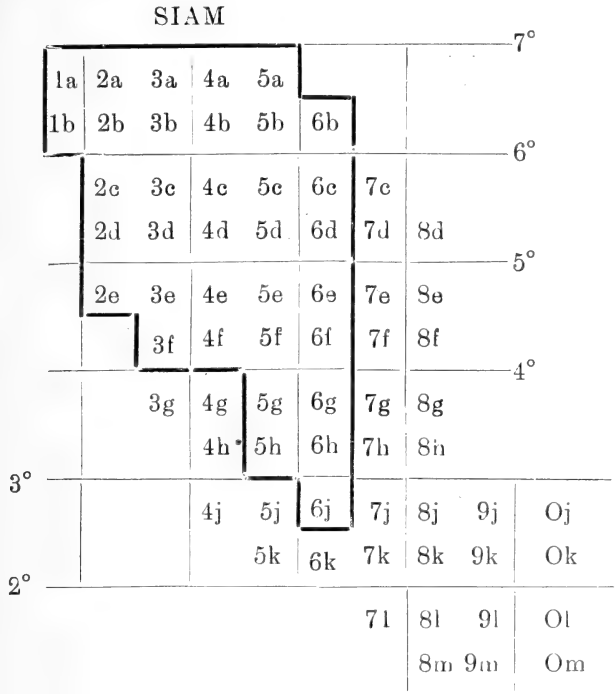


Diagram 13. The central montane area and northwards to 7° N.

Of the 17, *Streptocaulon Wallichii*,† *Phyllanthodendron dubium*,† *Glochidion perakense*,† *Ostodes muricata*† *Trichoglottis scaphigera*,† *Globba albiflora*† *and Curcuma Kunstleri*† are lowland;

Strobilanthes collinus,* *Strobilanthes rufo-pauper*,* *Piper penangense*,* *Bulbophyllum linearifolium*,* *Coelogyne pallens*,* *Podochilus lancifolia*,* and *Globba cernua** are montane. There is one not placeable.

of the 49 the following are lowland:—

Goniothalamus Scortechinii
Kadsura lanceolata
Shorea Maxwelliana
Pyrenaria Kunstleri
Kayea Kunstleri
Hydnocarpus nana
Cratoxylon Maingayi
Sterculia parvifolia
Tarretia perakensis
Evodia macrocarpa
Salacia Maingayi
Melanorrhoea aptera
Melanorrhoea Curtisii
Bauhinia ferruginea
Mussaenda Wrayi
Bassia laurifolia
Strychnos pencillata
Strobilanthes hirtisepalus
Cyrtandromoea megaphylla
Callicarpa angustifolia

Vitex siamica
Antidesma leucladon
Pasania Curtisii
Eria aporina

and the following montane:—

Brachytome Scortechinii
Diospyros Scortechinii
Jasminum Scortechinii
Loxocarpus coerulea
Strobilanthes Maingayi
Engelhardtia Wallichiana
Bulbophyllum selangorense
Ceratostylis cryptantha
Coelogyne carnea
Calanthe albolutea
Phreatia listrophora
Podochilus muricata
Protolirion paradoxum
Scindapsus Scortechinii
Rhaphidophora Wrayi

There are nine not placed.

16. Plants confined to the mountainous centre and north-west of the Peninsula (diagram 13) and Lower Siam.

Out of the 43 species which extend into Lower Siam without passing beyond the Isthmus of Kra, 12, being *Popowia nervifolia, Alsodeia Scortechinii, Schoutenia Kunstleri, Otophora sessilis, Rourea anomala, Brassaiopsis palmata,* Argostemma diversifolium,* Psychotria Birchiana, Didymocarpus flava,* Pseuderanthemum caudifolium, Conamomum citrinum,* and *Didymosperma Hookeriana* are restricted, upon the south of the 7th. degree North, to the area of the last diagram, the rest extending to Malacca or Singapore or the East coast. The *Brassaiopsis,* the *Argostemma* and the *Didymocarpus* are the only species found high on the Taiping hills: the others occurring low down.

17. Plants reaching Tenasserim and the Andaman islands but not extending further north.

Out of 25 species which extend into Tenasserim and the Andaman islands 11 do not pass south of the central montane region of the Peninsula and 14 do.

Adinandra villosa, Gomphostemma Scortechinii** and *Dendrochilum album** are montane in the Taiping hills, and do not reach the south of the Peninsula.

Adenia nicobarica, Ardisia andamanica,* Chilocarpus atroviridis** and *Staurogyne lasiobotrys** are montane and do extend into Malacca or Johore, but no one of them to Singapore.

18. Species of the Asiatic continent, chiefly Burma, which penetrate into Malaysia down the Peninsula without reaching the Malay islands.

As we have in the foregoing paragraphs 15—17 followed the range of species northwards to the limits of the Malaysian region, the species which northwards, and northwards only, transcede it may conveniently be considered next. There are 66 in the Taiping list:—

28 of them in the Peninsula pass into the central montane region, but not beyond it,
1 reaches Mount Ophir,
37 reach the lower country of Malacca, Johore and Singapore.

Out of these 66 the following are in the Taiping hills montane, *Illicium cambodianum, Salacia flavescens, Vitis Lawsoni, Microtropis filiformis, Eugenia Thumra, Hedyotis coronata, Psychotria calocarpa, Ardisia solanacea, Aeschynanthus Hildebrandtii, Loranthus obtectus, Loranthus pulcher, Ficus variolosa, Ficus chartacea, Elatostemma molle, Calanthe Fostermanni, Saccolabium bigibbum* and *Sphaerocaryum elegans.*

Are there southern migrants among them?—Probably, as for instance *Illicium cambodianum* and *Psychotria calocarpa* and some others. But until the plants of Tenasserim and particularly of Lower Siam are better known, a southward migration actually in progress must be obscure.

19. The relationship of Mount Ophir.

Recorded for Mount Ophir and the Taiping hills are 39 species: 17 of them occur also in Singapore island, and a further 8 in the lowlands of Johore: 7 occur in Malacca: while another is found upon the Pahang coast. None of these then, are exclusively montane in the south of the Peninsula. Among the remaining 6 are *Diplospora Kunstleri* which is recorded for the two places, and for no others, and 5, i.e. *Evodia pilulifera, Argostemma involucratum, Paraboea cordata, Liparis Maingayi,* and *Iguanura Wallichiana* which occur upon the Main range and seem to leap the lowlands to that isolated mountain. The *Liparis* and the *Paraboea* reach Kedah Peak: the *Liparis,* the *Paraboea,* the *Argostemma* and the *Eugenia* reach Penang. It is to be observed that three of these four are herbs.

20. The relationship of Malacca—which it will be remembered, is a well-worked area.

As limited to the Taiping area and square *6k*, which is that of Malacca, are 12 species. Except *Hoya Maingayi* (and the "Malacca" of its label probably means Mt. Ophir), all of them are lowland plants in the Taiping area. It may be convenient to future workers if we enumerate them: they are *Sterculia bicolor, Pentace eximia, Swintonia lurida, Mangifera Griffithii, Diospyros rufa, Cordyloblaste Maingayi, Beilschmiedia longipes, Baccaurea polyneura, Macaranga Maingayi* (Taiping elevation not recorded), *Castanopsis Ridleyi* and *Smilax Kingii.*

The total number of endemic species common to Malacca and Taiping is 230 and of them 38 are highland in the Taiping area and 130 are lowland. There are 62, either both high and low, or of unrecorded elevation.

Microchites furcata,† which occurs low down on the Taiping hills and in the square *4g*, and *Coelogyne Kingii* which occurs at unrecorded elevations in the Taiping hills and square *5j* are akin to these; and *Licuala pusilla*,† which adds the Main range and Gunong Tahan is, like those, with difficulty classifiable.

21. The relationship of Singapore—another well-worked area.

As common to Taiping and Singapore Island, but not recorded from any places between or any area elsewhere are 7 species, namely, *Artabotrys Wrayi, Genianthus Maingayi, Piper flavimarginatum, Beilschschmeidia Kunstleri, Baccaurea Hookeri, Baccaurea latifolia* and *Freycinetia confusa*: all these as far as recorded occur at low levels in the Taiping area.

The total number of endemic species common to Singapore and Taiping is 172: and of them 14 are highland in the Taiping area and 106 are lowland. There are 52 either both high and low, or of unrecorded elevation.

22. Further endemic Taiping plants in the south of the Peninsula.

In the south of the Peninsula there are further species to the number of 51 which occur at low elevation, is Johore, for instance without occurring either in the Malacca or Singapore squares: and of them 19 are highland, and 18 lowland, and 14 either both high and low or of unrecorded elevation.

The following two lists are, (i) of the endemic species montane in Taiping which appear in the low country of the south of the Peninsula, and (ii) of the endemic species in Taiping which equally appear in this low country.

(i)

Phaeanthus lucidus	Morinda elliptica
Aglaia Griffithii	Lasianthus ? glaberrimus
Eurycoma apiculata	Vaccinium perakense
Canarium parviflorum	Diospyros argentea
Celastrus malayensis	Ervatamia cylindrocarpa
Gomphandra lanceolata	Urceola brachysepala
Bauhinia cornifolia	Hoya Maingayi
Pyrenaria acuminata	Didymocarpus corchorifolia
Eugenia caudata	Justicia pubiflora
Barringtonia Scortechinii	Loranthus malaccensis
Phyllagathis hispida	Lepeostegeres Kingii
Sonerila bracteata	Breynia coronata
„ erecta	Castanopsis Wallichii
Schefflera Ridleyi	Microstylis acutangula
Argostemma elatostemma, var.	Dendrobium aegle
„ spinulosum	Bulbophyllum modestum
Ophiorrhiza discolor	Coelogyne longibractata
Hedyotis mollis	Coelogyne perakensis
Urophyllum ferrugineum	Eria monticola

Eria poculata
Hornstedtia albomarginata
Zingiber gracile
Alpinia petiolata
Phrynium hirtum
Musa malaccensis

Nenga macrocarpa
Caryota obtusa
Pinanga paradoxa
Daemonorops hygrophilus
Plectocomia ? Griffithii
Dendrocalamus giganteus

(ii)

Polyalthia Scortechinii
Tetracera lucida, var
Artabotrys crassifolius
„ Wrayi
Oxymitra latifolia
„ calycina
Orophea enterocarpa
Xylopia magna
Melodorum lanuginosum
„ Kingii
„ elegans
Uvariella leptopoda
Drepananthus pruniferus
Limacia oblonga
Dipterocarpus Kunstleri
Balanocarpus penangianus
„ Heimii
Hopea globosa
Garcinia penangiana
Kayea grandis
Calophyllum canum
Hibiscus floccosus
Pentace eximia
Sterculia bicolor
Tarrietia simplicifolia
Byttneria Maingayi
Grewia Miqueliana
Eleocarpus Hullettii
Xanthophyllum stipitatum
„ Wrayi
Alsodeia Wrayi
Gonostylus Maingayi
Evodia malayana
Turpinia latifolia
Canarium pilosum
Canarium rufum
„ kadondon
Santiria laxa
„ apiculata
„ fasciculata
„ Wrayi
Amoora rubiginosa
„ Ridleyi
Aglaia Hiemii

Lophopetalum pachyphyllum
Icicaster Planchoni
Lophophyxis Maingayi
Gomphandra corymbosa
„ penangiana
Iodes velutina
Strombosia rotundifolia
Phytocrene palmata
„ oblonga
Zizyphus Kunstleri
Nephelium rubescens
Pometia alnifolia
Lepisanthes longifolia
Paranephelium macrophyllum
Smythaea macrocarpa
Swintonia lurida
„ spicifera
Melanorrhoea torquata
Melanochyla angustifolia
Mangifera Griffithii
Vitis cinnamomea
„ elegans
Leea gigantea
Ellipanthus gibbosus
Rourea rugosa
Connaropsis macrophylla
Millettia albiflora
Crudia Curtisii
Saraca bijuga
Spatholobus Maingayi
Bauhinia Wrayi
Pithecolobium contortum
Eugenia papillosa
„ Clarkeana
„ chloroleuca
„ penangiana
„ pustulata
„ expansa
„ filiformis
„ subdecussata
„ variolosa
„ Duthieana
Phyllagathis Griffithii
Allomorphia exigua, var.

Memecylon acuminatum
„ amplexicaule
Crypteronia Griffithii
Casearia Kunstleri, var.
Homalium propinquum
Schefflera Hullettii
Greenia Jackii
Ixora Kingstoni
Mussaenda mutabilis
Timonius Wallichianus
„ Wrayi
Urophyllum villosum
Aulacodiscus premnoides
Sideroxylon malaccense
Diospyros bilocularis
„ flavicans
„ rufa
„ oblonga
Palaquium bancanum
„ Clarkeanum
„ Maingayi
Willughbeia coriacea
Leuconotis Griffithii
Cordyloblaste Maingayi
Chonemorpha penangensis
Ervatamia peduncularis
Erycibe malaccensis
„ festiva
Cyrtandra cupulata
Vitex longisepala
„ peralata
„ coriacea
Clerodendron myrmecophilum
„ deflexum
Thottea dependens
Piper Curtisii
„ ramipilum
Myristica cinnamomea
Horsfieldia Lehmannana
„ sucosa
Knema Wrayi
„ Kunstleri
„ Cantleyi
Actinodaphne pruinosa
Beilschmiedia longipes
„ Kunstleri
Nothaphoebe panduriformis
Stemmatodaphne perakensis
Cryptocarya rugulosa
Litsea machilifolia, var.
„ perakensis
„ megacarpa
„ castanea
Aporosa pseudo-ficilifolia
„ stellifera
Baccaurea Maingayi
„ latifolia
„ polyneura
„ Griffithii
Antidesma pendulum
Drypetes pendula
Glochidion desmocarpum
Endospermum malaccense
Agrostistachys sessilifolia
Croton Griffithii
Macaranga Lowii
Artocarpus Maingayi
Pasania Cantleyana
„ Wallichiana
Castanopsis megacarpa
„ nephelioides
„ Ridleyi
Saccolabium perpusillum
Dendrobium clavator
Hornstedtia macrochilus
Elettiaropsis latiflora
Amomum xanthophlebium
Smilax Kingii
Dracaena umbratica
Dioscorea stenomeriflora
Forrestia gracilis
Alocasia ovalifolia
Homalomena paludosa
Pandanus Ridleyi
„ ornatus
Freycinetia lucens
„ confusa
Calamus densiflorus
Gnetum Kingianum

23. East coast plants that also are endemic.

Of the Taiping plants 3 combine the East coast of Pahang with the area of diagram 10:—*Miquelia caudata,* Symplocos perakensis*, and *Licuala malayana;** one combines the East coast of Pahang with the area of diagram 10 and the West coast:—*Polyalthia Hookeriana;** four combine the East coast of Pahang

with the area of diagram 7:—*Goniothalamus tenuifolius, Eugenia urophylla*†, *Ophiorrhiza tenella** and *Randia oocarpa*; and one combines the East coast of Pahang with the area of diagram 13:—*Ryparosa Scortechinii*†.

24. A summary in regard to endemic species.

In the following table the total number of endemic species of each area that has been considered are collected together. The first fact to notice is that in species common to the best-worked areas the endemism is high, reaching,

South of the Main range	..	..	46%
North of the Main range	..	..	40%
Penang	..	..	33%
Malacca	..	..	30%
Singapore	..	..	20%

but the order in which these five stand is not the order in which they might be arranged by the figures on the map opposite the first page of this bulletin, in which the Main range is regarded as but 20% known. It would follow then that as the Main range becomes better known, the number of the local endemics in the Taiping area will be reduced greatly by the discovery of them in it. Thus will the noteworthy peculiarity of the area be reduced.

Number of endemic species.

Area	Taiping	reach Penang	reach Lankawi or K. dah peak	enter upper Perak	reach N. part of Main range	do. S. part	reach N. Pahang mountains	extend towards 7° N	into Lower Siam	into Tenasserim	occur in Malacca	in E. Pahang	in Johor	in Singapore
squares 3e and 3f	196	..	..	..	..	..	..	..	..	..	..	..	..	..
diagram 6	34	34	..	..	..	..	..	..	..	..	..	..	..	..
diagram 7	5	3	5	..	..	..	..	..	..	..	..	..	..	..
diagram 8	11	..	..	11	..	..	..	..	..	..	..	..	..	..
under same	2	2	..	2	..	..	..	..	..	..	..	..	..	..
diagram 9	49	..	..	..	49	..	..	..	..	..	..	..	..	..
under same	8	8	..	..	8	..	..	..	..	..	..	..	..	..
diagram 10	69	..	..	..	37	69	..	..	..	..	..	..	..	..
diagram 11	8	..	..	8	8	8	..	..	..	..	..	..	..	..
diagram 12	24	..	..	1	17	17	24	..	..	..	..	..	..	..
diagram 13 to Lower Siam	68	42	22	6	31	52	67	68	..	..	..	..	..	..
to Tenasserim	43	19	15	11	25	27	16	8	43	..	22	13	20	17
N. to S. of Peninsula	25	13	9	7	13	18	12	2	3	25	8	4	8	6
Total	329	165	43	36	162	209	65	12	..	..	233	42	156	172
Percentage	871	286	94	82	350	400	184	90	46	25	263	59	184	195
	..	33	11	9	40	46	21	10	51	3	30	7	21	22

Number of Montane endemic species.

Area	Taiping	reach Penang	reach Lankawi or Kedah peak	enter upper Perak	reach N. part of Main range	do. S. part	reach N. Pahang mountains	extend towards 7° N	into Lower Siam	into Tenasserim	occur in Malacca	in E. Pahang	in Johor	in Singapore
squares 3e and 3f	50	..	..	..	..	..	..	..	..	..	..	..	..	..
diagram 6	3	3	..	..	..	..	..	..	..	..	..	..	..	..
diagram 7	2	2	2	..	..	..	..	..	..	..	..	..	..	..
diagram 8	7	..	..	7	..	..	..	..	..	..	..	..	..	..
under same	0	0	..	0	..	..	..	..	..	..	..	..	..	..
diagram 9	18	..	..	..	18	..	..	..	..	..	..	..	..	..
under same	1	1	..	..	1	..	..	..	..	..	..	..	..	..
diagram 10	33	..	..	..	17	33	..	..	..	..	..	..	..	..
diagram 11	3	..	..	3	3	3	..	..	..	..	..	..	..	..
diagram 12	13	..	..	..	8	7	13	..	..	..	..	..	..	..
diagram 13	22	11	11	2	16	18	21	22	..	..	..	..	..	..
to Lower Siam	6	2	3	3	5	4	4	4	6	..	3	3	2	1
to Tenasserim	7	3	2	1	3	6	4	1	2	7	1	1	4	1
N. to S. of Peninsula	53	29	12	4	30	43	19	4	..	..	38	7	35	14
Total	218	51	30	20	101	114	61	31	8	7	42	11	41	16
Percentage	..	23	14	9	46	52	28	14	4	3	19	5	18	7
Above average by	..	3	..	6	6	7	4	..	..	..	..	..	..	..
Below average by	10	..	..	..	..	..	..	..	1	..	11	2	3	15

Conversely it is clear that there has been a development of endemism on no small scale within what is here called the central montane area of the Peninsula (diagram 12), Taiping sharing in it.

We have endeavoured to recognise this montane flora by the endemism it possesses and we have found endemic species in all the following genera, the list of which is given to call attention to the circumstance that they are genera typical of Malaysia and that it is quite unnecessary to suppose any marked wandering in of made species of these genera from more northern regions: but that to account for the development of these endemics we have but to assume evolutionary processes in the Peninsula. In which connection it may be asserted that whatever the ages of the mountains of the central montane area of the Peninsula be, they are old enough to be several times over the foster-parents of these endemics.

That the species evolved within the central montane area is to be assumed: but the question of the part the Taiping hills may have played in their origin is not yet worth discussing.

This montane flora scarcely reaches Penang, to which the lesser elevations and the greater periods of heat scarcely invite it. It is remarkable in these figures that the species of narrow distribution common to Taiping and Penang are members rather of the Larut flora.

Genera supplying the montane Taiping endemics, with the number of species in brackets of more than one

Adinandra (2)
Gordonia
Impatiens
Megaphyllaea
Chisocheton
Dysoxylon
Aglaia
Gomphandra (2)
Glyptopetalum
Roureopsis
Polyosma
Eugenia
Osbeckia
Melastoma
Oxyspora
Campimia
Sonerila (3)
Medinilla (3)
Schefflera (2)
Brassaiopsis
Argostemma (3)
Mycetia
Gardenia
Diplospora
Psychotria
Lasianthus
Amaracarpus
Agapetes
Ardisia
Antistrophe
Symplocos
Cleghornia
Micrechites
Toxocarpus
Genianthus
Dischidia (3)
Fagraea (2)
Gaertnera
Lettsomia (2)
Torenia
Aeschynanthus
Didissandra
Didmocarpus (6)
Chirita
Staurogyne (2)
Strobilanthes (3)
Justicia
Premna
Gomphostemma
Piper (5)
Knema
Beilschmiedia (2)
Cinnamomum (2)
Nothaphoebe
Machilus
Actinodaphne
Litsea
Lindera
Loranthus
Balanophora
Antidesma
Daphniphyllum
Ficus
Pasania
Oberonia (2)
Liparis (3)
Dendrobium (3)
Bulbophyllum (5)
Eria
Trichotosia
Ceratostylis
Coelogyne
Podochilus
Thelasis
Anoectochilus (2)
Goodyera
Habenaria
Globba (2)
Zingiber
Hornstedtia
Geostachys
Curculigo
Dracaena
Pinanga
Iguanura
Daemonorops
Calamus (2)
Pandanus (2)
Freycinetia
Arisaema (3)
Carex
Gnetum

Number of Lowland endemic species.

Area	Taiping	reach Penang	reach Lankawi or Kedah peak	enter upper Perak	reach N. part of Main range	do. S. part	reach N. Pahang mountains	extend towards 7 N.	into Lower Siam	into Tenasserim	occur in Malacca	in E. Pahang	in Johor	in Singapore
squares 3e and 3f	91	..	..	..	..	..	..	..	..	..	..	..	..	..
diagram 6	22	22	..	..	..	..	..	..	..	..	..	..	..	..
diagram 7	1	1	1	..	..	..	..	..	..	..	..	..	..	..
diagram 8	4	..	..	4	..	..	..	..	..	..	..	..	..	..
under same	2	2	..	2	..	..	..	..	..	..	..	..	..	..
diagram 9	21	..	..	..	21	..	..	..	..	..	..	..	..	..
under same	2	2	..	..	2	..	..	..	..	..	..	..	..	..
diagram 10	25	..	..	..	14	25	..	..	..	..	..	..	..	..
diagram 11	0	..	..	0	0	0	..	..	..	..	..	..	..	..
diagram 12	8	..	..	0	4	7	8	..	..	..	..	..	..	..
diagram 13 to Lower Siam	33	23	9	3	15	22	32	33	..	..	..	..	..	..
to Tenasserim	23	11	9	6	11	14	7	2	23	..	9	8	9	10
N. to S. of Peninsula	11	7	3	2	6	6	4	..	1	11	4	2	3	3
Total	178	88	25	20	83	102	22	5	..	..	132	20	71	106
Percentage	421	156	47	37	156	176	73	40	24	11	145	30	83	119
Above average	..	37	11	9	37	42	17	10	6	3	34	7	20	28
Below average		4	..	..	..	..	..	..	..	..	4	..	1	6
		..	..	..	3	4	4	..	1	..	..	..	..	..

It looks as if between the Taiping hills and Moulmein changes proceed evenly, as might be expected in the lowlands. For, adding to the 68 endemic species which pass as in diagram 13 northwards to 7° N. to the 34 for the Taiping with Penang endemics, 5 for the Taiping with Kedah endemics, and so on, we get :—

	Total	Lowlan	Mon'ac
Endemics ending northwards in Tenasserim	25	11	7
„ „ „ „ Lower Siam	43	23	6
„ „ „ before 7° N.	107	56	27

but more work is required yet everywhere, but chiefly in Lower Siam, where hills are small and also botanically scarcely known.

25. The plants of Malaysia which are not endemic.

The next sections deal with Malaysian plants which are not confined to the Peninsula, but have overmastered sea-barriers: and first with these of narrow distribution with the Peninsula.

26. Malaysian plants, but in the Peninsula local.

In the Taiping area 32 species have been collected, which while they have been found nowhere else in the Peninsula, are known to occur in the western Malaysian islands:—

Sumatra only:—*Uvaria Larep*,† *Sabia sumatrana*,† *Eugenia Benjamina*, *Eugenia Hullettiana*,† *Eugenia subhorizontalis*,† *Piper velutinervium*,† and *Cinnamomum lampongum*.†

Java only:—*Padebruggea dasyphylla*,† *Piper acre*, *Litsea brachystachya*,† *Chrysoglossum villosum*, *Diglyphosa latifolia*, *Chelonistele pusilla*,* and *Physurus latifolius*.*

Sumatra and Java together:—*Stephania corymbosa*,* *Payena dasyphylla*,* and *Strobilanthes bibracteatus*.*

Borneo only:—*Melanorrhoea macrocarpa*,* *Platyclinis sarawakensis*, *Dendrobium Derryi*, *Bulbophyllum cleistogamum*, *Arundina revoluta*,† *Coelogyne quadrangularis*,* *Bromheadia brevifolia*, and *Bagnisia crocea*.

Sumatra and Borneo together:—*Saraca macroptera*, *Maesa macrothyrsa*,† and *Litsea fenestrata*.†

Java and Borneo together:—*Wightia borneensis*.*

Sumatra, Java and Borneo together:—*Henslowia Reinwardtiana*,† *Pasania Blumeana*,* and *Castanopsis costata*.

The species marked† are recorded only from low elevations; those marked* for high.

27. Malaysian plants which in the Peninsula are found in Taiping and Penang.

Another 11 which are found in the island of Western Malaysia, in the Peninsula appear confined to Taiping and Penang.

They are:—

Sumatra only:—*Saraca palembanica*† and *Trichospermum cymbiforme*.†

Java only:—*Melodorum latifolium*,† and *Platea latifolia*.†

Borneo only:—*Magnolia Maingayi*,* *Dipterocarpus fagineus*,† *Balanocarpus Curtisii*,† *Astronia smilacifolia*.† and *Korthalsia ferox*.

Sumatra and Borneo together:—*Anplectrum pallens*.†

Java and Borneo together:—*Dalbergia phyllanthoides*† and *Litsea cylindrocarpa*.†

28. Malaysian plants which in the Peninsula occur in the central mountain area.

There are 3 species which occur in the squares 3e and 4d, namely *Leea simplicifolia*, *Aporosa arborea*, and *Rafflesia Hasseltii*; the first and second both in Sumatra and in Java; the third in Sumatra only; and no one of them clearly montane in the Taiping hills.

There are 46 occupying the area of diagram 12:—

Sumatra only:—*Ryparosa Kunstleri*, *Aglaia membranifolia*,† *Eugenia garciniaefolia*,† *Oxyspora stellulata*, *Jasminum insigne*,† *Cinnamomum rhyncophyllum*†, *Pasania Eichleri*,† *Limatodis pallidus*,* and *Eria pilifera*.*

Java only:—*Saurauia nudiflora*,* *Saurauia cauliflora*,† *Canarium denticulatum*, *Passiflora Horsfieldii*,† *Lasianthus gracilis*, *Litsea angulata*,* *Lindera bibracteata*,* *Platyclinis gracilis*,* *Microstylis perakensis*, *Sarcopodium macropodum*,* *Dendrobium tetrodon*, *Collabium nebulosum*.*

Sumatra and Java together:—*Didymocarpus reptans*, *Schefflera scandens*, *Litsea Noronhae*,† *Phaius callosus*,* *Dicerostylis lanceolata*.*

In Borneo only:—*Lucinaea Ridleyi*, *Randia impressinervia*,† *Clerodendron Ridleyi*, *Gomphostemma microcalyx*,† *Lepeostegeres Beccarii*,* *Dendrochilum Kingii*, *Bulbophyllum catenarium*,* *Thecostele secunda*,† *Musa violascens*,† *Joinvillea malayana*,* *Pandanus stelliger*,* and *Alocasia Beccarii*.*

In Sumatra and Borneo together:—*Dapania scandens*,* *Cryptocarya crassinervia*,† *Eria longifolia* and *Pothos Barberianus*.*

In Java and Borneo together:—*Aralia ferox*, *Lindera caesia*,* and *Liparis latifolia*.*

In Sumatra, Java and Borneo together:—*Agalmyla staminea*.

29. Western Malaysian plants wide in the Peninsula.

Wider than these in the Peninsula and common to islands in Western Malaysia are:—

63 species in Sumatra only.
33 „ in Java only.
29 „ in Sumatra and Java together.
95 „ in Borneo only.
65 „ in Sumatra and Borneo together.
26 „ in Java and Borneo together.
60 „ in all three.

No useful purpose will be served by naming them. Their total is 371.

A further 12 species reach in addition Lower Siam. Two of them occur in it, the Peninsula and Sumatra, and two in Java: four of them occur in it, the Peninsula and Borneo: one is in both Sumatra and Java: two in Sumatra and Borneo together, and one in Java and Borneo together.

A count at this point shows that Borneo is known to possess 296 of these Western Malaysian plants that are in the Taiping hills, that Sumatra has 262 and Java, in spite of the much greater extent to which it has been botanised, has only 193.

30. The seas as barriers.

What means, we must ask, have the plants with which the last section deals had of crossing the seas which separate the Peninsula from the islands. There exists always the success of the random shot, e.g. the chance dispersal by a migrating bird or other means. Again it is generally believed that the bottom of the seas was bared about the south of the Peninsula at one or several times, and possibly in diverse manner in different times, so that for instance the forests of the Peninsula could stretch into Sumatra, and vice versa. From this we argue that when such a making bare of the sea-bottom has occurred, then the plants living in the south of the Peninsula at such a time or times, had greater facilities for transmigration than those in the north, and therefore the south has been likely to receive more species from other parts of the Malaysia than the north and also to give more: and evidence of this taking and giving ought to be obtainable. We find evidence in bringing the results of sections 22, 24 and 28 together in this section 30.

In sections 26-29 we have dealt with 475 plants of Malaysia which pass the seas. Of them 272 are in the Taiping area—lowland plants which reach the lowlands of the south of the Peninsula: 71 are also lowland plants in the Taiping area but do not reach (as far as we know them) the lowlands of the south of the Peninsula: 71 are montane plants in the Taiping area which descend to the lowlands in the south of the Peninsula: and 51 are montane plants in the Taiping area which do not descend. In section 24 we have summed up the total lowland plants of the Taiping area which are confined to the Peninsula as 421, and the montane plants as 218. In section 22 we have listed 178 lowland plants which reach the lowlands of the south of the Peninsula and 50 montane plants which do.

From these figures it is calculable that the chances of getting astride the seas for the lowland Taiping plants have been:—

60 per cent if they exist in the south of the Peninsula, 22 per cent if they do not;

and of the montane plants:—

55 per cent if they exist in the south of the Peninsula, 21 per cent if they do not.

The similarity of these figures is remarkable, and the support that they give to the supposition of land connections is distinct, or at any rate as distinct as is possible with such limited numbers.

In this Bulletin (Burkill and Holttum, A botanic reconnaissance on the Main Range at Fraser Hill, vol. 3 1923, p. 31) attention was directed to the way in which montane species upon the Perak-Pahang mountains descend to low levels in the south of the Peninsula and that among such as descend most of those among them as reappear in the Malay islands are found.

31. Plants of Tenasserim or the Andamans or the Nicobars extending into the Malay islands.

There are 39 species in the list which occur mostly in Tenasserim, some also in the Andamans, and a few in the Nicobars: and are found also in the islands of western Malaysia.

The most interesting of them is *Ilex glomerata*,* a species of Tenasserim and Java, with Taiping as its only station in the Malay Peninsula.

*Rhynchoglossum obliquum** and *Thecostele Zollingeri* are in but Penang and Taiping: and *Liparis lacerata** is but in Langkawi and Taiping and the Dindings.

Procris latifolia, which occurs from the Nicobars to Samoa is in the Peninsula one of the Central Montane type.

The remaining 34 reach the lowlands of the south of the Peninsula.

32. Plants of the continent of Asia, which extend into the Malay islands.

Lastly there are in the list 363 species, which are found in Burma or Siam, and also in the islands of western Malaysia, some few of them found as far northwards as the Himalaya and southern China, and some few of them found quite to the easternmost parts of Malaysia: some even wider.

In § 18 we have called attention to 66 species of the Asiatic continent north of Moulmein, found in Taiping and mostly else-

where in the Peninsula, but not in the Malay islands. It is seen that 85 per cent of the plants wide enough to live in Burma etc., and Taiping at the same time have enjoyed facilities, including pioneering constitutions, that have enabled them to get and keep, or keep at any rate, a place in the Malay islands.

The Taiping flora is at present a very interesting one to the Phytogeographer.

Abbreviations, chiefly of collectors names, used in this list.

Scort. -	B. Scortechinii	Kunstl. -	H. Kunstler
Curt. -	C. Curtis	Ridl. -	H. N. Ridley
H. & N. -	Mohamed Haniff and Mohamed Nur	B. & H. -	I. H. Burkill and Mohamed Haniff.
Hend. -	M. R. Henderson	Anders. -	J. W. Anderson
flr. -	flower		

The names of the months are abbreviated also, and the symbol ′ is used to indicate feet.

RANUNCULACEAE.

Naravelia laurifolia, *Wall.* At 200′, Wray 2687; flr. July. A wide climber of Indo-Malaya to the Philippines; in Peninsula 5c, 2d, 4d, 6f, 5g, 6g, 8g.

DILLENIACEAE.

Delima sarmentosa, *Linn.* Up to 4100′, Wray 1893, Ridl. 5353; flr. May, June. A climber of Indo-Malaya and China; in Peninsula common.

Tetracera assa, DC. At 100′, Wray 2306; flr. and fruit July. A slender climber of Siam, Indo-China and Java; in Peninsula common.

Tetracera lucida, *Wall.*, var. lanuginosa, *Ridl.* Up to 200′, Kunstl. 5579; flr. Feb. A woody climber, endemic, 3f, 6k, Johore, 9m, the var. at 3e only.

Tetracera macrophylla, *Wall.* 100-300′, Kunstl. 3388, 7564; flr. May, Sept. A climber of Sumatra; in Peninsula common.

Acrotrema costatum, *Jack.* At 300′, Wray 1380; flr. April. A herb of Borneo; in Peninsula Langkawi to Johore except in Malacca.

Wormia oblonga, *Wall.* Taiping, Derry 6257; flr. Sept. A tree up to 40′, of Sumatra; in Peninsula Kedah to Malacca.

Wormia pulchella, *Jack.* Taiping (in the Public Gardens), Curt. 1379; flr. Oct. A tree up to 40′, of Sumatra and Borneo; in Peninsula 3f, 6g, 8g, 5h, 6k, 9m.

Wormia subsessilis, *Miq.* At Taiping, Hend. 10358; flr. Jan. A large shrub of W. Malaysia; in Peninsula common.

Dillenia indica, *Linn.* At 200′, Hend. 10309; fruit Aug. A small tree of Indo-Malaya; in Peninsula 2d, 4d, 6k, 9m.

MAGNOLIACEAE.

Magnolia Maingayi, *King.* 4000-4500′, Ridl., B. & H. 12962; flr. March. A shrub or tree of Borneo; in Peninsula 2d, 4f.

Manglietia glauca, *Bl.* Forest Dept. 498; flr. May. A lofty tree of Indo-Malaya; in Peninsula 2c, 2d.

Michelia montana, *Bl.* At about 4000′, Wray 4038; flr. April. A small tree of Himalaya and Java; in Peninsula 2c, 4f.

Talauma Kunstleri, *King.* 2500-4000′, Wray 2826, Kunstl. 6383; flr. July. A tree up to 30′, endemic, 2c.

Talauma lanigera, *Hook. fil.* Larut, Kunstl., fide Ridl. A tree of about 20′, endemic, 2d, 7j, 6k.

WINTERACEAE.

Illicium cambodianum, *Hance.* From 2000′ upwards, all collectors; flr. Feb., March, May, fruit March. A shrub or small tree of Cambodia; in Peninsula Kedah Peak, G. Tahan, the Main Range, and Mt. Ophir.

SCHIZANDRACEAE.

Kadsura lanceolata, *King.* 500-1000′, Kunstl., fide Ridl. A small climber, endemic, 2d, 4f, 5g.

Kadsura scandens, *Bl.* Wray 2313. A liane of W. Malaysia to the Philippines; in Peninsula common at low altitudes.

ANONACEAE.

Griffithia cupularis, *King.* 800-1500′, Kunstl. 6643; fruit Sept. A shrub or tree, endemic and local.

Cyathostemma Hookeri, *King.* 300-800′, Kunstl. 6482; fruit Aug. A liane of Bangka and Borneo; in Peninsula 2d, 9m.

Cyathostemma Wrayi, *King.* At 300′, Kunstl. 4207; flr. May. A liane, endemic, 4f, 5h.

Uvaria hirsuta, *Jack.* 300-800′, Kunstl. 3890, 5920; fruit Feb., April. A slender climber of Indo-Malaya; in Peninsula 2d, 3f, 4h, 5h, 6j, 6k, 0k, 9m.

Uvaria Larep, *Miq.* 300-500′, Kunstl. 4011, Ridl. 11916; flr. Feb., March. A liane of Sumatra; in Peninsula 3e only.

Uvaria micrantha, *Hook. fil. and Th.* At 2000′, Ridl. 2984. A liane of Indo-Malaya to the Philippines; in Peninsula 1b, 2d, 6f, 6k.

Uvariella leptopoda, *Ridl.* Up to 300′, Kunstl., fide Ridl. A liane, endemic, 0m.

Cyathocalyx Maingayi, *Hook. fil.* Larut, Kunstl., fide Ridl. A tree up to 60′, endemic, 2d, 6k.

Cyathocalyx virgatus, *King.* Larut, Kunstl., fide Ridl. A tree up to 60′, of Java; in Peninsula 2d, 6k, 9m.

Drepananthus pruniferus, *Maing.* Larut, Kunstl., fide Ridl. A tree up to 50′, endemic, 2d, 4f, 8g, 6k.

Artabotrys crassifolius, *Hook. fil.* At 500′, Haniff 13202; flr. March. A liane of Burma; in Peninsula 6k, 9m.

Artabotrys gracilis, *King.* 300-1000′, Kunstl. 3746, 4987; flr. Oct., fruit Jan. A slender climber of Borneo; in Peninsula 3d, 5g, 5h, 9l.

Artabotrys oxycarpus, *King.* 500-1000′, Kunstl., fide Ridl. A liane, endemic, 6d.

Artabotrys suaveolens, *Bl.* At 2000′, Ridl. A liane of Indo-Malaya to the Philippines; in Peninsula common.

Artabotrys venustus, *King.* 100-4000′, all collectors: flr. Feb., March, Aug., Sept., fruit Jan., Sept. A liane of Siam; in Peninsula 4f, 5g.

Artabotrys Wrayi, *King.* At 300′, Wray 2663, 4006; flr. July, fruit March. A liane, endemic, 9m.

Desmos chinensis, *Lour.* At Waterloo, 1800′, Curt. 2705, 2717; flr. and fruit May. A tree or climber of Indo-Malaya and China; in Peninsula common.

Desmos cochinchinensis, *Lour.* 100-300′, Kunstl. 4182; flr. April. A slender climber of Indo-Malaya and China; in Peninsula 2b, 4b, 6c, 2d, 5h, 6h, 6k.

Desmos dasymaschala, *Saff.* At 300′, Wray, Kunstl. 4877; flr. Sept. A shrub of Burma to Java; in Peninsula common.

Desmos dumosa, *Saff.* 500-800′, Kunstl. 5520; fruit Feb. A liane of Assam and Siam; in Peninsula 2d, 3f, 6k, 9m.

Desmos filipes, *Ridl.* 2500-3500′, Wray 609, Kunstl. 2712, 5291, H. & N. 2500; fruit Dec.-Feb. A small tree, endemic, 6b, 6h.

Polyalthia asteriella, *Ridl.* Taiping Hill, Ridl. (not seen). A tree, endemic and local.

Polyalthia canangioides, *Boerl.* Wray 2075? A small tree of W. Malaysia; in Peninsula 6k.

Polyalthia dumosa, *King.* At 1200′, Wray 2628, 2978. A shrub, endemic and local.

Polyalthia glomerata, *King.* 2800-3000′, Kunstl., fide Ridl. A tree up to 50′, of Lower Siam and Sumatra; in Peninsula 3e only.

Polyalthia Hookeriana, *King.* At about 2500′, Ridl. 2985; flr. Feb. A tree up to 70′, endemic, 4f, 4h, 5h, 7h.

Polyalthia hypogaea, *King.* Taiping Hills, Kunstl., fide Ridl. A small tree, endemic, 4f.

Polyalthia hypoleuca, *Hook. fil.* Up to 300′, Kunstl. 5310; fruit Dec. A tree of Borneo; in Peninsula 2d, 4h, 6j, 6k, 9m.

Polyalthia laterifolia, *King.* Larut, Kunstl., fide Ridl. A tree up to 70′, of Java; in Peninsula 4f, 9m.

Polyalthia macrantha, *King.* Larut, Kunstl., fide Ridl. A tree up to 70′, endemic and local.

Polyalthia macropoda, *King.* Wray 2075? A tree up to 60′, endemic, 2d, 4e, 4f, 8l, 9m.

Polyalthia oblonga, *King.* 2500-3000′, Wray 2805, Curt. 1281, 2703; flr. May, Dec. A small tree of Borneo; in Peninsula 2d, 9k, 9l.

Polyalthia pachyphylla, *King.* 300-500′, Kunstl. 7516; fruit April. A tree up to 100′, endemic and local.

Polyalthia Scortechinii, *King.* Larut, Kunstl., fide Ridl. A small tree, endemic, 1b, 4f, 6g, 5h, 5k, 9l, 9m.

Polyalthia sumatrana, *King.* Larut, Kunstl., fide Ridl. A tree up to 60′, of Sumatra and Borneo; in Peninsula 4f, 6g, 5h, 9m.

Anaxagorea Scortechinii, *King.* At Waterloo, Curt.; fruit May. A bush or small tree of Lower Siam; in Peninsula common.

Goniothalamus Curtisii, *King.* At Waterloo, Curt. 2706; flr. May. A shrub or small tree, endemic, 5g, 5h.

Goniothalamus macrophyllus, *Hook. fil.* Up to 3000′, Wray 2987, Curt. 2706, Ridl. 5377, H. & N. 2351; flr. Feb., May, June. A shrub or small tree of W. Malaysia; in Peninsula common.

Goniothalamus Ridleyi, *King.* At Batu Kurau, Curt. 2893; flr. Oct. A tree up to about 20′, of Borneo; in Peninsula 4d, 3f, 4f, 8g, 6k, 9m.

Goniothalamus Scortechinii, *King.* Taiping, Kunstl., fide Ridl. A shrub or small tree, endemic, 2d, 4d, 4e, 5f, 5h.

Goniothalamus tapis, *Miq.* Larut, Kunstl., fide Ridl. A shrub or small tree of Sumatra and Borneo; in Peninsula 2d, 6k, 7k, 9m.

Goniothalamus tenuifolius, *King.* 2000-3000′, Ridl. (not seen). A bush or small tree, endemic, 2c, 4d, 3f, 4f, 8g, 5h.

Orophea dodecandra, *Miq.* 300-500′, Kunstl. 7386; flr. March. A tree up to 50′, of Borneo; in Peninsula common.

Orophea enterocarpa, *Maing.* 300-800′, Kunstl. 7642, 7695; flr. April, fruit June. A tree up to 30′, endemic, 6g, 7j, 6k.

Orophea hastata, *King.* Larut, Kunstl., fide Ridl. A small tree, endemic, 4d, 3f, 5g, 9m.

Mitrephora macrophylla, *Oliv.* 500-2500′, Wray 2942, Curt. 1279, Ridl. 2985, 5377; flr. Feb., June, Dec. A small tree, endemic, 2d, 4d, 6e, 3f, 4f, 4g, 5h.

Mitrephora Maingayi, *Hook. fil.* 300-1000′, Kunstl. 5242, 7547, 7743; flr. June, Dec., fruit April. A tree up to 50′, of Siam, Indo-China, and Borneo; in Peninsula 2d, 4d, 5h, 6k.

Mitrephora reticulata, *Hook. fil.* At about 4000′, Wray, Anders. 128, B. & H. 13023; flr. and fruit March. A tree up to 30′, of Indo-Malaya; in Peninsula common.

Popowia nervifolia, *Maing.* Taiping Hills, fide Ridl. A small tree of Lower Siam; in Peninsula 2d, 4d, 4f, 6f, 5h.

Popowia perakensis, *King.* 2000-4000′, Wray 2055, 2825, 3233, Curt. 1990; flr. Sept., fruit June. A small tree, endemic and local.

Popowia ramosissima, *Hook. fil. & Th.* 800-2000′, Kunstl. 7743, Curt. 1994, Anders. 98, H. & N. 2390; flr. June, Sept., fruit Feb. A small tree of W. Malaysia to Philippines; in Peninsula common.

Oxymitra affinis, *Hook. fil. & Th.* 500-800′, Kunstl. 5126; fruit Nov. A climber of Lower Siam; in Peninsula 6k, 7l, 9m.

Oxymitra biglandulosa, *Scheff.* Wray 2082; fruit June. A climber of W. Malaysia; in Peninsula 4f, 5h, 6k, 9m.

Oxymitra calycina, *King.* 500-800′, Kunstl. 6780; flr. Oct. A climber, endemic, 1b, 2b, 2d, 4e, 9m.

Oxymitra latifolia, *Hook. fil. & Th.* 800-1000′, Kunstl. 6879; fruit Nov. A climber, endemic and common.

Melodorum elegans, *Hook. fil. & Th.* 300-500′, Wray 1823, Kunstl. 3324; flr. April, Sept., fruit April. A slender climber, endemic, 2d, 5h, 6k, 9l, 9m.

Melodorum fulgens, *Hook. fil.* 100-4000′, Wray 2441, H. & N. 2317; flr. Feb., fruit July. A climber of Borneo; in Peninsula 4f, 6g, 5h, 6k, 9m.

Melodorum Kingii, *Boerl.* 300-500′, Wray 1965, Kunstl. 5344; flr. Dec., fruit May. A liane, endemic, 5h, 6k.

Melodorum lanuginosum, *Hook. fil. & Th.* 300-500′, Wray 2568, Kunstl. 5312; flr. Dec., fruit July. A liane, endemic, 1b, 2d, 3f, 6j, 6k, 9m.

Melodorum latifolium, *Hook. fil. & Th.* 500-2500′, Wray 3224, Kunstl. 6293. A liane of W. Malaysia; in Peninsula 2d, 4f.

Melodorum litsaefolium, *King.* 300-800′, Kunstl. 4986; flr. Oct. A liane, endemic and local.

Melodorum manubriatum, *Hook. fil. & Th.* Wray 2085, 2640; flr. June, fruit June, Aug. A liane of Tenasserim, Bangka and Borneo; in Peninsula common.

Melodorum pisocarpum, *Hook. fil. & Th.* At 200′, Wray 2149; fruit June. A climber of Sumatra; in Peninsula 2d, 5j, 6k, 9m.

Melodorum prismaticum, *Hook. fil. & Th.* 100-500′, Wray 2068, 2447, Kunstl. 3922; flr. July, fruit Feb., June. A liane of Bangka and Borneo; in Peninsula 2d, 4f, 6k, 9m.

Melodorum rubiginosum, *Hook. fil. & Th.* Near Batu Kurau, Curt.; flr. Oct. A liane of Indo-Malaya; in Peninsula 2d, 4f.

Xylopia fusca, *Maing.* At 300′, Kunstl. 2816; fruit Feb. A tree up to 80′, of Borneo; in Peninsula 2d, 6k.

Xylopia magna, *Maing.* 500-800′, Kunstl. 3712; fruit Jan. A tree up to 60′, endemic, 4f, 6k.

Xylopia olivacea, *King.* 2500-4000′, Wray 2054, 2818, Curt. 1992, Ridl. 11925; flr. Feb., June, Sept., fruit Aug. A tree up to 70′, endemic, 4g, 6j.

Phaeanthus lucidus, *Oliv.* At 4076′, Forest Dept. 1451; flr. and fruit Feb. A bush or small tree, endemic, 2d, 7g, 5h, 7j, 6k, 7l, 9m.

Phaeanthus nutans, *Hook. fil. & Th.* 300-500′, Wray 4182, Kunstl. 8435; fruit Jan., June. A shrub or small tree of Sumatra; in Peninsula common.

MENISPERMACEAE.

Tinomiscium petiolare, *Miers.* 1000-1500′, Kunstl. 8494; flr. Feb. A climber of Indo-Malaya; in Peninsula common.

Fibraurea chloroleuca, *Miers.* 300-800′, Wray 2166, Kunstl. 6451; flr. Aug., fruit June. A liane of W. Malaysia; in Peninsula common.

Arcangelisia Loureiri, *Diels.* 200-800′, Wray 2147, 3153, Kunstl. 5608; fruit Feb., June. A liane of Indo-China and Lower Siam; in Peninsula 6k.

Limacia oblonga, *Miers.* At 300′, B. & H. 13037. A climber, endemic and common.

Pericampylus incanus, *Miers.* 300-4000′, Wray 2539, Ridl.; flr. July. A climber of Indo-Malaya and China; in Peninsula common.

Stephania capitata, *Spreng.* Up to about 3000′, Curt. 1995, Ridl.; flr. Aug., Sept. A climber of W. Malaysia; in Peninsula 2d, 8g, 5h, 7k, 9l, 9m.

Stephania corymbosa, *Walp.* 3000-3800′, B. & H. 12832; fruit March. A climber of W. Malaysia; in Peninsula 3e only.

Stephania hernandifolia, *Walp.* At 100′, Wray 2438; fruit July. A climber of Africa and Indo-Australia, in Peninsula doubtfully from Penang.

Cyclea elegans, *King.* 1500-2000′, Kunstl., fide Ridl. A climber, endemic and local.

Cyclea laxiflora, *Miers.* Taiping Hills, Kunstl., fide Ridl. A slender climber of Lower Siam; in Peninsula Taiping to Singapore.

CRUCIFERAE.

Nasturtium indicum, *DC.* At 3400′, B. & H. 12813; flr. March. A weed of S. E. Asia; in Peninsula 2d, 8g, 9m.

Cardamine hirsuta, *Linn.* At 3400′, B. & H. 12816. An introduced weed of temperate and subtemperate regions; in Peninsula 2d, 9m.

CAPPARIDACEAE.

Roydsia Scortechinii, *King.* 300-800′, Kunstl., fide Ridl. A climber, endemic, 5h.

Capparis larutensis, *King.* At 500′, Kunstl. 5103; flr. Nov. A thorny climber, endemic, 4f.

VIOLACEAE.

Alsodeia cinerea, *King.* Up to 300′, Kunstl. 3416; fruit Sept. A shrub, endemic and local.

Alsodeia comosa, *King.* At Taiping, Ridl. 14676; fruit Aug. A shrub or small tree of Indo-China and Borneo; in Peninsula 4f, 8g, 5h.

Alsodeia floribunda, *King.* Larut Hills, Kunstl., fide Ridl. A shrub or tree of Sumatra; in Peninsula 4e, 4f, 6k, 9m.

Alsodeia Hookeriana, *King.* 300-500′, Kunstl. 3362; fruit Sept. A tree up to 30′, endemic, 5g.

Alsodeia pachycarpa, *King.* At Waterloo, 500′, Curt. 2718; fruit May. A small tree, endemic, 5g.

Alsodeia Scortechinii, *King.* At 100′, Wray 2339; fruit June. A shrub or tree of Lower Siam; in Peninsula 5h.

Alsodeia Wrayi, *King.* 500-800′, Kunstl. 3199; flr. Aug. A small tree, endemic, 2d, 4d, 4f, 9k.

POLYGALACEAE.

Polygala venenosa, *Juss.* From 500′ upwards, all collectors; flr. Feb., March, Aug., Sept., fruit Oct. A small shrub of W. Malaysia to the Philippines; in Peninsula common.

Salomonia cantoniensis, *Lour.* At Taiping, Hend; flr. all the year. A small herb of S. E. Asia; in Peninsula common.

Epirizanthes elongata, *Bl.* At 2500′, Ridl. A small parasitic herb of Tenasserim to Borneo, and China; in Peninsula common.

Trigoniastrum hypoleucum, *Miq.* 500-1000′, Kunstl. 3784; fruit Jan. A tree of Sumatra; in Peninsula 2d, 4f, 5h, 6j, 9m, 0m.

Xanthophyllum affine, *Korth.* 2500-3500′, Wray 2803, 2815, 2947, H. & N. 2358, 2478; flr. and fruit Feb. A bush or tree of Tenasserim to the Philippines; in Peninsula common.

Xanthophyllum bullatum, *King.* At 100′, Kunstl. 3161; flr. and fruit Aug. A shrub or small tree, endemic, 5h.

Xanthophyllum Griffithii, *Benn.* At 1500′, H. & N. 2392; flr. Feb. A tree up to 60′, of Tenasserim; in Peninsula 2d, 4e, 4f, 5h, 6j, 6k.

Xanthophyllum Kunstleri, *King.* 300-800′, Kunstl. 3512; flr. Oct. A tree up to 80′, endemic, 2d.

Xanthophyllum Palembanicum, *Miq.* 500-3400′, Kunstl. 7615, H. & N. 2392, B. & H. 12822; fruit March, May. A small tree of Sumatra; in Peninsula common.

Xanthophyllum pulchrum, *King.* At 300′, Wray 2659. A shrub or small tree, endemic, 2d.

Xanthophyllum stipitatum, *Benn.* 500-1000′, Kunstl. 3285, fruit Jan. A tree up to 70′, endemic, 4g, 6g, 6k.

Xanthophyllum Wrayi, *King.* At about 300′, Kunstl. 2770, Ridl., Burn-Murdoch 166; flr. Feb. A shrub, endemic and common.

CARYOPHYLLACEAE.

Stellaria uliginosa, *Murr.* 3400-4000′, B. & H. 12652, 12815; flr. Feb. and March. A small herb of North temperate regions. Doubtless introduced. A plant collected by Ridley at 4000′ in 1892 may be this. Not recorded from elsewhere in the Peninsula.

Sagina apetala, *Linn.* At 3700′, B. & H. 12612; flr. March. A small herb of Europe; not previously recorded from the Peninsula. Doubtless introduced.

HYPERICACEAE.

Cratoxylon Maingayi, *Dyer.* Public Gardens, Taiping, Burkill; flr. March. A tree up to 40′ endemic, 2d, 6g.

FLACOURTIACEAE.

Flacourtia Rukam, *Zoll. and Mor.* 100-4300′, Wray 2399, Kunstl. 2858, B. & H. 12578; flr. March, July, fruit March. A small thorny tree of Indo-Malaysia; in Peninsula common.

Hydnocarpus castanea, *Hook. fil.* 1000-1500′, Kunstl. 6872. A tree up to 60′, of Burma and Tenasserim; in Peninsula 1b, 2d, 6e, 3f, 4f, 5g, 5h.

Hydnocarpus nana, *King.* Up to 2000′, Wray 2060, Ridl. 3002. A small tree, endemic, 2d, 4d, 4f, 5h.

Hydnocarpus Wrayi, *King.* Larut, Kunstl., fide Ridl. A tree up to 25′, endemic and local.

Ryparosa Kunstleri, *King.* At 2500′, H. & N. 2379; fruit Feb. A tree up to 100′, of Sumatra; in Peninsula 3f, 4f, 5h.

Ryparosa Scortechinii, *King.* 300-500′, Kunstl. 3757; fruit Jan. A small tree, endemic, 6c, 2d, 4f, 7g, 5h.

GUTTIFERAE.

Garcinia atroviridis, *Griff.* At 2000′, Ridl. A tree up to 60′, endemic, common; occasionally cultivated.

Garcinia costata, *Hemsl.* At 300′, Wray 525. A tree up to 70′, endemic and local.

Garcinia dumosa, *King.* 100-200′, Wray, fide Ridl. A shrub, endemic and local.

Garcinia eugeniaefolia, *Wall.* At 2500′, H. & N. 2375; fruit Feb. A tree up to 60′, of Tenasserim; in Peninsula common.

Garcinia Gaudichaudii, *Planch. and Triana.* Taiping Hills, fide Ridl. A small tree of Indo-China; in Peninsula 2d, 4f, 5j.

Garcinia Mangostana, *Linn.* The Mangosteen. Cultivated all over the Peninsula. Not known in a wild state.

Garcinia nervosa, *Miq.* 300-600′, Kunstl. 3197. A tree up to 80′, of Sumatra and the Philippines; in Peninsula 5h, 6k, 0k, 9m.

Garcinia nigrolineata, *Planch.* At 300′, Wray 2150; flr. June. A tree up to 40′, of Burma to the Carimon Is.; in Peninsula common.

Garcinia opaca, *King.* At 100′, Kunstl. 5460; fruit Jan. A tree up to 40′, endemic, 4f. A doubtful species.

Garcinia penangiana, *Pierre.* At 100′, Kunstl. 7565; flr. May. A tree up to 40′, endemic, 2d, 3f, 6f, 9j, 9m.

Calophyllum canum, *Hook. fil.* At 100′, Kunstl. 5420; flr. Jan. A tree up to 80′, endemic and common.

Calophyllum Kunstleri, *King.* At 100′, Kunstl. 5734; fruit Dec. A tree of Borneo and the Philippines; in Peninsula 1b, 2d, 6e, 8g, 5h, 6j.

Calophyllum molle, *King.* 1000-1500′, Kunstl. 6274, Forest Dept. 20; flr. Feb., fruit Oct. A tree up to 80′, of Sumatra; in Peninsula 2d, 4f, 6g.

Calophyllum pulcherrimum, *Wall.* At Taiping, Anders. 114, Burn-Murdoch 330; fruit March, May. A tree up to 80′, of Indo-China and W. Malaysia; in Peninsula common.

Calophyllum subsessile, *King.* Taiping, Kunstl., fide Ridl. A tree up to 80′, endemic and local.

Kayea grandis, *King.* 300-1000′, Kunstl. 7294, 7500; flr. April. A tree up to 80′, endemic, 2d, 3f, 6j, 6k.

Kayea Kunstleri, *King.* 300-500′, Kunstl. 6850; flr. Nov. A tree up to 50′, endemic, 2d, 3f, 5h.

Kayea nervosa, *T. Anders.* At 100′, Kunstl. 5569; flr. Feb. A tree up to 40′, of Burma; in Peninsula 3e only.

Mesua ferrea, *Linn.* At Taiping, Venning; flr. Oct. A tree of Indo-Malaya; in Peninsula common.

TERNSTROEMIACEAE.

Adinandra acuminata, *Korth.* 2500-4000′, Wray 618, 2804, Kunstl. 6289, 6359, Anders. 103, H. & N. 2339, B. & H. 12830, 13280; flr. Feb., March, fruit July. A tree up to 60′, of Sumatra; in Peninsula common.

Adinandra dumosa, *Jack.* 100-300′, Wray 1972, Hend. 10137; flr. Feb. A bush or small tree of W. Malaysia; in Peninsula very common.

Adinandra integerrima, *T. Anders.* At Waterloo, Curt. 2723; flr. May. A small tree of Siam and Indo-China; in Peninsula 1a, 1b, 2d, 5g, 6g.

Adinandra macrantha, *Teys. and Binn.* Taiping Hills, Kunstl., fide Ridl. A tree up to 80′, of Sumatra and Java; in Peninsula 8g, 5h, 7h, 9l.

Adinandra maculosa, *T. Anders.* At 2500′, Wray 2817. A tree up to 60′, endemic, 2d.

Adinandra parvifolia, *Ridl.* At 4000′, Ridl. 5236; flr. June. A tree up to 40′, endemic, 4e, 6e.

Adinandra villosa, *Choisy.* At 4000′, Forest Dept. 5753; fruit Jan. A tree up to 50′, of Tavoy; in Peninsula 2d, 6e, 4f, 5g.

Ternstroemia Scortechinii, *King.* 300-500′, Kunstl. 3756; fruit Jan. A small tree, endemic, 4f, 5g, 6g.

Eurya acuminata, *DC.* 2000-4200′, Curt. 1999, B. & H. 12619; flr. Sept., fruit March. A shrub or small tree of Indo-Malaysia and China; in Peninsula common.

Pyrenaria acuminata, *Planch.* At 4300′, B. & H. 12870; flr. Feb. A small tree, endemic and common.

Pyrenaria Kunstleri, *King.* 300-2000′, Kunstl. 3948, Curt. 2713, Ridl.; flr. March, fruit Feb., May. A tree up to 40′, endemic, 2d, 4f, 5h.

Schima Noronhae, *Reinw.* 2000-2500′, Hend. 10126, B. & H.; flr. Jan., March. A tree up to 50′, of Indo-Malaya; in Peninsula 1b, 2d, 6e, 4f, 5g, 5h.

Gordonia taipingensis, *Burkill.* 3500-4300′, H. & N. 2359, B. & H. 12734; flr. Feb., March. A tree up to 50′, endemic and local.

Actinidia Championii, *Benth.* 3000-4000′, Kunstl. 5437, Ridl. 5232, B. & H. 12729; flr. June, fruit Jan., March. A climber of China and Sumatra; in Peninsula 5h, 7k.

Saurauia cauliflora, *Bl.* At Batu Kurau. Scort., fide Ridl. At Waterloo, Curt. 2720; flr. May. A tree of Java; in Peninsula 5h.

Saurauia nudiflora, *DC.* 2000-4400′, Fox 166, Ridl., B. & H. 12967; flr. March, Oct., Dec. A bush or small tree of Java; in Peninsula 4d, 6e, 5g, 5h, 6j.

Saurauia tristyla, *DC.* 100-4000′, Scort. 1535, Curt. 1285, Ridl., Hend. 10048, 10144, 10424; flr. Jan., Feb., Oct. A small tree of Indo-China and Siam; in Peninsula common.

Archytaea Vahlii, *Choisy.* At Taiping, Wray 2564, Haniff 13115; flr. March, July. A small tree of W. Malaysia; in Peninsula 2d, 4e, 8g, 5h, 9j, 6k, 8l, 9m.

DIPTEROCARPACEAE.

Dipterocarpus fagineus, *Vesque.* 500-2000′, Kunstl. 3527, Ridl. A tree up to 80′, of Borneo; in Peninsula 2d, 4f.

Dipterocarpus grandiflorus, *Blanco.* 400--2000′, Wray 4057, Ridl.; fruit May. A tree up to 150′, of Sumatra, Borneo and the Philippines; in Peninsula common.

Dipterocarpus Kunstleri, *King.* 500-800′, Kunstl. 3606; fruit May. A tree up to 120′, endemic, 6g, 5h, 6j, 6k.

Anisoptera Curtisii, *Dyer.* 300-2000′, Kunstl. 3618, 3706, B. & H.; fruit Nov., Dec. A tree up to 100′, of Lower Siam, Borneo and the Philippines; in Peninsula 2d, 3f, 6j.

Shorea Kunstleri, *King.* 500-800′, Kunstl. 3705; fruit Dec. A tree up to 100′, endemic and local.

Shorea macroptera, *Dyer.* 500-1000′, Kunstl. 3742; fruit Jan. A tree up to 80′, of Borneo; in Peninsula common, unless absent in the N. E.

Shorea Maxwelliana, *King.* 300-800′, Kunstl. 3744; fruit Jan. A tree up to 80′, endemic, 2d, 5h, 6j.

Shorea Ridleyana, *King.* 500-800′, Kunstl. 3571, 3617; flr. Nov. A tree up to 80′, endemic, 6f, 5g.

Pachychlamys Hemsleyanus, *Ridl.* At Taiping, Curt. 3213; fruit Oct. A tree up to 60′, endemic, 2d.

Pachychlamys Thiseltoni, *Ridl.* Taiping Hills, Kunstl., fide Ridl. A tree up to 80′, of Sumatra; in Peninsula 2d, 3f, 4f, 5h, 8j, 9k.

Hopea globosa, *Brand.* At 700′, B. & H. 13035; a seedling in March. A lofty tree, endemic, 6f, 7g, 5h, 5j, 8j, 7k.

Hopea micrantha, *Hook. fil.* 500-800′, Kunstl. 3525; flr. Oct. A tree up to 80′, of Borneo; in Peninsula 2d, 3f, 6k, 0m.

Hopea nervosa, *King.* 500-800′, Kunstl. 3690; fruit Dec. A tree up to 70′, endemic, 4e.

Hopea Pierrei, *Hance.* Taiping Hills, Kunstl., fide Ridl. A tree up to 80′ or more, of Indo-China, Borneo and the Philippines; in Peninsula 2d, 6k, 9m.

Synaptea faginea, *Pierre.* Larut, Kunstl., fide Ridl. A tree up to 70′, of Indo-China and Tenasserim; in Peninsula 2d, 3f, 5h.

Synaptea Lowii, *Ridl.* 800-1200′, Kunstl. 7496; flr. April. A tree up to 80′, endemic, 3f.

Synaptea perakensis, *Ridl.* 300-1500′, Wray 2264, Kunstl. 7549; flr. April, fruit June. A tree up to 80′, endemic, 3f.

Synaptea reticulata, *Ridl.* 1500-2000′, Kunstl. 6969; flr. Dec. A tree up to 80′, endemic and local.

Vatica Kunstleri, *Ridl.* At 300′, Kunstl. 5338; fruit Dec. A shrub or tree up to 30′, endemic, 4f.

Vatica Wallichii, *Dyer.* At 100′, Kunstl. 5432, 76594; flr. Sept., fruit Jan. A tree up to 100′, of Lower Siam and Bangka; in Peninsula 2d, 4f, 4g, 8g, 4h, 8j, 6k, 9k, 9l, 9m.

Balanocarpus Curtisii, *King.* 100-500′, Kunstl. 3294, 6543; flr. Aug., Sept. A tree up to 30′, of Borneo; in Peninsula 2d.

Balanocarpus Hiemii, *King.* Forest Dept. 28; flr. Sept., fruit Feb. A tree up to 60′ or more, endemic, 2d, 5g, 6g, 8g, 4h, 5h, 6j, 6k.

Balanocarpus penangianus, *King.* At Taiping, Kunstl., fide Ridl. A tree up to 70′, endemic, 2d, 6k.

Pachynocarpus Stapfianus, *King.* 300-850′, Kunstl. 7466. A tree up to 100′, of Lower Siam; in Peninsula 1b, 2d, 4f, 4g, 6g, 8g, 5h.

ANCISTROCLADACEAE.

Ancistrocladus pinangianus, *Wall.* 100-800′, Wray 1862, Kunstl. 6452; flr. May, Aug. A bush or climber of Indo-China to Sumatra; in Peninsula common.

BIXACEAE.

Bixa orellana, *Linn.* At 4000′, Anders. 87. The Arnotto. A bush, pantropic, of S. American origin; in Peninsula cultivated.

MALVACEAE.

Sida rhombifolia, *Linn.* At Taiping, Hend.; flr. and fruit all the year. An undershrub, pantropic, common through the Peninsula.

Urena lobata, *Linn.* 100-300′, Hend. 10051, 10148; flr. and fruit all the year. An undershrub, pantropic; in Peninsula common.

Hibiscus floccosus, *Mast.* 300-500′, Kunstl. 7024; fruit Jan. A tree up to 80′, endemic, 4d, 6d, 4f, 5f, 6g, 6j, 6k, 7k.

Hibiscus surattensis, *Linn.* At 200′, Hend. 10049; fruit Jan. A sprawler of the Old World tropics; in Peninsula common.

Durio macrophyllus, *Ridl.* At about 3000′, Ridl. 5352; flr. June. A tree up to 60′, endemic, 4d, 3f, 6k.

Durio malaccensis, *Planch.* Larut, Forest Dept. 39; flr. Sept. A lofty tree, endemic, 6j, 6k.

Durio zibethinus, *Linn.* The Durian. A tree up to 100′, of Indo-China and W. Malaysia, known only in cultivation.

Boschia Griffithii, *Mast.* 100-500′, Wray 2444, Kunstl 3303, 3496; flr. July, Sept. A tree up to 60′, of Sumatra; in Peninsula common.

Neesia synandra, *Mast.* At Batu Kurau, Haniff 13265; flr. May. A tree up to 70′, of Lower Siam; in Peninsula 2d, 6e, 4f, 8g, 5h, 9m.

Eriodendron anfractuosum, *DC.* Kapok. Commonly cultivated. A tree up to 70′, pantropic.

STERCULIACEAE.

Sterculia bicolor, *Mast.* At Taiping, Wray 2378; flr. July. A tree up to 60′, endemic, 6k.

Sterculia hyposticta, *Miq.* At 500′, Hend. 10129; fruit Jan. A small shrub of Indo-China to Sumatra; in Peninsula common in the North.

Sterculia Kunstleri, *King.* 500-800′, Kunstl. 4782; fruit Aug. A tree up to 70′, endemic and local.

Sterculia laevis, *Wall.* 300-800′, Kunstl. 3941, 4068; fruit March. A shrub about 6′, of Tenasserim, Java, Borneo; in Peninsula common.

Sterculia parviflora, *Roxb.* At 300′, Wray 2541; fruit July. A tree up to 60′, of Sylhet, Burma and Cochin-China; in Peninsula common.

Sterculia parvifolia, *Wall.* 300-2300′, Wray 2256, 4233, Kunstl. 3849, Ridl.; flr. June. A small tree, endemic, 2d, 5h.

Sterculia rubiginosa, *Vent.* 500-3500′, Wray 2994 (var. ensifolia) Kunstl. 6489, H. & N. 2365; flr. Feb., fruit Sept. A small tree, of Indo-Malaya; in Peninsula, common from Penang to Singapore.

Scaphium longiflorum, *Ridl.* Waterfall Hill, Wray, fide Ridl. A tree, endemic and local.

Tarretia perakensis, *King.* 500-800′, Kunstl. 3184. A tree up to 80′, endemic, 5h.

Tarrietia simplicifolia, *Mast.* At 300′, Ridl., (fallen fruits only). A lofty tree, endemic, 5h, 6j, 6k, 9m.

Helicteres Isora, *Linn.* At 100′, Kunstl. 2268; flr. Aug. A shrub or small tree, of Indo-Australia and S. Africa; in Peninsula 2d, 8j.

Pterospermum Blumeanum, *Korth.* At 300′, Kunstl. 3390; flr. Sept. A tree up to 50′, of Indo-Malaya; in Peninsula Langkawi to Singapore.

Byttneria Curtisii, *Oliv.* 100-500′, Ridl. 14664, Hend. 10420, 10474; flr. Aug., fruit Feb., Oct. A slender climber, endemic, 2d.

Byttneria Maingayi, *Mast.* At Waterloo, Curt. 2890; flr. Oct. A woody climber, endemic and common in the South.

Leptonychia glabra, *Turcz.* 100-1000′, Wray 1820, Kunstl. 2185 (var. Mastersiana), Curt., Hend. 10464; flr. Feb., May, Aug., fruit Feb., May. A shrub or small tree of Indo-Malaya; in Peninsula common.

TILIACEAE.

Brownlowia macrophylla, *King.* 200-500′, Wray 2148, Kunstl. 6861; flr. June, Nov. A tree up to 40′, endemic and local.

Pentace eximia, *King.* 500-800′, Kunstl. 3482, 3649; flr. Oct., fruit Dec. A tree up to 70′, endemic, 6k.

Pentace Kunstleri, *King.* At 100′, Kunstl. 6811; flr. Nov. A tree up to 40′, endemic, 6g.

Pentace macrophylla, *King.* At 100′, Wray 1737. A tree up to 30′, endemic and local.

Pentace perakensis, *King.* 300-1000′, Kunstl. 3428; flr. Oct. A tree up to 40′, endemic and local.

Pentace strychnoidea, *King.* 500-1000′, Kunstl. 3478; flr. Oct. A tree up to 80′, endemic and local.

Schoutenia Kunstleri, *King.* At Ulu Tupai, Wray 2692; flr. Aug. A tree up to 70′, of Lower Siam; in Peninsula 2d, 6f.

Schoutenia Mastersii, *King.* 500-1000′, Kunstl. 3381; flr. Sept. A tree up to 50′, of Borneo; in Peninsula 2d, 6g, 6j, 6k.

Grewia antidesmaefolia, *King.* 300-500′, Kunstl. 3051. A tree up to 40′, of Lower Siam; in Peninsula 4d, 4f, 9k.

Grewia erythrocarpa, *Ridl.* At 300′, Wray, fide Ridl. A small tree up to 14′, endemic, 5g.

Grewia fibrocarpa, *Mast.* 200-2500′, Wray 599, 2176, 2827; flr. June. A tree up to 50′, endemic, 2d, 4f, 5g, 5h, 6j, 0j, 6k, 0k.

Grewia globulifera, *Mast.* At Taiping, Forest Dept. 1153. A large or small tree, of Borneo; in Peninsula, Penang to Singapore.

Grewia Miqueliana, *Kurz.* 2000-3200′, Wray 4039, B. & H. 12791; flr. April, fruit March. A tree up to 40′, endemic, Taiping to Johore.

Grewia umbellata, *Roxb.* 300-3900′, Wray 4005, B. & H. 12936; flr. March. A climbing shrub of Siam, Java and Borneo; in Peninsula common.

Trichospermum cymbiforme, *Sprague.* Larut, Kunstl., fide Ridley. A tree up to 100′, of Sumatra; in Peninsula 2d.

Trichospermum Kurzii, *King.* At 300′, Wray 1970; flr. May. A tree up to 100′, of Tenasserim; in Peninsula 4f, 5h, 5j, 6k.

Eleocarpus Barnardii, *Burkill.* At 100′, Barnard; flr. Feb. A tree, endemic and local.

Eleocarpus Hullettii, *King.* 300-500′, Kunstl. 3412; flr. Sept. A tree up to 40′, endemic; in Peninsula 2d, 4f, 8j, 9m.

Eleocarpus Jackianus, *Wall.* 100-1000′, Kunstl. 2530, 5575; flr. Feb. A tree up to 100′, of Borneo; in Peninsula, common on the West.

Eleocarpus obtusus, *Bl.* At 2000′, Forest Dept. C. F. 945; flr. Oct. A tree up to 40′, of Indo-Malaya; in Peninsula common.

Eleocarpus paniculatus, *Wall.* At 100′, Kunstl. 6215; flr. June. A tree up to 40′, of Lower Siam, Bangka, Borneo; in Peninsula common.

Eleocarpus parvifolius, *Mast.* At 2500′, H. & N. 2374; fruit Feb. A tree up to 100′, of Lower Siam and Borneo; in Peninsula Penang to Singapore.

Eleocarpus pedunculatus, *Wall.* Taiping Hill, Ridl. 11917; fruit Feb. A tree up to 80′, of Borneo; in Peninsula 2d, 6k, 9m.

Eleocarpus rugosus, *Roxb.* At 100′, Kunstl. 7293; flr. March. A tree up to 100′, of India; in Peninsula 2d, 4f, 9m.

Eleocarpus stipularis, *Bl.* 3500-4100′, Kunstl. 6266, Derry, H. & N. 2348; flr. Feb. A tree up to 60′, of W. Malaysia; in Peninsula common.

GONOSTYLACEAE.

Gonostylus Maingayi, *Hook. fil.* At 100′, Kunstl. 6925; fruit Dec. A large tree, endemic, 2d, 4f, 6j, 6k, 9m.

LINACEAE.

Ixonanthes reticulata, *Jack.* 200-300′, Hend. 10438; flr. Jan. A shrub up to 8′, of Borneo; in Peninsula 2c, 2d, 3f, 5h, 7k, 7l, 9m.

OXALIDACEAE.

Oxalis corniculata, *Linn.* At 3600′, B. & H. 12649; fruit March. A creeping herb, cosmopolitan; in Peninsula common near houses.

Oxalis corymbosa, *DC.* At 3400′, B. & H. 12820; flr. March. A creeping herb, said to be of Mascarene origin; in Peninsula running wild here and on Penang Hill.

Connaropsis laxa, *Ridl.* Taiping Hills, Kunstl., Curt., fide Ridl. A tree up to 50′, endemic and local.

Connaropsis macrophylla, *King.* 200-2500′, Ridl. 2987, Anders., Hend. 10071, 10321, 10475, B. & H. 12824; flr. Jan.-March, Aug. Shrub or small tree, endemic, 2c, 2d, 3d, 3f, 4f, 8g, 9m.

Dapania scandens, *Stapf.* At about 1000′, Wray 2078, 3146, Curt. 2724; flr. May, fruit June. A woody climber of Sumatra and Borneo; in Peninsula 4f.

BALSAMINACEAE.

Impatiens Curtisii, *Hook. fil.* 2300-4000′, Curt. 1348, Ridl. 1955, B. & H. 12806: flr. Feb., Dec. A herb, endemic and local.

Impatiens Holstii, *Engl. and Warb.* At Maxwell's Hill, B. & H. A Trop. African species, cult. and running wild here.

RUTACEAE.

Evodia latifolia, *DC.* 300-2000′, Wray 1819, 2567, Ridl. 3008, 14683; flr. July, Aug. A tree of 20′, of W. Malaysia; in Peninsula 2d, 4e, 3f, 6f, 5h, 6j, 6k, 7l.

Evodia macrocarpa, *King.* At 100′, Kunstl. 7489; fruit April. A tree up to 50′, endemic, 2d, 5g.

Evodia malayana, *Ridl.* Wray 3126, Scort. 154, Forest Dept. C. F. 5653; flr. March, Oct. A bush or small tree, endemic, 1b, 6b, 2d, 3f, 8h, 6k, 9m.

Evodia pilulifera, *King.* At about 2000′, Wray 2995, Ridl. A shrub up to 15′, endemic, 4f, 5g, 5h, 7k.

Tetractomia Roxburghii, *Hook. fil.* 100-4700′, Wray 2106, Kunstl. 6194, Derry, B. & H. 12583; flr. June, fruit March, June. A tree up to 80′, endemic, 2d, 5g.

Acronychia Porteri, *Hook. fil.* 300-500′, Kunstl. 7469; fruit April. A tree up to 70′, of Lower Siam; in Peninsula 2d, 8g, 5h, 6j, 6k, 9m.

Glycosmis macrophylla, *Lindl.* 500-1000′, Kunstl. 2549; flr. Nov. A shrub up to 10′, endemic, 2d.

Glycosmis malayana, *Ridl.* 100-4000′, Kunstl. 2827, 2839, Anders. 129, Hend. 10125, B. & H. 12903, 13026; flr. Jan., March, Nov., fruit Feb., March. A shrub, endemic, Langkawi to S ngapore.

Glycosmis puberula, *Lindl.* 2000-4500′, Ridl. 3006, 3011. A shrub of Lower Siam and the Philippines; in Peninsula 1b, 2c, 2d, 8h, 6k, 9m.

Micromelum pubescens, *Bl.* At Ulu Tupai, Wray 2682; flr. Aug. A large shrub or small tree of Indo-Australia and China; in Peninsula common.

Clausena excavata, *Burm.* Up to 2000′, Wray 3320, Ridl.; flr. Feb. A foetid shrub or small tree of Indo-Malaya to the Philippines; in Peninsula common.

Luvunga eleutheranthera, *Dalz.* At 2500′, Wray 2977, 3215. A liane of Indo-Malaya; in Peninsula 2d, Pahang, 9l, 9m.

Luvunga scandens, *Ham.* At 3800′, B. & H. 12999; flr. March. A liane of Indo-Malaya; in Peninsula 2d, 3f, 8h, 8k.

SIMARUBACEAE.

Brucea sumatrana, *Roxb.* At Waterloo, Curt. 134; flr. Dec. A shrub up to 6′, of Indo-Australia; in Peninsula common.

Eurycoma apiculata, *Benn.* 2500-3400′, Ridl., B. & H. 12707; flr. March, fruit June. A shrub up to 8′, endemic, 2d, 4e, 3f, 5g, 5h, 9k.

Eurycoma longifolia, *Jack.* 300-3000′, Kunstl. 4075, 7244, 7548, Hend. 10131; flr. Jan. Feb., fruit March, April. A shrub or small tree of Indo-Malaya; in Peninsula common.

OCHNACEAE.

Gomphia corymbosa, *Ridl.* 1500-2000′, Kunstl. 7310; flr. Jan. A shrub or small tree, endemic, 2d, 4f, 9m.

Gomphia sumatrana, *Jack.* Larut, Kunstl., fide Ridl. A tree about 40′, of Tenasserim, Sumatra and Borneo; in Peninsula common.

Tetramerista glabra, *Miq.* At 300′, Wray 2129. A tree up to 60′, of Sumatra and Borneo; in Peninsula common.

BURSERACEAE.

Canarium denticulatum, *Bl.* Larut Hills, Kunstl., fide Ridl. A tree up to 70′, of Java; in Peninsula 4f.

Canarium kadondon, *Benn.* At 100′, Kunstl. 6707, 7577; flr. Oct., fruit May. A tree up to 50′, endemic and common.

?Canarium littorale, *Bl.* 2000-2500′, Kunstl. 6998, fide Ridl. A doubtful species. "It closely resembles C. littorale, *Bl.* of Java, but the single specimen is insufficient to be certain of." (Ridley).

Canarium parvifolium, *Benn.* 3000-3500′, Kunstl. 2618; fruit Dec. A lofty tree, endemic, 4f, 6k, 9m.

Canarium pilosum, *Benn.* var. hirtellum, *Ridl.* Up to 500′, Wray 2645, Haniff 13129; flr. March, Aug., fruit March. A tree up to 60′, endemic, the var. at 2d, 4f, the species at 5h, 6k, 9m.

Canarium rufum, *Benn.* At Kota, Wray 3325; fruit Feb. A tree up to 60′, endemic, 3d, 3f, 4f, 5g, 5h, 8h, 6k, 9m.

Santiria apiculata, *Benn.* 300-500′, Kunstl. 3556, 3760; fruit Jan. A tree up to 60′, endemic, 4f, 6f, 6g, 5h, 6j, 6k, 9l, 9m.

Santiria fasciculata, *Benn.* 100-800′, Kunstl. 3319, 3500, 6610, 6832 (var. puberula); flr. Sept., fruit Sept.-Nov. A tree up to 50′, endemic, 2d, 6e, 6g, 5h, 6k.

Santiria laevigata, *Bl.* At 100′, Kunstl. 5441; fruit June. A tree up to 150′, of Sumatra; in Peninsula 4f, 5h, 7h, 8h, 5j, 6j, 6k, 9m.

Santiria laxa, *King.* 300-800′, Kunstl. 3192, 3516; flr. Aug. fruit Oct. A tree up to 90′, endemic, 2d, 6e, 5h, 6j, 6k, 9k, 9m.

Santiria longifolia, *King.* 100-800′, Kunstl. 3594, 6838; fruit Nov. A tree up to 20′, endemic, 2d.

Santiria macrocarpa, *King.* At 100′, Kunstl. 5304; fruit Dec. A tree up to 80′, endemic and local.

Santiria multiflora, *Benn.* 300-800′, Kunstl. 4988; fruit Oct. A tree up to 60′, of Borneo; in Peninsula 4f, 5h, 7h, 8h, 6k, 9m.

Santiria oblongifolia, *Bl.* 100-1000′, Kunstl. 6602, 8472; flr. Sept., fruit Feb. A tree up to 80′, of W. Malaysia; in Peninsula 2d, 4f, 6k.

Santiria Wrayi, *King.* 800-1000′, Kunstl. 3689; fruit Dec. A tree up to 30′, endemic, 4f, 5h, 6j, 7l.

Icicaster Planchoni, *Ridl.* At 100′, Kunstl. 5545; fruit Feb. A tree up to 60′, endemic, 4f, 5h, 6k, 9m.

MELIACEAE.

Sandoricum indicum, *Cav.* 300-500′, Kunstl. 8297; fruit Nov. A tree up to 80′, of Indo-Malaya; in Peninsula common in villages.

Sandoricum nervosum, *Bl.* At Kota, Wray 3345; flr. Feb. A tree up to 80′, of Sumatra, Java and Philippines; in Peninsula common in cultivation.

Megaphyllaea annulata, *Ridl.* At 3000′, Curt. 2693, Ridl. 11963; flr. May. A tree, endemic and local.

Megaphyllaea perakensis, *Hemsl.* 2500-3800′, Wray, Kunstl. 5305, 6317, Ridl. 5358, B. & H. 12985; flr. March, fruit June, July, Dec. A tree up to 40′, endemic and local.

Chisocheton macrothyrsus, *King.* 2500-4000′, Wray, Scort. 82, Curt. 2002; flr. Nov., fruit Sept. A tree up to 40′, endemic, 5h.

Chisocheton penduliflorus, *Planch.* At about 2000′, Wray 3244, Scort. 48, Ridl., Derry. A shrub or small tree, endemic, 2d, 4f, 6j, 6k, 7l.

Chisocheton rubiginosus, *King.* 300-500′, Kunstl. 3848, 5095; flr. March, fruit Nov. A tree up to 60′, endemic and local.

Dysoxylum cauliflorum, *Hiern.* 600-1000′, Kunstl. 3267; flr. Aug. A tree about 60′, of Borneo and Philippines; in Peninsula 2d, 4e, 5h, 9j, 6k, 9m.

Dysoxylum costulatum, *Miq.* 1500-2900′, Kunstl. 6791, B. & H. 12690; fruit March, Nov. A tree up to 50′, of Sumatra; in Peninsula common.

Dysoxylum densiflorum, *Miq.* 3000-3200′, Wray 4323, Derry. A tree up to 40′, of Sumatra and Java; in Peninsula 4f, 5g, 9m.

Dysoxylum interruptum, *King.* 3000-4000′, Kunstl. 6349. A tree up to 40′, endemic and local.

Dysoxylum macrothyrsum, *Miq.* var. microbotrys, *Ridl.* 500-800′, Kunstl. 6788; flr. Nov. A tree up to 60′, of Borneo and Java; in Peninsula the var. at 4f, the species at 4f, 5g, 5h, 6j, 6k, 9m.

Dysoxylum rugulosum, *King.* 300-500′, Kunstl. 2863, 3158; fruit Aug. A tree up to 25′, endemic, 5g.

Amoora Maingayi, *Hiern.* Larut, Kunstl., fide Ridl. A tree up to 35′, endemic, 5h, 6k.

Amoora Ridleyi, *King.* At 100′, Kunstl. 5383; fruit Dec. A tree up to 100′, endemic, 4f, 6g, 8j, 6k.

Amoora rubescens, *Hiern.* Larut, Forest Dept. C. F. 257; flr. May. A tree up to 60′, endemic, 2d, 4f, 6j, 6k, 8l, 9m.

Amoora rubiginosa, *Hiern.* 100-200′, Kunstl. 6221; flr. June. A tree up to 100′, endemic, 6k, 9m.

Aphanamixis Rohituka, *Pierre.* At about 2500′, Ridl. (not seen). A tree up to 70′, of Indo-Malaya and China; in Peninsula common.

Aphanamixis sumatrana, *Ridl.* At about 2000′, Wray 2216, 2990, Ridl. A tree up to 20′, of Sumatra; in Peninsula 2d, 4e, 5f, 4f, 5h, 6k.

Aglaia cinerea, *King.* 3000-3500′, Kunstl., fide Ridl. A shrub or small tree, endemic, 5g.

Aglaia cordata, *Hiern.* 2000-3000′, Wray 2982, 2962A, Kunstl. 6360, Curt., Ridl. 11915; flr. May, fruit Feb., July. A tree up to 30′, of Borneo; in Peninsula 1b, 4d, 6g, 4h, 6k, 9m.

Aglaia Griffithii, *Kurz.* 1000-4000′, Wray 2224, Kunstl. 4321, 6341, 6889, Ridl. 3021; flr. Feb., July, fruit Nov. A tree up to 50′, endemic and common.

Aglaia Hiernii, *King.* At 100′, Kunstl. 6706; flr. Oct. A tree up to 100′, endemic, 4f, 6k.

Aglaia Kunstleri, *King.* At 300′, Kunstl. 5287; fruit Dec. A tree up to 60′, endemic, 4f, 5g.

Aglaia leucophylla, *King.* Larut, Kunstl., fide Ridl. A tree up to 60′, endemic and local.

Aglaia macrostigma, *King.* 500-800′, Kunstl. 5474; fruit Jan. A tree up to 60′, endemic and local.

Aglaia membranifolia, *King.* 500-800′, Kunstl. 5159; flr. Nov. A tree up to 30′, of Sumatra; in Peninsula 4f.

Aglaia odoratissima, *Bl.* 300-3800′, Wray 2664, 3202A, 2959, Kunstl. 3507, Ridl. 14679, B. & H. 12968; flr. March, June. A tree up to 40′, of Siam to Java; in Peninsula common.

Aglaia oligophylla, *Miq.* Larut, Kunstl., fide Ridl. A tree up to 20′, of Burma and Sumatra; in Peninsula 2d, 6k, 7l, 9m.

Aglaia palembanica, *Miq.* 300-4200′, Kunstl. 3882, Curt. 2003, B. & H. 13024; flr. Sept., fruit Feb. A shrub or tree up to 20′, of Sumatra and Borneo; in Peninsula 1b 2d, 4e.

Aglaia tenuicaulis, *Hiern.* Up to about 2500′, Kunstl. 3091, Ridl. A shrub or small tree of Sumatra; in Peninsula 2d, 5g, 5h, 6j.

Aglaia trichostemon, *C. DC.* At Maxwell's Hill, Ridl. (not seen). A tree about 20′, of Borneo; in Peninsula 2d, 6e, 5g, 7h, 6j, 6k, 9m.

Walsura multijuga, *King.* 100-1500′, Wray 1859, 2568, 4183, Kunstl. 3446, 6915, 8400; flr. Dec., fruit June, July, Dec. A tree up to 30′, of Sumatra, Borneo and Philippines; in Peninsula 2d, 4f, 5h, 6k, 9m.

Heynea trijuga, Roxb. At 500′, Wray 1860, Kunstl. 3971; fruit March. A tree up to 20′, of Indo-Malaya and China; in Peninsula 2d, 0j, 9m.

CHAILLETIACEAE.

Chailletia deflexifolia, *Turcz.* 300-800′, Kunstl. 5501; fruit Feb. A climber up to 70′, of Java; in Peninsula 3f, 4f, 6k, 8l.

Chailletia tenuifolia, *King.* 300-2000′ (fide Ridl.), Wray 1850. A shrub or small tree up to 15′, endemic, 3d.

OLACACEAE.

Ctenolophon parvifolius, *Oliv.* Ridl. 11433; fruit Dec. A tree up to 40′, of Sumatra and Borneo; in Peninsula common.

Scorodocarpus borneensis, *Becc.* Larut Hills, Kunstl., fide Ridl. A tree up to 70′, of Borneo; in Peninsula 3f, 8g, 5h, 8j, 8h, 9l, 9m.

Strombosia javanica, *Bl.* At Waterloo, Curt., fide Ridl. A tree up to 30′, of Tenasserim to Borneo; in Peninsula 2d, 4f, 6g, 5h, 6k, 0k, 9m.

Strombosia rotundifolia, *King.* At Taiping, Burn-Murdoch 332; fruit May. A large shrub, endemic, 6g, 8j, 9m.

Platea latifolia, *Bl.* 300-500′, Kunstl. 5885; fruit April. A tree up to 100′, of Java; in Peninsula 2d.

Gomphandra affinis, *Mast.* 100-1000′, Curt. 2721, Ridl. 14680; flr. May, fruit Aug. A shrub about 8′, of Burma; in Peninsula common.

Gomphandra gracilis, *King.* 200-2500′, Wray 2138, 3002; fruit June. A shrub or small tree, endemic, 4f.

Gomphandra lanceolata, *King.* 1700-4700′, Wray 2829, Kunstl. 4211 (var. angustifolia), 4240, Ridl. (var. a, Burkill), B. & H. 12656, 12801; flr. March, May, June. A shrub up to 10′, endemic and common. Var. a, Burkill does not fit in with any of Ridley's varieties. It occurs also in Negri Sembilan, and on Bukit Kutu, and G. Berumban.

Gomphandra nyssifolia, *King.* 4000--4500′, Kunstl. 3822; fruit Jan. A tree up to 20′, endemic, 4d.

Gomphandra penangiana, *Wall.* At 300′, Wray 2667. A shrub up to 8′, endemic, 2d, 5g, 6j, 6k.

Gomphandra sp. 3000-4200′, Fox 161, Ridl.; flr. Oct. A shrub. Does not agree with any species in Ridley. Near G. gracilis.

Stemonurus umbellatus, *Becc.* 3000-3500′, Kunstl., fide Ridl. A tree up to 120′, of W. Malaysia; in Peninsula 6k.

Phytocrene bracteata, *Wall.* 3000-3500′, Kunstl. 6911; flr. Dec. A long prickly climber of Burma and Borneo; in Peninsula 2d, 6k, 0k, 9m.

Phytocrene oblonga, *Wall.* At 100′, Kunstl. 5606; flr. Feb. A liane, endemic, 2d, 6k.

Phytocrene palmata, *Wall.* At 100′, Kunstl. 5560; fruit Feb. A liane, endemic, 2d, 5h, 6k.

Miquelia caudata, *King.* At about 2500′, Ridl. 5229. A slender climber, endemic, 8f, 5g.

Iodes ovalis, *Bl.* Larut, Kunstl., fide Ridl. A climber up to 60′, of Malaysia; in Peninsula 4g, 6k, 9l.

Iodes velutina, *King.* At 200′, Scort. A woody climber, endemic, 6j, 6k, 9m.

Lophophyxis Maingayi, *Hook. fil.* 200-500′, Kunstl. 6552. A liane, endemic, 5g, 6k.

Erythropalum scandens, *Bl.* To about 2500′, Wray, Curt. 2777, Ridl.; flr. June, Oct. A woody climber of Indo-Malaya; in Peninsula 2d, 3f, 4f, 8g, 6k, 9m.

ILICACEAE.

Ilex cymosa, *Bl.* 800-1000′, Kunstl. 8506; flr. Feb. A tree up to 50′, of Indo-Malaya; in Peninsula common.

Ilex epiphytica, *King.* At about 2500′, Ridl. 3008. A shrub of Borneo; in Peninsula 4e, 6e, 5g, 5h, 7k.

Ilex glomerata, *King.* 3500-4000′, Kunstl. 6926; flr. Dec. A tree up to 30′, of Tenasserim and Java; in Peninsula 3e only.

Ilex malaccensis, *Loesen.* At 300′, Kunstl. 2463; flr. Oct. A shrub up to 18′, of Sumatra and Borneo; in Peninsula 6k.

Ilex triflora, *Bl.* 3000-4600′, Kunstl. 6991, Ridl. 5376, Anders. 67; flr. March, June, fruit Dec. A bush up to 15′, of Indo-Malaya and China; in Peninsula 2c, 4d, 4e, 6e, 4f, 5g, 7k, 9k.

CELASTRACEAE.

Microtropis elliptica, *King.* 300-4500′, Kunstl. 4193, Ridl.; fruit May. A shrub or small tree, endemic, 2d, 4f, 9k.

Microtropis filiformis, *King.* At about 2500′, Ridl.; flr. June. A shrub or small tree of Burma and Lower Siam; in Peninsula 1b, 2b, 3f, 4f, 5h,

Glyptopetalum quadrangulare, *Prain.* At 2500′, Wray 3229. A shrub up to 15′, endemic, 4f, 6g, 5h.

Lophopetalum pachyphyllum, *King.* 800-1500′, Kunstl. 7525; flr. April. A tree up to 100′, endemic, 6j, 6k.

Lophopetalum Scortechinii, *King.* 500-1000′, Kunstl. 6676; flr. Oct. A tree up to 80′, endemic and local.

Celastrus malayensis, *Ridl.* 3000-4100′, Curt. 2005, Ridl. 5237, H. & N. 2466; fruit Feb., June. A climber up to 50′, endemic, common.

Kurrimia paniculata, *Wall.* 100-1000′, Wray 2376, 2386, Kunstl. 4111, 5772, 6501; flr. July, Aug., fruit Apr., Nov. A tree up to 60′, of W. Malaysia except Java; in Peninsula, Kedah to Singapore.

Perrottetia alpestris, *Loesen.* 3900-4400′, Curt. 2090, Fox 171, Ridl. 3013, 5512, 11451, B. & H. 12556; fruit March. A shrub up to 13′, of W. Malaysia and Philippines; in Peninsula 4f, 5g.

Hippocratea nigricaulis, *Ridl.* 300-500′, Kunstl. 6556; flr. Sept. A slender climber of Burma; in Peninsula 2d, 5h, 6k, 8l

Salacia flavescens, *Kurz.* At about 4000′, Curt. 2004. A sprawler of Tenasserim and Lower Siam; in Peninsula Setul to Singapore.

Salacia Maingayi, *Laws.* 500-800′, Kunstl. 7471; flr. April. A climber up to 15′, endemic, 2d, 6d, 5g.

Salacia prinoides, *DC.*, var. macrophylla, *King*. 300-500′, Kunstl. 7552; fruit May. A climber or bush, the species of Indo-Malaya and the Philippines; in Peninsula the species at 2b, 2c 3f, 6k, 9m, the var. at 3e only.

Salacia Wrayi, *King*. At Kota, Wray, fide Ridl. A liane, endemic and local.

RHAMNACEAE.

Zizyphus affinis, *Hemsl.* 300-1500′. Kunstl. 3568, 6720, Ridl. 11434; flr. Oct., Dec., fruit Nov. A thorny climber, endemic. 1b, 2d, 3f.

Zizyphus calophylla, *Wall.* At 300′. Kunstl. 5255; flr. & fruit Dec. A thorny climber, of Bangka and Borneo; in Peninsula common.

Zizyphus Kunstleri, *King*. 300-500′. Kunstl. 3772, Ridl. 3405; fruit Jan. A thorny climber, endemic, 2d, 3f, 9l.

Zizyphus oenoplia, *Mill.* At 500′. Kunstl. 5276; fruit Dec. A thorny bush of Indo-Australia; in Peninsula 1b, 2b, 2d, 6d, 6f, 5h, 5j, 6k, 9m.

Colubrina anomala, *King*. 500-800′. Kunstl. 6561; flr. Sept. A tree up to 40′, endemic and local.

Ventilago malaccensis, *Ridl.* At 100′. Kunstl. 6573; fruit Sept. A woody climber of Lower Siam and Borneo; in Peninsula 1b, 2d, 6g, 7g, 6k, 9m.

Ventilago oblongifolia, *Bl.* At Waterfall Hill, Wray, Scort., fide Ridl. A liane of Java and Philippines; in Peninsula 5g, 5h, 6j, 9l, 9m.

Smythea macrocarpa, *Hemsl.* 200-2000′. Wray 36, 2211, Kunstl. 3642, 6597, 7726; flr. June, Sept., fruit June, Dec. A liane, endemic, 2d, 4f, 6k, 7l, 9l.

AMPELIDACEAE.

Vitis cantoniensis, *Seem.* 1500-2000′. Kunstl. 2285; flr. Sept. A slender vine of Indo-China and China; in Peninsula 5h, 6j, 7l.

Vitis cinnamomea, *Wall.* 300-500′. Wray 2925, Kunstl. 2912; flr. April. A slender vine, endemic. Kedah to Singapore.

Vitis elegans, *Kurz.* 500-3700′. Hend. 10471, B. & H. 12759; flr. Feb. A vine, endemic and common. Hend. 10471 is a large form, connecting this species with V. cinnamomea.

Vitis furcata, *Laws.* 200-about 2500′. Kunstl. 8402 (var. pubescens), Ridl., H. & N. 2398; flr. June, fruit Jan., Feb. A woody vine of Sumatra; in Peninsula, Penang to Singapore.

Vitis glaberrima, *Wall.* 100-4400′. Kunstl. 6212, Fox 151; flr. Oct., fruit June. A long vine of Tenasserim to Sumatra; in Peninsula 2d, 4h, 5h, 8h, 6k, 7l, 9l, 9m.

Vitis Kunstleri, *King.* Larut, Kunstl., fide Ridl. A climber of Lower Siam; in Peninsula 4f, 7g.

Vitis Lawsoni, *King.* 2500-3000′, Kunstl. 6827, Ridl. 5238; flr. July, fruit June. A climber of Burma; in Peninsula 2d, 4f, 5g, 5h, 9m.

Vitis macrostachya, *Miq.* At 100′, Kunstl. 6238; flr. June. A climber of Sumatra; in Peninsula Penang to Singapore.

Vitis mollissima, *Wall.* 3700-3800′, B. & H. 12983; fruit March. A wide climber of Lower Siam; in Peninsula Langkawi to Singapore.

Vitis novemfolia, *Wall.* At Maxwell's Hill, Ridl. 5235; flr. June. A slender vine of Tenasserim; in Peninsula 2d, 3f, 4f, 6f, 7g, 6j, 0j, 6k, 9m.

Vitis pedunculariș, *Wall.* 100-800′, Kunstl. 3970, 5364; fruit March, Dec. A climber of Sumatra and Borneo; in Peninsula 2d, 6d, 5h, 6j, 6k.

Vitis polystachya, *Wall.* 3000-3500′, Scort. 244, Ridl. 2999, H. & N. 2367; flr. March, fruit Feb. A climber of Siam to Sumatra; in Peninsula 2d, 4f, 5h, 6j, 6k, 8l, 9l.

Vitis pyrrhodasys, *Miq.* Larut, Kunstl., fide Ridl. A slender vine of W. Malaysia; in Peninsula 2c, 6c, 2d, 5g, 5h, 6k, 8l, 9l.

Vitis repens, *Wight and Arnott.* At 4400′, Fox 135; flr. Oct. A climber of S. E. Asia; in Peninsula Kedah and Kelantan to Singapore.

Vitis Scortechinii, *King.* 800-1000′, Kunstl. 2897; flr. March. A slender climber, endemic, 6d, 4f, 5h.

Vitis trifolia, *Linn.* 300-4750′, Ridl., B. & H. 12945; fruit March. A vine of India, Lower Siam and Java; in Peninsula common.

Vitis Wrayi, *King.* Taiping Hills, Scort., fide Ridl. A slender climber of Lower Siam; in Peninsula 2d, 3f, 5h, 6j, 6k, 9l.

Pterisanthes coriacea, *Korth.* Up to 4000′, Curt. 2606, Ridl. 3001; flr. May, Sept., Dec. A slender climber of Lower Siam; in Peninsula Taiping to Singapore.

Pterisanthes cricpoda, *Planch.* Taiping Hills, Ridl. (not seen). A slender climber of Sumatra; in Peninsula 2d, 3d, 4f.

Pterisanthes pedata, *Laws.* At 2500′, Haniff 13208; fruit March. A short climber, endemic, 5h, 6j, 6k, 9l.

Leea Curtisii, *King.* At Waterloo, 1800′, Curt. 2872. A shrub up to 5′, endemic, 4d.

Leea gigantea, *Griff.* 100-1000′, Ridl. 14649; flr. Aug. A bush or small tree, endemic, Langkawi to Singapore.

Leea sambucina, *Willd.* At 300′, Wray 3282. A big shrub of India to Sumatra; in Peninsula common.

Leea simplicifolia, *Zoll.* 2000-2500′, Kunstl., fide Ridl. A dwarf shrub, of Sumatra and Java; in Peninsula 4d.

SAPINDACEAE.

Allophyllus glaber, *Roxb.* At Maxwell's Hill, Scort., fide Ridl. A small tree, endemic, common.

Allophyllus ternatus, *Lour.* At 3000′, Scort. 290. A shrub up to 10′, of Indo-China and Malaysia; in Peninsula common.

Erioglossum edule, *Bl.* At Kota, Wray 3344. A tree of Indo-Australia; in Peninsula in villages and open country.

Lepisanthes cuneata, *Hiern.* Larut, Kunstl., fide Ridl. A shrub or small tree, endemic, 2d, 4e, 3f, 4f, 7h, 6j.

Lepisanthes longifolia, *Radlk.* 1500-2000′, Kunstl. 8465: fruit Feb. A shrub up to 20′, endemic, 2d, 6g, 8j, 6k, 7l, 9l.

Otophora sessilis, *King.* 300-800′, Kunstl. 2460: flr. Oct. A shrub or small tree of Lower Siam; in Peninsula 1b, 2d.

Nephelium lappaceum, *Linn.* The Rambutan. A tree up to 50′, of W. Malaysia; in Peninsula cultivated and occurring as an escape.

Nephelium mutabile, *Bl.* 200-500′, Kunstl. 6478: flr. Aug. A small tree of W. Malaysia and Philippines; in Peninsula 6f, 5g, 5h, 9m.

Nephelium ophioides, *Radlk.* Kunstl., Larut, fide Ridl. A tree up to 80′, endemic, 4f, 5h, 6k.

Nephelium rubescens, *Hiern.* At 100′, Kunstl. 6523, 6750: flr. Aug., fruit Oct. A tree up to 60′, endemic, 3f, 4h, 6k, 7l, 9m.

Nephelium setosum, *Ridl.* Euphoria setosa, Radlk. 1000-2000′, Kunstl., fide Ridl. A doubtful species.

Nephelium sp. At 3800′, B. & H. 13008; fruit March. A lofty tree. Near N. glabrum.

Pometia alnifolia, *Radlk.* 500-800′, Kunstl. 3781; flr. Jan. A tree up to 60′, endemic, 2d, 4f, 5h, 9m.

Guioa fuscidula, *Radlk.* 200-500′, Kunstl. 2452; flr. Oct. A tree up to 40′, of Tenasserim; in Peninsula 3e only.

Mischocarpus sumatranus, *Bl.* 100-4000′, Kunstl. 4689, 5391, 8329, Ridl.; flr. Jan., fruit Feb., April. A tree up to 70′, of Indo-Malaya; in Peninsula 2d, 6d, 5h, 9m.

Paranephelium macrophyllum, *King.* 300-500′, Kunstl. 3204, 6436; flr. and fruit Aug. A tree up to 100′, endemic, 4d, 4e, 4f, 0j, 6k, 9m.

STAPHYLEACEAE.

Turpinia latifolia, *Wall.* 200-500′, Wray 2172, Kunstl. 8487; flr. Feb., fruit June. A tree up to 40′, endemic, 2d, 5g, 8g, 5h, 6k, 7k, 9m.

Turpinia pomifera, *DC.* 3000-4000′, Kunstl. 4243; fruit May. A tree up to 40′, of Indo-Malaya and China; in Peninsula 3e only.

SABIACEAE.

Sabia sumatrana, *Bl.* At 1800′, Kunstl. 2117; flr. and fruit July. A climber of Sumatra; in Peninsula 3e only.

Meliosma elliptica, *Hook. fil.* At 100′, Kunstl. 5468; flr. Jan. A tree up to 30′, of Sumatra and Java; in Peninsula 4f, 5h, 6k, 9m.

Meliosma nitida, *Bl.* 500-2500′, Wray 3243, Kunstl. 2707, 2842, 4895, Curt.; flr. Jan., May, fruit March, Sept. A shrub or small tree of Sumatra and Java; in Peninsula 2d, 4f, 3g, 5g, 4h, 5h, 5j, 6k, 9l.

ANACARDIACEAE.

Buchanania sessiliflora, *Bl.* 300-800′, Wray 2402, 2558, 2642, Kunstl. 6593; flr. Sept., fruit Aug. A tree up to 60′, of Burma and W. Malaysia; in Peninsula common.

Bouea microphylla, *Griff.* At 300′, Kunstl. 5531; flr. Feb. A tree up to 80′, of Malaysia; in Peninsula only doubtfully wild at 2d, 8g, 6k, 9m.

Mangifera Griffithii, *Hook. fil.* 300-500′, Kunstl., fide Ridl. A tree up to 100′, endemic, 6k.

Mangifera quadrifida, *Jack.* 200-300′, Kunstl. 8444; flr. Jan. A tree up to 60′, of Borneo; in Peninsula 2d, 8g.

Mangifera longipetiolata, *King.* 2500-3000′, Kunstl. 7266; flr. Feb. A tree up to 60′, endemic and local.

Melanorrhoea aptera, *King.* 300-500′, Kunstl. 3485, 3727; flr. Oct. A tree up to 70′, endemic, 2d, 6g.

Melanorrhoea Curtisii, *Oliv.* 800-1000′, Kunstl. 6887; flr. Nov. A tree up to 80′, endemic, 2c, 2d, 5g.

Melanorrhoea inappendiculata, *King.* Larut, Kunstl., fide Ridl. A tree up to 60′, endemic, 2d.

Melanorrhoea macrocarpa, Engl. 3000-4000′, Curt. 3722; fruit Dec. A tree of Borneo; in Peninsula 3e only.

Melanorrhoea torquata, *King.* At 100′, Kunstl. 5552; flr. Feb. A tree up to 100′, endemic, 3f, 8g, 8j.

Swintonia lurida, *King.* At Kota, Wray, fide Ridl. A small tree, endemic, 6k.

Swintonia spicifera, *Hook. fil.* 300-1500′. Kunstl., fide Ridl., B. & H. A tree up to 100′, endemic, 2c, 2d, 6j, 6k, 7k.

Campnosperma Griffithii, *March.* At 100′, Kunstl. 6541; flr. Sept. A tree about 80′, of Sumatra and Borneo; in Peninsula 6k, 9m.

Rhus perakensis, *Scort.* At 300′, Wray 2316. A slender climber, endemic, 6g.

Melanochyla angustifolia, *Hook. fil.* 300-500′. Kunstl., 3359; flr. Sept. A tree up to 70′, endemic, 2d, 6j, 6k.

Melanochyla bracteata, *King.* At 100′, Kunstl. 5549, 7303; flr. and fruit Feb. A tree up to 80′, endemic, 4f.

Melanochyla densiflora, *King.* At 100′, Kunstl. 5615; flr. Feb. A tree up to 80′, endemic and local.

Melanochyla Kunstleri, *King.* 300-500′, Kunstl. 6810; flr. Nov. A tree up to 100′, endemic and local.

Melanochyla nitida, *King.* 1000-1500′, Kunstl., fide Ridl. A tree up to 100′, endemic, 2d.

Semecarpus lucens, *King.* At 100′, Kunstl. 5470, 6895; flr. Jan., Nov. A tree up to 70′, endemic and local.

CONNARACEAE.

Connarus ellipticus, *King.* At 300′, Wray 1831. (Up to 4200′, Kunstl., fide Ridl.) A climber, endemic, Penang to Singapore.

Connarus oligophyllus, *Wall.* 200-500′, Kunstl. 5613, 8432, flr. Jan., fruit Feb. A climber of Lower Siam; in Peninsula 2d, 4f, 7g, 5h, 8h, 6k, 9m.

Connarus villosus, *Jack.* 800-1500′, Wray 1858, Kunstl. 5550; fruit Feb. A liane of Sumatra and Borneo; in Peninsula common.

Ellipanthus gibbosus, *King.* At Waterloo, Curt.; fruit May. A tree up to 16′, endemic, 4f, 5g, 9k, 9l.

Ellipanthus Griffithii, *Hook. fil.* At 300′, Wray 2404. A tree up to 60′, of Borneo; in Peninsula 4f, 6k, 9m.

Rourea anomala, *King.* At Taiping, Haniff 1262; flr. May. A big liane of Lower Siam; in Peninsula 2d, 6d, 4e, 4f.

Rourea rugosa, *Planch.* 300-500′, Kunstl. 8406; flr. Jan. A liane, endemic and common.

Rourea similis, *Bl.* 100-500′, Kunstl. 5516, 8405, flr. Jan., Feb. A liane of Sumatra and Borneo; in Peninsula 2c, 2d, 4f, 5h, 6k, 9k, 9m.

Roureopsis Scortechinii, *King.* 4000-4500′, Curt. 1998, H. & N. 2465; fruit Feb., Sept. A slender climber, endemic and local.

Agelaea pinnata, *King.* At 500′, Kunstl. 5425; flr. Jan. A liane, endemic and local.

Agelaea vestita, *Hook. fil.* 100-300′, Wray 2538, 2549; flr. July. A liane of W. Malaysia; in Peninsula common.

Cnestis ramiflora, *Griff.* At 300′, Kunstl. 3759; fruit Jan. A climber of Indo-Malaya; in Peninsula common.

LEGUMINOSAE.

Crotolaria incana, *Linn.* At Taiping, Hend. 10162; flr. and fruit Feb. A shrubby herb, cosmopolitan; in Peninsula 2d.

Crotolaria semperflorens, *Vent.* At 4100′, B. & H. 12867; flr. and fruit Feb. A herb of S. India, Sumatra and Java; in Peninsula 6j, 6k.

Flemingia congesta, *Roxb.* At Taiping, Hend. 10161; flr. and fruit April. A small shrub of Indo-Malaya and China; in Peninsula common.

Phaseolus calcaratus, *Roxb.* At Batu Kurau, Curt. 2984; flr. Oct. A twining herb of S. E. Asia; in Peninsula 2b, 6b, 6f, 5g.

Spatholobus ferrugineus, *Benth.* At 300′, Kunstl. 3366; flr. Nov. A big liane of W. Malaysia; in Peninsula 2d, 4f, 6k, 8k, 9m.

Spatholobus Maingayi, Prain. 500-800′, Kunstl. 6906; flr. Dec. A climber, endemic, 4f, 6k, 9l, 9m.

Mucuna biplicata, *Teys. and Binn.* At Taiping, Hend. 10136, 10373; flr. Jan., fruit Feb. A liane of Sumatra and Borneo; in Peninsula 1b, 2d, 4d, 6f, 5g, 7k, 9l.

Mucuna pruriens, *DC.* At Kota, Wray 3326; an annual climber, pantropic; in Peninsula 3e only.

Erythrina lithosperma, *Miq.* 1800-3800′, Curt. 2982, B. & H.; flr. Feb., Oct. A tree of Indo-Malaya to Philippines; in Peninsula only doubtfully wild.

Milletia albiflora, *Prain.* 100-300′, Wray 1864, Kunstl. 6842; flr. May, fruit Nov. A tree up to 50′, endemic, 2d, 6e, 3f, 4f, 5h, 6k.

Milletia sericea, *Benth.* Larut, Kunstl., fide Ridl. A liane of W. Malaysia; in Peninsula 2d, 4f, 5g, 5h, 6k, 9k.

Milletia unifoliata, *Prain.* At Tupai, Wray 2836; fruit Aug. A tree up to 30′, endemic, 3f, 4f.

Padebruggea dasyphylla, *Miq.* At 200′, Wray, fide Ridl. A liane of Java; in Peninsula 3e only.

Dalbergia phyllanthoides, *Bl.* 500-1000′, Wray 2086, Kunstl. 4978, 5182; flr. Oct., fruit Nov. A climber of Java and Borneo; in Peninsula 2d.

Dalbergia tamarindifolia, *Roxb.* At 100′, Kunstl. 6481; flr. Aug. A climber or tree of Indo-Malaya to the Philippines, and China; in Peninsula 1b, 2b, 2c, 2d, 6e, 4f.

Pterocarpus indicus, *Willd.* A tree up to about 80′, of Tenasserim to the Philippines; in Peninsula commonly planted as a roadside tree, and probably wild in 2d, 5h, 6k.

Pongamia glabra, *Vent.* At Taiping, Hend. 10231; flr. Nov. A tree up to 60′, of Indo-Australia and Mascarene Is.; in Peninsula common near the sea.

Derris elegans, *Benth.* 100-500′, Kunstl. 3911, 5583; flr. Feb. A climber, widely Malaysian; in Peninsula 5h, 6k.

Derris elliptica, *Benth.* The Tuba plant, cultivated. Wray 1678. A sprawler of Siam to Borneo, only doubtfully wild in 2b, 2d.

Derris malaccensis, *Prain,* var. aptera. 300-800′, Kunstl. 6428; fruit Aug. A climber of Siam to Borneo; in Peninsula 2d, 4f, 6f, 5g, 9k, the var. only in 3e.

Kunstleria Kingii, *Prain.* 500-1500′, Kunstl. 3830, 6870, 6935; flr. Nov., Dec., fruit Jan. A liane, endemic and local.

Desmodium capitatum, *DC.* At Taiping, Scort., fide Ridl. A creeping shrublet of S. E. Asia; in Peninsula 2b, 3f, 6f, 7g, 5h.

Desmodium heterophyllum, *DC.* At 100′, Kunstl. 2579; flr. Nov. A small herb, of S. E. Asia; in Peninsula 5b, 2d, 8e, 5g, 8h, 6k, 9m.

Desmodium polycarpum, *DC.* Up to 300′, Kunstl. 4984, Ridl., Hend. 10164; flr. April, Oct., fruit Oct. A shrublet of Africa and Indo-Australia; in Peninsula common.

Desmodium virgatum, *Zoll.* At Batu Kurau, Scort., fide Ridl. A small shrub of Burma, Java, Philippines; in Peninsula 3e only.

Ormosia gracilis, *Prain.* At about 3000′, Wray 2979. A tree up to 40′, endemic, 5g.

Ormosia scandens, *Prain.* 300-500′, Kunstl., fide Ridl. A liane, endemic and local.

Cassia alata, *Linn.* At 300′, Hend. 10068; flr. and fruit Jan. A large shrub, pantropic, of S. American origin; in Peninsula common.

Cassia javanica, *Linn.* At Taiping, Wray 2020; flr. March. A tree of W. Malaysia; in Peninsula cultivated only.

Koompassia malaccensis, *Benth.* At Taiping, Wray, Kunstl., fide Ridl. A tree up to 150′, of Sumatra; in Peninsula 2d, 3f, 7g, 6k, 9m.

Dialium patens, *Baker.* At 100′, Kunstl. 5577; flr. Feb. A tree up to 80′, of Borneo; in Peninsula 8g, 6k.

Bauhinia bidentata, *Jack.* 300-500′, Kunstl. 3183; flr. Aug. A liane or shrub of Singapore; in Peninsula, Penang to Johore.

Bauhinia cornifolia, *Baker.* 3000-4300′, Kunstl. 6261, B. & H.; flr. July. A liane, endemic, 2d, 6d, 5g, 6g, 5h, 5j.

Bauhinia ferruginea, *Roxb.* 300-500′, Kunstl. 2508; fruit Nov. A shrub (Kunstl.) or liane (Ridl.), endemic, 2d, 4f, 5h.

Bauhinia Findlaysoniana, *Grah.* Larut, Scort. 1463. A liane of Siam and Borneo; in Peninsula 2d.

Bauhinia flammifera, *Ridl.* At Taiping, Scort. We are of opinion that at least one sheet placed by Mr. Ridley under B. integrifolia, Roxb. is his B. flammifera. The only other sheet seen by us that Mr. Ridley quotes in his Flora is his own from Temengoh (the type of B. holosericea, Ridl.): this differs. Assuming that the type of B. integrifolia, Roxb. agrees with the latter, then the Taiping plant is B. flammifera, which is very common through the Peninsula, extending to Lower Siam.

Bauhinia glauca, *Wall.* At Kota, Wray, Scort., fide Ridl. A small climber of China and W. Malaysia; in Peninsula 2d, 5f, 6f.

Bauhinia lucida, *Wall.* 300-500′, Kunstl. 3434; flr. Oct. A liane, endemic, 2d.

Bauhinia mollissima, *Wall.* 300-800′, Kunstl. 5165; flr. Nov. An erect or climbing shrub of Tenasserim; in Peninsula 2b, 2d.

Bauhinia Wrayi, *Prain.* At Taiping, Wray 1934; flr. May. A small climber, endemic, 5g, 8l.

Saraca bijuga, *Prain.* At 500′, Kunstl. 4059; fruit March. A small tree, endemic, 4d, 4f, 6k.

Saraca declinata, *Miq.* 300-3000′, Kunstl. 2729, 3691; flr. Jan. A tree up to 20′, of Java; in Peninsula 4d, 6f, 5b, 6k.

Saraca macroptera, *Miq.* Larut, Kunstl., fide Ridl. A tree up to 40′, of Sumatra and Borneo; in Peninsula 3e only.

Saraca palembanica, *Miq.* At 100′, Kunstl. 6372; flr. July. A tree up to 40′, of Sumatra; in Peninsula 2d, 3f.

Saraca taipingensis, *Cantley.* Taiping Hills, Cantley, Anders. 99; flr. March. A small tree, endemic, 4f, 5g, 6g, 5h, 6½, 6k.

Saraca triandra, *Baker.* 300-2000′, Kunstl. 3797, 4507, 8516, Ridl. 14678; flr. Aug., fruit Jan. A shrub or tree of Sumatra and Borneo; in Peninsula common from Kedah to Malacca.

Crudia Curtisii, *Prain.* At Taiping, Kunstl., fide Ridl. A tree up to 150′, endemic, 2d, 4f, 5h, 8j, 6k.

Crudia gracilis, *Prain.* At Taiping, Kunstl., fide Ridl. A shrub, endemic and local.

Mezoneuron sumatranum, *Wight and Arn.* At Taiping, Scort., fide Ridl. A prickly climber of Sumatra, Borneo and Philippines; in Peninsula 2d, 3f, 4f, 5h, 6k, 9m.

Caesalpinia parviflora, *Prain.* Larut, Kunstl., fide Ridl. A small tree or climber, endemic and local.

Parkia speciosa, *Hassk.* 100-2000′, Wray, Kunstl. 5300; flr. Dec. A tree up to 80′, of Sumatra and Java; in Peninsula 2d, 5h, 6k, 9m.

Adenanthera bicolor, *Moon.* At Ulu Sapetang, Forest Dept. 233. A tree up to 80′, of Ceylon; in Peninsula 2d, 5h, 6k, 9m.

Entada Schefferi, *Ridl.* At 100′, Kunstl. 6228; fruit June. A liane of Lower Siam and Java; in Peninsula common.

Mimosa pudica, *Linn.* The sensitive plant. Common everywhere in waste ground. Distrib: pantropic, of S. American origin.

Acacia pennata, *Willd.* 300-800′, Kunstl. 5504. A climber of Trop. Africa and Asia; in Peninsula 2b, 2d, 8g, 5h, 6j, 6k.

Pithecolobium affine, *Baker.* 300-500′, Kunstl. 3406; flr. March. A small tree of Burma and ?Borneo; in Peninsula 3f, 5h, 6k, 9m.

Pithecolobium contortum, *Benth.* 500-800′, Wray 2636, 4249, Kunstl. 6869; flr. Nov. A small tree, endemic, 2c, 2d, 3f, 4f, 5h, 7l, 9m.

Pithecolobium Clypearia, *Benth.* At Taiping, Scort. 481. A small tree of Malaysia and S. China; in Peninsula 2d, 8d, 4f, 5h, 8h, 6k, 9m.

Pithecolobium ellipticum, *Hassk.* 200-300′, Wray 2666, Hend. 10043, 10305; flr. Aug., fruit Jan. A small tree of W. Malaysia to the Philippines; in Peninsula 2c, 3d, 3f, 4f, 6k, 9k, 9m.

Pithecolobium lobatum, *Benth.* At 200′, Hend.; fruit Jan., Feb. A tree up to 80′, of Malaysia; in Peninsula common.

ROSACEAE.

Parinarium asperulum, *Miq.* 500-1500′, Kunstl. 3537, 7568; flr. April, fruit Oct. A tree up to 80′, of Sumatra; in Peninsula 2d, 6e, 8g, 9m.

Parinarium elatum, *King.* 500-1000′, Kunstl. 3436, 3711; flr. Oct., fruit Jan. A tree up to 130′, endemic and local.

Parinarium Kunstleri, *King.* 300-800′, Kunstl. 3715, 6917; fruit Dec., Jan. A tree up to 80′, endemic and local.

Pygeum parviflorum, *Teys. and Binn.* 300-3000′, Kunstl. 3791, 6896 (var. densa), 7236; flr. Dec., Jan., fruit Feb. A tree up to 60′, of Java and Borneo; in Peninsula 2d, 4d, 4f, 5h, 6k.

Rubus elongatus, *Smith.* 300-800′, Wray 1849, Ridl. A bramble of W. Malaysia; in Peninsula 5h.

Rubus glomeratus, *Bl.* 3500-4500′, Fox 167, Hervey, Anders. 54, B. & H. 12609, 12778; flr. March, Oct. A bramble of W. Malaysia; in Peninsula 1b, 2d, 5g, 5h, 6j, 9m.

Rubus rosaefolius, *Smith.* 4000-4500′, Wray 4187, Ridl. 5233; flr. and fruit June. A bramble of Africa, Indo-Australia, Japan; in Peninsula 2d, 4e, 4f, 5g, 5h.

Pyrus granulosa, *Bertol.* At 4400′, Fox 153; fruit Oct. A tree up to 100′, of India to Sumatra; in Peninsula 6e, 4f, 5g.

SAXIFRAGACEAE.

Dichroa febrifuga, *Lour.* 2000-3900′, all collectors; flr. Feb., March, Dec., fruit March. A shrub of Indo-Malaya and S. China; in Peninsula 4f, 5h.

Weinmannia Blumei, *Planch.* 3800-4750′, Ridl. 3027, B. & H. 12892; flr. March, fruit Feb. A small tree of Java and ?Borneo; in Peninsula 6e, 5g, 6g, 8g, 7k.

Polyosma conocarpa, *Ridl.* 2500-3800′, Wray, B. & H. 12947; fruit March. A small tree of Sumatra; in Peninsula 1b, 2d, 8g, 8j, 6k, 9m.

Polyosma grandis, *Ridl.* 3500-4000′, Kunstl. 3802; flr. Jan. A tree up to 50′, endemic and local.

LEGNOTIDACEAE.

Gynotroches axillaris, *Bl.* 300-800′, Wray 2501, Kunstl. 5245; flr. Dec. A small tree of W. Malaysia and the Philippines; in Peninsula common.

Pellacalyx axillaris, *Korth.* 200-300′, Kunstl. 3627, Hend. 10173; flr. Dec., fruit June. A shrub or small tree of Sumatra and the Philippines; in Peninsula 2d, 8g, 5h, 6k, 9l, 9m.

Pellacalyx Saccardianus, Scort. At Taiping, Wray 701, Ridl. 3020; flr. Dec. A tree of Borneo; in Peninsula 2d, 4f, 8g, 5h, 5j, 9m.

ANISOPHYLLAEACEAE.

Anisophyllaea apetala, *Scort.* 2000-2500′, H. & N. 2391, B. & H. 12829; flr. March, fruit Feb. A small tree, endemic, 3f, 5h, 6k.

Anisophyllaea Curtisii, *King.* At 2500′, H. & N. 2378; flr. Feb. A small tree, endemic, 2d.

Anisophyllaea disticha, *Baill.* 300-2500′, Wray 17, Curt. 3721; fruit Oct., Dec. A shrub of W. Malaysia; in Peninsula 2c, 2d, 8g, 8j, 8l, 9l, 9m.

Anisophyllaea Gaudichaudiana, *Baill.* 1500-2000′, Wray 2214, Kunstl. 2731, Ridl. 3028; flr. Jan., fruit June. A tree up to 50′, endemic; 2d.

COMBRETACEAE.

Terminalia citrina, *Roxb.* 300-500′, Wray 3173; flr. Aug. A tree or climber of S. India; in Peninsula 2d, 6f, 5h, 6j.

Combretum nigrescens, *King.* Larut, Kunstl., fide Ridl., Forest Dept. 164 (var. Kunstleri). A climber, endemic, the species at 6e, 5h, 6j, the var. at 6g.

Combretum sundaicum, *Miq.* At Taiping, Wray 4272, Haniff 1258; flr. May. A woody climber of W. Malaysia and the Philippines; in Peninsula common.

MYRTACEAE.

Rhodamnia cinerea, *Jack.* 300-1000′, Wray 2325, Kunstl. 6813, H. & N. 2397; flr. Feb., Nov. A small tree of Siam to Australia; in Peninsula common.

Rhodomyrtus tomentosa, *Wight.* 200-500′, Kunstl. 8410; flr. Jan. A shrub of Indo-Malaya to Japan; in Peninsula common.

Eugenia Benjamina, *King.* Up to 2500′, Wray 2623, 2797, 3204; A shrub of Sumatra; in Peninsula 3e only.

Eugenia caudata, *King.* 1800-4700′, Kunstl. 4241, 6262, Curt. 2007, B. & H. 12768; flr. March, May, fruit July, Sept. A tree up to 40′, endemic, 2d, 5h, 6j, 6k, 7k.

Eugenia chlorantha, *Duthie.* 300-1000′, Kunstl. 4082, 4220; flr. April, fruit May. A tree up to 50′, of Sumatra and Borneo; in Peninsula 2d, 5h, 6k, 9m.

Eugenia chloroleuca, *King.* 1500-2000′, Wray 2917, Kunstl. 4951, 7307, Ridl. 11920; flr. Sept., fruit Feb. A tree up to 40′, endemic, 6k, 9m.

Eugenia Clarkeana, *King.* 300-500′, Kunstl. 6822; fruit Nov. A small tree, endemic, 6f, 5h, 8j.

Eugenia corrugata, *King.* 3000-4000′, Kunstl. 5298; fruit Dec. A tree up to 40′, endemic, 5g.

Eugenia cymosa, *Lam.* At 300′, Kunstl. 3422; flr. Oct. A small tree of Indo-Malaya; in Peninsula 1b, 2d, 3f, 6k, 9m.

Eugenia Duthieana, *King.* 500-4300′, Kunstl. 3966, 4218, B. & H. 12759; flr. March, fruit May. A tree up to 50′, endemic, 2c, 2d, 5h, 8h, 6k, 9m.

Eugenia Dyeriana, *King.* 100-500′, Kunstl. 6196, 6767; flr. June, fruit Oct. A tree up to 70′, endemic and local.

Eugenia expansa, *Duthie.* 100-2500′, Wray 3199, Kunstl. 5483; flr. Jan. A shrub or tree, endemic, 2d, 4f, 5h, 6k, 9m.

Eugenia filiformis, *Wall.* 100-2500′, Kunstl. 6708, Ridl. 2991; flr. Feb., Oct. A spreading tree, endemic, Penang to Singapore.

Eugenia Gageana, *King.* At 100′, Kunstl. 7563; flr. May. A tree up to 50′, endemic and local.

Eugenia garcinifolia, *King.* 300-500′, Kunstl. 6974; flr. Dec. A tree up to 80′, of Sumatra; in Peninsula 4f.

Eugenia grata, *Wight.* At 100′, Kunstl. 5414, 5433; flr. Jan. A shrub or small tree of Indo-Malaya; in Peninsula 1b, 2d, 3f, 7l. 2d, 3f, 7l.

Eugenia Hoseana, *King.* 300-500′, Wray 2952, Kunstl. 3407; flr. Sept. A tree up to 40′, endemic, 9l.

Eugenia Hullettiana, *King.* 500-800′, Kunstl. 7470; flr. April. A small tree of Sumatra; in Peninsula 3e only.

Eugenia inophylla, *Roxb.* Larut, Kunstl., fide Ridl. A tree up to 50′, endemic, 1a, 1b, 2d, 4f, 8h.

Eugenia Koordersiana, *King.* 500-1000′, Kunstl. 6233; flr. June. A tree up to 80′, endemic?, local.

Eugenia Kunstleri, *King.* Up to 800′, Kunstl. 3310; flr. Sept. A tall tree, endemic, 2d.

Eugenia lineata, *Duthie.* 300-500′, Wray 1973, Kunstl. 4086, Haniff 13121; flr. March, April. A tree up to 60′, of W. Malaysia; in Peninsula common.

Eugenia mollis, *King.* At 100′, Kunstl. 8387; flr. Jan. A shrub, endemic and local.

Eugenia myrtifolia, *Roxb.* At 100′, Wray 2703, Kunstl. 8379; flr. Jan., Aug. A bushy tree of Indo-Malaya; in Peninsula 8g, 8h, 7l, 9l, 9m.

Eugenia nigricans, *King.* At 1000′, Wray, fide Ridl. A tall tree, endemic and local.

Eugenia pachyphylla, *Kurz.* At 2000′, Curt., fide Ridl. A tree of Burma; in Peninsula 6k.

Eugenia papillosa, *Duthie.* 100-400′, Kunstl. 2813; flr. Feb. A lofty tree, endemic, 5h, 6k, 9m.

Eugenia penangiana, *Duthie.* 1000-1500′, Kunstl. 6965; fruit Dec. A tree up to 80′, endemic, 2d, 5h, 6k.

Eugenia perakensis, *King.* At 100′, Kunstl. 5595; flr. Feb. A tree up to 70′, endemic, 3f, 4f.

Eugenia polita, *King.* Larut, Kunstl., fide Ridl. A shrub or small tree, endemic, 3f, 6k, 9k.

Eugenia polyantha, *Wight.* 200-3000′, Wray 2587, 2958, Kunstl. 6614; flr. Sept. A tree up to 70′, of Indo-Malaya; in Peninsula 2b, 2d, 4f, 6f, 6g, 5h, 6k, 9m.

Eugenia Prainiana, *King.* 100-1000′, Kunstl. 3526 (var. Pearsoniana), 5309, 6584; flr. Oct., fruit Sept., Dec. A tree up to 80′, endemic and local.

Eugenia pseudo-formosa, *King.* 3000-4000′, Kunstl. 6254; flr. July. A small tree of Sumatra; in Peninsula 1b, 2d, 5h, 9m.

Eugenia punctulata, *King.* 300-2000′, Kunstl. 6611, 6937; flr. Sept., fruit Dec. A tree up to 50′, of Borneo; in Peninsula 5g, 7g, 8g, 5h, 6k, 9m.

Eugenia pustulata, *Duthie.* 300-800′, Kunstl. 6758, 7536; flr. April. A small tree, endemic, 6c, 2d, 6k, 9m.

Eugenia quadrata, *King.* At 100′, Kunstl. 5547; flr. Feb. A small tree, endemic and local.

Eugenia setosa, *King.* 100-300′, Kunstl. 5266, 6202; flr. June, Dec. A shrub or climber, endemic and local.

Eugenia subdecussata, *Duthie.* 300-500′, Kunstl. 3752; fruit Jan. A shrub or small tree, endemic, Kedah to Singapore.

Eugenia subhorizontalis, *King.* At Taiping, Wray 2118; flr. June. A small tree of Sumatra; in Peninsula 3e only.

Eugenia tecta, *King.* Up to 500′, Kunstl. 1863; flr. June. A small tree, endemic and local.

Eugenia Thumra, *Roxb.*, var. penangiana, *King.* At 4000′, B. & H. 12860; flr. Feb. A tree of Burma (the species); in Peninsula the var. at 2d, 3f.

Eugenia valdevenosa, *Duthie.* 300-4100′, Scort. 315, Kunstl. 2737, 5122, Ridl. 5347, H. & N. 2467; flr. Feb., June, fruit Jan., March. A tree up to 20′, endemic, 2d, 5g, 5h, 6k, 9l.

Eugenia variolosa, *King.* 300-800′, Kunstl. 2796, 3995; flr. March, Oct. A small tree, endemic, 4f, 4g, 5h, 7j, 8l, 9l, 9m.

Eugenia zeylanica, *Wight.* 300-500′, Kunstl. 5904; flr. April. A bushy tree of Indo-Malaya; in Peninsula common.

Barringtonia macrostachya, *Kurz.* 500-800′, Kunstl. 3779; fruit Jan. A shrub or tree of Burma and Borneo; in Peninsula 1b, 2b, 2c, 6k, 0k, 9m.

Barringtonia pauciflora, *King.* 1500-2000′, Kunstl. 6355; flr. July. A tree up to 40′, endemic and local.

Barringtonia Scortechinii, *King.* 4000-4300′, Hervey 300, B. & H. 12762; fruit March. A tree up to 60′, endemic, 2d, 5g, 5h, 6k.

Barringtonia sumatrana, *Miq.* ? H. & N. 2468 (determination doubtful). A tree of W. Malaysia; in Peninsula 2d, 7g, 9k, 9l, 9m.

MELASTOMATACEAE.

Osbeckia perakensis, *Ridl.* G. Hijau, Mrs. Bland. A shrub, endemic and local.

Melastoma imbricatum, *Wall.* 2000-4000′, Curt., Ridl. 2934; flr. May, Sept. A large shrub of Indo-China and Sumatra; in Peninsula 2d, 3f, 6g, 5h.

Melastoma malabathricum, *Linn.* 100-4300′, Ridl., Hend. 10013, Haniff 13104, B. & H. 12622; flr. Jan., March. A shrub of Indo-Australia and the Mascarene Is.; in Peninsula common in the North.

Melastoma perakense, *Ridl.* 1000-4700′, all collectors; flr. Jan., Feb., June, July. A shrub of Lingga and Java; in Peninsula 4f, 5g, 8g, 5h, 7l.

Melastoma sp. 2000-4300′, Ridl. 2935, Anders. 1, B. & H. 12580; flr. March. A shrub up to 12′. Near M. molle.

Oxyspora floribunda, *Ridl.* 3000-4500′, Ridl. 2940, 5342, B. & H. 12946; flr. March, June. A large shrub, endemic and local.

Oxyspora stellulata, *King.* Anders. 70; flr. March. A large shrub or tree of Sumatra; in Peninsula 6d, 4e, 4f, 5g.

Allomorphia alata, *Scort.* 200-3000′, Kunstl. 2047, Curt. 3719, Ridl. 11435, Hend. 10057; flr. all the year. A small shrub, endemic, 6c, 6d, 6e, 4f, 5h.

Allomorphia exigua, *Bl.* At Waterloo, Ridl. 2946 (var. capillaris); fruit March. A small shrub, endemic, 4d, 3f, 9k, the var. at 4d, 3f.

Blastus Cogniauxii, *Stapf.* 4000-4500′, Wray 2984, Curt., Ridl. 2947, Anders. 10, B. & H. 12618, 12859; flr. Feb., March. A shrub of Borneo; in Peninsula 4d, 6d, 6e, 4f, 6f, 5g, 5h, 9k, 9l.

Phaulanthus Curtisii, *Ridl.* 100-4000′, Curt. 2014, 2986, 3715, Ridl. 14688, Hend. 10452; flr. Feb., Aug.--Dec. A small shrub, endemic, 2d, 4d, 4e.

Campimia Wrayi, *Ridl.* 2000-4000′, Curt. 2008, Ridl. 2948, 5197; flr. Feb., June, Sept., fruit June, Sept. A small shrub, endemic and local.

Sonerila begoniaefolia, *Bl.* 4000-4500′, Ridl., Hervey. A herb of W. Malaysia; in Peninsula, Penang to Singapore.

Sonerila brachyantha, *Stapf.* At 4000′, Ridl. 2945; flr. and fruit March. A small herb, endemic, 4e, 6e, 3f, 4f, 5h.

Sonerila bracteata, *Stapf.* 3200-4700′, Scort. 12a, Kunstl. 2133, Anders. 35, B. & H. 12853; flr. Feb., March, July, fruit March, July, Oct. An erect herb, endemic, 5g, 5h, 8k.

Sonerila erecta, *Jack.* 300-4750′, all collectors; flr. Feb., March, Sept., fruit Feb., March. A herb, endemic, 2d, 4f, 5g, 9k.

Sonerila glabriflora, *Stapf.* At 100′, Kunstl. 1955, 2128; flr. and fruit June, July. A small herb, endemic, 4f.

Sonerila heterostemon, *Naud.* 200-2500′, Ridl. 11436, Hend. 10027, 10180; flr. and fruit June, Dec. A small herb of Sumatra and Borneo; in Peninsula Taiping to Singapore.

Sonerila integrifolia, *Stapf and King.* 1800-4500′, Kunstl. 2004, 2161, Fox, Ridl. 2943, B. & H. 12747, 13011; flr. March, fruit Aug., Oct. An erect herb, endemic, 5g, 5h.

Sonerila nidularia, *Stapf.* 300-1000′, Curt., Hend. 10193, 10427, 10448; flr. Feb., May, June, Oct., fruit June. A small herb, endemic, 3f, 6g.

Sonerila picta, *Korth.* var. concolor, *Ridl.* 2000-3000′, Curt. 3720; fruit Dec. A succulent herb of W. Malaysia; in Peninsula the var. at 6e, 4f, 5g, 6g, 5h, 7k.

Sonerila repens, *Stapf.* 2000-4000′, all collectors; flr. Feb., March, Dec., fruit Feb., July, Dec. A fleshy herb, endemic, 4f.

Sonerila succulenta, *Stapf.* At 3000′, Ridl. 2942; flr. and fruit Feb. A succulent herb, endemic and local.

Phyllagathis Griffithii, *King.* 500-3000′, Curt. 2012, Haniff 13130, B. & H.; flr. March, Sept. A creeping herb, endemic, 4f, 5h, 5j, 6k.

Phyllagathis hispida, *King.* 4500-4700′, Fox, Anders. 23, B. & H. 12880; flr. Feb., March, Oct. A woody herb, endemic, 5c, 3d, 6e, 4f, 5g, 9k.

Phyllagathis rotundifolia, *Bl.* 200-4500′, Kunstl. 2728, Curt. 2013, Ridl. 2936, Hend. 10437; flr. Jan.-March, Sept., fruit Jan., Feb. A creeping herb of Sumatra; in Peninsula common.

Marumia nemorosa, *Bl.* 4000-4300′, Ridl., B. & H. 12599; flr. March. A climber of Tenasserim, Sumatra and Borneo; in Peninsula common.

Dissochaeta annulata, *Hook. fil.* At 2500′, Ridl.; flr. June. A climber of Borneo; in Peninsula 2d, 7k, 9k, 9l, 9m.

Dissochaeta anomala, *King.* ?Larut, Kunstl., fide Ridl. A climber, endemic, 6d. Possibly Kunstler's Ulu Bubong specimens are what Ridley means here, as he does not quote them in his Flora.

Dissochaeta celebica, *Bl.* 100-500′, Kunstl. 2468, Curt. 2725; flr. May, fruit May, Oct. A slender climber of Bangka to the Philippines; in Peninsula common.

Dissochaeta gracilis, *Bl.* Up to 3200′, Curt., Anders. 5, Haniff 13267, B. & H. 12784; flr. March, May, Dec., fruit March, Dec. A slender climber of W. Malaysia; in Peninsula 4d, 6d, 4e, 4f, 5g, 6g, 5h, 7l, 9m.

Dissochaeta intermedia, *Bl.* At 4500′, Fox 178; flr. Oct. A slender climber of Java; in Peninsula 2d, 6g, 5h, 7l, 9m.

Dissochaeta pallida, *Bl.* 1000-4500′, Kunstl. 8499, Fox 178, Ridl. 5241, B. & H. 12941; flr. Feb., June, Oct., fruit March, June. A climber of W. Malaysia; in Peninsula 5c, 2d, 3f, 4f, 6g, 4h, 5h, 9m.

Anplectrum divaricatum, *Triana.* 100-2000′, Curt. 2009, Ridl.; flr. Sept. A climber of W. Malaysia; in Peninsula 2d, 5g, 5h, 5j, 6j, 6k.

Anplectrum glaucum, *Triana.* 300-400′, Curt.; flr. Oct. A climber of W. Malaysia; in Peninsula 2d, 4d, 6j, 6k, 7k.

Anplectrum pallens, *Bl.* var. petiolare, *Ridl.* 100-2000′, Derry, Curt., Ridl. 11444, H. & N. 2302; flr. Sept., fruit Jan., Feb., Nov., Dec. A slender climber of Sumatra and Borneo; in Peninsula, the species at 2d, the var. common.

Medinilla Clarkei, *King.* At Maxwell's Hill, Burkill, (abnormal leaf only). An epiphyte of Sumatra; in Peninsula 4d, 4e, 4f, 5g, 5h, 7k, 9k.

Medinilla crassinervia, *Bl.* At 300′, Wray 1821. An epiphyte of Borneo to N. Guinea; in Peninsula 2d, 6e, 4f, 5g, 6k, 9m.

Medinilla Hasseltii, *Bl.* 500-3000′, Kunstl. 1961, 8507, Curt. 2715, 3448, Ridl.; flr. Feb., June, Dec., fruit May. A small epiphyte of W. Malaysia; in Peninsula 4d to 9m.

Medinilla heteranthera, *King.* 3000-4500′, Kunstl. 3644, Ridl. 5346, Derry, B. & H. 12952; flr. June, fruit March. An epiphyte, endemic, 4f, 5g.

Medinilla scandens, *King.* 200-2000′, Ridl. 2933, Hend. 10393; flr. Jan, Nov., fruit Nov. A creeper on trees, endemic, 4f.

Medinilla Scortechinii, *King.* 4000-4500′, Wray 1739, Curt., Anders. 16, Derry; flr. March, Oct., fruit March. An epiphyte, endemic, 4f, 5g, 5h.

Medinilla speciosa, *Bl.* Up to 3000′, Wray 3218, Curt. 2011, Derry; flr. Sept., fruit Oct. A large shrub of W. Malaysia; in Peninsula 2d, 4f, 5g.

Medinilla venusta, *King.* Taiping Hills, Kunstl., fide Ridl. (the species). At 3500′, Ridl., B. & H. 12928 (var. chionantha); flr. Feb., March. An epiphyte, endemic, 4f, 5g.

Pogonanthera pulverulenta, *Bl.* Larut Hill, Derry. A shrub of W. Malaysia; in Peninsula 6b, 2d, 3f, 8h, 9j, 6k, 9m.

Astronia smilacifolia, *Triana.* 1800-2000′, Kunstl. 2027, Ridl. 11921; flr. Feb., fruit July. A small bushy tree of Borneo; in Peninsula 2d, 4e.

Pternandra capitellata, *Jack.* At 600′, Hend. 10087; flr. Jan. A bushy tree of Tenasserim; in Peninsula 2d, 3f.

Pternandra coerulescens, *Jack.* At Taiping, Ridl. 14686; fruit Aug. A small tree of W. Malaysia: in Peninsula common in low country in the West.

Pternandra echinata, *Jack.* var. pubescens, *King.* 300-500′, Wray 2354, Kunstl. 3518; fruit Oct. A bushy tree of W. Malaysia; in Peninsula the species common, the var. at 6c, 2d, 5h, 6k.

Memecylon acuminatum, *Sm.* 300-800′, Kunstl. 3458: fruit Oct. A tree, endemic, 2d, 5g, 9j, 6k, 7k, 8k, 8l, 9m.

Memecylon amplexicaule, *Roxb.* 200-1800′, Wray 1964, 2326, 3278, Kunstl. 3058, Curt. 1294, Ridl. 14687: flr. Aug., Dec., fruit June. A small tree, endemic, Penang to Singapore.

Memecylon caloneuron, *Miq.* 800-1000′, Kunstl., fide Ridl. Wray 3235. A tree of W. Malaysia; in Peninsula 1b, 3f, 9l.

Memecylon Curtisii, *Burkill and Henderson,* nom. nov. *M. gracilipes, Ridl.* At Waterloo, 1000′, Curt., fide Ridl. A small tree, endemic and local. Ridley's name is preoccupied by M. gracilipes, C. B. Rob. (1911), a Philippine plant.

Memecylon dichotomum, *Clarke.* 1000-4000′, Wray 2959, Kunstl. 5036, 5297, Curt. 1295, Ridl. 2938: fruit Oct., Dec. A slender shrub, endemic, 2c, 6e, 6f, 5g, 6g, 5h, 5j, 7j, 6k.

Memecylon epiphyticum, *King.* 800-2500′, Kunstl. 5184, Ridl.: flr. June, fruit Nov. An epiphytic shrub, endemic and local.

Memecylon floridum, *Ridl.* 500-1000′, Kunstl., fide Ridl. A tree up to 50′, endemic and local.

Memecylon fruticosum, *King.* 200-500′, Kunstl. 2971, 3625: flr. April, Aug. A shrub, endemic, 5g, 5h.

Memecylon garcinioides, *Bl.* At 3000′, Wray 2961, 3203: flr. Aug. A small tree of W. Malaysia; in Peninsula common.

Memecylon heteropleurum, *Bl.* 500-800′, Kunstl. 6621. A shrub or small tree of Sumatra and Borneo; in Peninsula 4f, 6f, 6g, 5h, 6k, 9m.

Memecylon Kunstleri, *King.* At Changkat Serdang, Wray, fide Ridl. A tree, endemic, 4f, 5h.

Memecylon laevigatum, *Bl.* 500-2500′, Kunstl. 3768, Ridl.: flr. Jan., June. A shrub or small tree of Indo-Malaya; in Peninsula 5g, 5h, 6k, 9l, 9m.

Memecylon minutiflorum, *Miq.* 2500-3000′, Wray 3249, Kunstl. 6265; fruit July. A tree of Sumatra: in Peninsula common.

Memecylon myrsinioides, *Bl.* 300-800′, Wray 2258, Kunstl. 3517; fruit Oct. A shrub or small tree of W. Malaysia; in Peninsula common.

Memecylon oligoneuron, *Bl.* Larut Hills, Kunstl., fide Ridl. A small tree of Java, Borneo and the Philippines; in Peninsula 2d. 4f, 5f, 0j, 6k.

Memecylon Wallichii, *Ridl.* Kunstl. (Larut), Curt. (Waterloo), fide Ridl. A shrub or small tree, endemic, 2d.

LYTHRACEAE.

Crypteronia Griffithii, *Clarke.* 800-1500′, Wray 2638, 2589, Kunstl. 4152; flr. April. A tree, endemic, 2d, 6f, 5h, 6k.

Duabanga sonneratoides, *Ham.* At Waterloo, Curt.; flr. May. A lofty tree of Himalaya to China; in Peninsula 1a, 2d, 4f, 6f, 5g, 5h, 6k.

SAMYDACEAE.

Casearia Clarkei, *King,* var. Kunstleri, *Ridl.* 800-1000′, Kunstl. 6936; fruit Dec. A tree up to 80′, endemic, the species Penang to Singapore, the var. at 4e, 4f, 9k.

Casearia coriacea, *Vent.* At 4300′, B. & H. 12871; fruit Feb. A small tree of Java and Borneo; in Peninsula 4f, 9m.

Casearia Lobbiana, *King.* 800-1800′, Wray 2594, Kunstl. 2631, Curt.; flr. Jan., fruit July, Sept. A shrub or small tree of Lower Siam; in Peninsula 2d, 5h, 6k, 8l, 9m.

Homalium propinquum, *Clarke.* 800-1500′, Kunstl. 4883; flr. Sept. A tree up to 100′, endemic, 2d, 4g.

PASSIFLORACEAE.

Passiflora foetida, *Linn.* At 200′, Hend. 10067; flr. and fruit Jan. A climber, pantropic, of S. American origin; in Peninsula common in waste ground.

Passiflora Horsfieldii, *Bl.* At 500′, Haniff 13135; flr. March. A slender climber of Java; in Peninsula 4f, 6f.

Adenia acuminata, *King.* 600-3000′, Wray 1745, Hend. 10422; fruit Oct. A slender climber of Sumatra and Java; in Peninsula, Taiping to Malacca.

Adenia nicobarica, *King.* At 3000′, Ridl., H. & N. 2352, Hend. 10120; fruit Jan., Feb., Dec. A slender climber of Tenasserim and Lower Siam; in Peninsula 1a, 1b, 2d, 3f, 6f, 5h, 8k.

CUCURBITACEAE.

Hodgsonia capniocarpa, *Ridl.* 100-500′, Kunstl. 4021; flr. March. A wide climber of Indo-Malaya; in Peninsula 2d, 6g, 7g, 6k.

Trichosanthes celebica, *Cogn.* At 500′, Kunstl. 4033; fruit March. A slender climber of Celebes; in Peninsula 3f, 6f, 6k, 7l, 9m.

Trichosanthes tricuspidata, *Lour.* 200-500′, Kunstl. 5111; fruit Nov. A slender climber of Indo-China, Siam, Java, Borneo; in Peninsula 2d, 4e, 7g.

Trichosanthes Wawraei, *Cogn.* 1000-2500′, Kunstl. 2203, 5280; fruit Dec. A slender climber, endemic, 2d, 4f, 8g, 6k, 8l, 9m.

Gymnopetalum integrifolium, *Kurz.* At 300′, Wray, fide Ridl. A creeping herb of Indo-China and Java; in Peninsula 6d, 3f.

Momordica Clarkeana, *King.* At 300′, Wray 3273. A climber, endemic and local.

Melothria affinis, *King.* 100-1500′. Kunstl. 2539, Curt.; fruit May, Nov. A climbing herb of Borneo; in Peninsula 6d, 4e, 3f, 5g, 5h, 8h, 6k, 7l.

BEGONIACEAE.

Begonia hirtella, *Link.* 3400-3800′, B. & H. 12811, 12997; flr. March. A herb, native of S. America, occurring here as an escape.

Begonia Maxwelliana, *King.* 2300-4300′, B. & H. 12569, 12755, 12803; flr. March. A herb, endemic, 2d, 4f.

Begonia taipingensis, *King.* Taiping, Wray, Scort., Kunstl., fide Ridl. A long creeping herb, endemic, 5g, 5h.

UMBELLIFERAE.

Hydrocotyle asiatica, *Linn.* At 4750′, B. & H. A herb of the tropics and sub-tropics of the Old World; in Peninsula common.

Hydrocotyle javanica, *Thunb.* 3700-4000′, Curt. 2086, B. & H. 12912; fruit Sept. A creeping herb of Indo-Australia, China, Japan; in Peninsula 4d, 4f, 5g.

Hydrocotyle rotundifolia, *Roxb.* At 3700′, B. & H. 12915; flr. Feb. A creeping herb of Indo-Malaya; in Peninsula 9m.

Eryngium foetidum, *Linn.* At 3500′ on banks, Hend., B. & H.; flr. March. A foetid herb of S. American origin; in Peninsula common.

ARALIACEAE.

Aralia ferox, *Miq.* 2000-4000′, Kunstl. 5089, Ridl. 5230, B. & H.; flr. June, fruit Oct. A climber of Java and Borneo; in Peninsula 6e, 4f, 5g.

Schefflera affinis, *Viguier.* Larut Hills, Kunstl., fide Ridl. A shrub, endemic, 5h.

Schefflera elliptica, *Harms.* 200-4400′, Wray 2136, Kunstl. 2541, Ridl., B. & H. 12673; flr. March, fruit June, Nov. A scandent shrub of Tenasserim and Java; in Peninsula 1b, 2b, 2d, 5h, 8h, 9m.

Schefflera Hullettii, *Viguier.* At 300′, Wray 2323. An epiphytic or terrestrial shrub, endemic, 4g, Johore, 9m.

Schefflera lurida, *Ridl.* 3500-4000′, Ridl.; fruit Dec. An epiphytic shrub, endemic, 4f.

Schefflera Ridleyi, *Viguier.* At 3600′, B. & H. 12976; flr. and fruit March. An epiphytic shrub, endemic, common.

Schefflera scandens, *Viguier.* At 300′, Curt. 2687; fruit May. A slender climber of Sumatra and Java; in Peninsula 4f.

Schefflera subulata, *Viguier.* 300-2900′, Ridl., Hend. 10081, B. & H. 12689; flr. Jan.-March. An epiphyte of W. Malaysia; in Peninsula common.

Schefflera tomentosa, *Viguier.* Wray 3152; flr. Sept. A shrub of Sumatra and Java; in Peninsula 3f, 4g, 4h, 5h, 9l.

Trevesia cheirantha, *Ridl.* 200-300′, Wray 2332, Hend. 10064; flr. June, fruit Jan. Small prickly tree of Burma and Sumatra; in Peninsula common.

Arthrophyllum ovalifolium, *Miq.* At 200′, Hend. 10123; fruit Jan. A small tree of Tenasserim and Sumatra; in Peninsula common.

Brassiopsis palmata, *Kurz.* At 2900′, Ridl. 3018, B. & H. 13030; fruit Feb., March. A small prickly tree of India and Lower Siam; in Peninsula 4e, 4f.

CORNACEAE.

Mastixia bracteata, *Clarke.* Larut, Kunstl., fide Ridl. A tree up to 60′, endemic, 6k.

Mastixia rostrata, *Bl.* At 4000′, Fox; flr. Oct. A tall tree of Java; in Peninsula 2d, 6k.

Alangium rotundatum, *Ridl.*, n. sp. 1000-3800′, Curt. 2689, B. & H. 12851; flr. Feb., May. A tree, endemic and local.

Aralidium pinnatifidum, *Miq.* 100-300′, Wray 3155. A small tree of Sumatra and Borneo; in Peninsula 2b, 6f, 5g, 5h, 6k, 7l, 9m.

CAPRIFOLIACEAE.

Viburnum sambucinum, *Bl.* At about 3800′, Ridl., B. & H. 12992; flr. March, June. A shrub or small tree of W. Malaysia; in Peninsula common.

RUBIACEAE.

Sarcocephalus Junghuhnii, *Miq.* At Taiping, Kunstl., fide Ridl. A small tree of Indo-China to the Philippines; in Peninsula common.

Nauclea peduncularis, *G. Don.* 300-3000′, Wray 3197, Kunstl. 3578; flr. Nov. A tree of Siam and Borneo; in Peninsula, 2d.

Uncaria attenuata, *Korth.* Wray 3150. A slender climber of Indo-Malaya; in Peninsula 5c, 6c, 2d, 6k, 9m.

Uncaria dasyoneura, *Korth.* Larut, Kunstl., fide Ridl. A climber of Ceylon and Java; in Peninsula 2d, 5g, 6k.

Uncaria ferrea, *DC.* 300-800′, Scort. 130, Kunstl. 5390; flr. Jan. A slender climber of Indo-Malaya; in Peninsula 6e, 2d, 6d, 6f, 8g.

Uncaria Kunstleri, *King.* At 100′, Kunstl. 5376; flr. and fruit Dec. A climbing shrub, endemic and local.

Uncaria pedicellata, *Roxb.* Larut, Kunstl., fide Ridl. A climber of W. Malaysia; in Peninsula common in open country.

Uncaria Roxburghiana, *Korth.* Larut, Kunstl., fide Ridl. A slender climber of Sumatra and Borneo; in Peninsula 5g, 5h, 9m, 0m.

Uncaria sclerophylla, *Roxb.* 100–4400′, Derry, Hend. 10222, B. & H. 12944; flr. March, fruit Nov. A liane of W. Malaysia; in Peninsula common.

Uncaria trinervis, *Hav.* At 300′, Kunstl. 2981; fruit Oct. A slender climber, endemic, 2d.

Wendlandia paniculata, *DC.* 3800-4100′, H. & N. 2349, B. & H. 12854, 12984; flr. Feb., March. A small tree of Indo-Malaya and China; in Peninsula 3e only.

Greenia Jackii, *Wight and Arn.* At about 1000′, Ridl., flr. June. A shrub or small tree, endemic, from Langkawi to Malacca.

Argostemma diversifolium, *Ridl.* Up to 4000′, Anders. 92, 102; flr. March. A succulent herb, endemic, 4d.

Argostemma elatostemma, *Hook. fil.* var. obovata, *King.* 2000-4500′, Curt., Fox, Ridl., Hervey, Anders. 100; flr. March, May, June, Oct. A creeping herb, endemic, 2d, 5g, 6j, 9k.

Argostemma involucratum, *Hemsl.* 2000-4700′, Wray 696, Ridl. 11445 (var. glabrum), 2927, 11953 (var. hirsutum); flr. Feb. A creeping herb, endemic, common in the hills.

Argostemma nutans, *King.* Larut, Kunstl., fide Ridl. A succulent herb, endemic, 4f.

Argostemma pictum, *Wall.* 2000-3800′, Ridl., B. & H. 12687, 12949, 13200; flr. March. A succulent herb of Tenasserim and Lingga; in Peninsula 1b, 2d, 6e, 4f, 5h, 9l.

Argostemma spinulosum, *Clarke.* 2000-4000′, Wray 2953, Curt., Ridl. 2926, Anders. 123, B. & H. 13010; flr. March, May. A herb, endemic, 4f, 5g, 5h, 6j, 9k, 9l.

Argostemma unifolioide, *King.* 2300-4500′, Wray 2814, Ridl. 11448, Hose 40; flr. Aug., fruit Dec. A tuberous herb, endemic, 4f.

Ophiorrhiza communis, *Ridl.* At 3000′, Wray 2059, Curt.; flr. May. A herb of Borneo; in Peninsula, Kedah to Malacca.

Ophiorrhiza discolor, *R. Br.* 100-4500′, Ridl.; flr. Feb., Aug. A herb, endemic, 2d, 6e, 5h, 6k, 7l, 9m.

Ophiorrhiza major, *Ridl.* Taiping Hills, Ridl. (not seen). A woody herb, endemic, common.

Ophiorrhiza pallidula, *Ridl.* At 300′, Wray 1984. A herb, endemic, 4e, 6e, 5g, 5h.

Ophiorrhiza tenella, *King.* At about 4500′, Ridl.; flr. March. A herb, endemic, 2c, 4e, 6g, 8g, 5h.

Hedyotis capitellata, *Wall.* 200-4000′, Ridl., Anders. 84, Hend. 10065, 10373, 10434; flr. Jan., March. A climbing shrub of Malaysia; in Peninsula common.

Hedyotis congesta, *Wall.* At 1000′, Hend. 10017, 10194; flr. June, fruit Feb. A shrubby herb of Tenasserim, Sumatra and Borneo; in Peninsula common.

Hedyotis coronata, *Wall.* At about 4500′, Ridl. A wiry herb of Burma and Siam; in Peninsula 1b, 2b, 4d, 6d, 4e.

Hedyotis hispida, *Retz.* Taiping Hills, Ridl.; flr. Feb. A herb of Indo-Malaya, China and Japan; in Peninsula 2d, 6d, 4f, 6f, 6k.

Hedyotis mollis, *Wall.* At 3800′, B. & H. 12940; flr. March. A slender climber, endemic, 2d, 6d, 5j.

Oldenlandia Heynei, *Don.* 100-300′, Ridl., Hend. 10235, 10236; flr. Nov., fruit Aug. A wiry herb of Java; in Peninsula 2d, 3f, 7l, 9m.

Lucinaea membranacea, *King.* 2000-4000′, Curt. 1337, 2016, Ridl. 5543; flr. Feb., May, June, Sept. An epiphytic climber of Borneo; in Peninsula 4f, 5g, 7l, 9m.

Lucinaea morinda, *DC.* 100-4500′, Kunstl. 5498, 8482, Curt.; flr. Jan., Feb., Sept. A sprawler of W. Malaysia; in Peninsula 4f, 5h, 8h, 6k, 9l, 9m.

Lucinaea Ridleyi, *King.* 1500-3600′, Kunstl. 2162, Ridl. 2923, 11441, B. & H. 12942, 13203; flr. March, Aug. fruit Dec. An epiphytic climber of Borneo; in Peninsula 4f, 5g.

Mussaenda glabra, *Vahl.* 4000-4400′, Anders. 59, B. & H. 12623; flr. March. A bush or climber of Indo-Malaya; in Peninsula, Taiping to Singapore.

Mussaenda mutabilis, *Hemsl.* 200-2000′, Wray 91, 1846, Curt. 2023, Ridl. 14332; flr. July, Sept. A sprawler, endemic, Taiping to S. Johore.

Mussaenda oblonga, *King.* Larut, Kunstl., fide Ridl. A shrub of Tavoy; in Peninsula 4d, 4e, 4f, 6f, 5g, 6k.

Mussaenda villosa, *Wall.* At 2000′, Curt. 2024; fruit Sept. A shrub of Siam and Borneo; in Peninsula 1b, 2b, 6c, 2d, 6d, 4e, 5g, 7k.

Mussaenda Wrayi, *King.* 100-1000′, Wray 2583, Kunstl. 1960, Hend. 10025, 10182; flr. Jan., June, fruit June. A scandent shrub, endemic, 2d, 5g, 5h.

Mycetia flava, *Ridl.* At 2000′, Curt. 2021; flr. Sept. A small shrub, endemic, 4f.

Aulacodiscus premnoides, *Hook. fil.* 500-800′, Wray 2562, 2665, Kunstl. 2392; flr. July, Sept. A tree up to 40′, endemic, 2d, 4f, 5g, 5h, 5j, 8j, 9l, 9m.

Urophyllum ferrugineum, *King and Gamble.* 2000-4000′, Curt. 2017, 3716, Ridl. 2930, 11443, B. & H. 12711, 13209; flr. March, May, Dec., fruit Feb.-May, Sept. A shrub, endemic, 2c, 4e, 4f, 9k.

Urophyllum glabrum, *Wall.* 300-2500′, Wray 1825, 2079, 2592, 2940, Ridl., Anders. 151; flr. March, fruit Feb., March. A shrub of W. Malaysia and the Philippines; in Peninsula common.

Urophyllum Griffithianum, *Hook. fil.* Taiping Hills, Wray, fide Ridl. A large shrub or small tree of Sumatra and Java; in Peninsula common.

Urophyllum hirsutum, *Hook. fil.* 300-3000′, Kunstl. 3236, H. & N. 2496; flr. Feb., Aug. A shrub or small tree, endemic and common.

Urophyllum macrophyllum, *Korth.* At 700′, Hend. 10425; flr. Oct. A shrub or small tree of Tenasserim, Java and Borneo; in Peninsula 2d, 4d, 6e, 3f, 5g, 5h, 9m.

Urophyllum streptopodium, *Wall.* At 600′, Hend. 10481; flr. Feb. A shrub of Borneo; in Peninsula common.

Urophyllum villosum, *Wall.* 300-1000, Wray 2634, Kunstl. 2563, Ridl., Hend. 10032, 10091, 10181, 10476; flr. June, Nov., fruit Jan., Feb., Dec. A shrub, endemic, 2d, 4e, 3f, 4f, 6g, 8j, 9m.

Brachytome Scortechinii, *King and Gamble.* 3500-4500′, Wray 2999, Curt., H. & N. 2328, B. & H. 13014; flr. Feb., fruit March, Sept. A shrub, endemic, 2c, 4f, 5g.

Randia auriculata, *Schum.* 300-3200′, Kunstl. 2514, 6467, Curt. 2020, B. & H. 12782; flr. Sept., Nov., fruit March, Aug. A woody climber of W. Malaysia to the Philippines; in Peninsula 2d, 4e, 4f, 6j, 8l, 9m.

Randia Curtisii, *King and Gamble.* 100-300′, Kunstl. 3305, 6814; flr. Sept., fruit Nov. A spiny climber, endemic, 2d.

Randia densiflora, *Benth.* 300-1500′, Wray 1851, Kunstl. 2752, 3893, 4222; flr. Jan., Feb. A shrub or tree of Indo-Australia, China and Japan; in Peninsula common.

Randia impressinervia, *King and Gamble.* At 200′, Wray 2158; flr. June. A climber of Borneo; in Peninsula 4f.

Randia longiflora, *Lam.* 300-800′, Kunstl. 5231; flr. Dec. A thorny climber of Indo-Malaya and China; in Peninsula common, usually in tidal rivers.

Randia macrophylla, *Hook. fil.* At 3000′, Wray 3232. A shrub of Sumatra; in Peninsula common.

Randia oocarpa, *Ridl.* At Taiping, Scort., fide Ridl. A thorny bush, endemic, 1b, 2b, 8h.

Randia Scortechinii, *King and Gamble.* 500-1000′, Wray 3212, Kunstl. 3453; flr. Oct. A bushy tree of Borneo; in Peninsula 2d, 4f, 5h, 6j.

Randia stenopetala, *Ridl.* 1000-3000′, Curt. 1306, 3144; flr. Dec. A shrub, endemic, 4e, 4f.

Gardenia virescens, *Ridl.* 3800-4000′, Ridl., B. & H. 13182; flr. March. A creeping shrublet, endemic and local.

Petunga Roxburghii, *DC.* At 4000′, Anders. 83; flr. March. A bush or tree of Indo-Malaysia; in Peninsula, Kedah to Johore.

Petunga venulosa, *Hook. fil.* Taiping Hills, Wray, fide Ridl. A tree up to 60′ of Borneo; in Peninsula 2d, 3f, 4f, 6k.

Diplospora Kunstleri, *King and Gamble.* 2000-3700, Kunstl. 3211, B. & H. 12717, 12774; flr. March, Aug., fruit March. A small tree, endemic, 7k.

Diplospora malaccensis, *Hook. fil.* At 3700′, Anders., B. & H. 12977; fruit March. A small bushy tree of Sumatra and Borneo; in Peninsula common.

Diplospora Wrayi, *King and Gamble.* 2000-4000′, Wray, Kunstl. 5277, 6253, Curt. 1304, Ridl. 5544; flr. June, fruit Feb., Dec. A shrub, endemic, 4d, 5h.

Jackia ornata, *Wall.* At 100′, Kunstl. 5294, 8466; flr. Dec., fruit Feb. A small tree of Sumatra and Borneo; in Peninsula 3f, 4h, 6k, 9m.

Ixora arguta, *R. Br.* 200-2000′, Wray 2135, Curt. 1303, Ridl.; flr. Dec., fruit June. A bush of Burma to Lower Siam; in Peninsula common.

Ixora concinna, *Br.* At 4700′, B. & H. 12629; flr. March. A tree of St. Barbe Isle; in Peninsula Taiping to Singapore.

Ixora congesta, *Roxb.* 700-1000′, Hend. 10116, 10202, 10203; flr. Jan., June. A small shrub of Tenasserim; in Peninsula common.

Ixora grandifolia, *Zoll. and Mor.* 100-4500′, Kunstl. 5609, H. & N. 2455; flr. and fruit Feb. A shrub or tree of W. Malaysia; in Peninsula common.

Ixora Kingstoni, *Hook. fil.* At Changkat Serdang, Wray. A large bush, endemic, Taiping to Johore.

Ixora Lobbii, *Loud.* 1000-4400′, Wray 519 (var. angustifolia), Fox 158, Derry. Anders. 152, Ridl., B. & H. 12713; flr. March, June, Oct. A shrub or small tree of Siam; in Peninsula the species common, the var. at 6d, 5h.

Ixora pendula, *Jack*, var. opaca, *Ridl.* 100-3000′, Kunstl. 4061, 4118, Curt. 2022, Ridl., Anders. 155, Hend. 10119, B. & H. 12698; flr. Jan.-April, Sept., fruit March. A shrub, the species in Sumatra; in Peninsula the species and var. common.

Ixora stricta, *Roxb.* 2100-4500′, Kunstl. 2247, Anders. 31; flr. March, Aug., fruit Aug. A shrub of Indo-Malaya and China; in Peninsula common.

Pavetta graciliflora, *Wall.* Taiping Hill, Anders. 154; flr. March. A shrub of Lower Siam; in Peninsula common from Malacca northwards.

Pavetta indica, *Linn.*, var. canescens, *Ridl.* 4000-4700′, Ridl., Anders. 153, B. & H. 12591, 12666, 12857; flr. Feb., March, fruit March. A large bush, the species in Indo-Australia and S. China; in Peninsula the var. common, the species at 2b.

Tarenna grandifolia, *Ridl.* At Maxwell's Hill, Derry. A small shrub, endemic and common.

Tarenna longifolia, *Ridl.* 100-2500′, Ridl. 2920, 14315; flr. Aug. A small shrub, endemic, 1a, 1b, 2d, 6j, 6k, 8k.

Tarenna Ridleyi, *Pearson.* Taiping Hill, Anders. 105; flr. March. A small shrub, endemic, 4f, 8g, 6k, 7l, 9m.

Tarenna Wallichii, *Ridl.* 100-500′, Kunstl. 2516, 2794; flr. Feb., Nov. A shrub of Borneo; in Peninsula 2b, 2d, 8g, 6k.

Stylocoryna costata, *Miq.* At 3200′, B. & H. 12786; fruit March. A tree of Sumatra; in Peninsula 5h, 6j, 6k.

Gardeniopsis longifolia, *Miq.* 2500-3500′, Wray 2832, Kunstl. 2361, 2850, Ridl. 5343; flr. June, Sept., fruit March. A shrub of Sumatra; in Peninsula common.

Timonius Wallichianus, *Valeton.* 300-1000′, Kunstl. 5464, 6300; fruit Jan. A small tree, endemic and common on the West.

Timonius Wrayi, *King and Gamble.* 500-1500′, Wray 3200, Kunstl. 5168, 5781, 6781; flr. Oct., fruit Nov. A tree up to 50′, endemic, 2d, 3f, 9k, 9m.

Prismatomeris malayana, *Ridl.* 2500-3000′, Wray 2948, Kunstl. 6344; flr. July, fruit Aug. A shrub or small tree of Indo-China and W. Malaysia; in Peninsula common.

Morinda elliptica, *Ridl.* At 4000′, Curt. 2016; flr. Sept. A small tree, endemic, very common. Hitherto confused with M. citrifolia, (Ridley).

Rennellia paniculata, *King and Gamble.* 3000-3500′, Kunstl. 5432, Anders. 118, H. & N. 2354; flr. Jan., fruit Jan.-March. A shrub or small tree, endemic, 2d, 6d, 4f, 5h.

Rennellia speciosa, *Hook. fil.,* var. elongata, *King and Gamble.* 1000-1500′, Kunstl. 3926, Curt.; flr. & fruit Feb. & Dec. A shrub, the species in Indo-Malaya; in Peninsula common.

Coelospermum scandens, *Bl.* 800-1000′. Kunstl. 7248; fruit Feb. A slender climber of Malaysia; in Peninsula 6k, 9m.

Coelospermum truncatum, *King and Gamble.* At 100′, Kunstl. 5508; fruit Feb. A shrubby climber of Tenasserim, Sumatra and Java; in Peninsula 2d, 6k, 9m.

Canthium horridum, *Bl.* 300-500′, Kunstl. 6234; flr. June. A spiny shrub of Indo-Malaya and the Philippines; in Peninsula common.

Psychotria angulata, *Korth.* Taiping Hill, Anders. 106; flr. March. A shrub of Burma, Bangka and Borneo; in Peninsula common.

Psychotria Birchiana, *King and Gamble.* 300-4700′, all collectors; flr. Feb., March, May, Aug., fruit Feb., March, Oct. A small shrub of Lower Siam; in Peninsula 4e, 6f, 5g, 5h.

Psychotria calocarpa, *Kurz.* At Maxwell's Hill, Ridl.; fruit Feb. A small shrub of India and Burma; in Peninsula 6d, 3f, 5h, 0j, 6k, 7k, 71.

Psychotria montana, *Bl.* At Maxwell's Hill, Ridl. 2922; fruit March. A shrub of Burma, Sumatra and Java; in Peninsula 4d, 6d, 6e, 5g, 5h, 0j, 7k.

Psychotria morindaeflora, *Wall.* At Maxwell's Hill, Curt. 2019; flr. Sept. A woody climber, endemic, 2d.

Psychotria ovoidea, *Wall.* 2000-3000′, Ridl. 5545, B. & H. 13220; fruit March, June. A slender climber, endemic, 8g, 7j, 6k, 9k, 9l, 9m.

Psychotria penangensis, *Hook. fil.* Taiping Hills, Ridl.; flr. Dec., fruit March. A climber, endemic, common.

Psychotria rhinocerotis, *Reinw.* At Waterloo, 1500′, Curt. 2695; fruit May. A small shrub of Java; in Peninsula 1b, 2b.

Psychotria rostrata, *Bl.* 300-500′, Scort. 1482, Kunstl. 2190; flr. Aug. A shrub of W. Malaysia; in Peninsula common.

Psychotria sarmentosa, *Bl.* Taiping Hills, Ridl. 11442; flr. Dec. A climber of Indo-Malaya; in Peninsula common.

Psychotria Scortechinii, *King and Gamble.* 3000-4200′, Fox 161, Ridl., H. & N. 2745; flr. Feb., Oct., fruit Feb. A climber, endemic and local.

Psychotria stipulacea, *Wall.* At Maxwell's Hill, Ridl. 2918, Anders. 101; flr. March. A shrub of Sumatra; in Peninsula common.

Psychotria viridiflora, *Reinw.* At 3900′, Ridl. 2919, B. & H. 12950; flr. and fruit March. A large bush or small tree of Indo-Malaya; in Peninsula common.

Chasalia curviflora, *Thw.* 500-3800′, Ridl. (var. longiflora), Hend. 10011, 10026, B. & H.; flr. Jan., Feb., March. A shrub of Indo--Malaya and the Philippines; in Peninsula common.

Cephaelis cuneata, *Hook. fil.* At 2000′, Ridl.; fruit Dec. A small shrub, endemic, common.

Cephaelis Ridleyi, *King.* 300-2500′, Curt., Ridl. 11440; flr. June, fruit May, Oct., Dec. A shrub, endemic, 5g.

Lasianthus appressus, *Hook. fil.* 600-3000′, Ridl., Hend. 10103, B. & H. 12699; fruit Jan.-March. A shrub of Borneo; in Peninsula common.

Lasianthus attenuatus, *Jack.* Taiping Hills, Ridl.; fruit Dec. A shrub of Lingga; in Peninsula, Taiping to Singapore.

Lasianthus constrictus, *Wight.* 300-500′, Kunstl. 2780; fruit Feb. A shrub of Burma, Java, and Borneo; in Peninsula common.

Lasianthus cyanocarpus, *Jack.* At 2500′, Wray 2819. A shrub of Indo-Malaya to the Philippines; in Peninsula common.

Lasianthus ?glaberrimus, *Ridl.* At 3800′, B. & H. 12645; fruit March. (Determination doubtful). A foetid shrub, endemic, 2d, 5g, 6k.

Lasianthus gracilis, *King and Gamble.* At 2000′, Ridl. 2904; fruit March. A bushy shrub of Java; in Peninsula 4f.

Lasianthus Griffithii, *Wight.* At 2000′, Ridl.; fruit Feb. A shrub of Lingga and Borneo; in Peninsula from Taiping to Singapore.

Lasianthus inaequalis, *Bl.* At 800′, Wray 2588; flr. July. A shrub of W. Malaysia and the Philippines; in Peninsula 2d.

Lasianthus Lowianus, *King and Gamble.* 2000-3000′, Kunstl. 2797, Ridl.; flr. Feb., fruit Dec. A foetid shrub, endemic, 2b, 4f, 5g, 5h.

Lasianthus Maingayi, *Hook. fil.* At Taiping, Ridl. 14338; fruit Aug. A shrub of Sumatra and Borneo; in Peninsula common.

Lasianthus montanus, *King and Gamble.* 3000-3500′, Kunstl., fide Ridl. A bushy shrub, endemic, 6e.

Lasianthus oblongus, *King and Gamble.* 500-4000′, Wray 2590, Kunstl. 4128, Curt. 2018, Ridl. 11438, Hend. 10200; flr. April, June, July, Sept., fruit June, Dec. A foetid shrub, endemic, common.

Lasianthus pilosus, *Wight.* At Waterloo, Curt.; flr. May. A shrub of ?Burma; in Peninsula 6d, 6f, 7f, 6k, 8k.

Lasianthus rhinocerotis, *Bl.* 4000-4700′, Anders. 64, B. & H. 12660, 12878; flr. Feb., March. A shrub or small tree of Java and Borneo; in Peninsula 4e, 4f, 5g, 6g, 5h, 8l.

Lasianthus stipularis, *Bl.* At Taiping, Scort. 213; fruit March. A slender shrub of Malaysia; in Peninsula 4d, 6d, 6g, 5h, 9l, 9m.

Saprosma Scortechinii, *King and Gamble.* 2500-3000′, Kunstl., fide Ridl. A shrub, endemic, 6d, 4f.

Saprosma ternatum, *Hook. fil.* 300-500′, Wray 2262, Kunstl. 4006, Curt. 2088; flr. March, Sept. A shrub of Indo-Malaya; in Peninsula 6d, 6e, 7f, 6g, 5h, 6k, 7k.

Amaracarpus caudatus, *Ridl.* At about 4000′, Wray, fide Ridl. A small foetid tree, endemic and local.

Paederia foetida, *Linn.* At 100′, Kunstl. 7650; flr. May. A climber of Indo-Malaya and China; in Peninsula 1b, 2b, 2d, 6e, 4f, 8h, 6k, 8k, 9m.

Paederia verticillata, *Bl.* 100-500′, Kunstl. 5316, Hend. 10145; flr. Feb., Dec. A climbing shrub of W. Malaysia to the Philippines; in Peninsula common.

Borreria hispida, *Schum.* At Taiping, Hend. 10234; flr. Nov. A rough wiry herb of Indo-Malaya and China; in Peninsula common.

Spermacoce ocymoides, *Burm.* At Maxwell's Hill, B. & H. A pantropic weed, common in the Peninsula.

Cinchona succi-rubra, *Par.* At 3600′, B. & H. 12644; flr. and fruit March. Cultivated. A native of S. America.

COMPOSITAE.

Elephantopus scaber, *Linn.* At Taiping, Hend. 10247; fruit Jan. A rough herb, pantropic; in Peninsula common.

Mikania scandens, *Willd.* Roadsides, Taiping, Hend. 10018; flr. Jan. A shrub or climber, pantropic; in Peninsula common.

Ageratum conyzoides, *Linn.* 2000-3800′, Hend. 10132, B. & H. 12553; flr. Jan., March. A herb, pantropic; in Peninsula very common.

Bidens pilosa, *Linn.* Maxwell's Hill clearing, B. & H. A pantropic herb; in Peninsula common.

Synedrella nodiflora, *Gaertn.* At 300′, Hend. 10308; flr. Aug. A herb, pantropic; in Peninsula common.

Vernonia cinerea, *Less.* 200-4000′, Hend. 10000, B. & H.; flr. and fruit all the year. A pantropic herb; in Peninsula very common.

Emilia sonchifolia, *King and Gamble.* 200-4750′, Hend. 10213, B. & H.; flr. Sept. A herb, pantropic; in Peninsula common.

Erechthites valerianifolia, *DC.* At 4750′, B. & H. 12889; flr. and fruit Feb. A herb, pantropic; in Peninsula common.

Blumea balsamifera, *DC.* At 200′, Hend. 10146; flr. Feb. Ngai camphor. A shrub of Indo-Malaya; in Peninsula common.

Blumea chinensis, *DC.* At about 3700′, Ridl., B. & H. 12775; fruit Feb., March. A climber of Indo-Malaya; in Peninsula common.

Blumea densiflora, *DC.* 3700-4000′, Hervey, Ridl., B. & H. 12777; flr. Feb., March. A shrub of Himalaya, Burma and Java; in Peninsula 3e only? Apparently rare.

Blumea lacera, *DC.* At Taiping, Hend. 10163; fruit April. A herb of Trop. Africa and Asia; in Peninsula common.

Blumea membranacea, *DC.* Larut Hills, Ridl. A herb of Indo-Malaya; in Peninsula common, especially in the North.

Dicrocephala latifolia, *DC.* At Taiping, Ridl. (not seen). A herb of Trop. Africa and Asia; in Peninsula 3e only.

Crepis japonica, *Benth.* At 3700′, B. & H. 12648; fruit March. A herb of the Tropics of the Old World; in Peninsula 2b, 2d, 4e, 6k, 7l, 8l.

Galinsoga parviflora, *Cav.* 100-3700′, Ridl. 11938, B. & H. 12911; flr. Feb. A herb, introduced from Trop. America. Also in Java.

Tithonia diversifolia, *Gray.* Running wild on edge of Maxwell's Hill clearing, B. & H. An American herb.

LOBELIACEAE.

Lobelia affinis, *Wall.* 300-4000′, Kunstl. 2376, Curt. 2025, Anders. 85; flr. Sept., fruit March, Sept. A creeping herb of Indo-Malaya and China; in Peninsula common.

Isotoma longiflora, *Presl.* 200-2000′, Hend. 10121, 10378; flr. and fruit Jan. A herb of the W. Indies; in Peninsula an escape from cultivation.

CAMPANULACEAE.

Campanumaea celebica, *Bl.* At 4000′, Curt. 2089; fruit Sept. A herb of Indo-Malaya; in Peninsula 5g.

Pentaphragma Scortechinii, *King and Gamble.* 2000-4000′, Kunstl. 2653, Ridl. 2896, Hend. 10128; flr. Jan. An erect herb, endemic, common.

VACCINIACEAE.

Agapetes perakensis, *Ridl.* 3000-4000′, Kunstl. 6363, Fox 165, Ridl. 5532, H. & N. 2479, B. & H. 12682; flr. Feb., June, fruit March, July. An epiphytic climber, endemic, 4f, 5g.

Vaccinium acuminatissimum, *Miq.* 300-1500′, Kunstl., fide Ridl. A small epiphytic shrub of W. Malaysia; in Peninsula 4f, 9m.

Vaccinium bancanum, *King.* 3500-4750′, Kunstl. 7018, 8415, Anders. 49, B. & H. 12573, 12620; flr. Jan., March, fruit March, Dec. A shrub of W. Malaysia; in Peninsula 6e, 5g, 5h, 7k.

Vaccinium Hasseltii, *Miq.* At 3500′, H. & N. 2360; flr. Feb. A large epiphytic shrub of Sumatra and Java; in Peninsula 2c, 6g, 5h, 8h, 9m.

Vaccinium perakense, *Ridl.* 3000-4000′, Curt. 3703, Ridl.; flr. March. A shrub or small tree, endemic, 6e, 6g, 9k.

ERICACEAE.

Diplycosia microphylla, *Becc.* 4500-4750′, Curt., B. & H.; flr. Sept. An epiphytic shrub of Borneo; in Peninsula, Kedah Peak to Mt. Ophir.

Rhododendron jasminiflorum, *Hook.*, var. maculata. 4000-4200′, Curt., Fox 124, Derry, B. & H. 12621; flr. Oct., fruit March, Oct. An epiphytic shrub of W. Malaysia; in Peninsula the species at 2c, 7k, 9k, the var. at 6e, 4f, 5g, 9k.

Rhododendron javanicum, *Benn.* 2500-4570′, all collectors; flr. March, Sept., Oct., Dec., fruit March, Dec. An epiphytic shrub of W. Malaysia except Borneo; in Peninsula 2c, 2d, 5g, 5h.

Rhododendron longiflorum, *Lindl.* 500-2500′, Kunstl. 5181, B. & H. 13205; flr. March, Nov. An epiphytic or terrestrial shrub of Sumatra and Borneo; in Peninsula 2c, 6e, 4f, 5h, 6j, 9m.

Rhododendron malayanum, *Jack.* 4000-4750′, Wray 614, Curt. 2029, Ridl., H. & N. 2319, Anders. 39, Derry, B. & H.; flr. Feb., March, Sept., Oct. A small epiphyte of W. Malaysia; in Peninsula 4e, 6e, 4f, 5g, 5h, 7k.

MYRSINACEAE.

Maesa indica, *Wall.* 2000-3000′, Scort. 365, Ridl. 3007; flr. April. A shrub or small tree of Indo-Malaya; in Peninsula 5g.

Maesa macrothyrsa, *Miq.* At Taiping, Hend. 10243; flr. Nov. A climber of Sumatra and Borneo; in Peninsula 3e only.

Maesa ramentacea, *Wall.* 200-300′, Kunstl. 2788, 4144; flr. Feb., fruit April. A climber or tree of Indo-Malaya; in Peninsula common.

Myrsine Porteriana, *Wall.* At about 4000′, Ridl. 2992, B. & H. 12760; flr. March, fruit Feb. A shrub or small tree of Sumatra; in Peninsula 2d, 8g, 5h, 7k, 9k, 9l.

Embelia amentacea, *Clarke.* 800-1000′, Kunstl. 6280; flr. and fruit July. A slender climber of Borneo; in Peninsula 3f, 5g, 5h, 6k, 9m.

Embelia coriacea, *Wall.* 100-4700′, all collectors; flr. Oct., Nov., fruit Feb., Aug., Sept., Nov. A liane of W. Malaysia and the Philippines; in Peninsula common.

Embelia dasythyrsa, *Miq.* At 300′, Kunstl. 4103: fruit April. A slender climber of Bangka and Borneo; in Peninsula 4f, 5h, 6k.

Embelia Lampani, *Scheff.* 500--1000′, Kunstl. 4210; flr. May. A slender climber of Sumatra; in Peninsula 2d, 5h, 6k, 9m.

Embelia parviflora, *Wall.* 3800-4000′, B. & H. 12939; fruit March. A slender climber of Burma and Sumatra; in Peninsula 3e only.

Labisia pothoina, *Lindl.* 2500-4700′, Wray 753, B. & H.; flr. and fruit March. A herbaceous undershrub of W. Malaysia; in Peninsula common.

Ardisia andamanica, *Kurz.* At Maxwell's Hill, Wray 108. A tall shrub of Tenasserim; in Peninsula 4f, 5g, 5h, 7k, 8l.

Ardisia colorata, *Roxb.* 100-3800′, Scort. 1505, Kunstl. 3284, 3567, Curt., Anders. 149, H. & N. 2332, B. & H. 12683, 13191; flr .Feb., March, Nov., fruit March, May, Aug. A shrub or small tree of Indo-Malaya; in Peninsula common.

var. polyneura, *Clarke.* 2000-2500′, Wray 2810, Ridl. 3000, 5508; fruit Feb., June, Aug. Distrib: Lower Siam; in Peninsula 4f, 5h, 6k, 9m.

var. salicifolia, *King and Gamble.* 1800-3000′, Wray 2960, Kunstl. 3216, 6816, Ridl.; flr. Aug., Nov., fruit Aug., Dec. Distrib: Lower Siam; in Peninsula 2d, 5g, 6k.

Ardisia crenata, *Roxb.* At 2000′, Ridl. 2899. A bush of Indo-Malaya, China and Japan; in Peninsula common.

Ardisia Kunstleri, *King and Gamble.* 300-800′, Kunstl. 4071, 4100; flr. March, fruit April. A shrub up to 20′, endemic, 4f.

Ardisia lanceolata, *Roxb.* 300-2000′, Kunstl. 2954, Curt.; flr. April, May. A tree about 40′, of W. Malaysia and the Philippines; in Peninsula common.

Ardisia oxyphylla, *Wall.* At 2000′, Curt.; flr. May. A shrub of Tenasserim, Lower Siam and Borneo; in Peninsula 1a, 2d, 4d, 3f, 6j, 6k.

Ardisia porosa, *Clarke.* 200-4500′, Wray 2160, 2835, Scort. 116a, Ridl. 14262, Hend. 10454; flr. Feb., June, Aug., Dec. A shrub, endemic, 2d, 6j, 6k.

Ardisia Ridleyi, *King and Gamble.* 2500-4000′, Ridl. (not seen). A shrub of Sumatra; in Peninsula 1b, 6e, 5g, 7k, 9l, 9m.

Ardisia rosea, *King and Gamble.* 2500-4300′, Kunstl. 6247, Ridl. 5511, Anders. 71, B. & H. 12598, 13027; flr. and fruit March and June. A shrub or small tree, endemic, 6e, 4f, 5g.

Ardisia solanacea, *Roxb.* At about 2500′, Wray 3000; flr. Sept. A shrub or tree of India and Burma; in Peninsula 4f, 5h.

Ardisia villosa, *Roxb.* 500-2000′, Wray 2801 (var. glabrata), 3149, Kunstl. 6448, Ridl.; flr. Aug., fruit Aug., Sept. A small shrub of Indo-Malaya; in Peninsula common.

Ardisia virens, *Kurz.* 3800-4000′, Ridl., B. & H. 12969; flr. and fruit March. A big shrub of Indo-China and Borneo; in Peninsula 4f.

Ardisia Wrayi, *King and Gamble.* At 300′, Wray 3280; fruit Oct. A small shrub, endemic and local.

Antistrophe caudata, *King and Gamble.* At 2000′, Ridl.; fruit Feb. A shrub or small tree, endemic, 4f, 5h, 6j.

Antistrophe Curtisii, *King and Gamble.* At 4000′, Curt. 3390; flr. June. A shrub, endemic, 4e.

SAPOTACEAE.

Sideroxylon malaccense, *Clarke.* 300-1000′, Wray 136, Kunstl. 6550; flr. Sept. A tree up to 60′, endemic, 2d, 5h, 6k, 9m.

Payena dasyphylla, *Pierre.* At 3500′, Kunstl., fide Ridl. A tree up to 100′, of Sumatra and Java; in Peninsula 3e only, except a var. in Perak and Singapore.

Payena Leerii, *Kurz.* At Taiping, Barnard, C.F.946. A tree up to 100′, of W. Malaysia and the Philippines; in Peninsula 4f.

Bassia Braceana, *King and Gamble.* 100-500′, Kunstl. 3195, 3740, 6447; flr. Aug., fruit Jan. A tree up to 70′, endemic, 2d, 4f.

Bassia Curtisii, *King and Gamble.* Waterfall Hill, Wray 512. A tree up to 80′, endemic 2d.

Bassia Kunstleri, *King and Gamble.* 500-2000′, Wray 2463, Kunstl. 6410, Ridl. 5536, Derry; flr. Aug., fruit June, Oct. A tree up to 60′, endemic and local.

Bassia laurifolia, *King and Gamble.* At 300′, Kunstl. 3720; fruit Jan. A tree up to 60′, endemic, 2c, 2d, 3d, 5h.

Bassia longistyla, *King and Gamble.* At 300′, Kunstl. 2680; flr. Jan. A tree up to 100′, endemic and local.

Bassia Motleyana, *Clarke.* 100-1000′, Wray, Kunstl. 5454 (var. Scortechinii); flr. Jan. A tree about 80′, of Borneo; in Peninsula 5j, 6k, 9l, 9m.

Bassia perakensis, *King and Gamble.* At 2000′. Derry (Curt. 3695); fruit Sept. A tree up to 80′, endemic and local.

Palaquium bancanum, *Burck.* 300-500′. Kunstl. 6506: flr. Aug. A tree up to 150′, endemic, 2d, 9m.

Palaquium Clarkeanum, *King and Gamble.* At 600′. Wray 530. A tree up to 100′, endemic, 1b, 5h, 6k.

Palaquium Gutta, *Burck.* 100-2800′. Curt. 3637, 3725, Stephens, B. & H.: fruit Aug. The Gutta Percha tree. A tree up to 100′, of W. Malaysia: in Peninsula common.

Palaquium Maingayi, *King and Gamble.* At Changkat Serdang, Wray. A tree up to 60′, endemic, 5h, 6j, 6k.

Palaquium Oxleyanum, *Pierre.* 300-3000′. Wray 518 (var. glabrata), 590, Curt. 3638, 3724, Derry. A lofty tree, the var. only in Lower Siam; in Peninsula 6f, 5h, 9m.

Palaquium xanthochymum, *Pierre.* Larut, Kunstl., fide Ridl. A tree up to 120′, of Bangka and Borneo; in Peninsula 6k, 9m.

EBENACEAE.

Diospyros apiculata, *Hiern.* 500-800′. Kunstl. 5127, 6770: flr. Oct., Nov. A shrub, endemic, 2d.

Diospyros argentea, *Griff.* 3000-4000′. Kunstl. 6896, Ridl.: flr. Nov. A shrub, endemic, 6e, 3f, 4f, 5h, 6k, 9m.

Diospyros bilocularis, *Oliv.* 1500-2000′. Kunstl. 7383: fruit March. A tree about 80′, endemic, 6k, 9m.

Diospyros ellipsoidea, *King and Gamble.* 500-1000′. Kunstl. 7269: flr. and fruit Feb. A shrub or tree, endemic, 4f.

Diospyros flavicans, *Hiern.* 300-1500′. Kunstl. 3072, 3380, 3774, 6633: flr. Sept., fruit Jan., June. A shrub or tree, endemic, 1a, 2d, 4f, 5g, 6k.

Diospyros graciliflora, *Hiern.* 300-2500′. Wray 3214, Kunstl. 5173, 6742; flr. Oct., fruit Sept. A tree up to 50′, of Java and Borneo; in Peninsula 2c, 2d, 4f.

Diospyros nutans, *King and Gamble.* Larut Hills, Kunstl., fide Ridl. A shrub up to 15′, endemic, 4f, 9l.

Diospyros oblonga, *Wall.* 1000-2000′. Kunstl. 4924: fruit Oct. A tree up to 70′, endemic, 2d, 3f, 6k, 9m.

Diospyros rigida, *Hiern.* 100-2500′. Wray, Kunstl. 4204: fruit March. A tree up to 40′, endemic, 4d, 4f.

Diospyros rufa, *King and Gamble.* 300-3500′. Kunstl. 3330, 5409, 6712; fruit Jan., Sept., Oct. A tree up to 80′, endemic, 6k.

Diospyros Scortechinii, *King and Gamble.* 2000-4000′, Wray 638, Kunstl. 4126, 5296, 6356, Curt. 2092, Ridl.: flr. April, July, fruit Sept., Dec. A tree up to 50′, endemic, 2d, 4f, 5g, 5h.

Diospyros subrhomboidea, *King and Gamble.* 1000-1500′, Kunstl., fide Ridl. A shrub, endemic, 5g, 5h.

Diospyros toposioides, *King and Gamble.* 1000-1500′, Kunstl. 4106; fruit April. A tree up to 40′, endemic, 3f, 4f, 5h.

Diospyros tristis, *King and Gamble.* Larut, Kunstl., fide Ridl. A tree up to 50′, endemic and local.

Diospyros Wallichii, *King and Gamble.* 200-500′, Wray 2535. Kunstl. 2966, 6779; flr. April, Oct., fruit July. A tree up to 60′, of Lower Siam; in Peninsula 1b, 2d, 4f, 5h, 6k.

STYRACACEAE.

Styrax benzoin, *Dryand.* At 2500′, B. & H. 12828; fruit March. A tree up to 80′, of Sumatra and Java; in Peninsula 4f, 5h, 6j, 6k, 9m.

Symplocos adenophylla, *Wall.* 3500-4000′, Kunstl. 6873; flr. Nov. A shrub or small tree of Sumatra, Borneo and Philippines; in Peninsula 2c, 2d, 6e, 5g, 6k, 9k, 9m.

Symplocos Brandiana, *King and Gamble.* 3000-4000′, Scort. 346, Curt. 2030; flr. March, Sept. A small tree, endemic and local.

Symplocos calycodactylos, *Brand.* At Waterloo, 3000′, Curt. 1330; flr. Dec. A shrub?, endemic and local.

Symplocos cerasifolia, *Wall.* 2500-3500′, Wray 3003, H. & N. 2326; fruit Feb., Sept. A tree up to 80′, endemic, 2d, 6k.

Symplocos Curtisii, *Oliv.* 1800-4500′, Wray 692, 2830, Kunstl. 2099, 2804, Curt., Ridl. 5524, H. & N. 2453; flr. Feb., May, July, fruit June-Aug. A shrub or small tree, endemic, 2d, 4f.

Symplocos fasciculata, *Zoll.* 100-800′, Wray 1865, Scort. 1527, Kunstl. 2021, 5337; flr. May, July, Nov., Dec. A tree up to 50′, of W. Malaysia; in Peninsula 4e, 5h, 6j, 6k, 9m.

Symplocos ferruginea, *Roxb.* Larut Hills, Kunstl., fide Ridl. A tree up to 60′, of Indo-Malaya; in Peninsula 2d, 4f, 5g, 8h, 6k.

Symplocos perakensis, *King and Gamble.* At about 2500′, Wray 2944, 2953; flr. July, Aug. A tree up to 60′, endemic, 4f, 7g, 5h.

Symplocos rigida, *Clarke.* 500-3000′, Wray 3207, Kunstl. 5045, Curt. 3726, H. & N. 2386; flr. Oct., fruit Feb., Sept., Oct., Dec. A tree up to 80′, endemic, 4f, 5g, 6k, 9m.

Symplocos spicata, *Roxb.* 2500-4400′, Wray 2798 Kunstl. 6299, B. & H. 12951; flr. July, fruit March, Aug. A tree up to 20′, of Indo-Malaya and China; in Peninsula 5h, 8h, 6k.

Cordyloblaste Maingayi, *Ridl.* 300-800′, Kunstl., fide Ridl. A tree up to 60′, endemic, 6k.

OLEACEAE.

Jasminum bifarium, *Wall.* At Taiping, Hend. 10216, 10281; flr. Jan., Nov. A sprawler of W. Malaysia and the Philippines; in Peninsula common.

Jasminum insigne, *Bl.* At Tupai, Wray 2840; flr. Aug. A liane of Sumatra; in Peninsula 6e, 4f.

Jasminum Maingayi, *Clarke.* 500-3000′, all collectors; flr. Feb., March, fruit Dec. A climber, endemic, 2b, 2d, 4f, 5h, 7l.

Jasminum Scortechinii, *King and Gamble.* 2000-4500′, all collectors; flr. Feb.-April, Sept.-Dec., fruit Feb. A climber, endemic, 2d, 5g.

Jasminum Wrayi, *King and Gamble.* 300-1000′, Wray 3147, Ridl.; flr. Sept. A slender climber, endemic, 5h.

Osmanthus Scortechinii, *King and Gamble.* 100-4500′, Wray, Kunstl., fide Ridl. A tree up to 50′, endemic, 5h.

Linociera paludosa, *King and Gamble.* At 100′, Kunstl. 6476; flr. Aug. A tree up to 80′, of Borneo and the Philippines; in Peninsula 3e only.

Myxopyrum nervosum, *Bl.* 100-300′, Wray 2534, 4179, Scort. 532; flr. June, fruit April, July. A liane of Sumatra and Java; in Peninsula 2d, 4f, 5g, 6g, 6k.

APOCYNACEAE.

Willughbeia coriacea, *Wall.* At 1000′, Wray, H. & N. 2396; fruit Feb. A large liane, endemic, 1b, 2d, 6k, 9k, 9m.

Willughbeia edulis, *Roxb.* At 2000′, H. & N. 2381; fruit Feb. A liane of Assam, Burma and Borneo; in Peninsula 3f.

Willughbeia firma, *Bl.* At Waterfall Hill, Wray. A large liane of W. Malaysia; in Peninsula common.

Chilocarpus atroviridis, *Bl.* 2500-3000′, Scort., Kunstl., fide Ridl. A slender climber of Tenasserim; in Peninsula 5b, 6k.

Chilocarpus costatus, *Miq.* At Changkat Serdang, Wray. A liane of Sumatra; in Peninsula 2d, 4e, 7g, 5h, 6k, 8l.

Chilocarpus enervis, *Hook. fil.* 300-500′, Kunstl. 3786, 7532; fruit Jan. April. A liane of Borneo; in Peninsula 4f, 6j, 6k, 9l.

Chilocarpus minutiflorus, *King & Gamble.* Larut, Kunstl., fide Ridl. A climber, sometimes epiphytic, endemic and local.

Leuconotis eugenifolius, *DC.* At Waterfall Hill, Wray, fide Ridl. A climber of Sumatra and Borneo; in Peninsula 2d, 4e, 5g.

Leuconotis Griffithii, *Hook. fil.* At Taiping, Wray. A climber, endemic, 5h, 6j, 6k, 9m.

Melodinus citriformis, *King and Gamble.* 500-800′, Kunstl., fide Ridl. A slender climber, endemic and local.

Melodinus coriaceus, *Olir.* At 300′, Wray, fide Ridl. A liane, endemic, 2d.

Melodinus orientalis, *Bl.* At 3000′, Scort. 355; flr. April. A liane of Sumatra and Java; in Peninsula 2d, 4f.

Alyxia Forbesii, *King and Gamble.* 3200-3800′, Kunstl. 2124, B. & H. 12978; flr. July, fruit March. A climber of Sumatra and Java; in Peninsula 2d, 4d, 5g, 6g.

Hunteria corymbosa, *Roxb.* At 300′, Kunstl. 7465; flr. April. A tree up to 40′, of India and Sumatra; in Peninsula 1b, 2d, 5h, 6j.

Rauwolfia perakensis, *King and Gamble.* 3600-4300′, Ridl. 2898, 5523, H. & N. 2338, B. & H. 12582, 12625; flr. Feb., March, fruit June. A shrub of Lower Siam; in Peninsula 2c, 4d, 6d, 8d, 4f, 6f, 5g, 5h, 8h.

Ervatamia corymbosa, *King and Gamble.* At 2900′, B. & H 12691; fruit March. A shrub or tree, endemic and common.

Ervatamia cylindrocarpa, *King and Gamble.* At 3200′, B. & H. 12684; fruit March. A shrub, endemic, from Penang to Malacca.

Ervatamia peduncularis, *King and Gamble.* 200-300′, Wray 1936, Kunstl. 1858, Hend. 10076; flr. June, fruit Jan., May. A shrub, endemic and common as far south as Mt. Ophir.

Dyera costulata, *Hook. fil.* Jelutong. Common on the lower slopes of the hill, B. & H. A tree up to 250′, of Sumatra; in Peninsula common.

Alstonia angustiloba, *Miq.* At 300′, Wray, Kunstl., fide Ridl. A tree up to 100′, of Java, Borneo and the Philippines; in Peninsula 2d, 5g, 9m.

Pottsia cantoniensis, *Hook. and Arn.* 500-800′, Kunstl. 2318; flr. Sept. A liane of Java; in Peninsula 2d, 3d, 4f, 6k.

Strophanthus dichotomus, *DC.* 300-500′, Kunstl. 3896; flr. Feb. A sprawler of Java; in Peninsula 4f, 6f, 6k, 8k, 9m.

Urceola brachysepala *Hook. fil.* At 3800′, B. & H. 12560; flr. March. A liane, endemic, 2d, 6k, 9m.

Urceola elastica, *Roxb.* 800-3500′, Wray 4273, Kunstl. 2241, 4239, 5061, 7567; flr. May, fruit Aug., Oct. A large liane of Sumatra; in Peninsula 2d, 4f, 6k.

Parameria polyneura, *Hook. fil.* 200-500′, Kunstl. 3337, 7491; flr. April, Sept. A liane of Burma, Sumatra and Borneo; in Peninsula 2d, 6k, 9m.

Ecdysanthera multiflora, *King and Gamble.* 2000-3000′, Kunstl., fide Ridl. A liane, endemic and local.

Chonemorpha penangensis, *Ridl.* At 500′, Kunstl. 3636; flr. Dec. A liane, endemic, 2d, 4d, 4f, 6g, 6k.

Anodendron Candolleanum, *Wight.* 100-500′, Kunstl. 5558, 6516; flr. Feb., Aug. A liane of Borneo; in Peninsula 2d, 4e, 6k.

Anodendron pauciflorum, *Hook. fil.* 100-800′, Kunstl. 5587, 5599; flr. Feb. A climber up to 15′, endemic, 2d.

Cleghornia gracilis, *King and Gamble.* At 4000′, Kunstl., Scort., fide Ridl. A slender climber, endemic and local.

Trachelospermum Curtisii, *King and Gamble.* Larut, Kunstl., fide Ridl. A climber, endemic, 2d.

Micrechites furcata, *Ridl.* 300-500′, Kunstl. 6564; flr. Sept. A liane, endemic, 4g.

Micrechites tubulosa, *Ridl.*, n.sp. At 3200′, B. & H. 12785; flr. March. A liane, endemic and local.

ASCLEPIADACEAE.

Phyllanthera perakensis, *King and Gamble.* About 200′, Kunstl., fide Ridl. A climber, endemic and local.

Streptocaulon Wallichii, *Wight.* At 2000′, Ridl.; flr. and fruit March. A woody climber, endemic, 1b, 2b, 2d, 6d, 3f.

Toxocarpus Scortechinii, *King and Gamble.* At 3600′, Derry (Curt. 3706). A twining shrub, endemic and local.

Goniostemma acuminatum, *Wight.* Taiping Hills, Wray, Kunstl., fide Ridl. A slender climber of Assam; in Peninsula 2d.

Genianthus Maingayi, *Hook. fil.* Larut, Kunstl., fide Ridl. A slender climber, endemic, 9m.

Genianthus Ridleyi, *King and Gamble.* At 3500′, Ridl. 2988, 11988; H. & N. 2366; flr. Feb. A climber, endemic and local.

Genianthus rufo-velutinus, *King and Gamble.* At 300′, Kunstl. 5611; flr. Feb. A liane, endemic and local.

Cyanchum corymbosum, *Wight.* 300-500′, Kunstl., fide Ridl. A slender twiner of Himalaya and Assam; in Peninsula 2d.

Cyanchum ovalifolium, *Wight.* At Taiping, Kunstl., fide Ridl. A slender climber of Java; in Peninsula common.

Pentasacme caudatum, *Wall.* 300-3000′, Curt., Ridl. 2885; flr. Dec. A herb of India and Burma; in Peninsula 4d, 4e, 6e, 4f, 5g, 5h.

Tylophora exilis, *Colebr.* Larut, Kunstl., fide Ridl. A slender twiner of Assam; in Peninsula 3f, 5h, 6k.

Tylophora longifolia, *Wight.* 3700-4000′, all collectors; flr. March, June, Oct., Sept., Dec. A twiner of India and Borneo; in Peninsula 3e only.

Tylophora Wallichii, *Hook. fil.* At 3000′, H. & N. 2306; flr. Feb. A slender twiner of Borneo; in Peninsula 2d, 6j, 6k, 9m.

Heterostemma piperifolium, *King and Gamble* At Taiping, Ridl. 14268; flr. Aug. A slender twiner, endemic, 4e, 4f, 5h.

Hoya citrina, *Ridl.* At Batu Kurau, Scort., fide Ridl. A long climber, on limestone, endemic, 4f, 5h.

Hoya coronaria, *Bl.* At 300′, Hend. 10315, 10319; flr. and fruit Aug. A long climber of Malaysia; in Peninsula 2d, 8d, 3f, 4f, 8g, 7l, 9m.

Hoya Curtisii, *King and Gamble.* Waterloo, at 2000′, Curt. 2894; flr. Oct. A creeping epiphyte, endemic and local.

Hoya lacunosa, *Bl.* Larut, Kunstl., fide Ridl. A creeping epiphyte of W. Malaysia; in Peninsula 6k, 9m.

Hoya Maingayi, *Hook. fil.* 3700-4500′, Ridl., Anders. 55, H. & N. 2452, B. & H. 12750, 12964; flr. Feb., March, fruit Feb. A climber, endemic, 6k.

Hoya multiflora, *Bl.* 2000-2600′, Ridl. 5520, Hend. 10124; flr. Jan., June. A small epiphytic shrub of Indo-Malaya; in Peninsula 2d, 4f, 6f, 5g, 5h, 0j, 7k, 8l.

Hoya plicata, *King and Gamble.* At 3000′, Scort., fide Ridl. A climber, endemic and local.

Hoya revoluta, *Wight.* Maxwell's Hill, Ridl.; flr. June. A slender climber, endemic, common.

Hoya Ridleyi, *King and Gamble.* At 2400′, Ridl. (not seen). A long climber of Lower Siam; in Peninsula common.

Dischidia albida, *Griff.* Taiping Hills, Scort., fide Ridl. A slender creeper, endemic, 6e, 4f, 5g, 6k, 7k, 8l, 9m.

Dischidia astephana, *Scort.* 3600-4750′, H. & N. 2341, B. & H.; fruit Feb. A slender creeper, endemic, 4e, 6e, 4f, 6g, 5h.

Dischidia benghalensis, *Colebr.* 3200-4750′, B. & H. 12655, 12796; flr. March. A sprawler of Java and Borneo; in Peninsula common.

Dischidia coccinea, *Griff.* 4000-4500′, Ridl. 2903, Fox; flr. Oct. A slender creeper of Borneo; in Peninsula 8g, 6k, 9m.

Dischidia cordifolia, *King and Gamble.* At 2000′, Ridl.; flr. Feb. A twining shrub, endemic, 6g.

Dischidia hirsuta, *Done.* At 300′, Wray, fide Ridl. A slender creeper of Indo-Malaya; in Peninsula 2d, on the Southern coasts in 4h, 8h, 6k, 9k, 9m, inland in 5h, and in varieties in 4f, 7k, 8l.

Dischidia Rafflesiana, *Wall.* Larut, Kunstl., fide Ridl. A creeper of Malaysia to Australia; in Peninsula 1b, 2b, 2c, 8g, 7k, 9m.

Dischidia Scortechinii, *King and Gamble.* At 4200′, B. & H. 12617; flr. March. A slender creeper, endemic, 5g.

Dischidia tubuliflora, *King and Gamble.* Taiping Hills, Ridl.; fruit Dec. A wiry creeper, endemic, 4e, 4f.

Dischidia sp. At 4700′, B. & H. 12640; flr. March. A creeper with small pink flrs.

Physostelma Wallichii, *Wight.* Taiping Hill, Ridl.: flr. Feb. A wiry twiner of W. Malaysia: in Peninsula 6e, 3f, 4f, 9m.

LOGANIACEAE.

Buddleia asiatica, *Lour.* 300-500′, Kunstl. 4060; flr. March. A small shrub of Indo-Malaya and China; in Peninsula 2d, 4d.

Fagraea auriculata, *Jack.* 4000-4200′, Curt., Fox. H. & N. 2344, B. & H. 12643, 12861; flr. Oct., fruit Feb., March, Oct. An epiphyte then a tree up to 30′, of Indo-China and W. Malaysia to the Philippines; in Peninsula 3f, 5h, 8h, 6k, 7l, 9l, 9m.

Fagraea carnosa, *Jack.* At 300′, Wray 2317; flr. June. An epiphytic shrub of Burma and Sumatra; in Peninsula 3f.

Fagraea lanceolata, *King and Gamble, non Blume.* At about 2500′, Wray 3202: fruit Sept. An epiphytic climber, endemic, 5g. A doubtful species of which flowers have not been collected.

Fagraea oblonga, *King and Gamble.* 2000-4000′, Wray 2992, Ridl. 5558, B. & H. 12685, 12982; flr. March, fruit March, June, Sept. An epiphyte, endemic, 4f, 5g.

Fagraea obovata, *Wall.* 300-4400′, Wray 4181, Kunstl. 7578, B. & H. 12585; flr. April, fruit March, June. An epiphytic shrub of Indo-Malaya; in Peninsula common.

Fagraea pauciflora, *Ridl.* 200-500′, Wray 1960, Kunstl. 1926, 3242, H. & N. 2400, Hend. 10218; flr. Feb. May, June, fruit Aug., Nov. A shrub of Sumatra and Borneo; in Peninsula 6e, 8j, 9m.

Fagraea racemosa, *Jack.* 200-500′, Kunstl. 3188, Hend. 10046; fruit Jan., Aug. A bush or small tree of Borneo: in Peninsula common.

Fagraea vaginata, *King and Gamble.* 300-4000′, Kunstl. 3868, 4044, 4238, Hervey; flr. Feb., May, fruit March. A large shrub or small tree of Java; in Peninsula 4f, 5h, 6k.

Strychnos flavescens, *King and Gamble.* Larut, Kunstl., fide Ridl. A liane, endemic, 2d, 6k.

Strychnos penicillata, *A. W. Hill.* At about 300′, Scort. 1485, Ridl. 3006, Forest Dept. C. F. 1154; fruit Nov. A liane, endemic, 2d, 3d, 4e, 6j.

Strychnos pubescens, *Clarke.* At 300′, H. & N. 2401 (a large-leaved variety). A liane of Indo-China, Sumatra and Borneo; in Peninsula 4f, 6j, 6k, 9m.

Strychnos Scortechinii, *A. W. Hill.* Larut, Kunstl., fide Ridl. A liane, endemic, 4f, 5h, 6k.

Gaertnera oblanceolata, *King and Gamble.* 3000-4700′, Ridl., Anders. 19, B. & H. 12898, 12902; flr. Feb., March, fruit March. A shrub, endemic and local.

CONVOLVULACEAE.

Erycibe aenea, *Prain.* 300-2500′, Kunstl., fide Ridl. A liane, endemic and local.

Erycibe festiva, *Prain.* 500-800′, Kunstl. 6445; flr. Aug. A liane, endemic, 6k, 9m.

Erycibe glomerata, *Bl.* 800-3000′, Wray 2580 (var. longifolia), Curt. 1283, Ridl. 2989 (var. typica); flr. Feb., Dec. A shrub or small tree of Java and Borneo; in Peninsula 1b, 4f.

Erycibe Griffithii, *Clarke.* Larut, Kunstl., fide Ridl. A liane of Tenasserim, Sumatra, Moluccas, and Philippines; in Peninsula 2d, 6k, 9m.

Erycibe magnifica, *Prain.* 500-1000′, Kunstl. 3454; flr. Oct. A liane, endemic and local.

Erycibe malaccensis, *Clarke.* 300-800′, Kunstl. 3180, 3575; flr. Aug., Nov. A climber, endemic, 2d, 6k.

Erycibe praecipua, *Prain.* Larut, Kunstl., fide Ridl. A liane, endemic, 2d.

Erycibe Stapfiana, *Prain.* 300-4000′, Kunstl. 4015, 4115; flr. March, April. A liane of Tenasserim; in Peninsula 4d, 4f, 5g.

Erycibe strigosa, *Prain.* 500-800′, Kunstl. 8461; flr. Feb. A liane, endemic and local.

Lettsomia Curtisii, *Prain.* At about 4500′, Anders. 63; fruit March. A climber, endemic, 5h.

Lettsomia Kunstleri, *Prain.* At Waterloo Estate, Ridl.; fruit March. A climber of Sumatra; in Peninsula 3d, 4f, 6f, 5g, 5h, 6j, 6k.

Lettsomia penangiana, *Miq.* 100-4000′, Wray 2334, Kunstl. 2048, 2574, Curt. 2034, Anders. 90, Derry; flr. March, June, July, Sept., fruit Nov. A slender climber, endemic, 2d, 5g.

Lettsomia Scortechinii, *Prain.* 3800-4400′, Fox 180, Ridl. 5559, Hervey, B. & H. 12943; flr. Feb., fruit March Oct. A slender climber, endemic and local.

Hewittia bicolor, *Wight.* Larut, Scort., fide Ridl. A twiner of Trop. Africa and Indo-Australia; in Peninsula 6k.

Merremia caespitosa, *Hallier.* Larut. Kunstl., fide Ridl. A slender twiner of Indo-Australia; in Peninsula common.

Merremia convolulacea, *Dennst.* At Larut. Ridl. (not seen). A slender twiner of Trop. Africa and Indo-Australia; in Peninsula a common weed.

Merremia hastata, *Hallier.* 100-500'. Hend. 10050, 10083, 10233; flr. Jan., Nov. A sprawler of Trop. Africa and Indo-Australia; in Peninsula common.

Merremia umbellata, *Hallier.* At Taiping, Ridl.; flr. Feb. A long twiner, pantropic; in Peninsula common.

Merremia vitifolia, *Hallier.* Larut, Scort., fide Ridl. A sprawler of S. E. Asia; in Peninsula 2b, 6c, 6d, 8g.

Ipomoea rubro-coerulea, *Hook.* At 3500', B. & H. A twining herb of Mexico; running wild here.

Ipomoea staphylina, *R. & S.* var. malayana, *Prain.* 100-500', Kunstl. 2538, 5091; flr. Oct., Nov. A shrubby climber of Sumatra; in Peninsula 2b, 2d, 6e.

SOLANACEAE.

Solanum aculeatissimum, *Jacq.* At 3300', B. & H. 13[illegible]2; fruit March. ? Cultivated. A prickly shrublet of Lower Siam to Java; in Peninsula usually on seashores and sandy places.

Solanum Blumei, *Nees.* 1800-4400', Kunstl. 2234, Curt. 2035, Fox 126, Ridl.; flr. Aug.-Oct., fruit Sept. A shrub of W. Malaysia; in Peninsula 4e, 4f, 5g, 5h, 9l.

Solanum verbascifolium, *Linn.* 500-3500', Kunstl. 2069, B. & H.; flr. July. A shrub up to 8', pantropic; in Peninsula 2c, 2d, 6f, 5g, 7g, 5h, 9m.

Datura suaveolens, *Humb. and Bonpl.* At 3800', B. & H. A Mexican herb; running wild here.

SCROPHULARIACEAE.

Wightia borneensis, *Hook. fil.* 2000-3000', Derry; flr. Oct. A liane, eventually a tree, of Java and Borneo; in Peninsula 3c only.

Limnophila villosa, *Bl.* At Taiping, Wray, fide Ridl. A small aromatic herb of Sumatra and Java; in Peninsula common in damp places.

Vandellia crustacea, *Benth.* 100-500', Hend. 10322, B. & H.; flr. and fruit Feb., Aug. A cosmopolitan weed; in Peninsula common.

Torenia atropurpurea, *Ridl.* 4000-4750', Ridl. 5507, B. & H. 12735; flr. March, June. A creeping herb, endemic, 4f, 5g.

Bonnaya veronicaefolia, *Spreng.* var. grandifolia, *Hook. fil.* At Taiping, Wray, fide Ridl. An erect herb, the species of S. E. Asia; in Peninsula the var. at 2b, 6b, 5g, 6k.

Striga hirsuta, *Benth.* At Taiping, Ridley's collector. A small herb of Indo-Malaya; in Peninsula common in grass.

Scoparia dulcis. *Linn.* 3500-4000′, B. & H. A woody herb of American origin; in Peninsula a common weed.

LENTIBULARIACEAE.

Utricularia minutissima, *Vahl.* Larut, Kunstl., fide Ridl. A minute herb, endemic, 8g, 8j, 6k, 7k.

GESNERACEAE.

Aeschynanthus Hildebrandtii, *Hemsl.* 4000-4100′, Ridl., H. & N. 2347; flr. Feb., June, fruit Feb. A creeping epiphyte of Burma; in Peninsula 6g.

Aeschynanthus obconica, *Clarke.* 2000-3200′, Kunstl. 2849, Curt. 2990 (Batu Kurau), B. & H. 12798; flr. March, Oct., Dec. An epiphytic creeper of Borneo; in Peninsula 4d, 3f, 4f, 4h, 5h.

Aeschynanthus parvifolia, *R. Br.* 2000-4500′, all collectors; flr. Feb., March, Sept., Oct., Dec. An epiphytic creeper of W. Malaysia; in Peninsula common.

Aeschynanthus perakensis, *Ridl.* 2000-4500′, Kunstl. 3641, 7022, Curt., Ridl. 11447, Anders. 95; flr. March, Sept., Dec., fruit Dec. A small shrub, endemic, 4e, 4f.

Aeschynanthus purpurascens, *Hassk.* At 2000′, Ridl., fruit June. An epiphyte of W. Malaysia; in Peninsula 6d, 4f, 5h, 7l, 9m.

Aeschynanthus rhododendron, *Ridl.* 300-4750′, all collectors; flr. Feb.-April, Sept., Oct., Dec., fruit July, Oct. A small erect shrub, endemic, 4e.

Agalmyla staminea, *Bl.* 1000-4000′, all collectors; flr. Feb., Sept., Oct., fruit Sept., Dec. A creeper on trees, of W. Malaysia; in Peninsula 4e, 5g.

Didissandra frutescens, *Clarke.* 300-3000′, Wray 1723, Curt., Ridl. 2912, Hend. 10449; flr. and fruit Feb., Dec. A small shrub of Sumatra; in Peninsula 2d, 4e, 3f, 4f, 6k.

Didissandra quercifolia, *Ridl.* 2000-4200′, all collectors; flr. Feb., March, May, Aug., Sept. A woody stemmed herb, endemic and local.

Didymocarpus albomarginata, *Hemsl.* 200-4400′, all collectors; flr. Jan., Feb., June, Sept., fruit Jan., June, Oct. A herb, endemic, 5h.

Didymocarpus alternans, *Ridl.* 500-3000′, Kunstl. 2311, Curt.; flr. Dec., fruit Sept., Dec. A herb, endemic, 4f.

Didymocarpus corchorifolia, *R. Br.* G. Hijau, Scort. 1266, fide Ridl. A small shrub, endemic, 2d, 4f, 6j, 8l. Ridley in his Flora says "Taiping Hills, all collectors," but there is no specimen from Taiping Hills in Herb. Singap.

Didymocarpus crinita, *Jack.* 3000-4000′, all collectors; flr. Feb., March, Aug., Sept. A herb of Sumatra and Borneo; in Peninsula common.

Didymocarpus flava, *Ridl.* 2000-4200′, all collectors; flr. Jan.-March, Aug., Sept., Dec. A woody herb of Lower Siam; in Peninsula 4f.

Didymocarpus hirsuta, *Ridl.* Larut Hills, Kunstl., fide Ridl. A woody herb, endemic, 4f.

Didymocarpus hispida, *Ridl.* 3700-4600′, Kunstl. 2417, 8429, Curt. 2037, Ridl., Anders. 32, Hervey, B. & H. 12594, 12667, 12749, 12751, 12876, 12879; flr. Jan., Feb., March, Sept., fruit Sept. A herb, endemic, 4d, 4e, 4f, 5g.

Didymocarpus malayana, *Hook. fil.* 500-3000′, Curt. 2039, Haniff 13136; flr. Sept., fruit March. A shrublet, endemic, 4e, 4f, 5g, 5h.

Didymocarpus parviflora, *Ridl.* At 4000′, Curt., fide Ridl. A woody herb, endemic, 6j.

Didymocarpus reptans, *Jack,* var. monticola, *Ridl.* 200-4000′, all collectors; flr. Jan., March, June, July, Sept., fruit March, Oct. A creeping herb of Sumatra and Java; in Peninsula the var. at 3f, 4f, 5g, 5h, 6j, the species at 2d, 5g, 5h.

Didymocarpus serratifolia, *Ridl.* At 1000′, Ridl. 11922 (not seen). A woody herb, endemic and apparently also from 7g.

Didymocarpus sulphurea, *Ridl.* G. Hijau, Scort. 6a; fruit Aug. A woody herb, endemic, 4e, 4f, 5g.

Didymocarpus urticaefolia, *Ridl.* Up to 4000′, Curt., fide Ridl. A herb, endemic, 4d.

Chirita caliginosa, *Clarke.* At Batu Kurau, Scort. 1582; fruit Dec. A soft herb on limestone, endemic, 4d, 4e, 4f, 5h.

Chirita elata, *Ridl.* 3000-4000′, Curt. 2038, Ridl. 2911, H. & N. 2353, Hend. 10109, B. & H. 12566, 12990; flr. Feb., March, Sept., Oct., fruit Jan. A rough herb, endemic and local.

Chirita Glasgovii, *Ridl.* At Waterloo, Robertson-Glasgow; flr. and fruit Dec. A weak herb, endemic and local.

Loxocarpus caerulea, *Ridl.* 4000-4700′, Scort. 1427, Kunstl. 6990, Ridl., Anders. 3, B. & H. 12881; flr. Feb., March, Oct., Dec. A stemless herb, endemic, 3d, 6e, 4f, 5h.

Paraboea capitata, *Ridl.*, var. oblongifolia, *Ridl.* At Batu Kurau, Scort. 1581; fruit Dec. A stemless herb on limestone, endemic, the species at 4f, 5h, the var. at 4e, 4f.

Paraboea cordata, *Ridl.* 2300-4500′, all collectors; flr. Feb., March, July, Aug., Oct. A tall herb, endemic, 2c, 2d, 4d, 7k.

Boea paniculata, *Ridl.* At Batu Kurau, Scort. 1611; fruit Dec. A shrublet up to 1′, on limestone, endemic, 4e, 5h.

Rhynchoglossum obliquum, *Bl.* At about 4000′, Fox; flr. and fruit Oct. A succulent herb of S. E. Asia; in Peninsula 4f.

Epithema saxatile, *Bl.* At Batu Kurau, Scort. 1580; flr. Dec. A herb of W. Malaysia; in Peninsula 1b, 2d, 4e, 4f, 6g, 5h.

Monophyllaea Horsfieldii, *R. Br.* At Batu Kurau, Scort. 1579; flr. Dec. A succulent herb, usually on limestone, of Sumatra and Java; in Peninsula 4b, 4e, 4f, 5h.

Monophyllaea patens, *Ridl.* At Batu Kurau, Scort., fide Ridl. A succulent herb on limestone, endemic, 4e 4f, 5h.

Stauranthera grandiflora, *Benth.* 1000-1500′, Kunstl. 2248; flr. Aug. A succulent herb of Burma; in Peninsula 2d, 6e, 4f.

Rhynchotecum parviflorum, *Bl.* 1500-2000′, Kunstl. 2237, Ridl.; flr. Aug., fruit Dec. A small-shrub of Sumatra and Java; in Peninsula 2d, 6d, 6e, 4f.

Cyrtandromoea acuminata, *Benth. and Hook.* 100-2000′, all collectors; flr. Jan., April, June, Aug., Dec. A small weak shrub of Sumatra; in Peninsula common in the North.

Cyrtandromoea megaphylla, *Hemsl.* Waterfall Hill, Wray 43. A bush, endemic, 2c, 4f, 5g, 5h.

Cyrtandra cupulata, *Ridl.* 300-3000′, Scort. 366, Kunstl. 1940, 2057; flr. April, June, fruit July. A shrub, endemic and common.

Cyrtandra dispar, *DC.* 100-4000′, Scort. 367, Kunstl. 2052, 3891, 5131, Ridl., Anders. 124, B. & H. 13013; flr. March, April, fruit Feb., July, Nov. A small shrub, endemic, 2d, 4f.

Cyrtandra pendula, *Bl.* At 2000′, Curt. 2036; flr. Sept. A woody herb of Sumatra and Java; in Peninsula, Taiping to Singapore.

Cyrtandra pilosa, *Bl.* 100-4000′, all collectors; flr. Jan.-March, June, Oct., fruit March. A small shrub of Malaysia; in Peninsula common.

BIGNONIACEAE.

Pajanelia multijuga, *DC.* At base of Taiping Hill, Hend. 10388, Cubitt's coll. C.F.947; flr. Jan., Dec., fruit Dec. A tree up to 80′, endemic, 2d, 4d. Ridley's specimen from Kranji, Singapore is not this.

Radermachera amoena, *Seem.* At Taiping, Wray, Scort. 1496; fruit Nov. A tree up to 80′, of Indo-Malaya; in Peninsula 2b, 5h, 6k, 9m.

Radermachera stricta, *Zoll. and Mor.* At 200′, Wray 2143; fruit June. A tree up to 30′, of Indo-Malaya; in Peninsula 2d, 4d, 6e, 4f, 5h, 6j, 6k.

PEDALINACEAE.

Sesamum indicum, *DC.* At Taiping, Hend. 10092; fl and fruit Jan. An erect herb, cultivated in all tropics.

ACANTHACEAE.

Thunbergia fragrans, *Roxb.* At about 3800′, B. & H. A sprawler of India; probably an escape from cultivation here.

Staurogyne arcuata, *Clarke.* 2000-4500′, Wray 694, Curt., Ridl. 2892; flr. June, fruit Feb., Sept. A creeping ascending herb, endemic, 4d, 4f.

Staurogyne lasiobotrys, *Kuntze.* Up to 4500′, Curt. 1350 (Waterloo), Ridl.; flr. Dec., fruit March. A small shrub of Burma; in Peninsula 1b, 6c, 4d, 5h, 5j, 0j.

Staurogyne macrantha, *Clarke.* 4500′ and upwards, Kunstl., fide Ridl. A herbaceous shrublet, endemic and local.

Staurogyne pauper, *Clarke.* At 200′, Kunstl., fide Ridl. An erect herb, endemic and local.

Staurogyne setigera, *Kuntze.* At 300′, Ridl. 14431; flr. Aug. A creeping herb of W. Malaysia; in Peninsula common.

Staurogyne subglabra, *Clarke.* 3600-4500′, Curt., Ridl., Hervey, H. & N. 2340, B. & H. 12872; flr. Feb., Dec., fruit Dec. An erect herb of Borneo; in Peninsula 2c, 4f, 5h.

Strobilanthes bibracteatus, *Bl.* 4000-4700′, Ridl. 5516, Anders. 2, Kloss, B. & H. 12899; flr. Feb., May, June, fruit March. An undershrub of Sumatra and Java; in Peninsula 3e only.

Strobilanthes collinus, *Nees.* At about 4500′, Ridl.; flr. and fruit March. A big herb or shrub, endemic, 1b, 2d, 6d.

Strobilanthes flaccidifolius, *Nees.* At Batu Kurau, Haniff 13255. A herb, cultivated for blue dye in Upper Perak and Kelantan; native of Indo-China and S. China.

Strobilanthes hirtisepalus, *Clarke.* Taiping Hills, Kunstl., fide Ridl. An undershrub, endemic, 2c, 4f, 5g, 5h.

Strobilanthes Maingayi, *Clarke.* At Maxwell's Hill, Kloss. An undershrub up to 3′, endemic, 1b, 2d, 5g, 5h.

Strobilanthes rufo-pauper, *Clarke.* 3000-4500′, Ridl. 5515, Hervey, Curt., Anders. 26, B. & H. 12974; flr. March, Sept. A creeping herb, endemic, 4f.

Strobilanthes rufo-sepalus, *Clarke.* Taiping Hills, Ridl.; flr. Dec. A herb, endemic, 2d, 4d, ?4e, 5g.

Phlogacanthus brevis, *Clarke.* At 300′, Kunstl., fide Ridl. An undershrub, endemic and local.

Gymnostachyum magis-nervatum, *Clarke.* Larut, Kunstl., fide Ridl. A herb, endemic and local.

Pseuderanthemum caudifolium, *Ridl.* At Taiping, Scort. 1531, Curt.; flr. Sept., Nov. A shrub up to 5′, of Lower Siam; in Peninsula 3f, 4f.

Gendarussa vulgaris, *Nees.* At 300′, Hend. 10317; flr. Aug. A bush of S. E. Asia; in Peninsula common in or near cultivation.

Justicia Clarkeana, *Ridl.* 3000-3200′, Kunstl., fide Ridl. A tall herb, endemic and local.

Justicia Maingayi, *Clarke.* At Taiping, Ridl. 14432, Anders. 93; flr. March, Aug., fruit Aug. A slender shrub, endemic, 2d.

Justicia ptychostoma, *Nees,* var. auriculata, *Clarke.* At Taiping, Kunstl., fide Ridl. A herb, endemic, the species common, the var. at 4e, 3f.

Justicia pubiflora, *Clarke.* 4000-4700′, Ridl., Anders. 11, B. & H. 12863; flr. Feb., March, Dec. A herb, endemic, 8l, 8m.

Justicia Scortechinii, *Clarke.* At 3000′, Scort., fide Ridl. A herb, endemic and local.

Peristrophe acuminata, *Linn.* At Batu Kurau, Haniff 10553; flr. May. A herb up to 3′, of Indo-Malaya; in Peninsula common.

VERBENACEAE.

Lantana aculeata, *Linn.* At Taiping and at 3800′, Hend., B. & H. A prickly bush, pantropic, of S. American origin; in Peninsula common in waste ground.

Stachytarpheta jamaicensis, *Vahl.* At Taiping, Hend. 10034; flr. all the year. A small shrub, pantropic, of S. American origin; in Peninsula common.

Callicarpa angustifolia, *King and Gamble.* At Batu Kurau, Scort., fide Ridl. A shrub on limestone, endemic, 1b, 4e, 5h.

Callicarpa arborea, *Roxb.* At 200′, Hend. 10037; flr. Jan. A tree up to 60′, of Indo-Malaya; in Peninsula 6b, 2c, 2d, 3f, 6g, 6j.

Callicarpa cana, *Linn.* At Taiping, Ridl. (not seen). A shrub of Malaysia to Australia; in Peninsula 2b, 2d, 7g, 5j, 6k.

Premna Derryana, *King and Gamble.* At 3700′, Derry. B. & H. 12972; flr. March. A climbing shrub, endemic and local.

Premna sterculifolia, *King and Gamble.* At 300′, Wray, Kunstl., fide Ridl. A shrubby climber, endemic and local.

Gmelina villosa, *Roxb.* At Changkat Serdang, Wray, fide Ridl. A shrub or small tree, of Indo-Malaya to the Philippines: in Peninsula common.

Clerodendron deflexum, *Wall.* At 700′, Hend. 10004, 10426: flr. and fruit Jan., Oct. A small shrub of Pulau Battam; in Peninsula common.

Clerodendron disparifolium, *Bl.* 100-3000′, Curt. 2043, Hend. 10303, B. & H.; flr. Aug., fruit Aug., Sept. A tree up to 20′, of W. Malaysia; in Peninsula common.

Clerodendron myrmecophilum, *Ridl.* 100-1080′, Ridl., Hend. 10035; flr. Jan., Aug. A shrublet, endemic, 8d, 9l, 8m, 9m.

Clerodendron paniculatum, *Linn.* 300-800′, Kunstl. 6437, fide King and Gamble. A tall shrub of Java: in Peninsula 2c, 2d, 4f, 5g, 5h, 6j, and sometimes cultivated.

Clerodendron penduliflorum, *Wall.* At Batu Kurau, Scort., fide Ridl. A small shrub of Burma and Tenasserim: in Peninsula 4b, 2c, 2d, 6d, 5h.

Clerodendron Ridleyi, *King and Gamble.* Larut, Kunstl., fide Ridl. A shrub or small tree of Borneo; in Peninsula 5h.

Clerodendron serratum, *Spreng.* var. Wallichii, *Clarke.* Taiping, Scort. 107, fide King and Gamble. A bushy shrub of Indo-Malaya; in Peninsula 6c, 4e, 6e, 4f, 5g, 5h.

Clerodendron umbratile, *King and Gamble.* At 3000′, Derry (Curt. 3704); flr. Sept. A shrub of Sumatra; in Peninsula 4f, 5h, 6k.

Vitex coriacea, *Clarke.* At 1000′, Wray 2225, fide King and Gamble. A tree, endemic, 2c, 4f, 6k, 9m.

Vitex gamosepala, *Griff.* 500-1000′, Scort. 445, 1480, Kunstl. 1841, fide King and Gamble. A small tree of Sumatra and Borneo: in Peninsula 5g, 8g, 5h, 6k, 9m.

Vitex heterophylla, *Roxb.* Up to 1000′, Kunstl., fide King and Gamble. A tree up to 80′, of Indo-Malaya; in Peninsula 4f.

Vitex longisepala, *King and Gamble.* 500-2000′, Curt., Ridl. 2984, Anders. 104, Cubitt C. F. 1152, Hend. 10019, 10479: flr. Feb., March, Oct., fruit Jan., May. A tree, endemic, Penang to Malacca.

Vitex peralata, *King.* Larut, on low ground, Kunstl. 2064, 6187, 6874, 8299, fide King and Gamble. A spreading tree, endemic, Taiping to Singapore.

Vitex pteropoda, *Miq.* Larut, on low ground, Kunstl. 5249, 6668, fide King and Gamble. A spreading tree of Sumatra; in Peninsula 8h, 9m.

Vitex pubescens, *Vahl.* At about 200′, Hend. 10209, Haniff 13271 (Batu Kurau); fruit May, Sept. A bushy tree of Indo-Malaya to the Philippines; in Peninsula common.

Vitex siamica, *Williams.* At Batu Kurau, Scort. 1618, fide King and Gamble. A tree, on limestone, endemic, 1b, 5h.

Sphenodesme triflora, *Wight.* At Taiping, Wray, Kunstl., fide Ridl. A climber or erect shrub of Sumatra and ?Borneo; in Peninsula common.

LABIATAE.

Hyptis brevipes, *Poit.* At Taiping, Wray 3051; flr. Sept. A herb up to 3′, pantropic, of S. American origin; in Peninsula common.

Hyptis suaveolens, *Poit.* At Taiping, Hend. 10324; flr. Aug. A herb of Trop. America and S. E. Asia; in Peninsula common.

Coleus atropurpureus, *Benth.* At Taiping, Hend. 10107; flr. Jan. A small herb of Malaysia; in Peninsula common.

Dysophylla auricularia, *Bl.* At Taiping, Wray, fide Ridl. A herb up to 3′, of S. E. Asia; in Peninsula common.

Calamintha gracilis, *Benth.* Up to 3400′, Ridl. 11912, Anders. 89, B. & H. 12812; flr. Feb., March. A slender creeper of Assam and Java; in Peninsula 3e only.

Leucas zeylanica, *R. Br.* At Taiping, Hend. 10160; flr. April. A herb of S. E. Asia; in Peninsula very common.

Paraphlomis rugosa, *Prain.* 500-3000′, Scort. 339, Kunstl. 2372, Curt. 2726, Ridl. 2892, Anders. 112; flr. Sept., fruit March. A shrub of Indo-Malaya; in Peninsula 4f.

Gomphostemma crinitum, *Wall.* At about 200′, Wray 3340, Hend. 10058; flr. Jan., Feb., fruit Jan. A woody herb of Tenasserim; in Peninsula common in hill forests.

Gomphostemma Curtisii, *Prain.* 2000-4300′, Curt. 1310, Fox 173, Ridl.; flr. Feb.-March, Oct., fruit Dec. A woody herb, endemic, 2d, 4f, 5g.

Gomphostemma microcalyx, *Prain.* 1800-2000′, Kunstl. 2155, fide King and Gamble, Ridl. A large herb of Borneo; in Peninsula 4f.

Gomphostemma Scortechinii, *Prain.* Up to 4500′, Scort., Kunstl., fide Ridl. A woody herb of Tenasserim; in Peninsula 6d.

AMARANTACEAE.

Deeringia celosioides, *Brown.* At Batu Kurau, Scort., fide Ridl. A sprawler on limestone, of Indo-Australia; in Peninsula 5h.

Deeringia indica, *Zoll.* At Waterloo, Curt. 2691; flr. and fruit May. A small shrub of W. Malaysia and Philippines; in Peninsula 2b, 4e, 4f, 6g, 5h.

Cyathula prostrata, *Bl.* At Taiping, Hend. A straggling herb, pantropic; in Peninsula common in open ground.

Psilotrichum trichotomum, *Bl.* At Maxwell's Hill, Ridl. Cultivated. A flaccid herb of Indo-Malaya to the Philippines; in Peninsula 1a, Ulu Kal, Perak.

Aerua Curtisii, *Oliv.* 500-1000′, Waterloo, Curt.; fruit May. A straggling herb, endemic, 4d.

POLYGONACEAE.

Polygonum capitatum, *Ham.* At 4000′, B. &. H. 12961; flr. March. A herb of Himalaya, not previously recorded from the Peninsula. Doubtless introduced.

ARISTOLOCHIACEAE.

Apama corymbosa, *Soler.* 100-3000′, Kunstl. 2875, Curt. 2045, H. & N. 2301, Hend.10010; flr. Jan.-March, Sept., fruit Jan., March. A shrub of Sumatra; in Peninsula, Penang to Malacca.

Thottea dependens, *Klotzsch.* 300-1000′, Ridl., B. & H.; flr. March. A shrub, endemic, 2d, 3f, 4f, 7k, 9m.

Aristolochia minutiflora, *Ridl.* 100-3300′, Kunstl., fide Ridl. (the species), Wray 2997, Kunstl., fide Gamble (var. dolobrata). A slender climber, endemic, 3f, the var. at 3e only.

CYTINACEAE.

Rafflesia Hasseltii, *Suringar.* Taiping Hill, Cantley, Wray, fide Ridl. A parasite of Sumatra; in Peninsula 4d.

NEPENTHACEAE.

Nepenthes ampullaria, *Jack.* At 100′, Kunstl. 1943; flr. June. A climber of Malaysia; in Peninsula 2d, 4e, 8g, 5h, 6k, 9l, 9m.

Nepenthes gracilis, *Korth.* 100-300′, Kunstl., 1941, 4019, 4025, Hend. 10050; flr. March. A slender climber of W. Malaysia; in Peninsula common in low country.

Nepenthes Rafflesiana, *Jack.* At 4400′, Fox 182, Derry; flr. and fruit Oct. A climber of Sumatra and Borneo; in Peninsula 5g, 8h, 6k, 7k, 8l, 9l, 9m.

Nepenthes sanguinea, *Lindl.* 4400-4750′, Wray, Kunstl. 3316. Curt. 2044, Fox 183, Ridl., Derry, Anders. 62, B. & H. A climber of Borneo; in Peninsula 6e, 4f, 5g, 6g, 5h, 7k.

PIPERACEAE.

Peperomia Maxwellana, *C. DC.* At about 2500′, Ridl. 5481; flr. June. A small herb, endemic and local.

Piper acre, *Bl.* 1000-4000′, Curt., fide Ridl. A slender climber of Java; in Peninsula 3e only.

Piper Betle, *Linn.* At 1500′, Waterloo, Curt. 2701; fruit May. Sirih. A climber extensively cultivated in S. E. Asia.

Piper boehmeriaefolium, *Wall.* 500-1500′, Kunstl. 2231, 2257, fide C. de Candolle. An erect shrub of E. Himalaya to Siam; in Peninsula 4d, 6g, 5j.

Piper Curtisii, *C. DC.* At about 2000′, Curt. 2699, Ridl.; fruit May. A slender creeper, endemic, 4d, 5h, 6k, 9l.

Piper eucolyptolimbum, *C. DC.* 2800-3000′, Kunstl. 3228, fide C. de Candolle. A climber, endemic and local.

Piper filipes, *C. DC.* 3200-3500′, Kunstl. 3122, fide C. de Candolle. A creeper, endemic and local.

Piper flavimarginatum, *C. DC.* Taiping Hills, Ridl.; fruit Feb. A climber, endemic, 6f, 9m.

Piper gymnocladum, *C. DC.* At about 2500′, Ridl. 5479; flr. June, fruit June, Dec. A climber, endemic and local.

Piper kotanum, *C. DC.* At Kota, Wray 1947, fide C. de Candolle. A climber?, endemic and local.

Piper larutanum, *C. DC.* Larut, Kunstl. 3327; flr. and fruit Sept., fide C. de Candolle. A climber on trees, endemic and local.

Piper longamentum, *C. DC.* 1800-3000′, Kunstl. 32071 (?); flr. Aug., fide C. de Candolle. A climber?, endemic and local. Kunstler's number as quoted by de Candolle is almost certainly a mistake.

Piper longibracteum, *C. DC.* At 3000′, Wray 101. A long climber, endemic, 4d.

Piper magnibaccum, *C. DC.* 3900--4000′, Curt. 2046, Ridl. 5480, Anders. 158, B. & H. 13012; flr. and fruit March, Sept. A climber, endemic, 4e, 4f, 5g.

Piper Maxwellanum, *C. DC.* At 2500′, Wray 1734. A climber, endemic and local.

Piper miniatum, *Bl.* 100-4000′, Curt., Ridl. 2962, Anders. 82; flr. March, Oct. A climber of Java; in Peninsula common.

Piper minutistigmum, *C. DC.* Larut, Kunstl. 2388; flr. and fruit Sept., fide C. de Candolle. A large climber, endemic and local.

Piper muricatum, *Bl.* 200-1000′, Wray 2076, Ridl., Hend. 10001, 10060; fruit Jan., March. A herb of W. Malaysia; in Peninsula common.

Piper nigrum, *Linn.* At Waterloo, Curt. 2700; fruit May. Black pepper, cultivated, a native of S. India.

Piper penangense, *C. DC.* 3000-4700′, Ridl., Anders. 72, B. & H. 12668, 12897; flr. Feb., March, fruit Feb. A small shrub, endemic, 2d, 3d, 4d.

Piper porphyrophyllum, *N. E. Br.* 200-4500′, Curt. 2048, Haniff 10552, Hend. 10003, 10069; flr. Sept., fruit Jan. A climber of Borneo; in Peninsula common.

Piper ramipilum, *C. DC.* Larut, Kunstl., fide C. de Candolle. A creeper up to 20′, endemic, 2d, 4d, 4f, 6k, 7l, 9m.

Piper ribesioides, *Wall.* 200-1000′, Wray 2184, 4244, Kunstl., fide C. de Candolle. A creeper on trees, of Tenasserim and Sumatra; in Peninsula common.

Piper Ridleyi, *C. DC.* 300-4500′, Curt. 2047, Ridl. 14503, Anders. 147, B. & H. 12693; flr. March, Aug., Sept., fruit March, May, Aug. An erect shrub, endemic, 4d, 4f, 5g, 4h, 9m.

Piper Scortechinii, *C. DC.* 2800-3000′, Scort. 285, Kunstl. 3230, fide C. de Candolle. A slender climber, endemic, 4f.

Piper semangkoanum, *C. DC.* At 4000′, Ridl. An erect shrublet, endemic, 5g.

Piper stylosum, *Miq.* 200-4700′, Wray 8, Curt. 2049, Ridl., Anders. 37, B. & H. 12874, Haniff 13281; flr. Feb., May, fruit March, Sept. A small erect shrub of Sumatra and Borneo; in Peninsula common.

Piper umbellatum, *Linn.* At Waterloo, 1500′, Curt. 2698; fruit May. An erect shrub, pantropic; in Peninsula 2d, 6d, 6f, 5g, 5h, 6j.

Piper velutinervium, *C. DC.* 1800-2000′, Kunstl. 2193, 2196; flr. and fruit Aug., fide C. de Candolle. An erect? pepper of Sumatra; in Peninsula 3e only.

CHLORANTHACEAE.

Chloranthus officinalis, *Bl.* 3000-3700′, B. & H.; fruit Feb. A shrub of Indo-Malaya; in Peninsula common.

MYRISTICACEAE.

Horsfieldia brachiata, *Warb.* Larut, Kunstl., fide Ridl. A tree up to 60′, endemic, 6k, 9m.

Horsfieldia fulva, *Warb.*, var. paludicola, *Warb.* Larut, Kunstl., fide Ridl. A tree up to 60′, endemic, the var. at 4f, 9m, the species at 4f, 6k.

Horsfieldia Irya, *Warb.* At 300′, Kunstl. 7447; flr. April. A tree of Indo-Malaya; in Peninsula common.

Horsfieldia Lehmanniana, *Warb.* At Taiping, Wray 2088; flr. June. A tree up to 50′, endemic, 4f, 5g, 6k, 9m.

Horsfieldia majuscula, *Warb.* At 2000′, Wray 2218, Ridl. 11919; flr. Feb. A tree about 50′, endemic, 2d, 4f, 9m.

Horsfieldia subglobosa, *Warb.* At 100′, (up to 2000′, fide Ridl.) Kunstl. 6672; fruit October. A tree up to 70′, of Sumatra; in Peninsula 6k, 8l.

Horsfieldia sucosa, *Warb.* At 300′, Kunstler 4078; fruit April. A tree up to 100′, endemic, 2d, 4f, 6k, 9m.

Gymnacranthera Farquhariana, *Warb.* 100-3000′, Wray, 2084, 2399, Kunstl. 5408, 6622, 6652, 7481; flr. April, Sept., fruit Jan., June, July, Sept. A tree up to 60′, endemic and common.

Gymnacranthera Forbesii, *Warb.* 300-1000′, Kunstl. 3783, 6591; flr. Sept., fruit Jan. A tree up to 80′, of Sumatra; in Peninsula 2d, 3d, 4f, 6f, 6k, 9m.

Myristica cinnamomea, *Warb.* 500-1500′, Wray 2056, Kunstl. 5170, 6440; fruit Nov. A tree up to 90′, endemic and common.

Myristica crassa, *King.* At 2000′, Wray 646. A tree up to 80′, endemic, 4f, 6j, 6k, 9m.

Myristica elliptica, *Wall.* 200-400′, Wray 1736, 2345; flr. and fruit April. A tree up to 80′, of Sumatra and Borneo; in Peninsula common.

Myristica maxima, *Warb.* 300-800′, Kunstl. 5513; fruit Feb. A tree up to 70′, of Borneo; in Peninsula 2d, 9m.

Knema Cantleyi, *Warb.* At 100′, Kunstl. 5614; flr. Feb. A tree up to 50′, endemic, 2d, 5h, 9m.

Knema conferta, *Warb.* At Taiping, Wray 2377; flr. July. A tree up to 40′, of Tenasserim, Siam and Borneo; in Peninsula common.

Knema Curtisii, *Warb.* Taiping Hill, Ridl. 14681; fruit Aug. A small tree, endemic, 2d, 6k, 9m.

Knema furfuracea, *Warb.* 800-1200′, Kunstl. 5600; flr. Feb. A tree about 30′, of Sumatra and Borneo; in Peninsula common.

Knema intermedia, *Warb.* At 100′, Kunstl. 6371, 7576; fruit May, July. A tree up to 50′, of W. Malaysia; in Peninsula common.

Knema Kunstleri, *Warb.* 500-3000′, Wray 2056, Kunstl. 4150, 6440, Curt. 2051, Haniff 13127; flr. March, April, fruit June, Sept. A tree up to 20′, endemic, 4f, 5h, 6k.

Knema laurina, *Warb.* At Waterloo, Curt. 2728; fruit May. A tree up to 60′, of W. Malaysia; in Peninsula common.

Knema oblongifolia, *Warb.* Taiping Hills, Ridl. (not seen). At 3000′, Curt. 2050 (var. monticola); fruit Sept. A shrub, endemic, the species common, the var. at 4f.

Knema Wrayi, *Warb.* At 100′, Kunstl. 6521; fruit Aug. A tree up to 30′, endemic, 4f, 5h, 6k, 7l, 9m.

MONIMIACEAE.

Matthea sancta, *Bl.* 2500-3000′, Wray 2811, B. & H. 12826; flr. and fruit March. A shrub or tree of Borneo; in Peninsula, 8h, 6k, 7l, 9m.

LAURACEAE.

Cryptocarya crassinervia, *Miq.* 100-500′ (to 3000′, fide Gamble), Kunstl. 5729, 6579; flr. Sept., Nov. A tree up to 60′, of Sumatra and Borneo; in Peninsula 3f, 4f, 5h.

Cryptocarya densiflora, *Bl.* 500-800′, Kunstl. 3605. A tree up to 60′, of Java, Borneo, Philippines; in Peninsula 5g.

Cryptocarya Kurzii, *Hook. fil.* 100-300′, Kunstl. 5320, 5395; flr. Jan., fruit Dec. A tree up to 40′, of Tenasserim to Borneo; in Peninsula 4f, 8j, 6k, 9l, 9m.

Cryptocarya rugulosa, *Hook. fil.* 500-1000′, Kunstl. 3749, 6279; flr. Jan., fruit July. A tree up to 50′, endemic, 2d, 3f, 6k.

Crytocarya Scortechinii, *Gamble.* 100-4000′, Kunstl. 6297, 6298, Ridl. 2966; flr. March, July. A tree up to 70′, endemic, 4f, 5g.

Beilschmiedia Foxiana, *Gamble.* At about 4000′, Fox (Ridl. 10705). A tree, endemic and local.

Beilschmiedia insignis, *Gamble.* At Taiping, Kunstl., fide Ridl. A tree up to 70′, endemic and local.

Beilschmiedia Kunstleri, *Gamble.* On low ground, Kunstl. 6854, fide Gamble. A tree up to 100′, endemic, 9m.

Beilschmiedia longipes, *Hook. fil.* 800-2000′, Kunstl. 5465. Ridl.; flr. Jan. A spreading tree up to 50′, endemic, 6k.

Beilschmiedia perakensis, *Gamble.* 500-800′, Kunstl. 8489; flr. Feb. A shrub or tree, endemic, 4f.

Beilschmiedia Scortechinii, *Gamble.* At 3700′, Scort. 483, 493, fide Gamble. A tree, endemic and local.

Dehaasia cuneata, *Bl.* At Taiping, Wray 2099, 2654, 3101, Kunstl. 6745, fide Gamble. A tree up to 50′, of Burma, Sumatra, Java; in Peninsula 1a, 3f, 5h.

Endiandra praeclara, *Gamble.* 100-4000′, Kunstl. 6714, H. & N. 2320; flr. Feb., Oct., fruit Feb. A tree up to 70′, endemic, 2d, 4f, 5h.

Cinnamomum cinereum, *Gamble.* 500-2000′, Wray 2629, Kunstl 8515, fide Gamble, Wray 4056; flr. April. A tree up to 70′, endemic and local.

Cinnamomum graciliflorum, *Gamble.* At about 4500′, Scort. 1228, fide Gamble. A tree, endemic, 4d.

Cinnamomum iners, *Reinw.* 100-800′, Kunstl. 3861, 6456, 6510; flr. Aug., fruit Feb. A tree about 40′, of Indo-Malaya to the Philippines; in Peninsula common.

Cinnamomum Kunstleri, *Ridl.* Within 100′, Kunstl. 5568, fide Ridl. A tree up to 40′, endemic and local.

Cinnamomum lampongum, *Miq.* Up to 800′, Kunstl. 4802, 6595, fide Gamble. A tree of Sumatra; in Peninsula 3e only.

Cinnamomum mollissimum, *Hook. fil.* 100-800′, Wray 2669, Kunstl. 6013, fide Gamble. A shrub or small tree, endemic, 2d, 4f.

Cinnamomum rhyncophyllum, *Miq.* Up to 500′, Kunstl. 3287, fide Gamble. A tree up to 50′, of Sumatra; in Peninsula 4f, 5g.

Alseodaphne insignis, *Gamble.* 800-1000′, Kunstl. 6958, 7273; fruit Feb., Dec. A tree up to 100′, endemic and local.

Alseodaphne paludosa, *Gamble.* Larut, Kunstl. 5378, fide Gamble. A tree up to 100′, endemic and local.

Alseodaphne Wrayi, *Gamble.* At Kota, Wray 2543, at Larut, Kunstl. 5493, 5917, fide Gamble. A tree up to 50′, endemic and local.

Nothaphoebe fruticosa, *Gamble.* At 2000′, H. & N. 2389; flr. Feb. A shrub or small tree, endemic, 4f, 5h.

Nothaphoebe Kingiana, *Gamble.* 500-3500′, Kunstl. 4938, H. & N. 2331; flr. Feb., Sept. A tree up to 40′, endemic and local; a var. at 3f.

Nothaphoebe panduriformis, *Gamble.* At Changkat Serdang, Wray, fide Ridl. A tree up to 50′, endemic, 4f, 6f, 5g, 8g, 8h, 6k.

Nothaphoebe reticulata, *Gamble.* At 4000′, Ridl. 2967, B. & H. 12865; flr. Feb. A tree up to 50′, endemic, 5g, 5h.

Nothaphoebe umbelliflora, *Bl.* 400-600′, Kunstl. 8484; flr. Feb. A tree up to 50′, of Siam to Borneo; in Peninsula common.

Machilus Scortechinii, *Gamble.* 3500-4000′, Scort. 492, Kunstl. 8413, fide Gamble. A tree up to 50′, endemic and local.

Phoebe cuneata, *Bl.* 100-4600′, Kunstl. 2646, 6249, 6577, 6995, Ridl., H. & N. 2342; flr. Jan., Feb., Dec., fruit June, Sept. A tree up to 80′, of Java; in Peninsula 2d, 4f, 5g, 5h, 7l, 9m.

Phoebe macrophylla, *Bl.* At Waterloo, Curt. 2727; fruit May. A bushy tree about 40′, of Java; in Peninsula 3f, 9m.

Stemmatodaphne perakensis, *Gamble.* Up to 1000′, Wray 2658, Kunstl., fide Gamble. A tree up to 70′, endemic, 4f, 6k.

Actinodaphne glomerata, *Nees.* At Larut, Kunstl., fide Ridl. A tree up to 40′, of Sumatra and Java; in Peninsula 9m.

Actinodaphne montana, *Gamble.* 3000-3500′, Kunstl. 2129, 2913, fide Gamble. A tree up to 70′, endemic and local.

Actinodaphne pruinosa, *Nees.* Waterfall Hill, Wray, fide Ridl. A tree up to 40′, endemic, 2d, 6k, 9m.

Actinodaphne sesquipedalis, *Hook. fil.* 500-4200′, Kunstl. 4399, 5147, Curt. 2053, Hend. 11811; flr. March, June, Sept., Nov. A tree up to 50′, of Lower Siam and Borneo; in Peninsula 2d 4f, 5h.

Litsea amara, *Bl.* At 2000′, Ridl. 2981; flr. Feb. A bush or small tree of Indo-Malaya; in Peninsula common and variable.

Litsea angulata, *Bl.* At 4100′, B. & H. 12866; flr. Feb. A tree up to 80′, of Java; in Peninsula 5h.

Litsea brachystachya, *Boerl.* 800-1000′, Kunstl. 6855; flr. Nov. A tree up to 50′, of Java; in Peninsula 3e only.

Litsea castanea, *Hook. fil.* 500-1500′, Kunstl. 4937, 6497; flr. Aug., Sept. A tree up to 100′, endemic, 4f, 5h, 6k.

Litsea citrata, *Bl.* 3000-4000′, Ridl. 11390, H. & N. 2323, B. & H. 12935, flr. Feb., Dec., fruit March. A small tree of Indo-Malaya and China; in Peninsula 4f, 5g.

Litsea claviflora, *Gamble.* 500-1000′, Kunstl. 8492, fide Gamble. A tree up to 40′, endemic and local.

Litsea cordata, *Hook. fil.* 100-200′, Kunstl. 3962, 6529; flr. Sept., fruit March. A tree up to 30′, of Sumatra and Borneo; in Peninsula 4f, 5h, 6k, 9l, 9m.

Litsea cylindrocarpa, *Gamble.* At 100′, Kunstl. 5500, 6673; flr. Jan., fruit Oct. A tree up to 130′, of Java and Borneo; in Peninsula 2d, 3f.

Litsea fenestrata, *Gamble.* Up to 800′, Kunstl. 5938, 6859, fide Gamble. A tree up to 100′, of Sumatra and Borneo; in Peninsula 3e only.

Litsea ferruginea, *Bl.* 300-800′, Kunstl. 6039, 6826; flr. May, fruit Nov. A tree up to 80′, of Java; in Peninsula 4f, 9m.

Litsea firma, *Hook. fil.* 400-500′, Kunstl. 6772, 7391, fide Gamble. A tree up to 100′, of W. Malaysia except Java; in Peninsula 6k, 9m.

Litsea gracilipes, *Hook. fil.* At 100′, Kunstl. 5421; fruit Jan. A small tree of Borneo; in Peninsula 8h, 6k, 9m.

Litsea Griffithii, *Gamble.* Larut, Kunstl., fide Gamble. A tree up to 60′, of Sumatra; in Peninsula 4f, 5h, 6k, 9l, 9m.

Litsea hirsutissima, *Gamble.* 100-2500′, Kunstl., Curt. 1344, fide Gamble. A shrub, endemic, 4f.

Litsea lancifolia, *Hook. fil.* 200-500′, Kunstl. 3233, 6609; flr. Aug., Sept. A bush or small tree of Indo-Malaya and China; in Peninsula 4f, 5h, 9l, 9m.

Litsea machilifolia, *Gamble,* var. angustifolia, *Gamble.* At 100′, Kunstl. 6815; fruit Nov. A tree up to 80′, endemic, the var. at 4f, 5g, the species at 2d, 6k, 9m.

Litsea megacarpa, *Gamble.* 100-500′, Wray 2337, Kunstl. 6124, 6237, 6409, 6567, 6866; flr. May, June, fruit July, Sept., Nov. A tree up to 60′, endemic 2d, 4f, 4h, 5h.

Litsea monticola, *Gamble.* 3500-4500′, Kunstl. 7000, 8454, fide Gamble. A tree up to 50′, endemic and local.

Litsea nidularis, *Gamble.* 800-1000′, Kunstl. 6883; fruit Nov. A tree, endemic, 2d, Ulu Kenat, Perak.

Litsea Noronhae, *Bl.* At Ulu Tupai, Wray, fide Gamble. A shrub or tree up to 50′, of Sumatra and Java; in Peninsula 3f, 4f, 5h.

Litsea oblanceolata, *Gamble.* Up to 300′, Kunstl. 1952, 2020, fide Gamble. A tree up to 40′, endemic and local.

Litsea panamonja, *Hook. fil.* At Waterloo, 1500′, Curt. 2694; flr. May. A tree up to 40′, of Assam to Lower Siam; in Peninsula 5g, 6k.

Litsea patellaris, *Gamble.* 400-800′, Kunstl. 7312, fide Gamble. A tree up to 60′, endemic and local.

Litsea perakensis, *Gamble.* Up to 800′, Kunstl., fide Gamble. A tree up to 40′, endemic, 4f, 9l, 9m.

Litsea pustulata, *Gamble.* Up to 800′, Kunstl. 2544, 3418, 5140, fide Gamble. A tree up to 30′, endemic and local.

Litsea spathacea, Gamble. Up to 3000′, (fide Gamble), Ridl. A small tree, endemic, 2d, 5h, 6j.

Litsea Teysmanni, *Gamble.* At low altitudes, Wray, Kunstl., fide Ridl. A tree up to 70′, of Bangka and Borneo; in Peninsula 6k.

Litsea Wrayi, *Gamble.* 800-1400′. Wray 4036: flr. April. A tree up to 80′, endemic and local.

Neolitsea villosa, *Gamble.* 4000-4500′. Kunstl. 7011: fruit Dec. A tree up to 30′, of Amboina and the Philippines; in Peninsula 3e only.

Lindera bibracteata, *Boerl.* At 4500′. H. & N. 2461; flr. Feb. A shrub up to 15′, of Java; in Peninsula 4d, 4f.

Lindera caesia, *Boerl.* 3500-4000′. Kunstl. 6951. Curt. 2052: flr. Sept., Dec. A small tree of Java and Borneo; in Peninsula 6e, 5g, 5h.

Lindera malaccensis, *Hook. fil.* 500-800′. Kunstl. 5139: flr. Nov. A tree up to 80′, of Sumatra and Borneo; in Peninsula 4f, 5g, 6k, 7l, 9m.

Lindera pipericarpa, *Boerl.* 3000-3500′. Scort., Kunstl., fide Ridl. A tree up to 40′, endemic, 4f, 5g.

HERNANDIACEAE.

Illigera appendiculata, *Bl.* At 3800′. B. & H. 12561: flr. March. A climber up to 80′, of Indo-Malaya; in Peninsula common.

PROTEACEAE.

Helicia attenuata, *Bl.* At 200′. Hend. 10210: flr. Sept. A shrub or tree of Java; in Peninsula 2d, 6e, 4f, 5h, 9l.

Helicia excelsa, *Bl.*, var. Forbesii. *Ridl.* At low altitudes. Kunstl. 3392, fide Gamble. A tree up to 80′, the species from Burma to Tenasserim, the var. in Sumatra and Cambodia; in Peninsula the var. in 3e only.

Helicia Kingiana, *Prain.* 500-1000′. Kunstl. 3714. 3881. 6217. fide Gamble. A tree up to 70′, endemic. 4f, 5g.

Helicia rufescens, *Prain.* 200-1500′. Wray 2083. 3084. Kunstl. 4213, 4939, 5096, 8504, fide Gamble. A tree up to 80′, endemic and local.

THYMELAEACEAE.

Daphne composita, *Gilg.* At about 4000′. Wray 510. A shrub or small tree of Indo-Malaya: in Peninsula 4f, 5g, 5h.

Wikstroemia Candolleana, *Meissn.* 4000-4700′. Curt. 2055 Ridl. 2900, Anders. 24. B. & H. 12658. 12965: flr. March, Sept. A shrub or small tree of Java; in Peninsula 3d, 4d, 6e, 4f, 5g, 6g.

Aquilaria malaccensis, *Lamk.* Larut. Kunstl., fide Ridl. A tree up to 80′, of W. Malaysia to Philippines; in Peninsula common.

LORANTHACEAE.

Loranthus coccineus, *Jack.* 300-800′, Wray 2582, Kunstl. 2323; flr. Sept. fruit July, Sept. A parasitic shrub of Indo-Malaya; in Peninsula common.

Loranthus crassipetalus, *King.* Larut Hills, Ridl. A parasitic shrub, endemic, 4f, 5h.

Loranthus ferrugineus, *Roxb.* At Taiping, Wray, Hend. 10002; flr. Jan. A parasitic shrub of W. Malaysia to Philippines; in Peninsula common.

Loranthus grandifrons, *King.* At 100′, Wray 1958, Kunstl. 2067; flr. May, July. A parasitic shrub of Lower Siam to Sumatra; in Peninsula 4f, 6f, 6g, 7g, 5j, 6k.

Loranthus heteranthus, *Wall.* 2500-3500′, Wray 3234, Kunstl. 6362. A parasitic shrub of Indo-Malaya; in Peninsula 2c, 4d, 4f, 8g, 8j.

Loranthus Lobbii, *Hook. fil.* 2000-4500′, Curt., Ridl. 2969, H. & N. 2384; flr. Feb., Sept. A parasitic shrub, endemic and common.

Loranthus malaccensis, *Hook. fil.* 3000-4000′, Kunstl. 6286. A parasitic shrub, endemic and common.

Loranthus obtectus, *Wall.* 4300-4750′, Fox 120, B. & H. 12670; flr. March, Oct. A parasitic shrub of Burma and Lower Siam; in Peninsula 4h, 6k, 9l.

Loranthus pentandrus, *Linn.* At about 1000′, Wray 2062; flr. and fruit June. A parasitic shrub of Indo-Malaya and S. China; in Peninsula common.

Loranthus pentapetalus, *Roxb.* 4000-4750′, Ridl. 2968, B. & H. 12891; flr. Feb. A parasitic shrub of Indo-Malaya and S. China; in Peninsula 4f, 5h, 8h, 6k.

Loranthus productus. *King.* 2500-3500′, Wray 2949, H. & N. 2327; flr. Feb. A parasitic shrub, endemic, 4f, 5g.

Loranthus pulcher, *DC.* 3000-4000′, Wray 3225, Kunstl. 6257, Fox 160, Ridl. 5231; flr. June, fruit Oct. A parasitic shrub of Tenasserim and Siam; in Peninsula 1a, 2d, 6e, 4f, 5g.

Elytranthe avenis, *G. Don.* At 4500′, Wray 645, fide Gamble. A parasitic shrub of Sumatra and Java; in Peninsula 2c, 6e, 4f, 6g.

Elytranthe diantha, *Gamble.* Up to 800′, Scort. 76, 604, Kunstl. 1870, 6446, fide Gamble. A parasitic shrub, endemic and local.

Elytranthe formosa, *G. Don.* 3000-4000′, Kunstl. 6264, Hervey. A parasitic shrub of Burma and Java; in Peninsula 4f, 5g, 7g, 5h.

Elytranthe Kunstleri, *Gamble.* At Taiping, Kunstl., fide Ridl. A bushy parasitic shrub of Borneo; in Peninsula 6e, 3f, 4f, 7g.

Lepeostegeres Beccarii, *Gamble.* At 3200′, B. & H. 13029; flr. March. A creeping parasitic shrub of Borneo; in Peninsula 4f.

Lepeostegeres Kingii, *Gamble.* At about 4500′, Scort. 1251, fide Gamble. A parasitic shrub, endemic, 6e, 4f, 5g, 6k, 9l.

Viscum dichotomum, *G. Don.* At 300′, Kunstl. 4191. A parasite on other Loranthaceae, of India and Burma; in Peninsula common.

Viscum orientale, *Willd.* At 2000′, Ridl. A bushy parasitic shrub of Indo-Australia and S. China; in Peninsula 2c, 2d, 4f, 8h, 6k, 9m.

SANTALACEAE.

Henslowia Reinwardtiana, *Bl.* At 100′, Kunstl fide Ridl. A parasitic climber of W. Malaysia; in Peninsula 3e only.

Henslowia umbellata, *Bl.* 800-1000′, Kunstl. 5213, fide Gamble. A climbing parasite of Siam and W. Malaysia; in Peninsula common.

Henslowia Wrayi, *Gamble.* 500-1000′, Kunstl., fide Ridl. A climbing parasite, endemic and local.

OPILIACEAE.

Lepionurus sylvestris, *Bl.* 300-2500′, Wray 2820, Kunstl. 5502, 8521, B. & H. 13032 (var.); flr. March. A small shrub of Siam, Java and Borneo; in Peninsula common.

BALANOPHORACEAE.

Balanophora ?multibrachiata, *Farcelt.* 4200-4700′, B. & H. A parasite of Sumatra; in Peninsula 4f, 5g, 6j, 9k.

Balanophora truncata, *Ridl.* At 3900′, B. & H. 12?27; flr. March. A parasite, endemic, 4f, 5g, 5h. This specimen differs from typical B. truncata in the flr.-spikes being purplish-grey and not dirty yellow.

Rhopalocnemis ruficeps, *Ridl.* 2500-4000′, Ridl. (not seen). A fleshy parasitic herb, endemic, 2d.

EUPHORBIACEAE.

Euphorbia thymifolia, *Burm.* At Taiping, Wray, fide Ridl. A prostrate herb, pantropic; in Peninsula 2d, 8g, 6k, 9m.

Bridelia tomentosa, *Bl.* 100-500′, Kunstl. 2492, 2676, Ridl. 2977, Hend. 10021, 10111, 10138, 10224; flr. Oct., Nov., fruit Jan., Feb. A small tree of Indo-Australia; in Peninsula common.

Cleistanthus ellipticus, *Hook. fil.* 100-500′, Wray 2547, Kunstl. 3196, 5162; flr. July, Aug., fruit Nov. A tree up to 40′, endemic, 2d.

Cleistanthus Kingii, *Jabl.* 300-500′, Kunstl. 3064, 6744; fruit June, Oct. A shrub or tree up to 60′, endemic, 4e.

Cleistanthus membranaceus, *Hook. fil.* 200-500′, Kunstl. 1974, 3355, 3424, 6619; flr. June, Sept., Oct. A tree up to 30′, endemic, 2d.

Cleistanthus pedicellatus, *Hook. fil.* At Taiping, Wray, fide Ridl. A small tree, endemic, 2d.

Cleistanthus podocarpus, *Hook. fil.* At 100′, Kunstl. 6701; fruit Oct. A tree up to 70′, endemic and local.

Acetephila excelsa, *Müll. Arg.* Larut, Kunstl., fide Ridl. A shrub up to 8′, of India and Ceylon; in Peninsula 2d, 4e, 5h, 9m.

Andrachne australis, *Zoll.* 300-500′, Kunstl., fide Ridl. A small shrub of Indo-Australia; in Peninsula 3e only.

Phyllanthus frondosus, *Wall.* 2500-4700′, Wray 1856, Ridl., Anders. 66, B. & H. 12579; flr. March, June, Dec. A shrub up to 6′, of Siam, Lingga and Carimon Islands; in Peninsula common.

Phyllanthus gomphocarpus, *Hook. fil.* Larut, Kunstl., fide Ridl. A shrub up to 8′, of Siam; in Peninsula 1b, 3f, 4f, 5h, 6j, 6k, 7k.

Phyllanthus urinaria, *Linn.* 300-3800′, Hend. 10311, B. & H. 13005; flr. March, Aug. A small herb, pantropic; in Peninsula common.

Phyllanthodendron dubium, *Gage.* 300-2000′, Kunstl. 4941, Ridl. 2972, 14547; flr. Feb. fruit Aug., Sept. A shrub, endemic, 1b, 2c, 4e, 3f.

Glochidion coronatum, *Hook. fil.* 200-500′, Wray 1956, Kunstl. 6678; flr. May, Oct. A shrub up to 12′, of Tenasserim and Lower Siam; in Peninsula common on the West.

Glochidion desmocarpum, *Hook. fil.* At Changkat Serdang, Wray, fide Ridl. A tree up to 30′, endemic, 4f, 5h, 6k, 9m.

Glochidion laevigatum, *Hook. fil.* 2500-4750′, H. & N. 2376, B. & H. 12576, 12884; flr. Feb., March. A tree up to 50′, of Tenasserim; in Peninsula 2d, 4h, 5h, 6k, 0k, 7l, 9m.

Glochidion leiostylum, *Kurz.* At 100′, Kunstl. 5435; flr. Jan. A tree up to 25′, of Burma to Lower Siam; in Peninsula 1b, 4h, 5h, 6k, 9m.

Glochidion microbotrys, *Hook. fil.* 500-800′, Kunstl. 7479; fruit April. A tree up to 50′, of Lower Siam; in Peninsula 5h, 9m.

Glochidion perakense, *Hook. fil.* At Taiping, Wray 1683, Ridl.; flr. Feb. A tree up to 20′, endemic, 2b, 2d, 4f.

Glochidion sericeum, *Hook. fil.* At 300′, Wray 2327; fruit June. A small tree of W. Malaysia; in Peninsula common from Taiping to Singapore.

Flueggia microcarpa, *Bl.* At Ulu Tupai, Wray 2686; flr. and fruit Aug. A bush or small tree of Trop. Africa and Indo-Australia; in Peninsula common in the North.

Breynia angustifolia, *Hook. fil.* 200-1000′, Kunstl. 3949, Hend. 10230; fruit Nov. A shrub up to 10′, endemic, 4f.

Breynia coronata, *Hook. fil.* 3000-3500′, Kunstl. 2229; fruit Aug. A tree up to 20′, endemic and common.

Drypetes pendula, *Ridl.* 600-1500′, Kunstl. 3540, 6733; fruit Oct. A tree up to 60′, endemic, 2d, 5h, 9m.

Drypetes perakensis, *Gage.* Larut, Kunstl., fide Ridl. A shrub or small tree, endemic and local.

Antidesma alatum, *Hook. fil.* 1500-3000′, Wray 1675, 2794, Kunstl. 2211, 5010, Curt. 1322, Ridl. 2978, 5503; flr. Dec., fruit June, Aug., Oct. A tree up to 30′, of Lower Siam; in Peninsula common from Taiping southwards.

Antidesma coriaceum, *Tulasne.* 100-1500′, Wray 1854, Kunstl. 4212, 5372, 5422, 5598, 8394, 8470; flr. Jan., Dec., fruit Feb., May. A tree up to 30′, of Lower Siam and Borneo; in Peninsula common.

Antidesma cuspidatum, *Müll. Arg.* At 300′, Wray 1839; fruit April. A tree of Borneo; in Peninsula common.

Antidesma gracillimum, *Gage.* At about 2500′, Wray, fide Ridl. A small tree, endemic, 4d.

Antidesma Kunstleri, *Gage.* At about 2500′, Ridl. 2975. A shrub up to 9′, endemic, 4d.

Antidesma leucocladon, *Hook. fil.* Larut, Kunstl., fide Ridl. A shrub or small tree, endemic, 2d, 4e, 5g.

Antidesma montanum, *Bl.* 200-800′, Wray 2146, Kunstl. 2031; fruit June, July. A tree up to 40′, of Indo-Malaya; in Peninsula common at low altitudes.

Antidesma pachystachys, *Hook. fil.* 500-800′, Kunstl. 5778; fruit Nov. A shrub up to 15′, endemic, 2d.

Antidesma pendulum, *Hook. fil.* 300-800′, Wray 2559, 3284, Kunstl. 3460; flr. July. A shrub up to 8′, endemic, 4d, 4f, 9l.

Antidesma stipulare, *Bl.* Larut, Kunstl., fide Ridl. A shrub or small tree of W. Malaysia except Sumatra; in Peninsula 5h, 8l.

Antidesma tomentosum, *Bl.* 1500-2500′, Wray 2983, Kunstl. 3928; fruit Feb. A shrub or small tree of W. Malaysia; in Peninsula 4d, 6e, 4f, 7g, 9k, 7l, 9l.

Daphniphyllum lancifolium, *Hook. fil.* 4000-4600′, Kunstl. 7007. A tree up to 60′, endemic and local.

Daphniphyllum laurinum, *Baill.* At 4700′, B. & H. 12632; fruit March. A large shrub of Siam and W. Malaysia; in Peninsula common.

Aporosa arborea, *Müll. Arg.* Larut, Kunstl., fide Ridl. A tree up to 40′, of Sumatra and Java; in Peninsula 4d, 6f.

Aporosa Benthamiana, *Hook. fil.* Larut, Ridl. (not seen). A tree up to 80′, endemic, 2d, 5h 6k, 9m.

Aporosa falcifera, *Hook. fil.* Larut, Kunstl., fide Ridl. A tree up to 60′, of Borneo; in Peninsula 4f, 5h, 9m.

Aporosa frutescens, *Bl.* Larut, Barnard C.F.40; fruit Sept. A shrub or tree of Sumatra and Java, in Peninsula common.

Aporosa Miqueliana, *Müll. Arg.* 100-500′, Kunstl. 3322, 3501, 6658; flr. Oct., fruit Sept., Oct. A shrub or tree up to 40′, of Sumatra and Borneo; in Peninsula 4f, 5g, 5h, 9l.

Aporosa nigricans, *Hook. fil.* 300-800′, Kunstl. 3347, 3539; flr. Sept., Oct., fruit Sept. A tree up to 20′, of Borneo; in Peninsula common.

Aporosa pseudo-ficifolia, *Pax.* 100-3000′, Wray 2053, 2627, 3206, Kunstl. 2802, 3231, 5108, Ridl. 2973; flr. Feb., fruit June. A shrub up to 10′, endemic, 2d, 5g, 6k.

Aporosa stellifera, *Hook. fil.* At 300′, Kunstl. 3323; flr. Sept. A tree up to 30′, endemic, 2d, 4d, 4f, 5h, 8k.

Baccaurea bracteata, *Müll. Arg.* 100-300′, Kunstl. 5177, 5293, 6648; fruit Sept., Nov., Dec. A tree up to 40′, of Sumatra and Borneo; in Peninsula 4f, 6f, 6g, 8h, 6j, 9l, 9m.

Baccaurea brevipes, *Hook. fil.* At 100′, Scort. 1442, Kunstl. 6232; flr. June, Oct. A tree up to 20′, of Borneo; in Peninsula common.

Baccaurea Griffithii, *Hook. fil.* At 100′, Kunstl. 6617, Anders. 110; fruit March, Sept. A tree up to 60′, endemic and common.

Baccaurea Hookeri, *Gage.* Larut, Kunstl., fide Ridl. A tree up to 70′, endemic, 9m.

Baccaurea Kingii, *Gage.* Larut, Kunstl., fide Ridl. A tree up to 50′, endemic, 2d, 4f, 6k, 9m.

Baccaurea latifolia, *King.* 800-1000′. Kunstl. 6702; flr. Oct. A tree up to 60′, endemic, 9m.

Baccaurea macrophylla, *Müll. Arg.* At Kota, Wray 2406; fruit Aug. A tree up to 80′, of Borneo; in Peninsula 2d, 4f, 5g, 9m.

Baccaurea Maingayi, *Hook. fil.* 1500-2000′. Kunstl. 6837; fruit Nov. A tree up to 60′, endemic, 6k, 9m.

Baccaurea malayana, *King.* Larut, Kunstl., fide Ridl. A tree up to 80′, endemic, 6e, 4f, 5h, and cultivated.

Baccaurea minor, *Hook. fil.* Larut, Kunstl., fide Ridl. A tree up to 30′, endemic, 4d, 4f, 9m.

Baccaurea Motleyana, *Müll. Arg.* At 200′. Hend. 10227; fruit Nov. The Rambai. A tree of about 60′, of Sumatra and Borneo; in Peninsula cultivated.

Baccaurea parviflora, *Müll. Arg.* 800-1500′. Kunstl. 3963; fruit March. A tree up to 15′, of Indo-Malaya; in Peninsula common.

Baccaurea polyneura, *Hook. fil.* At 100′, Kunstl. 6511; flr. Aug. A tree up to 80′, endemic, 6k.

Baccaurea sapida, *Müll. Arg.* 100-2500′. Wray, Kunstl. 3278. 6700, Ridl.; flr. Aug., Oct. A tree up to 50′, of Indo-Malaya; in Peninsula 1b, 0k.

Baccaurea Wallichii, *Hook. fil.* At 500′. Kunstl. 3717; fruit Jan. A tree up to 40′, of Borneo; in Peninsula, 2d, 6f, 5h, 6k, 9l. 9m.

Baccaurea Wrayi, *King.* 2500-3500′. Wray 513. Kunstl. 6353; fruit July. A tree up to 80′, endemic, 1a, 2d, 8h.

Scortechinia Kingii, *Hook. fil.* 800-1000′. Kunstl. 3776; fruit Jan. A tree up to 60′, of Borneo; in Peninsula 6k, 9k.

Elateriospermum Tapos, *Bl.* At Waterloo. Robertson-Glasgow; fruit Dec. A tree up to 100′ or more, of W. Malaysia; in Peninsula 2d, 4f, 5h, 6j, 6k.

Galearia subulata, *Müll. Arg.* Larut, Kunstl., fide Ridl. A shrub up to 18′, endemic, 2d, 4f.

Croton argyratum, *Bl.* 300-500′. Kunstl. 7420; flr. March. A tree up to 40′, of Indo-Malaya to the Philippines; in Peninsula common.

Croton confusum, *Gage.* Larut, Kunstl., fide Ridl. A shrub or tree up to 30′, of Siam; in Peninsula 2d, 6j, 7k, 9l, 9m.

Croton Griffithii, *Hook. fil.* 1000-2000′. Curt. 2057; flr. Sept. A shrub or tree, endemic and common.

Trigonostemon indicus, *Müll. Arg.* At about 1000′, Wray 2633; flr. and fruit Aug. A tree up to 30′, of Siam to Sumatra; in Peninsula common.

Trigonostemon longifolius, *Baill.* 500-800′, Kunstl. 5224; fruit Nov. A shrub up to 12′, of Tenasserim and Sumatra; in Peninsula common.

Agrostistachys borneensis, *Becc.* 500-2500′, Wray 2976, Kunstl. 3523, Curt. 2688, Ridl. 5493; flr. May, June, fruit Oct. A spreading shrub of Borneo; in Peninsula 2c, 2d, 3f, 5h, 0m.

Agrostistachys Gaudichaudii, *Müll. Arg.* Taiping Hills, Kunstl., fide Ridl. A tree up to 60′, endemic and common.

Agrostistachys sessilifolia, *Pax. & Hoffm.* 500-1000′, Wray 2644, Kunstl. 3459; flr. Aug. A small shrub, endemic and common.

Ostodes macrophylla, *Benth.* 1000-1800′, Kunstl. 3916, Curt. 2685; flr. May, fruit Feb. A tree up to 40′, of Java to the Philippines; in Peninsula 5g, 6g, 5h, 6j, 6k, 9m.

Ostodes muricata, *Hook. fil.* Up to 500′, Kunstl. 3415; fruit Sept. A shrub or small tree, endemic, 2d, 3f, 4f.

Claoxylon indicum, *Hassk.* 200-4000′, Wray 2175, Ridl. 2980; flr. Feb., fruit Feb., June. A shrub of Indo-Malaya; in Peninsula common.

Claoxylon Kingii, *Hook. fil.* 2000-2500′, Kunstl., fide Ridl. A shrub up to 6′, endemic and local.

Claoxylon Wallichianum, *Müll. Arg.* At 2000′, Curt. 2056; flr. Sept. A tree up to 20′, endemic, 2d.

Coelodepas longifolium, *Hook. fil.* 500-1000′, Kunstl., fide Ridl. A tree up to 30′, endemic and local.

Alchornea villosa, *Müll. Arg.* At about 1000′, Ridl. 2796. A bush of Sumatra and Java; in Peninsula common.

Epiprinus malayanus, *Griff.* 300-2200′, Wray 2213, Kunstl. 3228, 3543, 3908, 6875, Curt. 1338; flr. Feb., June, Aug., Dec., fruit Nov. A shrub up to 9′, of Sumatra; in Peninsula 2c, 2d, 4e, 5g, 5h, 6j, 6k.

Melanolepis multiglandulosa, *Reinw. fil. & Zoll.* At Kota, Wray, fide Ridl. A tree up to 30′, of Indo-Malaysia and S. China; in Peninsula 6d, 6g, 5h.

Mallotus barbatus, *Müll. Arg.* At 100′, Scort. 277, Kunstl. 1823, Ridl.; flr. April, fruit April, June. A large bush of Indo-Malaya and S. China; in Peninsula 2b, 2d, 4d, 4e, 4f.

Mallotus cochinchinensis, *Lour.* At 3100′, B. & H. 12571; flr. and fruit March. A tree up to 30′, of Indo-Malaya and China; in Peninsula common.

Mallotus floribundus, *Müll. Arg.* At Changkat Serdang, Wray, fide Ridl. A tree up to 40′, of Malaysia; in Peninsula 1a, 2c, 4d, 4f, 6f, 7h, 8h, 6k, 9l.

Mallotus macrostachys, *Müll. Arg.* 4000-4600′, Kunstl. 2303, 2496, Curt. 2055, Fox 108; flr. Sept., Oct. A large shrub or small tree of Siam to Borneo; in Peninsula common.

Mallotus repandus, *Müll. Arg.* 100-2000′, Wray 3330, Ridl.; fruit Feb. A climber up to 80′, of Indo-Australia; in Peninsula 2b, 2d, 3f, 5h, 6j.

Mallotus Wrayi, *King.* 300-1600′, Kunstl. 3165, 3456; flr. Aug., fruit Oct. A tree up to 80′, endemic, 3f.

Ptychopyxis costata, *Miq.* Taiping Hills, Ridl. 5490; fruit June. A tree up to 40′, of Sumatra; in Peninsula 5h, 6k, 9m.

Ptychopyxis Kingii, *Ridl.* 500-3000′, Kunstl., fide Ridl. A tree up to 50′, endemic and local.

Macaranga denticulata, *Müll. Arg.* At Taiping, Herd. 10147, 10217, 10372, 10443; flr. Jan., Feb., fruit Nov. A tree up to 40′, of Indo-Malaya; in Peninsula 2b, 6e, 4f, 5g, 5h, 7h.

Macaranga Hosei, *King.* At Taiping, Wray, fide Ridl. A tree up to 40′, of Borneo; in Peninsula 8d, 4f, 6k.

Macaranga Hullettii, *King.* At about 2500′, Ridl., 5497; fruit June. A tree up to 30′, endemic, 3f, 4f, 5g, 4h, 5h, 5j, 6k.

Macaranga Lowii, *King.* Larut, Kunstl., fide Ridl. A tree up to 15′, endemic, 2d, 6e, 5h, 6k, 9m.

Macaranga Maingayi, *Hook. fil.* Larut, Kunstl., fide Ridl. A tree up to 40′, endemic, 6k.

Macaranga puncticulata, *Gage.* At Taiping, Herd. 10044; fruit Jan. A bush or tree of Borneo; in Peninsula 5g, 4h, 9m.

Macaranga Tanarius, *Müll. Arg.* At Kota, Wray, fide Ridl. A small tree of Indo-Australia; in Peninsula common.

Endospermum malaccense, *Müll. Arg.* 100-300′, Wray 2320, 2379, Kunstl. 6392; flr. June, July. A tree up to 80′, endemic and common.

Endospermum perakense, *King.* Larut, Kunstl., fide Ridl. A tree up to 80′, endemic and local.

Pimeleodendron Griffithianum, *Benth.* At 2000′, B. & H. 12827; fruit Feb. A tree up to 40′, endemic, 2d, 4e, 5g, 4h, 5h, 6k, 9m.

Homalanthus populifolius, *Grah.* At Waterloo, 1500′, Curt. 2684; flr. May. A tree up to 20′, of Malaysia to Australia; in Peninsula 2d, 4d, 4f, 6g, 5h, 0j.

Excoecaria sp. 2000-3000′, Kunstl. 2344, fide Hooker. An imperfectly known species.

Sapium indicum, *Willd.* At about 3000′, Ridl.; fruit June. A tree of Indo-Malaya; in Peninsula common on the sea-coasts.

URTICACEAE.

Trema amboinensis, *Bl.* At Taiping, Hend. 10038; flr. Jan. A shrub or small tree of Indo-Australia and China; in Peninsula common.

Gironniera nervosa, *Planch.* Larut, Kunstl., fide Ridl. A tree up to 80′, of Sumatra and Borneo; in Peninsula, Penang to Singapore.

Gironniera parviflora, *Planch.* Taiping Hills, Ridl. (not seen). A tree up to 60′, of the Carimon Is.; in Peninsula common.

Gironniera subaequalis, *Planch.* At 2500′, Ridl. (not seen). A tree up to 80′, of Indo-Malaysia; in Peninsula 2d, 4f, 5g, 5h, 6k, 9m.

Sloetia sideroxylon, *Teys. & Binn.* 500-800′, Wray 2226, 2561, Haniff 13207; fruit March. A tree up to 100′, of W. Malaysia; in Peninsula common.

Ficus acamptophylla, *Miq.* At 3000′, Scort. 310. A climbing epiphyte or tree of Bangka and Borneo; in Peninsula 4d, 3f, 4f, 9l.

Ficus alba, *Reinw.* 200-1500′, Kunstl. 1855, Hend. 10063. A shrub up to 8′, of W. Malaysia; in Peninsula common.

Ficus annulata, *Bl.* Larut, Kunstl., fide Ridl. An epiphyte or tree up to 50′, of Indo-Malaya; in Peninsula common.

Ficus apiocarpa, *Miq.* 100-300′, Wray 1957, Kunstl. 5149. A woody climber of W. Malaysia to the Philippines; in Peninsula common.

Ficus araneosa, *King.* 300-500′, Kunstl. 3565(?). A slender epiphytic climber, endemic, 4f.

Ficus bracteata, *Wall.* At 600′, Barnard 6001. A large shrub or small tree of Java and Borneo; in Peninsula 5h, 6k, 9m.

Ficus callicarpa, *Miq.* Larut, Kunstl., fide Ridl. A woody climber of Tenasserim and W. Malaysia; in Peninsula common.

Ficus celebica, *Bl.*, var. Kunstleri, *Ridl.* Larut, Kunstl., fide Ridl. A climber, the species in Celebes, the Philippines, and N. Guinea; in Peninsula the var. endemic and local.

Ficus chartacea, *Wall.* 3800-4400′, Kunstl. 3217 (var. torulosa), Fox 176, B. & H. 12572. A shrub up to 6′, of Burma; in Peninsula common.

Ficus chrysocarpa, *Reinw.* At about 2500′, Wray 2799. A shrub about 4′, of Indo-Malaya; in Peninsula 3f, 4f, 5g, 6k, 9m.

Ficus consociata, *Bl.* Larut, Kunstl., fide Ridl. An epiphyte of W. Malaysia; in Peninsula, Penang to Singapore.

Ficus copiosa, *Steud.* At about 3000′, Wray 1723, Curt. A shrub or small tree of W. Malaysia except Borneo; in Peninsula 3e only.

Ficus cunia, *Ham.* Taiping Hills, Ridl., (not seen). A bush or small tree of India to Tenasserim; in Peninsula 6d, 6e, 5g, 7g, 5h, 7l.

Ficus cuspidata, *Reinw.*, var. sinuata, *King.* 2500-3000′, Ridl. (not seen). An erect shrub or tree, the species of Malaysia; the var., endemic and local.

Ficus diversifolia, *Bl.* 100-4600′, Wray 649 (var. lutescens), Scort. 308 (var. Kunstleri), H. & N. 2368, Hend. 10239 (var. ovoidea). A bush, epiphytic or not, of Malaysia; in Peninsula common and variable.

Ficus fistulosa, *Reinw.* 2000-3000′, Wray 2937, Scort 274, Kunstl. 6339, H. & N. 2355. A bushy tree of Indo-Malaya and China; in Peninsula 2c, 2d, 4f, 6f, 5g.

Ficus fulva, *Reinw.* 100-500′, Hend. 10040, 10166. A small tree of Indo-Malaya; in Peninsula 5g, 5h.

Ficus glabella, *Bl.* Larut, Kunstl., fide Ridl. A tree up to 60′, of Indo-Malaya; in Peninsula common.

Ficus glandulifera, *Wall.* 100-3000′, Wray 2331, Kunstl. 6326, 8509. A shrub or tree up to 60′, of W. Malaysia; in Peninsula 2d, 9l, 9m.

Ficus globosa, *Bl.* 100-4500′, Ridl. 2970, 14550. A bushy climber of Indo-Malaya; in Peninsula common.

Ficus heterophylla, *Linn.* At Kota, Wray 3335. A creeping shrub, eventually a small tree, of Indo-Malaya; in Peninsula 4f, 6g, 8g, 5h.

Ficus hispida, *Linn.* At 300′, Ridl. (not seen). A shrub or small tree of Indo-Australia and China; in Peninsula common.

Ficus indica, *Linn.* 100-800′, Kunstl. 8495 (var. Gelderi), Hend. 10245. A tree of Indo-Malaya to the Philippines; in Peninsula common.

Ficus laevis, *Bl.* Larut, Kunstl., fide Ridl. An epiphyte or small tree of Indo-Malaya; in Peninsula Penang to Singapore.

Ficus lepicarpa, *Bl.* At 300′, Wray 1983. A small tree of W. Malaysia; in Peninsula 2d, 4f, 5g, 5h, 5j, 6j.

Ficus Lowii, *King.* 1500-2000′, Kunstl. 5412. A liane, endemic, 4d, 4f.

Ficus microstoma, *Wall.* Larut, Kunstl., fide Ridl. A tree up to 60′, of Java; in Peninsula 5h, 6k, 9l, 9m.

Ficus obpyramidata, *Hook. fil.* Larut, Kunstl., fide Ridl. A tree up to 30′, endemic, 5h.

Ficus obscura, *Bl.* At 3500′, H. & N. 2333. A shrub or tree of Indo-Malaya; in Peninsula 4d, 5h, 0k, 9m.

Ficus obtusa, *Hassk.* Larut, Kunstl., fide Ridl. A large epiphytic shrub of W. Malaysia to the Philippines; in Peninsula 2d, 4f, 5h, 6k.

Ficus parietalis, *Bl.* At Kota, Wray 3318. An epiphytic shrub of W. Malaysia; in Peninsula 1a, 2d, 3g, 8g, 6k.

Ficus pisifera, *Wall.* At Taiping, Wray 2401. A climbing epiphyte, becoming a tree, of W. Malaysia to the Philippines; in Peninsula common.

Ficus pisocarpa, *Bl.* Larut, Kunstl., fide Ridl. A small tree of Java; in Peninsula 9m.

Ficus polysyce, *Ridl.* At 300′, Wray 2668. A tree about 50′, of Lower Siam; in Peninsula common.

Ficus pomifera, *Wall.* Larut, Kunstl., fide Ridl. A tree of Indo-Malaya; in Peninsula 4d, 4f, 6f, Johore.

Ficus procera, *Reinw.* At 300′, and Waterloo, Wray 2536, Robertson-Glasgow. A tree of Sumatra and Java; in Peninsula 4d, ?6g, 6k, 9m.

Ficus pruniformis, *Bl.* At 200′, Wray 2137. An epiphyte of W. Malaysia to the Philippines; in Peninsula 4e, 3f, 4f.

Ficus punctata, *Thunb.* 3200-3700′, B. & H. 12720, 12795. A woody climber of W. Malaysia; in Peninsula common.

Ficus pyriformis, *Hook. & Arn.* Taiping Hills, Ridl. A shrub up to 15′, of India to Tenasserim and S. China; in Peninsula 5c, 4d, 6d, 4e, 6e, 4f.

Ficus ramentacea, *Roxb.* 100-1000′, Wray 2333, 4040. A liane of Indo-Malaya; in Peninsula common.

Ficus recurva, *Bl.* 300-600′, Wray 2269, Kunstl. 5490. An epiphytic climber of W. Malaysia to the Philippines; in Peninsula common.

Ficus religiosa, *Linn.* Planted as a roadside tree. A native of India.

Ficus rostrata, *Lamk.* 300-4000′, all collectors. A climbing or erect shrub of Indo-Malaya; in Peninsula common.

Ficus subulata, *Bl.* At Tupai, Wray 2436. A liane of Indo-Malaya and S. China; in Peninsula 6b, 2d, 4e, 3f 4f, 5h, 6k, 7k.

Ficus urophylla, *Wall.* 2000-3500′, Curt. 2060, Ridl., H. & N. 2369. An epiphytic shrub of Indo-Malaya; in Peninsula common.

Ficus variolosa, *Lindl.* At 4700′, B. & H. 12661. A shrub or small tree of Hongkong; in Peninsula 4f.

Ficus villosa, *Bl.* 600-1000′, Kunstl. 4215. A liane of W. Malaysia to the Philippines; in Peninsula 2d, 4f, 5g, 5h, 6k, 9m.

Ficus xylophylla, *Wall.* At 3200′, B & H. 12781. An epiphyte or tree of Sumatra and Borneo; in Peninsula 2d, 4f, 5h, 6k, 9m.

Ficus sp. 3000-4000′, H. & N. 2494, B. & H. 12954. A bush up to 8′. Near F. urophylla, but distinguished by the more numerous and horizontal nerves, and the very long tip to the leaf.

Artocarpus Gomeziana, *Wall.* At 300′, Wray 2073. A tree up to 60′, of Tenasserim and Borneo; in Peninsula, Penang to Singapore.

Artocarpus Kunstleri, *Hook. fil.* Larut, Kunstl., fide Ridl. A tree up to 100′, endemic, 6f, 6j, 6k, 7l, 9m.

Artocarpus Lowii, *Hook. fil.* Larut, Kunstl., fide Ridl. A tree up to 70′, endemic, 5g.

Artocarpus Maingayi, *King.* 300-500′, Kunstl. 6963. A tree up to 40′, endemic, 6g, 5h, 6k, 9m.

Artocarpus rigida, *Bl.* Larut, Kunstl., fide Ridl. A tree up to 100′, of Burma, Sumatra and Java; in Peninsula 4f, 5g, 5h, 6k, 9m.

Conocephalus amoenus, *Hook. fil.* Taiping Hills, Ridl. (not seen). A stout climbing epiphyte of Borneo; in Peninsula common.

Conocephalus ?suaveolens, *Bl.* At 3800′, B. & H. A climber of Indo-Malaya and the Philippines; in Peninsula common.

Conocephalus subtrinervis, *Miq.* Taiping, Wray, fide Ridl. At 2000′, Curt. A slender erect epiphyte of Borneo and ?Sumatra; in Peninsula common.

Prainea scandens, *King.* Larut, Kunstl., fide Ridl. A liane, endemic and local.

Pilea muscosa, *Lindl.* 300-3700′, Ridl. 14546, B. & H. 12916; flr. Feb. A small fleshy herb of S. America, occurring in the Peninsula in shady spots in Penang, Kuala Lumpur, Malacca, Singapore, etc.

Pellionia Duvauana, *N. E. Br.*, var. viridis, *Ridl.* Larut Hills, Kunstl., fide Ridl. A creeping herb of Tenasserim; in Peninsula common.

Pellionia javanica, *Wedd.* Maxwell's Hill, Ridl. (not seen). A creeping herb of Java; in Peninsula 1a, 2d, 4d, 4f.

Elatostemma acuminatum, *Brngn.* Taiping Hills, Curt., fide Ridl. A slender herb of Indo-Malaya; in Peninsula 4f, 5g, 5h, 6k.

Elatostemma molle, *Wedd.* At 4000′, B. & H. 12858. A herb of Himalaya and Assam; in Peninsula 2d, 4d, 6e.

Elatostemma sessile, *Forst.* At 4200′, B. & H. 13022. A herb of Indo-Australia and Africa; in Peninsula 2d, 4d, 4f, 5g, 6g, 5h.

Procris latifolia, *Bl.* Taiping Hills, Ridl. (not seen). A small shrub of Tenasserim to the Pacific; in Peninsula 4d, 4f, 5g, 6g, 5h.

Debregeasia squamata, *Hook. fil.* Taiping Hills, Ridl. (not seen). A shrub up to 15′, endemic, 4e, 4f, 5h.

JUGLANDACEAE.

Engelhardtia Wallichiana, *Lindl.* At about 2500′, Ridl. 5478; fruit June. A tree up to 100′, endemic, 2d, 5g.

CUPULIFERAE.

Quercus oidocarpa, *Korth.* 500-800′, Kunstl. 3723; fruit Jan. A tree up to 100′ of Burma, Sumatra and Borneo; in Peninsula 2d, 6k.

Pasania Blumeana, *Gamble.* 3500-4000′, Kunstl. 3232, Derry; fruit Aug. A tree up to 50′, of W. Malaysia; in Peninsula 3e only.

Pasania Cantleyana, *Gamble.* 300-1000′, Kunstl. 5112, 5396, 5475, 5554; flr. Nov., fruit Jan., Feb. A tree up to 80′, endemic and common.

Pasania conocarpa, *Schky.* 300-700′, B. & H. 13178, 13224; flr. March. A tree about 80′, of W. Malaysia; in Peninsula 4f, 5g, 4h, 9m.

Pasania costata, *Gamble.* 500-1000′, Kunstl. 7277; fruit Feb. A tree up to 80′, of Sumatra and Java; in Peninsula 4f, 6j, 9k.

Pasania Curtisii, *Gamble.* Up to 1000′, Kunstl., fide Gamble. A tree about 40′, endemic, 2d, 5g, 5h.

Pasania cyclophora, *Gamble.* 2000-3000′, Kunstl. 6888; flr. Nov. A tree up to 100′, of Borneo; in Peninsula 2d, 4f, 5g.

Pasania cyrtorhyncha, *Gamble.* 500-800′, Kunstl. 4898; flr. Sept. A tree up to 50′, of Sumatra, Borneo and the Philippines; in Peninsula Taiping to Singapore.

Pasania discocarpa, *Gamble.* 800--1500′, Kunstl. 5482; flr. Jan. A tree up to 130′, of Sumatra and Borneo; in Peninsula 2d, 5h, 6j.

Pasania Eichleri, *Gamble.* 300-1500′, Kunstl. 3875, 4043, 4092, 5570; flr. Sept., fruit Feb., March. A tree up to 100′, of Sumatra; in Peninsula 6g, 5h.

Pasania encleisocarpa, *Gamble.* 300-1000′, Kunstl. 5143, 5594, 5689; fruit Nov. A tree up to 60′, of Sumatra; in Peninsula 2d, 3f, 5g, 5h, 6k, 9m.

Pasania Ewyckii, *Gamble,* var. latifolia, *King.* Up to 800′, Kunstl. 8532, fide Gamble. A tree up to 40′, the species of Sumatra and Borneo; in Peninsula the species at 2d, 4f, 7g, 9m, the var. at 9m.

Pasania grandifrons, *Gamble.* 300-4000′, Kunstl. 3766, 4870, 5365, 6544, 7259; flr. Sept., fruit Feb. A tree up to 100′, endemic, 2d, 4e.

Pasania Kunstleri, *Gamble.* 100-1000′, Kunstl. 2482, 5128, 5436; flr. Oct., Nov., fruit Jan. A tree up to 30′, of Borneo; in Peninsula 1b, 3f, 4f, 5h.

Pasania lappacea, *Oerst.* 300-500′, Kunstl. 3919; flr. Oct. A tree up to 80′, of India and Burma; in Peninsula 3e only.

Pasania lamponga, *Gamble.* 100-500′, Kunstl. 6490, 6578, 6910, 7278; flr. Sept., fruit Feb., Dec. A tree up to 80′, of Sumatra and Borneo to Papua; in Peninsula common.

Pasania lucida, *Gamble.* 300-4700′, Wray 2217, Kunstl. 3999, 5086, 5279, 5351, 6500, 6914, B. & H. 12587; fruit March, Aug., Dec. A tree of about 80′, endemic and common.

Pasania omalokos, *Schky.* 2500-3000′, Kunstl. 6901; fruit Nov. A tree up to 100′, of Sumatra; in Peninsula 4f, 6j, 6k, 9m.

Pasania Rassa, *Gamble.* 4500-4600′, Kunstl. 6957; fruit Dec. A bush or tree up to 60′, of W. Malaysia; in Peninsula 2d, 6e, 5g, 6g, 7k, 9m.

Pasania Scortechinii, *Schzy.* At about 3500′, Kunstl. 2188, fide Gamble. A tree up to 100′, endemic and local.

Pasania spicata, *Oerst,* var. gracilipes, *DC.* Larut, Kunstl., fide Ridl. A tree up to 80′, of Indo-Malaya; in Peninsula common and variable.

Pasania sundaica, *Oerst.* 100-2500′, Wray 2563, 2699, 3103, Kunstl. 2232, 3866, 3944, 4870, 6583, 7013, 7371, Fox 185; flr. July-Sept., fruit Aug., Oct., Dec. A tree up to 80′, of W. Malaysia to the Philippines; in Peninsula common.

Pasania Wallichiana, *Gamble.* 1000-4000′, Kunstl. 5795, Curt., Ridl.; fruit Sept. A tree up to 60′, endemic and common.

Pasania Wrayi, *Gamble.* At Kota, Wray 2854. A tree, endemic, 4f.

Castanopsis costata, *A. DC.* Up to 4600′, Wray, Kunstl. 2999, 3651, 6975, fide Gamble. A tree up to 50′, of W. Malaysia; in Peninsula 3e only.

Castanopsis megacarpa, *Gamble.* 300-800′, Kunstl. 6469, 6522, Haniff 13134; flr. Aug., fruit March. A tree up to 80′, endemic and common.

Castanopsis nephelioides, *King.* 100-800′, Kunstl. 5542, 6518; flr. Feb. A tree up to 60′, endemic, 4f, 6k, 9m.

Castanopsis Ridleyi, *Gamble.* At 100′, Kunstl. 6831; fruit Nov. A tree up to 80′, endemic, 6k.

Castanopsis sumatrana, *A. DC.* 100--1000′, Wray 2168, Kunstl. 3788, 5382, 5510; flr. Feb., Dec., fruit Jan. June. A tree up to 80′, of Indo-Malaya to the Philippines; in Peninsula Penang to Malacca.

Castanopsis Wallichii, *King.* At 4000′, Fox 108; fruit Oct. A tree of about 80′, endemic and common.

SALICINACEAE.

Salix tetrasperma, *Roxb.* In open low ground near water, Kunstl. 1987, fide Gamble. A small tree up to 30′, of S. E. Asia; in Peninsula 2d, 4d, 6d, 4e, 5g, 5h, 8h, 6k, perhaps in most places planted.

HYDROCHARIDACEAE.

Ottelia alismoides, *Pers.* At 100′, Kunstl. 4073, 5530; flr. and fruit Feb., March. A submerged freshwater herb of Indo-Australia and Africa; in Peninsula 1b, 6b, 2d, 4f, 5h, 6k.

ORCHIDACEAE.

Microstylis acutangula, *Hook. fil.* 3000-4000′, Ridl.; flr. March. A terrestrial herb, endemic, 4f, 5h, 6j, 9l.

Microstylis congesta, *Rchb. fil. Malaxis latifolia, Sm.* At about 3000′, Ridl. A terrestrial herb of Indo-Australia and China; in Peninsula common.

Microstylis micrantha, *Hook. fil. Malaxis micrantha, Ktze.* 3000-4000′, Ridl., Hervey; flr. June. A creeping herb of Borneo; in Peninsula 6k, 7l, 8l, 9m.

Microstylis perakensis, *Ridl.* 200-3000′, Curt., Ridl.; flr. Sept., fruit June. A small terrestrial herb of ?Java; in Peninsula 6d, 4e, 4f.

Oberonia brunnescens, *Ridl.* Larut Hills, Ridl. An epiphyte, endemic, and local. The only sheet of this in Herb. Singap. is labelled "Perak, loc. incert.".

Oberonia insectifera, *Hook. fil.* At 3500′, Kunstl. 2793, fide Ridl. A small epiphyte, endemic, 6e.

Oberonia Prainiana, *King.* Taiping Hills, Ridl.; flr. Dec. A small epiphyte of Himalaya and Siam; in Peninsula 2d, 6j.

Oberonia rosea, *Hook. fil.* Larut Hills, Kunstl. 2664, fide Ridl. An epiphyte, endemic, 2d, 4f.

Liparis atrosanguinea, *Ridl.* At 3500′, Curt., flr. Dec. A terrestrial herb, endemic and local.

Liparis comosa, *Ridl.* At 2000′, Curt., Anders. 94; flr. Sept., fruit March, Sept. A small epiphyte, endemic, 4d, 4f, 5h.

Liparis compressa, *Lindl.* At 4000′, Curt. 2069, Ridl.; flr. March, Sept. An epiphyte of W. Malaysia and the Philippines; in Peninsula 4f, 5g.

Liparis disticha, *Lindl.* Larut, Kunstl. 4986, fide Ridl. An epiphyte of Indo-Malaysia and the Mascarene Is.; in Peninsula common.

Liparis elegans, *Lindl.* 300-3800′, Kunstl. 7283, Ridl, B. & H.; flr. and fruit Feb. An epiphyte or rock plant of Borneo; in Peninsula common.

Liparis ferruginea, *Lindl.* At 100′, Kunstl. 7282; flr. Feb. A terrestrial herb of Indo-China and Borneo; in Peninsula 4f, 6k, 9m.

Liparis furcata, *Ridl.* At 4000′, Ridl.; fruit March, Dec. A small terrestrial herb, endemic and local.

Liparis lacerata, *Ridl.* At 3000′, Ridl.; flr. and fruit June. An epiphyte of Tenasserim and Borneo; in Peninsula 1b, 3f.

Liparis latifolia, *Lindl.* 3000-4500′, Ridl. An epiphyte of Java and Borneo; in Peninsula 5h.

Liparis longipes, *Lindl.* Taiping Hills, Derry; flr. Sept. An epiphyte of Indo-Malaya and China; in Peninsula 2d, 4f.

Liparis Maingayi, *Ridl.* 3000-3300′, Ridl., Derry, Anders. 42, B. & H. 12704; flr. March, June, Oct., Dec. A herb on wet rocks, endemic, 2c, 2d, 4f, 5g, 7k.

Liparis parvula, *Ridl.* 3000-3900′, Fox, Ridl., B. & H. 12721; flr. March. A small terrestrial herb, endemic and local.

Liparis transtillata, *Ridl.* At Maxwell's Hill, Ridl. A terrestrial herb, endemic and local.

Platyclinis gracilis, *Hook. fil.* 3000-4500′, Curt., Ridl., Derry; flr. Sept., fruit March. An epiphyte of Java; in Peninsula 6e, 4f, 5h.

Platyclinis Kingii, *Hook. fil. Dendrochilum Kingii, Pftz.* Larut Hills, Curt. 2756; flr. March. An epiphyte of Borneo; in Peninsula 4e, 6e.

Platyclinis sarawakensis, *Ridl.* Taiping Hills, Curt., fide Ridl. An epiphyte of Borneo; in Peninsula 3e only.

Dendrobium aegle, *Ridl.* 3000-4000′, Ridl, Derry, H. & N. 2304, B. & H. 12963; flr. Feb., March, June, Sept. An epiphyte, endemic, 7l.

Dendrobium atro-rubens, *Ridl.* At 4100′, H. & N. 2346; flr. Feb. An epiphyte of Sumatra; in Peninsula 2c, 6e, 5g, 6g.

Dendrobium aureum, *Lindl.* var. Philippinensis. Larut Hills, Stephens, fide Ridl. An epiphyte of Indo-Malay to the Philippines; in Peninsula 3e only.

Dendrobium clavator, *Ridl.* At Taiping, Ridl. An epiphyte, endemic, 9l.

Dendrobium crocatum, *Hook. fil.* Larut, Kunstl., fide Ridl. An epiphyte, endemic, 6e, 5h, 5j, 9m.

Dendrobium crumenatum, *Sw.* The Pigeon Orchid. An epiphyte of Indo-Malaya and China; in Peninsula very common on roadside trees etc.

Dendrobium Derryi, *Ridl.* Taiping Hills, Derry; flr. Jan. An epiphyte, endemic and local.

Dendrobium flabellum, *Rchb. fil.* 300-1800′, Wray 3154, Kunstl. 6897; flr. Nov. A large epiphyte of Indo-Malaya; in Peninsula 4b, 6j, 7l, 9m.

Dendrobium Foxii, *Fidl.* At about 4000′, Derry, B. & H. 12726; flr. March, Oct. An epiphyte, endemic and local.

Dendrobium gemellum, *Lindl.* At Taiping (Resident's Garden), Ridl. An epiphyte of Siam to Borneo; in Peninsula 1b, 4b, 6e, 6k, 9m.

Dendrobium geminatum, *Hook. fil.* 3000-4500′, Curt. 2067, Fox, Derry, Stephens; flr. Sept., Dec. An epiphyte of Java; in Peninsula 2c, 6e, 4f, 5g.

Dendrobium Kelsalli, *Ridl.* At about 3000′, Ridl. An epiphyte, endemic, 2c, 6e, 6g, 7k, 0k.

Dendrobium leonis, *Rchb. fil.* Anders. 132; flr. March. An epiphyte of Indo-China and Borneo; in Peninsula 2d, 6f, 7g, 8g, 5h, 5j, 6k, 7l, 9m.

Dendrobium longipes, *Hook. fil.* At about 4500′, Ridl., Derry; fruit June. An epiphyte, endemic, 4e, 6e, 4f, 5g, 5h.

Dendrobium macropodum, *Hook. fil.* At 5000′, Ridl. (not seen). An epiphyte of Sumatra and ?Java; in Peninsula 6e, 6g.

Dendrobium pachyglossum, *Par. & Rchb. fil.* 2500-3000′, Ridl., Derry; flr. Oct. An epiphyte of Tenasserim; in Peninsula 1b, 2c, 6e.

Dendrobium pumilum, *Roxb.* At Taiping Curt.; flr. Oct. An epiphyte of Burma and Borneo; in Peninsula common.

Dendrobium roseatum, *Ridl.* At 4000′, Curt. 2061; flr. Sept. An epiphyte, endemic, 5h.

Dendrobium rosellum, *Ridl.* At Taiping, Ridl. An epiphyte of Borneo; in Peninsula 9l.

Dendrobium sinuatum, *Lindl.* 100-4000′, Curt., Ridl. An epiphyte of Borneo; in Peninsula 2d, 6e, 6g, 6k, 7l, 9l, 9m.

Dendrobium superbum, *Rchb. fil.* Larut Hills, Scort., Stephens, fide Ridl. An epiphyte of Borneo and the Philippines; in Peninsula 1b.

Dendrobium teres, *Lindl.* At about 3000′, Curt.; flr. June. An epiphyte of Borneo; in Peninsula 2d, 6j, 0k, 9l, 9m.

Dendrobium tetrodon, *Rchb. fil.* At Taiping, Hobson, fide Ridl. An epiphyte of Java; in Peninsula 4d, 4e.

Dendrobium tubiferum, *Hook. fil.* G. Hijau, Murton fide Ridl. An epiphyte of Java and Borneo; in Peninsula 4d, 8g, 6j, 7l, 9m.

Dendrobium uniflorum, *Griff.* 3000-4000′ (fide Ridl.), Curt., Ridl.; flr. Feb. An epiphyte of Borneo and the Philippines; in Peninsula 6e, 7k.

Dendrobium virescens, *Ridl.* At Taiping, Curt., fide Ridl. An epiphyte, endemic, 5c.

Bulbophyllum apodum, *Hook. fil.* Top of Batu Kurau, Scort., fide Ridl. An epiphyte of Borneo; in Peninsula 5j, 6j, 6k, 8l, 9m.

Bulbophyllum capitatum, *Lindl.* At about 4500′, Curt.; flr. Sept. A tufted epiphyte of Java and Borneo; in Peninsula 2d, 6e, 4f, 5g, 6g, 5h, 7l.

Bulbophyllum catenarium, *Ridl.* At about 3000′, Curt., Ridl.; flr. June, Oct. An epiphyte of Borneo; in Peninsula 6g, 5h, 9m.

Bulbophyllum citrinum, *Ridl.* At Taiping, Ridl. An epiphyte of W. Malaysia; in Peninsula 5k, 7k, Johore, 9m.

Bulbophyllum cleistogamum, *Ridl.* At Waterloo, 2000′, Curt.; flr. Oct. An epiphyte of Rhio and Borneo; in Peninsula 3e only.

Bulbophyllum galbinum, *Ridl.* 3000-4000′, Curt., Ridl. 2888, B. & H. 13199; flr. Feb.-April, June, Dec. A creeping epiphyte, endemic, 6e, 5g, 5h.

Bulbophyllum gigas, *Ridl.* At about 3000′, Ridl. 5193; flr. June. An epiphyte, endemic, 4f.

Bulbophyllum leptosepalum, *Hook. fil.* At about 3000′, Ridl.; flr. June. An epiphyte, endemic, 2d.

Bulbophyllum linearifolium, *King.* At 3800′, B. & H. 12562; flr. March. An epiphyte, endemic, 2c, 4f.

Bulbophyllum Lobbii, *Lindl.* At Maxwell's Hill, Stephens; flr. Sept. An epiphyte of Tenasserim to Borneo; in Peninsula 3e, 4e, 8l.

Bulbophyllum Makoyanum, *Ridl.,* var. Brienanum, *Ridl.* At Taiping, Curt., Ridl. An epiphyte of Borneo and the Philippines; in Peninsula the species at 9m, the var. at 4f, 9l.

Bulbophyllum Medusae, *Rchb. fil.* Waterfall Hill, Wray, fide Ridl. An epiphyte of Siam and Borneo; in Peninsula common.

Bulbophyllum modestum, *Hook. fil.* At 3000′, Curt., Ridl.; flr. June, Dec. A small epiphyte, endemic, 2c, 4f, 9m.

Bulbophyllum oblanceolatum, *King.* At 4000′, Ridl.; flr. March. An epiphyte, endemic, 4f, 5g, 6g.

Bulbophyllum ochranthum, *Ridl.* 3000-4000′, Curt., fide Ridl. An epiphyte, endemic and local.

Bulbophyllum perakense, *Ridl.* At Waterloo, Elphinstone, fide Ridl. An epiphyte, endemic and local.

Bulbophyllum pileatum, *Lindl.* Waterfall Hill, Wray, fide Ridl. An epiphyte of Sumatra; in Peninsula 2d, 9l, 9m.

Bulbophyllum psittacoides, *Ridl.* At 300′, Curt.; flr. Dec. An epiphyte of Siam; in Peninsula 1b, 2d, 3f, 8g, 5j, 6j, 6k, 7l, 9m.

Bulbophyllum pulchellum, *Ridl.* At Taiping Ridl. An epiphyte of Lower Siam and Rhio; in Peninsula 1b, 2d, 6d, 5h, 9l, 9m.

Bulbophyllum selangorense, *Ridl.* Taiping Hills, Long, fide Ridl. An epiphyte, endemic, 2c, 5h.

Bulbophyllum vaginatum, *Rchb. fil.* At Taiping, Hend. 10205; flr. Aug. An epiphyte of Java and Borneo; in Peninsula common.

Bulbophyllum variabile, *Ridl.* Taiping Hills, Ridl.; flr. April. An epiphyte, endemic, 4f.

Bulbophyllum Wrayi, *Hook. fil.* At 2500′, Derry; flr. Sept. An epiphyte, endemic, 4f, ?6d.

Dendrochilum album, *Ridl.* 3000-4600′, Kunstl. 3279, Ridl.; flr. June, Aug. A creeping epiphyte of Tenasserim and Lower Siam; in Peninsula 4e,.5g.

Eria aeridostachya, *Rchb. fil.* 3000-4000′, Ridl. (not seen.) An epiphyte of Malaysia; in Peninsula 3d, 6k, 9l, 9m.

Eria aporina, *Hook. fil.* At 2000′, Ridl.; flr. Dec. A small epiphyte, endemic, 2c, 4f, 5g.

Eria bidens, *Ridl.* 2000-4500′, Ridl. 2883, Anders. 46; flr. March. An epiphyte, endemic, 4f, 5g.

Eria brunea, *Ridl.* At about 2500′, Ridl., Long; flr. June. An epiphyte, endemic, 6g, 5h, 9m.

Eria densa, *Ridl.* 4500-4700′, Derry, H. & N. 2472, B. & H.; flr. Feb., Sept. An epiphyte of Borneo; in Peninsula 2c, 5g.

Eria ferox, *Bl.* 300-4200′, Kunstl. 3360, Curt. 1325, Ridl. 5192, H. & N. 2364, Anders. 30; flr. Feb., March, June, Sept., Dec. An epiphyte or rock plant of W. Malaysia; in Peninsula 2c, 6e, 4f, 5g.

Eria floribunda, *Lindl.* 3000-4700′, Curt., Ridl., H. & N. 2464, Anders. 43, B. & H. 12597 (var.), 12654; flr. Feb., March, Dec., fruit March. A small epiphyte of Malaysia; in Peninsula 1b, 2c, 6e, 5g, 5h, 5j, 9l, 9m.

Eria larutensis, *Ridl.* Taiping Hills, Curt. and Derry 3712, fide Ridl. An epiphyte, endemic and local.

Eria longifolia, *Hook. fil.* 2000-4500′, Ridl.; flr. June, fruit Feb. An epiphyte of Sumatra and Borneo; in Peninsula 6e, 4f, 5g, 6g.

Eria major, *Ridl.* 2500-4500′, Kunstl. 3311, Ridl., Derry, Hervey; flr. June, Sept. An epiphyte of Borneo and the Philippines; in Peninsula 4b, 4f, 5g, 6g.

Eria monticola, *Hook. fil.* Larut Hills, Curt.; flr. Aug. An epiphyte, endemic, 2c, 6e, 5g, 5h, 6j, 7k, 0k.

Eria pilifera, *Ridl.* 2500-3700′, Ridl. 2887, B. & H. 13003; flr. March. An epiphyte of Sumatra; in Peninsula 5g.

Eria poculata, *Ridl.* At about 4500′, Ridl. 2884; flr. Feb. An epiphyte, endemic, 2c, 6e, 5g, 7k, 9k.

Eria ramulosa, *Ridl.* Taiping Hills, Long; flr. March. A creeping epiphyte, endemic and local.

Eria teretifolia, *Griff.* At about 4000′, Curt., Ridl.; flr. March, Sept. A small epiphyte of Borneo; in Peninsula 2c, 2d, 6e, 4f, 5g, 6k, 7k.

Eria vestita, *Lindl.* At 4700′, B. & H. 12630; flr March. An epiphyte of Borneo; in Peninsula common.

Phreatia listrophora, *Ridl.* 2500-4000′, Ridl.; flr. June. A small epiphyte, endemic, 1b, 6e, 5g.

Phreatia minutiflora, *Lindl.* At about 3500′. Ridl. A small epiphyte, widely Malaysian: in Peninsula 5h. Johore, 9m.

Phreatia myosurus, *Lindl. Phreatia tenuiflora, Lindl.* 3[illegible]-4500′, Kunstl. 6923, Ridl., Anders. 4: flr. Feb., March, Dec. A small epiphyte of W. Malaysia and the Philippines: in Peninsula 5h.

Agrostophyllum bicuspidatum, *J. J. Sm., Podochilus collinus, Schl.* 3000-4500′, Ridl., Anders. 44, B. & H. 12555: flr. March, June. An epiphyte of Tenasserim and W. Malaysia: in Peninsula common.

Agrostophyllum majus, *Hook. fl.* At 2000′, Ridl.: flr. Feb. A tufted epiphyte of Sumatra and Borneo: in Peninsula 2d, 4f, 8h, 9l, 9m.

Ceratostylis cryptantha, *Ridl.* At about 2500′, Ridl.: flr. and fruit June. A small epiphyte, endemic, 2d, 5g.

Ceratostylis pendula, *Hook. fl.* 300-500′, Kunstl. 3847: flr. Feb. A small epiphyte of Borneo to the Philippines: in Peninsula 2d, 3h, 8h, 7l.

Ceratostylis puncticulata, *Ridl.* At about 4500′, Ridl.: flr. June. A small epiphyte, endemic and local.

Ceratostylis subulata, *Bl.* 4000-4500′, Curt., Fox 138, Ridl., B. & H. 12752; flr. March, Sept., Oct. A small epiphyte of Java: in Peninsula common.

Chrysoglossum villosum, *Bl.* Taiping Hills, Scort., fide Ridl. A terrestrial herb of Java: in Peninsula 3e only.

Collabium nebulosum, *Bl.* 4200-4500′, Haniff 9089, Derry, B. & H. 12757; flr. March, Oct. An epiphyte of Java: in Peninsula 4f.

Diglyphosa latifolia, *Bl.* Taiping Hills, Anders. 178: flr. March. A terrestrial herb of Java: in Peninsula 3e only.

Plocoglottis javanica, *Bl.* 3000-4000′, Curt., Ridl.: flr. June, Sept. A terrestrial herb of Java and Borneo: in Peninsula common.

Tainia atropurpurea, *Ridl.* At 2000′, Curt. 2308: flr. May. A terrestrial herb of Himalaya: in Peninsula 2d, 4f.

Ascotainia penangiana, *Ridl.* At about 4000′, Curt.: flr. Dec. A terrestrial herb of Java and Amboina: in Peninsula 2d.

Nephelaphyllum pulchrum, *Bl.* ? Larut Hills, Curt. A terrestrial herb of Indo-Malaya: in Peninsula 4e, 6e, 3f, 4f, 6j, 6k, 7k, 9m. Curtis' specimen is without locality, but Ridley in the "Materials" quotes a specimen from the Larut Hills without mentioning the collector.

Spathoglottis aurea, *Lindl.* 2000-4700′, Ridl., B. & H. A terrestrial herb of W. Malaysia to the Philippines: in Peninsula common in the hills.

Spathoglottis plicata, *Bl.* 100-3000′, Kunstl. 3268, Ridl., Hend. 10023, 10142, B. & H.; flr. Jan., Feb., Aug. A tall herb, widely Malaysian; in Peninsula common.

Phaius callosus, *Lindl.* 2500-4000′, Wray 2986, Kunstl 6413, Curt., Ridl. 5191; flr. June, Aug., Sept. A large terrestrial herb of Sumatra (a var.) and Java; in Peninsula 4e, 5g.

Phaius pallidus, *Ridl.* 3000-4000′, Ridl., Curt. 2064; flr. June, Sept. A terrestrial herb of Sumatra; in Peninsula 6e, 6f, 5g, 5h.

Calanthe albolutea, *Ridl.* At about 4000′, Ridl, Derry; flr. Oct. A large terrestrial herb, endemic, 2c, 6e, 4f, 6g.

Calanthe angustifolia, *Lindl.* At 4700′, Kunstl. 5054, Curt. 2066; flr. Sept. Oct. A terrestrial herb of Sumatra and Java; in Peninsula 2c, 4f, 5g, 6g.

Calanthe Ceciliae, *Rchb. fil.* Larut Hills, Anders 130; flr. March. A terrestrial herb of Java; in Peninsula 4e, 6e, 4f, 6g, 5h, 5j, 6k.

Calanthe curculigoides, *Lindl.* 2500-4000′, Wray 2809, Curt. 2065; flr. Sept. A terrestrial herb of Sumatra and Java; in Peninsula 1b, 2d, 4f, 7k, 8l, 9l, 9m.

Calanthe Foerstermanni, *Rchb. fil.* 3800-4000′, Curt, Ridl., B. & H. 13006; flr. March, June, Sept. A terrestrial herb of Assam; in Peninsula 3e only.

Calanthe veratrifolia, *R. Br.* 4000-4500′, Ridl., Hervey; flr. June. A terrestrial herb of Indo-Australia; in Peninsula 4f, 6g, 4h, 5h, 6j, 9l, 8m, 9m.

Arundina revoluta, *Hook. fil.* At 300′, Wray 1979, Ridl. 2882; flr. Feb., fruit Feb., June. A tall woody herb, a var. only in Borneo; in Peninsula 3e only.

Dilochia Wallichii, *Lindl.* At 4000′, Curt., Derry; flr. Jan., Oct. An epiphyte of W. Malaysia; in Peninsula 6j, 9m.

Coelogyne asperata, *Lindl.* 300-1000′, Kunstl. 7287; flr. Feb. A large epiphyte of Sumatra, Borneo and N. Guinea; in Peninsula 4d.

Coelogyne carnea, *Hook. fil.* 4000-4500′, Hose 41, Anders. 57; flr. March, Aug. An epiphyte, endemic, 3d, 4e, 6e, 4f, 5g, 6g, 5h.

Coelogyne Cumingii, *Lindl.* Larut Hills, Derry. Waterloo, Elphinstone; flr. Aug. A rock plant or epiphyte, endemic, 6e, 6f, 7k, ?0k, 9m.

Coelogyne Dayana, *Rchb. fil.* 4000-4700′, Kunstl. 6492, Curt., Ridl., Derry, Anders. 58, B. & H. 12596; flr. March, June, Aug. An epiphyte or rock plant of Sumatra and Borneo; in Peninsula 2d, 3d, 6e, 4f, 6g, 5h, 7k.

Coelogyne Kingii, *Hook. fil.* Larut Hills, Kunstl., Derry, fide Ridl. An epiphyte, endemic, 5j.

Coelogyne longibractata, *Hook. fil.* At 4700′, Derry, B. & H. 12628; flr. Feb., March. An epiphyte, endemic, 3d, 6e, 5g, 5h, 5j, 9l.

Coelogyne pallens, *Ridl.* 2000-4000′, Curt., Ridl., H. & N. 2324, B. & H. 12708; flr. Feb., March, Dec. An epiphyte, endemic, 2c, 4f.

Coelogyne perakensis, *Rolfe.* 3000-4500′, Curt. 2068, Ridl., Derry, Anders. 53; flr. March, Aug., Sept. An epiphyte, endemic, 4f, 5g, 6g, 9m.

Coelogyne pusilla, *Ridl.* At about 4500′, Curt. 2063, Ridl.; flr. Sept. An epiphyte of Java; in Peninsula 3e only.

Coelogyne quadrangularis, *Ridl.* At about 4500′, Ridl.; flr. July. An epiphyte? of Borneo; in Peninsula 3e only.

Coelogyne Rochusseni, *De Vr.* At 100′, Kunstl. 6794; flr. Nov. An epiphyte of W. Malaysia; in Peninsula common.

Coelogyne speciosa, *Lindl.* 3000-4500′, Ridl. 5198; flr. March, June. An epiphyte of Java and Borneo; in Peninsula 2d, 4e, 6e, 4f, 5g, 5h, 6j, 9l, 9m.

Pholidota parviflora, *Hook. fil.* 2500-4700′, Ridl., Derry, H. & N. 3245, B. & H. 12957; flr. Feb., March, Dec. An epiphyte, endemic, 3d, 4e, 6e, 4f.

Claderia viridiflora, *Hook. fil.* At 2000′, Ridl., B. & H. 12831; flr. Feb. A terrestrial herb of Sumatra and Borneo; in Peninsula 2d, 6e, 3f, 4f, 5j, 6k, 8k, 7l, 9l, 9m.

Cymbidium acutum, *Ridl.* Taiping Hills, Ridl. (not seen). At Waterloo, Elphinstone; flr. Aug. An epiphyte of Himalaya and Assam; in Peninsula 3e only.

Dipodium pictum, *Rchb. fil.* At about 2000′, Curt.; flr. June. A climber on trees, of W. Malaysia; in Peninsula 6e, 4f, 5g, 6k, 7k, 9m.

Grammatophyllum stapeliiflorum, *J. J. Sm., Cymbidium Huttoni, Hook. fil.* At Taiping, Derry, Stephens. An epiphyte of Sumatra, Java and Celebes; in Peninsula 3e only.

Bromheadia brevifolia, *Ridl.* Larut Hills, Ridl. (not seen). A herb of Borneo; in Peninsula 3e only.

Bromheadia palustris, *Lindl.* 100-300′, Ridl., Hend. 10141; flr. Feb. A tall herb of Indo-Malaya; in Peninsula 2c, 5c, 2d, 6k, 7k, 7l, 9l, 9m.

Adenoncos virens, *Bl.* At about 3000′, Ridl.; fruit June. A small epiphyte of W. Malaysia; in Peninsula 4e, 5h, 5j, 9m.

Doritis Wightii, *Benth.* Taiping Hills, Stephens. An epiphyte of India to Lower Siam; in Peninsula 1b, 4d, 5j, 0j, 6k.

Renanthera elongata, *Lindl.* At 300′, Wray, fide Ridl. A large herb of Java and Borneo; in Peninsula 2d, 3f, 4f, 6k, 7l, 9m.

Trichoglottis scaphigera, *Ridl.* At Waterloo, Curt., fide Ridl. A tall herb, endemic, 4a, 2d.

Saccolabium bigibbum, *Hook. fil.* At about 4500′, Ridl. An epiphyte of Burma; in Peninsula 4e, 6e, 6g, 5h.

Saccolabium ionosmum, *Ridl.* At about 3000′, Ridl.; flr. June. An epiphyte, endemic and local.

Saccolabium perpusillum, *Hook. fil.* At Taiping, in orchards, Curt.; flr. and fruit Oct. A small epiphyte, endemic, 5h, 6k, 9m.

Saccolabium secundum, *Ridl.* At 4000′, Hervey. A large epiphyte of Indo-Malaya; in Peninsula 1b, 2d, 5j, 6k, 7l.

Microsaccus javensis, *Bl.* At 3800′, B. & H. 12563; fruit March. A small epiphyte of Burma, Siam and Java; in Peninsula 4h, 5h, 9m.

Taeniophyllum serrula, *Hook. fil.* Larut, Kunstl., fide Ridl. An epiphyte endemic, 1a, 2d, 6d, 4e, 8f, 8g, 5h, 8h, 9l, 9m.

Ascochilus hirtulus, *Ridl.* Larut, Kunstl., fide Ridl. A small epiphyte, endemic, 1b, 2d, 6d, 6g, 5h, 5j, 6k.

Aerides odoratum, *Lour.* At 200′, Hend. 10150; flr. Feb. An epiphyte of Indo-Malaya and China; in Peninsula 1b, 2c, 2d, 5h, 6k, 0k.

Thrixspermum arachnites, *Rchb. fil.* At Taiping, Bishop Hose; flr. Feb. An epiphyte of W. Malaysia; in Peninsula 2d, 3f, 4f, 5h, 7l, 9l, 9m.

Thrixspermum lilacinum, *Rchb. fil.* At Taiping, Ridl. At 4000′, Ridl. (var. montanum), (not seen). A terrestrial herb of Java and Borneo; in Peninsula common in grassy swamps, the var. at 4f.

Thrixspermum pardale, *Schltr. Dendrocolla pardalis, Ridl.* Larut, Kunstl., fide Ridl. An epiphyte of Borneo; in Peninsula 4d, 6d, 4f, 6f, 7g, 8g.

Thrixspermum pauciflorum, *Ridl.* At 3000′, Scort., fide Ridl. An epiphyte?, endemic and local.

Acriopsis javanica, *Reinwdt.* 2000-4500′, Ridl., Anders. 56; flr. March. An epiphyte, widely Malaysian; in Peninsula common.

Thecostele maculosa, *Ridl.* At Taiping, Ridl. An epiphyte of Borneo; in Peninsula 2c, 6e, 6k.

Thecostele secunda, *Ridl.* At Taiping, Ridl. An epiphyte of Borneo; in Peninsula 4f.

Thecostele Zollingeri, *Rchb. fil.* At Waterloo, Curt. 2308, 2309; flr. May. An epiphyte of Tenasserim and Borneo; in Peninsula 2d.

Appendicula anceps, *Bl. Podochilus anceps, Schl.* 100-500′, Kunstl. 2609; flr. and fruit Dec. An epiphyte of Java to the Philippines; in Peninsula common.

Appendicula cornuta, *Bl. Podochilus cornuta, Schl.* Taiping Hills, Ridl. An epiphyte of Indo-Malaya and China; in Peninsula common.

Appendicula lancifolia, *Hook. fil. Podochilus lancifolia, Schl.* 3800-4400′, Fox 154, Ridl. 2886, B. & H. 12564; flr. Oct., fruit March. An epiphyte, endemic, 4b, 4f, 5h.

Appendicula muricata, *Teys. and Binn. Podochilus muricata, Schl.* At 3200′, B. & H. 12701. An epiphyte, endemic, 2c, 4f, 5g, 5h.

Appendicula torta, *Bl. Podochilus torta, Schl.* At about 2500′, Ridl.; flr. June. An epiphyte of Java and Borneo; in Peninsula 6e, 5h, 9l.

Appendicula undulata, *Bl. Podochilus unciferus, Hook. fil.* 2400-4000′, Curt. 2062, Fox 121, Ridl., Derry, Anders. 145, H. & N. 2470, B. & H. 12979; flr. Feb., March, June, Sept., Oct. An epiphyte of W. Malaysia to the Philippines; in Peninsula 4e, 6e, 4f, 6g, 5h.

Podochilus tenuis, *Lindl.* 100-300′, Curt., Ridl.; flr. Oct. A moss-like epiphyte of W. Malaysia; in Peninsula 2c, 2d, 4d, 4e, 6e, 4f, 5g.

Thelasis macrobulbon, *Ridl.* At about 2500′, Ridl.; flr. June. An epiphyte, endemic, 4f, 5h.

Oxyanthera elata, *Hook. fil.* At Taiping, Ridl. A stemless epiphyte of W. Malaysia to the Philippines; in Peninsula 2c, 2d, 4f, 5g, 6g, 8g, 5h, 8h, 9m.

Vanilla Griffithii, *Rchb. fil.* Taiping Hill, Stephens. At 3500′, B. & H.; flr. Sept. A climbing shrub of Siam to the Carimon Is.; in Peninsula common.

Galeola pterosperma, *Schltr. Galeola Hydra, Rchb. fil.* 200-4000′, Curt. 2070, Ridl. 2889; flr. March, Sept., Oct. A leafless saprophyte of Indo-Malaya; in Peninsula common.

Aplostellis flabelliformis, *Ridl.* At Taiping, Wray, fide Ridl. A tuberous herb of Indo-Malaya; in Peninsula 1a, 2b, 6f.

Aphyllorchis pallida, *Bl.* At 4300′, Fox 142, Ridl.; flr. Feb., Oct. A leafless saprophyte of Java and Borneo; in Peninsula 2d, 3d, 4d, 4e, 6e, 4f, 9m.

Corymbis longiflora, *Hook. fil.* 300-4500′, Kunstl. 6988, Curt., Ridl.; flr. June, Dec., fruit March. A terrestrial herb of Indo-Australia and Africa; in Peninsula common.

Tropidia curculigoides, *Lindl.* At about 3000′, Ridl. 5195, 11416; flr. Dec. A terrestrial herb of India and Borneo; in Peninsula common.

Physurus latifolius, *Bl.* At about 3000′, Curt.; flr. June. A terrestrial herb of Java; in Peninsula 3e only.

Cystorchis variegata, *Bl.* At Batu Kurau, Curt.; flr. Oct. A small terrestrial herb of Java and Borneo; in Peninsula common.

Anoectochilus albolineatus, *Tar. and Rchb. fil.* At Taiping, Derry, fide Ridl. A small terrestrial herb of India and Burma; in Peninsula 5h.

Anoectochilus ?calcaratus, *Ridl.* At 4000′, Anders. 69; flr. March. (Determination doubtful). A terrestrial herb, endemic and local.

Anoetochilus geniculatus, *Ridl.* Maxwell's Hill, Wray, fide Ridl. A small herb, endemic, 6k, 7k, 9l, 9m.

Anoectochilus macranthus, *Ridl.* 2000-3000′, Curt., Ridl.; flr. Dec. A small terrestrial herb, endemic, 9k.

Anoectochilus pectinatus, *Ridl.* 2500-4700′, Curt., Ridl. 5195, B. & H. 12758, 12895; flr. Feb., March, June. A terrestrial herb, endemic and local.

Anoectochilus Reinwardtii, *Bl.* 2500-3000′, Ridl.; flr. June. A small terrestrial herb of Sumatra and Java; in Peinsula 2c, ?2d, 4f, 5g.

Goodyera gracilis, *Hook. fil.* 4000-4700′, Ridl., Derry, B. & H. 12641; flr. March, June, Oct., fruit March. A small terrestrial herb, endemic and local, a var. only in 5h.

Hylophila lanceolata, *Hook. fil.* At 3600′, H. & N. 2336; flr. and fruit March. A terrestrial herb of Sumatra and Java; in Peninsula 4f.

Hylophila mollis, *Lindl.* Taiping Hills, Ridl.; flr. Aug. A terrestrial herb of Sumatra; in Peninsula 6k, 9m.

Lepidogyne longifolia, *Bl.* At 2500′, B. & H. 13210; flr. March. A large terrestrial herb of Sumatra, Java and the Philippines; in Peninsula 2d, 8m.

Cryptostylis arachnites, *Hassk.* At about 3000′, Ridl.; flr. June. A terrestrial herb of Indo-Malaya to the Philippines; in Peninsula common.

Habenaria gigas, *Hook. fil.* At about 3000′, Curt.; flr. June. A tall herb, endemic, 4f, 5h.

SCITAMINEAE.

Globba albiflora, *Ridl.* At Taiping, Ridl.; flr. Aug. A herb up to 3′, endemic, 2d, 8d, 4e.

Globba aurantiaca, *Miq.* 500-4000′, Ridl., Hervey, B. & H.; flr. March. A herb of Sumatra and Borneo; in Peninsula common.

Globba brachycarpa, *Baker.* 2000-4000′, Kunstl. 2414, Curt. 2703, Ridl. 2956; flr. March, Sept., Oct. A slender herb, endemic and local.

Globba cernua, *Baker.* 500-4000′, Ridl. 14429, Hervey, Anders. 86, 136, Hend. 10097, 10118, B. & H. 12852; flr. Jan., March, fruit Aug. A herb, endemic and common.

Globba leucantha, *Miq.* 300-1500′, Kunstl. 2291, Hend. 10456; flr. Sept. A herb of Sumatra; in Peninsula 3f, 4f, 8l, 9l, 9m.

Globba panicoides, *Miq.* 100-800′, Hend. 10006, 10176, 10190, 10445; flr. Jan., June. A herb up to 2′, of Sumatra and Borneo; in Peninsula common on the west.

Globba pendula, *Roxb.* 2000-4000′, Ridl. 2957, 14428, B. & H. 12773; flr. March, Aug., June. A herb of Tenasserim and Lower Siam; in Peninsula 2c, 2d, 4d, 4e, 6c, 6f, 5g.

Globba uliginosa, *Miq.* At Maxwell's Hill, Ridl.; flr. March. A herb up to 2′, of Sumatra; in Peninsula common.

Globba variabilis, *Ridl.* 300-1000′, Kunstl. 2051; flr. July. A herb up to 2′, of Lingga and Borneo; in Peninsula common.

Globba Wallichii, *Baker.* At 4000′, Fox. 136, Anders. 144; flr. March, Oct. A herb up to 2′, endemic, 2d.

Hedychium longicornutum, *Baker.* Larut Hills, Ridl.; flr. June. An epiphyte of Sumatra; in Peninsula common.

Camptandra parvula, *Ridl.* 400-4500′, all collectors; flr. Jan.-March, Sept. A small herb, endemic and common.

Gastrochilus albo-sanguinea, *Ridl.* Larut Hills, Woolridge, fide Ridl. A small herb, endemic, 1b.

Gastrochilus minor, *Baker.* Larut, Kunstl., fide Ridl. A small herb, endemic, 4d, 4f.

Curcuma Kunstleri, *Baker.* 100-1500′, Kunstl. 2542, Curt. 2719; flr. May, Nov. A herb, endemic, 2d, 3d, 4d, 4e, 3f, 4f.

Conamomum citrinum, *Ridl.* 300-4500′, Ridl. 2959, 14447, Anders. 40; flr. March, fruit Aug. A large herb of Lower Siam; in Peninsula 4e, 4f.

Conamomum utriculosum, *Ridl.* 2000-4000′, Curt. 2714, Ridl. 5190, Anders. 139, B. & H. 12955; flr. March, May, June. A large herb, endemic, 6e, 4f.

Costus globosus, *Bl.* Up to about 2500′, Ridl., Curt.; flr. May, June. A herbaceous plant up to 8′, of W. Malaysia; in Peninsula common.

Costus Kingii, *Baker.* 300-1500′, Kunstl. 2104, Curt.; flr. May, July. A herbaceous plant up to 6′, endemic, 2d, 4d.

Costus Kunstleri, *King.* 500-1000′, Kunstl. 2307; flr. July. A tall herb, endemic and local.

Costus speciosus, *Sm.*, var. argyrophyllus, *Wall.* At Taiping, Scort. 436; fruit April. A herbaceous plant up to 10′, widely Malaysian, the var. in Pegu; in Peninsula common.

Zingiber aromaticum, *Valeton.* At 300′, Kunstl. 2163; flr. Aug. A herb of Java; in Peninsula common, cultivated and in waste ground.

Zingiber chrysostachys, *Ridl.* 100-4000′, Curt. 2716, Ridl. 5199, Hervey; flr. May, June. A herb up 2′, endemic, 4d.

Zingiber gracile, *Jack.* 3000-3600′, Ridl. (var. elatior), B. & H. 12712; flr. June. A herb, endemic and common, the var. in 2d.

Zingiber Kunstleri, *King.* 2000-4300′, Ridl. 11449, 11962, B. & H. 12765; flr. Feb., March, Dec. A large herb, endemic and local.

Zingiber spectabile, *Griff.* At 300′, Kunstl. 3205; flr. Aug. A herb up to 7′, of Sumatra; in Peninsula common.

Amomum lappaceum, *Ridl.* 2000-3000′, Ridl.; fruit Feb., June. A herb up to 6′, endemic, 4f, 5h, 0k.

Amomum perakense, *Ridl.* At 2500′, Ridl.; flr. June, fruit Dec. A herb, endemic and local.

Amomum uliginosum, *Koen.* 100-4000′, Kunstl. 1839, Ridl.; flr. March, June. A herb up to 5′, of Siam and Borneo; in Peninsula common.

Amomum xanthophlebium, *Baker.* 500-1000′, Kunstl. 1957; flr. June. A herb up to 6′, endemic, common.

Hornstedtia albomarginata, *Ridl.* 2000-3800′, Ridl., B. & H. 12981; flr. March, June, Dec. A herbaceous plant up to 10′, endemic, 2d, 6d, 3f, 4f, 4h 5h, 6j.

Hornstedtia fulgens, *Ridl.* Larut Hills, Ridl. (not seen). A herbaceous plant up to 15′, endemic and local.

Hornstedtia grandis, *Ridl.* 3000-4000′, Ridl. 11450, B. & H. 12651; flr. March, June, Dec. A herbaceous plant up to 15′, endemic, 4f, 5g.

Hornstedtia imperialis, *Ridl.* 100-300′, Kunstl. 3075, Ridl., Hend. 10139, 10159, 10312; flr. Feb., April, June, Aug. A herbaceous plant up to 15′, of Sumatra and Java; in Peninsula cultivated.

Hornstedtia macrochilus, *Ridl.* 500-3000′, Kunstl. 1897, Curt.; flr. June, Sept. A herbaceous plant up to 12′, endemic, 6d, 4f, 6k, 7l, 9l.

Hornstedtia megalochilus, *Ridl.* 100-2000′, Kunstl. 2933, Ridl.; flr. April. A herbaceous plant up to 15′, of Lower Siam; in Peninsula common.

Hornstedtia metriochilus, *Ridl.* 2000-3000′, Curt., Ridl., Anders. 137; flr. March, May, June. A herbaceous plant up to 12′, endemic, 2d, 6d, 4e, 5h, 6k, 7l, 8l, 9l.

Hornstedtia scyphus, *Retz.* At 4000′, Curt. 2072; flr. Sept. A herbaceous plant up to 10′, of Sumatra and Borneo; in Peninsula 4h, 5h, 7l, 9m.

Hornstedtia triorgyale, *Ridl.* 200-300′, Kunstl. 2105; flr. July. A herbaceous plant up to 20′, endemic, 6d, 6g, 5h.

Elettariopsis latiflora, *Ridl.* 800-1500′, Kunstl. 2886; flr. March. A creeping herb, endemic, 2e, 4f, 5h, 6k, 8k, 9m.

Geostachys decurvata, *Ridl.* 3000-4000′, Kunstl. 6310, Ridl. 5189, Anders. 60; flr. June, July, fruit March, July. A large tufted plant, endemic and local.

Alpinia javanica, *Bl.* At 100′, Kunstl. 2296, at Waterloo, Ridl. 2954; flr. Sept., fruit March. A herb up to 6′, of Sumatra and Java; in Peninsula common.

Alpinia macrostephanus, *Ridl.* 500-1000′, Kunstl. 1905; flr. June. A herb up to 8′, endemic and local.

Alpinia mutica, *Roxb.* At 100′, Kunstl. 2581; flr. Nov. A herb up to 6′, of Borneo; in Peninsula 2d, 0k.

Alpinia petiolata, *Baker.* 2000-4000′, Kunstl. 6357, Curt., Ridl.; flr. June, July, Sept., Dec. A herb up to 3′, endemic, 6e, 4f, 5g, 6k.

Alpinia Rafflesiana, *Wall.* 100-4000′, Curt. 2074, 2985, Ridl., Anders. 143, Hend. 10007, 10078, 10096, 10455; flr. Jan., March, Sept., Oct. A herb up to 4′, endemic and common.

Alpinia scabra, *Benth.* 2000-3000′, Kunstl. 2818, Curt. 2722, Anders. 141, Hend. 10117, B. & H. 12692; flr. Jan., March, May, Dec. A herb up to 6′, of Java; in Peninsula common.

Donax grandis, *Ridl.* 500-4000′, Curt. 2071, Hend. 10417; flr. May, fruit Oct. A shrub up to 20′, of Tenasserim to Borneo; in Peninsula common.

Phrynium hirtum, *Ridl.* At 4200′, Ridl. 11452, B. & H. 12900; flr. Dec., fruit March. A stemless herb, endemic, common.

Phrynium malaccense, *Ridl.* At Maxwell's Hill, Ridl.; flr. March. A large stemless herb of Lower Siam; in Peninsula common.

Musa malaccensis, *Ridl.* Up to about 4700′, Ridl. 2949 B. & H.; flr. March, Dec. A banana up to 10′, endemic and common.

Musa truncata, *Ridl.* Taiping Hills, Ridl. (not seen). A big banana, endemic, 4f, 5h.

Musa violascens, *Ridl.* At 500′, Haniff 10561; flr. May. A banana up to 10′, of Borneo; in Peninsula 4d, 4e, 6e, 4f, 6f, 5g, 5h, 6j.

AMARYLLIDACEAE.

Curculigo latifolia, *Dryand.* 500-4600′, Kunstl. 2521, 6405, B. & H. 12642; flr. March, July, Nov. A stemless herb of Indo-Malaya; in Peninsula common.

Curculigo megacarpa, *Ridl.* 2000-3800′, Ridl. 11407, B. & H. 12991; flr. Feb., Dec. A large tufted plant, endemic and local.

Curculigo recurvata, *Dryand.* At 3000′, Ridl. 11421; flr. and fruit Dec. A tuberous herb of Indo-Australia and China; in Peninsula 4f, 9m.

BURMANNIACEAE.

Burmannia coelestis, *Don.* At Taiping, Hend. 10325; flr. Aug. A small herb of Indo-Australia and China; in Peninsula common.

Burmannia Disticha, *Linn.* At Taiping, Hose 44; flr. Dec. A small herb of Indo-Australia and China; in Peninsula 2c, 6e, 7k.

Burmannia longifolia, *Becc.* At 4750′, Kunstl. 5039, Ridl.; flr. June, fruit Oct. An erect herb of Malaysia; in Peninsula 3d, 4e, 6e, 4f, 5g, 6g, 5h.

Thismia arachnites, *Ridl.* At 2000′, Ridl. (not seen). A small saprophyte, endemic and local.

Bagnisia crocea, *Becc.*, var. brunnea, *Ridl.* About 4700′, Ridl.; flr. Feb. A very small saprophyte, the species of Borneo; in Peninsula 3e only.

TACCACEAE.

Tacca cristata, *Jack.* 200-3000′, Wray 2657, Kunstl. 2174, Hend. 10460, 10480; flr. Feb., Aug. A tuberous herb of Burma; in Peninsula common.

DIOSCOREACEAE.

Dioscorea bulbifera, *Linn.* 100-200′, Wray 2669, Kunstl. 3526; flr. Aug. A climbing shrub of Africa, Indo-Australia and China; in Peninsula common.

Dioscorea deflexa, *Hook. fil.* 300-1000′, Kunstl. 3858, 3972, 6568; flr. March, Sept. A wide climber of Tenasserim to Java; in Peninsula 2d, 8d, 4e, 7j.

Dioscorea glabra, *Roxb.* At 100′, Wray 569 (var. grisea), Kunstl. 2370 (var. grisea), 2186. A climber of India to Siam; in Peninsula 1b, 2c, 2d.

Dioscorea hispida, *Dennst.*, var. reticulata, *Hook.* At 300′, and Bukit Gantang, Wray 1894, Kunstl 4190; flr. May. A spiny climber of Indo-Australia; in Peninsula common.

Dioscorea laurifolia, *Wall.* 100-4700′, Kunstl. 5549, H. & N. 2308, 2309, 2316, 2318, 2329, 2343, 2388, 2393, 2394, B. & H. 12862; flr. and fruit Feb. A slender unarmed climber, endemic and common.

Dioscorea orbiculata, *Hook. fil.* At 300′, Wray 3251, Kunstl. 3421, 5068, B. & H. 12804. A slender climber of Sumatra and Borneo; in Peninsula common.

Dioscorea piscatorum, *Prain and Burkill.* At 200′, Hend. 10059. A thorny climber of Sumatra; in Peninsula 4e, 4f, 6f, 6g, 0j.

Dioscorea polyclades, *Hook. fil.* 300-800′, Kunstl. 2980. A climbing shrub of W. Malaysia; in Peninsula 5e, 4f, 5g, 5h, 5j, 6j, 8k, 9m.

Dioscorea pyrifolia, *Kunth.* 300-3600′, Kunstl. 5125, H. & N. 2337, 2399. A climbing shrub of W. Malaysia; in Peninsula common.

Dioscorea Scortechinii, *Prain and Burkill.* 3000-3900′, Scort., H. & N. 2307, B. & H. 12724, 12973; flr. Feb., March. A climbing shrub of Tonkin and Sumatra; in Peninsula 6k, 8l, 9l.

Dioscorea stenomeriflora, *Prain and Burkill.* 100-2000′. Kunstl. 4160, 5152, 6693, 6746; flr. April, Nov. A climber up to 30′, endemic, 5h, 9m.

LILIACEAE.

Protolirion paradoxum, *Ridl. and Groom.* Up to 4000′. Wray, Ridl. A small saprophyte, endemic, 2c, 4e, 6e, 4f, 5g.

Peliosanthes albida, *Baker.* 2000-4500′. Curt., Ridl. 14448, Hend. 10470, B. & H. 12703; flr. Feb., March, Sept. A herb of Sumatra and Borneo; in Peninsula 2d, 5h, 6k.

Peliosanthes grandiflora, *Ridl.* Taiping Hills, Ridl. A herb, endemic and local.

Peliosanthes violacea, *Wall.* Taiping Hills, Ridl., Anders. 121; fruit March. A herb of Himalaya to Siam; in Peninsula common.

Peliosanthes viridis, *Ridl.* At 2000′, Ridl.; fruit Feb. A bushy herb of Sumatra; in Peninsula 6k, 7l, 9l, 9m.

Ophiopogon malayanum, *Ridl.* 2000-3000′. Curt., H. & N. 2497; flr. Feb., fruit Dec. A herb of Borneo; in Peninsula 1b, 2d.

Dianella ensifolia, *Red.* 200-4750′. Wray 1978, 4282, Hend. 10228, B. & H.; fruit Nov. A herb up to 6′, of Indo-Australia and the Mascarene Is.; in Peninsula common.

Dracaena conferta, *Ridl.* At 2500′, Ridl. 11408, B. & H. 13034; flr. Dec., fruit March. A shrub up to 10′, of Lower Siam; in Peninsula 2d, 3d, ?6k.

Dracaena elliptica, *Thunb.* 3000-4700′, Ridl., B. & H. 12592, 12665; flr. March, June, fruit March. A shrub up to 6′, of Indo-Malaya; in Peninsula common.

Dracaena granulata, *Hook. fil.* At 200′, Kunstl. 6808, fide Ridl. A tree up to 60′, of ?Borneo; in Peninsula 9l, 9m.

Dracaena Maingayi, *Hook. fil.* Larut, Kunstl. 3564, fide Ridl. A tree up to 40′, of Malaysia; in Peninsula 2d, 8g, 5h, 6k, 7l, 9m.

Dracaena Porteri, *Bak.* Larut, Ridl. (not seen). A small shrub of Siam; in Peninsula 2d, 6d, 6e, 5h, 6j, 6k, 7k, 8l, 9m.

Dracaena robusta, *Ridl.* Taiping Hills, Ridl. (not seen). A shrub up to 9′, endemic, 6d, 4e, 5g.

Dracaena umbratica, *Ridl.* At 500′, Hend. 10113; flr. Jan. A shrub up to 3′, endemic, common.

Smilax aspericaulis, *Wall.* 1800-2000′, Kunstl. 2924, Ridl. 11403; flr. April, Dec. A climbing shrub of India to Java, except Sumatra; in Peninsula 5h.

Smilax barbata, *Wall.* Up to 2000′, Ridl. (not seen). A thorny climber of Bangka; in Peninsula 5h, 6k, 9m.

Smilax Blumei, *A. DC.* At 2000′, Ridl. (not seen). A thorny climber of Java; in Peninsula 4f, 6k.

Smilax calophylla, *Wall.* 100-3700′, Kunstl. 1961, 4108, B. & H. 12714; fruit March, April, June. A slender erect shrub of Sumatra; in Peninsula common.

Smilax Helferi, *A. DC.* 100-500′, Kunstl. 3365; flr. Sept. A woody climber of Tenasserim; in Peninsula common.

Smilax Kingii, *Hook. fil.* 300-800′, Wray 2063, Kunstl. 4171, Hend. 10008; fruit April. A thorny climber, endemic, 6j.

Smilax laevis, *Wall.* 300-4700′, Kunstl. 4140, Fox 139, Ridl. 2957, 11389, B. & H. 12864; flr. Dec., fruit Feb., April, Oct. A slender climber of China and Borneo; in Peninsula 2c, 2d, 4f, 5g, 5h, 7k, 9k.

Smilax leucophylla, *Bl.* Larut Hills, Kunstl. 3669, fide Ridl. A woody climber of Indo-China and Malaya; in Peninsula 2d, 3f, 8g, 5h, 0k, 9m.

Smilax megacarpa, *A. DC.* 300-1000′, Kunstl. 4177, 5084; flr. Oct., fruit April. A thorny climber of India, Tonkin and Java; in Peninsula 2d, 3f, 6k, 9m.

Smilax myosotiflora, *A. DC.* Larut, Kunstl. 2748, fide Ridl. A slender climber of Lower Siam and Java; in Peninsula common.

COMMELINACEAE.

Pollia sorzogonensis, *Endl.* At 2000′, Curt.; fruit May. A tall herb of Indo-Australia and China; in Peninsula common.

Pollia thyrsiflora, *Endl.* At 300′, and Waterloo, Curt., Ridl., Hend. 10047; flr. May, fruit Jan., March. A herb of Malaysia; in Peninsula 1b, 4e, 6e, 6f, 5g, 5h, 0j.

Commelina nudiflora, *Linn.* 100-4000′, Wray, Hervey, B. & H. 12780; flr. March. A creeping herb, pantropic; in Peninsula common.

Aneilema conspicuum, *Kunth.* Taiping Hill, Anders. 115; flr. and fruit March. A herb of Indo-Malaya; in Peninsula 2d, 4d, 6d, 6f, 6k.

Aneilema nudiflorum, *Br.* Taiping, Wray, fide Ridl. A creeping herb of S. E. Asia; in Peninsula common.

Floscopa scandens, *Lour.* At Taiping, Ridl., Hend. 10371; flr. Jan. A creeping herb of Indo-Australia and China; in Peninsula common near streams.

Forrestia gracilis, *Ridl.* 300-400′, Hend. 10451; flr. Feb. A creeping herb, endemic and common.

Forrestia marginata, *Hassk.* Taiping Hills, Ridl.; flr. Feb., fruit Feb., Dec. A creeping herb of W. Malaysia; in Peninsula common.

Forrestia mollis, *Hassk.* At about 3000′, Ridl. 2950; flr. March. A creeping herb of Sumatra and Java; in Peninsula 4d, 6e, 7k, 9k, 8l, 9l.

Forrestia monosperma, *Clarke.* 1500-2500′. Curt., Ridl. A creeping herb, endemic. 4d. 6e. 4f. 5h.

ALISMACEAE.

Limnocharis emarginata, *Humb. and Bonpl.* At 200′, Wray 1764. An aquatic herb of S. America. An escape from cultivation.

FLAGELLARIACEAE.

Flagellaria indica, *Linn.* At 4750′, B. & H. A climbing shrub of the Old World tropics; in Peninsula common, usually near the sea.

Joinvillea malayana, *Ridl.* At 4000′, Ridl. 11914, Hose 60; fruit Feb. A tall reed-like plant of Borneo; in Peninsula 4e. 4f. 5g.

Susum malayanum, *Hook. fil.* 200-3800′, Wray 2128, Curt., Ridl. 11430, Hend. 10459; flr. June, Oct., fruit Feb., June, Dec. A large herb of Java and Borneo; in Peninsula common.

PALMAE.

Areca pumila, *Bl.* Larut Hills, Ridl. 11429 (not seen). A palm up to 15′, of Siam and Java; in Peninsula 1b. 2d. 4e. 5g. 6j. 9m.

Pinanga malaiana, *Scheff.* At about 2000′, Ridl. A palm up to 12′, of Sumatra and Borneo; in Peninsula common.

Pinanga paradoxa, *Scheff.* Up to 3700′, Curt., Ridl., B. & H. 12715; fruit March, Oct. A palm up to 12′, endemic and common.

Pinanga polymorpha, *Becc.* 4400-4700′, Ridl., B. & H. 12875; fruit Feb., June, Dec. A palm up to 3′, endemic. 4f. 5g. 5h.

Pinanga Scortechinii, *Becc.* 2000-4700′, Curt. 2080, Fox, Ridl., Anders. 163, B. & H. 12627; flr. Sept., Dec., fruit Feb., March, Sept., Oct. A palm up to 15′, of Lower Siam; in Peninsula common.

Nenga macrocarpa, *Scort.* 3000-4500′, Ridl., B. & H. 12790; flr. Feb., June, Dec. A palm up to 18′, endemic and common.

Nenga Wendlandiana, *Scheff.* Taiping Hills, Ridl.; flr. Dec. A palm up to 15′, of Sumatra; in Peninsula Taiping to Singapore.

Oncosperma horrida, *Scheff.* At 3200′, B. & H. A palm up to 60′, of Borneo; in Peninsula 2d. 6e. 4f. 6g. 6k. 9m.

Iguanura bicornis, *Becc.* 3500-4000′, Kunstl. 6375; flr. and fruit July. A palm up to 8′, endemic, doubtfully from 4f.

Iguanura ferruginea, *Ridl.* 2000-4000′, Fox 162, Ridl. 11405; flr. Oct., Dec. A short-stemmed palm, endemic. 4f.

Iguanura geonomaeformis, *Mart.*, var. malaccensis, *Ridl.* Up to 2500′, Ridl. 11404, Robertson-Glasgow; flr. Dec. A palm up to 3′, endemic and common.

Iguanura polymorpha, *Becc.* 3000-4000′, Curt. 2078, Ridl. 3157, Anders. 173, Forest Dept. C.F. 29, B. & H. 12715; flr. and fruit Feb., March, Sept. A palm up to 7′, endemic, 6d, 4e, 4f, 6g.

Iguanura Wallichiana, *Hook. fil.* Up to 4000′, Fox, Anders. 170; flr. March. A palm up to 12′, endemic, 2d, 3d, 6e, 4f, 6f, 7k.

Arenga saccharifera *Labill.* At 3900′, B. & H. A palm up to 30′, of Indo-Malaya; in Peninsula common.

Arenga Westerhouti, *Griff.* Taiping Hills, Ridl. (not seen). A palm up to 30′, endemic, 2d, 4e, 6e, 4f, 6k.

Didymosperma Hookeriana, *Becc.* At Waterloo, 1500′, Curt.; fruit May. A dwarf palm of Lower Siam; in Peninsula 1a, 2b, 4d, 6e, 4f, 6g.

Caryota obtusa, *Griff.* Common at 3400′, Ridl. 11401, B. & H. A palm up to 60′, endemic, 4f, 5g, 6k, 9l.

Licuala longipes, *Griff.* At Maxwell's Hill, Ridl.; fruit June. A stemless palm, endemic, Taiping to Singapore.

Licuala malayana, *Becc.* 4000-4500′, Fox 163, Ridl., B. & H. 12589; flr. Oct., Dec., fruit March. A palm up to 7′, endemic, 6e, 4f, 6g, 7h.

Licuala modesta, *Becc.* 2000-4500′, Fox, Ridl., Hervey, B. & H. 12551, 12873, 12948; flr. Feb., March, June, Oct. A palm up to 10′, endemic and local.

Licuala pusilla, *Becc.* At about 1500′, Ridl. 11406, 14727; flr. Feb., Aug., Dec. A dwarf palm, endemic, 6e, 4f, 4g, 5g.

Zalacca affinis, *Griff.* Larut, Kunstl., fide Ridl. A short-stemmed palm, endemic, 2d, 3f, 6k, 8l, 9m.

Zalacca edulis, *Bl.* At 3200′, B. & H. A Javanese palm, cultivated here.

Eugeissonia tristis, *Griff.* Up to about 2500′, common. A tufted palm of Borneo; in Peninsula common on the West.

Daemonorops aciculatus, *Ridl.* 3000-4700′, Ridl., Anders. 176; flr. June, fruit March. A large rattan, endemic and local.

Daemonorops calicarpus, *Mart.* Larut, Kunstl., fide Ridl. A tufted palm, endemic and common.

Daemonorops didymophyllus, *Becc.* At 3200′, Ridl., B. & H. 12681; flr. March, fruit Feb. A rattan up to 40′ long, of Borneo; in Peninsula 2d, 4f, 7l, 9l, 9m.

Daemonorops elongatus, *Bl.* 3500-3800′, Fox, Ridl., B. & H. 12646, 12716; fruit Feb., March. A rattan of Borneo; in Peninsula common.

Daemonorops geniculatus, *Mart.* 2000-3500′, Kunstl. 2735, Ridl.; flr. Feb. A rattan about 20′, endemic and common.

Daemonorops hygrophilus, *Mart.* At 4300′, B. & H. 12763; flr. March. A tall stout rattan, endemic, 5h, 6k.

Daemonorops hystrix, *Mart.* Larut, Kunstl. 5142, fide Ridl. A rattan up to 30′, of W. Malaysia; in Peninsula common.

Daemonorops leptopus, *Mart.* Larut Hills, Ridl.; flr. Dec. A stout stemmed rattan, endemic, 4f, 5h, 6k, 9l, 9m.

Daemonorops monticolus, *Mart.* 3800-4700′, B. & H. 12763, 12994; fruit March. A tufted rattan of Borneo; in Peninsula 2d, 6k, 8l.

Daemonorops periacanthus, *Miq.* At about 2000′, Ridl. 11409; flr. Dec. A rattan up to 40′, of Sumatra and Borneo; in Peninsula common.

Ceratolobus laevigatus, *Becc.* 2000-2900′, Wray 2919, Ridl. 3488, 11436, H. & N. 2377, B. & H. 12696; fruit Feb., March, Dec. A climbing palm, endemic, 3f, 4f, 5g, 5h, 6j.

Calamus ciliaris, *Bl.* 2500-3700′, Ridl., B. & H. 12771; fruit March, Dec. A rattan up to 20′, of W. Malaysia; in Peninsula 6e, 8l, 9l.

Calamus Curtisii, *Ridl.* At Maxwell's Hill, Ridl.; flr. June. A stout stemmed rattan, endemic, 4f, 5g, 5h.

Calamus densiflorus, *Becc.* At Taiping, Kunstl. 5527, 8434, fide Ridl. A rattan up to 15′, endemic, 8f, 5h, 9m.

Calamus Diepenhorstii, *Miq.* Taiping Hills, Ridl. 11411, 11412; fruit Dec. A rattan up to 30′, of Sumatra and Borneo; in Peninsula 2d, 4d, 6e, 3f, 4f, 6j.

Calamus intumescens, *Becc.* At 2500′, Ridl. (not seen). A long stemmed rattan, endemic, 5g, 7l, 9m.

Calamus longispatha, *Ridl.* At Taiping, Wray 2392, 3017, fide Ridl. A stout rattan, endemic, 4f, 5g.

Calamus luridus, *Becc.* 3500-4000′, Ridl. 11987; fruit Feb. A rattan up to 20′, of Borneo; in Peninsula 4f, 5g, 5h, 6j, 7k, 9l, 9m.

Calamus ornatus, *Bl.* Larut, Kunstl., fide Ridl. A rattan up to 80′, of W. Malaysia and the Philippines; in Peninsula 6j, 6k, 7l, 9l, 9m.

Calamus pencillatus, *Roxb.* 200-4700′, Curt., Anders. 168, B. & H. 12590, 13219, Haniff 13257; flr. May, Sept., fruit March. A rattan up to 60′, of Java and Borneo; in Peninsula common.

Calamus ramosissimus, *Grij.* 1000-3000′, Curt., Ridl. 11986, H. & N. 2499, B. & H. 12688; flr. Feb., March, Sept., Dec. A rattan up to 30′, endemic, 2c, 6e, 4f, 6f, 6j.

Calamus rhomboideus, *Bl.* At about 4000′, Ridl. 11410; flr. Dec. A rattan up to 40′, of W. Malaysia; in Peninsula 6k.

Calamus rugosus, *Becc.* 3000-4000′, Curt., Ridl. 11314, 11315; flr. Feb., May, fruit Feb., Dec. A rattan up to 20′, endemic and local.

Calamus viridispinus, *Becc.* 4000-4700′, Ridl. 3494, 5203, 11413, 11985, Anders. 21, 167, H. & N. 2321, B. & H. 12767, 12901; flr. Feb., March, June, Dec. A rattan up to 25′, endemic and local.

Korthalsia echinometra, Becc. At 3200′, Ridl.; B. & H. 12787; flr. March. A rattan up to 100′, of Borneo; in Peninsula 5j, 6j, 6k, 9m.

Korthalsia ferox, *Becc.* Up to 4500′, Scort., Kunstl., fide Ridl. A rattan up to 30′, of Borneo; in Peninsula 2d.

Korthalsia scaphigera, *Mart.* 200-500′, Kunstl. 3722; flr. Jan. A rattan up to 60′, of Sumatra, Borneo and the Philippines; in Peninsula 6k, 9k, 9m.

Korthalsia tenuissima, *Becc.* At 300′, Kunstl. 4057, fide Ridl. A slender rattan up to 100′, endemic and local.

Plectocomia ?Griffithii, *Becc.* At 3900′, B. & H. A large rattan, endemic and common.

PANDANACEAE.

Pandanus bicornis, *Ridl.* 2500-3000′, Ridl.; fruit Dec. A shrub up to 2′, endemic and local.

Pandanus bidens, *Ridl.* At 2000′, H. & N. 2383; fruit Feb. A shrub up to 5′, endemic, 4f.

Pandanus glaucophyllus, *Ridl.* At about 2500′, Ridl.; fruit Dec. A shrub up to 12′, endemic and local.

Pandanus ornatus, *Kurz.* 1000-1800′, Kunstl. 2015, H. & N. 2395; flr. July, fruit Feb. A bush up to 12′, endemic and common.

Pandanus ovatus, *Kurz.* 300-800′, Kunstl. 3758, 6559; fruit Jan., Sept. A creeping shrub of Lower Siam; in Peninsula 1a, 2b, 2c, 2d, 6k, 9k.

Pandanus perakensis, *Ridl.* At Maxwell's Hill, Ridl.; fruit June. A shrub, endemic, 4e.

Pandanus Ridleyi, *Mart.* At 200′, Kunstl. 6839; flr. Nov. A shrub up to 10′, endemic, 5g, 5h, 6k, 7k, 9m.

Pandanus Scortechinii, *Mart.* Up to 300′, Kunstl. 3557. A shrub up to 4′, endemic and local.

Pandanus stelliger, *Ridl.* 2000-3000′, Kunstl. 4166, Ridl. 11625, B. & H. 12700; fruit March, April, Dec. A shrub up to 10′, of Borneo; in Peninsula 5g.

Freycinetia confusa, *Ridl.* At 200′, Wray 2151; flr. June. A climber, endemic, 9m.

Freycinetia lucens, *Ridl.* 100-1000′, Kunstl. 4003, 4091, 7578, 8523; flr. Feb.-April. A climber up to 40′, endemic, 5g, 5j, 9m.

Freycinetia montana, *Ridl.* 3000-4700′, Kunstl. 2619, Ridl. 5194, B. & H. 12557; flr. March, Dec., fruit June, Dec. A climber, endemic, 5g, 5h.

Freycinetia valida, *Ridl.* 4300-4700′, Ridl. 11891, B. & H. 12764; flr. Feb. A climber up to 30′, of W. Malaysia; in Peninsula 2d, 5h, 7k, 9m.

ARACEAE.

Cryptocoryne elliptica, *N. E. Br.* Larut Kunstl. 3166, fide Ridl. An aquatic herb, endemic and local.

Arisaema anomalum, *Hemsl.* 2000-4500′, Wray, Curt. 3714, Ridl., Derry, Hose 29, B. & H. 12581; flr. March, June, Aug., Dec. A tuberous herb, endemic, 4f.

Arisaema Kunstleri, *Hook. fil.* At Taiping, Derry. A tuberous herb, endemic, 1a, 2d.

Arisaema Wrayi, *Hemsl.* 3000-4700′, Wray 30, Ridl., Derry, Hervey, Hose 30, H. & N. 2305, B. & H.; flr. Feb., March, Aug., Sept. A tuberous herb, endemic, 4f.

Amorphophallus minor, *Ridl.* Larut Hills, Ridl. (not seen). A large tuberous herb, endemic, 2d.

Amorphophallus sparsiflorus, *Hook. fil.* At Maxwell's Hill, Wray 111. A large tuberous herb, endemic and local.

Amorphophallus variabilis, *Bl.* Larut Hills, Kunstl., fide Ridl. A tuberous herb of Java, Borneo and the Philippines; in Peninsula 1b.

Colocasia esculenta, *Schott.* 3100-3800′, B. & H.; flr. March. A native of Trop. Asia, now cultivated in all tropics.

Alocasia Beccarii, *Engl.* 4000-4300′, Ridl., Hervey, H. & N. 2350, B. & H. 12769, 13021; flr. March, fruit Feb., March, Dec. A creeping herb of Borneo; in Peninsula 4f, 5g, 5h.

Alocasia Lowii, *Hook. fil.* At 3800′, B. & H. A herb of Java and Borneo; in Peninsula 2b, 2d, 6d, 4e, 5g, 5h, 0j, 9l.

Alocasia ovalifolia, *Ridl.* From 300′ upwards, Ridl., Hend. 10320; flr. Aug., fruit Dec. A herb, endemic, 2d, 5g, 5h, 9l.

Aglaonema Schottianum, *Miq.* At 3000′, Wray 2828; flr. Aug. A stout herb of Burma, Java and Borneo; in Peninsula 1a, 1b, 2b, 2d, 6k, 0k, 9m.

Homalomena angustifolia, *Hook. fil.* At 2000′, Ridl. A creeping herb, of Java; in Peninsula common on rocks in mountain streams.

Homalomena coerulescens, *Jungh.* At 3200′, Ridl., B. & H.; flr. Feb., March, Dec. A stout herb of W. Malaysia; in Peninsula common.

Homalomena Griffithii, *Hook. fil.* Taiping Hills, Ridl. 11421; flr. Dec. A herb of Borneo; in Peninsula 2d, 6e, 5g, 6j, 6k, 7l, 9l, 9m.

Homalomena humilis, *Hook. fil.* 300-3000′, Wray 2069 (var. velutina), Curt., Ridl. 2952; flr. Sept., Oct. A short-stemmed herb of Sumatra and Borneo; in Peninsula 2d, 4e, 3f, 4f, 5g, 5h.

Homalomena nutans, *Hook. fil.* 100-1000′, Kunstl. 2571, fide Ridl. A creeping herb, endemic and local.

Homalomena paludosa, *Hook. fil.* At 300′, Kunstl. 3082; flr. June. A stout herb, endemic, 2d, 9l, 9m.

Homalomena sagittaefolia, *Jungh.* 2000-3200′, Wray, Ridl., B. & H. 12805; flr. Feb. A stout herb of Java and Borneo; in Peninsula common.

Homalomena trapezifolia, *Hook. fil.* 300-4500′, Wray 1976, Ridl., Hend. 10185, 10318; flr. June, fruit Aug. A creeping herb, endemic, 4d.

Schismatoglottis calyptrata, *Zoll. and Mor.,* var. picta, *Hallier.* Larut Hills, Ridl. (not seen). A herb of Indo-Malaya; in Peninsula common.

Schismatoglottis longifolia, *Ridl.* 1000-4500′, Curt. 2082, Ridl., Hend. 10089; flr. Jan., Sept., fruit March. A herb, endemic, 4d.

Piptospatha elongata, *N. E. Br.* 3000-4000′, Wray 3222, Curt., Ridl., Anders. 117; fruit March, Sept. A herb of Borneo; in Peninsula common on rocks in streams.

Anadendrum montanum, *Schott.* 3000-4500′, Wray 704, Ridl. A climbing epiphyte of Malaysia; in Peninsula common, usually at low altitudes.

Scindapsus Beccarii, *Hook. fil.* 100-300′, Wray 2261, Kunstl. 7477; flr. April. A creeping shrub of Sumatra and Borneo; in Peninsula 8e, 3f, 8f.

Scindapsus picta, *Hassk.* 300-800′, Kunstl. 6471; fruit Aug. A long slender climber of Java and Borneo; in Peninsula common.

Scindapsus Scortechinii, *Hook. fil.* 4000-4300′, Ridl., B. & H. 12574; flr. March, June. A climbing shrub, endemic, 2c, 4f, 5g, 5h.

Rhaphidophora Beccarii, *Engl.* At 300′, Wray 1981. A creeping shrub of Siam and Borneo; in Peninsula 2d, 4d, 6e, 4f, 5h, on rocks in streams.

Rhaphidophora crassifolia, *Hook. fil.* At 300′, Wray 2260. A climbing shrub, endemic, 4f, 5h.

Rhaphidophora giganteum, *Ridl.* Larut, Kunstl. 6681, fide Ridl. A large climbing shrub, endemic and common.

Rhaphidophora gracilipes, *Hook.* Larut, Kunstl. 2102, fide Ridl. A climbing shrub, endemic, 4f.

Rhaphidophora Huegeliana, *Schott.* Taiping Hills, Ridl. 11417; flr. Dec. A climbing shrub of Java to the Philippines; in Peninsula common.

Rhaphidophora Korthalsii, *Schott.* 3500-4400′. Wray 4321. Ridl. 11419, B. & H. 12586; flr. and fruit March. A climbing shrub of Java and Borneo; in Peninsula 2d, 5g, 0k, 9m.

Rhaphidophora Kunstleri, *Hook. fil.* 500-800′. Kunstl. 6796; flr. and fruit Nov. A climbing shrub up to 60′, endemic, 4e, 4f, 6f.

Rhaphidophora laetivirens, *Ridl.* Larut Hills, Derry. A creeping shrub, endemic, 2d, 5h.

Rhaphidophora Lobbii, *Schott.* Larut, Kunstl., fide Ridl. A slender climbing shrub of Borneo; in Peninsula Taiping to Singapore.

Rhaphidophora Wrayi, *Hook. fil.* 3000-3600′, Ridl. 2960, 11418, B. & H. 12975; flr. Dec. Fruit March. A climbing shrub, endemic, 2d, 4f, 5g.

Podolasia stipitata, *N. E. Br.* 2000-2500′. Curt., Ridl.; flr. Sept., fruit Feb., June. A creeping herb of Sumatra and Borneo; in Peninsula 3f, 8l, 9l.

Cyrtosperma lasioides, *Griff.* At Batu Kurau, Curt., 2988; flr. Oct. A thorny aquatic herb of Borneo; in Peninsula common.

Pothos Barberianus, *Schott.* At 2500′, Wray 4235 (var. Wallichii) Curt., Ridl.; flr. Sept. A climbing herb of Sumatra and Borneo; in Peninsula 3f, 5g.

Pothos Kingii, *Hook. fil.* 300-3000′, (fide Ridl.), Wray 3277. A climbing herb up to 30′, endemic and local.

Pothos latifolius, *Hook. fil.* 500-2000′, Wray 4236, Kunstl. 3887, 3983, Curt. 2987, Ridl. 11420; flr. Feb., Oct., Dec., fruit Feb. A climbing herb of Malaysia; in Peninsula common.

Pothos macrocephalus, *Scort.* At Waterloo, 1000′, Curt. 2895; flr. Oct. A climbing herb, endemic, 4f.

CYPERACEAE.

Kyllinga melanosperma, *Nees.* At 4750′, B. & H. 12885. A sedge of Africa, and Indo-Malaya to the Philippines; in Peninsula 9m.

Cyperus diffusus, *Vahl.*, var. pubisquama. *Ridl.* At Maxwell's Hill, Bishop Hose 51. A sedge up to 3′, the species pantropic; in Peninsula both the species and var. common.

Cyperus Haspan, *Linn.* At 3800′, B. & H. 13028. A sedge, pantropic; in Peninsula common.

Cyperus Iria, *Linn.* At Taiping, Ridl. (not seen). A sedge of the tropics and sub-tropics of the Old World; in Peninsula common.

Cyperus pilosus, *Vahl.* At Taiping, Ridl. A sedge of Africa and Indo-Australia; in Peninsula common in marshes.

Cyperus Zollingeri, *Steud.* At Taiping, Ridl. A sedge of Trop. Africa and Indo-Australia; in Peninsula common.

Mariscus Sieberianus, *Nees.* At 300′, Hend. 10310. A sedge, pantropic; in Peninsula common.

Fimbristylis acuminata, *Vahl.* At Taiping, Ridl. (not seen). A tufted sedge of Indo-Australia; in Peninsula common.

Scirpus erectus, *Poir.* At Taiping, Ridl. A sedge of Asia, Australia, and N. America; in Peninsula common.

Scirpus mucronatus, *Linn.* At Taiping, Ridl. A sedge of Europe, African Islands, and Indo-Australia; in Peninsula common.

Rhynchospora aurea, *Vahl.* At Batu Kurau, Haniff 13264. A sedge up to 3′, pantropic; in Peninsula common.

Actinoschoenus filiformis, *Benth.* At 300′, Ridl. A sedge of Indo-Malaya; in Peninsula 2c, 2d, 6e, 7k.

Gahnia javanica, *Mor.* 1000-4750′, Curt. 2079, Ridl., B. & H. A large tufted sedge of Malaysia; in Peninsula common.

Mapania humilis, *Naves and Villar.* 2000-4000′, Curt. 2081, Ridl. A small tufted plant of W. Malaysia to the Philippines; in Peninsula common.

Mapania Kurzii, *Clarke.* 700-4000′, Wray 1852, Curt., Ridl. 11425, B. & H. 13036. A large tufted plant, endemic, 2d, 4d, 6k.

Mapania longispica, *Ridl.* 1200-2000′, Ridl. 11424, Hend. 10105, 10429. A tufted plant, endemic and local.

Mapania palustris, *Benth.* 300-400′, Ridl., Hend. 10463. A large tufted plant of ?Java; in Peninsula common.

Scleria elata, *Thwaites.* Up to 4700′, Ridl. A sedge up to 3′, of Indo-Malaysia; in Peninsula 2d, 4d, 4f, 5g.

Scleria multifoliata, *Boeck.* At 300′, Ridl. A sedge up to 3′, of Indo-Malaya; in Peninsula common.

Carex cryptostachys, *Brngn.* 2000-4000′, Kunstl. 8517, Ridl. 11399, Anders. 116. A sedge of W. Malaysia and China; in Peninsula 2d, 3f, 4f, 6k, 7l, 8l, 9m.

Carex perakensis, *Clarke.* 2900-3000′, Ridl. 11423, B. & H. 12694. A sedge, endemic, 4f, 5g.

GRAMINEAE.

Paspalum conjugatum, *Berg.* 3800-4750′, B. & H. A pantropic grass, common in the Peninsula, but probably introduced.

Paspalum scrobiculatum, *Linn.* 100-4750′, Hend. 10153, B. & H. A grass, pantropic; in Peninsula common.

Isachne albens, *Trin.* 3000-4750′, Wray, Ridl. 3115, 11913, Bishop Hose 58, B. & H. 12887. A grass up to 4′, of Indo-Malaya and China; in Peninsula 6e, 4f, 5g.

Isachne australis, *R. Br.* At Taiping, Bishop Hose 74. A grass up to 2′, of Indo-Australia; in Peninsula common.

Panicum auritum, *Presl.* 100-300′, Ridl., Bishop Hose 55. A grass up to 6′,of Indo-Malaya and China; in Peninsula common.

Panicum maximum, *Jacq.* At 4000′, Ridl. Guinea-grass. A native of Africa, cultivated in all tropics.

Panicum muticum, *Forsk.* At Taiping, Bishop Hose 53. A grass up to 8′, pantropic; in Peninsula cultivated and as an escape.

Panicum myosuroides, *Br.* At Taiping, Bishop Hose 68. A tall grass of Indo-Australia and Africa; in Peninsula common.

Panicum ovalifolium, *Poir.* At 2000′, Ridl. A small grass of Trop. Africa and Indo-Malaya; in Peninsula common.

Panicum perakense, *Merrill.* At Taiping, in water, Bishop Hose 56. A grass up to 4′, of Borneo; in Peninsula 4d, 8k, 7l, 9l.

Panicum pilipes, *Nees and Arn.* 300-800′, Kunstl. 2787, Bishop Hose 73. A creeping grass of Indo-Australia and the Mascarene Is.; in Peninsula common.

Panicum sarmentosum, *Roxb.* 100-4500′, Wray, Kunstl. 2515, Ridl., Bishop Hose 54. A tall grass of Indo-Malaya; in Peninsula common.

Ichnanthus pallens, *Munro.* At 4000′, Bishop Hose 61. A grass, pantropic; in Peninsula 1b, 4f, 5g, 5h, 6k, 8l, 9l.

Thysanolaena agrostis, *Nees.* 100-4000′, Bishop Hose, Hend. 10155, B. & H. 12928, 13221. A grass up to 12′, of Indo-Malaysia; in Peninsula 2d, 4d, 4f, 5g.

Setaria glauca, *Beauv.* At Taiping, Bishop Hose 66, Ridl. 11402. A tufted grass, cosmopolitan; in Peninsula common.

Leersia hexandra, *Sw.* At Taiping, Bishop Hose 72. A grass up to 3′, pantropic; in Peninsula common.

Leptaspis urceolata, *Br.* On G. Hijau to 4500′, B. & H. A grass of Indo-Malaya; in Peninsula common in dense forest.

Imperata arundinacea, *Cyrillo.* At 4750′, B. & H. Lallang. A pantropic grass; in Peninsula very common.

Saccharum arundinaceum, *Retz.* At Taiping, Hend. 10156. A grass up to 15′, of Indo-Malaya; in Peninsula common.

Pogonatherum saccharoideum, *Beauv.* At 4750′, B. & H. A grass of S. E. Asia; in Peninsula 2d, 4d, 6e, 4f, 5h, 8h, 6k, 9k.

Rottboellia glandulosa, *Trin.* At Taiping, Ridl. A grass up to 6′, of Indo-Australia; in Peninsula common.

Andropogon aciculatus, *Retz.* Maxwell's Hill clearing, B. & H. A grass of Trop. Asia and Australia; in Peninsula common.

Anthistiria gigantea, *Cav.* At Taiping, Hend. 10152. A grass up to 16′, of Indo-Australia and China; in Peninsula common.

Sphaerocaryum elegans, *Nees.* At 4000′, B. & H. 12744. A creeping grass of India and China; in Peninsula 3f, 6k, 9l, 9m.

Sporolobus indicus, *Br.* At 4750′, B. & H. A pantropic grass; in Peninsula common.

Cynodon dactylon, *Pers.* At 3700′, B. & H. A pantropic grass; in Peninsula common.

Phragmites Karka, *Trim.* At Taiping, Bishop Hose 67. A reed up to 12′, of Indo-Australia and Africa; in Peninsula common.

Neyraudia madagascariensis, *Hook. fil.* At 300′, Ridl. A reed up to 12′, of Trop. Asia and Africa; in Peninsula 1b, 2b, 2d, 5j, 6k.

Eragrostis elegantula, *Steud.* At Taiping, Bishop Hose 64. A grass up to 4′, of Indo-Malaya and S. China; in Peninsula common.

Eragrostis elongata, *Jacq.* At Taiping, Ridl. A grass of Indo-Australia; in Peninsula common.

Lophatherum gracile, *Brngn.* 4000-4500′, Wray, Fox, Ridl., Hervey. A tall grass of S. E. Asia except S. India, and Japan; in Peninsula common.

Poa annua, *Linn.* 3700-4000′, Ridl., B. & H. A small grass, cosmopolitan; in Peninsula not common.

Gigantochloa Kurzii, *Gamble.* At Taiping, Wray 134, fide Ridl. A bamboo of Tenasserim and Siam; in Peninsula 3f, 4f.

Dendrocalamus giganteus, *Munro.* Below G. Hijau, Ridl. (not seen.) A bamboo up to 100′, endemic, Penang to Malacca.

GNETACEAE.

Gnetum Brunonianum, *Griff.* 2000-3600′, Ridl. 2783, B. & H. 12710; flr. March. An erect shrub of Tenasserim and Borneo; in Peninsula common.

Gnetum funiculare, *Bl.* 100-200′, Hend. 10241, 10323; fruit Aug., Nov. A liane of Indo-Malaya; in Peninsula common.

Gnetum Kingianum, *Gamble.* At Kota, Wray 2851, fide Gamble. A liane, endemic, 4f, 6j, 0j, 6k, 9m.

Gnetum Ridleyi, *Gamble.* At 4000′, Ridl. A climbing shrub, endemic, 4f.

Gnetum tenuifolium, *Ridl.* At Taiping, Ridl. 14565. A slender climber of Lower Siam; in Peninsula common as far south as Malacca.

Gnetum Wrayi, *Gamble.* Larut, Kunstl. 5283, 6590, fide Gamble. A climbing shrub, endemic, 6e, 8g, 9m.

CONIFERAE.

Agathis alba, *Foxworthy.* Common from about 2500′ upwards, Wray. A lofty tree of Indo-China to the Philippines; in Peninsula 2c, 2d, 6e, 5g, 7h.

RELATIVE HUMIDITY of the air at the Botanic Gardens Singapore, from wet and dry bulb hygrometer readings made daily at 9. a.m. during the year 1924.

Date.	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sep.	Oct.	Nov.	Dec.
1	100	80	91	82	76	83	83	95	83	79	76	75
2	87	87	81	81	79	84	76	79	89	77	74	79
3	85	80	87	84	84	95	80	77	81	68	67	69
4	87	93	95	82	74	85	81	68	87	70	88	66
5	91	87	78	85	76	81	75	83	78	75	91	84
6	100	79	79	80	77	81	88	81	75	62	85	89
7	100	87	98	84	..	95	87	75	83	64	91	73
8	76	80	79	82	93	93	89	76	72	62	95	90
9	81	87	91	81	75	81	77	76	75	62	85	78
10	83	77	83	76	95	79	90	75	77	62	84	95
11	78	81	76	76	87	83	93	76	91	72	79	91
12	78	95	81	78	91	85	83	78	81	82	77	74
13	85	87	77	78	85	79	100	79	93	77	68	75
14	77	100	83	84	87	83	76	86	..	84	86	74
15	81	90	78	81	89	82	77	78	75	93	75	75
16	78	85	89	83	83	80	77	77	79	72	79	71
17	81	83	78	79	79	79	77	83	93	93	84	84
18	79	78	100	..	87	77	77	81	78	76	91	84
19	72	79	76	76	89	74	79	77	83	93	78	78
20	91	81	91	83	87	93	81	76	77	77	83	78
21	76	80	81	76	80	77	79	79	93	73	72	82
22	76	83	87	95	98	72	72	95	79	84	79	86
23	91	80	93	80	87	86	77	85	89	81	91	69
24	83	87	76	77	100	79	72	75	77	74	79	71
25	78	83	83	89	81	85	74	71	76	95	86	75
26	..	79	85	80	80	91	74	71	84	81	95	69
27	91	80	91	80	81	81	93	83	89	95	81	67
28	78	83	91	69	95	83	75	79	91	72	89	63
29	81	82	93	76	78	90	75	83	77	86	89	69
30	77	..	95	78	87	95	75	68	77	77	83	69
31	80	..	80	..	81	..	79	86	..	83	..	75
Average	83.4	83.9	85.35	80.5	84.7	83.7	80.35	79.1	82.1	77.45	82.6	76.9

Average for the year 81.7.

RAINFALL

at the Botanic Gardens, Singapore, during the first half of the year, 1924.

Readings taken at 9 a.m. and expressed in inches.

Date	Jan.	Feb.	March.	April.	May.	June.
1	2.01	trace	.30	.62	..	..
2	.22	..	.13	.08	..	..
3	.01	1.65	.35	trace	trace	1.67
4	.59	.09	1.57	.01	..	.08
5	.07	1.10	.02	.47	.13	..
6	.42	.07	.01	..	..	..
7	.32	.32	..	..	..	1.15
8	.01	1.21	..	..	1.60	.91
9	..	.87	trace	..	.09	trace
10	.32	.81	..	.01	.70	..
11	..	1.17	.36	..	.12	..
12	.61	.09	trace	..	.59	.01
13	..	3.44	trace	trace	.02	.13
14	.10	.98	..	.01	.52	.09
15	.64	2.90	trace	.11	trace	..
16	.01	.08	.25	..	.01	.01
17	..	..	.10	.18	.70	.10
18	.03	.02	2.02	..	.25	.12
19	.03	.02	.60	1.11	trace	..
20	.53	..	.14	.04	.05	.24
21	..	.02	.64	..	.40	.06
22	.08	..	.70	.80	.25	..
23	1.87	..	.07	.01	.09	trace
24	.10	..	.01	.10	.53	.01
25	..	.68	1.55	.72	.03	..
26	.01	..	1.25	.03	..	.48
27	.01	..	.14	.02	..	.19
28	..	.06	.37	..	.81	trace
29	..	1.58	trace	..	.10	.75
30	..		.01	.03	.53	.01
31	..		.03		.15	
Total	7.99	17.16	10.62	4.35	7.67	6.10

RAINFALL

at the Botanic Gardens, Singapore, during the first half of the year, 1924.

Readings taken at 9 a.m. and expressed in inches.

Date	July.	Aug.	Sep.	Oct.	Nov.	Dec.
1	.01	.76	.20	..	.45	..
2	.02	.59	.54	.15	.12	.
3	.20	1.43	1.73	.29	..	..
4	trace	trace	.09	..	.11	..
5	..	..	.27	..	.04	.41
6	.09	..	..	..	.05	.17
7	.13	.42	..	..	.65	.03
8	1.20	..	..	..	.82	1.32
9	.15	..	..	..	.25	.01
10	2.54	..	.03	..	.19	.59
11	.27	..	.71	..	.06	.10
12	.01	.02	.01	.13	trace	trace
13	.45	..	.29	.12	..	.11
14	..	.04	..	trace	.07	.19
15	..	.01	.13	.02	.01	.17
16	..	trace	..	.10	.01	.
17	.03	.41	.55	1.52	.34	.49
18	..	.39	.09	trace	.06	.02
19	..	.24	3.23	.12	.06	.11
20	..	..	.01	.16	..	.02
21	.07	.40	.04	..	..	.39
22	..	1.81	.02	trace	..	.41
23	..	.08	.11	.06	1.03	.15
24	..	..	..	1.93	trace	.01
25	..	..	..	1.45	trace	..
26	..	.02	.09	.03	.07	..
27	2.57	.03	.74	1.32	.04	.09
28	.01	.13	.47	.01	1.24	..
29	..	..	.01	trace	.10	..
30	..	..	4.24	trace	..	..
31	..	.34		.67		..
Total	7.75	7.12	13.60	8.08	5.77	4.79

RAINFALL

at the head of the Waterfall Gardens, Penang during the first half of the year 1924, in inches.

Readings taken at 8 a.m. and credited to the date in which the twenty-four hours begin. Data kindly supplied by the Municipal Commissioners of George Town, Penang.

Date	Jan.	Feb.	March.	April.	May.	June.
1	.49	..	..	2.18	.17	..
2	1.58	.05	.80	.03	.13	.67
3	..	..	.25	1.65	.50	.49
4	.04	..	..	..	.07	.01
5	.02	..	..	1.17	.10	.02
6	.06	.45	.02	.01	..	.09
7	..	..	..	..	..	.81
8	.06	.03	.17	..	..	.02
9	.02	.33	.02	..	.04	..
10	..	..	..	1.54	.09	.59
11	.38	..	.24	..	.03	..
12	.04	..	.85	.04	.33	..
13	.01	.28	.59	..	1.10	..
14	..	.01	..	..	.63	..
15	..	.01	1.55	1.20	2.65	..
16	3.25	.04	.14	5.73	.67	..
17	.20	..	..	.22	.23	..
18	..	..	.60	.02	.11	..
19	.45	..	.38	..	..	.68
20	..	..	.11	.57	.03	.03
21	..	..	.14	..	1.20	.01
22	.04	..	.41	.31	.04	.62
23	..	1.55	..	.03	.13	.68
24	..	.05	.63	1.81	.04	.79
25	..	..	4.65	.16	.02	.65
26	..	.05	..	..	..	.48
27	..	3.05	..	.87	..	.06
28	..	.70	..	..	.04	2.98
29	..	..	.86	..	.87	.83
30	..		..	..	..	..
31	..		..		..	
Total	6.64	6.60	12.41	15.54	9.58	19.54

RAINFALL

at the head of the Waterfall Gardens, Penang, during the second half of the year 1924, in inches.

Readings taken at 8 a.m. and credited to the date in which the twenty-four hours begin. Data kindly supplied by the Municipal Commissioners of George Town, Penang.

Date	July.	Aug.	Sep.	Oct.	Nov.	Dec.
1	.29	..	.67	10.25	..	..
2	.04	.02	.26	2.67	.02	.03
3	..	..	.56	..	.55	..
4	.17	..	4.57	.02	.06	.20
5	..	..	.10	.63	.90	..
6	.47	.18	..	..	1.68	.03
7	..	..	..	..	..	.03
8	.03	..	.75	..	.02	.07
9	1.81	..	..	.02	3.97	.26
10	..	..	1.68	.02	.06	..
11	..	.43	.02	.25	.44	..
12	..	.02	.14	2.40	.03	..
13	..	.04	.23	.85	1.18	.03
14	..	2.05	.26	.96	..	..
15	..	..	.40	.61	..	.07
16	..	.08	..	1.18	.03	..
17	..	.02	1.08	.55	.11	.03
18	..	..	.25	.38	.65	.02
19	..	..	.05	.58	.89	1.47
20	2.29	..	.13	..	1.10	.07
21	.30	.03	.60	..	.06	..
22	..	.03	..	..	2.45	.01
23	..	.01	.69	.96	.51	..
24	..	.07	.66	.06	.25	..
25	..	..	1.79	.35	.20	..
26	..	.01	3.59	..	.67	..
27	..	1.28	1.76	..	.04	..
28	.06	.10	.02	.05	..	..
29	..	4.45	3.93	1.70	..	..
30	1.27	1.20	.13	.07	..	.02
31	.03	.45		.16		..
Total	6.76	10.47	24.32	24.72	15.87	2.40

Summary of Rainfall 1924.

	SINGAPORE.				PENANG.			
	No. of rainy days	Amount of rain		Longest Spell without rain	No. of rainy days	Amount of rain		Longest Spell without rain
		inches	mm.			inches	mm.	
January	21	7.99	203	4 days.	14	6.64	168	9 days.
February	21	17.16	436	3 „	13	6.60	167	6 „
March	27	10.62	270	2 „	18	12.41	315	3 „
April	19	4.35	110	4 „	17	15.54	395	3 „
May	24	7.67	194	2 „	23	9.58	243	3 „
June	20	6.10	155	2 „	19	10.54	268	8 „
July	16	7.75	197	5 „	11	6.76	171	10 „
August	19	7.12	181	4 „	18	10.47	261	4 „
September	22	13.60	345	4 „	25	24.32	618	2 „
October	21	8.08	205	8 „	22	24.72	628	3 „
November	24	5.77	146	3 „	23	15.87	403	3 „
December	20	4.79	122	4 „	14	2.40	61	7 „
Total	254	101.00	2564		217	145.85	3698	

Greatest amount in 24 hrs.	4.24 ins. or 108mm.	10.25 ins. or 260mm.
„ „ 48 hrs.	4.42 ins. or 112mm.	12.92 ins. or 328mm.
„ „ 72 hrs.	7.32 ins. or 186mm.	14.31 ins. or 364mm.

Excessively rainy periods, more than 5 ins. having fallen in 72 hours	1 (Feb.)	6 (Mar., Apr., Aug., Sept. (2) Oct.)
No. of days when condition persisted	1	14
Periods of comparative drought, less than .02 ins. having fallen in 120 hours	6	6 (Jan.-Feb., Feb., June, July (2) Dec.
(Jan.-Feb., March, Apr., July, Oct., Nov.-Dec.)		
No. of days when the condition occurred	15	27

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Departmental Notices.

A list of plants which can be purchased at the Botanic Gardens, in Singapore and in Penang, can be had upon application. The same list appears at intervals in the Government Gazette.

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