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Natural fistory Secretary.
" It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of Asia, will commit their observations to writing and send them to the Asiatic Society at Calcatta. It will languish, if such oommaniontions shall be long intermitted; and it will die away, if they shall entirely cease." Sir WM. Jonse.

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Hon. Nateral Histury Secretary.
af Che bonnds of its investicntion will be the geographical limits of A ain : and within these limits its inquiries will be extended to whaterer is performed by man or prodinced by nature." - Sin William Jones.

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## JOURNAL

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## ASIATIC SOCIETY OF BENGAL,

Vol. LXX. Part II.-NATURAL SCIENCE.

No. I.-1901.
I.-Notes on the Fauna of Chitral.-By Capt. A. H. MoMaron, C.S.I., C.I.E., F.Z.S., Political Agent, Dir, Swat, and Ohitral.
[Received 8th February; Read 6th March, 1901.]
As in the case of "Notes on the Fanna of the Gilgit District" (Jowrnal, Asiatic Society of Bengal, vol. lxviii, part 2, no. 2, pp. 105-109, 1899), I propose to place on record the results of such observations as I have been able to make in the matter of Zoology daring my official connection during 1899-1900-1901 with the Chitral country.

I know of no previons records having been made of the Fanna of this country. Any record of the existence or non-existence of animals in it will therefore be of use in adding to general knowledge regarding the geographical distribation of the varions forms of animal life.

As will be seen, my notes are lamentably scanty. They are based on personal observations made daring three visits to Chitral, and on the information kindly given to me by Capt. B. E. M. Gurdon, C.I.E., D.S.O., Assistant Political Agent in Chitral, Major G. A. J. Leslie, R.E., and other military officers stationed in Chitral.

Such as they are, I place these notes on record in the hope that they may be of interest, and form the modest beginning of a more complete and comprehensive record.

The conntry of Chitral is similar in most respects to the adjacent Hindu Kusk region of Gilgit. Geographically it may be defined as the J. 1.1
drainage area of the Chitral river and its numerous affluents as far south as the junction of the Arnawai river with the main stream.

Like Gilgit, it forms one of the most lofty tracts of country on the surface of our globe. From the high glacier-bound valleys which take their rise from Tirich Mir, $25,500 \mathrm{ft}$. and other lofty mountain peaks, the elevation of the conntry decreases until as one descends the valleys, the land of snow and glaciers is exchanged for barren hill sides, of rocky cliffs and debris. Passing through the fringe of forest line, one descends to the fertile alluvial plateaux of prehistoric river-beds through which the present streams now run in deep narrow gorges. The lowest elevation, i.e., of about $4,000 \mathrm{ft}$., is reached at the point where the Chitral river leaves the Chitral district and thence onwards under the name of the Kunar river flows through Asmar to join the Cabul river.

The northern and eastern portions of Chitral are very similar in character to the Gilgit country, and the conditions of life being the same, the fauna is, as one would expect, much the same in both countries. Further south and west however the rainfall is greater, and the hill sides are consequently more covered with forest and vegetation than those of the Gilgit District.* This naturally tends to an increase in the number and variety of the fanna, and we find pheasants, monkeys, jungle fowl, and leopard (Felis pardus) $\dagger$ which are not to be found elsewhere in Chitral or Gilgit. I am told that the green parrot (I presume Palsornis torquatus) is to be found at the lower end of the Chitral valley. They doubtless come up from the warmer climes of the Jalalabad and Knnar valley.

The neighbouring country on the west, Kafiristan, is very thickly wooded, and from all accounts appears to be particnlarly rich in fauna of all kinds. Zoological research in Kafiristan would doubtless give most valuable and interesting results. It is to be regretted that such research is at present out of the question.

I proceed now to note on a few species of the Chitral Fauna.
Mammalia.-The most numerous of the larger mammals in Chitral are Ibex, Markhor and Oorial.

1bex.-(Oapra sibirica). These abound on or above the snow-line throughout the higher and more elevated portions of the Chitral conntry and in the upper portions of all the valleys which join the Chitral valley above Chitral itself. They are not as far as I know to be found in any valley below Chitral.

[^0]They are identical with the ibex of the Gilgit District, bat for some reason or other, the average length of the horns is slightly less than of those of the Gilgit ibex. Horns of over 40 inches in length are fewer than in Gilgit, and the largest head obtained is I think not over 45 inches.

The ratting season begins about the lst of Febraary and continues for upwards of a montb, bat in the case of the older males only half that time.

The young are born in July at an average elevation of 14,000 feet, generally, it is said, in the same nullahs as ratting took place. The females retire into very difficult and inaccessible ground before giving birth.

Markhor.-(Capra falconeri). These are very numerons in all the lower valleys in Chitral. They are of the Pir Panjal variety (vide fig. 165 of Blanford's Fauna of India. Vol. Mammalia), i.e., with horns handsomely carved, but withoat the wide exaggerated curve and spread of the variety kuown ns the Astor. [I may note here that the Astor variety is only to be found in the few valleys which join the Indus river on the left bank between Bunji and Chilas. All the markhor elsewhere in the Gilgit District are of the Pir Panjal variety].

A few heads somewhat resembling the Cabul variety (fig. 166 of Blanford's Fauna of India) are also to be found in Chitral.

The northern limits of markhor in Chitral appoar to be:-in the Lutkho valley at a point half-way between Drusp and Shogot; in the Chitral main valley and valleys joining it on the left bank, at Mori (aboat 10 miles above Chitral). The sonthern limits of the Chitral (i.e., Pir Panjal variety) are said to be :-on the right bank of the Kanar river at Chighar Serai, and on the left bank at Nari (Narsat).

The largest head as yet obtained in the Chitrnl District measures 56 inches in length of horn. Horns over 50 inches are very rare.

In Chitral the ratting season begins abont the first week of December, and in Gilgit in about the second or third week of that month. It continues for about a month, bat in the case of the older males ouly about a fortnight. The young in Cbitral are born early in June, almost invariably, it is said, in the same nullahs where the parents were during the rutting season. The males leave these nullahs for cooler climes about May. The females retire into the highest and most difficult ground they can find in the nollah before giving birth.

Oorial.-(Ovis vignei).-These are plentiful in the Chitral valley from Reshan downwards. They are of the Ladak variety, known as shapu (Ovis cycloceros), and differ from the proper oorial of the Panjab, Aighanistan, Sind and Beluchistan (Ovis vignei) in having no white raff
below the neck but only a white tuft in the black beard on the breast, and in having shorter but more massive horns. The horns seldom exceed 30 inches in length. Any over 32 inches are practically unknown. The horns however reach a circomference of from 10 to 12 inches round the base, whereas the oorial seldom exceeds 10 incles. In naming the Chitral animal oorial (Ovis vignei) as above I have followed the nomenclatare of Dr. Blanford (Fanna of India) who includes both the shapu (Ovis cycloceros) and oorial (Ovis vignei) under that head. Their northern limits in Chitral are practically the same as those of the markhor.

Their rutting season begins about the 15 th of November and continues about a month. The young are born at an average elevation of 9,000 feet.

Of large mammals the following are also common in Chitral.
Leopard.-(Felis pardus). This, the common Indian leopard, is numerous in the lower portions of the Chitral district. It is not to be found in Gilgit.

Snow Leopard.-(Filis uncia). Common in all the higher portions of the country.

Bears.-Unlike Gilgit, where the black bear (Ursus torquatus) is very rare, in Chitral it is very common, and abounds in the Chitral main valley and side valleys as far north as Reshan.

Brown bears (Ursus arctus) ouly occur in the Chitral country at the head of the Turikho and Yarkhan valleys. Its scarcity iu Chitral is a contrast to its abondance in most parts of the Gilgit district.

Marmots.-The red or long-tailed Marmot (Arctomys caudatus) with its shrill whistle-like call, is to be found in large numbers at the head of the Ayun nullah, and at the head of the Yarkhan and Baroghil valleys. It does not appear to have been seen elsewhere.
[With reference to Marmots I might note here that since suggesting in my notes on the Fanna of Gilgit, that the Thibet, Himalayan, and Long-tailed Marmots ( Arctomys himalayanus-hodgsoni, and caudatus), might prove to be all one and the same species, I have been informed by Dr. Blanford that the A. himalayanus and A. caudatus are distinctly different forms as shown by the stracture of their skalls.]

Musk deer.-(Moschus moschiferus) is to be found in the Shishi Koh valley, and is said to be fairly common on the mountains dividing Chitral from Dir.

Monkeys are to be found in the lower end of the Chitral valley. They go about in herds." I cannot say what species they belong to.

[^1]The general characteristics seem to be those of Macacus rhesus, but all the specimens I have seen have, instead of a tapering tail, a tail of about 8 inches in length coming to an abrapt end as if it had been cat off like a for terrier's. I am endearouring to obtain a specimen to send down to the Indian Musenm, Calcatta, for identification.

The existence of monkeys in Chitral, and also as will be noted elsewhere in Dir and Swat, is remarkable, as I do not know of their ever having been reported so far west.

Wolves, jackals, hymnas, lynxes, pig and foxes are to be found in Chitral as in Gilgit. As regards smaller mammnls, I have been anable to make personal observations.

Reptilia and Batrachia.-As regards these I regret having been unable to make obsorvations. As in Gilgit, these families are but sparsely represented. Snakes are few, and the only specimen I have been myself able to obtain was one of Zamenis ventrimuculatus.

Birds.-Owing to its larger extent of wooded tracts, birds, especially of the smaller kinds, appear even more plentiful in the winter months in Chitral thnn in Gilgit. I have been anable to study them, and will content myself with a brief note of such kinds as have come to my notice.

Tetraogallus himalayensis.-The Himalayan snow-cock known as the Ram Chickor is very plentiful on the higher slopes of all the Chitral valleys, as is the case also in Gilgit.

Ohickor.-Oaccabis chucar is also very common in the lower valleys. Hawking these birds with varions kinds of hawks is the principnl form of sport indulged in by Chitralis.

Note.-I have never heard of either the grey or black partridge, Francolinus pondicerianus or vulgaris, being found anywhere in Chitral.

Pheasants.-The Rohtas pheasant exists in the nullahs below Drosh, bat I am unable to say whether it is the ordinary Pucrasia macrolopha or the species named Pucrasia castanea which "is only known" (vide Blanford's Fanna of India Birds, vol. iv.) " by two skins said to lave "come from Kafiristan. In these the neck all round, apper back, brenst, "and flanks are chestnat, and the middle of the abdomen black." I am endeavorring to obtain specimens, in order to elncidate this point. The Monal pheasant, Lophophorus refulgens, is plentiful in the wooded valleys of lower Chitral.

No Kalij pheasants have as yet been met with in Chitral.
Jungle Fovol.-Capt. Gurdon informs me that he has often heard what he thinks mast be jungle-fowl in the lower Chitral valleys. He says they crow just like a domestic cock. Unfortanately he has never obtained any specimens.

Mynas (the common Acridotheres tristis?) are very plentiful in lower Chitral. Eagles, Hawks and Vultures of various kinds are, as might be expected in such a mountainous country, very common in the winter months.

Chitral is famed for its Goshawks (Astur palumbarius) which are caught in large numbers every winter, or more correctly speaking at the commencement of each winter, as they pass over the country on their way to India. As many as 60 birds were caught in the winter of 1899. The method adopted is as follows; an open space of level ground, as high up a mountain side as possible, is selected. In the middle of this a hole large euough for a man to sit in is made, and then roofed over flush with the ground leaving a small concealed entrance at the side for entrance and exit. . In the centre of the roof is a small hole through which a tame chickor is put out to walk about on the roof, attached by its leg to a string held by the man inside the chamber. The passing goshawk attracted by the clickor swoops down and seizes it, whereupon it is caught by the legs and pulled down by the man into the chamber below. These goshawks in travelling over Chitral fly very high, and in fine clear weather fly too bigh to be attracted by this method. It is in threatening, cloudy weather when they fly lower that captures are made. The females are by far the most valued, and all those caught are, by time-honoured custom, the property of the Mehtar, to whom they have to be presented. They are sometimes returned to the captor, but more frequently a suitable present is given in retarn. The Clitrulis are famed for their skill in training hawks. A passage goshnwk has been known to be flown with success at game within 5 days of its captare. A female goshawk flown at game, after a male bird has been released, will make straight for the male and kill it.

Pisces.-The fishes of Chitral have never been stadied. The rivers contain fish in considerable numbers, though none reach any great size. A fish of 5 lbs. is said to have been caught in the lower Chitral river, but few reach 3 lbs. The majority appear to be of the kind known commonly as "Snow Trout," and is I presume a species of Cyprinine. A species of catfish (Siluroid) is also to be found in the lower waters of the Chitral River.

The Mahnseer, Barbus tor, is anknown in Chitral.
Lepidoptera.-The butterflies of Chitral include many rare and interesting kinds. Major G. A. Leslie, R.E , and Lt. W. H. Evans, R.E., are now engaged in making a collection which is likely to prove of great valuc.

I have recorded these notes with some diffidence. The zoological records of a country if they are to exist at all must have a beginning, eren though that beginning be a modest one. Chitral offers an interesting field for zoological research, and it will be seen from the above notes how little has as yet been done in this direction.

The existence of monkeys, marmots, musk deer, shapa, Himalayan snow cock, and (I think we may add) jungle-fowl in Chitral is interesting, as no record appears to have been as jet made of these animals so far West.
II.-Nutes on the Fauna of Dir and Swat.-By Captatn A. H. McMaron, C.S.I , C.I.E., F.Z.S. Political Agent, Dir, Swat and Chitral.
[Received 8th February ; Read 6th Maroh, 1901.]
On previous occasions I have, in the case of the Gilgit and Chitral Districts, placed on record a few notes on the Fauna of those countries, in the hope that though scanty in themselves they might be of interest in adding to our existing knowledge of the distribution of various forms of animal life.

I propose here to do the same with regnrd to the country of Dir and Swat, and to record such ferv observations on the Zoology of these countries as circumstances lave allowed me to make during my stay ( $1899,1900,1901$ ), in the Dir, Swat, and Chitral agency. Nothing as far as I know has ever been recorded in the matter of Zoology regarding these conntries before. My notes therefore must be taken as a modent endeavour to make a commencement of the complete Zoological records which it is to be hoped will be made of these countries hereafter by more capable hands.

Inability to move freely about this unsettled country and press of work have prevented my observations being of anything like an exten: sive nature. The greater portion of the country is as yet unvisited by Europeans, and a wide field of interesting zoological research remains antouched.

The countries of Dir and Swat are treated here as one. They represent the drainage arens of the Panjkora and Swat rivers respectively as far as their junction. Both rivers take their rise within a short distance of each other in the lofty mountain range which forms the southern boundary of Chitral. The peaks of this range vary in height, deoreasing from some $23,000 \mathrm{ft}$. on the N .-E. end to $15,000 \mathrm{ft}$. or 80 on the S.-W. end of the range.

The upper portions of the head valleys of both the Swat and Panjkora rivers resemble in most respects the valleys which on the north side of the range form part of Chitral. It is to be expected therefore that their fauna much resemble that of corresponding tracts in Chitral.

The remainder and the greater part of the Dir and Swat conntries are at a much lower elevation than that of Chitral. Both are mountainous, but each successive mountain range, as one proceeds southwards, becomes lower and lower, until at the southern edge of the country the highest peaks attain to no more than $6,000 \mathrm{ft}$., while the main valleys gradually descend to an elevation of only some $2,000 \mathrm{ft}$. Both the apper and lower portions of the Dir and Swat countries differ in one respect from Chitral, in thnt the annual rainfall is very much greater. This has resulted in clothing the hill sides of the npper valleys with wide deodar forests, and in thickly covering the lower slopes with pine, oak and other small trees. The lower valleys are wide expanses of alluvial land of great fertility.

As might be expected, the fauns of the country is very rich and varied. How little we jet know of it will be seen by the scantiness of these notes.

Mammalia.-On the northern fringe of Swat where the watershed of the Swat river is also the watershed of some of the upper Chitral valleys, the ibex (Capra sibirica) is reported. These I think are only visitors from the Chitral side. Ibex is not found in Upper Dir.

Marklior.-(Capra falconeri). A few of the Pir Punjab variety with gracefully curved horns (Fig. 165 of Blanford's Fauna of India, Vol. Mammalia) are to be found on the range which separates Dir from Chitral, and Asmar. I do not know if any exist in Upper Swat or Swat Kohistan, but one might expect to find them there.

Further south in the range of hills which separate Swat from Boner and the Peshawar plain, the Cabul variety with almost straight horns and a slight spiral are found.

Oorial.-Ovis vignei exist but in small numbers in the Southern borders of Swat. I'hey are of the Punjab variety, Ovis vignei proper, and I have not heard of the existence in Dir and Swat of the Ovis cycloceros or Shapa variety. It is doubtless to be found however in Swat Kohistan which lies between Chitral and C!ilas both possessing this variety.

Goral.- Cervus goral has been seen in the Lower Swat valley, where one was caught alive while being swept down the Swat river in a flood, and also on the hills above Malakand. The existence of this
animal is interesting, as it does not appear ever to have been before reported west of the Indus.

Musk Deer.-Moschus moschiferus is reported to be numerous in the upper portions of Dir.

Bears.-The Brown Bear, Urous arctus, has never been reported in Dir or Swat.

The Black bear, Ursus torquatus, is very common all over Dir and Swat, even as far south as the range separating Swat from the Peshawar valley.

Leopards.-The existence of snow leopard (Felis uncia) has never been reported, but I feel sure it is to be found in Swat Kohistan. The eommon leopard, Felis pardus, is very plentiful throughout Dir and Swat.

Momkeys.-It is somewhat surprising to find that monkeys are fairly common throughout most parts of Dir and Swat. I have seen sereral live specimens that have been brought in from Dir, and a large herd of monkeys has been lately seen on the slopes of the Bar Chanrai hill on the north side of the Lower Swat valley opposite Malakand. 1 have been unable to satisfy myself about the identity of this monkey. It appears to be of the same kind as specimens which I have seen in Chitral. I have only seen live specimens of animals of both countries. These strongly resented the close examination which is necessary for identification. In general characteristics they would appear to resemble either Macacus rhesus or Macacus assamensis, but their tails, which in adults are about 8 inches in length, are not tapering bat come to an sbrupt end as though cut off, like a fox terrier's tail. I hope to be able to send a specimen of this monkey to the Indian Museum, Calortta, for classification.

I should note that the existence of monkeys has been also reported to me as having been met by officers while out after markhor in the Pajja hill north of Mardan.

Among other common mammals in Lower Dir and Swat are the hyæna, jackal, fox, wolf, pig, hare, porcupine (Hystrix leucura) and hedgehog.

Reptilia or Batrachia.-Regarding these my observations have been confined to the immediate neighbourhood of Malakand and the Lower Swat valley between Chakdara and Malakand. Both snakes and lizards are numerous in the above area, but I bave devoted my attention chiefly to the former, of which I have examined a large number of specimens.

Ophidia.-Though snakes are numerons, they seem all to belong to bat very few speoies. By far the commonest genus of snake in this J. II. 2.
tract appears to be the Zamenis which is therein represented by the following species.

Zamenis diadema.-This is very common, and the specimens obtained average between 5 to 6 ft . in length. One specimen killed had just swallowed a large rat. The peculiarity about most specimens is the bright red colour of their heads. I have noticed this elsewhere on the N.-W. frontier.

Zamenis mucosus.-Also common. Several very Iarge specimens were sent me from Mardan. This suake, both in Mardan and here, is very dark coloured, and curiously resembles the black form of cobra. I have been more than once taken in by this resemblance. It is very common in the Guides' grass farm at Mardan, where it is the terror of the grass catters. It adds to its similarity to a cobra by inflating out its neck into some resemblance to a cobra's hood-and assuming a most threatening aspect.

Zamenis ladacensis.-Very common. I also obtained specimens of this snake with a bright vermilion line down the centre of its back. I understand that this variety used to be considered a separate one under the name Zamenis rhodorachis. This peculiar and very conspicuous colouring would almost appear to entitle it to retain a separate name.

Zamenis ventrimaculatus.-Not so common as the preceding species.
Next to the Zamenis comes in point of numbers of specimens obtained, the Echis carinatus, which is plentiful everywhere. It is possible that it is in reality far more numerous than the Zamenis, but escapes detection by its protective colouring and smaller size. This is the only species of the Viperides that has come to my notice in this country.

Naja tripudians.-I have only obtained a few specimens of the cobra in this country. It dnes not appear to be numerous. Those obtained have all been of the black variety.

Bungarus ceruleus.-Only one specimen of the karait obtained, and that in Malakaud itself.

Iropidonotus piscator.-Common in the Swat valley ; one large specimen was found to have 18 large developed eggs inside it.

Tropidonatus stolatus.-One specimen.
I have subsequently obtained another specimen, which I sent alive to the Indian Museum, where I called Major Alcock's attention to its colouring. The vivid light yellow colour of the centre portion of each cross band down the length of its back has not been brought to notice before.

Lycodon etriatus.-One specimen which I sent to the Indian Museum, Calcutta, where it was identified by Major Alcock.

Gongylophis conicus.-I obtained several specimens of this curious snake.

Contia angusticeps.-This snake deserves some remark. I obtained eleven specimens of it at Malakand and was nnable to identify it. Major Alcock, Superintendent, Indian Museum, Calcutta, to whom I sent specimens, was also unable to identify it with any known species, and it was sent to the British Nataral History Museum, where Mr. Boulenger has identified it as the nbove, i.e., Contia angusticeps, of which only one specimen appears to have been previously found.

Ophidia_-Continued.
Oligodon subgriseus.-One specimen.
Typhlops braminus.-Two specimens, which I sent alive to the Indian Maseum, Calcutta.

Glauconic blanfordii.-I obtained one specimen, which I sent alive to the Indian Museum, Calcutta. It unfortanately escaped before being definitely identified. Major dlcock says he thinks it was the above species.

Lacertilia.-Notwithstanding the number of Lizards in the country, I regret having been unable to devote attention to them. The only specimens examined by me, have been as follows;-

Varanus flavescens.-This is very common and attains a length of about 3 feet.

Varanus bengalensis.-Common.
Gymnodactylus scaber. One specimen identified as above by Major Aleock.

Calotes versicolor.
Eublepharis macularius.-One specimen identified by Major Alcock. The colouring of this specimen in life deserves notice. The transverse bands were jet black and bright yellow with a faint subshade of pink.

Birds.-The Dir and Swat countries are rich in varied and namerous kinds of birds, both visitors and permanent residents. A eareful study of them would doubtless prove of great interest. Among the few specimens examined by me are the following.

Rallus aquaticus \&.-Water Rail. Differs from the type given in Fanna of India (Birds, Vol. IV), in having the ashy-grey of the breast alightly (though very slightly) washed with brown. Its length is 12 inches, instead of 11 inches as in the type.

Otis tetrax.-Little Bustard. Two specimeus obtained in winter between Malakand and Mardan.

Cygnus olor.-Mate Swan. One live but wounded specimen brought in March, 1900, by a man who said he had shot it with three others at the month of the Swat river at Abazai.

Lophophorus refulgens.-The Monal Pheasant is fairly common in the higher and wooded slopes of all the Dir and Swat valleys. It appears to suffer from snow blindness, and is easily caught at such times. Several live specimens have been brought to me from Dir, and one from near Thana in Lower Swat.

Circus cyaneus.-Hen Harrier. One specimen obtained from the edge of the Pesliswar plain, November, 1900.

Dack and teal of many kinds pass through Swat and Dir on their way to and from India in the autumn and spring. Quail and snipe also pass through. I have never heard of Sand Grouse having been seen.

The Chickor and Scarse are permanent residents and very common. So also are the Grey and Black Partridges. The Black Partridge only frequent the lower ends of the valleys. The Grey extend further up the valleys.

Pisces.-The Panjkora and Swat rivers are full of fish, chiefly of the kind commonly known as Snow Trout, which would appear to be a species of Oyprininæ.

Mahaseer (Barbus tor) ascend both rivers in considerable numbers in the spring, but very few remain during the winter, as they nearly all descend again to the Cabul river in the late autumn. Mahaseer up to 80 lbs. have been obtained in the lower reaches of the Panjkora and Swat rivers.
III.-Note on the Butterfies comprised in the subgenus Tronga of the genus Eupløa.-By Lionel de Niceville, F.E.S., C.M.Z.S., \&c.
[ Received March 15th; Read April 3rd, 1901.]
In the Proceedings of the Asiatic Society of Bengal, 1892, pp. 158161, will be found a note by me on the Indian and Malayan Peninsula Butterflies of the subgenus Stictoploea of the genus Euplosa. In the Trans. Ent. Soc. Lond., 1892, pp. 247-248, is practically a reeumé of this paper. In the Journal of the Asiatic Society of Bengal, vol. 1xi, pt. 2, pp. 237-245 (1892), I gave a note on the subgenus Pademma of the genus Euploea. In the present paper I propose to deal with the subgenus Tronga of the genus Euploea. I am driven to do so by the circumstance that Mr. Robert Shelford, Curator of the Sarawak Museum, Borneo, has from time to time sent me large numbers of Trongas, imploring me to name them for him, as he is unable to do so from Dr. F. Moore's paper on the Euplosina in the Proceedings of the Zoological Society of London for 1883, pp. 253-324, in which mix
species of the subgenus from Borneo are given as distinct, and from the other literature at his disposal. I was no more successful than Mr. Shelford, and as in Calcutta I am shat off from nccess to the type specimens of all the described species, I despatched twenty-two male Trongas from Sarawak to Dr. Moore, who has been so kind as to set them all, and to retarn then to me. Under the date 7th October, 1900, he writes to me:-"I have compared your twenty-two male Trougas with the types available, and have put the name to a specimen agreeing exactly with the types of T. crameri, Lacas, T. brookei, Moore, and T. labuana, Moore. I have also enclosed a pencil sketch of the types of T. moorei, Bntler, and T. pryeri, Moore, to which none of yours agree. The types of all these are now in the British Museain. The other unlabelled specimens of Tronga returned yon will easily be able to match with the verified specimens. I have not been able to examine them with T. duatensis, Moore, as I have no opportunity now of comparing them with the type. I hope these will enable yon to satisfy yourself as to their specific value or otherwise." I would have been still more grateful to Dr. Moore for his kindness than I am had he been so good as to have given me his opinion as to the names by which the nineteen specimens he returned unnamed should be known. In this and similar cases it is not difficalt to pick out and name extreme individual forms of a variable species, but it is the intermediate specimens that pazzle one. However, with three named species, drawings of two others, and the description of the sixth it is not difficult to deal with the species of Tronga found on the north. ern side of Borueo. I may note that the Island of Daat, from whence T. daatensis was described, is quite close to the much lnrger island of Labnan on the North-West coast of Borneo; both these islands lie very near to the coast, and are therefore not likely to possess any species peculiar to them, especially Euplosas, which are well known to have very tough constitutions and to take long and voluntary journeys. On this sabject Mr. W. P. Pryer in Ann. and Mag. of Nat. Hist., fifth series, vol. xix, p. 48, n. 16 (1887) has some very interesting notes on the migrations of Wuploeas in North Borneo.

Dr. Moore in Proc. Zool. Soc. Lond., 1883, gives twelve species of Tronga, from the Nicobar Isles, Lower Burma, the Malay Peninsula, Sumatra, Nias, Borneo, and China. The latter habitat is most vague, as China is a vast country. In "Lepidoptera Indica," vol. i, pp. 76-80 (1890), Dr. Moore retains twelve species in the genus, out of which he describes as new T. nicevillei from the Sanderbunds near Calentta, and T. heylartsii from Sumatra; but he sinks his T. olivacea, Moore, as a gyanym of T. bremeri, Felder, and omits all reference to T. kinbergi,

Wallengren, from China, the total number therefore remaining the same as in 1883.

In 1896, Mr. H. Frahstorfer recorded E. (Tronga) kinbergi, Wallengren, from the Tengger mountains, 2,000 feet, East Java. In 1898, Mr. Fruhstorfer described Tronga cramori tenggerensis, new subspecies, from the same place.

In 1896, Dr. B. Hagen described and figared an Euploa pagenstecheri from Bawean Island, which lies midway between Borneo aud Java, The describer says it comes into Moore's genus Menama, which has in the male an androconal patch of slining black scales on the upperside of the hindwing behind the subcostal nervure towards the base of the wing (not mentioned by Dr. Moore), this character being absent from the genus Tronga. Dr. Hagen says it is allied to E. lorzse, Boisduval (a MS. name only, the species should be credited to Dr. Moore, who first described it). Mr. Fruhstorfer, however, makes it a local race of Tronga crameri, Lacas. From the figure I should say that it is a Menama rather than a Tronga, but it is impossible to be certain without seeing a male specimen.

In 1898, Dr. Hagen described Euploea (Tronga) mentawica and E. (T.) morrisi, from the Mentawej Islands, which lie to the south of the centre of the island of Sumatra.

In 1898, Mr. F. Fruhstorfer gave a list of the butterflies of the genus Tronga, and described Tronga crameri tenggerensis from the Tengger mountains, East Java, 2,000 feet, and Tronga crameri, ab. biseriata, from East Java. It is not known to me if Mr. Frulistorfer considered in 1898 that his $E$. tenggerensis is the same species as the E. kinbergi, Wallengren, he recorded in 1896 from the same spot. As noted above, the latter was originally described from China. But he remarks that the specimen in question appears to him to be a form of the very variable female of Euplosa (Isamia) raffesi, Moore, described from Java. He goes on to say that "In the British Museum E. kinbergi is apparently by mistake labelled as coming from China," although it was originally described from thence. In the same paper Mr. Fruhstorfer notes that Euplosa (Tronga) brookei, Moore, from Borneo is identical with Euploea (Menama) lorzæ, Moore, also from Borneo. This is wholly wrong, the two species are absolutely distinct, and Dr. Moore has correctly placed them in his genera Tronga and Menama respectively, although he has omitted to describe the satiny shining black patch of androconia on the upperside of the hindwing of the male by which Menama can in that sex be at once distinguished from males of Tronga, which lack this patch. Mr. Fruhstorfer further notes that it is impossible to establish the genus Menama [as distinct from Tronga],
inasmuch as in Borneo as well as in Sumatra there are "double" forms of Tronga and Menama. He says that he possesses, for example, specimens of Tronga niasica, Moore, from Nias Island with rounded forewings and others with angled forewings. That is quite probable, most likely in addition to Tronga niasica there is an undescribed species of Menama from that island, which I have not seen, though I have many males of I. niasica. Mr. Fruhstorfer also notes that the $E$. (Tronga) crameri of Lucas which I recorded from Bali seems to belong to $\boldsymbol{E}$. crameri tenggerensis, Frubstorfer. This is not absolutely the case, as my single specimen from that island does not agree entirely with Mr. Fruhstorfer's new subspecies, as it has fewer and smaller spots on the forewing, so is not typical, and is certainly in my opinion not a species distinct from $E$. crameri. In the genns Euploea I do not consider as a rule an extra spot or two, or even a whole series of spots, of ary specific value whatever; the maculation in Euploeas is in nearly every species a most variable character. Lastly Mr. Frahstorfer notes that it is carious that no species of Ironga has been found in the island of Palawan in the Philippines, but that in the other parts of the Malayan region there are two distinctly marked species of Tronga which may be classified according to the following scheme:-
A. Hindwing with a prominent row of submarginal dots:-under which be places (1) I'. crameri, Lucas, (2) T. crameri brookei, Moore, (3) T. crameri marsdeni, Moore, (4) 'I'. crameri bremeri, Felder, (5) I'. crumeri moorei, Batler [incorrect, as this is a Menama, not a Tronga], (6) T. crameri pagenstecheri, Hagen, (7) T. crameri tenggerensis, Frahstorfer, and ab. biseriata, Fruhstorfer, (8) T. crameri biseriata, Moore, and (9) T. crameri morrisi, Hagen. He notes that T. daatensis, Moore, T. Labuana, Moore, T. johanna, Kirby, and T. olivacea, Moore, all fall to T. crameri, Lucas. As regards T. olivacea this is incorrect from even Mr. Frahstorfer's views of the genus Tronga, as that species is, sccording to Dr. Moore himself, based on a small female variety of T. bremeri, Felder.
B. Hindwing with a double series of very large clear white spots :under which he places (1) I'. pryeri, Moore, (2) T. pryeri heylærtsii, Moore, (3) T. pryeri niasica, Moore, (4) T. pryeri mentawica, Hagen, and (5) T. pryeri nicevillei, Moore. Of I'. crameri brookei, Moore, he notes that it is perhaps a dry-season form of $T$. crameri, Lacas; while of T. pryeri heylsertsii, Moore, he notes that it is apparently a rainy-season form. These surmises are I think quite incorrect, as in Borneo, Sumatra, and the Malay Peninsula, where these species are said to occur, very few batterflies indeed exhibit seasonal clanges, there being no well-marked wet- and dry-seasons, rain falling almost throughout the year, and
ceritainly no such seasonal forms are found in the genas Euploaa occurring in those regions.

I have long held the opinion, gained by an extensive knowledge of the genus Euploea in life, that in nearly all cases it is highly.improbable that any one spot will contain two really distinct species of one group of the genus. Dr. Moore in his most valuable monograph of the genus Euploea written in 1883 evidently had no such suspicion, never having seen a live Eupleca, nor an opportunity of examining hundreds of specimens from a single locality as I have frequently done, as, for instance, he gave six (one with a query) species of Tronga from Borneo; six of Pademma from Assam, and probably several others, as he records four other species from E. and N.-E. Bengal, and another with a query, which probably mean Assam; four of Isamia from Sonth China and three from Cochin China; and four of Stictoploaa from Assam. While working up the Bornean Trongas, I thought it would be well to verify as far as I could this general opinion of mine that it is exceptional for two distinct species of one groap to really occur in any one given locality, and taking up only India and those regions lying adjaceut thereto and Southern China, regions that I am more or less well acquainted with from visiting many of them for the purpose of collecting butterfies, I find on the whole that my conjectures are likely to prove correct, though in two or three groups, sulgenera or genera (it is immaterial for our purpose how we torm them, though 1 prefer sabgenera in our present ignorance of the transformations of most of the species), this is certainly not the case, as in Penoa we lave a brilliantly blue-glossed species (deione, Westwood) and a non-blue-glossed species (doubledayi, Felder) occurring together in Sikkim, Assam and Burma; while two quite distinct non-glossed species, differing entirely iu size and male sexual brands, gardineri, Fruhstorfer, and menetriesii, Felder (=pinwilli, Butler and coalida, Swinhoe) ucour together in the Malayan Peninsula and Sumatra; again in Pademma we have in the region of Calcutta and sonthwards to Travancore a species (kollari, Felder) which is but slightly if at all blueglossed in those regions, gradually merging in other parts of Bengal (the Maldah district for instance), Sikkim, Bhatan and Assam into a strongly blue-glossed species (klugii, Moore). It is difficult to know how to deal in systematic work with such forms, as the one is quite distinct and constant in one region, while in another region this erstwhile "good species" becomes gradunlly merged into another species which in its extremest form is absolutely different. In Hongkong also two apparently quite distinct species of Crastia occar, viz., godastii, Lacas, and kinbergi, Wallengren. However, these exceptional groups do not greatly invalidate my previous conceptions of these varioas subgenera
of Euplosa, as speaking generally I think it may be treated as an axiom that no two really distinct species of one subgenus will be found to inhabit one limited area. If would-be describers of Euploeas and several other genera would bear this in mind in future, we would be saved many of the synonyms of the past which burden our butterfly literature and give endless. trouble in trying to unravel them. I may note here that I wholly dissent from the opinions held by Colonel C. Swinhoe as expressed in Trians. Ent. Soc. Lond., 1893, p. 270, that varietal forms of well-known species should be named. It may be arguable that "varieties" may perhaps be described and named for the sake of con, venience, though I consider it to be very inerpedient to do so, especislly in certain groups of Ifuplosas in which it is almost impossible to find two specimens marked exactly alike, and to be logical every specimen should have a name and thus reduce scientific nomenclature to an absurdity; bot what I especially deprecate is calling these obvious varieties "new species," which they certainly are not. However, the late Capt. E. Y. Watson in Journ. Bomb. Nat. Hist. Soc., vol. x, pp. 639-640 (1897) has already very clearly pointed out the untenable position taken up by Col. Swinhoe in this matter, so I will not further attempt to " kill the slain."

To prove my thesis I will give some lists of subgenera of Euplosa which I think will help to substantiate my case. These lists are not exhaustive and may perhaps contain some slight inaccuracies, but they are I believe in the main correct, and may prove perhaps to be some help to others in working at this great group. The names placed in brackets are in my opinion synonyms. The order of subgenera is that followed in Dr. Moore's monograph of the Euploeina published in 1883. It would have been better to have given two lists, one of localities the ofner of species, but this would have taken up too much time and space, so I have adopted the second course ; the first can with a little trouble be evolved from it.

## Menama, Moore.

Lower Burma, modesta, Butler (cupreipennis, Moore, tavoyana, Malay Peninsula, modesta, Butler.
[Moore).
Siam, camaralzeman, Butler. " modesta, Butler.
Nicobar Isles, simulatrix, Wood-Mason and de Nicéville.
Sumatra, moorei, Butler.
" buxtoni, Moore.
Borneo, lorzes, Moore.
J. 11. 3

Monama does not apparently support my theory, as from the list above two species are given from Siam; but Siam is a large country and may have two distinct species of Mrenamn occurring in different parts of it, though as camaralseman and modesta apparently differ not at all except in size-this difference being very considerable-it may be that they are one and the same species. Again two species, moorei and buxtoni, are recorded from Sumatra, the former is non-blue-glossed, the latter is blue-glossed. I have had very numerous specimens of moorei from thence, it is very common there, but I have never seen buatomi, so there may be some mistake about the habitat of that species. Dr. Moore places moorei in Tronga, but it is a true Menama.

## Tronga, Moore.

Lower Burma, crameri, Lacas (bremeri, Felder, johanna, Kirby, marsdeni, Moore, olivacea, Moore, brookei, Moore, labuana, Moore, daatensis, Moore, pryeri, Moore, heylertsii, Moore).

Malay Peninsula, crameri, Lucas.
Nicobar Isles, frauenfeldii, Felder (esperi, Felder, biseriata, Moore).
Sumatra, crameri, Lucas.
Banka, crameri, Lucas.
Bali, crameri, Lucas.
Borneo, crameri, Lucas.
Natuna Isles, crameri, Lacas.
Java, tenggerensis, Fruhstorfer, and ab. biseriata, Fruhstorfer.
Nias Island, niasioa, Moore.
Bawean Island, pagenstecheri, Hagen.
Mentawej Isles, morrisi, Hagen.
" ", mentawica, Hagen.
The subgenus Tronga is more fully considered on pages 30-38. I need only note here that I have not seen the two species recorded from the Mentawej Isles described as distinct by Dr. Hagen. It is highly probable I think that they are synonymous, and moveover are not separable from some previously-described species.

## Adigama, Moore.

Malay Peninsula, malayica, Butler (stolli, Weymer).
Sumatra, malayica, Butler.
Nias Island, malayica, Butler.
Java, ochsenheimeri, Moore.
Borneo, scudderii, Butler.
Palawan (Philippines), claudina, Staudinger.

I have nothing to remark abont this subgenus; each of the four known species inhabits a distinct area, and no two of them have been recorded from the same area.

Penos, Moore.
Kastern Himalayas, doubledayi, Felder.
deione, Westwood (poeyi, Felder, mugnifica, Assam, doubledayi, Felder. [Butler). " deione, Westwood.
Upper Burma, doubledayi, Felder.
" " deione, Westwood.
Lower Barma, doubledayi, Felder.
" " gardineri, Fruhstorfer.
" " limborgii, Moore.
Malay Peninsula, gardineri, Fruhstorfer.
monetriesii, Felder (pinwilli, Butler, evalida,
Indo-China, limborgii, Moore. [Swinhoe).
gardineri, Frahstorfer.
Sumatra, menetriesii, Felder.
" gardineri, Fruhstorfer.
Nias Island, menetriesii, Felder.
kheili, Weymer.
", ", kheiti, Weymer.
Banka, menetriesii, Felder.
Java, alcathoë, Godart (melancholica, Butler).
wallengrenii, Felder.
" ? geyeri, Felder.
? eyndhovii, Felder.
Billiton, transpectus, Moore.*
Lombok, ? geyeri, Felder. sapitana, Frahstorfer.
Borneo, uniformis, Mcore.
zonata, Druce.
". masina, Frahstorfer
Mentawej Isles, seitzi, Hagen.
Palawan (Philippines), cyllene, Staudinger.
$" \quad "$ distincta, Standinger.
I have made some remarks on the subgenus Penoa on page 16. It is

[^2]an exception to my theory that two allied species of the same subgenus do not as a rule occar in the same region. The synonymy of the subgenus has been greatly changed since Dr. Moore's Monograph of the Euplocina was published in 1883, and since his "Lepidoptera Indica" appeared. In the first-named paper his No. 1, alcathoë, Godart, is the doubledayi of Felder; his No. 3, menetriesii, Felder, is the gardineri of Fruhstorfer ; and his No. 4, pinwillii, Batler, is the menetriesii of Felder. I think• the number of recorded species in this genus will be greatly reduced in the future, and many of the names given above as representing distinct species will be reduced to the rank of synonyms. I possess only doubledayi, deione, gardineri, limborgii, menetriesii, alcathoë, ? geyeri, uniformis, and zonata.

Crastia, Hübner.
Western Himalayas
Eastern ". ${ }^{\prime}$ core, Cramer (cora, Hübner, vermiculata, Continental India $\quad$ Butler, nicevillei, Moore). Peninsular 9
Ceylon, asela, Moore.
Burma (Upper only) core, Cramer.
Juarma, godartii, Lucas (siamensis, Felder, layardi, Druce, subdita, Malay Peninsula, graminifera, Moore. [Moore, binghami, Moore).

$" \quad " \quad$| ? godartii, Lucas. |
| :--- |
| distantii, Moore |

Indo-China, godartii, Lucas.
" " mouhotii, Moore.
" " ? amynzone, Godart.
China, kinbergi, Wallengren.
" lorquinii, Felder (felderi, Batler).
" ? amymone, Godar't.
" godartii, Lacas.
,, prunosa, Moore.
Nicobar Isles, scherzeri, Felder (camoria, Moore).
Sumatra, ? amymone, Godart.
" inconspicua, Moore.
" distantii, Moore.
felderi, Batler.
Engano Isle, enganensis, Doherty.
" " oceanis, Doherty.
Java, haworthii, Lucas (eleusina, Hübner, part, pl. ccxxii (ix), figs. 1, 2, nec Cramer, hubneri, Moore, moorei, Felder, janus, Butler).

Java, godartii, Lucas.
Philippines, snelleni, Moore.

## godantii, Lacas.

From the list above it would appear that Crastia does not bear out my theory at all. Under core I have placed cora, Hübner, and vermiculata, Butler, as these names represent the dry-senson form of the species. I have also added nicevillei, Moore, which comes from the Sunderbans, near Calcutta. Many years ago four specimens of the "species" were given to me, taken in February, and I set them down to be rather unusually white examples of the dry-season form of core (cora+vermiculata). Two of these I gave to Colonel Swinhoe, and Dr. Moore described them as Tronga nicevillei in Lep. Ind., vol. i, p. 77, pl. xx. The male has no sexual brand in the submedian interspace of the forewing, this brand, however, is often obsolete in $O$. core, and is not a character of much importance. The wings also are broader than in typical $O$. core. In spite of these obvions differences, I am still of opinion that Tronga nicevillei is nothing more than the dry-season form of Orastia core found in the swamps of the Sunderbans. I cannot believe that an absolutely distinct species of Euploea is alone to be found in a very limited area of recently formed alluvial land attached to the mainland of Bengal. Except for this "species" India proper and Ceylon is each inhabited by only a single species of Orastia.

We now come to Barma, where godartii, Lacas, of which siamensis, Felder, is an undoubted synonym, is the dominant form. With it is found layardi, Drace, of which binghami, Moore, is a pare synonym. In this form the pale violet apical area to the forewing on the apperside in both sexes is absent ; but this feature is not constant, and intergrades between true godartii and true layardi are occasionally found. But in the extreme north of Burmn on the coast at Akyal, at Rangoon, and in Upper Tensaserim in Central Burma at Hatsiega is found subdita, Moore, which is the type and only species of Moore's genus Mahintha. The only specimens of this form that I have seen are from Akyab and the Arakan Hills, the latter locality being rather uncertain, as my specimens did not reach me direct from the collector but through a third person. These examples do not quite agree with Dr. Moore's figures of subdita from Akyab, (Lep. Ind., vol. i, pl. xxix), being less broad in the wing. As a species I do not consider it to be distinct from layardi, which again equals godartii, although its wings are a little broader than typical specimens of the last-named species. It bears the same relation to godartii that nicevillei does to core. In Upper Burma (Akyab, the Arracan Coast, and at Rungamutti in the Chittagong district) $E$. core has been obtained singly.

In the Malay Peninsula, distantii, Moore, was described from a single specimen from Province Wellesley (in Sumatra it is the common and dominant Crastia), but godartii has been recorded by Mr. Distant from Singapore, probably erroneously, and Dr. Moore has described Orastia graminifera from the "Malay Peninsula" apparently from a nique male example in Mr. Oberthür's collection. He compares it with vermioulata, Butler, but from the description it would appear to be nothing but a form of C. distantii, Moore, with rather smaller spots than in the typical specimens of that species; an obviously variably character in my large series of that species. Mr. Distant in lis "Rhopalocera Malayana" ignores graminifera altogether.

In Indo-China, which includes Siam, godartii is the commonest species. Dr. Moore records Crastia amymone, Godart, origiually described from Amboina, from Cochin China, a species I am quite nnable to recognise from the original description, and Dr. Arnold Pagenstecher says in his paper on the butterflies of Amboina that he has not seen it from thence. Lastly, Dr. Moore describes a Menama mouhotii from Cambodia, of which I have a typical male from Chentaboon in Siam. This species lias no male brand, and the wings are broader and more rounded than in typical Crastia. It therefore is an analogous species to nicevillei and subdita, and in my opinion is nothing but an aberrant form of layardi ( $=$ binghami), which again equals godartii ( = siamensis). If my conjectures are right, it is very remarkable that the subgenus Crastia should have given rise to three aberrant forms in three well-defined regions, all differing one from the other and in different ways from the parent forms. Crastia appears to be in a highly plastic state.

From China proper five species have been recorded-kinbergi, Wallengren; of which lorquinii, Felder, and felderi, Butler, are I believe synonyms; godartii, Lacas (these two species occur together in Hongkong, and are I believe distinct) ; amymone, Godart, the Amboina species twice before mentioned; and prunosa, Moore. This latter is described from the very vague locality "China" apparently from a single male in M. Oberthür's collection. If it should be found to occur in Hongkong it will probably prove to be a.synonym of kinbergi.

In the Nicobar Isles we have a single species of Orastia, the scherzeri of Felder, which was I believe originally wrongiy labelled from Ceylon, and is therefore almost certainly the camorta of Moore.* It is not a true Crastia, as although it has the Crastia brand on the forewing in the male, it has as well the secondary sexual characters of Menama on the hindwing, which are not found in true Crastia.

* Vide de Nicéville, Journ. A.B.B., vol. Ixviii, pt. 2, p. 178 (1889).

In Sumatra, the butterflies of the N.-E. portion of which are wellknown to me in life,* only one species of Crastia is I believe to be found, the distantii of Moore; though amymone, Godart, described from Amboina, has been recorded from thence; and inoonopicua, Moore, and felderi, Batler, have been both described from Sumatra. C. felderi certainly occurs in Hongkong and is a synonym of lorquinii, Felder; while C. inconopicua, the description of which discloses a species apparently distinct from either distantii or felderi, having an immaculate forewing on the upperside, may have been wrongly lahelled by Dr. A. R. Wallace, or occurs in a different part of the island to that with which I am familiar.

From Java two distinct species have been recorded-godartii, Lucas, which was I believe originally described from Java, but the work in which it is desoribed is not in the Calcutta libraries, anyhow, it probably does not really occur in Java; and haworthii, Lucas (=hübneri, Moore, + moorei, Felder, + janus, Butler, = eleusina, Hübner, part, nec Cramer). In my collection I have but a single Crastia from Java, which I call haworthii, Lucas. It is extremely variable, in some male specimens the brand is almost half the length and quite half the breadth that it is in others, and the maculation also is not exactly the same in any two of my fourteen specimens. I think that Mr. W. F. Kirby in the new edition of Hübner's Ex. Schmett., pp. 6, 7, has misinterpreted the figures on pl. 222 (9) of that work. Figares 1 and 2 represent a male Crastia which will stand as C. havorthii, Lucas, $=$ hübneri, Moore, $=$ moorei, Felder, = janus, Butler; while figures 3 and 4 represent the female of Selinda eleusina, Cramer, the male of which is figured by Cramer in Ex. Lep., on plate celxvi, fig. D. Mr. Kirby calls figs. 1 and 2 "Selind, janus, Butler," and figs. 3 and 4 "Selinda eleusina, Stoll [Cramer]. In Java only one species of Orastia appears to be found.

From the Philippines two species of Crastia have been recorded, melleni, Moore, and godartii, Lacas, the latter almost certainly incorrectly.

Trepsichrors, Hübner.

| Himalayas, Oadh, Central Provinces, | claudius, Fabriciust (linumi, Moore, van-deven- |
| :---: | :---: |
| Assam, Burma, Malay Peninsula, | teri, Forbes). |

[^3]Indo-China,
China, Formosa, Nicobar Isles, Sumatra, Bawean, Natuna'Isles, New Guinea? $\left\{\begin{array}{l}\text { claudius, Fabricius** (linmeri, Moore, van-deven- } \\ \text { teri, Forbes). }\end{array}\right.$ $\left\{\begin{array}{l}\text { claudius, Fabricius** (linmeri, Moore, van-deven- } \\ \text { teri, Forbes). }\end{array}\right.$
Ganjam on the F. coast of peninsular India, kalinga, Doherty. Nias Isle, verhuelli, Moore.
Bali,
Java, \} basilissa, Cramer.
P Malay Peninsula,
Billiton,
Banka,
Borneo,
Engano Isle, malakoni, Doherty.
Mentawij Isles, maassi, Hagen.
Philippine Isles, semperi, Felder (tisiphone, Butler).

| $\#$ | $\#$ | diocletia, Hübner (dufresne, |
| :--- | :--- | :--- |
| $"$ | Godart, megilla, |  |
| [ Erichson). |  |  |

The subgenns Trepsichrois bears out my theory very well, no two species occurring in the same spot. The development of the subgenus is very remarkable in the different islands of the Philippine Archipelago, where the most aberrant and distinct species are found.

Edplesa, Fabricins.
Ceylon, corus, Fabricins (elisa, Batler).
Assam $P$ vitrina, Fruhstorfer ?
Burma, vitrina, Fruhstorfer.
Malay Peninsula, castelnaui, Felder (phoebus, Butler).
Indo-China, drucei, Moore.
Nicobar Isles, castelnaui, Felder.
Sumatra, castelnaui, Felder.
Nias Isles, phosetena, Kheil.
Engano, micronesia, , Doherty.

- Fide Aurivilling; Ent. Tide,, vol. xviii, p. 141, n. 7 (1897).

Java, pavetts, Zinken-Sommer.
" gyllenhalii, Lacas.
castolnaui, Felder.
Banka, castelnaui, Felder.
Borneo, butleri, Moore.
" godmani, Moore.
Bawean, castelnati, Felder.
Philippines (Palawan), salvini, Staudinger.
Celebes, celebica, Fruhstorfer.
Talaut Isles, locupletior, Fruhstorfer.
Engano Isle, micronesia, Doherty.
The subgenus Euploea bears out my theory very well. It is true that three species have been recorded from Java and two from Bornen, but it is almost certain that only one species occurs in each island. Mr. Frubstorfer in Stet. Ent. Zeit., vol. lx, p. 353 (1899), gives only parette from Java and butleri from Borneo, which is almost certainly a correct statement of the facts.

Oalliplea, Butler.
Lower Burma, ledereri, Felder (inquinata, Butler).
Malay Peninsula, ledereri, Felder.
Indo-China, musa, Swinhoe.
Sumatra, ? ledereri, Felder.
" eunus, de Nicéville.
Java, mazares, Moore.
Bali, mazares, Moore.
Natuna Isles, mazares, Moore.
Borneo, aristotelis, Moore.
Lombok, sambavana, Doherts.
Sumba, sumbana, Doherty.
Batjan, ledereri, Felder.
Flores, mazares, Moore.
Philippines, pollita, Erichson.
" monilis, Moore.
" (Palawan), palawana, Fruhstorfer.
Hainan Island, China, hainana, Holland.
North China, mariesis, Moore.
The subgenus Culliploea sapports my theory very well, althongh the two first-named species occurring in the Philippine Archipelago are sometimes found on the same islands. It is very doubtful if two species are found in.Sumatra, the recorded ledereri being probably my laterdescribed eunus.
J. II. 4

Danisepa, Moore.
$\left.\begin{array}{l}\text { Eastern Himalayas, } \\ \text { Assam, } \\ \text { Burma, } \\ \text { Malay Peninsula, } \\ \text { Indo-China, } \\ \text { Sumatra, } \\ \text { Billiton, } \\ \text { Banka, } \\ \text { Natuna Isles, }\end{array}\right\}$
diocletianus, Fabricins (radamanthus, Fabricins, ramsayi, Moore).

Nias Island, schreiberi, Butler (maasseni, Weymer, niasana, Swinhoe, Java, alcidice, Godart (thoosa, Hübner). (niasica, Snellen). Borneo, lowei, Butler.
Dr. Moore in Lep. Ind., vol. i, p. 114 (1891) records D. shreiberi [sic!] from Borneo, but that species is I believe strictly confined to Nias. Mynheer P. C. T. Snellen has written an interesting note on the subgenus Danisepa in Tijd. voor Ent., vol. xlii, pp. 101-105 (1899), but omits all reference to $D$. schreiberi, Butler, which is an older name than D. niasica, Snellen. I am unable, as Dr. Moore did in 1883, to draw any line between diocletianus and radamanthus. In 1890 he united these two species, bat gave the latter name (rhadamanthus, sic!) precedence, while diocletianus in the older, and described ramsayi as a new species, restricting it to the Eastern Himnlayas. That species gradually merges into diocletianus, though typical specimens have the white markings larger; but this is an inconstant character. Mr. W. F. Kirby points out in the new edition of Hübner's Ex. Schmett., p. 5, that in Godart's D. alcidice from Java no mention is made in the description of the white marginnl spots on the forewing. This is probably an omission only, as no species of Danisepa is known from Java or elsewhere in which these spots are lacking, though they are blue rather than white. Kirby gives D. thoosa specific rank to the exclusion of the older alcidice. Danisepa supports my theory very well, as the several species nowhere overlap.

Salpinx, Hübner.
\(\left.\begin{array}{l}Lower Burma, <br>
Malay Peninsula, <br>
Western China, <br>
Nicobar Isles, <br>

Sumatra,\end{array}\right\}\)| leucostictos, Gmelin (dehaanii, Lucas, |
| :--- |
| novars, Felder, vestigiata, Butler, lazulina, |
| Moore, leucogonys, Butler). |

1901.] L. de Nicéville-Butterfies of the subgenus Tronga.

Nias Isle, Java,
Bali,
Borneo, Talaut Islands, Borneo, kadu, Eschscholtz. Engano Island, phane, Doherty.
Philippine Isles, kadu, Eschscholtz (eunice, Godart, hewitsonii,

| $"$ | $"$ | oculata, Moore. <br> simillima, Moore. |
| :--- | :--- | :--- |
| $"$ | $"$ | althæa, Semper. |
| $"$ | $"$ | meldole, Moore. |

Amboina, leucostictos, Gmelin.
Hainan Island, negleyana, Holland.
N. Formosa Island, hobsoni, Batler.

In the Philippine Isles the varions species of Salpinx occur together on several of the islands, which goes to disprove my theory; elsewhere the several species appear to inhabit well-defined separate areas, except in Borneo, where leucostictos and kadu are both found.

Padimma, Moore.

| Behar, | [klagii, Moore (illustris, Batler, grantii, |
| :---: | :---: |
| Bengal (Maldah), | Butler, dharma, Moore, augusta, Moore, |
| Sikkim hills, | indigofera, Moore, inperialis, Moore, regalis, |
| Bhatan, | Moore, macclellandi, Moore, uniformis, |
| Assam, | Moore, shervillii, Moore, hamilloni, |
| pper Barma, | Swinhoe). |
| Bengal (Maldah) |  |
| Assam, | klugii, Moore, geographical race erichsonii, |
| Upper Burma, | Felder (crassa, Batler, masoni, Moore, pem |
| Lower Burma, | bertoni, Moore, apicalis, Moore, burmeisteri |
| Malay Peninsula, | Moore). |
| Indo-China, |  |

Sikkim
Bengal, \}klugii, Moore, geographical race kollari, Felder Orissa, $\} \quad$ (rothneyi, Moore).
Soath India,
Ceylon, sinhala; Moore.
Hainan Island, minorata, Moore.
I have nothing to add to what I wrote on this subgenus nearly ten years ago. The two geographical races separated above are not strictly
geographically separated, as they overlap the typical form at cortain points. The Ceylonese species can be satisfactorily separated from the continental form ; the species from Hainan I have not seen.

Isamis, Moore.


Mantawej Isles, sticheli, Hagen.
From the list given above it will be seen that it is only in IndoChina that more than one species of Isamia is found. . I. grotei, male only, described from "Cochin" (Cochin China being evidently meant, not the district of that name in South India) is probably the same as I. margarita, Butler; I. marseuli is probably the same species; but I. fabricii belongs to quite another group (i.e., to the chloë group), being entirely unglossed with blue on the apperside, which is a conspicnons feature in the other three species. Unfortunately I do not possess a single specimen of Isamia from any part of Indo-China, so am unable to speak about.them from first-hand knowledge.
1901.] L. de Nicóville-Butterfies of the subgenus Tronga.

## Narmada, Moore.

Ceylon, montana, Felder (lankana, Moore).
South India, coreta, Godart (coreoides, Moore).
Sumatra, ? consimilis, Felder.
" martinii, de Nicéville.
Java, consimilis, Felder.
I have seen no specimen of $N$. consimilis from Sumatra. N. martinui from that island is not a true Narmada, as the male sexual brands are not typical ; nor dues the shape of the wings agree with those of typical Narmada. I may mention that/ $N$. coreta does occur in Orissa, I have many specimens from thence. Dr. Moore notes in Lep. Ind., vol. i, p. 134, that its identification from thence "Is probably erroneous, and requires confirmation." N. consimilis seems to be extremely rare, I have seen no specimen of it.

## Stictoples, Batler.

\(\left.$$
\begin{array}{l}\text { Eastern Himalayas, } \\
\begin{array}{l}\text { Assam, } \\
\text { Burma, }\end{array}
$$ <br>
Malay Peninsula, <br>

Indo-China,\end{array}\right\}\)| harrisii, Felder (grotei, Felder, part, female |
| :--- |
| only, hopei, Felder, microsticta, Batler, |
| binotata, Butler, regina, Moore, pygmsea, |
| Moore, crovoleyi, Moore). | $\left.\begin{array}{l}\text { Sumatra, } \\ \text { Borneo, }\end{array}\right\}$ tyrianthina, Moore.

Palawan (Philippines), dotata, Fruhstorfer.
Philippines, lextifica, Butler.
„ bazilana, Frubstorfer.
Sumatra, picina, Butler.
inconspicua, Butler. mossta, Butler.
$\left.\begin{array}{l}\text { Java, } \\ \text { Sambawa, }\end{array}\right\}$ lacordairei, Moore.
Formosa, swinhoei, Wallace.
S. tyrianthinn is very doabtfally distinct from S. harrisii. Four species of Stictoplea have been recorded from Sumatra. Out of the many hundreds of Euplecas which have passed through my hands from that island, I have seen but one species, which I identify as tyrianthina. S. mosesta is recorded from thence by Dr. Butler in Proc. Zool. Soc. Lond., 1866, p. 284, n. 49, p. 281, fig. 3, male, and Trans. Ent. Soc. Lond., third series, vol. v, p. 474, n. 51 (1867), and these records were overlooked by me in my paper on the batterflies of Sumatra in Journ. A.S.B., vol. lxiv, pt. 2, pp. 357-555 (1895). Dr. Moore gives it from New Guinea only. Notes by me on the Indian and Malay Peninsula
species of Stictoploea will be found in Proc. A.S.B., 1892, pp. 158-161, and Trans. Ent. Soc. Lond., 1892, pp. 247-248.

I now return to the discussion of the various species of the subgenus Tronga, and will take up each of them in the order in which they were first described.

## 1. Tronga crameri, Lucas.

Bupleea crameri, Lucas, Rev. et Mag. de Zool., 1853, p. 318, male; id., Moore, Horsfield and Moore, Cat. Lep. Mus. E.I.C., vol. i, p. 129, n. 256 (1857), male ; id., Batler, Proc. Zool. Soc. Lond., 1866, p. 277, n. 27 ; id., Druce, Proc. 'Zool. Soo. Lond., 1873, p. 338, n. 4; Crastia crameri, Batler, Journ. Linn. Soc. Lond., Zool., vol. xiv, p. 297, n. 7 (1878) ; id., Snellen, Notes Leyden Mus., vol. xvii, p. 118, n. 2 (1895); Euplea (Crastia) crameri, Marshall and de Nicéville, Butt. of India, vol. i, p. 78, pl. viii, fig. 15, male (1882) ; Tronga crameri, Moore, Proc. Zool. Soc. Lond., 1883, p. 266, n. 1 ; idem, id., Lep. Ind., vol. i, p. 79 (1890); id., Frahstorfer, Berl. Ent. Zeitsch., vol. xiiii, p. 188 (1898).

Habitat: Manilla (Lucas); Borneo (Moore); Borneo (Butler); Borneo (Druce) ; Natuna Isles (Snellen) ; Borneo (Marshall and de Nicéville) ; North and South Borneo, Mt. Mulu (Fruhstorfer).

This species was originally described from Manilla, in Lazon, the capital of the Philippines, but according to all authors including Herr G. Semper in Schmett. Philipp., p. 33 (1886), it is not found there. I have not had access to the original description, so do not know exactly what form of it M. Lacas described. The specimen I figured in 1882 may perhaps be typical, it has, on the upperside of the forewing, one discal spot in the second median interspace, and six submarginal spots, both the marginal and submarginal series on the hindwing obsolete. The specimen Dr. Moore has kindly marked for me as typical has eight submarginal spots on the forewing and a few (six) marginal spots on the hindwing, one belonging to the inner series. Dr. Butler notes that "The description by M. Lucas answers to Moore's species." It is extremely variable, even in Borneo, and has been given, in my opinion, nine synonymic names.

## 2. Tronga kinbergi, Wallengrén.

Euplosa kinbergi, Wallengrén, Wien. Ent. Monatsch., vol. iv, p. 35, n. 8 (1860); idem, id., Kongl. Svenska Fregatten Engenies Resa, Zoologi, Insecta, pt. 4, p. 358, n. 4 (1861) ; id., Butler, Proo. Zool. Soo. Lond., 1866, p. 273, n. 11, p. 458 ; Crastia kinbergi, id., Journ. Linn. Soo. Lond., Zoology, vol. xiv, p. 297, n. 6 (1878); Tronga kinbergi, Moore, Proc. Zool. Soc. Lond., 1883, p. 269, n. 12 ; Euplœa (Tronga) kinbergi, Frabstorfer, Berl. Ent. Zeitsch., vol. xli, p. 300 (1896).

Habitat : China, December (Wallengrén); China (Butler); China (Moore) ; Tengger mountains, 2,000 feet, East Java (Fruhstorfer).

When describing this species, Wallengrén gave "China" as its habitat, which is very vague, but as most of the older writers had access to species from Southern China only, T. kinbergi probably came from the Canton district or from the Island of Hongkong, both in Southern China. He compares it with E. alopia, Godart, which is an Isamia. He does not give the sex of the type specimen. The description agrees very well with some of my specimens of the very variable Erplaa (Crastia) lorquinii, Felder ( $=\boldsymbol{E}$. felderi, Butler), the commonest species in Hongkong. Should this species prove to be same as lorquinii, Wallengrén's name will stand, being the older. Butler in 1866 recorded it from China, and noted that " $E$. felderi may be a local form of E. kinbergi, Wallengren," which is probably a correct assumption. Moore in 1883 gave it as a Tronga from China, and said that specimens were in the collection of the British Museam, but in 1890 he made no mention of it in "Lep. Ind." amongst the extra-Indian species of Tronga. Frahstorfer recorded it from Java, which is almost certainly incorrect; as far as I know, no species of Euploea is common to both China and Java, and there is no reason to suspect that E. kinbergi came from any where else than China.*

## 3. Tronga bremeri, Felder.

Euploea bremeri, Felder, Wien. Ent. Monatsch., vol. iv, p. 398, n. 16 (1860); id., Batler, Proc. Zool. Soc. Lond., 1866, p. 277, n. 28; idem, id., Trans. Linn. Soc. Lond., Zool., second series, vol. i, pp. 535, 564, n. 6 (1877); id., Druce, Proc. Zool. Soc. Lond., 1873, p. 838, p. 5 ; id., Godman and Salvin, Proc. Zool. Soc. Lond., 1878, p. 638, n. 8 ; id., Distant, Rhop. Malay., pp. 23, 410, n. 2, pl. ii, fig. 4, male (1882, 1886); id., Marshall and de Nicéville, Butt. India, Barmah and Ceylon, vol. i, p. 78, n. 60 (1882) ; id., Marshall, Proc. A. S. B., 1882, p. 143, n. 60 ; id., Adamson, Notes Daxainze Burmah, p. 10 (1889) ; idem, id., Cat. Butt. Burmah, p. 5, n. 26 (1889) ; id., Hagen, Tidjsch. van het Kon. Ned. Aard. Genootsoh., 1890, p. 191, n. 2 ; idem, id., Berl. Ent. Zeitsch., vol. xxxvii, p. 143, n. 8 (1892) ; idem, id., Iris, vol. vii, p. 41, n. 104 (1894); id., Pagenstecher, in Kükenthal's Erg. einer zool. Forsch. Molukken mad in Borneo, p. 389, n. 109 (1897) ; Crastia bremeri, Butler, Journ. Linn. Soc. Lond., Zool., vol. xiv, p. 298, n. 9 (1878) ; Tronga bremeri, Moore, Proc. Zool. Soc. Lond., 1883, p. 267, n. 4, pl. xxix, fig. 5, male; idem, id., Journ. Linn. Boc. Lond., Zool., rol. xxi, p. 30 (1886) ; idem, id., Lep. Ind., vol. i, p. 76, pl. xix, figs. 1, 1a, 1b, male; 1c, 1d, female (1800) ; E. (Tronga) bremeri, Adamson, Cat. Butt. Burmah, p. 7, n. 15

[^4](1897) ; id., de Nio6ville and Martin, Journ. A.S.B., vol. lxiv, pt. 8, p. 870, n. 19 (1895); Tronga crameri bremeri, Frahstorfer, Berl. Int. Zeitach., vol. xliii, p. 188 (1898).

Habitat : Malay Peninsula (Felder); Malayan Peninsala; India; Assam and Nepal (sic!) ; Malacca ; Province Wellesley; Penang; Singapore ; Borneo ; Sumatra (Butler) ; Borneo ; Peninsula Malayica (Druce) ; Billiton; Borneo; Malacca (Godman and Salcin); Assam; Burma; Province Wellesley; Malacca; Tenasserin (Distant); Mergui Archipelago ; Penang ; Malacca; Singapore; Borneo ; Sumatra (Marshalland de Nicéville) ; Akyab, July (Marshall) ; Monlmain, June; Moumagan in Tavoy, September (Adamson) ; Deli on the east coast of Sumatra; Banka Island ; Farther India; Malacca (Hagen) ; Samarinda in Borneo (Pagenstecher) ; Malacca ; Sumatra : India (Butler) ; Province Wellesley; Tavoy; Mergai, December to March, very common; Akyab, July; Thoungyeen forests in Upper Tenasserim ; Mergai Archipelago, December to Marvil; Malay Peninsuln (Moore); Tavoy coast, September, common; Moulmain, one pair, June (Adamson); N.-E. Sumatra, plains to 1,500 feet (de Nicéville and Martin); Malacca; Sumatra; Natuna Isles (Fruhstorfer).

I consider this species to be a synonym of T. crameri, Lacas. It is extremely variable; Dr. Moore has devoted an entire plate to it in his Lep. Ind., which shews a few of these variations. Even its male secondary sexual characters are inconstant, as in Sumatra I have recorded that a few specimens have on the upperside of the forewing a short, sometimes quite a long and distinct, brand in the submedian interspace. These examples do not fit into Dr. Moore's definition of his genus Tronga, which is described and nsually does not possess a sexualmark or scent-producing organ. But these aberrant examples are certainly not distinct as species from the more common typical specimens of T. bremeri. This brand is sometimes present and sometimes absent in other species of Euplosa, as will be noticed hereafter. T. bremeri has been recorded from Assam and Nepal by Dr. Butler, but is not fonnd further north than Akyab in Upper Burma.

## 4. Tronga pradenfeldit, Felder.

Euplosa frauenfeldii, Felder, Verh. zool.bot. Gesellsoh. Wien, vol. xii, p. 479, n. 87 (1862); idem, id., Reise Nov., Lep., vol. ii, p. 342, n. 474, pl. xli, ig. 4, male (1865) ; id., Marshall and de Nicéville, Batt. Ind. Burmah and Ceylon, vol. i, p. 83, n. 66 (1882); id., de Niofrille, Journ. A.S.B., vol. lxviii, pt. 2, p. 178 (1899); E. frauenfeldi, Butler, Proc. Zool. Soc. Lond., 1868, p. 458 ; idem, id., Journ. Linu. Soc. Lond., Zool., vol. xiv, p. 800, n. 19 (1878).

Habitat: Ceylon (Felder); Ceylon (Marshall and de Nicéville); Nicobar Isles (de Nicéville); Ceylon (Butler) ; Trincomalee (Butler).

Felder in 1862 deacribed this species from Ceylon from a male collected by the officers of the "Novara" frigate which called at various ports. I believe that the specimen was incorrectly labelled, and really came from the Nicobars, where the "Novara" called, as no Euplosa answering to the description has since been found in Ceylon. Felder in 1865 redescribed both sexes of the species, retaining Ceylon as its habitat, but uniting to it his $E$. esperi, described from a female example from Kar Nicobar, though in his second description of $E$. frauenfeldii he omitted the Nicobars from the habitat of the species. In his 1866 monograph Dr. Butler noted quite correctly that the species is a local form of $\boldsymbol{E}$. crameri, Lucas, and that it is vel'y near to E.bremeri, Felder, as Felder said when describing it. In 1878 Dr. Butler recorded a male from Trincomalee in Ceylon. Dr. Moore described this specimen in his Lep. of Ceylon (where he gave E. esperi as a synonym), and again in his Lep. Indica, and figared it in the latter work. It is not T. frauenfeldii, having been wrongly identified, but is Orastia kinbergi, Wallengren, $=$ E. Lorquinii, Felder, and E. felderi, Butier. I am convinced that it never came from Ceylon, but was probably caught at Hongkong, where it is very common, by an officer of some man-of-war which subsequently visited the naval station of Trincomalee, and the specimen resched the British Musenm from thence. E. esperi is undoubtedly a synonym of $\boldsymbol{E}$. frauenfeldii, as also is Tronga biseriata, Moore.
T. frauenfeldii may be retained as a species or good local race of T. craweri, Lucas, as all the white spots on the forewing are very small and nearly uniform in size, while in $E$. crameri the spots of the submarginal series in the forewing are irregular in size, several of those towards the apex of the wing being much larger than the others. It is found in the Nicobar isles only, occurring on most of the islands. It has a sexual brand in the male in the forewing in the sabmedian interspace in some specimens, which is variable in size and promineuce, and wholly absent in others. Those bearing, this brand are considered by Dr. Moore to represent a distinct species, which he has called T. biseriata. As noted by me in several places in this paper, this brand is very inconstaut in many groups of Euplosas, and cannot be relied on to separate geners or subgenera by.

## 5. Tronga espiri, Felder.

Empleal esperi, Felder, Verh. zool.-bot. GeseHsch. Wien, vol. xii, p. 482, n. 100 (1882) ; id., Butler, Proo. Zool. Soc. Lond., 1866, p. 453*; id., Moore, Proc. Zool. Soc.

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Lond., 1877, pp. 682, 823 ; id., Wood.Mason and de Nioérille, Journ. A.S.B., vol. I, pt. 2, p. 227, n. 8 (1881); vol. li, pt. 2, p. 15, n. 7 (1882) ; id., Marshall and de Nićville, Butt. Indie, Burmah and Ceylon, vol. i, p. 83, n. 65 (1882); id., de Nioéville, Journ. A.S.B., vol. Ixviii, pt. 2, p. 178 (1899); Crastia esperi, Moore, Proc. Zool. Soc. Lond., 1883, p. 278, n. ; ; idem, id., Lep. Ind., vol. i, p. 88, pl. xxvi, figs. 2, 2a, male; 2b, $_{\text {2 }}$ fomale (1890).

Habitat: Kar Nicobar (Felder); Nicobar Islands (Butler); Kar Nicobar, Nicobars (Moore) ; Pulo Kondul, Kamorta, Trinkut, Katschall (Wood-Mason and de Nicéville); Nicobars (Marshall and de Nicéville); Nicobar Isles (de Nicéville); Kar Nicobar, Kamorta (Moore).

This species is, in my opinion, a synonym of E. fravenfeldii, Felder, to which Felder himself united it, as also did Dr. Moore in 1880. Felder compared it with the Philippine [sic] D. crameri, Lucas. For further notes regarding it see the last species.

## 6. Tronga jobanna, Kirby.

Ruplea johanna, Kirby, Syn. Cat. Diurn. Lep., p. 17, n. 181 (1871) ; id., Kheil, Rhop. Nias, p. 17 (1884); id., Frahstnrfer, Berl. Ent. Zeitech., vol. xliii, p. 189 (1898).

Habitat : Borneo (Kirby).
Mr. W. F. Kirby renamed the Euplosa crameri, Moore, described in Horstield and Moore's Cat. Lep. Mus. E.I.C., vol. i, p. 129, n. 256 (1857), from Borneo, as heconsidered it to represent a species distinct from the earlier E. crameri of Lacas, from Manilla in the Philippines, this locality, as previously noted, being in all probability incorrect. As, however, Dr. Moore says that his $E$. crameri is the same species as that of Lucas, Kirby's $\operatorname{F}$. johanna falls to it as a synonym.

## 7. Tronga biberiata, Moore.

T. biceriata, Moore, Proc. Zool. Soc. Lond., 1888, p. 266, n. 2; idem, id., Lep. lnd., vol. i, p. 78, pl. xxi, fige. 1, 1a, 1b, male; 1c, 1d, female (1890); id., de Niofrille, Journ. A.8.B., vol. Ixviii, pt. 2, p. 178 (1899) ; Tronga orameri biseriata, Fruhstorfer, Berl. Ent. Zeiteoh., vol, xliii, p. 188 (1898).

Habitat : Trinkut, Great Nicobar, Little Nicobar, Nancoury, Pulo Kondul—all in the Nicobar Isles (Moore) ; Nicobars (de Nicévzille); Nicobars (Fruhstorfer).

I have said all that is necessary about this species nnder T. frauenfoldii, Felder, of which it is a synonym.

## 8. Tronga marsdeni, Moore.

T. marsdeni, Moore, Proc. Zool. Soc. Lond., 1888, p. 206, n. 8 ; idem, id., Lop. Ind., vol. i, p. 79 (1890); Euplisa maredeni, Distant, Bhop. Malay., p. 411, n. 18,
pl. Exix, fig. 1, mals (1886); Tronga crameri marsdeni, Prohstorfor, Barl. Bnt. Zeitech, vol. xliii, p. 188 (1898).

Habrtat: Singapore (Moore); Singapore (Dietant); Singapore (Fruhetorfar).

Mr. Distant allows this species full specific rank, and says he has received two specimens from Singapore, which both differ from the type specimen described by Dr. Moore from the same island, which shews that this "species" is as variable as most of the other species in the sabgenus. In my opinion it is a synonym of T. crameri, Lucas, which species (as E. bremeri, Felder), has been recorded by several authors from numerous localities in the Malayan Peninsala. It is highly improbably that Singapore island, which has hardly a scrap of virgin forest remaining, has a distinct species of I'ronga to itself. Dr. Moore. says that it is "An intermediate form between T. bromeri, Felder, and T. crameri, Lacas."

## 9. Tronga olitaleen, Moore.

T. divacea, Moore, Proo. Zool. Soo. Lond., 1888, p. 267, n. 5 ; id., Fruhatorfor, Berl. Ent. Zeitsch., vol. xiiii, p. 189 (1898).

Habitat : Minthantoung, Thoungyeen valley, Tenaseerim (Moors).
This species was described from a single very small female specimen. Dr. Moore in Lep. Ind., p. 76, admits that it is a "small var." of T. bremeri, Felder, which itself is a synonym of T. crameri, Lacas.

## 10. Tronga niasica, Moore.

T. niasica, Moore, Proc. Zool. Soc. Lond., 1888, p. 267, n. 7 ; idem, id., Lep. Ind., vol. i, p. 79 (1890); Euploea niasica, Kheil, Rhop. Nias, p. 17, n. 18, pl. i, Eg. 2, female (1884); Tronga pryeri niasica, Fruhstorfer, Berl. Fint. Zeiteoh, vol. zliii, p. 189 (1808).

Habitar: Nias Island, W. coast of Sumatra (Moore) ; Nias (Kheil); Niss (Fruhetorfer).

I have eight males, but no females, of this species. The markings are more constant than usual, though they vary considerably in detail, for instance, the submarginal dots on the hindwing may form a complete series or may be reduced to a solitary spot, and there are intergrades between these two extremes; the spots on the forewing vary also in size and number. The species may, perhaps, be kept distinct, as the spots in the forewing are more uniform in size than in the other epecies of the subgenus known to me, except T. frauenfeldii, Fotder, in which they are constantly smaller.

## 11. Tronga broorti, Moote.

T. brookei, Moore, Proc. Zool. Soc. Lond., 1888, p. 268, n. 8; idem, id., Lep. Ind., rol. i, p. 79 (1890) ; id., Frahstorfer, Berl. Fint. Zeiteoh., vol. zliii, p. 188 (1698).

Dr. Moore has kindly identified a male specimen of this species for me from Sarawak, Borneo, and marked it "Same as type," though it does not agree with the type, as in the forewing it has no marginal series of spots, in the type they are said to be present but ".very minute." Mr. Fruhstorfer says that Tronga brookei is identical with Menama lorze, Moore. This is entirely incorrect, the genus Menama has a sexual patch of androconia on the upperside of the hindwing not found in Tronga, brookei is a Tronga, and lorsse is a Menama. I consider T. brookei to be a synonym of T. crameri, Lucas. Dr. Moore says it is "Comparatively smaller and narrower winged than T. crameri; of a paler brown colour, and with a violet-blue tint."
12. Tronga labuana, Moore.
T. Labuana, Moore, Proc. Zool. Soc. Lond., 1888, p. 268, n. 9 ; idem, id., Lep. Ind., vol. i, p. 80 (1890); id., Frahstorfer, Berl. Ent. Zoiteoh, vol, xiiii, p. 189 (1898).

Habitat: Labuan, Borneo (Moore).
Dr. Moore has identified a male specimen of this species for me from Sarawak, Borneo. Though marked "Same as type" it does not agree exactly with the description of the type; and it would be extraordinary perhaps if it did, as in these Borneo Trongas I cannot find two marked exactly alike. Mr. Fruhstorfer says that this species is a synonym of T. crameri, Lacas, wherein I agree with him.

## 13. Tronga daatensis, Moore.

T. daatensis, Moore, Proc. Zool. Soc. Lond., 1883, p. 868, n. 10 ; idem, id., Lep. Ind., vol. i, p. 80 (1890); id., Fruhstorfer, Berl. Ent. Zeitsoh., vol. xliii, p. 189 (1898).

Habitat : Island of Daat, Labuan, Borneo (Moore).
Dr. Moore, not having access to the type of this species, was unable to match it with any of the Bornean Trongas I sent to him. As, however, from the description it only appears to differ from other Borneo Trongas in some slight details of maculation I concur with Mr. Frahstorfer in considering it to be a synonym of T. crameri, Lacas.

## 14. Tronga pryeri, Moore.

T. pryeri, Moore, Proc. Zool. Soc. Lond., 1808, p. 269, n. 11 ; idem, id., Lop. Ind., vol. i, p. 80 (1890) ; id., Fruhstorfer, Berl. Fnt. Zeitahh., vol. ㄷlii, p. 189 (1808) ;

Enploea bremeri, var. pryeri, Distant and Pryer, Ann. and Mag. of Nat. Hist., fifth series, vol. xix, p. 47, n. 12 (1887).

Habitat : Sandakan, Borneo (Moore) ; North Borneo (Fruhstorfer); Sandakan, Borneo (Distant and Pryer).

Dr. Moore has sent me a sketch of the type male of this species, none of the specimens $I$ sent to him being identical. Its chiof peculiarity appears to be the presence of a complete double series of rather large spots on the hindwing. Mr. Fruhstorfer takes T. pryeri as the type of his second division of the genus Tronga, based on this character, and gives heyleertsii, Moore, niasica, Moore, mentawica, Hagen, and nicevillei, Moore, as subspecies of pryeri, though why he gives pryeri precedence over niasica, the latter being the older species, and brookei over lorzes for the same reason, is best known to himself. Though I sent no typical specimens of I'. pryeri from Borneo to Dr. Moore, I possess several of both seres that agree with his description and sketch of that species, and it is in my opinion another synonym of T. crameri, Lucas.

## 15. Tronga heylertsil, Moore.

T. heylærtsii, Moore, Lep. Ind., vol. i, p. 79 (1800); E. (Tronga) heylertsii, de Nicéville and Martin, Journ. A.S.B., vol. Ixiv, pt. 2, p. 371 , n. 21 (1896); T. pryeri heylaertsi, Frahstorfer, Berl. Ent. Zeitsch., vol. xliii, p. 189 (1898).

Habitat: Sumatra ; Moore); Sumatra (de Nicéville and Martin); Sumatra; Malacca (E'ruhstorfer).

From the description alone I can identify this species without difficalty, as it is the commonest form of Tronga occurring in Sumatra. It is another synonym of T. crameri, Lucas.

## 16. Tronga pagenstecherd, Hagen.

Ruploa pagenstecheri, Hagen, Jahr. des Nass. Ver. für Natur., vol. xlix, p. 182, n. 18, pl. iv, fig. 8, male (1806); Tronga crameri pagenstecheri, Fruhstorfer, Berl. Ent. Zeitech., vol. xliii, p. 188 (1898).

Habitat : Bawean Island (Hagen); Bawean (Fruhstorfer).
I have not seen this species. Dr. Hagen says that it comes into Moore's subgenus Menama, near M. lorzs, Moore, [nec Boisduval], while Fruhstorfer puts it in the subgenas Tronga.

## 17. Tronga mrntafica, Hagèn.

[^6]Habitat : Mentawej Islands (Hagen) ; Mentawej (Fruhstorfor). I have not seen this species.
18. Tronga morbist, Hagen.

Euplea (Tronga) morrisi, Hagen, Ent. Nach., vol. xxiv, p. 199 (1898) ; Tronga morrisi, Frahstorfer, Berl. Ent. Zeitsch., vol. xliii, p. 188 (1898).

Habitat : Mentawej Islands (Hagen); Mentawej (Fruhstorfer).
This species also I have not seen. It is highly improbable I think that two distinct species of Tronga inlabit one tiny group of islets lying to the south of the central portion of Sumatra. Should one prove to be a Tronga and the other a Menama the occurrence of two closely-allied bat subgenerically distinct species would be accounted for.
19. Tronga trngerrensis, Frabstorfer.
T. crumeri tenggerensis, Prahstorfer, Berl. Ent. Zeiteoh., vol. xiiii, pp. 187, 188 - (1898).

Habitat: Tengger mountains, 2,000 feet, East Java (Fruhstorfer). I have seen no specimen of this species. See remarks on p. 14.
20. Tronea bigebiata, Fruhstorfer.
T. crameri, ab. biseriata, Frohstorfer, Berl. Ent. Zoitech., vol, riiii, pp. 187, 188 (1888).

Habitar: East Java (Fruhstorjer).
Mr. Fruhstorfer describes this as an "aberration" of T. orameri, Lacas, which latter he records from "North and South Borneo, Mt. Mulu," only, and not from Java at all. Probably he intends it to be understood that it is an aberration of his tenggerensis rather than of crameri. There is already a I'ronga biseriata (see n. 7, p. 34) of Moore, so as a distinct species it cannot stand in any case. I have not seen it.

The two following species have been described in the genus Tronga :-

1. Tronga moorei, Butler, vide Moore, Proc. Zool. Soc. Lond., 1883, p. 267, n. 6, is a Menama.
2. Tronga uicetillei, Moore, Lep. Ind., vol. i, p. 77, pl. $\times \times$ (1890), is an aberrant Crastia in my opiniou.

Also Menama mouhotii, Moore, Proc. Zool. Soc. Lond, 1883, p. 265, n. 7, pl. xxxi, fig. 6, male, is in my opinion another aberrant Orastia.
IV.-Noviciæ Indicæ XVIII. The Asiutic species of Dalbergis.By D. Prain.
[Received 22nd April, 1901 ; Rend June, 1901.]
The writer, at such intervals during the past four years as have offered themselves in the routine of administrative duties, has given attention to the species of the genus Dalbergia that ocour in S.-E. Asia. In the course of this study he has received much assistance from many friends and has been in hopes of incorporating the results of his investigation in a monograph of at least the Asiatic Species of this genus, so interesting from an economic and so difficult from a taxonomic point of view. Circumstances for the moment forbid the accomplishment of this design. But while it is, at this time, impossible to provide a monograph of the genus which shall be, at least formally, complete, it is a pleasant duty to place at the disposal of members of this Society and of those who have so kindly assisted the writer, a compact review of the notes he has been able to make on collections that have been lent him for study in Calcutta or that he has been able to examine in Herbaria that he has visited. These notes, as embodied in this paper, take the form of a hand-list of the Asiatio species of the genus, with a fairly complete bibliography and a full citation of distribution so far as the specimens in the Colleotions examined by the writer are concerned. Except in the case of very well-known and obvious species the unmbers of sheets, where numbers are given, have been quoted. In spite therefore of its formal incom. pleteness the list now prepared will probably be found useful, not only by those who may consult the colleotions on which the list is besed, but by those who may be at work in Herbaria that have not yet been accessible to the writer. A list like the present serves, moreover, another parpose; it fulfils the desirable object of, in the words of a Russian proverb, "feeding the wolves and saving the sheep."

The Herbaria examined by the writer on the spot have been those of 1. Calontta; 2. Kew ; 3. British Maseum ; 4. The type Herbarinm of Wallich; 5. the Herbarinm of Linnæus ; 6. M. Drake del Castillo, Paris; 7. Peradeniya, Ceylon. The collections which have been entrusted to him for examination at Calcutta are those of 8. Herb. Baharanpur, lent by Mr. Dathie; 9. Herb. DeCandolle, Geneva, lent by Mr. DeCandolle, and 10. Herb. Boissier, Geneva, lent by Mr. Barbey; 11. Herb. Beccari, Florence, lent by Sig. Beccari ; 12. Herb. Paris, lent by M. Bureau; 13. Herb. Leiden, lent by the late Prof. Suringar ; 14. Herb. Berlin, lent by Prof. Engler ; 15. Herb. Buitenzorg,
lent by Dr. Treab; 16. Herb. Hong-Kong, lent by Mr. Ford. To all these friends and also to Mr. Bailey who kindly sent specimens of the only Dalbergia in the Brisbane Herburiam the writer wishes to express his grateful thanks.

It may be explained that the classification adopted in this list should be considered more or less tentative. The chief point, at this stage, is to arrive if possible at something approaching a definite idea of the various species. This, as will be seen from the quoted synonymy, has long been a desideratum; previous treatises have left many doubts both as to the limits of species and as to the incidence of names. That the present sketch is not without flaws in this respect goes without saying. The opportunities, however, which have been afforded the writer of examining the actual types of most of the doubtful forms have enabled him to settle definitely many if not all the old doubts; any new ones that may arise must be laid to his charge. The leading features of the present system of classification are (l) the reinstatement of Mr. Bentham's very natural subgenus Triptolemea, and (2) the limitation of the subgenus Selenololium to those species that have thick corky pods. There is an obvious convenience in keeping alongside of each other three species so clearly and naturally allied as are D. reniformis, D. Kunstleri and D. falcata though, from the fact that the stamens of the first are iso-diadelphous while those of the second and apparently also the third are monadelphons, we have within this section a cleavage on another plane, corresponding exactly to the cleavage between Dalbergaria and Sissoa. The other species that have been occasionally placed in Selenolobium owing to their having hard woody pods, not obviously winged, but that do not have the ventral suture markedly widened in consequence of a corky thickening of the endocarp, are all species that occur on sea-shores or in tidal estuaries and are with hardly an exception confined to such localities. This raises a strong suspicion that the character is a consequence of environment; it is at all events a character that adapts the pods for dispersal by floating. If this suspicion should prove correct the value of the character as a taxonomic one is greatly minimised. Such species have therefore been relegated to those sections in which their characters of corolla and stamens would naturally lead us to place them. Within the subgenus Sissoa a new section, that of the Unguiculats, has been tentatively recognised; it promises to be a useful and appears to be a natural division.
I. Sissoa Benth.

1. Siesos veræ.
2. Dalbergia Sissoo Roxb. Hort. Beng. 53 (1814); DC. Prodr.
ii. 416 (1825); Roxb. Flor. Ind. iii. 223 (1832); Wall. Oat. 5850 (1832); W. \& A. Prodr. i. 264 (1834) ; Grah. Cat. Bomb. Pl. 55 (1839); Vaigt, Hort. Suburb. Caloutt. 241 (1845) : Benth. Journ. Linn. Soc. iv. Suppl. 40 (1860) ; Dalz. \& Gibs. Bombay Flora, Suppl. 24 (1861); Bedd. Flor. Sylval. t. 25 (1869); Stewart, Panjab Plants 65 (1869); Brandis, For. Flor. 149 (1874) ; Bal. in Hook. f. Flor. Brit. Ind. ii. 231 (1876) ; Talbot, Bombay List 74 (1894); Gamble, Darjeeling List 28 (1896).

Wild in gravelly river beds along the foot of the Himalaya from. Upper Assam. (Simons! Mann!) the Duars (Prain!) the Terai of Sikkim (Gamble! Olarke! etc.), and Nepal (Wallich!) to Dehra Dun (King!) : ascending to 1000 feet in the Eastern Himalaya (Hooker!) and to 3000-4000 feet in the North.West Himalaya (Gamble! Olarke! Schlich!) and on the North-West frontier and Beluchistan (Stocks! Lace!). Wild also in Merwara (Afoir! Brandis!). Specimens from the Sitapahar Forest Reserve, Chittagong, (Ellis!) are probably from planted trees. Cocivatsd every where in the plains of Northern, Central, Weatern and Sonthern India; occasionally as if wild in Coorg (Hohenacker n. 785 !) and the Nilgiris ( Wight!).
2. Dalbregia lattfolia Roxb. Ooromand. Pl. ii. 7, t. 113 (1798); Hort. Beng. 53 (1814) ; DO. Prodr. ii. 416 (1825) ; Flor. Ind. iii. 221 (1832); Wall. Cat. 5852 (1832) ; W. \& A. Prodr. i. 264 (1834) ; Grah. Cat. Bomb. Pl. 55 (1839); Voigt, Hort. Suburb. Calcutt. 240 (1845); Wight, Ic. t. 1156 (1852); Benth. Journ. Linn. Soc. iv. S九ppl. 38 (1860); Dals. \& Gibs. Bomb. Flor. 77 (1861); Bedd. F'lor. Syvlat. t. 24 (excl. main fig.) (1869); Brandis For. Flor. 148 (1874) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 231 (1876); Talbot, Bombay List 74 (1894); Gamble, Darjeeling List 29 (1896).

Rajpotama: Merwara, Brandis! Aboo, King!. Neppal: Maries! Sirim: Hooker! Gamble! Chota Nagpor: Parasnath, Anderson! Hooker ! Tandi Hills, Campbell! Hundrugagh, Prain! Palamau, Camble! N. India: Jacquemont 731! 1386! Behar: Hooker! Bundelcund: Edgewoorth. S. Indta: Madras ; Heyne! Nilgiris, Leschenault 246! Wight 930! Gamble! Ayamalais, near Coimbatore, Wight! Mercara, Metz (Hohenacher 622)! W. Indis: Kala Nadi, Ritchie! Concan; Stocks! Law! Colitivted at Singapore, Ridley 8444!
3. Dalbergia emarainata Roxb. Hort. Beng. 53 (1814) ; Flor. Ind. iii. 224 (1832); Voigt, Hort. Suburb. Calcutt. 241 (1845). D. sissoides Grah. in Wall. Cat. 5876 (1832); W. \& A. Prodr. i. 265 (1834); Benth. Journ. Linn. Soc. iv. Suppl. 39 (1860) ; Bedd. Trans. Linn. Soc. xxv. 216 (1865). D. javanica Miq. Flor. Ind. Bat. i. 132 (1855); Benth. Journ. Linn. Soc. iv. Suppl. iv. 38 (1860). D. latifolia Kurz, For. Flor. Brit. Burm. i. 342 (1877); Koord. \&. Valet. Bijdr. ii. 77 (1895) nec Roxb. J. II. 6
D. latifolis var. sissoides Bedd. Flor. Sylvat. sub. Ł 24 (1869); Bak. in Hook. f. Flor. Brit. Ind. ii. 231 (1876).

Andamams: probably north Island, Kyd (Io. Roxb.) / Java; Horsfield! Koorders! Heijer! S. Impla: Nilgiris, Wight 931! Segar, Clarke 11305! Pulneys, near Kodaikanal, Bourne ! Courtallam, Wight !
4. Dalblrgia sacerdotua Prain. A tree, the young twigs soft, blackish, faintly puberulous. Leares 20 cm . long, leaflets $9-11$, ovato, base cuneate apex obtuse notched, membranous, finely reticulated, aparsely adpressed-puberulons on both surfaces, 6 cm . long, 3 cm . wide; rachis 15 cm . long and petiolules 4 mm . long finely paberulous. Flowers in terminal thyrscid panicles 8 cm . long 6 cm . wide, the peduncle, branchen and slender pedicels rusty-puberulous; bracteoles lanceolate obtuse, membranons, deciduous. Calya campanulate, teeth obtuse, the loweat as long as tube the others shorter. Petals short-clawed, standard orbicular hardly thickened at base. Stamens 10, monadelphous. Ovary shortly stipitate, glabrous except the stipe; orules 4. Pod thinly coriaceons, narrow-ligulate, tapering to the stipitate base, apex acuto, glabrous, 3 -seeded, 9 cm . long, 1 cm . wide.

China: Shanghai, Rév. pp. Hélot \& d’Argy 75 !
The reverend gentlemen who collected the material on which this very diatinct apecies is based, give its Chinese name an Te-Zã, i.e., "Aloes-Wood." Its neareat ally is D. Sise00 as regards pod and D. omarginate as regards foliage but it is rery different from both.
5. Dalbarain obtusifolia Prain. D. ovata var. obtusifolia Bak. in Howk. f. Flor. Brit. Ind. ii. 231 (1876). D. glanca Ktrr, For. Flor. Brit. Burm. i. 343 (1877), noc Wall.

Burma: Pegu, Kurz 1784! 2607 in part! Pakchoung, Brawdis 228 ! Shan Hills ; Madoe and elsewhere, King's Colleotors ! Lower Chindwin, Collectors of Forest Dept.! Hakung Valley, Grifith 1809 ! Cuina : Yunnan, near Momien, J. Anderson!

Griffth notes this as a " mediam tree."
6. Dalbergia tonkinensis Prain. A small or medium-sized tree. Leaves $20-22 \mathrm{~cm}$. long, leaflets $9-11$, ovate, base rounded, apex shortly abruptly acnminate, firmly subcoriaceous, very sparingly puberulous when young, soon glabrous, $6-9 \mathrm{~cm}$. long, $3-4 \mathrm{~cm}$. wide; rachis $13-15$ cm . long, and petiolales 4 mm . long glabrons; stipules small, tawnypuberulous, deciduous. Flowers "white, fragrant," in small, corymbose, axillary paniclen 5 cm . long, 3.5 cm . wide. Pods firmly coriaceons, ovate or oblong, sabacute, distinctly stipitate, 5 cm . long when 1 -seeded, 8 cm . long when 2 -seeded, 2 cm . wide, distinctly reticulated opposite the seed. Seed reniform, compressed, 1 cm . long, 5 mm . wide. Dalbergia sp. Drake del Castillo, Journ. de Bot. v. 215 (1891).

Cocrix-Cetma: Tonkin, Hanoi ; Balarea 2184! Ceima: Hainan, B. C. Henry 46 !

The abeence of flowers, which are simply noted by the Rev. Henry an white and fragrant, renders it impossible to locate this species definitely. It appeare, however, mif Mr. Drake del Caetillo's saggestion as to its affinity might be correct and that it in a Biesoa, near D. ovata and D. obtusifolia.
7. Dalbeggia ovata Grah. in Wall. Cat. 5854 (1832); Benth. in Journ. Lixn Soc. iv. Suppl. 40 (1860); Bak. in Hook. f. Flor. Brit. Ind. ii. 231 (1876); Kırx, For. Flor. Brit. Burma i. 343 (1877). D. glanca Wall. Oat. 5862 (1832).

Bubxa: Martaban, -Wallich 5854! Moulmein, Wallich 5862! Fulconer 566! Parish 340! Beddome! Rangoon, Cleghorn! Yainway, Brandis 1185! Thoungyne, 3000 ft., Lobb! Pegn, Kurs 1785! 2607 in part! 2610! 2595! Cocain-Chiva : route between Saigon and Bienhoa, Lefévre 320 !

Beddome notee this an a " large tree."
8. Dalbergia roliacea Wall. Oat. 5856 partly (1832); Benth. Juurn. Linn. Soc. iv. Suppl. 41 (1860) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 232 (1876) ; Kurz, For. Flor. Brit. Burma i. 347 (1877).

Blama : Martaban, Wallich! Palang Creek, Wallich! Pegu, Kurz 2602! Bangoon, Oleghorn 25 ! Shan Hills, Prazer 210! 233! Abdul Huq! Temasserim, Helfor 1806! Siam : borders of the Great Lake, Godefroy 686 !

Wallioh's n. 5885 is mach mixed. Letter A. is a mélange of $D$. foliacea, D. stipulacea, D. candenatoneis and D. volubilis ; B. is a mixtare, probably by miatake, of D. rimosa and D. volubilis; C. is D. foliacea; D. is D. foliacea; E. is D. stipulacea. The mixture of D. rimosa with $D$. foliacea, which in most collections has tuken place nuder B, has in Herb. De Candolle been made by Wallich nuder D. That it is in all probability a mistake in dietribating may be admitted; D. rimosa does not cocur in Southern Burma where D. foliacea grows. The other mistakes are mistakes of identification on Dr. Wallich's part.
9. Dalebrail yunnanensis Franch. Pl. Delavay. 187 (1890).

Chira : Yunnan, near Tapintze, Delavay 654!510! 2050! Yen-izehay, Delaray 3883! Mengtze, Henry 10205!
10. Dalberaia velutina Benth. var. typica Prain, Juurn. As. Soc. Beng. Ixvi. 2. 117 (1897). D. velutina Benth. Pl. Jungh. i. 255 (1854); Journ. Linn. Boc. iv. Suppl. 43 (1860) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 233 (1876) ; Kurz, For. Flor. Brit. Burma i. 848 (1877). D. stipulata Wall. Oat. 5868 (1832). Cassia timorensis H. f. \& T. Herb. Ind. Or., partly.

Aesam: Silhet, de Silea! Hooker \& Thomson / Burma : Moulmein,

Wallich! Amherst, Brandis! Rangoon, Kurz! Pegu, Kurz! Tenasserim, Helfer 1804! Malaya : Malacca, Maingay 548 !
var. Maingayi Prain, Journ. As. Soc. Beng. 1xvi. 2.117 (1897).
Burna : Mergai, Grifith 1798! Tenasserim, Helfer 1804! Malaya: Malacca, Maingay 612! Singapore, Ridley 6086! 5923! Borneo, Haviland 1444!

Helfer 1804 in Herb. Berlin is typical D. velutina. In Herb. Paris the same number is attached to a specimen of var. Maingayi. The Bornean plant may be varietally distinct.
11. Dalbergia borneensis Prain. A long climber with perfectly glabrous branches. Leaves $8-12 \mathrm{~cm}$. long, leaflets 7-9, oblong, obtuse, mucronulate, membranous, quite glabrous on both surfaces, 2.5 cm . long, 1.25 cm . wide, the terminal more cuneate at base and slightly larger than the others ; stipules large, sparingly puberulous or glabrous; rachis 8 cm . long and petiolules 2.5 mm . long glabrous. Flowers in lax lateral panicles with corymbose branches 6 cm . long, 4 cm . wide, the peduncles, branches and pedicels glabrous or very sparingly puberulous, bracts and 2 bracteoles at base of calyx narrowly subulate, pnberulous. Calyx 4 mm . long, puberulous, campanulate, base slightly gibbous, teeth acute subequal, upper pair wider than the three lanceolate lowest. Corollu white, petals with claws as long as calyx-tube, standard orbicular, emarginate, reflexed. Stamens usually 10 , in one bundle slit along top. Ovary long-stipitate, glabrous, style subulate; ovule usually solitary. Pod thinly coriaceous, pale straw-coloured, finely uniformly reticulated throughout, 1-seeded. Seed markedly reniform, 1.25 cm . long, 5 mm . wide, 1.2 mm . thick.

Malaya : Borneo, near Kuching, Haviland 2889! Kalong, Haviland 2890 !
12. Dalbergia Dybriana Prain. A large climber, with slender, blackish, glabrous branches, branchlets occasionally hooked. Leaves 8-12 cm. long, leaflets 11-15, obovate-oblong, base cuneate, apex rounded retuse, thinly coriaceous, finely closely reticulate, sparsely adpressedpubescent beneath, $2.5-3 \mathrm{~cm}$. long, $1-1.25 \mathrm{~cm}$. wide, rachis $7-9 \mathrm{~cm}$. long and petiolules 2.5 mm . long glabrous or sparsely adpressedpubescent. Flowers white, in lax few-flowered axillary panicles 5 cm . long, 3 cm . wide, rachis, branches and pedicels 3 mm . long puberulous. Calyx puberulous, campanulate, teeth triangular, obtuse, shorter than tube except the lowest subacute almost as long as tabe. Petals with claws as long as calyx-tube. Stamens 9, monadelphous. Ovary stipitate, glabrous except the puberulous stipe; ovales 2-3. Pod 1-2-seeded, thinly coriaceous, linear-oblong, 6.5 cm . long when 1 -seeded 9 cm .
long when 2 -seeded, 1.5 cm . wide, distinctly reticulated opposite the seeds.

Chiva: Hapeh, Henry 3437! 4132! 4138! 4561! Szechuen; Ky-min-se, Farges 1076! Yunnan; Mengtze, Henry 10503!

Farges gives the Chinese name as "Ta-kang-kin-ten."
13. Dalbergia cultrata Grah. in Wall. Oat. 5861 (1832); Beith. Journ. Linn. Soc. iv. Suppl. 39 (1860) ; Bak. in Hook.f. Flor. Brit. Ind. ii. 233 (1876) ; Kurz, For. F'lor. Brit. Burma i. 342 (1877). D. zeylanica Wall. Oat. 5847 B (1832), nec Roxburgh.

Bdema: Pegn, Kurz 1787! 2609! Wallich! McClelland! Brandis! Shan Hills, Oollett 406! King's Collector! Prazer ! Tenasserim, Gallatly! Trogla, near the hills, Wallich 5847 B! Siam: Radboerie, Teysmann 6027!
2. Sissoæ unguiculats. Standard with a long claw.
14. Dalbergia Havilandi Prain. A small tree with blackish, rugose, rusty-puberulous, thickish branchlets. Leaves 7-10 cm. long, leaflets 1-3, when three the two lateral subopposed, ovate, obtuse or sabacute, base truncate, firmly coriaceous, pubescent especially on the nerves above, velvety beneath, $5-8 \mathrm{~cm}$. long, $2 \cdot 5-4 \mathrm{~cm}$. wide, secondary nerves 4-5 pairs, much curved forwards distinct beneath ; rachis $\mathbf{1 \cdot 2 5 -}$ 2.5 cm . long, densely velvety as are the petiolules 3.5 mm . long. Ilowers in short, clastered racemes $1 \cdot 25-2.5 \mathrm{~cm}$. long, springing from tufts of triangular, rusty-velvety bracts in axils of old leaves, lowest pedicels longest, slender, 5 mm . long, tawny-pubescent as are the peduncles; bracts at base of pedicels solitary, ovate-lanceolate, 1.5 mm . long, persistent, the bracteoles below the calyx solitary, subulate, very small. Calyx campanulate, tawny-tomentose, 3.5 mm . long, toeth acute, half as long as tabe. Corolla white, claws of petals as long as calyxtabe. Stamens 9, monadelphous, slit along upper side or occasionally (fide Haviland) in 2 bundles of 5 and 4 respectively. Ovary densely pubescent as is its stipe; ovules 2. Pod not seen.

Bornbo : Sarawak, near Kuching, Haviland 2894! 2895!
15. Dalbergia Hullettii Prain, Journ. As. Soc. Beng. Ixvi. 2.119 (1897).

Singapore: Hullett 626 !
16. Dalbergia rostrata Grah. in Wall. Oat. 5867 (1832). D. Sis800 Miq. Flor. Ind. Bat. i. 128 (1855) nec Roeb. D. pseudo-Sissoo Miq. Flor. Ind. Bat. i. 128 (1855) ; Prain, Journ. As. Soc. Beng. lxvi. 2. 118 (1897). D. Championii Thwaites, Enum. Pl. Zeylun. 95 (1860); Benth., Jowrn. Linn. Soc. iv. Suppl. 39 (1860) ; Bak. in Hook f. Flor. Brit. Ind ii. 231 (1876) ; Trimen, Handbook of Ceylon Flora ii. 88 (1894).
D. nitida Zipp. Mss. in Herb. Lugd.-Bat. Endosparmum zojlanioum Champ. Mss. in Herb. Peradeniya.
8. India : Tinaivelly, at foot of Ghauts on banks of the river Tambraparni, Beddome 2424! Cercon: moiat regions, 2000-4000 ft., Thwaites 761! Java: Blume! Zippel! Hasskarl! Bornso: Sarawak, Gunong Woh, Beccari 2845! Igan, Beccari 3906! 3908! Sungei Unpanang, Beccari 3379 ! Singkawang, Toysmann 7875! Kuching, Haviland 2111! Celebes : S.-E. Peninsula, at Lepo-Lepo, near Kandari, Beccari! Malay Peninsula : Perak; Larut, Kumetler 8177! 3340! 3579! 4964! 656:5! Scortechini 1348! Wray 2098! 2965! Penang; Govt. Hill, Curtis! Singapore; Bukit Mandai and elsewhere, Hullett! Ridley!
17. Dalbergia Kingiana Prain, Journ. A8. Soc. Beng. Ixvii. 2. 289 (1898).

Burma: Kachin Hills, Shaik Mokim!
18. Dalbergia Hanbyana Prain. A large woody climber with rustypubescent young branches. Leaves 12 om . long, leafiets 4-5, ovate, acute, base cuneate or rounded, coriaceons, glabrous above, softly densely pubescent beneath, terminal the largest 7 cm . long, 3.5 cm . wide; rachis 6 cm . and petiolules 3.5 mm . rusty-paberalous. Flowers white, in loose panicles 10 cm . long, with rusty-pabescent main-rachis and branches $\mathbf{3 ~ c m}$. long; pedicels rusty, 3 mm . long; bracts and bracteoles small, ovate, rusty-pubescent. Oalyx campanulate, densely rusty-pubescent, 4.5 mm . long, teeth subequal triangular. Petals with claws as long as calyx. Stamew 9, monadelphous. Ovary pubescent, with long pubescent stipe ; ovales usually 2. Pod not seen.

Crima : Yunnan, at Mengtze, Heary 11248 !
19. Dalbergin Benthayt Prain, Journ. As. Boc. Beng. Ixvii. 2. 289 (1898). A woody climber, branches black, glabrons. Leaves $12-14 \mathrm{~cm}$. long ; leafiets 5-7, ovate or oblong-elliptic, narrowed to the obtuse or retuse apex, base cuneate or rounded, coriaceons, glabrous above, glancescont and finely adpressed-puberulous beneath, terminal the largest 5 cm . long, 2.5 cm . wide; rachis 8 cm . long and petiolales 4 mm . long glabrons. Flowers in short, axillary, rusty-pubescent panicles 3.5 cm . long, branches 1 cm . long, pedicels 3 mm . long; brwcts and bracteoles ovate, deciduous, rusty-pubescent. Calyx campanulate, densely rustytomentose, 4 mm . long, the 3 lower teeth narrow-ovate; rather longer than the two wider upper. Petale with claws as long as ealyx. Stamens 9, monadelphous. Ovary glabrous, stipitate; ovales usually 8. Poa glabrous, long stipitate, thinly coriaceons, ligulate, 1-2-seeded, 5-7 cm. long, 2 cm . wide, faintly reticulate opposite the compressed, reniform soed. D. rubiginosa Benth., F'lor. Hongkong. 93 (1861) non Rosb.

Cuma: Hongkong, Hance 1053!. Wifford! Wright 140! Ford! Seemann! Bodinier! Urquhart! Harland!
20. Dabbrrain Gardieriana Bonth., Jomm. Limm. Soc. iv. Suppl. $44^{2}$ (1860) ; Prain, Jourw. As. Soc. Beng. lxvi. 2. 444 (1897). D. congesta Bak. in Hook. f. Flor. Brit. Ind. ii. 282 (1876) partim, nec Benth.
S. Irdia: Nilgiris, Gumdner! Metz (Hohenacker 1591)! Wight 824! G. Thomson! Clarke 11129! Gamble 13176! 14501! Perrottel 469 !
21. Dabeergia bubigimosa Roxb. Ooromand. Pl. ii. 9, h. 115 (1728); Hort. Beng. 98 (1814) ; DO. Prodr. ii. 416 (1825) ; W. \& A. Prodr. i. 265 (1834) ; Bouch., Jowrn. Linn. Soc. iv. Suppl. 43 (eacl. ref. Ohina) (1860) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 232 (1876) ; Prain, Journ. As. Soc. Beng. Ixvi. 2. 443 (1897).
W. Indi4: Coycan, Stocke! Wight 823! 92t! Capara, Tulbot 70! 1182! 1867! 3594!
22. Dalbrrain congesta Grah. in Wall. Cat. 5872 (1832); IF. \& 4. Prodr. i. 265 (1834) ; Benth. in Journ. Lism. Soc. ir. Suppl. 48 (1860) ; Bak. in Hook. f. Elor. Brit. Ind. ii. 232 (eacl. syn. D. Gardneriana) (1876).
S. India: Coonoor, 6000 ft. Brandis! Gumble 11694! Prain! Uppre Burua : Chin Hills, Pràzer !
23. Dalberaia dersa Benth., Lond. Journ. Bot. ii. 217 (1843) ; Journ. Linn. Boc. iv. Swppl. 43 (1860); Flor. Austral. ii. 271 (1864).

Malay Archiprlago: Amboina, Teysmann 5120! Kej Islands, Ketoil at Tual, Becoari! New Guinea; without locality, Hinds! Island of Jobie, Barclay! Kaiser Wilhelmsland, Hollrung 84! 174! 477! Aubibalia: Queensland, vom Mueller! Bailoy! Possession Island, R. Brown! Prince of Wales Island, R. Brown! Torres Straits, Moseley! Albany Island, Hill !
24. Dalbrraia bumamica Prain, Journ. Ae. Soc. Beng. Ixivi. 2. 448 (1897).

Buema: Ruby Mines District, King's Oollectors! Chin Hills, O. $\boldsymbol{R}$. Duw 50!
25. Dalberata Jahsait Buevck Mes. in Herb. Bogor. A large shrabby climber with glabrous branches. Ireaves $5-8 \mathrm{~cm}$. long; leafiete 15-23, ovate-oblong, base faintly obliquely ouneate, apex rounded dightly emarginate, chartaceons, green above slightly glaucesoent boncath, fincly sparsely adpressed-pubescent on both surfaces, 3 om . loag, 1.85 cm . wide, rachis $8-10 \mathrm{~cm}$. long, and petiolules 4 mm . long glabrons. Flowers in congented axillary panicles 3 cm . long, 2 cm . wide, rachis and branohen puberulons, pedicels 3 mm . long, puberalous; bracts and 2 bracteoles nuder the calyx ovate, puberulous. Calyz campanu. lata, glabreacent, 4 mm . long, teeth short, triangnlar, obtuse. Corolla mite, 8 mm . long, claws of petale as long as calyx-tube, standard ovate, raflezed. Btamins 10, monadelphous, sheath slit along npper aide.

Ovary glapprous, long-stalked, style subulate; ovales 2. Pod narrowoblong, rather firmly coriaceous, with ronnded apiculate tip, distinctly stipitate, usunlly 2 -seeded, $5-6 \mathrm{~cm}$. long, 1.25 cm . wide.

Malaya: Key Islands, Warburg 20312! Key Toewal, Jaher ! Also cult. in Hort. Bogor, introduced from Key Toewal!

Moat nearly related to D. polyphylla and D. tamarindifolia but very distinct from both.
26. Dalbergia polyphylla Benth. Journ. Lizm. Soc. iv. Suppl. 44 exlouding the Bornean plant (1860). D. polyphylla Benth. Pl. Jungh. i. 256, in part ; the Philippine plant only (1854).

Philippines: Lazon, Ouming 1164! Vidal 2589!

[^7]28. Dalbergla malabarica Prain. A shrabby climber with densely rusty-pubescent young branches. Leaves $9-10 \mathrm{~cm}$. long; leaflets 21-31, thinly pubescent above, densely tomentose beneath, crowded, elliptic-oblong, hardly or not oblique at the base, 1.25 cm . long, 6-7 mm. wide, moderately firm ; rachis 8-9 cm. long densely pubescent, petiolules very short and lanceolate stipales densely rasty-pubescent. Flowers with the leaves, in congested, sessile, axillary corymbs 1.5 cm. long, 6 mm . wide; peduncles densely pubescent, pedicels glabrous; bracts triangular-ovate, persistent, and bracteoles 2 below calyx lanceolate, persistent, pubescent. Calyx campanulate, glabrous except on the margins of the teeth, 4 mm . long, teeth nearly as long as tube, the two upper connate obtuse, the others lanceolate acute. Corolla white, 8 mm . long, claws of petals as long as calyx-tube, standard ovate, entice, reflexed. Stamens 9, monadelphous. Ovary glabrons except along the upper suture, stipe distinct pubescent; style filiform ; ovnles 2. Pod qvate-oblong, very thinly coriaceous, glabrous, long stipitate, 8 cm .
long, 1.5 cm . wide, distinctly reticulately veined especially opposite the seed. D. tamarindifolia var. pubescens Bak. in Hook.f. Flor Brit. Ind. ii. 235 (1876).

Western India : Concan, Stocks! Canara, Talbot 408! 3665! Quilon, Wight! S. Tinuivelly, Beddome!

Though placed with D. tamarindifolia by Mr. Baker this is very distinot by its lesflets, which are hardly if at all oblique at the base, and by its different pods.
29. Dalbergia tamarindifolia Roxb. Hort. Beng. 53 (1814); Flor. Ind. iii. 233 (in part) (1832) ; Wall. Cat. 5870 (1832); Wight Icon. t. 242 (excl. fruit) (1840) ; Voigt, Hort. Suburb. Oalcutt. 241 (1845); Miq. Flor. Ind. But. i. 131 (l855) ; Benth. Jourı. Linı. Soc. iv. Suppl. 44 (1860) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 234(1876) ; Kurz, For. Flor. Brit. Burma i. 348 (1877) ; Prain, Journ. As. Soc. Beng. Ixvi. 2. 117 (1897). D. rafa Grah. in Wall. Oat. 5 64 (1832). D. multijuga Grah. in Wall. Cat. 5865 (1832); Zoll. et Mor. Verzeichn. 2 (1845). D. Blnmei Hassk. Cat. Hort. Bogor. 284 (1844) ; Pl. Jav. Rar. 400 (1848).

Himalaya: Nepal, Wallich! Sikkim, Hooker! Lister! Assam : Brahmapatra Valley, Watt! Simons! Peal! Jenkins! Mann! Olarke! Silhet, Gomez! Chittagong : Kodala, King's Oollector! Borma: Tenasserim, Wallich! Griffith! Helfer! Falconer! Andamans: S. Andaman, common; Barren lsland, Prain! China: Yunnan, Taping Valley, J. Anderson! Malaya: Langkawi, Ourtis! Perak, Scortechini! Wrıy! Kunstler! Penang, Wallich! Malacca, Maingay! Derry! Sumatra, Korthals! Forbes! Java, Horsfield! Ploem! Zollinger! Borneo, Korthals! Motley 262! Creagh! Haviland! Philippines: Lazon, Vidal 250!

The native name given for this by Hasskarl is Aroy Tjetjerehn or "climbing Tamarind." In Hort. Bogor at present this name connotes D. phyllanthoides BI., which is in cultivation there ander the name D. littoralis Hassk.

## 3. Sissos unguiculatæ Pseudoselenolobies.

30. Dalbergia candenatensis Prain. Cassia candenatensis Dennzt. Schl. zum Hort. Malabar. 12 (1818). Dalbergia torta Grah. in Wall. Cat. 5873 (1832); Prain, Journ. As. Soc. Beng. lxvi. 2. 120 (1897). D. monosperma Dalz. Hook. Journ. Bot. ii. 36 (1850); Miq. Flor. Ind. Bat. i. 132 (1855) ; Benth. Journ. Linn Soc. iv. Suppl. 48 (1860); Dalz. \&. Gibs. Bomb. Flor. 78 (1861) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 337 (1876) ; Talbot, Bombay List 75 (1894). Drepanocarpus monospermus Kurz, For. Flor. Brit. Burm. i. 337 (1877).-Karin Tagera Rheede, Hort. Malabar. vi. 25.
W. Indis: Concan, Stocks! Lave! Malabar, Rheede (Ic.)! Quilon, Wight 820! Cerlon: Pandure, 'Irincomali and Kodiyar, Thwaites! Trimen! Bengal: Sundribuns, Clarke 33423! Heinig! Andamans: J. II. 7.

Narcondam, Prain ! S. Andaman, very common, King's Collectors ! Burua : Amherst, Falconer! Kalian river, Martaban, Wallich! Mergui, Griffith 1799! Cochin-China : between Saigon and Cholen, Lefèvre 132! Annam, Haton, Godefroy 753 ! Tonkin, Balansa 1202! Malaya ; Langkawi, Curtis 2868 ! Penang, Wallich 5873! Curtis 220! Perak, coast, Scortechini 1099! Wray 2502! Malacca, atTanjong Kling, Ridley 3312 ! Singapore, Wallich! Kurz! I'. Anderson! Kunstler 66! Ridley 5576! Wichura 656! Sumatra; Indrapura, Korthals! Miller 1778! Biliton, at Blimbong, Teysmann! Borneo; Sarawak, Matong, Beccari 2526 ! Ignu, Beccari 3905! Bintulu, Haviland 2992! Celebes; S.-E. Peninsula, Lepo-Lepo near Kandari, Beccari! Moluccas; Amboina, Forster! Ceram Lant, Forster! Warburg 20311! New Guinea; Forbes! Philippines: Lazou, Batangos, Cuming 1542! Vidal 2605! Manila, Ouming 1541! China: Little Hongkong, Forl! Hongkong, Hance! Polynesta: Fiji, Seemann l28! Tonga Isds. at Vavau, Crootz 39 ! N. Caledonia, Pancher 44 ! Deplanche 336! Veillarl 2927! Australia: Cape York, Damel! Rockingham Bay, Dallachy! Port Darwin, Schultz 744!

Miquel reports the species also from Bangka; it is curious that it has never apparently been collected in the Sunda Archipelago or in Java. The only specimens from Java that $I$ have seen are from plants cultivated in the Buitenzorg Garden Hort. Bogor. nn. 854 ! 2692 !

Godefrey gives the Annamese name as "Cayme mak" and the Cambodian as "Baì tuk."
31. Dalbergia menoeides Prain, Journ. As. Soc. Beng. 1xvi. 2. 120 (1897) and 453 (1897).

Malaya : Perak, Scortechini 1392!
II. Dalbergaria Benth.
4. Dalbergarieæ.
32. Dalbbrgia glomeriplora Kurz, Journ. As. Soc. Beng. xlii. 2. 70 (1873) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 236 (1876); Kurz, For. Flor. Brit. Burma i. 345 (1877).

Burma : Prome, Kurs 2611!
35. Dalberaia cana Grah. in Wall. Cat. 5859 (1832); Kurz in Journ. As. Soc. Beny. xlii. 2. 70 (1873) Bak. in Hook. f. Flor Brit. Ind. ii. 237 (1876) ; Kurz, For. Flor. Brit. Burma i. 344 (1877) ; Prain, Journ. As. Soc. Beng. lxvi. 2. 450 (1897). D. parparea Wall. Cat. 5869 (1832) ; Benth. in Journ. Linn. Soc. iv. Suppl. 46 partly (1860); Bak. in Hook. f. Flor. Brit. Ind. ii. 235 partly (1876).

Burma: Tenasserim, Wallich 5859! 5869! Pegu, Brandis! Kure 1779! 2601
34. Dalbergia Kurzit Prain, Journ. As. Soc. Beng. lxvi. 2. 450 (1897). D. parparea Kurz, Journ, As. Soc. Beng. xlv. 2. 279 excl. cit.

Wall. Oat. 5869 (1875); For. Flor. Brit. Burma i. 344 (1877); not of Wall.

Bdrma : Pega, McOlelland 8! Brandis 1170! Kurz 1780! 1783 ! 2603 ! 2603 ! Kalay Hills, Prazer! Shan Hills, Alpin! Raby Mines Dist., King's Collector!
35. Dalbergia paniculata Roxb. Oor. Pl. ii. 8, t. 114 (1798) ; Hort. Beng. 53 (1814); DC. Prodr. ii. 417 (1825); Spreng. Syst. iii. 193 (1826) ; Rosb. Flor. Ind. iii. 227 (1832) ; Wall. Cat. 5848 partly (1832) ; W. \& 1. Prodr. i. 265 (1834); Grah., Cat. Bomb. Pl. 55 (1839); Benth., Jown. Linn. Soc. iv. Suppl. 45 (1860) ; Dulz. \& Gibs. Bomb. Flor. 78 (1861); Bedd. F'lor. Sylvat. t. 88 (1869) ; Brandis, For. F'lor. 151 (1874) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 236 (1876) ; 'I'albot, Bombay List 75 (1894); Prain, Journ. As. Soc. Beng. lxvi. 2. 449 (1897). D nigrescens Kurz, Pegu Rep. App. A 48 (1875) ; For. Flor. Brit. Burna i. 346 (1877).
S. India : Circars, Roxburgh! Mysore, Heyne! G. I'homsun! Columala, Wight! Cuddapah, Naidoo! Gamble 10867! Travanoore, Lawson! W. Isdia : Concan, Gibson! Stocks! Canara, 'Talbot! Burma : Pega, Eyre! Kurz 2618 ! Upper Burma, Grifith 1810! King's Oollectors! J. Anderson! Shan Hills, King's Collectors !
36. Dalbergia sericea G. Don, Gen. Syst. ii. 375 (1832). D. robusta Wall. Cat. 5849 A (1832); not of Roxb. D. hircina Wall. Oat. 5871 B (1832) ; Benth. Journ. Linn. Soc. iv. Suppl. 46 (1860) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 236 (1876) ; Gamble, Darjeeliny List 29 (1896) ; Prain, Journ. As. Soc. Beng. lxvi. 2.449 (1897); not of Ham. D. stenocarpa Kurz, Journ. As. Soc. Beng. xliv. 2. 205 (1875); Bak. in Hook. f. Flor. brit. Ind. ii. 238 (1876). D. emarginata Royle Mss. in Herb. Kevo; not of Roxb. D. assamica Benth. Journ. Linn. Soc. iv. Suppl. 45 in part (as to the Subsewalik locality only) (1860) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 235 partly (1876).

Himalaya: Garhwal, King! Duthie! Kamaon, Strachey \& Winterbottom 3! T. Thomson! Wallich! Royle! King! Duthie! MacKinnon! Nepal, Wallich! Hamilton! Sikkim, Gamble! Lister! Gammie! Olarke! Prain! Bootan, Grifith 1812! Gamble! Alipar Duars, Heawood!

Two names were indirectly made available for this very distinct species by Dr. Wallich. These are D. robusta Wall., given by that botanist nnder the mistaken belief that this was the same as Boxburgh's D. robusta which is a Derris, and D. hircina used under the mistaken impression that this is what Hamilton intended by $D_{0}$ hircina. Though aware that this also was a mistake, Mr. Bentham has chosen the latter as the preferable name. Fortunately, though this was not known to Mr. Bentham, there is another name, D. sericea G. Dou, which dates from the same jear and has the advantage of being accompanied by a description; it therefore supersedes both the others.

Mr. Baker has apparently seen an example of Wall. Cat. 5849 A whioh is e
D. lanceolaria Linn. f.; the writer has not seen one. In any case Wall. Cat. 5849 A at the Linnean Society's rooms (Wallich's type Herbarinm) is D. sericea.

Dalbergia hircina Ham., as written ap by Hamilton himself (in Herb. Brit. Museam), on two specimens collected at Darhora 12th Apl., 1811, and at Sukhyia 23rd Aug., 1809, is D. lanceolaria. The type of D. sericea G. Don, ns shown by a apecimen from Herb. Lambert named by G. Don himself, and now in the British Maseum collection, was also collected by Hamilton. On this Hamilton has noted "Dalbergia? A tree; Cheria ghant Hille 81-8-1802." It is this that has, in Wall. Cat. 6871 B, been erroneously written up by Wallich as D. hircina.
37. Dalbergia lanceolaria Linn.f. Suppl. 316 (1781) ; DC. Prodr. ii. 417 (1825) ; Benth., Journ. Linn. Soc. iv. Suppl. 45 (1860); Dals. \& Gibs., Bomb. Flor. 78 (1861); Brandis, For. Flor. 151 (1874) ; Bak. is Hook. f. Flor. Brit. Ind. ii. 235 (1876) ; Talbot, Bombay List 74 (1894). D. frondosa Roxb. Hort. Beng. 53 (1814) ; DC. Prodr. ii. 417 (1825); Roxb. Flor. Ind. iii. 226 (1832); Wall. Cat. 5855 (1832); W. \& A. Prodr. i. 266 mainly (1834); Grah., Pl. Bombay 55 (1839) ; Wight Icones t. 266 (1840) ; Voigt, Hort. Suburb. Calcutt. 241 (1845); Bedd., Flor. Sylvat. t. 88 (1869). D. zeylanica Roxb. Hort. Beng. 53 (1814); Flor. Ind. iii. 228 (1832); Wull. Oat. 5847 A (1832); Voigt, Hort. Suburb. Calcult. 241 (1845). D. arborea Heyne in Roth. Nov. Sp. 330 (1821); DO. Prodr. ii. 417 (1825). D. hircina Ham. in Wall. Oat. 5871 A (1832).
N. India: Hardwar, Humilton! King! T. Thomson! Darhorn, Hamilton! Sukhiya, Humilton! Rajputana, Abu, King! Ajmir, Jacquemont! Moir! Brandis! C. India; Jerdon! Chota Nagpar, Gamble! Haines! Campbell! Clarke! Wood! Prain! Behar, Hooker! Kurz! W. India : Concan, Stocks! Law! Canara, Talbot! Belganm, Ritchie ! S. India: Madras, Heyne! Roxburgh! Mysore, G. Thomson! Vellore, Gamble! Kurnool, Gamble! Tellicherry, Metz (Hohenacker 723)! Wight 927! Cottulam, Leschenault 191! Shevarois, Perrottet! Ceylon : Thwaites 1496 ! Colitivated at Bourbon, Richard!

Letter A of Wallich's Dalbergia robusta, reduced to this by Mr. Baker, is D. serices G. Don ( $=$ D. hircina Benth. and Bak. not of Ham.). Wight and Arnott have mainly $D$. lanceolaria nuder $D$. frondosa, but one of their quoted sheets, Wight n. 828, is $D$. paniculata. Leschenallt in Herb. Paris gives the native name of this as "Toda cotty moram."
38. Dalberain assamica Benth. Pl. Junghuhn. i. 255 (1854); Journ. Linn. Soc. iv. Suppl. 45 partly, the Assam locality only (1860); Bak. in Hook. f. Flor. Brit. Ind. ii. 235 partly, the Assam locality only (1876); Prain, Journ. As. Soc. Beng. 1xvi. 2. 449 (1897). D. lanceolaria Gamble, Darjeeling List 29 (1896) not of Linn.f.

Sikeim: Narchu Valley Prain! Prain's Collector! Assam : Brahmaputra Valley, Griffith K.D. 1803! Hooker \& Thomson! Masters ! Peal! Watt! Jenkins 54!

This is a fine tree, known in Assam as "Medeloa." The Subsiwalik speoimens collected by Edgeworth and included in this species by Bentham prove, on examination, to belong to D. sericea G. Don. ( = D. robusta Wall. not Rosb. - D. hircina Benth. not Ham.).
39. Dalbergia hopeana Hance, Journ. Bot. xx. 5 (1882); Forbes $\xi$ Hemsl., Journ. Linn. Soc. xxiii. 198 (1887).

Chins : Ichang; Walters! Henry 3670! 4558! 3112! 4932! Ningpo; Oldham! Cooper! Faber! Kwangtung; Sampson! Ford! Carles 556! Nant'o, Carles 287! E. Szechuen; Farges 1213! Yang-tze-kiang, Faber!

This Parges terms "Tan-mon-chou," the wood being "Tchan-Keou." Cooper says "Paitan" is the local, "white Chandan" the classical name. Henry, on" n. 8870 at Kew, calls it the Tín tree.
40. Dalbergia Wattil Olarke, Journ. Linn. Soc. xiv. 17, t. 5 (1889); Prain, Journ. As. Soc. Beng. Ixvi. 2. 451 (1897).

Manipur: Metaiphum, 5000 ft ., Watt 6830 ! Mayang, 3500 ft , Clarke 42034!
41. Dalbergia Oliveri Gamble ex Pruin in Journ. As. Soc. Beng. lvvi. 2. 451 (1897). D. paniculata Kurz, For. Flor. Brit. Burm. i. 345 (1877) not of Roxb. D. purpurea Bak. in Hook. f. Flor. Brit. Ind. ii. 235 partly and as to Pegı specimens only (1876) ; Prain, Journ. As. Soc. Beng. lxvi. 2. 449 (1897).

Burma : Pega, Kurz 1781! 2604! Wantho and Bhamo, J. W. Oliver! Collectors of Forest Dept.!

The recent receipt of fruiting specimens and oldish leaves of "Tamalan" (D. Oliveri Gamble) shows that this tree is the same as the "Tabou-ben" of Karz's Flors (D. paniculata Kurz, not of Roxb.) and farther settles finally a very troablesome question that had arisen regarding the incidence of the name D. purpurea.

In the Linnean Society's Herbarium (Wallich's type herbarinm) and in all the other herbaris seen by me D. purpurea Wall. is = D. cana Grah., except at Kew where there is mized with D. cana some D. volubilis. Bentham's D. purpurea, which is based on that material, is thus a mixture of $D$. cana and $D$. volubilis, while to these apecies Mr. Baker, in the F.B.I, has added a third in the shape of D. paniculata Kurz, non Roxb. The writer's D. purpursa, in this Journal (lxvi. 2. 449) rejeoted both D. purpurea Wall, and D. volubilis, and is restricted to Kars's plant, for whioh in any case therefore a new name would have had to be provided had this not already fortanately been done by Mr. Gamble.
42. Dalbergla Prazeri Prain, Journ. As. Soc. Beng. Ixvi. 2. 452 (1897).

Burma : Shan Hills at Koni, Prazer! Siam : Teysmann 52 !
Very closely related to D. Oliveri, "Tamalan" or "Tabon-ben" and to D. stipu. lacen "Donk-ta-loung-nway," having the pods of the former but in foliage more renambling the latter.
43. Dalbergia Hemsleyi Prain, Journ. As. Soc. Beng. Ixvi. 2. 450 (1897).

## Burma : Shan Hills, Collett! Prazer! King's Collector!

44. Dalbergin Balansis Prain. A tree 20-30 feet high. Leaves 13-18 cm. long, leaflets 13-15, ovate-oblong, obtuse or retuse, persistently puberulous beneath, chartaceous, finely reticulately veined, $3-4 \mathrm{~cm}$. long, 2 cm . wide, rachis $10-15 \mathrm{~cm}$. and petiolules 4 mm . long puberu. lous; stipules lanceolate. Flowers in lax axillary panicles $8-10 \mathrm{~cm}$. long, 5 cm . wide, with glabrescent peduncles and slender puberulous pedicels, bracts ovate-lanceolate and 2 lanceolate obtuse bracteoles under the calyx very caducous. Calyx campanulate, the upper teeth subconnate obtuse and lateral subacute half as long as tube, lowest lanceolate as long as tabe. Corolla white, standard orbicular 2-callose at base. Stamens in 2 phalanges of 5 each. Ovary densely pubescent; ovales usually 3. Pod long-stipitate, tapering to both ends, usually 1-, rarely $2-3$-seeded, coriaceous, reticulated opposite the seed, 8-12 cm. long, 3.5 cm . wide. Seeds subreniform, compressed. D. lanceolaria Hemsl., Journ. Linn. Soc. xxiii. 193 (1887) ; Drake del Castillo, Journ. de Bot. v. 214 (1891) not of Linn。f.

China : Kwangtung, Sampson! Ford! Kiu-Kiang, Sheaver! Millett! Tonkin : Mt. Bavi, Balansa 2289 !
45. Dalbergia volubilis Roxb. Cor. Pl. ii. 48, t. 191 (1798) ; Hort. Beng. 98 (1814) ; DC. Prodr. ii. 417 (1825) ; Spreng. Syst. iii, 193 (1826) ; Roxb. Flor. Ind. iii. 231 (1832); Wall. Cat. 5874 (1832); W. \& A. Prodr. i. 265 (183t) ; Grah., Oat. Bomb. Pl. 55 (1839) ; Benth. Journ. Linn. Soc. iv. Suppl. 46 (1860) ; Dalz. \& Gibs. Bumb. Flor. 78 (1861) ; Brandis, For. Flur. 152 (1874) ; Bak. iı Hook. f. Flor. Brit. Ind. ii. 235 (1876) ; Kurz, For. Flor. Brit. Burm. i. 346 (1877) ; Talbot, Bombay List 75 (1894) ; Prain, Journ. As. Soc. Beng. lxvi. 2. 114 (1897). D. confertiflora Benth., Journ. Linn. Soc. iv. Suppl. 41 partly, both the Oudh and the Concan plants (1860) not of Benth. in Pl. Junghuhn. ; Bak. in Hook. f. Flor. Brit. Ind. ii. 233 partly (1876) ; Talbot, Bombay List 75 (1894). D. foliacea Wall. Cat. 5856 partly (1832). D. purpurea Benth., Journ. Linn. Soc. iv. Suppl. 46 partly (1860); Bak. in Flor. Brit. Ind. ii. 235 partly (1876) not of Wallich. D. stipulaces Gamble, Darjeeling List 29 partly (1896) not of Roxb.
N. India: Oudh, Wallich! Duthie! W. Duars, Gamble 6683 ! Terai, Anderson! Clarke! Kamaon Bhabar, 1000 ft., Strachey and Winterbottom 2! Behar, Kurz! Campbell! Ball! Chota Nagpur, T. Anderson! Thomson! Wood! Clarke! C. India : Sagor, Jerdon! C. Provinces, Duthie! W. Indis: N. Canara, I'albot! Concan, Stocks! Malabar, Stocks! S. Canara, Metz (Hohenacker 561)! S. IndiA : Circars,

Bosburgh! Bolimpati, Wight! Travancore, Lawson! Kurnool, Gamble ! Ganjam, Gamble! Assax : Goalpara, Clarke! Garo Hills, Watt! Chittagong : Thanacheri, etc. Hooker \& Thomson! Gamble! Lister! King's Collector! Bubya: Chin Hills, Prazer! King's Collector! Kachin Hills, Prain's Collector! Bhamo, J. Anderson! Shway Yoe, J. Anderson! Pegn, Brandis! Kurz! Shan Hills, Collett! Prazer ! King's Collectors! Tenasserim, Wallich 5856 B! Cleghorn! Gallatly! Helfer 1805! Andamans : S. Andaman, very common, King's Collectors!
46. Dalbergia ferruginea Roxb. Hort. Beng. 98 (1814); Flor. Ind. iii. 223 (1832) ; Miq. Flor. Ind. Bat. i. 1. 133 (1855). D. luzonensis Fog. Nov. Act. Nat. Cur. xix. Suppl. i. 33 (1843) ; Benth, Journ. Linn. Soc. iv. Suppl. 48 (1860). D. pendulifiora Blume ex Miq. loc. cit. (1855). D. stipulacea Benth. loc. cit., partly (1860) not of Rnxb.

Malaya : Brit. N. Borneo, Bangi island at Pankalan, Fraser 274! Molnccas, at Tidore, Christian Smith! Teysmann 5186! Buru, Buitenzorg Oollectors! Ceram, Teysmann 5043! Foerster! Ceram Laut, Warburg 20309! New Goinea; Dutch N. G. at Sigar, near the coast, Wurburg 20313 ! Andai, Beccari 554!693! Philippines : Manilla, Meyen! Sawar, F. Jagor 915 ! Lazon, Vidal 2598! Panay, Vidal 2606 !
47. Dalbergia stipulacea Roxb., Hurt. Beng. 53 (1814); Flor. Ind. iii. 233 (1832) ; Wight, Icones t. 453 (1840); Voigt, Hort. Suburb. Caloutt. 241 (1845); Miq. Flor. Ind. Bat. i. 1. 133 (1855) ; Benth., Journ. Linn. Soc. iv. Suppl. 47 (1860); Bak. in Hook. f. Flor. Brit. Ind. ii. 237 excluding the syns. D. ferruginea and D. rostrata (1876) ; Kurz, For. Flcr. Brit. Burm. i. 346 (1877); Gamble, Darjeeling List 29 (1896); Prain, Journ. As. Soc. Beng. lxpi. 2. 451 (1897). D. tingeus Ham. in Wall. Cat. 5860 (1832). D. cassioides Wall. Cat. 5863 (1832). D. livida Grah. in Wall. Gat. 5866 (1832).

Eastern Himalaya: Sikkim, lower Hills aud Terai, Hooker ! Kurz! Anderson! Clarke! Gamble! King! Prain! Bootan and Dnars, Gamble! Lister! Haines! Assam: Brahmaputra Valley, Hamilton! Jenkins! Simons! Olarke! Mann! Fisher! Peal ! Naga Hills, King's Collector! Watt! Prazer! Prain's Collector! Garo Hills, Clarke! Khasia Hills; Hooker \& Thomson! Clarke! Manipur, Watt! Silhet, deSilca! Clarke ! Chittagong: Kodala, King's Collector! Borma: Kachin Hills, Prain's Collector! Hukung, Griffith! Chin Hills, Prazer! Kalay Hills, Prazer! Shan Hills, King's Collector! Pegu, McClelland! Kurz! Brandis! Tenasserim, Wallich! Gomez! Brandis! Helfer! Gallatly! Cleghorn! Falconer!

This species does not, as Mr. Baker supposes, extend to Malaya. The reason for the belief was the tentative reduction to this speoies by Mr. Bentham of the very different D. ferruginea Roxb., which was based on Molnccan specimens. D. rostrata Grah., also reduced here, is the very different specien desoribed by Thwaites as
D. Ohampionii and previously desoribed by Miquel as D. pseudo-Sissoo and also as D. Sissoo.
III. Triptolemea Benth.
5. Triptolemeæ veræ.
48. Dalbergia conpertiflora Benth., Pl. Junghuhn. i. 255 (1854); Journ. Linn. Soc. iv. Suppl. 41 (1860) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 233 (1876) ; Prain, Journ. As. Soc. Beng. lxvi. 2. 114 (1897). D. paniculata Wall. Cat. 5848 partly (1832); letters E.G.I. D. rubiginosa Kurz, For. F'lor. Brit. Burma i. 347 (1877) not of Roxb.

Eastern Himalata: Daphla Hills, Lister! Assam : Khasia Hills, Simons! Silhet, Wallich! Chittagong: at Kasalong, Lister! Olarke 19744! Thandacheri, King’s Collector! Burma : Pega, Kurz! Andamans : S. Andaman, very common, E. H. Man! King's Collectors!

The Western India locality cited for this species by Bentham and Baker is erroneons; all the specimens from the Concan so named by them are D. volubilis.
49. Dalbergia Collbttif Prain, Journ. As. Soc. Beng. Ixvi. 2. 445 (1897).

Borma: Shan Hills, Oollett 591! 723!
The writer has erroneonsly described this as a tree ; it is a large climber.
50. Dalbergia mimosoides Franch. Pl. Delavayanee 187 (1890). D. Milletti Prain, Journ. As. Soc. Beng. lxvi. 2. 446 (1897) hardly of Benth. D. tamarindifolia Roxb. Flor. Ind. iii. 223 in part (1832); Wight, Ioon. t. 242 as to fruit only (1840).

Khasia Hills; at 1-2000 ft. elev., Mann! Shampung, 4000 feet, Collett! Sohra, 4500 feet, Gallatly! Clarke 18845! Maoksandram, 4000 feet, Clarke 42875 ! China : Yunnan, in woods above Tapintze, Delavay 1982! Szechuen, near Tatchieuln, 9000 feet, Pratt 275.

This is very near D. Milletti from Hongkong and was in 1897 referred to that species by the writer. An opportunity, most obliging furnished by MM. Bureau and Franchet, of examining the type of M. Franchet's D. mimosoides shows that the Khasia plant is exactly the same as the Yannan and Ssechuen one and that the latter is probably best treated as specifically distinct from D. Milletti.

It may be mentioned in passing that Dalbergia Delavayi Franch., also kindly lent for stady, does not belong to this genas but is a Cladrastis, C. Delavayi, hardly different from C. sinensis Hemsl.
51. Dalbergia stenophylla Prain. A climber with lenticelled glabrous branches. Leares $6-8 \mathrm{~cm}$. long; leaflets $30-35$, small, linearoblong, obtuse, glabrous above, finely sparingly adpressed-puberulous beneath, rather close-set, 1 cm . long, 3 mm . wide, rachis $5 \cdot 5-7 \mathrm{~cm}$. long and very short petiolules glabrous. Flowers small, secund, in axillary panicled cymes $3-5 \mathrm{~cm}$. long, $1 \cdot 5-4 \mathrm{~cm}$. wide, peduncle, branches and short pedicels finely puberulous, bracts and 2 bracteoles at base of calyx
embracing lower third of tabe ovate, persistent, small. Oalyx 2.5 mm . long, campanulate, teeth short, obtuse, one-third as long as tube except the lower acate two-thirds the length of tube. Corolla white, 5 mm . long, claws of petals short. Stamens 9, monadelphous. Ovary stipitate, glabrous; ovules 3. Pod thinly coriaceons, narrowly oblong or ligulate, rarely ovate-ncate; 2 - or 1 -seeded, $2-3 \mathrm{~cm}$. long if one-seeded, 5 cm . long if 2 -seeded; 1 cm . wide; rather distinctly reticulated throughout, not indurated opposite the seed.

Cbina: Hapeh, Henry 1355! 1950! 3852! 4135! 6188! Szechuen, Ky-min-se near Tchan-Keou, Farges 1075!


#### Abstract

M. Farges gives the Chinene name of this as Kang-kin-ten. It is very nearly related to both D. Milletti and D. mimosoides but has narrower leaflets and much narrower pods than either.


52. Dalbergia Milletti Benth., Jourm. Lirzn. Soc. iv. Suppl. 34 (1860) ; Flor. Hongkong 92 (1861). D. polyphylla Benth., Pl. Jungh. i. 256 in part (1854); Seem. Bot. Her. 375 (1855). Derris pinnata Lour. Flor. Cochin-Chin. 432 (1793) possibly.

China : Hongkong, Hance 1809! Wilford! Ford! Champion! Hupel, Henry 3095! 6286! Yunnan, at Mengtze, 5000 feet, Henry 9975 !
53. Dalbergia Hancei Benth. in Journ. Linn. Soc. iv. Suppl. 54 (1860); Flor. Hongkong 93 (1861).

China: Hongkong, Hance 1816! Ford! Wilford! Weiss! Macao; Culléry in Herb. Gaudichand, voy. Bonité! Near Canton, Park 35 !
54. Dalbergia Thomsoni Benth. in Journ. Linn. Soc. iv. Suppl. 33 (1860) ; Bak. in Hook.f. Flor. Brit. Ind. ii. 236 (1876).

Assam : Patkoye Mts., Griffith 1799/1 K.D.! Khasia, Hooker \&. Thomson! Clarke!

This apecies is not a Dalbergaria, bat a Triptolemea.
55. Dalbergia Scortrchinii Prain, Journ. As. Soc. Beng. Ixvi. 2. 444 (1897). A shrubby climber 15-30 feet long with twining glabrons branches here and there twisted and thickened into spiral hooks. Leares $15-20 \mathrm{~cm}$. long, leaflets $11-15$, elliptic, closely puberulous beneath, glabrous except midrib above, $1 \cdot 5-4 \mathrm{~cm}$. (rarely in young shoots 6 cm .) long, 1-2 (rarely 2.5 ) cm . wide, rachis $8-10 \mathrm{~cm}$. long and petiolules 4 mm . long densely paberulous. Flowers minute, secund, in an ample terminal and in smaller axillary paniculate cymes 5 cm . wide and as long as the leaves; peduncles, branches and pedicels pubescent; bracts caducous; bracteoles persistent one at base of short pedicels lanceolate acuminate and two at base of calyx ovate obtuse embracing lower third of calyx-tube. Oalyx 2.5 mm . long, campanulate, teeth short, obtuse, one-third as long as tube, except the acute lowest half as long as tube.
J. II. 8

Jorolla white, 4 mm . long, claws of petals short. Stamens 9, sub-3-adelphous, the central obvexillary stamen being separated almost or quite to the base from the lateral groups of 4 ench. Ovary pubescent, shortly stipitate; style short; ovules usually 3-4, sometimes only 2, rarely more than 4. Pod coriaceous, narrowed at both ends, $4-5 \mathrm{~cm}$. long, 1.25 cm . wide, 1-3-seeded. D. Junghuhnii var. Scortechinii Prain, Journ. As. Soc. Beng. lxvi. 2. 115 (1897).

Malaya: Penang; Ayer Etam, Curtis 1437! Malacca; Bijong, Scortechini 1830! Maingay 549 (Herb. Propr. 1554)! Singapore; Bukit Timah, Ridley 6406! Bangka; Teysmann! Java; Djampong, Teysmanus 1418! Borneo ; Sarawak, Beccari 2887! Haviland 2893 !
56. Dalbergia Curtisil Prain. A scandeut shrub with puberulous branches. Leaves $15-18 \mathrm{~cm}$. long; leaflets usually 7-9, oblong or elliptio, rounded obtuse and faintly emarginate at apex, cuneate rarely rounded at base, glabrous above, rather closely puberulous except on the midrib beneath, 3-5 cm. long, 2.5 cm . wide ; rachis I]-12 cm. long and petiolules 4 mm . long paberulous. Flovers minate, secund, in large axillary panicles exceeding the leaves, peduncles branches and pedicels pubescent; bracteoles persistent, one at base of pedicel lanceolate, 2 at base of calyx ovate obtuse embracing the lower third of calyx-tube. Calyx 2.5 mm . long, campanulate, teeth short obtuse onethird as long as tabe. Corolla white, 4 mm . long, claws of petals short. Stamens 9, monadelphons. Ovary pubescent; ovales 2-3. Pod thin, membranous, not seen ripe. D. discolor Miq. Flor. Ind. Bat. Suppl. 296 (1860) nec Bl. D. Junghulnnii Bak. in Flor. Brit. Ind. ii. 233 (1876) partly; Prain, Journ. As. Soc. Beng. lxvi. 2. 115 (1897) partly, not of Benth.

Malaya: Penang, 500 ft ., Curtis! Malacca, Maingay! Sumatra; Lampongs, Teysmann!

This species is nearest to D. stercoracea Maingay, but in a note by Maingay himself it is remarked that, while this is the case, the two are very distinct. This has no trace of the foetid odour characteristio of D. stercoracea. The two apeoies have been confused by Mr. Baker and myself with each other and also with D. Junghuhnii. Miquel, whose specimens I have seen, has named this D. discolor ; it is, however, very anlike the Bornean species so named by Blume, and previoasly described by Miquel himself ander Blame's name.
57. Dalbergia stercoracea Maing. Mss. in Herb. Kew. D. Junghuhnii Bak. in Hook. f. Flor. Brit. Ind. ii. 233 in part (1876) ; Prain, Journ. As. Soc. Beng. Ixvi. 2. 115 var. typica in part (1897), not of Benth. D. frondosa Miq. Flor. Ind. Bat. i. 133 (var. typica only and exclud. all synonyms), (1855), not of Romb.

Malaya: Malacca, Maingay! Mueller! Derry! Singapore, Hullett! Ridley! Sumatra, Korthals!

This has been confounded with D. Junghuhnii Benth. by Mr. Baker and the writer. The fewer differently-shaped leaflets and the stercoraceons odour of the flowers amply distinguish it. Miquel, whose Sumatra specimens of "D. frondosa" have been seen by the writer, has named it as above. Both D. sennoides Bl. and D. phyllanthoides BI. linve been incladed here by Miquel bat authentic examples of theee, named by Blume, have been seen by the writer nnd their true place is indicated noder the latter species.
58. Dalbergia melanoxylon Guill. \& Perr. Flor. Seneg. Tent. 227, t. 33 (1834) ; Benth., Juurn. Liun. Soc. iv. Suppl. 47 (1860). D. Stocksii Benth., Journ. Linn. Soc. iv. Suppl. 42 (1860); Bak. in Hook. f. Flor. Brit. Ind. ii. 234 (1876).

Western India : Concan,Stocks! Canara, Talbot!also at Poona, cult. Woodrow ! Madras, cult. Wight's Collector! Calcutta, cult. Thomson! Anderson! King! etc. Distrib.-Africa, from Senegal to Abyssinia and Mozambique.

The examination of Stocks' specimens, and of some exactly like them from Canara in Mrr. Talbot's herbarium, makes it certain that the plant termed D. Stocksii by Bentham is the African D. melanosylon, as represented by many specimens in the Herbaria of Kew, the British Masenm, Mr. de Candolle and Calcutta. The same species has been in oultivation at Calcatta at lenst since 1858, that being the earliest date on our herbarinm specimens collected in the Gardens. At Madras it appears to have been in caltivation about as long. There is nothing about Stocks' specimens to indicute whether that botanist considered the tree indigenoas or introduced, bat the note by Mr. Talbot that the plant is known in Western India as "Chinese Blackwood," as opposed to D. latifolia or " Bombay Blackwood," points to a foreign origin.
59. Dalbergia multiflora Heyne ex Wall. in Cat. sub. n. 5848 (1832). Dalbergin sympathetica Nimmo in Grah. Oat. Bomb. Pl. 55 (1839) ; Voigt, Hort. Suburb. Calcutt. 241 (1845) ; Benth., Pl. Jungh. 255 (1854) ; Journ. Linn. Soc. iv. Suppl. 42 (1860); Dalz. \& Gibs., Bomb. Flor. 78 (1861) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 234 (1876) ; Talbot, Bomb. List 75 (1894). D. frondosa Wall. Cat. 5855 partly (1832); W. \&- A. Prodr. 266 partly (1834), not of Roxb. D. paniculata Wull. Oat. 5848 partly (1832), not of Roxb.—Anamullu Rheede, Hort. Malabar. viii. 40.

Western India : Concan, Stocks! Kuntze! Canara, Talbot! Mysore, Heyue! Wight! Travancore, Lawson 205!
var. glabrescens Prain; leaflets glabrous above, glabrescent or sparingly pubescent beneath.

Southern India: Carnatic, Wight 819 K.D.! G. Thomson / Courtallam, Wight 267! Travancore, Lawson 218!

In 1897 the writer pointed out in this Journal (vol. lxvi. pt. 2, p. 446) that Wallich's n. 5848 B (from Herb. Heyne) is this species and not, as Wallich erroneously supposed, D. paniculata. Working subsequently through the British Masenm
collection the writer disoovered a note on a sheet of D. sympathetica Nimmo, from Herb. Wight in Herb. Shattleworth, in Mr. Bentham's handwriting, which shows that that learned botanist had already made this discovery. The note is as follows :"This is a distinct speoies for which Heyne's name D. multifora may be retained "unless it turns ont be one of Roxburgh's. I have it in flower from Arnott who, in " his Prodromus, appears to have confounded it with D. frondosa. He had it not then " in flower."

This being the Amerimnum horridum of Dennstedt [Schlüs. Hort. Malabar. 34 (1818)] it ought perhaps to receive the name Dalbergia horrida; the objection to using this name is the existence of a synonym $D$. horrida Grah. which is the equivalent of D. spinosa Roxb.
60. Dalbergia phyllanthoides Blume ex Miq. in Flor. Ind. Bat. i. 1. 134 (1855).
var. typica; leaflets membranous. D. frondosa Miq. var. $\beta$. Flor. Ind. Bat. i. 1. 134 (1855). D. polyphylla Benth. Mss. inz Herb. Kew (Journ. Linn. Soc. iv. Suppl. 34 partly) not of Pl. Junghuhn.

Malaya: Java, Blume! Nagel 387! Borneo, Barber! Motley 32 !
var. sennoides Prain; leaflets firmer, larger. D. sennoides Bl. ex Miq. Flor. Ind. Bat. i. 1. 134 (1855). D. Janghahnii Benth., Journ. Linn. Soc. iv. Suppl. 33 in part (Malacca plant only) (1860) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 233 partly (1876), not of Benth. in Pl. Junghuhn. D. subsympathetica Prain, Journ. As. Soc. Beng. lxvi. 2. 116 (1897). D. littoralis Hassk. Mss. in Herb. Hort. Bog.

Malaya: Perak, Scortechini 201! 1071! Wray 2086! 3205! Kunstler 2354! 3562! 4978! 5182! Penang, Curtis 1492! Malacca, Griffith! Goodenough! Jagor! Maingay! Java, cult. in Hort. Bogor.

The opportanity of examining aathentic examples of Blame's and Miquel's specimens in the Leiden Herbariam, kindly afforded by the late Prof. Suringar, has permitted a settlement of the confusion in synonymy connected with this species, the validity of which the writer had already established in 1897.

6]. Dalbergia Jongeuhnir Benth., Pl. Jungh. i. 254 (1854); Miq. F'lor. Ind. Bat. i. 1. 129 (1855); Benth., Journ. Linn. Soc. iv. Suppl. 33, in part and as regards the Sumatra locality only (1860).

Malapa : Sumatra, at 3000 ft. elev., Junghuhn. 233 ! Java, de Vriese!
62. Dalbergia coromandeliana Prain. An erect glabrous shrub, the ultimate branches distichous, horizontal, rigid, spinous. Leaves fasciculate, $3-4 \mathrm{~cm}$. long, leaflets 7-9, elliptic or cuneate-oblong, retuse, $6-9 \mathrm{~mm}$. long, 3-5 mm. wide, glabrous even when young on both surfaces, rachis $2.5-3.5 \mathrm{~cm}$. long, puberulous when young, soon glabrous; petiolales 1 mm . long, glabrous. Flowers minute, secund, in small recurved fascicled cymes, rachis puberulons, $1-1.5 \mathrm{~cm}$. long, pedicels 3 mm . long, glabrous; bracteoles caducous, one at base of pedicel lanceolate, 2 at base of calyx ovate, subacute, embracing lower third of calyx-tubc. Calyx 2.5 mm .
long, campanulate, teeth short, obtuse, one-third as long as tube. Corolla white, 4 mm . long, claws of petals short. Stamens $9-10$, monadelphous, diadelphous, or 3 -adelphous the obvexillary stamen being free. Ovary glabrescent; ovules 3-4. Pod thinls coriaceous, distinctly wide-reticulate throughont, quite glabrous, narrow-ovate, 3.5 cm . long, 1.5 cm . wide, distinctly stipitate and cuneate at base, subacute at apex, l-seeded. D. spinosa W. \& A. Prodr. i. 266 (1834), not of Roxb.

Southern India : exact locality not stated, Wight 798 ( $821 \mathrm{~K} . \mathrm{D}$. ) flower! Shevaghiri Hills, Wight 822 K.D. fruit!

Though much like $D$. spinosa in general appearance this is very distinct even as regards leayes and flowers, and is wholly distinct as regards fruit. Its nearest ally is in reality $D$. multiflora, but the much smaller oymes with much longer pedicels, and the much smaller quite glabrous pod amply distingaish it. The leaflets too are much smaller and fewer than in $D$. sympathetica so that it is easily distinguished, even by its foliage, from D. sympathetica VAR. glabrescens where, as in this, the leaflets may be glabrons. The spines of this plant are straight as in D. spinosa. The stamens, as in the case of D. melanosylon, may be variously monadelphons, diadelphous or 3-adelphons.
63. Dalbergia discolor Bl., Miq. Flor. Ind. Bat. i. 1. 130 (1855); Penlh. in Journ. Linn. Soc. iv. Suppl. 41 (1860).

Malaya: Borneo, southern coasts, Korthals! Celebes, Teysmann 12539 !

This species has been tentatively placed by Bentham near D. foliacea; it is most nearly related to $D$. rimosa.
64. Dalbergia bimosa Roxb. Hort. Beng. 53 (1814); DO. Prodr. ii. 417 (1825); Roxb. Flor. Ind. iii. 233 (1832); Wall. Cat. 5853 (1832) ; Wight Ic. t. 262 (1840); Voigt, Hort. Suburb. Calcutt. 241 (1845) ; Benth., Journ. Linn. Soc. iv. Suppl. 32 (1860) ; Brandis, For. Flor. 148 (1874) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 232 (1876). D. foliacea Wall. (pro parte) Cat. 5856 B; Gamble, Darjeeling List, 29 (1896), nec Wall. Dalbergia sp. Drake del Castillo, Journ. de Bot. v. 215 (1891).

Sikim : Lower Hills, Terai and Duars; Hooker ! King! Gamble! Gammie! Haines! Assam : Brahmaputra Valley; Jenkins! Simons! Mann! King's Oollectors! Masters! Peal! Silhet; Wallich! Clarke! Cachar; Prazer! Khasia; Griffith 1801! Hooker \& I'homson! Clarke! Mann! Gallatly! Nagn Hills; Olarke! Watt! Burma : Kachin Hills, Prain's Oollectors! Tonkin : Black river, Balansu 2293!

The Tonkin specimens have the leaflets glabrous beneath and the venation slightly different from that in the leaves of typical D. rimosa.
65. Dalbergia Forbeisil Prain. A moderately large climbing shrubs with glabrous branches. Leaves $13-18 \mathrm{~cm}$. long, leaflets usually 5 , ovate-acuminate, base rounded, thinly coriaceous, closely finely reticu-
late, glabrous on both suifaces the terminal exceeding the others, 4-9 cm. long, 2-4 cm. wide, rachis $6.5-9 \mathrm{~cm}$. long and petiolules 5 mm . lung glabrous. Flowers numerons small, secund, in dichotomous cymes disposed in terminal corymbose wide panicles extending into the axils of the apper leaves, $12-15 \mathrm{~cm}$. long, $8-10 \mathrm{~cm}$. wide, shortly pedicelled, 2-bracteolate below the calyx, bracteoles persistent. Oalyx campanulate, 5-toothed, teeth all obtuse, subequal, rather shorter than the tube. Corolla white, the petals rather distinctly clawed; standard orbicular, subauriculate, slightly emargiuate. Stamens 9 , in a sheath slit along the back; sometimes a free vexillary stamen present. Ovary glabrous, shortly stipitate, style short; ovale solitary. Pod distinctly stipitate, coriaceous, oblong, glabrous, veined opposite the seed, 4-6 cm. long, 2 cm. wide, 1 -seeded. Seed reniform, much compressed. D. parviflora Prain, Journ. As. Soc. Beng. lxvi. 2. 121 (1897) in part, not of Roxb.

Malaya : Lingga, Teysmann! Bigni Telok, 3500 feet, Forbes 3216 ! Warburg n. 20310, in Herb. Berol., leaf-specimens from the Ara Islands, appears the same.

This the writer in 1897 sapposed to be a form of D. parvifora, bat the opportunity of examining its fraits, afforded by the kindness of Dr. Treab, who lent the Herbarium material of Dalbergia from Baitenzorg, shows that this is a very distinct species.
66. Dalbergia Albertisil Prain. A climbing shrub; young branches terete. Leaves $18-20 \mathrm{~cm}$. long ; leaflets $8-9$, lateral distinctly alternate, very dark-green and quite glabrous on both surfaces, firmly. coriaceous, midrib impressed above, prominent beneath, secondary nerves faint especially above, rather numerous, ovate-acute with rounded base, terminal rather the largest, 7 cm. long, 3.25 cm . wide; rachis $14-16 \mathrm{~cm}$. long, and petiolules 3 mm . long glabrous. Filowers minute, secund, in ample terminal thyrsoid panicles, with sparsely puberulous, zigzag rachis 12 cm . long, giving off at each angle stoutish, horizontal branches 2.5 cm . long, breaking at their tips into 2 or more reflexed cyme-branches; bracts and bracteoles minute, deciduous. Calyx 1.5 mm ., teeth short obtuse. Corolla and stamens not seen. Pod thin, membranous, green, suborbicular apiculate and l-seeded, rarely oblong and 2 -seeded, slightly cuneate at the base, $2 \cdot 5-4 \mathrm{~cm}$. long, 2 cm . wide, 2 mm . thick, finely puberulous, rather distinctly wide-reticulate throughout, with a short but distinct stipe 4 mm . long.

New Guinea: Fly River, D'Albertis !
A very distinct species with the inflorescence of the groap to which $D$. multifora and D. Junghuhnii belong, bat differing in the bracteoles not being persistent and still more in foliage. Its nearest ally is $D$. Forbesii from Sumatra, a species with much thinner leaves.
6. Triptolemess Pseudoselenolobiess.
67. Dalbergia parviflora Roxb. Hort. Beng. 98 (1814); Flor. Ind. iii. 225 (1832); Miq. Flor. Ind. Bat. i. 1. 132 (1855); Benth., Journ. Liın. Soc. iv. Suppl. 33 (1860); Prain, Journ. As. Soc. Beng. lxvi 2. 121, excl. syn. D. Cumingiana Benth. (1897). D. Zollingeriana Miq. Flor. Ind. Bat. i. 1. 130 (1855). D. Cumingii var. Zollingeriana Benth., Journ. Linn. Soc. iv. Suppl. 32 (1860). D. corymbifera Bl. ex. Miq. l.c. (1855). Drepanocarpus Camingii Kurz, For. Flor. Brit. Burma i. 136 (1877).

Burma: Tenasserim, Helfor 1808! Malaya: Dindings, Curfis! Pahang, Ridley! Perak, Wray 2525! Kunstler 1423! 5937! 6151! Sumntia, Zollinger 3041! Teysmann 4440! Java, Blume (type of D. corymbifera)! Teysmann! Borneo; Sarawak, at Biniulu, Beccari 3601! at Sungei Mahan, Becrari 3585! at Santubong, Beccari 2149! Celebes, Zollinger (type of D. Zollingeriana Miq.)! Halmaheira, Teysmann 5668! Moluccas; Amboina, O. Smith!

Possibly this is cultivated in Tenasserim. The original;ticket of Helfer's $n$. 1808 shows that it came from Tenasserim not the Andamans; it was fonnd at the 3rd Camp from Tennsserim in olearings in a native garden.

This yields the Kayoe Lakka of commerce. Beccari describes it as a sping climbing shrab, the spines woody and branched. Its Malay name is Acor Berangan. Old stems stripped of alburnam and dead are reddish (rosso-ciliegio) and are termed Cajn Lacca-nsed by the Chinese in their ceremonies with other odoriferons woods. The opportunity of examining good specimens of Caming's n 1244 in Herb De Candolle and of stadying the fine saite of specimens of D. Cumingiana in Herb. Kew has enabled the writer to see that the two species, though united by Mr. Bentham, are very distinct.
68. Dalbergia Cumingiana Benth., Pl. Junghuhrı. 255 (1854); Miq. Flor. Ind. Bat. i. 1. 129 (1855). D. Cumingii Benth., Journ. Liun. Soc. iv. Suppl. 32, excl. var. Zollingeriana (1860).

Philippings: Luzon, Cuming 1244! Vidal 735! Pili, Vidal 1255! Catarman, Isd. of Samar, Vidal 255 !
69. Dalbergia Goderfoy Prain. A woody climber, branchlets subdistichons, recurved, puberuleis. Leaves $7-8 \mathrm{~cm}$. long, leaflets 6-9, wide ovate, firmly papery, finely puberulous on both surfaces, base rounded, apex rounded or slightly emarginate, $1 \cdot 5-3 \mathrm{~cm}$. long, 1-1.75 cm . wide, rachis $4-5 \mathrm{~cm}$. long and petiolules 2.5 mm . long puberulous. Flowers in axillary, subsimple racemes forming terminal, leafy panicles, rachis puberulous. Oalyx campanulate, in frait glabrescent or puberulous, pedicels 2.5 mm . long, teeth subequal, obtuse, shorter than tube except the lowest lanceolate about as long as tube. Petals and stamens not seen. Pod obliquely subreniform, thinly woody, 2 cm . long, $1 \cdot 25 \mathrm{~cm}$. wide, 4 mm . thick, finely closely velvety externally, with a flattened
stipe $\cdot 5-1 \cdot 25 \mathrm{~cm}$. long, also velvety, and ovaligerous in its npper part. Seed compressed, reniform, 8 mm . long, 4 mm . wide.

Siam : South-west of the Great Lake, Gudefroy 288 !
A very distinct species, evidently belonging to the same gronp an D. Cumingiana and D. parcifiora, but well-marked by its closely finely velvety pods.
70. Dalbergia Beccarii Prain. A climbing shrab with slender, terete, densely finely pubescent branches. Leaves sub-2-farious, $3-4 \mathrm{~cm}$. long, leaflets 11-19, oblong, slightly emarginate at the apex, dark-green above rather paler beneath, finely pubescent on both surfaces, 8 mm . long, 4 mm . wide; rachis 3.5 cm . long and very short petiolules pubescent; stipules lanceolate, 2 mm . long. Flowers very minate, secund, in small cymes in the lower leaf-axils, under 1 cm . wide; rachis and pedicels puberulous; bracts and bracteoles deciduous, very minute. Culyx 1.5 mm . long, campanulate, teeth short, obtuse, one-third as long as tube except the lower acute three-fourths the length of the tube. Corolla not seen. Stamens monadelphons. Ovary glabrons. Pod firm, thickish, pale-brown, corinceous, glabrous, l-seeded, irregularly ovate, apiculate, 1.25 cm . long, 8 mm . wide, 2.5 mm . thick, with a short but distinct stipe 2.5 mm . long. Ormocarpum scandens Teysm. Mss. in Herb. Beccari.

Borneo : Sarawak, Kucling, Beccari 566! 1105! Kapuas, Teysmann 8254!
71. Datbergia bpinosa Roxb. Hort. Beng. 98 (1814); Flor. Ind. iii. 226 (1832) ; Voigt, Hort. Suburb. Calcutt. 241 (1845) ; Benth., Journ. Linn. Soc. iv. Suppl. 49 excludirg citation Wight 798 (1860); Bak. in Hook f. Flor. Brit. Ind. ii. 238 excl. ref. W. \& A. Prodr. (1876); Talbot, Bombay List 75 (1894). D. horrida Grah. in Wall. Cat. 5877 (1832); Drepanocarpus spinosus Kurz, For. Flor. Brit. Burma i. 337 (1877).
S. India: Arcot, Gamble 18212! Madras, Heyne (Wallich, Cat. 5877 B)! W. India: Concan, coast, fide I'albot. Bengal: Sundribuns, Kurz! Clarke! Ball! Heinig! Griffith 1811! Chitragong: coast, Roxburgh. Burma : Rangoon, Kurz 1762! Moulmein, Wallich!

## III. Selenolobiom Benth.

7. Selenolobies Pseudodalbergaries.
8. Dalbergia reniformis Roxb. Hort. Beng. 53 (1814); Flor. Ind. iii. 226 (183.) ; Wight, Icones i. 261 (1840) ; Bak. in Hook. f. Flor. Brit. Ind. ii. 238 (1876). D. flexnosa Grah. in Wall. Oat. 5875 (1832); Benth, Journ. Linn. Soc. iv. Suppl. 48 (1860). D. stipulata Wull. Oat. 5868 partly (1832). Drepanucarpus reniformis Kurz, For. Fior. Brit. Burma i. 336 (1877).

Assam: Smith (Herb. Roxb.)! Silhet, deSilva! Clarke 42711!

Cachar, Prazer 149! Burma: Pega, Kurz 1785! 2608! Brandis! Tenasserim, Oleghorn! Falconer! Gallatly! Beddome!

An original example of $D$. reniformis, so named by Roxbargh himself, is preserved in the Brit. Mus, collection. The stamens in this speoies are isodiadelphous.
8. Selenolobies Pseudosissos.
73. Dalbergia falcata Prain. A climbing sbrab; young branches angular, rusty-puberulons, their bases beset with ovate-acute, subcoriaceons bracts 2.5 mm . long. Leaves $10-16 \mathrm{~cm}$. long, leaflets $5-9$, the lateral ones approximate but hardly ever opposite, dark-green above, pale beneath, glabrous above, finely sparsely adpressed-pubescent beneath, chartaceons, ovate shortly abraptly acuminate, the terminal
 rather prominent beneath, secondary veins 6-8 pairs fine but distinct beneath, as are the reticulations; rachis $4: 5-10 \mathrm{~cm}$. long, and petiolules $3-4 \mathrm{~mm}$. long glabrous; stipules lanceolate, slightly striate within, pubescent externally, 8 mm . long. Flowers in axillary panicles 6-8 cm . long, with spreading rasty-puberulous branches, bracts and bracteoles deciduous, pedicels 2.5 mm . long. Oalyx 3 mm . long, teeth lanceolate except the apper, the lowermost as long as the tabe. Corolla not seen. Stamens monadelphous. Ovary rusty-pabescent. Pod finely puberulous, at length glabrescent, rigid, falcate, not very greatly thickened, 1-2seeded, 3 cm . (when 2 -seeded 5.5 cm .) long, 1.75 cm . wide, 6 mm . thick, with a distinct, slender, paberulous stipe 8 mm . long, dark-brown when ripe, with narrow grey lines alongside the ventral suture.

Borneo : Bintulu, Beccari 4027! Sarawak, Beccari 67 !
A very distinct member of the group to which D. reniformis and D. Kunstleri belong.
74. Dalberaia Konstleri Praín, Journ. As. Soc. Beng. Ixvi. 2. 121 (1897) and 453 (1897).

Malaya: Perak, Kunstler 4736!7067!
This is obvionsly very closely related to $D$. reniformis but it has, if not alwaya, at_least asually monadelphous stamens.

# V.-Materials for a Flora of the Malayan Peninsula.-By Sir Georae King, K.C.I.E., LL.D., F.R.S., \&c., late Superintendent of the Royal Botanic Garden, Calcutta. 

[Received April 2nd; Read Jane 5th, 1901.]
No. 12.
The present contribution to these Materials is occupied exclusively by an account of the Natural Order Myrtaceæ. In the sequence followed in Hooker's Flora of Brilish India, which has been adopted in these papers, this family ought to have immediately preceded Melastomacer. But, for reasons which are of no importance to any one besides the anthor, the acconnt of the latter order was prepared first and was published in the eleventh of these papers. In the present paper 122 species, belonging to 11 genera, are described. Six of these genera are represented by only a single species; two of them by 2 species; one by 5 , one by 11, and the remaining one (Eugenia) by no fewer than 96 species. The latter genus is a very perplexing one, from the fact that the species resemble each other so closely. It is impossible to limit the genus by really good well-marked characters, and it is equally impossible to divide it into sab-genera by characters which do not break down. Eugenia seems to be essentially a genus in the evolution of which an extraordinary number of the successive forms have been preserved. I liave adhered to the arrangement of the species into the groups Jambosa and Sysygium, although there are many species which might be referred to either. Nobody can be more dissatisfied than I myself am with the clavis of the species which I have prepared. In fact, while dealing with this genus and with its literature, the belief has been forced upon me that verbal descriptions are of very little use in identifying the species, and that the only safe way of doing so is by comparison with authentically named Herbarinm specimens.

## Order XLVI. MYRTACE $\mathbb{F}$.

Trees or shrubs, rarely herbs. Leaves opposite, seldom alternate or whorled, petioled, simple, entire, rarely denticulate or crenate, 3 -nerved or pinnately-nerved and asually with an intramarginal nerve, generally coriaceous, and dotted with pellacid glands. Stipules if present small and deciduous. Flowers regular, very rarely irregular, hermaphrodite, or polygamous by abortion, axillary, solitary or in spikes cymes corymbs or heads, naked or with an involucre, often with 2 bracts at the base, white, pink, purple, or yellow, never blue. Calyx superior or $\frac{2}{8}$-superior, limb 4-5-many-fid or -partite, persistent or deciduous,

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valvate or imbricate, sometimes entire or closed in bud. Petals inserted on a disk surrounding the cavity of the calyx, equal in number to the calyx-lobes and alternate with them, rarely 0 . Disc lining the calyxtube, staminiferous at the margin. Stamens usually numerous, inserted with the petals in several rows, rarely definite and alternate with the petals; filaments free or more or less coherent at the base or in bundles opposite the petals; anthers small roundish, with parallel cells barsting longitudinally. Ovary inferior or $\frac{1}{2}$-inferior, crowned by a fleshy disk, 1 celled with 1 or more ovales, or more usually 2 -many-celled with many ovales; placentation axile (parietal in Rhodamnia) ; style terminal rarely lateral, smooth or bearded at the summit; stigma undivided. Frtit usually crowned by the caly.x-limb, either 1 -celled and 1 -seeded by abortion, or 2-many-celled with loculicidal dehiscence; or baccate and indehiscent with the cells many-seeded or 1 -seeded by arrest. Seeds angular cylindric or compressed ; testa hard or membranous, sometimes winged; albumen 0 ; embryo straight carved or spirally twisted, cotyledons usually short and obtuse sometimes combined into a mass with the radicle, very rarely leafy, radicle often thick. Distrib.-Tropical and sub-tropical regions of both hemispheres; species upwards of 2800.

Thibs I. Leptospermese. Fruit oapsular; leaves opposite or alternate.

Leaves narrow. Flowers few or solitary in the leaf-axils. Stamens 10 or fewer, free, in a single series; leaves opposite ... ... ... ...
Stamens numerous, free, in a single series; leaves alternate ... ... ... ... ...
Flowers in heads or spikes; leaves usually alternate; stamens numerous, slightly combined into bundles opposite to and longer than the petals
...
Leaves broad.
Flowers in axillary cymes; leaves alternate; stamens indefinite, united into 5 bundles opposite to and shorter than the petals
Tribs II. Myrter. Frait a berry; leaves opposite, often gland-dotted.
Ovary 1-celled with 2 parietal multi-ovalate placentas:
flowers small; leaves 3 -nerved from the base
Ovary 1-8-celled with 2 rows of ovales in each cell separated by spurious partitions; flowers rather large; leaves 3- to 5 -nerred at the base, seeds numerous ... Orary 5- (sometimes 4.) celled, with several ovales in each cell, often with spurious partitions; seeds few; embryo long and narrow with small cotyledons: flowers small and numerous; leaves not 3-nerved

1. Bercera.
2. LEPTOBPERMUM.
3. Mghalmoca.
4. Tristania.
5. Rhodamnia.
6. Rhopomyrtus.
7. Decaspermun.

| Ovary 2-8-celled with several ovales in each cell, without sparious partitions; embryo thick, fleshy; cotyledons |  |
| :---: | :---: |
| Ovary 2-celled with numerous ovales in each cell; flowers small, few, in small axillary inflorescences. Stamens 8 : otherwise as in Eugenia | 9. Pseudo-evgenia. |
| mire 1II. Lecythidex. Frait hard and fibrous or fleshy, dehiscent; leaves alternate, not gland-dotted. |  |
| Stamens all antheriferons, staminodes none; embryo n divided ; fruit angular, one-seeded | 10. Barbingtoni |
| Inner stamens shorter and without anthers; embryo in volute; the cotyledons leafy, plicate: fruit ovoid, severa seeded | 11. Planchonia. |

1. Becerea, Linn.

Glabrous heath-like shrubs. Leaves opposite, narrow, pointed, entire, with many pellacid glands. Flowers 5 -merous, rarely 4 -merous, axillary, peduncled, with 2 minately bracteolate. Oalya-tube widely campanulate ; lobes 5, membranous, persistent. Petals 5, suborbicular. Stamens 10 or fewer, shorter than the petals. Ovary in the single Malay species $\frac{1}{8}$-inferior, $2-3$-celled, with several ovales in each cell. Capsule barsting from above localicidally. Seeds angular; embryo straight with short cotyledons.-Distrib. Species about 50, the greater number Anstralian, a few in New Caledonia, one only extending into India.

There are considerable differences in the stamens amongst the species referred by Messrs. Bentham and Hooker to this Linnæan genas. Some of the species have only 5 stamens, while others (like the solitary Indo-Malayan one) have 10 which however are not unfrequently reduced to 8. There are moreover differences in the shape of the anthers and filaments. The ovaries also in some have two and in others three cells. On these and other oharaoters more than a dozen genera were founded by Schauer and others, but these have been advantageously reduced to Breckea.

Beckea frutrscens, Linn. Sp. Pl. 358. A slender shrab with thin wiry branches. Leaves linear, pointed, $\cdot 25$ to $\cdot 5$ in. long and $\cdot 05 \mathrm{in}$. broad. Flowers axillary, 08 in . in diam., usually solitary, in short peduncles. Calyx with 5 rounded persistent lobes. Stamens 10 (or sometimes only 8). Ovary half-inferior. DC. Prod. III, 229 : Sur. in Trans. Linn. Soc. III, 260 ; Bot. Mag. t. 2802 ; Blume Mus. Bot. I, 69 ; Miq. Fl. Ind. Bat. Vol. I. Pt. 1, 406 ; Suppl. 308; Benth. Fl. Hong-Kong, 118 : Duthie in Hook. fil. Fl. Br. Ind. II, 463. B. Oumingiana, Schaner in Walp. Rep. II, 920. B. chinensis, Gærtn. Fruct. I, 157, t. 31. B. sumatrana, Bl. Mus. Bot. I, 69.

In all the provinces except the Andaman and Nicobar Islands. Distrib.-Malayan Archipelago.

## 2. Leptospermom, Forst.

Shrubs or small trees, glabrous or silky-pubescent. Leaves alternate, entire, rigid, with 1-3 nerves or nerveless. Flowers solitary and axillary, or 2-3 together at the ends of the branches, rarely peduncled, sometimes polygamous; bracts broad, scarious, often imbricate, the lower ones cadncous. Calyx-tube broadly campanulate or turbinate, adnate to the ovary below, the free upper part broad; lobes 5. Petals 5 , spreading. Stamens numerous, in a single series, not longer than the petals; anthers versatile, their parallel cells bursting longitudinally. Orary inferior or $\frac{1}{2}$-inferior, enclosed in the calyx-tube, 5 - or morecelled, rarely 3- or 4-celled; style filiform, inserted in a deep depression of the ovary, sometimes short; stigma capitate or peltate. Oapsule usaally exceeding the calyx-tube, opening loculicidally from above. Seeds numerons, linear or winged, often sterile; embryo straight. Distrib.-Species upwards of 30, chiefly Australian, a few in New Zealand and New Caledonia.

## NOTE.

As in Backea the speoies have been separated off into several genera whioh have been reduced by Messrs. Bentham and Hooker.

Leptospermum flavescens, Sm. in Trans. Linn. Soc. III, 262. A bush or small scraggy tree with thin, striate, 4-angled branches: the young parts glabrous or sericeous. Leaves coriaceous, narrowly oblonglanceolate to oblanceolate, obtuse, often with a deciduons point, subsessile; when dry distinctly dotted beneath and obscurely 3-nerved, glabrous or silky on the midrib beneath and on the edges, from 4 to 1 in . long and $\cdot 1$ to $\cdot 3$ in. broad. Flowers sessile or sub-sessile, about $\cdot 5$ or $\cdot 6$ in. in diam. (when dry). Calyx-tube glabrous or sericeons. Capsule much depressed, surrounded by the calyx-tabe, glabrous or hairy, 5-ridged, pitted, opening by 5 valves, 25 to 30 in . in diam. (when dry). DC. Prod. III, 227 ; Hook. fil. Fl. Tasm. I, 139 ; Benth. Fl. Austral. III, 104.

This species is common and widely distributed in Australia and has several well-marked varieties of which two occur in our region.
var. commune, Beuth. Fl. Austral. III, 104. Young branches leaves and calyx-tube glabrous or glabrescent. Leaves narrowly oblong or linear-lanceolate, $\cdot 1$ to $\cdot 15$ in. broad. L. flavescens, Bot. Mag. t. 2695. L. amboinensis, Blume Bijdr. 1100: Mus. Bot. Lagd. Bat. I, 68 ; DC. Prod. III, 229 : Miq. Fl. Ind. Bat. I, Pt. 1, 404 ; Duthie in Hook. fil. Fl. Br. Ind. II, 464. L. polygalifolium, Salisb. Prod. 350; L. Thea, Willd. Spec. Pl. II, 949. L. porophyllum, Cav. Ic. IV, 17, t. 330, fig. 2. Macklottia amboinensis, Korth. in Ned. Kruidk. Arch. I, 196. Myrtus amboinensis, Ramph. Herb. Amb. II, 77, t. 18.

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Malacca (on Mourt Ophir) ; Griffth (K.D. 2339) ; Lobb, Stolickza, Maingay (K.D.) 713. Kzdsh, Ridley 5349. Distrib.-Bangka, Amboina, Moluccas, Borneo, Australia.
var. javanica. Young branches densely sericeons; calyx-tube glabrescent, occasionally very sericeous. Leaves obovate-lanceolate, broadly obtuse, with long silky hairs on the margins and on the midrib beneath. Flowers often crowded. L. javanicum, Blume Bijdr. 1100 ; Mas. Bot. Lugd. Bat. I, 68; DC. Prod. III, 229 : Dathie in Hook. fil. Fl. Br. Ind. II, 464. L. floribundum, Jungh. Java I, 578; Nat. en Geneesk. Arch. Ned. Ind. II, 370; Miq. Fl. Ind. Bat. I, Pt. 1, 404. Macklottia javanica, Korth. Ned. Kruidk. Arch. 196.

Malacca: Grifith. Perak: Wray 330, 885, 3839 : Scortechini 754: King's Collector 7426, 7435. Distrib.-Sumatra, Java, Celebes, Borneo. Burmah (a single specimen) at Moulmein; Lobb. This variety is mach commoner in the Peninsula than the former.

## 3. Melaledca, Linn.

Trees or shrubs. - Leaves alternate, rarely opposite, entire, lanceolate or linear, flat or subterete, 1-3-many-nerved. Flowers in heads or spikes, each sessile in the axil of a floral leaf, 5 -merons; bracts deciduons. Oalyx-tube subglobose; lobes 5, imbricate or open, deciduous or persistent. Petals 5, spreading, deciduous. Stamens numerons, more or less united at their bases into 5 bundles opposite the petals; anthers versatile, the cells parallel and bursting longitudinally. Ovary inferior or half-inferior, enclosed in the tabe of the calyx; style filiform, stigma small; ovales numerous. Capsule included in the calyx, dehiscing loculicidally by 3 valves. Perfect seeds cuneate: embryo straight, longer than the radicle. Distrib.-Species about 130, almost all Australian, but one scattered in Asia.

Melaledca Lejcapendron, Linn. Mant. 105. A tree often of considerable size; the bark pale, thick, peeling off in papery layers. Branches usually pendulous, slender. Leaves coriaceons, alternate, narrowly oblong-elliptic, oblique or falcate, acuminate acute or obtase, narrowed below into a short petiole, with 3 to 5 or 7 vertical unastomosing nerves; when young adpressed-hairy, when old glabrous: length 1.5 to 5 in.; breadth 2 to 1 in. Spikes 2 to 6 in . long; sometimes interrupted, solitary, at first terminal bat sabsequently sarmounted by a leaf-axis, the rachis and calices glabrous or hairy : calyx-tube ovoid, the lobes orbicular. Petals $\cdot 1$ to $\cdot 15 \mathrm{in}$. in diam. Staminal bundles under 5 in . long. Fruit about 2 in . in diam. Benth. Fl. Austral. III, 142 : Krrz in Journ. As. Soc. Beng. XLVI, Pt. 2, 61; Fl. Br. Burm. I, 472; Duthie in Hook. fil. FI. Br. Ind. II, 465.
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Malacca: Singapore. Distrib.-Malayan Archipelago, British India, Australia.

The following two varieties have been distinguished by Mr. Duthie in Hooker's Flora of British India.
var. Leucadendron; spikes glabrous. Linn. Mant. 105 and Suppl. 342 ; Lour. Fl. Cochinch. 468 ; Roxb. Fl. Ind. III, 397 ; DC. Prodr. III, 212 ; Wall. Cat. 3646 ; Blume Mns. Bnt. I, 66 ; Miq. Fl. Ind. Bat. I, pt. 1, 401. Myrtus Leeccadendron, Linn.-Ramph. Herb. Amb. II, 72, tt. 16, 17, f. 1.-Cultivated in India.
var. minor; spikes villons. M. minor, Sm. in Rees. Cycl. 23 ; DC. Prodr. III, 212 ; Wall. Cat. 3645 ; Blume Mus. Bot. I, 67 ; Miq. Fl. Ind. Bat. I, Pt. 1, 403. M. Cajıputi, Roxb. Fl. Ind. III, 391; W. \& A. Prodr. 326; Miq. l.c. 403. M. Leucadendron, Lam. Encycl. 64l. M. viridiflora, Gmotn. Frnct. I, 173, t. 35 ; DC. Prodr. l.c. ; Wall. Cat. 3647. M. saligna, Blume Mus. Bot. I, 66. M. Oumingiına and luncifolia, Turcz. in Bull. Soc. Mosc. xx. 164. M. saligna, Gmel. Syst. 793.-Rumph. Herb. A mb. II, 76.-This appears to be the plant from which the Cajuputoil of commerce is chiefly obtained.

## 4. Tristania, R. Br.

Tall shrabs or trees. Leaves alternate or crowded at the summit of the branches, rarely opposite, coriaceous, glabrous. Flowers small, yellow or white, in pedanculnte axillary cymes; bracts deciduous or 0. Calyx-tube turbinate-campanulate or open, attached below to the ovary; lobes 5, short, persistent. . Petals 5, imbricate, spreading. Stamens numerous, shorter than the petals, usually united in 5 bundles and opposite to them; anthers versatile, cells parallel and opening longitudinally. Ovary inferior or $\frac{1}{2}$-superior, the apex flat or convex; 3-cellerl; orules many in each cell, suspended or horizontal. Cupsule loculicidally 3-valved. Perfect seeds few, linear, cuneate, or winged at the upper part; embryo straight, cotyledons broad, longer than the radicle. Distrib.-About 22 species inhabiting the Malay peninsula and islands, New Caledonia, and Australia.


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1. Tristania subauriculata, n. sp. King. A tree 10 to 40 feet high : the young branches pale (when dry) puberulous or glabrescent. Leaves very coriaceous, sessile, obovate-oblong, the apex broad, blant, emarginate or slightly pointed, gradually narrowed to the slightlyauricled base : both surfaces glabrous, pale when dry, the upper shining, the lower paler, dull, obscurely glandular: main-nerves spreading, not prominent, $\cdot 2 \mathrm{in}$. apart, length 2.5 to 6 in ; breadth 1.5 to 2.5 in . Oymes axillary, fow-flowered, mach shorter than the leaves, dichotomous: the peduncles 3 to 8 in . long, compressed, clothed, especially above, with white silky hairs. Flowers $\cdot 25$ in. across. Calyx-tube tubularcampanulate, densely pubescent below externally, the teeth broadly triangular, blunt, short. Petals rounded, entire, glabrous. Stamens in 5 groaps of 10 each. Ovary depressed-globular, glabrous. Capsule subglobular, glabrous, half-enveloped by the calyx, $\cdot 25$ in. in diam. Seeds compressed, about 8 in each cell.

Perak : King's Oollector 7047, 8253.
This is allied to T. merguensis, bnt has broader leaves of much thicker texture and sessile; shorter fewer-flowered oymes, and smaller flowers and fruit.
2. Tristania merguensis, Griff. in Journ. As. Soc. Beng. for 1854, p. 637. A tree. Young branches stout with pale bark when dry; the youngest puberulous. Leaves obovate-lanceolate, obtuse or obtusely acuminate, narrowed to the very short or almost obsolete petiole; mainnerves ascending, distinct, $\cdot 1 \mathrm{in}$. apart; both surfaces glabrous, the lower dull, paler and obscurely glandular, the apper shining; length $3 \cdot 5$ to 7 in.; breadth $\mathbf{l} \cdot 15$ to 2 in .; petiole $\cdot 1$ to $\cdot 2 \mathrm{in}$. Cymes on angular peduncles $\cdot 5$ to $1 \cdot 5 \mathrm{in}$. long, slightly supra-axillary, shorter than the leaves, dichotomous, hoary-pubescent, especially towards the apex. Flowers densely crowded at the ends of the branchlets, 25 in . in diam. Calyx-tube densely clothed with white pubescence on both surfaces, broadly cupular, tapered to the very short almost obsolete pedicel, the teeth broad, rounded. Petals small, transversely oblong, shortly clawed. Ovary pilose. Oapsule sub-globular, large ( 4 in . in diam.), glabrous, half-enveloped by the calyx ; its valves broad, blunt. Seeds compressed, about 8 in each cell. Kurz, For. Fl. Burm. I, 473. "Tristanis affinis," Griff. Notul. 650 : Ic. Pl. Asiat. t. 636, f. 3. Melaleuca eugeniifolia, Wall. Cat. 3648. M. decurrens, Wall. Cat. 3649.

Malacca : Finlayson, Harvey. Perax: Wray 2921, 4124; Scortechini 1021. Pahang: Ridley 1062: growing at elevations of several thousand feet. Distrib.-Burma, Borneo.
3. Tristania Maingayi, Duthie in Hook. fil. Fl. Br. Ind. II, 467. A tree: young branches with brown bark (when dry) and covered with deciduous white hairs. Leaves narrowly oblong-oblanceolate acute, much

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narrowed to the short petiole; main-nerves spreading, less than $\cdot 1$ in. apart, not conspicuous ; lower surface dull and glandular, slightly paler than the shining upper: length 1.75 to 3.5 in .; breadth 5 to 1.25 in .; petiole $\cdot 1$ to $\cdot 2$ in. Cymes on angular peduncles 5 to $1 \cdot 25 \mathrm{in}$. long, axillary, shorter than the leaves, dichotomous, hoary; the flowers few, crowded, $\cdot 3 \mathrm{in}$. in diam., on very short pedicels. Calyx-tube broadly cup-shaped, tapered to the base; the teeth shallow, broad, sub-acute. Petals.small, sub-rotund, sub-entire, hairy outside. Ovary pubescent. Capsule large ( 35 in. in diam.) sub-globular, glabrous, enclosed in the calyx except at the apex; its valves broad, blunt. Seeds winged, 9 or 10 in each cell.

Penang: Maingay (K.D. 769) ; Ourtis, 238, 438.
I keep up this species with mach hesitation. It appears to me to be a form of T. merguensis with leaves and capsules smaller than usaal.
4. Tristania obofata, R. Br. in Benn. and Horsf. Fl. Jav. 127, t. 27. A large shrub: the joung branches reddish-brown, rusty puberulous. Leaves obovate, much coutracted to the short petiole, the apex rounded or retuse; both surfaces glabrous, the lower glandular and paler : main-nerves spreading, about $i$ in. apart; length 1.5 to 2.5 in .; breadth 6 to 1.2 in .; petiole $\cdot 2$ to 4 in . Oymes extra-axillary and terminal, few-flowered, paberulous or glabrous, mach shorter than the leaves. Flowers $\cdot 15 \mathrm{in}$. long, on pedicels shorter than themselves, often in pairs. Calym-tube turbinate; the teeth rounded, short. Petals subrotund with serrate margins. Ovary silky. Capsule 2 in. long, oval, glabrous, much longer than the persistent calyx: its valves broad, blunt. Miq. Fl. Ind. Bat. I, Pt. 1, 397.

Singapore: Ridley 5886.
5. Tribtania Whiteana, Griff. Pl. Cantor. 18. A shrub, the young bark brown. Leaves oblanceolate, bluntly acuminate, much narrowed to the short petiole; both surfaces shining, the lower pellucid-punctate, pale: main-nerves numerous (about 05 in . apart), sub-horizontal; length 3 to 5.5 in .; breadth $\cdot 75$ to 1.75 in. ; petiole $\cdot 25$ to $\cdot 5 \mathrm{in}$. Cymes on peduncles nearly as long as the leaves, corymbosely paniculate, minutely pubescent, axillary and terminal, the bracts few and leaflike; bracteoles small caducous. Flowers numerous, on pedicels shorter than themselves, $\cdot 1$ in. across. Calyx-tube obconic, densely pubescent on both surfaces, its teeth obsolete. Petals orbicular, glandular. Capsule under • 1 in. in diam., free from the calyx except at the base. T. Wightiana, Duthie in Hook. fil. Fl. Br. Ind. II, 466 . T. sumatrana, Miq. Fl. Ind. Bat. Suppl. 308. Hypericinea pimentifolia, Wall. Cat. 4828.
J. II. 10.

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Malacca: Griffith (K.D. 2340). Singapore: Wallich, Lobb. Pbang: Walker 62. Distrib.-Sumatra, Java, Borneo.

## NOTE.

In Hooker's Flora of British India T. burmannica, Griff. is said to have been collected at Malacca. I find however no specimens from that locality in either the Kew or the Calcutta Herbariam ; and I therefore omit it here.

## 5. Rhodamnia, Jack.

Shrubs or small trees. Leaves opposite, 3-nerved, hoary or pubescent beneath. Flowers rather small, pedicels short, sometimes shortly fasciculate or in short lax racemes; bracteoles small, deciduous. Calyxtube ovoid or subglobose, not produced beyond the ovary ; segments 4 , persistent. Petals 4, spreading. Stamens numerous, in several series, free; filiments filiform; anthers versatile with parallel cells dehisoing longitudinally. Ovary l-celled with parietal placentas and many orules; style filiform, stigma peltate. Berry globose, crowned with the limb of the calyx. Seeds few, reniform, globose or variously compressed, testa hard; embryo horseshoe-shaped, radicle long, cotyledons very short. Distrib.-About 6 species; Australia, and Tropical Asia.

Rhodaminia trinarvia, Blame Mas. Bot. Lagd. Bat. I, 79. A small tree or a shrab: young parts and inflorescence often silky. Leaves ovate-oblong or oblong-lanceolate, acuminate, 3-nerved; upper surface glabrous, reticulate; the lower glabrons or silvery pubescent; length 1.75 to 4.5 in .; breadth 75 to 2 in .; petiole $\cdot 2$ to 35 in . Peduncles varying in length but always much shorter than the leaves, axillary, l - rarely 3 -flowered, minutely bracteolate near the calyx. Fruit globose, reddish, 2 to $\mathbf{~}^{3} \mathrm{in}$. in diam. Karz in Journ. As. Soc. Beng. XLVI, Pt. 2, 63 ; For. Fl. Br. Burma I, 474 : Benth. Fl. Austral. III, 278 ; Duthie in Hook. fil. Fl. Br. Ind. II, 468. Myrtus trinervia, Sm. in Trans. Linn. Soc. III, 280. Eugenia ? trinervia, DC. Prod. III, 279 : Bot. Mag. 3223.

In all the Provinces except the Andaman Islands; common. Distrib. -The Malayan Archipelago and Philippines to Australia, Burma.
var. concolor ; leaves green on both surfaces, sparingly pubescent, peduncles 4-7-or fewer-flowered. R. cinerea, Griff. Notul. 653, not of Jack. ; Kurz in Journ. As. Soc. l.c. R. concolor, Miq. Fl. Ind. Bat. Suppl. I, 315. Myrtus smilacifolia, Wall. Cat. 3629.
var. spectabilis; leaves silverg-white beneath or greyish when old, flowers usually fewer, 2 or solitary. R. spectabilis, Blume Mus. Bot. I, 78 ; Miq. Fl. Ind. Bat. I, Pt. 1, 479 ; Karz l.c. R. cinerea, Jack. in Mal. Misc. Monvarora spectabilis, Wight Ill. II, 12, t. 97, f. 5,

> R. Nageli, Miq. Fl. Ind. Bat. I, Pt. 1, 478. R. subtriflora and R. Mulleri, B1. l.c. 79 .
> This species, being widely distributed, presents many forms several of whioh have been described as species. The above arrangement of these forms into two varieties was first suggested by Kurz.

## 6. Rhodomybtus, DC.

Small trees or tomentose shrabs. Leaves opposite, 3-nerved. Flowers rather large, axillary. Calyx-tube turbinate, oblong or subglobose, slightly produced above the ovary ; lobes 5 , rarely 4, herbaceous, persistent. Petals 5, rarely 4, spreading. Stamens indefinite, free, in many series. Ovary 1-2-3-celled with spurions partitions, or divided into numerous 1 -ovaled superposed cells ; style filiform, stigma capitate. Berry globose or ovoid, with few or numerons seeds not distinctly superposed in rows. Soeds compressed, reniform or nearly orbicular, horizontal, testa hard; embryo carved or spiral, radicle very long, cotyledons small. Distrib. - 5 species, four of them inhabitants of E. Australia, and one widely distributed over Tropical Asia, especially throaghout the Indian Archipelago, as far as China.

Rhodomyrtus romentosa, Wight Spicil. Neilgh. I, 60, t. 71. A slirab 4 to 8 feet high: young parts tomentose. Leaves the lower ternate, the apper opposite, elliptic to obovate, obtuse, sometimes macronate, 3 -nerved, the under surface covered with soft white tomentam, the upper glabrons: length 1.5 to $2 \cdot 5$ iu.; breadth 65 to 1 in .; petiole $\cdot 1$ to $\cdot 15 \mathrm{in}$. Peduncles axillary shorter than the leaves, 1-3. flowered, bracteolate close to the calyx. Flowers $\cdot 5$ to 75 in . across. Calyx tomentose, with 5 unequal lobes. Petals downy, shortly clawed. Berry abont the size of a cherry, oval or sub-globose, dark-parple : pulp abandant, sweet. Seeds compressed, forming 2 rows in each cell. Miq. Fl. Ind. Bat. I, Pt. 1, 477 ; Benth. Fl. Hongk. 121 ; Dathie in Hook. fil. Fl. Br. Ind. II, 469 ; Trimen Fl. Ceylon. II, 166. Myrtus tomentosa, Ait.; DC. Prodr. III, 240 ; Vahl Symb. II, 56 ; Blume Bijdr. 1081 ; W. \& A. Prodr. I, 328; Wight III. II, 12, t. 97, f. 3, Ic. 522 ; Roxb. Fl. Ind. II, 498 ; Wall. Cat. 3630 ; Korth. in Ned. Kruidk. Arch. I, 197. M. canescens, Lour. Fl. Cochinc. I, 311.

Pemana, Malacca, Perak. Dibtrib.-Malayan Archipelago. Hills of Soathern British India and Ceylon.

## 7. Decaspermid, Forst.

Shrabs or amall trees. Leaves opposite, pinnate-nerved. Flowers small, in axillary racemes, or in terminal leafy panicles, occasionally polygamous. Calyx-tube campanulate, slightly or not at all produced
above the ovary; lobes 4 or 5, spreading. Petals 4 or 5 , spreading. Stamens numerous in several series, free, filaments filiform; anthers small, versatile, with parallel cells opening longitudinally. Ovary 4. or 5 -celled with 2 or very few ovules in each cell; cells often divided by spurions dissepiments; style filiform, stigma peltate. Berry globose, crowned by the calyx-lobes. Seeds 8 to 10 , reniform-sub-globose, testa hard ; embryo horse-shoe-shaped or circular, with long radicle and short cotyledons. Distrib -Abont 4 species in tropical Asia, Australia, and the Pacific Islands.

Decaspermid panicolaton, Kurz in Journ. Ab. Soc. Beng. XLVI, Pt. 2, 61 : For. Flora. Br. Burma I, 475. A small tree, often 30 feet high. Young parts and inflorescence minately sericeous-tomentose. Leaves membranous or thinly coriaceons, oblong-lanceolate or ovatelanceolate, acuminate, the base often narrowed, edges entire; mainnerves about 10 pairs, spreading, not prominent ; upper surface glabrous : the lower paler and reddish, glandular, midrib always pubescent on the lower and always on the upper; length 1.25 to 3.5 in . ; breadth $\cdot 4$ to 1 in.; petiole 1 to $\cdot 3 \mathrm{in}$. Panicles axillary and shorter than the leaves, or terminal and longer than the leaves; bracts small and deciduons, or leaf-like and permanent. Flowers 2 to 3 in . in diam., often polygamous. Petals white, pabescent inside. Oalyx-tube more or less clothed with white hairs; the lobes roundish or sub-acute, hairy or glabrous. Style exserted. Berry globose, about 1 lin . in diam. Duthie in Hook. fil. Fl. Br. Ind. I, 470. Nelitris paniculata, Lindl. Collect. Bot. nuder 16 ; DC. Prod. III, 231 ; Wall. Cat. 3627 ; Wight III. II, t. 97, fig. 10. Icon. 521 ; Benth. Fl. Austral. III, 279. N. polygama, Spreng. Syst. II, 488 ; Korth. in Ned. Kruidk. Arch. 1, 197. N. pallescens, Miq. Fl. Ind. Bat. Suppl. 314. Eugenia polygama, Roxb. Hort. Beng. 92 ; Fl. Br. Ind. II, 491. E. cuspidata, Wall. Cat. 3627. Memecylon acuminatum, Wall. Cat. 4105 ; Syzygium vimineum, Wall. Cat. 3593 B. Hirea Finlaysoniana, Wall. Cat. 3566 F.

In all the provinces except the Andaman and Nicobar Islands: common. Distris.-Malayan Archipelago, Burma, Khasia Hills, Sikkim Terai.

Varions other forms to which specific names have been given appear to me to be reducible here. The Wallichian examples in Herb. Calcutta of Wall. Cat. 3593 $B$ and 4106 belong in $m y$ opinion to this species.
var Finlaysoniana, Duthie l.c.; leaves sab-coriaceons, panicles shorter than the leares, few-flowered, calyx densely tomentose, its lobes rounded: stamens nearly equalling the petals. N. polymorpha, Blame Mas. Bot. Lugd. Bat. I, 75, t. LX. Hirea Finlaysoniana, Wall. Cat. 7363.

## 8. Edgenia, Linn.

Trees or shrubs, smooth or rarely tomentose or setose. Leaves opposite rarely alternate, coriaceous or membranons, pinnate-nerved. Inflorescence centripetal with solitary axillary flowers, or in short racemes or centrifagal in dense terminal or axillary cymes or in terminal or lateral trichotomous panicles. Bracts usually small and deciduons. Calys-tube globose or more or less elongate, 4- or 5-lobed or sub-truncate. Petals 4 or 5, free and spreading or connivent calyptrate and caducous. Disc lining the calyx-tube, staminiferous at the edge. Stamens numerons, in many rows, usually combined in 4 or 5 bundles; filaments slender; anthers small, versatile, dehiscing longitudinally. Ovary inferior, 2- rarely 3 -celled; ovales many in each cell; style filiform, stigma small: Fruit inferior, crowned by the remains of the calyx, pulpy, rarely dry. Seeds few, oblong or globose, often compressed, testa membranous or cartilaginous, albumen none or very scanty; embryo thick, fleshy. Distrib.-About 650 species chiefly in tropical America and Asia; a few in tropical Africa and Anstralia.

Sect. I. Jambosa. Flowers neually 4-merons, often large. Calym olavate, funnel-shaped or sub-globose, its staminal disc often thickened and its moath with 4-persistent often thickened lobes crowning the frait. Petals free, Berry pulpy; seeds large.

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Reticulations of leaves faint ... ... ... ... $\left\{\begin{array}{l}\text { 15. B. Dyeriana. } \\ \text { 16. E. Hemsleyana. }\end{array}\right.$

## Leaves small-

Leaves 2.5 to 8 in. long (longer in No. 19)
Flowers in terminal spreading panicles-


Leaves ovate-lanceolate or narrowly elliptic (sometimes broadly elliptic in E. pyrifolia) much narrowed to each end, the apices sometimes candate-acuminate -


Flowers in small axillary or terminal racemes or in lax racemone few.flowered paniclee -
89. E. conglomerata.
40. E. urceolata.
41. E. glaica.

Flower buds globnlar or slightly elongated
42. E. subrufa.
48. E. Duthieana.
44. E. polyantha.
45. E. Manii.
46. T. caudata.

Flower-buds and flowers mach elongated
$\left\{\begin{array}{l}\text { 47. E. filiformis. }\end{array}\right.$
48. E. andamanica.

Flowers in dense short terminal or axillary glomeruli or oymes-
Flowers not conspionougly bracteolate-
Flower-bude globalar ... ... ... ... 49. E. Hoseana.
Flower-bnds much elongated $\quad \ldots \quad \ldots \quad \ldots\left\{\begin{array}{l}\text { 50. E. Benjamina. } \\ \text { 51. } . . \text { variolosa. } \\ \text { 52. E. clavifora. } \\ \text { 58. E. zeylanica. } \\ \text { 54. E. grata. } \\ \text { 55. E. tocta. }\end{array}\right.$

Flowers in conspicuonaly bracteolate dence clusters, $\left\{\begin{array}{l}\text { 56. E. pseudo-tetra. } \\ \text { branches 4-angled ... }\end{array}\right.$... ... ... ...
57. E. polita. ptera.
Sect. II. Syzyaidy. Flowers 4. or 5-merous, usually emall : the calyz obovoid, tarbinate or clavate, its staminal diso rarely thickened, the lnouth 4. or 5 -toothed or lobed or sub-entire. Petals more or less connate, much imbricate and calyptrately deciduoas. Berries small, sub-globose or oblong, often with little palp.

Flowers panicled, their buds $\mathbf{8} \mathrm{in}$. or more in length (less in E. nigricans and E. cepansa), olavate, always narrowed into a long pseudo-stalk-

Leaves more than 2 inches long-
Main-nerves of lenves under 25 pairs, distinct-
Panicles large, lax, spreading, mostly terminal
58. E. valdevenosa.
59. E. oblongifolia.
60. E. oub-horisontalis.

Panicles short, both axillary and terminal
61. E. Valetomiana.
62. E. expansa.
63. E. chloroleuca.
64. E. nigricans.
65. E. inophylla.
66. E. oblata.
67. E. Bernardi.
68. E. Prainiana.
69. E. Pearsoniana.

70 E. levrcaulis.
71. E. Goodenovii.

Leaves 2 inches or less in length, rarely as much as 2.5 in .-
Glabrous-

| Frait oblong | .. | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | $\ldots$ | 72. E. linocieroidea. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |

Flowers numerons, less than 2 in . long, in terminal or axillary panicles, oblong or olavate, tapered gradually to the base, rarely narrowed into a short psendo-stalk, all withoat a true pedicel except sometimes the terminal ones of the branchlets.
Leaves obtuse or sab-mante ... ... ... ... ... $\left\{\begin{array}{l}\text { 77. R. inasensio. } \\ \text { 78. R. subdecussata. } \\ \text { 79. } \text { E. punctulata. }\end{array}\right.$


Flowers small, numerous, in short much-branched spread. ing cymose panicles mostly from the scars of fallen leaves, globular or nearly so, narrowed gradually to the base or
95. E. operculata.
96. E. nicobarica. abruptly contracted into a short pseudo-stalk.

1. Edgenia formosa, Wall. Pl. As. Rar. II. 6, t. 108 : Wall. Cat. (in part) 3609. A tree, 20 to 30 feet high : young branches almost terete, with pale bark. Leaves coriaceous, ovate-oblong to lanceolate-oblong, much tapered to the acate apex, sometimes in threes; the base rounded, slightly cordate; upper surface pale, olivaceons (when dry), the lower paler; both quite smooth; main-nerves 12 to 20 pairs, rather strong, ascending, rather straight, interarehing 2 to 3 in. from the edge ; length 8 to 12 occasionally to 18 in . ; breadth 3 to 5 in .; petiole about 2 in . Flowers about 2 in . across (excluding the stamens), 'pale rose-coloured. on pedicels 3 to $\cdot 5 \mathrm{in}$. long, bracteolate near the apex, in fascicles of three (occasionally solitary), usually from the branches below the leaves but sometimes terminal. Calyx-tube 6 to $\cdot 75$ in. long, clavateturbinate, smooth; the 4 lobes broad, rounded, unequal, $\cdot 5 \mathrm{in}$. broad and about half as long. Petals $\cdot 5 \mathrm{in}$. long, almost orbicular. Filaments more than 1 in. long, very numerous, spreading. Fruit as large as a small apple, globose, contracted towards the base, crowned at the apex by the spreading calyx-lobes, white, smooth, 2 -seeded, the pulp rather scanty. Duthie in Hook. fil. Fl. Br. Ind. II, 471 ; Kurz in Journ. As. Soc. Beng. XLVI, Pt. 2, 68 ; For. Fl. Brit. Burm. I, 492 ; Wight Ill. II, 14. Jambosa formosa, Walp. Rep. Bot. Il, 191 ; Blume Mus. Bot. I, 92 ; Miq. Fl. Ind. Bat. I, Pt. 1, 412. J. mappacea, Korth. in Ned. Kruidk. Arch. I, 200. E. somarangensis, DC. Prod. III, 286.

## Prrak: King's Oollector 6254; Scortechini.

Only a few specimens of this are to be found from our ares in the Herbaria at Kew and Oalcutta, and they have all oblong-lanoeolate leaves. In British India the form with ovate-oblong leaves is the commoner.

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2. Eugenia prrakensis, King n. sp. A glabrous tree, $\mathbf{5 0}$ to $\mathbf{7 0}$ feet high : young branches as thick as a swan-quill, brown when dry. Leaves coriaceous, oblong-elliptic, the apex sub-acute, narrowed gradually to the cordate, slightly oblique base; upper surface olivaceons when dry, the lower pale-brown; main-nerves 12 to 14 pairs, ascending, curving a little and interarching $\mathbf{~} 2$ to $\cdot 4 \mathrm{in}$. from the edge, very prominent on the lower surface, faint on the upper; intermediate nerves and reticulations slender but distinct; length 12 to 18 in.; breadth 5 to 8 in .; petiole 3 in. very stont. Flowers 1 in . or more across, in fascicles of 6 to 8 from depressed tubercles on the smaller branches, on peduncles $\cdot 5 \mathrm{in}$. long. Calyx-tube campanulate, $\cdot 5 \mathrm{in}$. long, contracted into a pseudo-stalk at its junction with the peduncle: the mouth with 4 broad, rounded lobes less than 1 in. long. Petals orbicular, longer than the calyx-lobes. Fruit unknown.

Perak: King's Oollector 5595.
A species only once collected and the specimens have no fruit; somewhat renembling 2. macrocarpa, Roxb., but with smaller flowers and larger leaves.
3. Edgenia javanica, Lamk. Dict. III, 200. A glabrous tree, 25 to 35 feet high : young branches terete, pale-brown. Leaves thinly coriaceous, elliptic-oblong, elliptic-lanceolate or elliptic, the apex acute or subacute, slightly narrowed to the rounded (sometimes slightly cordate) base; both surfaces pale-brown when dry: main-nerves slightly conspicuous on the lower surface, 8 to 12 pairs, slightly curved, spreading, interarching about $\cdot 1 \mathrm{in}$. from the edge; length 4 to 8 in .; breadth 1.75 to 3.5 in. ; petiole 1 to $\cdot 2 \mathrm{in}$. Flowers 1 in . or slightly more in diam. (excluding the stamens) white, in axillary or terminal lax pedunculate fewflowered corymbose racemes : peduncle of racemes from 1 to 1.25 in . in length; pedicels of flowers $\cdot 4$ to 6 in. long. Oalyx-tube clavateturbinate, smooth, 35 to 5 in . long, tapering into a short pseudo-stalk, the 4 lobes broad, unequal, rounded, blunt, concave. Petals obovateorbicular, larger than the sepals. Filaments slender, about 75 in . long. Fruit when quite ripe depressed-turbinate, about 1.5 in . long and 2 in . broad at the apex, pale-yellowish, 1 - or few-seeded, the endocarp spongy. Duthie in Hook. fil. Fl. Br. Ind. II, 474 ; Karz in Journ. As. Soc. Beng. XLVI, (1877), Pt. 2, 69 ; For. Fl. Brit. Barm. I, 494. E. alba, Roxb. Hort. Beng. 39; Fl. Ind. II, 493 ; Wall. Cat. 3612A, 3614 all the numbers. Jambosa alba, Rumph Herb. Amb. I, 127, t. 39 ; W. \& A. Prodr. I, 332 ; Wight Ill. II, 14; Ic. t. 548 ; Miq. FI. Ind. Bat. I, Pt. 1, 443 (in part). J. samarangensis, Korth. in Ned. Kraidk. Arch. I, 201 ; Blame Mas. Bot. I, 95. Jambosa macrophylla, DC. Prod. III. 286 (in part). Myrtus samarangensis, Blume Bijdr. 1084. Jambosa insignis, Bl. Mus. Bot. I, 100. Jambosa ambigua, Bl. Mns. Bot. I, 96.
J. II, 11

Malacca : Grifith 2352, Maingay 748, Hervey. Singapore : Ridloy 8931. Andaman aud Nicobar islands (very common). Distrib.-Java, Zollinger, 2nd Journey 808, etc. ; Timor Laut, Forbes 334; New Guinea and many of the other islands of the Archipelago.

Distinguished in the group by its shortly petiolate leaves and pedanculate lax racemes which are often terminal.
var. Roxburghiana, Duthie in Fl. Br. Ind. II, 475 ; leaves almost sessile, cordate and amplexicaul at the base, the apex rounded. E. decora, Wall. Cat. 3608.
4. Eugenia Jambos, Linn. Sp. Pl. 47. A shrub or small glabrous tree : young branches more or less four-angled, pale-brown, rather slender. Leaves thinly coriaceous, oblong-lanceolate, tapering to each end, the apex acuminate (sometimes almost caudate) the base more abruptly narrowed to the petiole; both surfaces pale-olivaceons when dry; the main-nerves distinct on the lower, 10 to 14 pairs, slightly curved, ascending, interarching in a rather faint nerve $\cdot 1 \mathrm{in}$. inside the edge, the secondary nerves rather distinct, one (sometimes two) between each pair of primaries ; length 4 to 7 in. ; breadth 1 to 1.6 in. ; petiole 25 in. Flowers 2.5 to 3 in . in diam., in few-flowered terminal racemes shorter than the leaves, the pedicels 3 to $\cdot 4$ in. long. Oalyx-tube turbinate, $\cdot 5 \mathrm{in}$. long, the lobes 4, broad, short, reflexed. Petals much larger than the calyx-lobes, obovate-rotund, about $\cdot 5 \mathrm{in}$. long; filaments $1 \cdot 5$ to 2 in. long, shorter than the style. Fruit ovoid or globular, 1.5 to 2 in. long, dull-yellow tinged with pink, smooth, endocarp fleshy and edible, crowned by the inflexed calyx-lobes. Seeds one or two. Roxb. Hort. Beng. 37 ; Fl. Ind. II, 494; Wall. Cat. 3615 ; Wight Ill. II, 14; Duthie in Hook. fil. Fl. Br. Ind. II, 474. Brandis For. Fl. 233 ; Kurz in Journ. As. Soc. Beng. XLVI. (1877) Pt. 2, 69 ; For. Fl. Brit. Burm. I, 495. Jambosa vulgaris, DC.; Blume Mus. Bot. I, 93; W. \& A. Prodr. I, 332 ; Bot. Mag. 3356 ; Miq. Fl. Ind. Bat. I, Pt. 1, 425 ; Wight Ic. 435. Myrtus Jambos, Kunth; Korth. in Ned. Kruidk. Arch. I, (1846), 200 ; Blume Bijdr. 1085.-Rumph. Herb. Amb. I, 123 ; Rheede Hort. Mal. I, 27, f. 17.

Cultivated in most of the provinces : perhaps wild in Perak; Scortechini ; Maingay 735. Cultivated also in British India.

Readily distinguished in this section by its narrow leaves attenuated to each ond and fow-flowered terminal racemes.
5. Eugenia malaccensis, Linn. Sp. Plantar. 470. A glabrous tree, 30 to 40 feet high; young branches almost terete (slightly compressed) with pale bark. Leaves coriaceons, with short but distinct petioles, narrowly elliptic-oblong to oblanceolate-oblong, the apex more or less suddenly acute, the base much tapered to the petiole: when dry the upper

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surface olivaceous the lower pale-brown: main-nerves 10 to 12 pairs, slightly curved npwards, interarching to form a marginal nerve 1 in . to $\cdot 15 \mathrm{in}$. from the edge ; length 6 to 11 in .; breadth 1.75 to 3 in ; petiole .3 to $\cdot 5 \mathrm{in}$. Flowers 1 to 1.5 in . in diameter, in sessile or shortly pedunculate fascicles of three from the branches below the leaves. Calyortube obconic about $\cdot 5 \mathrm{in}$. long, tapering into the quarter inch long ebracteolate pedicel; calyx-lobes 4, broadly rounded, coriaceous, not reflexed. Petals orbicular, with a broad claw, the edges thin, about $\cdot 4 \mathrm{in}$. in diam. (when dry). Fruit abont the size of a hen's egg, obovate, turbinate to elliptic-ovoid, smooth and glossy, from pale-rose-coloured to dark-parple, crowned by the inflexed calyx-lobes, edible. Seed nsually solitary. Duthie in Hook. fil. FI. Brit. India. II, 471 ; Roxb. Fl. Ind. II, 483 ; Wall. Cat. 3611; Wight Ill. II, 14, t. 98; Kurz in Journ. As. Soc. Beng. XLVI, Pt. 2, 68 ; For. Fl. Brit. Burm. I, 493. E. macrophylla, Lam. Encyc. III. 196. Jambosa malaccensis, DC. Prod. III, 286 ; Korth. in Ned. Kraidk. (1847), 200 ; Bot. Mag. 4408; W. \& A. Prodr. I, 332. J. purpurascens, DC. l.c. excl. syn. Roxb. J. domestica, Ramph. Herb. Amb. I, 121, t. 37 (not good) and 38, f. i ; DC. l.c. 288 ; Blame Mus. Bot. I, 91 ; Miq. Fl. Ind. Bat. I, Pt. 1, 411. Myrtus macrophylla, Spreng. ; Blame Bijdr. 1084. M. malaccensis, Spreng.; Blume l c. 1083. —Burm. Fl. Ind. 114 ; Rheede Hort. Mal. I, 29, t. 18.

Doubtfully wild in any of the Provinces, bat frequently cultivated as it also is in Burma, the Malayan Islands and British India.

The variety with very dark parple ovoid-elliptic fruit was described as a species by Roxburgh and has the following synonymy :-Eugenia purpurea, Roxb. Hort. Beng. 37 ; Fl. Ind. II, 483; Wight Ill. II, 14; Ic. II, 549. Jambosa purpurea, Wall. Cat. 3610. J. domestica, var. purpurea, Blume Mus. Bot. I, 92 ; Miq. l.c.-J. nigra, Rumph. Amb. 125, t. 38, fig. 1 ?
6. Eugenia pseudo-pormosa, King n. sp. A glabrous shrub; young branches slender, sub-terete, compressed near the nodes, pale. Leaves sab-coriaceous, elliptic or oblong-elliptic, acuminate, slightly narrowed to the rounded base; upper surface olivaceons-brown when dry, the lower pale jellowish-brown; main-nerves 14 to 20 pairs, curving upwards, interarching 15 to $\cdot 25 \mathrm{in}$. from the margin; length 7 to 12 in .; breadth 3 to 5 in. ; petiole $\cdot l$ or $\cdot 2 \mathrm{in}$. long, or absent. Flowers white tinged with red, sessile in densely, crowded fascicles or very condensed cymes at the apices of the branches, 6 in . in diam., the bads globular. Oalyz $\cdot 4 \mathrm{in}$. long; the tube cylindric-campanulate, the mouth with 4 broad blunt lobes becoming hardly triangular. Petals orbicular. Style $1 \cdot 5 \mathrm{in}$. long. Stamons and fruit anknown.

Prbak: Wray 1809, 3581; King's Oollector 3401, 5389, 6254; doortechimi. Sing Pore : Ridley 9520.

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A specien resembling $\boldsymbol{F}$. formosa in its shrubby habit and its leaves; the latter are however thinner in texture and they have more numerous nerves. The flowers of this are however sessile fasciculate and mach smaller in size. Wray 3688 and Ridley 9628, which has its clavate flower bads in very short racemes, is probably a form of this species. E.samarangensis DC. mach resembles this but has its flowers in small racemes or panicles.
7. Edgenia papillosa, Duthie in Hook. fil. Fl. Br. Ind. II, 495. A tree 40 to 50 feet high : young branches stout about as thick as a goose-quill, terete, brown, those of the inflorescence 4 -angled. Leaves coriaceous, somewhat amplexicaul, oblong-elliptic sometimes obovateelliptic or lanceolate, subacute or blunt, narrowed to the cordate auriculate sub-amplexicaul base; upper surface smooth, shining, dark-olivaceous or blackish-brown ; under surface reddish-brown; main-nerves 16 to 20 pairs, curving slightly upwards and interarching $\cdot 1$ to $\cdot 2 \mathrm{in}$. from the edge, very prominent on the lower surface like the mid-rib, inconspicuous or depressed on the upper; length 8 to 12 in.; breadth 3 to 5 in. ; petiole less than 1 , very thick. Panicles pedunculate, crowded at the apices of the youngest shoots or axillary, shorter than the leaves: the branches mostly short, divaricate, scurfy like the branchlets. Flowers (the stamens included) 6 in . long, sessile and collected in globose-clavate bracteate heads of 5 to 8 at the apices of the branchlets; the bracts oblong, blunt, deciduous. Oalyx 35 in. long, funnel-shaped, narrowed above the middle to a pseado-stalk: the limb wide and with 4 broadly triangular, unequal, reflexed, blunt lobes. Petals orbicular, three times as long as the calyx-lobes, not mach shorter than the stamens. Fruit unknown. E. anacardifolia, King MSS.

Malacca; Manigay (K.D.) 737; Holmberg 873. Singapore: Ridley 3829. Perak : Scortechini ; King's Collector 2813, 5869, 8475.
8. Ejgenia densiflora, Duthie in Hook. fil. Fl. Br. Ind. II, 473. Shrubby, occasionally arboreous, glabrous : young branches compressed, pale-brown. .Leaves coriaceons, narrowly elliptic-oblong, acuminate, the base cuneate, both surfaces glabrous, shining, finely reticulate, the upper olivaceous (when dry) the lower pale-brown; main-nerves 12 to 20 pairs, slender but distinct on both surfaces (when dry), ascending slightly, curved and interarching 3 to $\cdot 4 \mathrm{in}$. from the edge, a second series of short arches being interposed between these and the margin; length 5 to 8 in . ; breadth 1.75 to 2.5 in .; petiole 35 to $\cdot 5 \mathrm{in}$. Panicles terminal, many-flowered, compact; the branchlets numerous and fewflowered. Flower-buds clavate, about $\cdot 5$ in. long just before expansion. Flowers about 75 in. across, white, mach tinged with red. Oalya-tube funnel-shaped, 3 to $\cdot 4 \mathrm{in}$. long, jointed to a stout pedicel shorter than itself ; the 4 lobes, $\cdot 15 \mathrm{in}$. long, unequal, broad, rounded. Petals much larger than the calyx-lobes, sub-orbicular, muoh shorter than the
stamens. Fruit as large as a cherry, rose-coloured, globular, with a tough smooth epicarp, the apex crowned by the large calyx-lobes. Seed one, rarely two. Jambosa densifora, DC. Prod. III, 287 ; Korth. in Ned. Kruidk. Arch. I, 200 ; Blume Mus. Bot. I, 93 ; Miq. Fl. Ind. Bat. I, Pt. 1, 416. Myrtus densiflora, Blame Bijdr. 1087. Eugenia corymbosa, Roxb. Fl. Ind. III, 497 ; Wight Ic. 627.

Malacca: Maingay (K.D.) 760/1 762/2 (? 758). Perak : King's Collector 738, 4355, 4682, 5721, 5855, 5868, 7065, 8102, 10940; Scortechini 149, 743 ; Wray 544. Singapore: Ridley 356, 5072. Pabang: Ridley 2646. Penang : Curtis 3431. Distrib.-Sumatra, Java.

A very handsome species somewhat resembling E. Jambos, L. but distingaished by its dense terminal panicles of flowers which are individually smaller than those of that species, also by its broader leaves, and smaller fruit ; allied to E. pendens, Duthie and E. garcinifolia, King.
9. Edgenia plombea, King n. sp. A glabrous tree; young branches only as thick as a crow-quill, 4 -angled, with dark bark. Leaves thinly coriaceous, lanceolate, acuminate, somewhat narrowed at the base ; both surfaces of a dull leaden colour when dry, the apper shining, the lower dull ; main-nerves 10 to 12 pairs, prominent on the lower, depressed on the upper surface; length 3 to 4 in.; breadth 1 to 1.5 in.; petiole 1 in. Flowers about 75 in. in diam., greenish-white, in terminal or axillary shortly pedunculate racemes of abont three. Calyx 6 in. long, campanulate or widely funnel-shaped, suddenly contracted just above its insertion on the short pedicel ; the month wide, divided into four broad, rounded segments $\cdot 15$ in. long. Petals rotund-reniform, longer than the calyx-teeth, shorter than the stamens. Fruit anknown.

Peraft : on Gunong Pateh, elevat. 3400 feet; Wray 479.
A speoies resembling this has been collected in Borneo by Mr. Ridey (Herb. Ridloy 9071).
10. Edgenia Scortechinit, King n. sp. A glabrous shrub or tree: young branches thicker than a crow-quill, boldly 4 -angled, winged below the nodes. Leaves scantily pellucid-dotted, sub-coriaceous, ovate-oblong to oblong-lanceolate, acnte rarely acuminate, narrowed to the rounded occasionally minutely cordate base; both surfaces brown when dry, the lower paler ; main nerves 7 to 10 pairs, prominent on the lower surface, carving upwards, and joining to form a bold uerve 2 in . from the edge, between which and the edge is a second series of minute arches; length 4 to 6 in.; breadth 1.35 to 2.35 in.; petiole $\cdot 15 \mathrm{in}$. sometimes absent. Racemes terminal and in the upper leaf-axils, corymbose, condensed, very much shorter than the leaves, 3 - to 9 -flowered. Flowers pale-red, with some yellow in the centre, about 65 in . in diam., on very short podicels. Calyx shortly and widely campannlate, 4 in . long,
smooth, the mouth with very broad short unequal lobes, very little contracted at the base. Petals red, orbicular, longer than the calyxlobes, much shorter than the stamens. Fruit broadly oblong, the apex truncate and crowned by the thick, deep, cup-shaped calyx, about $\cdot 5 \mathrm{in}$. long, the base abruptiy contracted into a short pseudo-stalk.

Perak: Scortechini 649; King's Collector 4734, 7801, 10076. Malacca: Manigay (K.D.) 736.


#### Abstract

This resembles E. diospyrifolia, Wall., but that species has long-stalked flowers, with a narrower calyx-tube, and the nervation of the leaves is different. This also resembles $\boldsymbol{E}$. coarctata, Blume, which however differs in having pale terete young branches and larger leaves, and $E$. xmula, Blume, from which it differs in the number of the nerves of the leaves and in its thicker young branches. From E. macrocarpa, Roxb., this differs in its much thinner quadrangular branches and muoh amaller flowers and fruit.


VAR. parvifolia; leaves narrowly oblong-lanceolate, only from 3 to 6 in. long and 8 to 1.25 in. broad.

Preak: King's Collector 3348, 10437.
11. Edgenia mollis, King n. sp. A hairy shrub or small tree : young branches slender, pale-brown, 4 -angled like the rachis and branches of the panicle but not winged, covered with short, thick, brown hairs. Leaves sab-coriaceous, oblong-lanceolate, the apex finely acuminate, slightly narrowed to the rounded, slightly cordate base; upper surface pale olivaceous-brown, subglabrous; the lower darker and everywhere covered with hairs like those on the young branches and inflorescence; length 8 to 12 in .; breadth $1 \cdot 75$ to 4 in .; petiole $\cdot 1$ to -2 in . Panicles terminal, shortly peduuculate, nearly as long as the leaves; the branches spreading and more or less trichotomous at their extremities. Flowers numerous but not crowded, about $\cdot 5 \mathrm{in}$. across when expanded. Calyxtube $\cdot 4$ in. long, clavate, densely and minutely scurfy-hairy tapering mach to the short pedicel ; the month 3 in. across, divided into 4 subequal rounded lobes about $\cdot 1 \mathrm{in}$. long, their edges thin and glabrous. Petals orbicular, white, much longer than the calyx-lobes. Fruit ovoidglobose, crowned by the cupular calyx, covered with decidnous scurflike hairs, 6 in. long.

Perak: King's Collector 2686, 2808, 5572, 8387; Wray 2372. Distrib.-Sumatra, Forbes 1475.
12. Eugenia quadrata, King n. sp. A glabrous tree, 20 to 30 feet high : young branches as thick as a goose-quill, acutely 4 -angled and narrowly winged, pale-brown. Leaves thinly coriaceons, narrowly oblong, much acuminate, slightly narrowed and cordate at the rounded base; upper surface pale olivaceous-brown when dry, the lower darker brown and often not olivaceous; main-norves 20 to 25 pairs, slender,
diatinct, interarching $\cdot 1 \mathrm{in}$. from the margin ; the reticulations minute; length 8 to 10 in .; breadth 1.75 to 2.75 in .; petiole very short 05 in . long. Cymes very short, glomerulate, 3-flowered, pedunculate, solitary and axillary or in groups of 3 or 4 and terminal, about 2 to 3 in . long ; their peduncles compressed, 1 to 1.5 in . long. Flowers white, about .75 in. in diam. : calyx-tube $\cdot 5 \mathrm{in}$. long, widely campanulate, suddenly contracted into a long pseudo-stalk, epedicellate ; calyx-lobes 4, unequal, broad, rounded, only $\cdot 1 \mathrm{in}$. long or less, reflexed. Petals orbicular, much larger than the calyx-lobes. Stainens slightly exceeding the petals. Fruit unknown.

Perak: King's Collector 5547.
In shape and nervation the leaves of this somewhat resemble those of E . mollis, King.
13. Edgrnia scalarinervis, King n. sp. A glabrous tree, 20 to 30 feet high : young branches nearly as thick as the little finger, slightly compressed, pale. Leaves coriaceous, elliptic-ovate, sub-acute, the base rounded and cordate; upper surface brown slightly tinged with olivaceons (when dry), the lower much paler; main-nerves 22 to 30 pairs, very prominent on the lower and depressed on the upper surface, curving very slightly upwards and interarching $\cdot 15 \mathrm{in}$. from the margin, the intermediate nerves rather distinct, the reticulations few and large; length 10 to 14 in .; breadth 5 to 7 in .; petiole about ' 3 in ., stout, wrinkled when dry. Flowers in much contracted few-flowered terminal racemes, 1.5 in . or more across. Calyx-tube magenta-coloured (fide collector), smooth, 75 in . long, coutracted at the base into a pseudostalk $\cdot 15 \mathrm{in}$. long and jointed to a pedicel $\cdot 15 \mathrm{in}$. long; the month wide, divided into 4 broadly-triangalar teeth $\cdot 15$ in. long. Petals unknown. Style about 1 in . long, the stamens shorter. Fruit (unripe) globular-ovoid, crowned by the large, wide-tubular, 4-lobed calyx-limb $\cdot 75$ in. long.

Perak: King's Oollector 8200 ; Ridley 3095.
The speoimens of this very fine species are scanty and imperfect. It is distingaished by the great size of its leaves and by the large number and the prominence of their sub-horizontal nerves.
14. Eugenia progamentacea, King n. sp. A tree ? ; young branches terete, as thick as a quill, pale-brown. Leaves chartaceous-coriaceous, narrowly elliptic-oblong, abruptly and shortly acuminate, the base cuneate ; upper surface when dry shining and of a dull leaden-colour; the lower brown, both finely and transversely reticulate; main-nerves 28 to 32 pairs, very regular, straight, slightly ascending, interarching $\cdot 15$ in. from the margin, prominent on the lower, depressed on the upper surface; length 12 to 16 in. ; breadth 4 to 6 in.; petiole 5
in., laterally compressed. Panicles 3 or 4 inches long, solitary in the leaf-axils or in groups of 2 or 3 at the apices of the branches; the branchlets few, short, spreading, bearing 3 or 4 flowers at their apices. Flowers 6 in. in diam.; depressed globular in bud. Calyx-tube shortly and widely campanalate, suddenly contracted into a pseudo-stalk $\cdot 1 \mathrm{in}$. long:: the teeth 4, short, anequal, rounded, inflexed. Petals 4, orbicularovate, pellacid-dotted, not mach longer than the stamens, free. Fruit globular, smooth, crowned by the short calyx-cap, 1 in . in diam., black when dry. Syzygium subdecussatum, Wall. Cat. 5589 in part.

Penang: Ourtis 1440.
Since the time of Wallich who issued it along with his Syz. subdecussatum this has been collected by Mr. Curtis only. The elongate leaves of parchment-like texture with many straight very regalar nerves and short panicles and globalar frait distinguish it.
15. Eugrnia Dybriana, King n. sp. A tree, 40 to 50 feet high; young branches as thick as a goose-quill; young branches terete below, compressed near the apex, dark-brown. Leaves thickly coriaceons, elliptic, (oblong in the variety), sligbtly narrowed at each end; both surfaces dark-brown when dry and shining; the upper with midrib and main-nerves impressed, the reticulations invisible; the lower of a warmer brown colour, the main-nerves and midrib (but not the reticnlations) very bold : main-nerves 13 to 20 pairs, slightly curved, ascending, interarching $\cdot 1 \mathrm{in}$. or more from the recurved edge; length 7 to 9 in.; breadth 3.5 to 5 in .; petiole 4 to 6 in .; short. Panicles nartow, few-flowered, much shorter than the leaves, terminal or from the upper leaf-axils, usually pedunculate : branches few, short, spreading, mach compressed, the flowers crowded at their apices. Flowers 4 in . across when expanded, sessile, obovoid in bud. Calyx campanulate, - 3 in. long, abruptly constricted into a very short psendo-stalk, the month wide and with 4 small rounded lobes. Petals 4 , free, not calyptrate, orbicular. Stamens white, only 25 in . long. Fruit (unripe) globular, smooth, crowned by the small, short, circular remains of the calyx, 75 in. in diam.

Prrak : Scortechini 2018; Wray 2094; King's Oollector 6196, 6404, 6767.
var. oblonga; leaves oblong or narrowly oblong-elliptic, 4 to 8 in. long and 1.25 to 2.75 in . broad ; panicles nearly as long as the leaves.

Prear: King's Collector 7669.
A species near $\boldsymbol{E}$. Clarkeana, King, but with larger leaves with more nerven, larger flowers but smaller panicles.
16. Eogenia Hemsleynana, King n. sp. A tree, 30 or 40 feet high : young branches thinner than a goose-quill, the bark yellowish-grey.

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Leaves large, rigidly coriacoous, elliptic or elliptic-oblong, shortly and bluntly acuminate, slightly narrowed at the base; both surfaces, but especially the upper, dark when dry, the upper shining with the nerves impressed, the lower somewhat paler, dull and the nerves prominent; main-uerves 20 to 25 pairs, slightly curved upwards and interarching $\cdot 1$ to $\cdot 2 \mathrm{in}$. from the edge : length 6 to 9 in.; breadth 3 to 3.5 in. ; petiole $\cdot 3$ to $\cdot 35$ in. stont. Panicles mostly on long 4 -angled striate peduncles, terminal, shorter than the leaves, crowded in groups of 6 to 8 at the apices of the twigs; branches few, a long one often from the very base, the remaining short (mostly under one inch), all compressed, and each bearing at its apex a dense capitule of sessile flowers 3 or ${ }^{-4} \mathrm{in}$. across. Calyx 15 in. long, campanulate, contracted and ribbed at the base but not forming a pseudo-stalk; the mouth with 4 broad, rounded, concave teeth. Fruit (nnripe) globular with numerous bold vertical ribs, the apex crowned by the calyx-lobes.

Perak: Wray 1803; King's Collector 6114, 8697.

[^9]17. Edgenia pachyphylla, Kare in Journ. As. Soc. Beng. XLII, Pt. 2, 332. A glabrous tree: the young branches slender, terete, paleyellow when dry. Leaves coriaceous, obovate to obovate-oblong, the apex abruptly and broadly apiculate, the base cuneate; upper surface oliva-ceons-brown when dry, the lower pale-brown: main-nerves 12 to 15 pairs, slender but distinct on the lower surface, spreading, slightly curved and interarching about $\cdot 1 \mathrm{in}$. from the margin, length 3.5 to 5 in. ; breadth 2 to 2.25 in .; petiole 2 to 3 in . Flowers 3 in . in diam., in pedunculate few-flowered corymbose racemes or panicles axillary or clustered at the apices of the branches, the common peduncles 1 to 1.5 in. long, those of the branchlets (in the panicles) half as long, all 4-angled, the flowers themselves sessile at the apices, the bads globoseclavate. Calyx in the expanded flower ${ }^{4} 4 \mathrm{in}$. long, widely fannelshaped, suddenly contracted into a cylindric tube, the 4 lobes of the mouth about $\cdot 2 \mathrm{in}$. long, broad, rounded. Petals sub-orbicular, larger than the calyx-lobes. Stamens 4 in . long. Fruit anknown. Karz For. Fl. Br. Burma I, 490 ; Dathie in Hook. fil. FI. Br. Ind. II, 477.

Malacca: Griffith (K.D.) 2371/1 : Maingay (K.D.) 742. Distrib.Burma, Brandis 1337.

[^10]ovate-oblong to broadly ovate, rarely obovate-oblong, the apex blunt with a short abrupt point, or sub-acate, the base slightly cuneate, both surfaces deep-olivaceous brown the apper somewhat shining, the lower dull: main-nerves 10 to 12 pairs, rather straight, slightly ascending and interarching with an iniramarginal nerve close to the edge, not conspicuons on either surface: length 3 to 4.5 in ; breadth 1.75 to 2.75 in ; petiole 3 to 5 in . Panicles mostly in clusters at the apices of the branches, pedanculate, or shorter than the leaves; branchlets 4 -angled, spreading, few-flowered, the flowers sessile, or nearly so, clustered at the apices, $\cdot 25$ to ${ }^{-3} \mathrm{in}$. in diam. Calyx clavate-rotund, abont $\cdot 2 \mathrm{in}$. long just before expansion, vertically ribbed, tapering to the base; the lobes 4, unequal, less than $\cdot 1 \mathrm{in}$. long, broad. Petals rotand, larger thàn the calyx-lobes. Fruit globular-ovoid crowned by the capular calyx, vertically ribbed, 4 in. in diam. (unripe). Dathie in Hook. fil. Fl. Bn. Ind. II, 466 ; Kurz in Journ. As. Soc. Beng. XLVI, Pt. 2, 68. E. grandis, Wight rar. lepidocarpa, For. Fl. Br. Burma I, 490.

Singapore: Ridley 1643, 4633, 4657, 4972, 6307, 6308, 8408; Wallich 3618; Walker; Hullet; King. Malacca: Griffith 2369, 2376, 2373, 2369, 2416; Maingay 725, 757, 759; Hervey; Deiry. Perak: Wray 415, 3907, 3914, 3908 ; King's Collector 10042. Distrib.-Barma.

A species in many respects resembling $E$. grandis, Wight, bat with smaller less shining leaves with fewer nerves and broader in proportion to length : shortor panicloe, smaller flowers which moreover are mostly sessile, and smaller, ribbed frait.
19. Evarnia garcinifolia, King n. sp. A glabrous tree, $\mathbf{6 0}$ to 80 feet high ; young branches slender, compressed, 6 -ridged, brown. Leaves thickly coriaceons, elliptic, or elliptic-oblong, the apex with a short abrupt point, slightly narrowed to the sub-acate or rounded base, the edges recurved when dry : both surfaces (when dry) shining, conspicuonsly reticalate, pale-olivaceons brown, the upper rather the darker, main-nerves 10 to 12 pairs, rather prominent beneath, interarching irregularly 2 to $\cdot 3 \mathrm{in}$. from the edge, some of the secondary nerves as prominent as the main ones; the reticulations minute but distinct; length 5 to 10 in .; breadth 2 to 3.5 in .; petiole 2 to 3 in . Panicles terminal, spreading, 3 or 4 in . across and scarcely as much long. Flowers probably on thick striate pedicles 25 in . long. Oalyx narrowly campanulate, 5 in . long, the month with 4 nnequal, short, rounded teeth. Petals orbicular. Stamens unknown. Fruit (young) globular-ovoid, crowned by the 4 triangular calyx-teeth.

Preak: King's Collector 4541, 6974. Sumatra: Scortechini 365.
A species allied to $\boldsymbol{E}$. densifora, Dathie, but with a less dense inflorescence and larger flower-bnds. The leaves of this moreover are larger and thioker, the reticulations more marked and the edges recurved.
20. Eugenia crenulata, Duthie in Hook. fil. Fl. Br. Ind. II, 490. A glabrous tree: young branches as thick as a goose-quill, terete, brown. Leaves thickly coriaceous, elliptic or elliptic-rotand, the apex rounded but with an abrupt short apiculus, the base cuneate; both surfaces (when dry), shining, the numerous reticulations and nerves distinct, the intramarginal nerve very close to the thickened and slightly crenate edge; under surface rather remotely black-pustulate; length 4 to 5 in.; breadth 2.5 to 4 in.; petiole 3 to 6 in. Panicles terminal, nearly as long as the leaves when in bud, (sometimes longer), corymbosely trichotomus, many-flowered; the peduncle and branches 4-angled, compressed, the nodes and the insertions of the flowers with minate bracteoles. Flowers (including the stamens) 4 in. long, sessile. Petals 4, calyptrate. Calyx -2 in. long, campanulate with a truncate mouth, contracted for half its length into a pseudo-stalk. Fruit nnknown.

Malacca : Maingay (K.D.) 739. Singapore : Ridley 6232.
Becognisable at once by its orenate leaves; only twice collected and evidenty rare. The Singapore specimen has thinner leaves and more slender longer panicles but, in other respects, it agrees with the Malacca one.
21. Edgenia arandis, Wight Ill. II, 17 : Ic. t. 535. A glabrous tree, 30 or 40 feet high: young branches terete, dark-brown. Leaves thickly coriaceons, ovate-rotund to ovate-elliptic or elliptic-oblong, the apex rounded with or without an abrupt short blunt point, or subacute or acute, the base always narrowed to the petiole: both surfaces shining; and the apper olivaceous, the lower brown when dry: mainnerves 12 to 14 pairs, curving upwards very slightly and interarching, with an intermarginal nerve 1 to 2 in . from the edge: the secondary nerves and lax reticulations slender but distinct like the main ones on both surfaces, length 8.5 to 7 in . ; breadth $1 \cdot 75$ to 4 in .; petiole $\cdot 4$ to 65 in . Panicles mostly clustered at the apices of the branches, more than half as long as the leares, on peduncles $\cdot 6$ to $1 \cdot 25 \mathrm{in}$. long; the branches spreading, an inch or more long. Flowers sessile at the ends of the branches, 35 to 45 in . in diam. when expauded; the buds just before expansion clavate-rotund, 5 in. long. Calyx clavate, tapered to the short pedicel, $\cdot 35$ to $\cdot 5 \mathrm{in}$. long, smooth, the 4 lobes concave, orbicular, about 2 in . long, two much larger than the others. Petals of the same size and shape as the calyx-lobes. Filaments 35 in . long. Ripe fruit oblong-ovoid, 1.5 in . long, crowned by the cup-shaped calyx-limb, 1-seeded. Duthie in Hook. fil. Fl. Br. India I, 475 ; Kurz in Journ. As. Soc. Beng. XLVI, (1877), Pt. 2, 67 ; For. Fl. Brit. Burm. I, 489. E. firma, Wall. Cat. 3603 ; not of DC. E. cymosa, Roxb. Hort. Beng. 37 ; Fl. Ind. II, 492 ; not of Lam. Jambosa grandis, Blame Mus. Bot. I, 108. ' J. firma, Blume l.c. J. urceolata, Korth. in Miq. Fl. Ind. Bat. I,

Pt. 1, 418 in part. Syzygium grande, Walp. Repert. II, 180 ; not of Wall. Cat. 3554. S. firmum, Thwaites Enum. 417. B. montanum, Thwaites l.c. 116.

Malacca: Griffith (K.D.) 2368, 2369, 2370, 2371 ; Maingay 730, 723. Singapore : Ridley 4633 ; Hullet. Langami: Ourtis. Penang: Curtis 7515. Distrib.-British India in Burma, Chittagong, Sylhet and Assam.

A species easily recognised by its thick glossy reticulate leaves, large (mostly) terminal panicles with large flower-buds and ovoid-cylindric smooth frait crowned by the cap-shaped calyx-lobes.

Included under this both by Dathie in the Flora of Britigh India and by Trimen in his Flora of Ceylon, is a Ceylon plant (Thwaites C.P. 2694 which he named 8. insigne). This plant has quite the leaves of $\boldsymbol{E}$. grandis, but the flower buds are much larger and if flowers and fruit were available it would probably turn out to be specifically distinct. F. grandis, Wight, is allied closely to E. lepidocarpa, Wall.
22. Euginia Thumra, Roxb. var. penangiana, King. A mediumsized tree; young branches somewhat thinner than a goose-quill ; the bark rough, brown. Leaves coriaceous, oblong-elliptic or oblong-lanceolate, sab-acute or bluntly and very shortly acuminate, the base cuneate; both surfaces dull; the upper dark leaden-brown, the nerves and midrib impressed; lower surface dark-brown, the nerves and midrib prominent; main-nerves 15 to 20 pairs, curving upwards, interarching 1 in. from the edge ; length 4 to 5 in .; breadth 1.8 to 2 in . ; petiole 3 to 5 in. Panicles nearly as long as the leaves, terminal and axillary, pedunculate, lax ; the branches numerous, spreading, 4 -angled like the pedancle, the smaller compressed. Floweers 35 in. long (including the stamens), sessile, white, crowded, 5 or 10 together at the apices of the ultimate branchlets, clavate in bud. Oalyx fannel-shaped, narrowed for half its length into a ribbed psendo-stalk, the mouth with 4 broad, suborbicular lobes. Fruit unknown.

Penang: Ourtis 2410.
This differs from the typical $\boldsymbol{E}$. Thumra, Roxb., in having narrower leaves with fewer nerves and rather shorter panicles the branches of which are more acately 4-angled. Fruit of this is unknown : when found it may yield characters warranting the separation of this as a distinct species.
23. Ejgrnia Grifyithir, Duthie in Hook. fil. Fl. Br. Ind. II, 481. A tree, 50 to 80 feet high; young branches thinner than a goose-quill, their bark brown and rather rough. Leaves coriaceous, oblong or nairowly elliptic, narrowed about equally at base and apex, both surfaces dark-brown when dry, shining; main-nerves 15 to 20 pairs, spreading, rather straight, interarching 1 in. from the edge, depressed on the upper and prominent on the lower surface, reticulations small, indistinct; length 4.5 to 6 in ; breadth 2 to 2.5 in ; petiole $\mathbf{2}$ to $\mathbf{3} \mathrm{in}$.

Panicles small, racemose, in clusters of 6 to 8 at the apices of the branches, few-flowered, anequal in length bat all shorter than the leaves and on more or less long, compressed, dark-coloured pedancles; the branches few, unequal in length but all under an inch, compressed; flowers in threes, sessile at the apices of the branchlets, the buds clavate. . Calys campanalate, 25 in . long, constricted for more than half its length into a thick pseudo-stalk: the mouth with 4 broad, rounded lobes. Pelals 4, orbicnlar not calyptrate. Fruit (unripe) globular-ovoid, slightly corrugated, crowned by the small circular remains of the calyx.

Malacca: Griffith (K.D.) 2375. Perak: Wray 2713; King's Collector 6192. Singapore: Ridley 4980, 4981, 7951.
24. Eugenia Clabkeana, King, n. sp. A tree 30 to 50 feet high; young branches as stont as a quill, terete, compressed near the nodes, brown. Leaves coriaceous, elliptic-oblong to elliptic, very shortly acuminate, gradually narrowed from about or below the middle to the acnte base; apper surface dark-brown, shining, not reticulate, the nerves faintly impressed ; lower liver-coloured, rather dall, with numerons small pustules, the 12 to 16 pairs of curved main-nerves slightly prominent, the intramarginal nerves abont $\cdot 1$ in. distant from the slightly recurved edge, reticulations invisible; length 4.5 to 8 in ; ; breadth 1.75 to 3 in .; petiole 3 to 35 in . Panicles mostly terminal, shorter than the leaves, pyramidal, with many 4 -angled, often compressed branches. Flowers sessile, in densely crowded capitulos at the apices of the branchlets, about 35 in. across when expanded, white. Petals 4 or 5 , free, broadly oblong, not calyptrate. Calyx widely campanulate, nearly 2 in . long, constricted at the base, ragulose ; its month with 4 broad, shallow, blunt lobes. Fruit globalar and 1 -seeded or depressed-reniform and 2 -seeded, vertically corrugated when young, ragalose when ripe, shining, black, crowned by the small circular remains of the calyx ; the globular form .75 in. or more in diam., the reniform form aboat 1 in . long and 1.35 in . broad; pulp none.

Perak: Scortechini 205; King's Oollector 3349, 3491, 8573, 6822, 7811.

Allied to $\mathcal{E}$. Griffithii, Duthie, but with a single large terminal panicle instesid - of a number of araall ones and with smaller flowers.
25. Eqgeria corrdaata, King n. sp. A tree, 30 to 60 feet high; young branches terete but compressed at the apices thinner than a goose-quill, brown. Leaves as in E. Olarkeana, but the main-nerves not depressed on the apper sarface. Panicles terminal, short and fewbranched; the branches terete. Flovers not seen. Fruit globular, much corrugated and vertically ridged, especially towards the base and
apex, depressed-globose, the rind 25 in. thick, when fully ripe, greenishyellow, and 2 to 3 in . in diam.

Perak: King's Collector 5298, 6987.
26. Eugenia pendens, Duthie in Hook. fil. Fl. Br. Ind. II, 475. A small tree with pendent branches: young branches compressed, slender, brown. Leaves thinly coriaceons, pellucidly dotted, narrowly oblong-elliptic or elliptic, occasionally somewhat oblanceolate, the apex shortly and rather abruptly acuminate, the base cuneate; both surfaces olivaceous when dry: main-nerves 10 to 12 pairs, slender, ascending, slightly curved, interarching 2 in . from the margin, secondary nerves and reticulations indistinct; length 5 to 7 in .; breadth 1.4 to 3 in .; petiole 3 to $\mathbf{3 5}$ in. Panicles terminal, about 2 in . in diam., condensed, the branchlets about 5-flowered. Flower-buds globose-clavate, 5 in. long just before expansion. Flowers when expanded nearly ${ }^{5} 5$ in. across. Calyx-tube narrowly funnel-shaped, jointed to a pedicel shorter than itself: lobes short, rounded, subequal, reflexed. Petals orbicular, longer than the calyx-lobes. Stamens -75 in . long. Fruit depressedglobular, green flushed with red, smooth, crowned by the short reflexed calyx-lobes, 1 in . in diam.

Malacca: Griffith 2349 ; Maingay 747 ; Hervey. Johore: Ridley 4200. Singapore: Ridley 8048, 8447. Perak: Scortechini 1809, 2021 ; Wray 3537. Penang : Ridley 10242. Distrib.—Sumatra, Forbes 1377.

[^11]27. Eugenia Burkilliana, King n. sp. A. tree, 40 to 60 feet high: young branches thinner than a goose-quill, brown. Leaves coriaceons, oblong-lanceolate, shortly acuminate, the base cuneate; both surfaces (when dry) shining, pale brownish-green, the apper pitted, the lower with black dots, the edges slightly recurved; main-nerves 10 to 14 pairs, ascending and forming wide arches 1 to 15 in. from the edge, between which and the actual edge is a second intramarginal nerve, the secondary merves and connecting reticulations almost as prominent, all thin and equally visible on both surfaces, all raised : length 2.25 to 3.5 in. ; breadth 9 to $1 \cdot 25$ in. ; petiole $\cdot 35$ to $\cdot 5 \mathrm{in}$. Panicles terminal, sessile, many-flowered, broader than long, much branched, their tops broadly pyramidal, usually somewhat shorter than the leaves: branches thick, striate, 4 -angled, slightly compressed. Flowers 7 in. long including the stamens, reddish before expansion, afterwards white, sessile, in threes at the ends of the branchlets, clavate in bud. Calyx 35 to 4 in . long, striate, funnel-shaped, its lower half gradually narrowed into a

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psendo-stalk : the mouth with 4 broad, rounded, shallow lobes. Petals orbicular, not calyptrate. Fruit unknown.

Preak: Wray 2785, 3070; King's Collector 4719, 6186.


#### Abstract

A species near E. oblongifolia, Dathie, bat differing in its leaves, which are of the same colour on each surface and have more distinct nerves and reticulationa equally visible on both surfaces. The mouth of the calyz too is different, being deeply 4 -lobed.


28. Edaenia Helferi, Dathie in Hook fil. Fl. Br. Ind. II, 480. A considerable tree: young branches indistinctly 4-angled, as thick as a crow-quill, with pale-brown deciduous bark. Leaves narrowly elliptic, tapered to each end, the apex obtusely and shortly acuminate, the base caneate; both surfaces finely reticulate, pale olivaceous-green, the upper the darker : main-nerves about 12 pairs, faint, interarching close to the edge: the secondary nerves very faint; length 2.5 to 3.25 in .; breadth 1 to 1.25 in . ; petiole 2 in . Panicles terminal, solitary, spreading, abont half as long or sometimes quite as long as the leaves, the branchlets spreading, their bark exfoliating. Flowers in threes at the ends of the branchlets, about $\cdot 5$ in. across; buds clavate. Oalyx-tube funnel-shaped, $\cdot 2$ in. long, attenaated at the base to a pedicel ${ }^{\circ} 2$ in. long, the 4 lobes of the month unequal, short, broad, rounded. Petals broadly orbicular, much longer than the calyx-lobes and laalf as long as the stamens, bearing large pellucid glands on the exterior like the calyxtabe. Fruit unknown.

Pemang: Ourtis 212. Singapore: Lobb. Perak: King's Collector 4181. Distrib.-Burma (Tenasserim) Helfer 2418.

Closely allied to E. ramosissima, Wall, but with smaller flowers.
29. Euarnia Kurzif, Duthie in Hook. fil. Fl. Br. Ind. II, 478. var. andamanica, King. A tree: young branches as thick as a crowquill, terete, the bark very pale. Leaves thickly membranous, oblongelliptic, the base cuneate, the apex shortly caudate-acuminate; apper surface pale-olivaceous brown when dry, shining, remotely pitted, the main-nerves faint: lower surface paler brown, not olivaceons, the 10 or 12 pairs of main-nerves rather bold, arching upwards and interarching $\cdot 15$ to $\cdot 2$ in. from the edge; length 4.5 to 6 in. ; breadth 1.85 to 2.25 in.; petioles 3 to 4 in . Punicles from the axils of the apper leaves, or terminal, shorter than the leaves, often broader than long, spreading, many-flowered; the branches 4 -angled, pale. Flowers mostly in threes at the ends of the branchlets, 6 in . long (including the stamens). Calyx - 15 in. long; widely campenalate, narrowed into a thick pseadostalk as long as itself; the mouth wide, with 4 broad, rounded, reflexed teeth. Petals 4, free, sub-orbicular, reflexed. Stamens four times as long as the calyx. Fruit nnknown.

## andaman Islands, at Hobdaypore; King's Collector.

This differs from typical $E$. Kurzii in having narrower more acuminate leaves and longer stapens. The young branches moreover have paler bark. Fruit is as yet unknown, but when found it may afford characters to warrant specific rank for this.
30. Edgenia anisobepala, Duthie in Hook. fil. Fl. Br. Ind. II, 481. A large tree: young branches terete, thinner than a goose-quill, brown, smooth. Leaves coriaceous, ovate to ovate-lanceolate, shortly acuminate, the base cuneate, both surfaces (when dry) dark-brown, the upper shining and with the nerves rather faint; the lower paler brown, the 12 to 14 pairs of curved main-nerves rather distinct, interarching $\cdot 1 \mathrm{in}$. from the edge, the secondary nerves somewhat distinct; length 2.5 to $3.5 \mathrm{in} . ;$ breadth 1 to 1.75 in .; petiole 2 to $\cdot 25 \mathrm{in}$. Panicles terminal, corymbose; usually shorter than the leaves, the branches numerous, spreading, rather crowded, 4 -angled, the peduncle compressed. Flowers 5 in. long (including the stamens), sessile, clavate in bud, in threes at the apices of the branchlets. Calyx 3 in . long, campanulateiufundibuliform, its lower half contracted into a pseado-stalk; the limb with 4 unequal, broad, rounded labes (two being larger and sub-petaloid). Petals 4; not calyptrate. Fruit unknown. E. anisosepala, Dathie in Hook. fil. Fl. Br. Ind. II, 481 in part.

Malacca : Griffith (K.D.) 2380, 2381. Maingay (K.D.) 754, 753 (in part). Malacca: Derry 289.

Mr. Duthie remarks that the Griffthian specimens above quoted differ somewhat from those of Maingay inasmuch as they have smaller flowers. With these Mr. Derry's single specimen agrees. Maingay's specimens have a much larger more spreading panicle, with smaller flowers. The material is very poor and I think it is likely that, when more is forthcoming, it will be found that two species are mixed under the name E. anisosepala, Dnthie.
31. Eugenia Gageana, King n. sp. A tree, 40 to 50 feet high : young branches thinner than a goose-quill, terete, compressed at the nodes, brown (when dry). Leaves thickly coriaceous, oblong-lancoolate, bluntly acuminate, the base cuneate; upper surface dull-brown, the midrib thin and depressed, the main-nerves faint: lower surface paler brown, the midrib thick and the reticulations and secondary nerves numerous and distiuct; the main-nerves 12 to 18 pairs, curving opwards and interarching ${ }^{1} 1 \mathrm{in}$. from the edge : length 5 or 6 in .; breadth 1.5 to 2.25 in. ; petiole 25 to 3 in . Panicles terminal, about half as long as the leaves, sessile, corymbose, many-flowered, branching from the base ; branches stout, spreading, obtusely 4 -angled. Flowers seessile, in threes at the apices of the branchlets, globose-clavate in bud. Oalys narrowly campanulate, rather abruptly narrowed into a psendo-stalk :about 05 in. in length. Eruit nnknown.

Preak : King's Collector 7563.
32. Edarnia Holletiana, King n. sp. A tree, 20 to 25 feet high; young branches thicker than a crow-quill, terete, brown. Leaves thinly coriaceous, elliptic or elliptic-ovate, with an abrapt, broad, short, apical acumen, the base cuneate, the edge slightly recurved; upper surface somewhat shining, dull-olivaceous; the lower tinged with brown ; mainnerves numerous, about $\cdot 1 \mathrm{in}$. apart, rather straight, curving upwards at the ends only and there interarching less than 05 in . from the edge, faint on the upper surface and only slightly conspicuous on the lower, the midrib depressed on the upper surface convex on the lower : reticulations almost invisible on the upper, not prominent on the lower surface; length 3.25 to 4.5 in. ; breadth 1.5 to 2 in .; petiole 3 to 4 in . Panicles axillary and terminal, as long or nearly as long as the leaves, rather lax, pednuculate; the branches few, spreading, 4 -angled, compressed. Flowers. pale-green, (the stamens white), in groups' of three, sessile at the ends of the branches, about $\cdot 5$ or $\cdot 6$ in. long (including the stamens), clavate in bud. Calyx about $\cdot 25 \mathrm{in}$. long, funnel-shaped, the lower two-thirds cylindric and vertically ribbed; the mouth wide, divided into four broad, rounded lobes. Petals 4 suborbicular, reflezed, free. Fruit unknown.

Perak : King's Oollector 7470. Distrib.—Sumatra, Ridley 8973.
A species resembling in many respects $\boldsymbol{E}$. glauca, King, but with larger flowers and differently veined leaves.
33. Edgenia chlorantha, Duthie in Hook. fil. Fl. Br. Ind. II, 487. A small glabrous tree: young branches thin, dark-brown, sub-terete. Leaves coriaceous, elliptic or ovate-elliptic, the apex shortly and abruptly acuminate, the base cuneate, both surfaces olivaceous-green when dry : main-nerves numerous, interarching less than 1 in . from the edge, thin but distinct, the secondary nerves and reticulations also distinct : length 4.5 to 6 in.; breadth 2 to 3 in.; petiole 3 to 35 in. Panicles much shorter than the leaves, axillary and terminal, divaricate, many-flowered, condensed, trichotomous, the branchlets com. pressed, 4-angled, short. Flowers 3 in . in diam. (excluding the stamens), sessile, clavate. Calyx 35 in . long, contracted into a thick, ridged psendo-stalk for more than half its length, the mouth with 4 short thick, broad, rounded, spreading or reflexed lobes. Petals orbicular, greenish, not calyptrate. Fruit sab-globnlar, smooth, crowned by the prominent reflexed or spreading calyx-teeth, 3 to $\cdot 4 \mathrm{in}$. in diam.

Malacca : Griffith (K.D.) 2385 ; Maingay (K.D.) 733. Singapore : Ridley 445, 3910, 5823, 9220. Parang : Ridley 1096. Penang: Ourtis 180, 1448; Ridley 7957, 7952, 10190. Johore: Ridley 9181. Perak : King's Oollector 1277, 4082, 4220, 4076, 6765, 5619, 7511, 8535. Distrib; -Samatra, Forbes 3098.
J. II. 13

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Although the petals of this are greenish, the stamens are of a brilliant red coloar and as these are more permanent than the petale the specific name is somewhat mieleading. There are however some speoimens in whioh the petals are distinctly stated by the collector to be red.

In the Herbarium the species is readily recognised by the large persistent spreading aalyx-lobes which crown the fruit and by the greenish colour of the leaves.
34. Eugenia penangiana, Duthie in Hook. fil. Fl. Br. Ind. II, 486. A slender glabrous tree, 40 to 80 feet high : young branches sub-terete, ribbed, those of the inflorescence 4 -angled, all pale when dry. Leaves coriaceous, lanceolate or oblong-lanceolate rarely oblanceolate, obtusely acuminate, the base cuneate; both surfaces yellowish when dry, the lower slightly paler ; nerves numerous spreading not prominent on either surface; length 2 to 3 in. rarely 4 in . ; breadth 75 to 1.75 in. ; petiole $\cdot 1$ to $\cdot 15$ in. Panicles mostly terminal, but a few axillary, 1 to 3 in. long, on slender peduncles, the branchlets numerous divaricate, each bearing at its apex 3 to 5 sessile, white, clavate flowers ${ }^{\circ} 5$ or ${ }^{\circ} 6 \mathrm{in}$. long. Oalyx about 4 in . long (longer in fruit), funnel-shaped, abraptly tapering to the base, ribbed (when dry), the limb with 4 or 5 short often obscure teeth. Petals orbicular, equal in number to the calyx-lobes, free. Stamens short. Fruit elongate, gradually tapered to the base from the trancate apex, crowned by the cupular, entire calyx-limb, 5 or 6 in . long.

Pgang: Maingay (K.D.) 744; Ourtis 193, 2790, 2972. Perak: Scortochini 132, 184, 1368, 3410, 5651, 6965 ; Wray 3066. Malacea: Dorry 1177.

It is poseible that two species may be oovered by the preceding desaription as some of the specimens have smalier thinner leaves and flowers with more comatrieted prondo-etalke than the type specimen (Maingay 744) on which Mr. Dathie founded the speaies.
35. Edannia Ridleyi, King n. sp. A tree; young branches thinner than a goose-quill, torete, the bark brown, rather rough. Leawes thinly coriaceoras, oblong- or orate-lanceolate, acute, or acuminate, the base cuneate; both surfaces rather dull when dry, the upper dark olivaceous brown, the nerves impressed; the lower pale warm brown, the midrib and nerves very prominent; main-nerves 7 to 10 pairs, curving upwards and interarching far from the edge, the secomary nerves prominent but the reticulations obscure; length 3.5 to 4.5 in .; breadth 1.25 to 2 in ; petiole 4 to 5 in . Paxicles axillary and tecminal, half as long as the leaves, the terminal cometimes as long, broad, the branches few aad spreading horizontally, compressed especislly at the nodes. Fiovers 3 in. long (including the stamens), greon, sesaile, the buds clavate; calyx $\mathbf{2} \mathbf{i n}$. long, campanulate above, abraptly narrawed
for half its length into a minutedy granular pseudo-stalk; the mouth with 4 large, mounded lobes. Petals not calyptrate, three times as loag as the calyx-lobe日, ovate-rotiond and like the latter reflexed in flower. Bruit unknown.

Smgapore: (in the " garden jungle"), Ridloy 3706, 6416, 6419, 5728, 6233. Pemang: Owrtis 3010.

## Notable for ite green flowera

36. Eugenia pteapolia, Duthie in Hook. fil. Fl. Br. Ind. II, 487. A tree 20 to 40 feot high; young branches thicker than a crow-quill, pele, terete (the very youngest 4 -angled), brownish-white. Leaves coriaceous, elliptic-oblong or oblong-lanceolate, occasionally obovateelliptic, shortly and rather bluntly cuspidate, or cordate-acuminate, the base caneate; upper surface (when dry) dark olivaceous-brown, chining, the main and seoondary nerves and also the midrib deprossed, the latter prominent, the former faint; lower surface paler and duller than the upper and the nerves and reticulations rather more prominent, the midrib bold and coavex, the former faint; lower surface paler and duller than the apper ; length 2.5 to 4 in . ; breadth 1 to 1.75 in . ; petiole $\cdot 25$ to $\cdot 35 \mathrm{in}$. Panicles axillary and terminal, shorter or longer than the leaves, layly branched, corymbose or pyramidal, many-flowered, the branches spreading, slender, acutaly 4 -angled, bracteoles at the bases of the branches and at the bases of the flowers minate, subulate, decidnons. Flowers white, 4 in . long (including the calyx), clavate in bud, sessile in gronps of two, three or more at the ends of the branchlets; calyx slightly over $\cdot 2 \mathrm{in}$. in length, funnel-shaped, vertically striate, the mouth with 4 broad, shallow, rounded teeth. Petals reni-form-orbicular or orbicalar, dotted ontside, free. Fruit depressedglobular, crowned by the narrow tubular remains of the calyx, not pulpy, 75 in. in diam. when ripe. E. tumida, Duthie l.c. 487 . Syzygium pyrifolium, Wall. Cat. 3584; DC. Prodr. III, 261 (Syzyg.) ; Korth. in Ned. Kruidk. I, 204; Miq. Fl. Ind. Bat. I, Pt. 1, 457. Calyptranthes syrifolia, Blume Bijdr. 1090.

In all the provinces except the Andeman and Nicobar Islands: common.
37. Eugenia hingata, Duthie in Hook. fil. Fl. Br. Ind. II, 487. A tree 30 to 60 feet high; young branches thicker than a crow-quill, terete, their bark pale-brown. Leaves thinly coriaceous, ovate-lanceolate or naxrowly elliptie, rather abruptly and shortly acuminate, the base cuneate; upper surface (when dry) olivaceons-brown, shining, sometimes minately pitted; the nerwes numerons, indistinat, the midrib depressed; lower pale-brown, not olivaceons, the main-narves more distinet than on the upper, close together, the neighbonring ones
connected throughout their whole length by curving loops; length 2.75 to $\cdot 4$ in.; breadth $1 \cdot 1$ to $1 \cdot 75$ in.; petioles 25 to $\mathbf{3 5}$ in. Panicles terminal and from the upper leaf-axils, shortly pedunculate, lax, longer than the leaves; branches numerous divaricate, 4 -angled, the younger also compressed. Flowers 4 or $\cdot 5$ in. long (including the stamens), sessile in twos or threes at the apices of the branchlets, the bads clavate. Calyx narrowly funnel-shaped, gradually tapering to the base, striate; the mouth with 4 rather deep, broad, rounded, concave lobes. Petals 4, orbicular, reflexed. Fruit ovoid, crowned by the thick, short, wide, 4 -toothed calyx, black and shining when ripe, one-seeded, not pulpy, $\cdot 3$ in. long and $\cdot 2$ in. in diam. E. corymbosa, Wall. Cat. 3566 F. Jambosa lineata, DC. Prod. III, 287 ; Miq. Fl. Ind. Bat. I, Pt. 1, 428. Olavimyrtus lineatus, Blume Mus. Bot. I, 116. Myrtus lineata, Blume Bijdr. 1087.

In all the provinces except the Nicobar and Andaman Islands: common. Distrib.-The Malayan Archipelago.

A widely distribated species and varying as to size of leaf and also of flower-bud. In some specimens some of the nerves are of a dark colour on the lower aurface. This is often confused with $\boldsymbol{E}$. rubricunlis, Miq., which is itself a somewhat doubtfal species.
38. Eugenia cymosa, Lamk. Dict. III, 109 (not of Roxb.). A shrub or small tree; young branches as thick as a crow-quill, terete, pale. Leaves thinly coriaceons, ovate, ovate-lanceolate, (narrowly oblonglanceolate in VAR. concinna), candate-acuminate, the base cuneate; both surfaces when dry brown, the apper tinged with olivaceons, the numerous nerves and reticulations distinct on the lower less so on the upper ; length 2 to 3 in .; breadth 1 to $1 \cdot 5$ in.; petiole 15 to 3 in . Panicles numerous, axillary and terminal, an inch or two in length, the terminal twice as long, lax, the branches few, spreading, slender, compressed, with 3 or 4 flowers at their apices. Flowers sessile, white, 35 in . long (including the stamens). Oalyx campanulate, abruptly contracted into a pseudostalk, the mouth with 4 small triangular lobes. Petals 4, orbicular, free. Fruit almost globular, the size of a pea, blueish-black, pulpy, 1 or 2 -seeded, (if 2 -seeded transversely oblong in shape). Wight Ill. II, 17 ; Ic. t. 555 ; Kurz in Journ. As. Soc. Beng. XLVI, Pt. 2, 67 ; For. FI. I, 486. Duthie in Hook. fil. Fl. Br. Ind. II, 482. Syz. caudatum, Wall. Cat. 3591. S. vimineum, Wall. Cat. 3533 P. S. concinnum, Wall. Cat. 3582. S. nelitricarpum, T. \& B. in. Nat. Tidsch. Ned. Ind. XXV. S. cymosum, DC. Prodr. III, 259 ; Korth. in Ned. Kraidk. Arch. I, 202 ?. E. nigrescens, Poir. Suppl. III, 123 ?. E. rhodomelea, Commers. in DC. Prodr. l.c. Jambosa tenuicuspis, Miq. Fl. Ind. Bat. I, 431. Myrtus cymosa, Spreng. ; Blume Bijdr. 1086.

In all the provinces. Distaib.-Burma, Sylhet and Assam, Java.
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var. concinna (sp. Wall.); leaves narrowly oblong-lanceolate, candate-acuminate.

Perak: King's Oollector 10521. Distrib.-Burma, Wallich 3582.
39. Eugenia conglomerata, Duthie in Hook. fil. Fl. Br. Ind. II, 497. A large tree; young branches thinner than a goose-quill, obscurely 4 -angled, blackish-brown, smooth : the older terete, grey, striate. Leaves coriaceous, oblanceolate, sub-acute or blunt, much tapered to the base: upper surface (when dry) blackish-brown, shining; the lower liver-coloured, somewhat dull, minutely black-dotted; mainnerves 18 to 20 pairs, spreading, curved, faint, more distinct on the upper than on the under surface, the midrib stout on the lower surface, the edges slightly recurved; length 3 to 4.5 in .; breadth 8 to 1.75 in .; petiole 2 to 35 in. Inflorescences generally 2 or 3 together from small tubercles on the naked branches below the leaves, consisting usually of few-flowered capitula on short peduncles from 25 to 5 in . long, or of solitary flowers from the bases of the peduncles. Flowers small, sab-globular or campanulate, only about •] or $\cdot 15 \mathrm{in}$. long, sessile. Calyx widely campanalate; the limb with 4 rounded lobes. Petals 4, free. Fruit pisiform, smooth, crowned by the 4 calyx-lobes and also by the stamens, red, smooth.

Malacca: Maingay (K.D.) 745. Singapore: (near the Botanic Garden), Ridley 5073.
40. Eogenia drceolita, King. A tree, $\mathbf{3 0}$ to $\mathbf{6 0}$ feet high : young branches rather thinner than a goose-quill, 4-angled, with pale brownishyellow, striate bark. Leaves coriaceous, elliptic-oblong, elliptic, or obovate-elliptic, shortly and bluntly acuminate, the base cuneate; upper surface (when dry) dark-brown, shining, pellucid-dotted; the lower warm-brown, with black dots: main-nerves 12 to 18 pairs, curving upwards and interarching ${ }^{\bullet} 1 \mathrm{in}$. or more from the edge; length 5 to 7 in.; breadth 2 to $3 \cdot 25$ in.; petioles 25 in. long. Flowers from small axillary tubercles, solitary, fasciculate or in small panicles, (often several from one axil), much shorter than the leaves and with a few (usually about 3) very short, slender, spreading, 4 -angled branches powdered with ferragineous scarf. Flowers about 35 in. across (including the stamens). Calyx an open, rotate cup on a short, thin stalk, the margin divided into 4 broad, sab-orbicular, blunt, spreading, concave lobes. Petals 4, orbicular, free, spreading. Fruit turbinate, about 5 in. in diam., crowned by the short calyx-limb. Jambosa urceolata, Korth. in Ned. Kruidk. Arch. I, (1847), 202; Miq. Fl. Ind. Bat. I, Pt. 1,418 (excluding all the synonyms).

Perak: Wray 2423, 2609, 2928, 3134, 3248 ; King's Oollector 1908, 2317, 713, 3345, 4262, 6665, 6682, 6600, 10677, 10780. Selangor:

Bidley 7336. Singapore: Ridley 256, 4975. Malacca : Ridley. Dibtrib. -Sumatra.

The rotate 4-lobed calyx distinguishes this species.
41. Eugenia gladca, King n. sp. A tree, 40 to 50 feet high; young branches somewhat thicker than a crow-quill, terete; the bark pale-brown and flaky. Leaves coriaceous, oblong- or orate-lanceolate, often obovate-lanceolate, snb-acute or blunt and with a short blunt point; upper surface (when dry) olivaceous-brown and shining, the lower glancous (not glaucous in var.) ; the numerous nerves and reticulations very distinct on both surfaces, edge slightly recurved, (not recurved in var.) the intramarginal nerve very close to it; length 2.25 to $4 \mathrm{in}$. ; breadth 1 to 2 in .; petiole 25 to $\cdot 3 \mathrm{in}$. Flowers few, sessile, 3 in . long (including the stamens) and as much wide, in racemes or small, fewbranched, axillary or terminal panicles 3 or 4 inches long (often several together), with compressed, 4 -angled rachises. Calyx-limb, a wide shallow cup with 4 broad, shallow, deciduons lobes, afterwards truncateerose, below narrowed into a thin pseado-stalk. Petals 4, orbicular, clawed, free, reflexed. Fruit anknown.

Penang: Ourtis 1152, 2228. Perak: Ridley 3086. Malacca: Derry 1184.

Distingaished by its much reticulate leaves glancous beneath and its fewflowered inflorescence.
var. pseudo-glauca, King; like the type but with thinner narrower and more acute leaves with no tendency to be obovate, not glancous beneath and the edges not recurved.

Perak: Ridley 3108, 8386. The Dindings; Ourtis 3440.
42. Edgenia subrufa, King n. sp. A tree, 20 to 30 feet high: young branches half as thick as a goose-quill, terete, grey or pale-brown after the defoliation of the thin, flaky, brown bark. Leaves thickly coriaceous, narrowly elliptic or elliptic-ovate, shortly acaminate, the base cuaeate; upper surface (when dry) pale olivaceous-brown slightly shining, the midrib, nerves aud reticulations depressed; lower reddiah, dull, the midrib and nerves prominent: main-nerves about 8 pairs, curving upwards, interarching at less than $\cdot l \mathrm{in}$. from the edge to form a somewhat faint intramarginal line, the edges reourved; length 3.5 to 5 in.; breadth 1.5 to 2 in .; petiole 3 to $\cdot \frac{1}{4}$ in. Panicles terminal and axillary, pedunculate, the few branches very short and crowded at the apex of the peduncle; both peduncle and branches 4 -angled. Flowers ${ }^{5} \mathrm{in}$. long (including the stamens), sessile, in threes at the apioes of the very short ( $\cdot 1 \mathrm{in}$. long) branches, clavate-abovoid in bud. Calyx campanulate, funnel-shaped, reduced for 2 third of its length to a
stoat, wrinkled pseado-stalk : the month undulate and with 4 broad shallow deciduons teeth. Fruit ovoid, smooth, crowned by the wide circular remains of the calyx, $\cdot 4 \mathrm{in}$. long (unripe) and $\mathbf{3 5} \mathrm{in}$. in diam.

Singapore : Ridley 4588. Pbhang: Ourtis 194.
var. robusta, King; leaves larger ( 3.5 to 5.5 long and 1.5 to 2.2 in. broad) than in the typical form, and young branches thicker. Panicles several, terminal, 2 to 2.5 in . long; the branches more numerous than in the type form and not crowded at the apex, the lower as much as ${ }^{4} 4 \mathrm{in}$. long.

Penang: Ourtis 194, 1448, 3275.
A very rare bat distinot species readily recognised by its short panicles, oomparatively large flowers, and by the boldness of the midrib and of the few nerves on the under surface of the leaves which when dry are of a conapicaons terra.cotta coloar.
43. Ejgenia Dothlana, King n. sp. A tree, 40 to 70 feet high; young branches thicker than a crow-quill, the bark brown, rather rough. Leaves corisceous, elliptic, ovate-elliptic or lanceolate-elliptic, shortly acuminate, the base cuneate ; both surfaces brown when dry and rather dull, the lower slightly the paler; main-nerves 4 to 8 pairs, curved, ascending, interarching far from the edge (about $\cdot 15 \mathrm{in}$.), impressed on the apper, faintly prominent on the lower surface; the secondary nerves almost as prominent as the main ones; the reticulations indistinct on the lower, invisible on the upper surface; length 3 to 5 in.; breadth 1.25 to $2 \cdot 25$ in. ; petiole $\cdot 15$ to $\cdot 2 \mathrm{in}$. Racemes slender, 1 to 2 inches long, slender, solitary, clustered, terminal or axillary, the rachis dark, 4 -angled. F'lowers few, sessile, clavate in bud, sometimes clustered at the apex of the rachis. Calyx 2 in . long, funnel-shaped, half of it contracted into a pseudo-stalk, the month wide and with 4 broad, rounded teeth. Petals reflexed, orbicular, white. Fruit clavate when young, becoming almost globular when ripe, rugulose, crowned by the wide circular remains of the calyx, $\cdot 75 \mathrm{in}$. long and $\cdot 65 \mathrm{in}$. in diam.

Perak: King's Collector 3966, 4218, 6268; Scortechini. Malacca: Detry 256. Penang : Ourtis 653. Singapore : Ridley 3864, 4982, 8400.

A species resembling $\mathbb{I}$. minutiflora, Miq., but with larger flowers and more numerously nerved leaves. It is named after Mr. J. F. Duthie, F.L.S., who elaborated the Myrtaces for Hooker's Flora of British India.
44. Edgenia polyantha, Wight Ill. 17 ; Icones 543. A tall, slender tree; young branches rather thicker than a crow-quill, brown. Leaves thinly coriaceous, narrowly elliptic or lanceolate, sometimes oblongoblanceolate, shortly and bluntly acuminate, the base cuneate: upper surface (when dry) dark-brown, shining, the nerves scarcely visible; lower paler brown, dull, with numerons minute black dots ; main-nerves

8 to 10 pairs, spreading, slightly curved upwards at the endsoand inter-, arching less than $\cdot 1 \mathrm{in}$. from the edge, slightly prominent on the lower surface: length 3 to 4.5 in ; breadth 1 to 1.5 in .; petiole $\cdot 2$ to $\cdot 3 \mathrm{in}$. Panicles numerous, from the young branches below the leaves, or rarely axillary, 1 to 1.5 in . long; the rachis and short divaricate branches slender, compressed, 4-angled. Flowers at the ends of the branchlets, usually in threes, white, sessile. Petals 4, orbicular, free. Oalyx a little more than 1 in . long, campanulate, constricted for one-third of its length into a pseudo-stalk, rugulose, shining : the mouth with 4 deep, rounded lobes. Fruit much depressed-globular if one-seeded, broader than long if two-seeded, always much depressed and crowned by the circular remains of the calyx, black, hard, without pulp, $\cdot 15 \mathrm{in}$. long and of the same width if globalar, and more than twice as broad if 2-seeded. Duthie in Hook. fil. Fl. Br. Ind. II, 496. E. nitida, Dathie l.c. E. lucidula, Miq. Fl. Ind. Bat. I, Pt. 1, 444. ? Myrtus cymosa, Bl. Bijdr. 1086.

In all the provinces, except the Nicobars and Andamans: common. Distrib.-Malay Archipelago, Burma.
45. Edgenia Manir, King n. sp. A tree, 20 to 30 feet high : young branches about as thick as a crow-quill, pale-brown, terete. Leaves membranous, elliptic to ovate-elliptic, the apex acuminate, the base cuneate; both surfaces brown when dry, the lower much paler than the upper and with numerons small black dots; main-nerves 5 or 6 pairs, curved, ascending, interarching 1 to $\cdot 15 \mathrm{in}$. from the edge; reticulations large, indistinct on the lower and invisible on the apper surface; length 3.5 to 4.5 in . ; breadth 1.5 to 2 in . ; petiole 2 to 4 in . Panicles mostly shorter than the leaves, crowded, from the axils of leaves and of fallen leaves, usually shorter than the leaves, the branches few and slender (one often from the very base), compressed. Flowers clustered at the apices of the filiform branchlets, often numerous and crowded, sometimes few, whitish-red in colour, globular in bud. Calyx $\cdot 15 \mathrm{in}$. long, campanulate, abruptly contracted into a short pseudo-stalk; the mouth with 4 deep, ovate-rotund lobes. Petals 4 , rotund, slightly longer than the calyx-lobes, free, not calyptrate. Fruit depressed-globular, minutely rugulose, crowned by the small circular remains of the calyx, 4 in . broad and slightly less from base to apex.

Andaman Islands: King's Oollectors.
Named in honour of Mr. E. H. Man, C.I.E., Depaty Commissioner of the Andamans, who has for jears given most cordial help in the botanical exploration of the Andaman and Nicobar groups. A species related to E. polyantha, Wight, bat with larger fewer-nerved leaves, and rather longer flowers and fruit. Also near F. operculata, Roxb.
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46. Egarila oaddata, King. A glabrous bush or amall tree; young branches very slender, sub-terete, the bark pale.grey or brown. Loaves thinly coriacoous, lanceolate or ovate-lanceolate, enudate-acuminate, the base cuneate; both sarfaces pale-brown when diy, the lower palest; nerves numerous, spreading, soarcely visible; length 1.75 to 3 in.; breadth $\cdot 75$ to $1 \cdot 1$ in.; petiole $\cdot 15$ to $\cdot 3 \mathrm{in}$. Racemes on slender peduncles, axillary or terminal, shorter than the leaves, laxly 3 - to 5 -llowered. Flovers 25 in . across, on slender pedicels $\cdot 1$ to $\cdot 2 \mathrm{in}$. long, (longer in frait). Oalyx $\cdot 2 \mathrm{in}$. long, campanulate, contracted at the very base into a very short pseudo-stalk (less than a quarter of its length), the month with 4 short, broad, blunt, deciduons teeth. Petals orbicular, about twice as long as the short stamens, decidnous. Fruit at first ovoid, afterwards nearly globular, $\cdot 5 \mathrm{in}$. long, smooth, crowned by the capalar, short, 4-toothed calyx-limb. Myrtus caudata, Wall. Cat. 3631.

Singapore: Wallich. Penang: Ourtis 654. Perak: Ourtis 2007; Scortechini 392, 444; King's Oollector 3654, 4241, 6262; Wray 472, 1176, 1574, 2824, 3208, 5841.

A apecies rather easily recognised by ita small candate-acuminate, lanceolate, indistinctly-nerved leaves and few-flowered, lax racemes. Wallich also issued ander his No. 3591 a plant to which he gave the name Syzygium caudatum. It difors mach from this and is in fact Ingenia cymosa, Lamk.
47. Edgenia pilfrormis, Wall. Cat 3578. A glabrous tree, 30 to 50 feet high, with slender drooping branches: young branches very slender, terete, dark-coloared. Leaves coriaceons, small, pellucid-dotted, lanceolate or ovate-lanceolate, shortly caudate-acuminate, the base cuneate: both surfaces greenish-brown when dry : the nerves numerous, a few slightly conspicuons, the others very faint; length 1.75 to 3 in.; breadth 75 to 1.2 in.; petiole 15 to $\cdot 2 \mathrm{in}$, slender. Racemes slender, very lax, fow-flowered, axillary and terminal, as long as or longer than the leaves. Flowers 75 in . long including the stamens, inserted on the slender rachis by filiform pedicels 75 to 1.25 in . in length. Oalyx fannel-shaped, attenuated for half its length into a slender pseadostalk; the limb with 4 broad, blunt, reflexed lobes nearly 1 in . long. Petals orbicular-reniform, reflexed, 25 in . long. Ripe fruit ellipticovoid to sub-globular, smooth, $\cdot 75 \mathrm{in}$. long, crowned by the calyx-lobes. Dathie in Hook. fil. Fl. Br. Ind. II. 478. Syzygium filiforme and S. capillare, Wall. Cat. 3580 and 3578. Clavimyrtus virens, Blume Mus. Bot. Lugd. Bat. I, 114.

Singapore: Wallich; Hullett; Ridley 4569. Penana: Wallich; Ourtis 1090, 1448. Malacoa: Grifith (K.D.) 2389; Maingay (K.D.) 721 ; Derry 451, 471. Perax : King's Oolleotor 2321, 5601, 5861, 5925, 6708; Wray 1192, 3262; Ridley 9640.
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48. Edgenia andamanica, King n. sp. A small glabrons tree: .young branches slender, with greyish-brown rather rough bark. Leaves coriaceous, rotund-ovate to rotund, with a very short abript blunt apiculus, obscurely crenate near the apex, abruptly tapered to the base; nerves numerous invisible on the npper shining surface and faint on the dull lower surface, curving npward, interarching close to the margin; length 1.5 to 2.5 in.; breadth 1 to 2 in.; petiole 3 or $\cdot 4$ in. Panicles often as long as the leaves, crowded, pedunculate, axillary and terminal, the branchlets usually trichotomous, 4 -angled, bearing 3 or 4 sessile flowers at their apices. Flowers about $\cdot \mathbf{5} \mathrm{in}$. long, clavate, the calyx contracted into a pseudorstalk more than half of its length, the mouth with 4 erect, equal, triangular, acate teeth. Petals 4, orbicular, calyptrate. Fruit unknown.

## Andaman Islands: King's Collector.

49. Edarnia Hoseana, King n. sp. A glabrous tree, 30 to 40 feet high : young branches thinner than a goose-quill, pale greyish-gellow, terete, the very youngest quadrangular. Ieeaves coriaceous, elliptic to ellipticoblong, abruptly and shortly caudate-acuminate, the base cuneate; upper surface dark-brown leaden and shining when dry, the lower palebrown and dull; main-nerves 15 to 20 pairs ascending very little, almost straight, interarching 1 in . from the edge; length 4.5 to 7 in .; breadth 1.75 to 2.5 in.; petiole 15 to 3 in . Racemes axillary and terminal, solitary, not more than 1 in . long, the rachis with 2 deep grooves. Flowers white, $\cdot 35 \mathrm{in}$. long, exclusive of the stamens, sessile, enveloped in several sub-ovate leathery bracts as long as themselves. Calyx-tube widely campanulate, contracted slightly at the base but not into a psendo-stalk; its texture very leathery; its mouth with 4 blunt, obtuse lobes. Petals orbicular. Fruit unknown.

Prrak : Scortechini 163; Wray 2952 ; King's Collector 3407.
50. Edgenia Benjamina, King n. sp. A glabrous shrub or small tree : young branches thin, terete, pale-brown. Leaves thinly coriaceons, conspicuionsly pellucid-dotted on both surfaces, narrowly elliptic, sometimes oblanceolate-elliptic, with an abrapt, narrow, short apiculus half an inch or more in length, the base cnneate : both sarfaces pale yellowish. or greenish-brown when dry; the nerves very numerous, distinct like the reticulations, interarching near the margin; length 2.5 to 3 in.; breadth 1 to $1 \cdot 5 \mathrm{in}$.; petiole 15 in . slender. Rucemes axillary or terminal, shorter than the leaves, few-flowered. Flowers 5 to 6 in. long, (including the stamens), sessile on short stout pedicels. Calyx clavate, the mouth with 4 broad, blant lobes. Petals orbicular, with thin edges. Fruit when young covered with large convex pellucid glands, crowned by the deeply 4 -lobed calyx-limb; when ripe depressed-globular, the calyx-limb reduced to a ring, 1 in . long and 1 to 1.4 in . broad.
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Perak : Wray 2623, 2797, 3204; King's Collector 7306. Distrib.Sumatra, Forbes 2046.


#### Abstract

Named from the resemblance of its leaves to those of Ficus Benjamina, Linn. The Perak specimens have no ripe frait on them and the description of it above given is taken from Forbes's Sumatra specimens which agree in leaf absolutely with


 those collected in Perak.51. Eugenia variolosa, King n. sp. A glabrous shrub, 12 to 20 feet high: young branches slender, 4 -angled, pale-brown, profusely dotted, like the leaves on both surfaces and the flowers, with large pellucid glands. Leaves thinly coriaceous, oblong-lanceolate, rarely elliptic-oblong, caudate-acuminate, the base cuneate; both surfaces when dry pale-brown; main-nerves 12 to 15 pairs slightly prominent on the lower surface (when dry), ascending, rather straight, interarching $\cdot 1$ to $\cdot 15$ in. from the margin, secondary nerves and reticulations indistinct : length 5.5 to 7 in . ; breadth 1.35 to 2.5 in.; petiole $\cdot 2$ to 3 in . Bacemes axillary and terminal, crowded, only about 1 in . long. Flowers white, $\cdot 4$ in. across, on stont pedicels less than $\cdot 1$ in. long. Calyx-tube narrowly campanulate, $\cdot 2 \mathrm{in}$. long, the month with two very nnequal pairs of rounded teeth. Petals orbicular, thick in the centre, mach shorter than the stamens. Style about $\cdot 5$ in. long. Friut globular: smooth, prominently glandular-dotted, crowned by the short calyx; 8 in. in diam.

Perak: Scortechini; King's Collector 3415, 3995, 6036, 10437. Singapore: Ridley. 8411, 8449. Selangor: Ridley 4973.

Distingaished by having prominent pustale-like glands on all its parts.
52. Eugenia clatiflora, Roxb. Hort. Beng. 37 ; Fl. Br. Ind. II, 488. A glabrons tree, 25 to 30 feet high : young branches slender, palebrown, compressed. Leaves thinly coriaceous, lanceolate or oblonglanceolate, shortly acuminate, the base acute; main and secondary nerves very numerous, curving upwards and interarching less than $\cdot 1$ in. from the edge : length 4 to $6 \mathrm{in}_{\mathrm{o}}$; breadth 1.5 to 2 in .; petiole $\cdot 1$ to $\cdot 15 \mathrm{in}$. Flowers 6 to 8 in . long, in very shortly stalked, condensed, axillary corymbs, sessile; the calyx-tube narrowly cylindric-clavate, contracted at the base into a slender pseudo-stalk; the mouth with 4 or 5 short, broad lober. Petols 4 or 5, free, white, orbicular-ovate, about $\cdot 25$ in. long ; filaments about 6 in. long. Fruit narrowly oblong-ovoid, sbout -8 in . long, smooth, pulpy, crowned by the short, incurved calyx-limb, 1-seeded. Duthie in Hook. fil. Fl. Br. Ind. II, 484 ; Wight Ill., II, 15 ; Ic. t. 606 ; Kurz in Journ. As. Soc. Beng. XLVI, Pt. 2. 65 ; For.' F1. I, 480. Syzygium claviflorum, Wall. Cat. 3575. S. longiflorum; Wall. Cat. 3572. S. excavatum, Wall. Cat. 3574. Wall. Cat: Indeterminata 8085.

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G. King-Matorials for a Flora of the Malayan Peninsula. [No. 1,

Nicobar and Andaman Islands; common. Distrib.-British India in Burma, Chittagong and Assam.
var. leptantha; flowers and fruit smaller than in the typical form : flowers in short racemes, not in corymbs : frait 4 in . long. Dathis in Hoak. fil. Fl. Br. Ind. II, 484; Benth. Fl. Austral. III, 283 (Syz.); Kurz in Journ. As. Soc. Beng. XLVI, Pt. 2, 65 ; For. Fl. I, 480. S. suavissimum, Wall. Cat. 3573. Syyyg. Griff. Notal. 654.

Malacca : Griffith (K.D.) 2366/l, 2367. Penang : Ridley 1021, 1109.
var. excavata; leaves more coriaceons than in the typical form and somewhat larger, young branches with rather rough bark. Syzygium excavatum, Wall. Cat. 3574.

Penang: Ourtis 697, 749, 8384, 8393. Prov. Wellesley : Ridley 6970. Perax : King's Collector 7440. Johore: Ridby 4076.
var. Maingayi; young branches rather stout, the very youngest smooth, the older with deeply striate bark. Leaves thickly coriaceous, oblong-lanceolate, shortly acuminate, main-nerves not prominent, the midrib very prominent on the lower surface: length $4: 5$ to 7.5 in . Flowers about 5 in . long: fruit unknown. E. Maingayi, Dathie in Hook. fil. Fl. Br. lnd. II, 484.

Malacea : Maingayi (K.D.) 750.
This is known only from Maingay's imperfect specimens. It does not appear to me to be separable specifically from $E$. clavifora, Roxb.

Var. glandulosa; young branches acutely 4-angled: leaves as in var. Maingayi: calyx-tube with large pellucid glands.

Malacca : Mount Ophir ; only once collected.
53. Eegenia zexlanica, Wight Ill. II, 15 : Ic. I, 73. A glabrous tree, 30 to 60 feet high : young branches slender, obsoletely 4 -angled or terete, pale-brown. Leaves coriaceous, lanceolate, sometimes ovatelanceolate, obtusely acuminate, the base acute: both surfaces shining, brown when dry, the lower minutely glandular and paler : nerves 10 or 12 pairs, indistinct, interarching near the edge, the reticulations obsolete; length 1.5 to 3.5 in . ; breadth 35 to 1.5 in.; petiole 05 to $\cdot 15$ in. Panicles axillary and terminal, crowded, the axillary shorter than the leaves, the terminal longer; branchlets short, 4 -angled like the main-rachis. Flowers numerous, in twos or threes at the apices of the nltimate branchlets, their length (inclading the stamens) 35 to $\mathbf{4}$ in. Calys funnel-shaped, 2 in. long, sessile or on a short pedicel; the tube ribbed, granular-tubercled; the limb with 4 or 5 ovate-ratund, concave, erect, deciduous lobes. Petals orbicular, 4 or 5, deciduous as a calyptra. Fruit pisiform, smooth, white. Dathie in Hook, fll. Fl. Br. Ind. II, 485. Karz in Journ. As. Soo. Beng. XLVI, Pt. 2, 65; For. Fl. I, 481. E. spicata, Lam. Dict. III, 201 ; DC. l.c. (Syz.).Trimen FI. Ceylon I, 171.

Bedd. Fl. Sylp. I, t. 202. E. glandulifera, Roxb. Hort. Beng. 37; Fl. Ind. II, 496. S. seylanioum, DC. Prodr. III, 260 ; Wall. Cat. 3564, in part; Z. corticata, Wall. Cat. 3565 ; Dalz. and Gibs. Bomb. Fl. 94. Acmena zeylanica, Thwaites Enum. 118. A. parviflora, DC. l.c. 262. Jambosa bracteata, Miq. Fl. Ind. Bat. I, Pt. 1, 437. S. corticatum, Wall. Cat. 3565. Myrtus zeylamica, Linn. Sp. Pl. 675.-Rheede Hort. Mal. v. t. 20.

In all the provinces; common. Distrib.-British India, Ceylon.
54. Edeamia grata, Wight Ill. II, 15. A small glabrous tree: young branches sub-terete, the bark pale-brown, loose. Leaves coriaceous, ovate-lanceolate to lanceolate, aouminate, the base acute; upper surface brown when dry, the lower pale, main-nerves numerons, carving, ascending, interarching about $\cdot 1 \mathrm{in}$. from the edge, distinct as is the midrib on the lower surface in the young leaves, indistinct on the opper: length 2 to 85 in .; breadth 85 to 1.5 in .; petiole 15 to $\cdot 25 \mathrm{in}$. Inflorescence and flowers as in E. seylanica but the calyx-tube not granular. Fruit ovoid, pellucid-dotted, crowned by the small calyxlobes, $\cdot 2$ in. long, black when ripe. Kurz in Journ. As. Soc. Beng. XLVI, PE. 2, p. 65 ; For. Flora Burma I, 480 ; Dathie in Hook. fil. Fl. Br. Ind. 486. Syzyg. gratum, Wall. Cat. 3586. S. scabridum, Wall. Cat. 3564 D. Myrtus quadrangularis, Ham.

Malacca: Griffith (K.D.) 2364. Penang: Ourtis 317, 756, 2245; Wallich. Perak : Ridley 7955, 9456 ; King's Oollector 5414, 5433, 6267. Amdamar Islands: King's Collector. Disthib.-Sumatra.

A specien very close to $\boldsymbol{k}$. meylanica but with somewhat larger leavee, glancons or sub-glaucous beneath. The best distinguishing marks lie however in the calyxtube which in this is amooth, and in the frait which in this is ovoid and black.
55. Eugbia tbcta, King n. sp. A glabrous tree, 20 to 25 feet high : young branches slender, 4-angled; the bark dark-brown, flakey. Leaves thinly coriaceons, almost sessile, ovate-lanceolate, shortly and obtusely acuminate, the base rounded and minutely cordate; both surfaces pale-brown when dry; nerves numerous but scarcely visible, the midrib prominent on the lower sarface and bearing small scattered tubercles ; length 2.5 to $8 \cdot 25 \mathrm{in}$.; breadth $1 \cdot 1$ to 1.6 in ; petiole $\cdot 05$ to $\cdot 1$ in., densely covered with black tubercles. Flowers 5 or ${ }^{-6} \mathrm{in}$. long (including the stamens), crowded in axillary or terminal fasicles, sessile. Calye widely funnel-shaped, tapered to the bracteolate base, minutely dotted; the limb wide, with 5 broad lobes. Petals orbicular, yellowish, deciduous. Fruit unknown.

Prrak: King's Oollector 1863.
56. Eugrifa pseddo-tetraptera, King n. sp. A tree? Young branches of the thickness of a crow-quill, compressed at the nodes,

## 110 G. King-Materials for a Fhora of the Malayan Peninoula. [No. 1,

4 -angled and 4 -winged, the bark dark-brown and flakey, deciduous. Leaves thinly coriaceons, almost sessile, broadly lanceolate or ovatelanceolate, the base broad and minately cordate, the apex shortly and blantly acuminate; apper surface dull olivaceons-brown with remote black pits, the nerves slightly and the midrib greatly depressed; lower surface pale-brown, with many small black marks especially on the bold thick midrib; main-nerves 14 to 18 pairs, prominent, slightly curved, sabascending and interarching at abont $\cdot 1 \mathrm{in}$. from the edge; length 2 to 2.25 in.; breadth 1 to 1.5 in .; petiole 05 in. wrinkled. Flowers in terminal, sessile, multi-bracteate glomeruli about 4 in . long; the bracts abont as long as the flowers, large, broadly oblong, blunt, their posterior sarfaces bearing many black dots. Flowers about $\mathbf{2 5}$ in. long, their pedicels less than $\cdot 1 \mathrm{in}$. Oalyx cylindric, slightly contracted at the base; the moath with 5 erect, ovate, blunt, sub-distant teeth, aboat 05 in. long. Petals sub-orbicular, calyptrate. Fruit subglobular, ${ }^{-25} \mathrm{in}$. in diam., crowned by the calyx-teeth.

Johore : on Gunong Panti, Ridley 4197.


#### Abstract

This species comes very near E. tetraptera, Miq., but that apecies has narrower, less conspicnonsly bracteate flowers and its young branches are covered with glandalar hairs. This is also allied to $\boldsymbol{E}$. tecta, King, which has, however, larger flowers in pedunculate bracteate heads. The leares of the two are almost exactly' alike in texture and form, bnt the dots and pits in those of F. tecta are less conspicuous than in these of this plant. This is also olosely allied to re. polita


57. Edgenia polita, King. A glabrous tree, 30 to 60 feet high; young branches slender, compressed and acutely 4 -angled or winged, their bark pale-brown and deciduous. Leaves coriaceous, lanceolate or ovate-lanceolate, bluntly and shortly acuminate, the base abruptly cuneate, both sarfaces shining and of a liver-brown colour; main-nerves 10 to 12 pairs, often forked, interarching less than 04 in . from the edge, hardly visible on the upper surface, length 1.5 to 2.25 in.; breadth 75 to 1 in ; petiole under $\cdot 1 \mathrm{in} . \quad$ Panicles shorter than the leaves, axillary and terminal, very condensed, many-flowered, bearing coriaceons bracts of two sorts, those at the base of the panicle with long, subulate points, those at the base of its branches and of the flowers oblong with broad truncate apices, the rachis and branches 4 -winged. Flowers: (including the stamens) 35 in . long, sessile. Oalyx funnel-shaped, ribbed, very coriaceous; the limb much prolonged beyond the ovary; but only slightly expanded, with 5 ovate-rotund, concave, erect lobes.' Petals orbicular, deciduous. Stamens not very numerous nor long.' Fruit globular, crowned by the 5 calyx-lobes, when young minately pellucid-glandular. E. zeylanica, Duthie (not of Wight) in Hook. fil. Fl. Br. Ind. II, 485, in part. Syzyg. politum, Wall. Cat. 3626.

Penang: Porter; Ourtis 511. Johore : Ridley 4078. Prrak : Scortechini 585; Wray 2822; King's Collector 6930, 8679. Malacca: Ridley 859.

A species superficially resembling $E$. seylanica, Wight, bat really difering greatly from that and every other species within our region by its prominently bracteate and very condensed inflorescence which has winged branchlets. The froit has been only twice collected.
58. Eugernia valdrvenosa, Dathie in Hook. fil. Fl. Br. Ind. II, 489. A glabrous tree, 20 to 50 feet high: young branches rather thinner than a goose-quill when dry, acately 4 -angled but not winged, the bark brown. Leaves coriaceous, elliptio, shortly and abruptly acnminate, the base cuneate or rounded; apper surface olivaceous-brown, reticulate, the nerves faint; lower warm-brown, the main-nerves 14 to 24 pairs, very prominent, curving upwards and interarching in a wavy line $\cdot 15$ to $\cdot 25$ in. from the edge; length 5.5 to 8 in .; breadth 2.85 to .3 .5 in. ; petiole $\cdot 2$ to 25 in. Panicles terminal or from the upper leafaxils, pedunculate, rather shorter than the leaves, with many spreading, lax branches, the branchlets compressed. Flowers white, sessile, in heads on the ends of the branchlets, 4 in . long (including the stamens), the buds narrowly clavate. Oalyx narrowly infundibuliform, tapering equally from base to apex, the mouth trancate, entire. Petals calyptrate. Fruit depressed-globalar, crowned by the short remains of the calyxtabe, smooth, $\mathbf{7 5}$ in. in diam. L. ellipticum, Wall. Cat. 3587 in part, (not of other authors).

Prnang: Wallich; Curtis 55; King's Collector 1579; Maingay 723, 762. Perax : Scortechini 1662; Wray 2209, 2842; King's Collector 737, 2737, 4947, 5122, 5322, 7008, 10246, 10873.

Under the pre-occapied name L. ellipticum, Wallich issued this species as No. 3587 of his Catalogne. Mired with it, however, he issued some leaves of a distinct species from Pensang. Good apeoimens, with leaves exactly agreeing with these, have since boen found and that plant has been named $\boldsymbol{B}$. pergamacea, King.
59. Eugenia oblonarfolia, Dutbie in Hook. fil. Fl. Br. Ind. II, 491. A tree; young branches somewhat thicker than a crow-quill, very pale, 4-angled (sometimes obscurely so). Leaves thinly coriaceons, elliptic or oblong-elliptic, shortly acuminate, the base cuneate; both surfaces shining, the nerves and reticulations distinct; upper surface pale-olivaceons, the lower pale-brown; main-nerves 10 to 16, slender, whitish, not much more prominent than the secondary, interarching less than $\cdot 1$ in. from the edge ; length 3 to 4.5 in .; breadth 1.25 to 2 in .; petiole 3 in. long. Panicles terminal, corymbose, spreading, manyflowered, 3 or 4 inches in length and as many in breadth; the short peduncle and numerons branches stout, 4 -angled, the branchlets
compressed, all very pala. F'lowers 8 or ${ }^{4} \mathrm{in}$. across. Petals 4, calyptrate, green. Calyx 2 in . long, campanulate, contracted for half its length into a thin pseudo-stalk, smooth; the mouth truncate or very slightly toothed. Fruit (unripe) globular, smooth, crowned by the short, wide remains of the calyx, 35 in . in diam.

Malacca : Maingay (K.D.) 746. Singapobe: Ridley 360, 4993, 10131. Perak: King's Collector 6012, 8848, 10883.
var. parviflora; flowers smaller than in the typical form: leaves oblong-lanceolate, tapering to each end, 3.5 to 5.5 in . long and 1 to 1.5 in. broad.

Perak: Scortechini 618.
var. robusta, King ; calyx 35 in . long; panicles, branches of panicle and young twigs thicker than in the typical form.

Perak: Scortechini 216.
60. Eugenia sobhorizontalis, King n. sp. A small tree; young branches thinner than a goose-quill, terete, blackish-brown when dry. Jeaves thinly coriaceons, oblong or elliptic-oblong, tapering to each end, shortly and sharply acuminale, the base cuneate, the edges somewhat recurved (when dry), the npper surface dark olivaceous-brown and shining, the midrib depressed, all the nerves faint, lower surface dark brown, not olivaceons, duller than the apper, the midrib very bold and convex, the main-nerves 15 to 20 pairs, sub-horizontal, thin, bat rather prominent and shining, interarching to form a bold intramarginal line - 1 in. from the edge, the secondary nerves and reticulations rather distinct ; length 4.5 to 7 in .; breadth $1 \cdot 5$ to 2.3 in . ; petiole ${ }^{\circ} 5$ to 6 in . Punicles axillary and terminal, the former shorter than the leaves, the latter often longer, lax : the branches rather sparse, spreading, compressed, obscurely 4 -angled. Flowers white, sessile, in clusters of 3 to 6 at the ends of the branchlets, globose-clavate in bud. Calyx 25 in. long, funnel-shaped, contracted to a psendo-stalk for half its length : the limb with 4 shallow, broad, rounded (sometimes acute) lobes. Fruit unknown.

Perak: Wray 2118, 2097. Distrib.-Sumatra, Hort. Bogor. 3850 under the name of $E$. punctulata, Miq., which it is not.
61. Eugenia Valetoniana, n. sp. King. A tree, 60 to 80 feet high; young branches thicker than a crow-quill, terete, the bark pale-brown, flakey. Leaves as in $E$. Griffithii but somewhat narrower and with rather more numerous main-nerves. Flowers sessile in small terminal or axillary panicles shorter than the leaves, with very few short, terete, few-Howered cymose branches, or in small pedunculate cymes. Calyx -3 in. long, clavate-campanulate, constricted into a short psendo-stalk; the wide mouth trancate or with 4 deciduous, short, rounded lobes.

Petale small, orbicular, deciduous. Fruit when unripe pyriform, when ripe globalar, crowned by the wide calyx-limb, ${ }^{5} \mathrm{in}$. long.

Perak: King's Oollector 5982, 6090.
A species near E. Griffithii, and also near E. Clarkeana and E. Koordersiana, but with mach smaller panicles and frait at first pyriform.
62. Eugenia bxpansa, Duthie in Hook. fil. Fl. Br. Ind. II, 491. A tree, 20 to 50 feet high; young branches thinner than a goose quill, terete, pale-brown. Leares coriaceous, oblong-lanceolate or oblongelliptic, acuminate, the base cuneate, both surfaces brown (when dry) and shining, the lower paler; main-nerves 20 to 24 pairs, faint, spreading, connected by numerous loops, not very prominent in either sarface bat distinctest on the lower, intramarginal line less than 1 in. from the edges : length 4 to 6.6 in .; breadth 1 to 2.25 in .; petiole $\cdot 15$ to $\cdot 2 \mathrm{iu}$. Panicles numerous, terminal and axillary, usually 2 or 3 together, varying in length from less than one inch to several inches, the longer ones bearing a few slightly compressed branches with 5 to 8 sessile flowers crowded at their apices. Flowers (including the stamens) 3 in . long (sometimes longer), clavate in bud. Calyx 15 in. long, infundibuliform, minutely rugulose; the month truncate, undulate, slightly reflexed. Petals orbicular, calyptrate. Fruit nnknown. Syzygium expansum, Wall. Cat. 3567. S. euneuron, Miq. Fl. Ind. Bat. Suppl. 314.

Penang: Wallich 3567; Curtis 247. Perak: Wray, Scortechini, King's Collector; very common.
63. Edaenia chlorolsica, King. A small tree or shrub; young branches almost as thin as a crow-quill, terete below but 4 -angled near the apex, yellowish. Leaves coriaceons, oblanceolate, shortly and bluntly acuminate, much narrowed at the base; both surfaces pale-olivaceous; the upper tinged with brown, shining, the main-nerves indistinct or invisible; the lower very pale, dull, the 12 to 16 main-nerves spreading, very faint, the edge thickened and slightly recurved; length 3 to 5.5 in.; breadth 1 to $2 \cdot 25 \mathrm{in}$. ; petiole 3 to 35 in . Panicles much shorter than the leaves, mostly terminal, rarely axillary, trichotomous, the branchlets also trichotomons, all acutely 4 -angled and striate, the bracteoles at the nodes and at the bases of the flowers short, concave, ovate. Flowers bibracteolate at the base, in threes, 4 in . long (including the stamens) on 4 -angled pedicels $\cdot 1 \mathrm{in}$. long. Calyx $\cdot 15 \mathrm{in}$. long, minutely rugulose; the month with 4 broad, shallow teeth. Fruit ellipsoid, rugulose, crowned by the 4 persistent calyx-teeth, length (unripe) 3 iu.

Perak: King's Collector 1901, 4951, 7307 ; Scortechini 45 ; Wray 2917.

This olosely resembles Rugenia fastigiata (Calyptranthes fastigiata, Blume), bat the leaves have shorter petioles and fewer nerves and the fruit of this is corragated J. II. 15

## 114 G. King-Materiuls for a Flora of the Malayan Peninsula. [No. 1,

ragulose and not glandular. This also resembles Eugenia sylvestris (Caryophyllus sylvestris, Blame) almost exactly in leaves: but the fruit of the latter is very different.
64. Eugenia nigricans, King n. sp. A large tree; young branches rather thicker than a crow-quill, sub-terete, dark-brown whon dry. Leaves oblong to oblong-elliptic, shortly and abraptly acnminate, the base more or less cuneate; both surfaces very dark-olivaceous and dull (when dry), the lower with a reddish tinge: nerves very numerous and close together, straight and sub-horizontal, all faint below and distinct above, the reticulations few and faint on both surfaces, the edge recurved, and the intramarginal line very near it; length 2.5 to 4 in .; breadth $1 \cdot 4$ to 2 in .; petiole 3 to $\cdot 4 \mathrm{in}$. Panicles axillary and terminal, not more than half as long as the leaves with few lax trichotomous spreading branchlets, all 4 -angled. Flowers white, 3 in. long (including the stamens), in threes, sessile, clavate in bud. Calyx -15 in . long, wrinkled, funnel-shaped, narrowed for half its length into a psendo-stalk, the month wide and truncate. Petals deciduous. Fruit unknown.

Prrak: Wray 2221.
65. Edgenia nnophylla, Roxb. Hort. Beng. 37 : FI. Iud. II, 496. A glabrous tree, 40 to 60 feet high; young branches rather thinner than a goose-quill, terete, dark-brown. Leaves coriaceons, narrowly elliptic or elliptic-lanceolate, rather abruptly acuminate, the base cuneate; both surfaces when dry smooth, shining, the numerous thin, curved, ascending main-nerves indistinct; the upper surface almost black, the lower deep-brown; length 3 to 5 in .; breadth 1.25 to 2.25 in.; petiole .2 to $\cdot 4 \mathrm{in}$. Panicles corymbose, in the apper leaf-axils and terminal, nearly as long as or longer than the leaves, on rather long peduncles, many-flowered, ench from 2.5 to 3 in . across, the branches and branchlets numerous, 4-angled. Flowers 2 or 3 together, sessile at the apices of the branches, 4 in . long (including the coloured stamens) white, clavate in bud. Calyx funnel-shaped, rather abruptly tapered to the base, ${ }^{-2}$ in. long, smooth; the mouth trancate, with 5 very obscure, short, broad teeth. Petals calyptrate. Fruit (according to Roxburgh) pear-shaped, large. Duthie in Hook. fil. FI. Br. Ind. 1I, 481 in part. Wight Ic. 623 (bad). Jambosa inophylla, Miq. Fl. Ind. Bat. I, Pt.. 1, 433. Syzygium inophyllum, Wall. Cat. 3600 in part ; DC. Prodr. III, 260.

Perak: Wray 1377, 2554, 2655, 2734 ; King's Collector 4741, 6079, 655, 8481. Penang: Curtis 973, 974, 2621.

Two specimens of this are incladed in the Linnæan Society's set of the Walliohian plants ander 8600. The other two sheets belong to two different speciea.
66. Eugenia oblata, Roxb. Hort. Beng. 37 ; Fl. Iud. 1I, 493.

A tree, 40 to 50 feet high; young branches terete (when dry), reddishbrown. Leaves thinly coriaceons, oblong to elliptic-oblong, or broadly lanceolate, acuminate, the base cuneate; both surfaces brown (when dry), shining, the upper often tinged with olivaceous and the lower with red, main-nerves 20 to 24 pairs, close, connected by numerons secondary nerves and reticulations, indistinct on the upper but distinct on the lower surface, intramarginal nerve very close to the slightly recurved margin; length 3.5 to 5 in .; breadth 1 to 2.5 in .; petiole 2 to $\mathbf{2 5} \mathrm{in}$. Panicles axillary and terminal, shorter than the leaves, often pedunculate, corymboee, the branches and branchlets few, crowded, obtusely 4 -angled. Flowers '3 in. long, including the stameus, white, sessile, shortly clavate in bad. Calyx - 25 in. long, fannel-shaped, the mouth with 4 deciduons, short, blunt lobes, narrowed to a pseudo-stalk. Petnls orbicular, calyptrate. Fruit as large as a cherry when ripe, smooth, pulpy, the pericarp rather thick ; seed solitary. Wight Ill. II, 15 ; Ic. t. 622 ; Kure in Journ. As. Soc. Beng. XLVI, Pt. 2, 67 ; For. Fl. I, 488; Duthie in Hook. fil. Fl. Br. Ind. II, 492. S. oblatum, Wall. Cat. 3569. S. pulchellum, Wall. Cat. 3566 in purt. Syzg. truncatum, Miq. Fl. Ind. Bat. I, Pt. 1, 455. Jambosa pulohella, Miq. Fl. Ind. Bat. I, Pt. 1, 422. E. comosa, Wall. Cat. $356 \mathrm{~b}^{\mathrm{D}}$; l.c. 3600 C (under E. inophylla).

Malacca : Derry 1178. Perak : Scortechini. Province Wellesley : Curtis 9378a. Penang: Ridley 9378.
67. Ejaenia Bernardi, King n. sp. A medinm-sized tree; young branches thicker than a crow-quill, sligbtly compressed, dark-brown, the older terete and grey. Leaves thinly coriaceous, broadly elliptic, abraptly and shortly acuminate, the base slightly cuneate; both surfaces brown (when dry) and shining, the lower slightly paler; the numerous close nerves and their connecting reticulations distinct on both; the intramarginal line less than 1 in . from the edge, the midrib depressed on the upper, promineut on the lower surface; length 3.5 to 4.5 in . ; breadth 1.75 to 2.25 in. ; petiole 25 to $\cdot 4 \mathrm{in}$. Panicles terminal, occasionally from the branches below the leaves, shorter than the leaves when in flower but longer in fruit, densely corymbose, trichotomously branched, many-flowered, the peduncle and lower branches terete, the branchlets 4-angled. Flowers partly sessile and partly on very short thick pedicels, the buds obovoid, obtuse. Calyx 15 in. long, campanu-late-cylindric, tapering slightly to the base but not forming a pseudostalk, smooth, the limb truncate. Petals falling off in a depressed calyptra. Stamens 25 in . long. Fruit turbinate, black when ripe, without pulp, crowned by the minate remains of the calyx, $\cdot 2 \mathrm{in}$. in diam.

Perak: Scortechini 326. Selangor:*Ridley 8617. Penana: Curtis 975, 2845.

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 G. King-Materials for a Hlora of the Malayan Peninsula. [No. 1,Remarkable for its short, obovoid flower-bads; closely related to E. simulans which has, however longer clavate bads.
68. Edgenia Prainiana, King n. sp. A tree 60 to 80 feet high; young branches as thick as a goose-quill, terete, brown. Leaves thickly coriaceous, elliptic-oblong, the apex shortly acuminate, the base cuneate; upper surface dark-brown, shining, the midrib pale and depressed, the nerves slightly raised, faint; lower surface yellowishbrown, dall, the 20 to 30 pairs of main nerves and the intramarginal one slightly raised but indistinct, edges slightly recurved; length 3.5 to 5 in.; breadth 1.5 to 1.75 in.; petiole about $\cdot 5 \mathrm{in}$. Pamicles mostly terminal, but a few of smaller size from the upper leaf-axils, about half as long as the leaves while in flower, many-flowered, much condensed, corymbose, broader than long; the peduncles short, stout, somewhat 4 -angled like the stout, short branches. Flowers in threes at the ends of the branchlets, sessile, white, clavate in bud. Oalyx - 35 in . long, funnel-shaped, tapering gradually to the base: the mouth 5-lobed, the lobes broad, rounded, and with pale, cartilaginous tips. Petals 5 orbicular, glandular-dotted, much longer than the calyx-lobes, apparently calyptrate. Fruit (unripe and excluding the long calyxtube) globular-ovoid, $\cdot 75$ to 1 in . in length, and $\cdot 75 \mathrm{in}$. in diam., crowned by the large, stout, withered, 5 -toothed calyx-limb ${ }^{-25} \mathbf{~ i n . ~ l o n g . ~}$

Perak: Wray 3990 ; King's Oollector 5309, 6584.
69. Eogenia Prarsoniana, King n. sp. A tree 80 to 100 fect high; young branches thicker than a crow-quill, pale brown or whitish, terete. Leaves coriaceous, ovate, the base rounded, the apex caudateacuminate, the edges somewhat recurved; upper surface olivaceousbrown, shining, the numerous nerves faint, the midrib depressed; lower surface brown, dull, the nerves fainter than on the upper, the midrib sharp and prominent; length 2.75 to 4 in. ; breadth 1.5 to 2 in ; petiole $\cdot 25$ to 3 in. Panicles terminal, $1 \cdot 5$ in. long, not pedunculate, branching from the base; the branches short, thick, slightly compressed and slightly 4 -angled. Flowers in twos or threes at the ends of the branchlets, about 5 in . long (inclading the stamens), white, clavate in bud, some sessile and others on very short, stont pedicels. Oalyx ${ }^{\circ} 25 \mathrm{in}$. long, funnel-shaped gradually tapering to the thick base; the mouth trancate. Petals 5, orbicular, calyptrate. Fruit unknown.

Perak : King's Collector 3526.
Allied to $\boldsymbol{E}$. Prainiana, bat differing in the trancate calyr-limb, sessile panicles and thinner young branches the bark of which noreover is nearly white.
70. Eugenia leficadis, Duthie in Hook. fil. Fl. Br. Ind. II, 492. A tree; young branches half as thick as a goose-quill, terete, very pale. Leaves coriaceous, oblong-lanceolate or oblong-elliptic, shortly and
abruptly acuminate, the base caneate; upper surface dark-olivaceous (when dry) and shining, the midrib bold and depressed and the nerves not depressed but faint; lower sarface chocolate-brown, dull, the numerous nerves and reticulations indistinct, the intramarginal line very close to the edge, faint; length 3.5 to 4.5 in .; breadth 1 to 1.6 iu .; petioles 2 to 3 in . Panicles mostly terminal, but a few in the upper axils, condensed, much shorter than the leaves; branches few, crowded, very stout, obscurely 4 -angled, shining. Flowers 5 or 6 in. long (including the stamens), in threes at the apices of the branchlets, the middle one on a short thick pedicel, the lateral pair sessile. Oalys $\cdot 25 \mathrm{in}$. long, campanulate, tapering regularly to the base; the mouth with 5 small, bluntly triangular teeth reflexed after flowering. Petals orbicular, much larger than the calyx-teeth, calyptrate. Fruit when ripe as large as a cherry, depressed at both ends, pulpy, the apex crowned by the small circular remains of the calyx. Duthie in Hook. fil. Fl. Br. Ind. II, 492 (in part). E. inophylla, ? in Wall. Cat. 3600 and not of Roxb.

Malacaa : Maingay Herb. prop. 3012 (K.D. 753 in part). Penang : Wallich ; Ourtis 750, 666, 2246, 2247.

Hitherto collected only in Malacoa and Penang. This is one of three plants issued doubtfully by Wallich as $\boldsymbol{E}$. inophylla, Roxb.; and one of two issued from Herb. Kew, as 753 Maingay. There are in Herb. Kew, three Maingayan sheets under the distribation 753. Two of these bore the same number in Maingay's own colleotion, viz., 3012: the third, which is imperfect, bore his 1558 , and is a different plant from his 3012 and is really E. anisosepala, Dathie. E. lævicaulis is allied to $\boldsymbol{E}$. oblata, Roxb., but has more contracted panicles with muoh shorter branches, more oblong flower-buds, shorter stamens, more faintly nerved leaves which are usually smaller.
71. Eugenia Goodenovii, King n. sp. A tree, 50 to 70 feet high; young branches somewhat thicker than a crow-quill, terete, with compressed nodes, the bark dull pale yellowish-grey. Leaves coriaceous, oblong-elliptic, rarely somewhat lanceolate, the base much cuneate, the apex acute or sometimes shortly and bluntly acuminate; both surfaces rather dull when dry, yellowish-brown, the lower somewhat paler, the main-nerves many pairs, inconspicuous on either surface as are the secondary nerves and the reticulations; the intramarginal nerve faint, ebout $\cdot 1 \mathrm{in}$. from the edge; length 3.5 to 5.5 in .; breadth 1.5 to $2 \mathrm{in}$. ; petioles 2 to -3 in . Panicles terminal and from the axils of a few of the apper leaves, $1 \cdot 5$ to 2 in . long and about as broad; the branches few, spreading, obscurely 4 -angled. Flowers shortly pedicelled, (when expanded) from $\cdot 2$ to 3 in. across, the buds clavate from ${ }^{2}$ to $\cdot 3$ in. long. Oalyx funnel-shaped, the mouth with 4 broad, rounded lobes. Petabs 4, sub-orbicular, calyptrate. Fruit broadly urn-shaped, the apex broad
and trancate, crowned in the middle by the short conical remains of the atyle, about 5 in . in diam. when dry and about 6 in . long, the base with a fleshy papilla and a short stout stalk. Syz. rigidum, Wall. Cat. 3581.

Malacoa: P; Wallich; Goodenough 1759. Selangor: King's Oollector 8741. Distrib.-Java.

Wallich's specimons of this are referred in the Flora of British India to E. chlorantha, Duthie. The better examples colleoted since Wallich's time by Messra. Goodenough and Kunstler however show this to be a distinot species, Wallich's specifo name for whioh would have been retained but for the priority of DeCandolle's Eugenia rigida. This strongly resembles B. Zippelliama, Miq., as that apecies is represented at Kew.
72. Eugenia linocisroidea, King. A tree, $\mathbf{4 0}$ to $\mathbf{5 0}$ feet high; soung branches when in flower as thick as a crow-quill (thicker when in fruit), dark-brown. Leaves coriaceons, lanceolate, shortly acuminate, the base cuneate; both surfaces of an olivacoons, leaden colour when dry, the upper very dark and shining, the nerves numerons, indistinct: the lower paler and dull, the nerves straight spreading, black, interarching less than 05 in . from the edge, the reticalations not prominent: length 2 or (rarely) 3 in.; breadth 6 to 1 in .; petioles $\cdot 1 \mathrm{in}$. Panioles terminal, as long as the leaves when in flower (longer when in frait), much branched, many-flowered, broader than long: main-branches subhorizontal, somewhat 4 -angled, the branchlets acutely so. Flowers 4 in. long (inclading the stamens), sessile, the bads clavate. Oalyx 3 in. long, funnel-shaped, the lower half narrowed into a vertically ridged peeudo-stalk; the month with 4 deep, broad, rounded lobes. Petals 4 , sub-orbicular, calyptrate. Fruit oblong, with deep rugulose, vertical ridges, the apex crowned by the enlarged calyx-limb and ita 4 inflexed teeth : length (unripe) 35 in.

Prake: King's Collector 4580, 7980, 8094; Wray 1898, 2595.
73. Egabia myrtipola, Roxb. Hort. Beng. 37; Fl. Br. Ind. II, 490. A shrub or small tree; young branches 4 -angled, pale-brown, the older terete, greyish. Leaves thinly coriaceons, lanceolate to broedly ovate, shortly acuminate, the base acnte: both surfaces shining, dotted, when dry brown, the lower paler; nerves close and namerous, thin but distinct on both surfaces; length 1.5 to 2.5 in . ; breadth 75 to 1.35 in .; petiole $\cdot 15$ to $\cdot 2 \mathrm{in}$. Panicles mostly terminal but a few from the apper leaf-axils, pedunculate, longer than the leaves; branches lax, spreading, corymbose, 4 -angled. Flowers 3 in . long (including the stamens) sessile or pedicellate on the apices of the branchlets in twos or threes. Oalyx $\cdot 15 \mathrm{in}$. long, clavate, the month with 4 very narrow lobes or almost truncate. Petals 4, orbicular, calyptrate. Fruit globular; pisiform, pulpy, bluish-black, smooth, crowned by the capular, trunoate calyx-

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limb, 1-seeded. Dathie in Hook. fil. Fl. Br. Ind. II, 483 ; 3 Wiglit III. II; 15; Ic. t. 618; Kurz in Journ. As. Soc. Beng. XLVI, Pt. 2, 67 ; For. Fl. I, 486. Syzygium myrtifolium; DC. Prodr. IlI; 261 ; Wall. Cat. 3571 ; Miquel Fl. Ind. Bat. 1, Pt. I, 456. O. oleina, Wight Ill. II, 15.

Singapore: Wallich. Prnang: Wallich. Prrak: Wiay 2703; King's Collector 8379.
74. Eugenia Stappiana, King n. sp. A shrub, 2 to 6 fect high; young branches rigid, slender, 4 -angled, the bark brown and deciduous. in long flakes. Leaves very coriaceous, lanceolate or brondly elliptio tapering to the blunt sub-acute (occasionally rounded and retuse) apex, the base slightly cuneate or rounded; both surfaces olivaceous-brown when dry, the upper with large scattered pits, the lower paler, not dotted or pitted, nerves and reticulations very indistinot on both surfaces, the midrib distinct on the lower: length $\mathbf{5}$ to $\mathbf{l} \mathbf{i n .}$; breadth -4 to $\cdot 8$ in. ; petiole under $\cdot 1$ in. Panicles terminal, shorter than or as long as the leaves, few-flowered; the branches few, rigid, stont, square and with 4 thick wings. Flowers 3 in . long, with several bracteoles at. their insertion on the short, stont, papillose pedicels. Oulya 15 in . long, narrowly campanulate, slightly inflated below the middle, ribbed: and densely papillose externally, the mouth slightly expanded and with: 4 or 5 spreading rounded teeth. Petals orbicular, free. Stamens about -15 in. long. Fruit sub-globular, crowned by the calyx lobes, white.

Prpak: Scortechini 336; Wray 216, 1582, 1619: at elevations of 5000 to 7000 feet.

This belongs to a groap of dwarf montane species of Ergenia well-represented an the mountains of Ceylon and Southern British India and of which some species from the mountain of Kina Balu in Borneo have recently been described and figared in the Linnæan Transactions by Dr. O. Stapf. of the Kew Herbariam. The nearest ally of this is $B$. kinabaluensis, Stapf., from which this is distinguished by its larger inflorescence with winged branchlets, granular calyx-tube and pedicels, and leas rotund leaves, entire (not retase) at the apex.
75. Ejognia Wrati, King n. sp. A small tree; young branches obtusely 4 -angled, brown (when dry) smooth, the older terete, rough; the bark grey. Leaves thickly coriaceous, broadly elliptic or sub-rotund the apex obtuse or sub-obtuse entire, not narrowed at the base : apper surface hrown, the nerves and reticulations faint, the midrib depressed; lower surface pale sub-glancous, the nerves and reticulations numerous and distinct, the midrib broad; length $\cdot 75$ to 1.35 in .; breadth -65 to $1 \cdot 15 \mathrm{in} . ;$ petiole $\cdot 1 \mathrm{in}$. or less. Panicles solitary, compact, terminal, in a short peduncle; its branches short and stout, slightly 4-angled, not winged or papillose. Flowers greenish, 35 in. long, (including the stamens) sessile in clusters of 8 or 4 at the ends of the brantblets, with'a single decidurus bracteole at the base of each, the buds
shortly clavate. Calys funnel-shaped, $\cdot 15 \mathrm{in}$. long; not much narrowed to the base, smooth; the mouth with 5 unequal, broad rounded lobes. Petals calyptrate. Stamens short. Fruit anknown.

Perak : at elevations of 5,000 to 7,000 feet ; Wray 321, 1504, 3859 ; Scortechini 313.

This is another of the dwarf montane species. It. resembles the Nilgiri E. calophyllifolia, Wight, very closely indeed and the differences between the leaves of the two can be appreciated only by comparison of actual specimens. The reticulations in the lower surface of this are finer and the enclosed spaces shorter. E. calophyllifolia has 4 -merous flowers and the flowers of this are 5 -merous. Fruit of this is at present nnknown. From it, when found, a good oharacter may, it is hoped, be obtained.
76. Eugenia setosa, King n. sp. A shrub or creeper: young branches as thick as a crow-quill, dark-brown, densely clothed on the rachis and branches of the inflorescence with coarse subulate hairs mixed with brown scurf. Leaves thinly coriaceons, narrowly oblonglancenlate, shortly and abruptly acuminate, the base rounded; apper surface (when dry) olivaceous with minute scattered black dots, the lower tinged with brown, minutely pustulate: nerves very numerous and close, sub-horizontal, interarching very near the slightly recurved minutely undulate edge; length 1.35 to 2.75 in. ; breadth $\mathbf{4}$ to 85 in .; petiole under $\cdot 1$ in. Panicles axillary and terminal, about as long as the leaves, pedunculate, with spreading many-flowered branches. Flowers crowded on the branchlets, ${ }^{4} \mathbf{i n}$. long (including the stamens), clavate, the buds with globular apex abruptly contracted below, sessile or on short pedicels. Calyx campanulate above, contracted about the middle into a psendo-stalk; the mouth truncate but with 5 small triangular deciduous lobes. Petals orbicular, deciduous. Fruit turbinate, crowned by the small truncate calyx-limb, minutely covered with pellucid, granule-like glands ; length and breadth about - 35 in .

Perak: Wray 2704; King's Collector 5266, 6601, 6793.
77. Eugenia inasensis, King n. sp. A small white-flowered tree; young branches thicker than a crow-quill, terete with compressed nodes; the bark pale and rather smooth. Leaves coriaceons, broadly elliptic to elliptic-oblong, sometimes slightly obovate, mach tapered to the base, the apex with a short, abrupt blunt point, the edges recurved; when dry, the upper surface shining, pale yellowish-brown, the midrib depressed; the lower paler and dull, the midrib bold; main-nerves inconspicnous on both; length 2.5 to 4 in ; breadth 1.25 to 2.25 in .; petiole $\cdot 2$ to $\cdot 4$ in. Panicles much shorter than the leaves, terminal or from the upper leaf-axils, solitary or several together, pedunculate, usually 3-branched, the peduncle and branches dark-coloured, compressed. Flowers in threes, 3 to ${ }^{\circ} 4 \mathrm{in}$. in diam. When expanded, their
buds obovoid nearly ${ }^{\mathbf{2}} \mathrm{in}$. long. Calyx campanulate, sessile, not taporing into a pseudo-stalk, the month with 5 small rounded lobes, or truncate. Petals 5, orbicular-calyptrate. Fruit nnknown.

Perak : or Ganong Inas at elevations of about 5,000 feet; Wray 4144, 4150, 5154.

A apacies known only from Mount Inas. It is allied to R. subdecuseata, Dathie, in many respects, but diffors from that species in having petiolate leares tapering much to the base and having recurved edgen. The main nervee are, moreover, leas distinct and the under surface is not dotted. The twige aleo differ in being rery pale in colour instead of brown.
78. Edgrnia subdrcussata, Duthie in Hook. fil. Fl. Br. Ind. II, 491. A tree or shrub; young branches sub-terete, compressed below the nodes, brown. Leaves sessile or nearly so, corisceons, elliptic or oblong-elliptic, rarely somewhat obovate-elliptic, (sub-rotand in var. montana), tapering but little to either end, the apex sometimes with a short blunt acumen, the base minutely cordate; both surfaces darkbrown when dry, the upper polished; the lower slightly paler and pellucid-dotted; nerves numerous but not prominent on either surface, the midrib prominent on the lower ; length 2 to $5 \cdot 5 \mathrm{in}$; breadth $\mathbf{1 . 3 5}$ to 3 in.; petiole very short or absent (about 1 in . long in VAR. montana). Panicles terminal, shorter than the leaves, pedunculate, the peduncle and all the branches and bianchlets much compressed; the branches short, crowded. Flowers 35 in . long (including the stamens), sessile in heads on the apices of the branchlets; the buds shortly clavate. Calys funnel-shaped, the mouth with 5 small triangular teeth. Petals calyptrate. Fruit globular, crowned by the small calyx-cup, smooth, 5 or ${ }^{-6}$ in. in diam. Sysygium subdecussatum, Wall. Cat. 3589 in part.

Simaapore: Wallich; Ridley 4662, 4814, 9498, 10389. Malacta: Maingay (K.D.) 740 ; Derry 476, 975 ; Ridley 1985. Perak: King's Collector ; Scortechini; very common from the sea-level to elevations of 5,000 feet.

A species readily reoognised by the elliptio polighed leaves, tapering very little to either end, aleo by the compressed short branchlets of the infloresoence and the shortly clavate flowers.
var. colorata, King; panicle very condensed, flower-buds longer than in the typical form, leaves when dry tinged with red. F. colorata, Duthie in Hook. fil. Fl. Br. Ind. II.

Malacca \& Maingay (K.D.) 749.
Only a single specimen of this is known. It appears to me a form of E. sub. decussata, and unworthy of speoific rank.
var. montana, King; shrubby ; leaves often sub-rotund or obovoid elliptic, from 1 to 2.5 in . long ; panicles longer than the leaves.
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Preak : Scortechini 294 ; Wray 217, 3844. King's Collector 8030.


#### Abstract

Syzygium apodum, Miq., a Sumatran species, olosely resembles this but has thicker leaves with strongly recurved margins. 79. Eugenia punctulata, King. A tree, 30 to 50 feet high; young branches thinner than a goose-quill, slightly compressed, the bark pale-brown, deciduons in flakes, and the older branches grey. $\boldsymbol{A}$ Leaves coriaceous, obovate or oblanceolate, the apex broad and usually blunt but sometimes with a short point, much narrowed at the base, the edges slightly recurved; upper surface olivaceous (when dry), shining, the nerves indistinct; lower olivaceous-brown, the numerons straight nerves and reticulations faint; length 1.5 to 3 in .; breadth 1 to $1 \cdot 75$ in.; petiole $\cdot 2$ to $\cdot 25$ in. Panicles rather lax, terminal, longer than the leaves (often twice as long, especially in the fruiting stage) : branches numerous, spreading, compressed or 4 -angled, many-flowered. Flowers sessile at the apices of the branchlets with a few scarions bracteoles at their bases. Calyx campanulate, only ${ }^{1}$ in. long, its moath obscurely 4-toothed, smooth. Petals deciduons. Fruit ovoid, much wrinkled when dry and crowned by the wide calyx-limb, ${ }^{\circ} 4 \mathrm{in}$. long (nnripe). Syzygium punctulatum, Wall. Cat. 3583. Jainbosa punctulata, Miq. Fl. Ind. Bat. Suppl. 310.

Singapore: Wallich. Perak: King's Collector 3475, 3782, 6426, 6671, 6937, 10984; Wray 1125, 3972. Singapork: Ridley 3893, 4988, 4989, 6540. Malacca : Derry 1154. Distrib.-Borneo.


This is doubtfully referred in the Flora of British India to E. pyrifolia, Wall. The more complete specimens collected since that Flora was pablished show that E. punctulata is a perfectly distinct species.
80. Elgenia bracteolata, Wight Ill. II, 15 : Ic. t. 531. A tree, 30 to 60 feet high; young branches boldly 4 -angled, pale-brown, about as thick as a goose-quill. Leaves coriaceous, oblong-obovate or oblanceolate, the apex broad and with a short blunt apiculus, rarely sab-acute, the base cuneate: when dry the upper surface dark-brown, shining, obscurely pitted, the nerves faint and impressed ; the lower paler brown, neither pitted or dotted, the numerous pairs of horizontal nerves and the wide reticulations slightly distinct, the midrib very prominent; length 3 to 5 in.; breadth $1 \cdot 5$ to 2 in. ; petiole 3 to $\cdot 5$ iv. Panicles terminal, as long as the leaves, with small, ovate, concave bracteoles at all its nodes, corymbose, many-flowered, the branches few, the branchlets numerous and all (like the peduncle) acutely 4 -angled:and grooved. Flowers in threes at the apices of the branchlets : bibracteolate at the base and on short pedicels, 3 in . long including the stamens, globularclevate in bud. Calya 15 in. long, shortly infundibuliform, ragulose, the mouth with 4 rounded lobes. Pelals whitish, calyptrate. Frinit

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oblong, tapering to each end; the apex erowned by fie 4 peristettint calyx-teeth, minately rugulose, length (very unripe) ' 25 in . Korz in Journ. As. Soc. Beng. XLVI, Pt. 2, 66; For. Flora Burm. I, 482; Duthie in Hook. fll. Fl. Br. Ind. II, 488.

Malacca: Maingay (K.D.) 770. Pinang: Ourtis 1089, 3175. Perak: very common. Distrib.-Burma: Griffith (K.D.) 2387 ; Helfer (K.D.) 2386, 2373.

Easily recognised by its profasely bracteolate inflorescence and acntely 4 angled branches and panicle. Curtis's 1089 is when dry of a much paler colour than the Perak specimens, otherwise it agrees.
81. Ecgenia venulosa, Wall. in Cat. ex Duthie in Hook. fil. Fl. Br. Ind. II, 490. A tree, 20 to $\mathbf{2 5}$ feet high; young branches thicker than a crow-quill, terete, pale. Leaves coriaceous, elliptic-rhomboid to oblanceolate, the apex obtuse or sub-acute, the base cuneate; upper surface pale-brown often with an olivaceous tint (when dry), dotted, shining, duller, the nerves faint; under surface paler, and not olivaceous, the mainnerves 10 to 14 pairs, rather straight, sub-erect, not mach more prominent than the secondary nerves, both sets connected by numerous loops, the intramarginal nerves about $\cdot 1 \mathrm{in}$. distant from the slightly recurved edge; length 2 to 3 in .; breadth 8 to $2 \cdot 2$ in.; petiole $\cdot 1$ to $\cdot 15 \mathrm{in}$. Panicles terminal, broadly corymbose, much-branched, usually shorter or not much louger than the leaves (longer in var.); peduncle and branches 4 -angled, the flowers in threes at the apices of the branchlets, clavate in bud, sessile. Calyx 2 in . long, ragulose, oampanulate in its apper half, the lower contracted, the mouth truncate, or slightly lobed. Petals calyptrate. Fruit globular, submamillate, the apex with a deep, circular, entire pit bounded by the calyx-walls, $\cdot 5 \mathrm{in}$. in diam.

Malacca : Griffith (K.D.) 2405 ; Maingay (K.D.) 74]. .Singapore : Wallich; Ridley 5985. Johore: 4986. Perak : Scortechini 188; Wray 3016.
var. macrothyrsa; panicles longer than the leaves and as much as 4 in . broad.

Malacca: Griffith (K.D.) 2405; Derry 21 ; Maingay (K.D.) 719. Johore: Ridley 4196. Perak: Scortechini 188.
82. Edgenia pseddo-subtilis, King. A tree, 30 or 40 feet high; jonng branches pale greyish-yellow, or almost white, slightly thicker than a crow-quill, terete. Leaves very coriaceons, narrowly. oblongelliptic tapering from the middle to each end, the apex.anb-acute or obtuse, the base ouneate; both surfaces when dry dall, pade-brown; the upper pellicid-pitted and the nerves faint; the lower paler not pitted, the midrib promineint but the 5 to 7 pairs of main-nerves faist, sume crect, curved, not interarching near the edge, length 225 to $4 \mathrm{in}$. ;
12. G. King-Materials for a Fillora of the Malayan Poninsula. [No. 1, beendth 1.1 to 1.25 in. petiole $\cdot 5$ to $\cdot 75 \mathrm{in}$. Panicles shorter than or nearly as long as the leaves, axillary and terminal, often 2 or 3 together, few-branched; the branches divaricate, 4-angled, few-flowered, trichotomous, Floveers sessile, small. Calyce only 05 in . long, at first almost cylindric slightly narrowed to the base, afterwards arn-shaped and finally globalar, the mouth with a projecting rim, traucate but with 4 broad, shallow teeth. Fruit the size and shape of a pepper-corn, smooth, surmonnted by the small remains of the calyx and by the base of the style. E. brachiata, Duthie (not of Roxb.) in Hook. fil. FI. Br. Ind. II, (in part).

Pemang: Curtis 3475. Perak: King's Collector 6946. Singapors: Bidloy 4990.
vas. platyphylla; leaves broader than in the typical form, elliptic, oblanceolate-oblong, sub-acute or with broad rounded apex, the base always cuneate.

Singapors: Ridley 3962. Malacca: Derry; Scortechini. Preak: Pranang : Curtis 32. Syzyg. ribesoides, Wall. Cat. 3553. Syzyg. oinereum, Wall. Cat. 3576.

VAB. subacuminata; leaves bluntly acuminate.
Pranang: King's Collector 1793.
This apecies closely resembles S. subtile, Miq, in its pale branches, in the shape and texture of its leaves and in its flowers. The leaves however have only about one-third as many nervee. The two are however very near.
83. Eugenia microcalyx, Duthie in Hook. fil. Fl. Br. Ind. II, 493. A tree, 40 to 50 feet high; young branches slender, 4 -angled, brown. Leaves coriaceons, oblong-obovate or oblong-lanceolate, sub-acnte, much narrowed from the middle to the base; upper surface blackish-brown when dry, the nerves faint: lower warm-brown the nerves and midrib prominent: main-nerves 10 to 14 pairs, rather straight, ascending, interarching $\mathbf{1 5} \mathrm{in}$. from the edge in a bold wavy line; the edges much and irregalarly reourved when dry; length 2.25 to 3.5 in .; breadth 1.25 to 2 in . ; petiole $\cdot 25$ to $\cdot 3 \mathrm{in}$. Panicles terminal and axillary, as long as or longer than the leaves, on long slender peduncles; branches and branchlets lax, spreading, compressed, with minutely triangular persistent bracteoles at their bases. Flovers yellowish-white, sessile, in heads at the ends of the branchlets, small (only ${ }^{2} 2 \mathrm{in}$. long including the stamens), bracteolate at the base. Calya 15 in . long, funnel-shaped, minutely granular; the mouth with 4 small distant triangular lobes. Petals 4, calyptrate. Fruit (probably unripe) as large as a pepper-corn, globular, crowned by the wide calyx-limb, white tinged with red.

Mhlacas: Griffth (K:D.) 2410 (in part), 2411 . Derry 3531 ; Maingay (K.D.) 727, 731. Singapore: Ridley 2054. Perak : King's Colloctar 5936, 5990, 6627, 8129, 8700, 10417, 10735.

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VAR, obovata; leaves obovate or obovate-lanceolate.
Preak : King's Oollector 6627, 10417, 8129, 8700, 5990, 5986, 8700.
84. Eugenia scoparia, Wall. Cat. 8594. A tree? Young branches about as thick as a crow-quill, terete, pale-brown, smooth. Leaves coriaceons, oblanceolate to obovoid, occasionally elliptic-lanceolate, the apex sub-acute or obtuse, the base always cuneate ; upper surface brown and with numerous small pits, the lower paler and with numerous minute black glands, midrib depressed on the upper and prominent on the lower surface, the nerves almost invisible on both; length $\mathbf{1 . 2 5}$ to 2.25 in . ; breadth 6 to $1 \cdot 1 \mathrm{in}$. Panicles terminal and from the upper leaf axils, longer than the leaves, on slender, rather long, 4-angled peduncles bearing near the apex a few divaricate laxly-flowered branches. Flower-buds clavate, about 15 in . long; mouth of calyx wide, shortly 4-lobed, the tube short and abruptly contracted at the base. Fruit almost globular with a truncate apex, smooth, 1 in . in diam. Duthie in Hook. fil. Fl. Br. Ind. II, 489. Syzygium scoparim, Wall. MSS. ? 8. avene, Miq. Fl. Ind. Bat. Suppl. I, 312.

Signapore: Wallich. Malacca : Goodenough 1649.
Specimens of a species nearly allied to this were colleoted at Changi in Singan pore by Mr. Ridley in October 1890 and again at Selangor (Herb. 7555) in 1896. They differ in having the leaves broader, more pronounced obovate, and almost without dots or glands.
85. Edgenia mybiantha, King n. sp. A tall tree; young branches slightly thicker than a crow-quill, terete. Leaves very coriaceous, oblanceolate sub-acute, the base much narrowed; when dry upper surface pale-brown, shining, dotted; the lower darker brown, dull, sub-glancous; nerves 3 or 4 pairs, on each side very faint, distant, ascending: reticulations on both surfaces invisible, the edges slightly recurved; length 1 to 1.75 in .; breadth $\cdot 5$ to 75 in .; petiole $\cdot 25$ to $\cdot 3 \mathrm{in}$. Panicles very nomerous, longer than the leaves, terminal or in the upper axils, pedunculate ; branches numerous, spreading, the branchlets quadrangular and bearing at their apices numerous small sessile flowers with broad rounded bracteoles at their bases. Flowers only ${ }^{1} \mathrm{in}$. long, truncate in bud. Calyx cylindric, the moath very obscurely lobed. Frint unknown.

Parak: Scontechini 337.
A species resembling r. microcalya, Dathie, in its infloresoence and very small flowers and also in the character of the venation of the leaves which however are much smaller.
86. Eugbnia vereconda, Duthie in Hook. fil. Fl. Br. Ind. II, 496. A small tree; young branches as thick as a crow-quill, pale yellow, terete, smooth. Leaves thinly coriaceous, ovate, acuminate, the base
broadly cuneate; upper surface brown when dry, shining; the lower very pale brown, dull; the numerous nerves, reticulations and intramarginal nerve rather distinct on both surfaces but especially on the npper when dry; length 2 to $3 \mathrm{in}$. ; breadth 75 to 1.5 in ; petiole ${ }^{-35}$ to 6 in .; slender. Panicles crowded at the apices of the branches and in one or two of the upper leaf-axils, shorter than the leaves, on short peduncles, the branches slender, lax, 4 -angled. Flowers only 15 in. long, sessile or on short pedicles, clavate, constricted immediately below the tarbinate apex. Calyx-tube somewhat ribbed, the wide month with 4 shallow distant lobes. Petals calyptrate. Fruit unknown. Sysygiums verecundum, Wall. Cat. 3579.

Malacca: Grifith. Penang: Wallich. Singapore: Ridley 9486. Pangeore: Scortechini 163.
87. Eugenia Sweitenhamiana, King n. sp. A tree, 60 to 70 feet high; young branches thinner than a goose-quill, terete, very pale, faintly striate. Leaves thickly membranons, elliptic-oblong to obovatelanceolate narrowed to the rounded base, the apex shortly and bluntly acuminate ; upper surface dark-brown the nerves and midrib impressed; lower surface pale-brown, the midrib and main-nerves prominent; the latter 9 to 12 pairs curved and interarching to form a stout intramar. ginal nerve $\cdot 1$ in. from the margin, the reticulations indistinct on both surfaces ; length 3.5 to 4 in. ; breadth 1.2 to $1.75 \mathrm{in}^{\text {; }}$; petiole 25 to 35 in. Panicles several together at the ends of the branches, as long (with their peduncles) as the leaves or longer, each bearing near its apex a few slender 3 -flowered umbellate branches, the branchlets, pedunclebranches and branchlets compressed and 4 -angled. Flowers greenishwhite, 35 in . across when expanded ; the buds before expansion clavate, $\cdot 2$ in. long. Calyx funnel-shaped, sessile, contracted at the base, its mouth with 4 broad, rounded, deciduous lobes. Petals 4, sub-orbicular, free, as large as the calyx-lobes. Stamens short. Fruit unknown.

Perak : Scortechini; King's Collector 7590.


#### Abstract

A species near K. pseudo-subtile, King, but with oblanceolate leaves and long slender pedunculate umbellate panicles crowded at the apices of the twig. Named to commemorate the help afforded in the Botanical exploration of Perak by Sir Frank Swettenham, K.C.M.G.


88. Eugenia acuminatissima, Kurz in Journ. Ab. Soc. Beng. XLVI, Pt. 2, 67 ; Fl. Br. Burm. I, 487. A tree, 20 to 50 feet high; young branches about as thick as a crow-quill, slightly compressed; the bark pale-brown, peeling off in vertical flakes. Leaves coriaceons, lanceolate or oblong-lanceolate, the apex candate-acuminate, the base cuneate; both surfaces pale-brown when dry, the npper tinged with olivaceons, slining, the midrib depressed, the main-nerves 15 to 20 pairs; slightly raised, faint; lower sarface darker than the uppof; the

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nerves faint, the intramarginal line rather less than $\cdot 1$ in. from the edge; length 2.5 to 4 in .; breadth 9 to 1.4 in .; petiole 2 to 25 in , Panioles nsnally large, lax, many-branched, pedunculate; langer than the lenves, mostly terminal but some also from the upper leaf-axils: branches acutely 4 -angled, the upper also compreseed. Flowers numeroun, small, white, sessile, usually in threes from the ends of the branchlets, $\cdot 2$ in. long (including the stamens). Calyx tarbinate-clavate, nearly " 2 in . long, the lower half contracted, the upper part turbinate its mouth trancate or very obscurely toothed. Petale 5 or 6, minute, rotand, clawed, erose, free. Frwit depressed-globular, crowned by the minate circular remains of the calyx, ${ }^{4}$ to $\cdot 5 \mathrm{in}$. broad and about $\mathbf{3 5}$ to ${ }^{-4}$ in. long. Dathie in Hook. fil. Fl. Br. Ind. II, 483. Jambosa acuminatissimn, Hassk. in Flora (1849), 592 ; Miq. Fl. Ind. Bat. I, 438. Syzyg. nltissimum, Wall. Cat. 3588. Nfyrtus acuminatisṣima, Blume Bijdr. 1088.

In all the Provinces except the Nicobar Islands. Drstrib.-Burma, Sumatra.
89. Eugenia Konstleri, King n. sp. A tall tree; young branches thinner than a goose-quill, terete, pale. Leaves thinly coriaceons, ovater. lanceolate, acuminate, much narrowed at the base: upper surface brown (when dry), with small depressed dots, the nerves indistinct: lower palebrown with numerous small black dots: main-nerves bold on the under. surface, 8 to 10 pairs, curving apwards and interarching 1 to $\cdot 15 \mathrm{in}$. from the edge; length 3.5 to 5.5 in .; breadth 1.5 to 2.25 in .; petiole $\cdot 4$ to $\cdot 5$ in. Panicles terminal or from the upper leaf-axils, much shorter than the leaves; the short peduncle and the numerous sprearding branches 4-angled, with many small pustules, minutely bracteolate at the divisions. Flowers small, numerous, greenish-yellow, in threes at the apices of the branchlets, sessile. Calya $\cdot 1 \mathrm{in}$., funnel-shaped, the mouth with 4 obscure broad teeth. Petals orbicular. Fruit ovoid, contractedsomewhat at the base and crowned by the short wide calyx-limb, smooth, $\cdot 5-6$ in. long.

Perak: King's Collector 3310, 8680. Penang : Ourtis 179.

[^12]indistinct; the lower brown with many minate papillæ especially on the prominent midrib; main-nerves 10 to 14 pairs, curving upwards and interarching ${ }^{-1} \mathrm{in}$. from the margin, pale, and prominent on the lower surface; length 4.5 to 7 in.; breadth 1.35 to 2.25 ; petiole 3 to 4 in. Panicles small, several together, shorter than the leaves, terminal or from the upper leaf-axils, branching from the base, the branches spreading, papillose, stoat, 4 -angled. Flowers few, sessile, 25 in. long (including the stamens), truncate in bud. Calya campanulate, minutely papillose externally ; the mouth wide and with 4 short, broad, sub-acute lobes. Petals calyptrate. Fruit globular, the apex with a circular pit snrrounded by the wide, short, cupular remains of the calyx, smooth, $\cdot 4$ to $\cdot 5 \mathrm{in}$. in diam.

Malacca: Maingay (K.D.) 751. Singapore: Ridley 4657, 4979, 6420, 6421. Perai : King's Collector 3724, 6758, 7536.

A speciea reoognisable by its short stont panicles with ahort widely campanulate flowers, and pustulate stems and panicles. The leaves (when dry) are distinguished by their colour, greenish above and brown beneath.
91. Edgenia Koordersiana, King n. sp. A tree, 40 to 80 feet high ; young branches somewhat thicker than a crow-quill, terete, dark pur-plish-brown when dry. Leaves coriaceous, elliptic or narrowly ovate, rarely oblanceolate, shortly caudate-acuminate, the base cuneate; both surfaces (when dry) very dark brown, the lower slightly paler ; mainnerves 8 to 10 pairs, curving slightly and interarching 1 in. or more from the edge, impressed on the upper surface slightly prominent on the lower ; length 2.75 to 3.75 in.; breadth 1 to 1.75 in. ; petiole about $\cdot 3$ in. Panicles terminal, usually much longer than the leaves, corymbose, many-branched, the peduncle and branches sharply 4 -angled, compressed at the nodes; branchlets 3-to 5 -flowered at the apex. Flowers white, clavate in bud, sessile. Calyz campanulate, 4-angled, - 15 in . long, contracted for half its length into a psendo-stalk; the month with 4 deep, broad, rounded lobes. Petals 4, sub-rotund, calyptrate. Fruit anknown.

Perak : Scortechini 257 ; King's Oollector 6208, 6233, 6385.
When dry the leaves and panicles of this are very dark-coloured. It is allied to $\boldsymbol{E}$. pseudo-subtilis and $\boldsymbol{E}$. Clarkeana, bat differs from both in leaves. I have named it in honour of Dr. S. H. Koorders of the Forest Dept. in Netherlande India.
92. Edgenia simulans, King n. sp. A tree, 30 to 40 feet high, with pendulous branches: young branches terete, the very youngest compressed and about as thick as a crow-quill, brown. Leaves thinly coriaceons, oblong or elliptic-lanceolate, shortly and rather bluntly acuminate, the base cuneate; both sides dark-brown and shining when dry, the lower paler and duller, slightly olivaceous; nerves numerons,

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straight; ineonspicuious lite the reticulations, intramargipal norve viery near the edge; length 4.5 to 5.5 in. ; breadth 1.75 to to 8.25 in ; petiole 3 to $\cdot 4$ in. Panicles mostly axillary, sometimes terminal, 3 to $4 \mathrm{in}_{\mathrm{i}}$ long, pedunculate, pyramidal, the branches nearly horizontal, all terete. Flowers mostly in threes at the apices of the branchlets, sessile, olevate in bud. Calyx nearly 15 in . long, obconic, with a sub-obtuse base; the month thickened, undulate, indistinctly 5-toothed. Petule oalyptiate. Stamens unequal. Fruit unknown.

Psrak: Scortechini 83, 274.
This resembles E. Bernardi, King, but differv in having olavate, not shorthy obovoid, flower-bads, and in its panioles being usually lateral not terminal. The leaves of the two are much alike. Ridley's specimens collectedin the garden jungle (8104 and 9845) probably belong to this but the panicle is laxer and ita branches thinner.
93. Edgenia Curtisif, King n. sp. A tree, 60 to 80 feet high; foung branches thinner than a goose-quill, terete, the bark brown and peeling off in flakes. Leaves coriaceous, oblong-lanceolate or oblongelliptic, rarely oblanceolate, the apex shortly and bluntly acuminate, the base cuneate, the edges slightly recurved when dry, both surfaces when dry pale olivaceous-brown, shining, obscurely pustulate, the lower less shining and darker in colour than the upper and with numerous very distinct minute conical concolorous pustules; the midrib depressed on the upper but prominent and pustulate on the lower sarface; main and secondary nerves numerous, spreading, interarching less than 1 in. from the slightly recurved edge, rather distinct on the lower but faint on the apper surfaces; length 3 to 5.5 in .; breadth 1 to 2 in . ; petioles $\cdot 15$ to 2 in . Panicles terminal, from half as long as to as long as the leaves, branched from the base, dense, many-flowered,' broader than long, the main-branches spreading, terete, the secondary and tertiary acntely 4 -angled, all stout, the bark very granular, altimately flakey. Flowers crowded at the ends of the branchlets, $\cdot 2$ in. long (including the stamens), sub-globose in bud. Oalyx campanulate, narrowed to the base and produced into a short psendo-stalk, granular, shining: the mouth wide, with 5 small, broadly triangular teeth. Petals 5, papillose outside, orbicular, ? calyptrate. Fruit nuknown.

Perak: Wray 2968, 3102 ; King's Oollector 6149.
vab. minor ; flowers smaller (rather less than 2 in . long, inclading the stamens): Calyx not produced into a pseadosstalk, its mouth obscurely lobed : leaves 2.5 to 3 in. long.

Perak: Wray 194. Malacca: Harvey.
94. Edgenia ppercclata, Roxb. Hort. Beng. 37; Fl. Br. Ind.If; 486, A tree, 30 to 50 feet high; young branches slightly compressed; doditet ;and grooved at first, afterwards tarete, the bark pale-brown at firat bat J. II. 17
plitimately grey. Leaves thinly coriaceous, variable in shape, ovateoblong to elliptic and (in var. 2) obovate, shortly acnminate, bluntly apiculate or (in VAR. 2) obtuse, the base cuneate; both surfaces olivaceonis .when dry, the lower paler and minately dotted: main-nerves distinct on the. lower sarface, 8 to 12 pairs, curved, ascending, becoming faint towards the intramarginal nerve: length 4 to 6 in.; breadth 1.6 to 2.2 in.; petiole. 2 to 3 in. Panicles from the branches below the leaves, 2 or 3 inches long, pedunculate, spreading, lax ; the branches divaricata, trichotomons, 4 -angled. Flowers in threes at the apioes of the branchlets, greenish, sessile. Calyx smooth, campanalate, contracted at the base; the limb trancate. Petals 4, calyptrate, orbicular, concave, abont $\cdot 1$ in. across. Fruit pisiform, smooth, very dark purple, palpy, l-seeded. Wight Ic. t. 552 ; Brandis For. FI. 234 ; Karz For. FI. I, 483 ; Dathie in Hook. fil. Fl. Br. Ind. II, 498. E. cerasoides, Roxb. Hort. Beng. 92 ; FI. Ind. II, 488 ; Wight Ic. t. 615 ; Miq. Anal. Bot. Ind. I, 27 ; Fl. Ind. Bat. I, Pt. 1, 443; Karz in Journ. As. Soc. Beng. XLVI, Pt. 2, 66 ; For. FI. I, 484. Syzygium nervosum, DC. Prodr. III, 260; Mem. Myrt. II, 16; Wall. Cat. 3551 A \& B ; 3553 B \& C (under E. ribesioides); Benth. Fl. Hongk. 119; Tluwaites Enum. 417 ; Miq. Fl. Ind. Bat. l.c. 460 ; Bedd. FI. Sylv. Anal. Gen. CVI. S. costatum, nodosum, and angkolanum, Miq. Fl. Ind. Bat. l.c. 448. Oalyptranthes mangiferifolia, Hance in Walp. 'Ann. II, 629. O. costata, Ham. in Wall. Cat. 3556. O. grandis and 'C. Tatna, Ham. in Wall. Cat. 3554, 3555.

Preak: Scortechini 306. Penang: Ourtis 1444. Distrib.-British India, S. China and the Malay Archipelago.

Two varieties have been separated off but I have no specimens of either from any of the Provinces in our region. These are described as follows by Mr. Duthie in Hooker's Flora of British India.
var. Paniala ; berries oval. E. Paniala, Roxb. Fl. Ind. II, 489 ; Wight Ic. t. 616 ; Kurz For. Fl. I, 483. Syz. Panealla, Wall. Cat. 3557 ? Oalyptranthes cuneata, Ham.?
vak. obovata, Kurz For. FI. I, 482; leaves obovate or oblanceolate, symes more compact. Syz. obovatum, Wall. Cat. 3552, not of DC. S. vastum, Wall: Cat. 3661. S. polyanthum, Thwaites ; not of Wight. .

A third variety occurs in Perak but it has as yet been ouly once collected. It may be distinguished as follows.
var. coriacea; leaves thicker than in the type and not dotted or very obscurely dotted on the lower surface.

Perak: Wray 2725, at Matong on the sea-coast.
95.' Eugenia nicobabica, King. A tree $P$ Young branches rather thinner than a goose-quill, terete, somewhat rough, grey. Leaves thinly -coriaccous, lanceolate or elliptic, the apex sub-acute, the base oureate;

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both surfaces (when dry) olivaceous-brown; the apper shining, with the midrib and main-nerves depressed; the:lower paler and dull; main-nerves 5 to 8 pairs, faint on both surfaces; reticulations few, faintly visible on the lower invisible on the apper surface; length of the lanceolate form 2.5 to 3 in., of the elliptic form 3 to 4.5 in .; breadth respectively 1 to 1.5 in . and 1.5 to 2.5 in .; petiole 6 ta 8 in . Panicles numerons, crowded on the branches below the leaves, trichotomons, 1 to 2 in . long, with a few divaricating, few-flowered branches: Flowers in threes at the ends of the branchlets, 25 in . long (including the stamens), sessile or on short, stont 4 -angled pedicels, obovoid in buid. Calyx $\cdot 1 \mathrm{in}$. long, lengthening to -2 in . after fertilization, campanulate with a 4 in. wide, truncate, irregalarly toothed thickened moith, much narrowed to the base bnt not constricted into a pseado-atrilk. Petals 4 orbicular, calyptrate. Fruit anknown. E. occlusa, Kurz in Hook. fil. Fl. Br. Ind. II, 498 (not of Miquel).

Nicobar Islands: Kurz.
This has been collected only in the Nicobar islands and there only by Kurz who referred it to Sysygium occlusum, Miq. But it differs so much from an arthentic specimen of that species in the Horsfield collection and from Miquel's awn description, that I have given it a new name.
96. Eigenia Jambolana, Lamk. Dict. III, 198. A small tree; young branches thinner than a goose-quill, terete, very pale :when dry. Leaves coriaceons, rather variable, rotand-ovate to oblong-ovate, blantly and shortly acuminate, sub-acute or obtuse, slightly narrowed at the base; both surfaces brown when dry, the under paler; nerves and their connecting reticulations numerous, distinct when dry on both sarfaces but especially on the lower, intra-marginat nerve and midrib prominent on the lower; length 2.5 to 4 in.; breadth $1 \cdot 5$ to $2 \cdot 25$; petiole 6 to 75 in. Panicles from the branches below the leaves, much branched ; the branches divaricate, all terete, many-flowered, longer than the leaves. Flowers whitish, sessile, 4 in. across. Calyx campanalate, suddenly contracted into a stout pseudo-stalk less than half its length, the limb at first obscurely and broadly 4 -toothed bat. altimately truncate. Petals 4, arbicalar, rather more than $\cdot 1$ in. longr. calyptrate. Fruit ovoid-oblong, about the size of an olive, pulpy, smooth, dark-purple, I-seeded. Ham. in. Wern. Soc. Trans. V,.342; Rosb. FI. Ind. II, 484; Wight Ic. t. 535 ; Benth. Fl. Austral. III, 283 ; Bedd. Fl. Sylv. I, t. 197 ; Brandis For. Fl. 233; Karz in Journ. As. Soc. Beng. XLVI, Pt. 2, 67; For. Fl. I, 485. Dathie in Hook. fil. Fl. Br. Ind. II, 499. Syz. Jambolanum, DC. Prodr. III, 259 ; Wall. Cat. 3560; W. and A. Prodr. I, 329; Dalz. and Gibs. Fl. Bomb. 93. E. frondisa, Wall. Cat. 3560 G : not 3590. E. Moorei, F. Muell. Fragm. V, 33. Calyptranthes Jambolana, Willd. Sp. Pl. II, 975. O. capitellata,

Hàm. in WaH. Cat. 3560 B. E. caryophyllifolia, Lam. Dict. III, 198 ; Roxb. Hort. Beng. 37; Fl.: Ind. II, 486; Wight Ic. II, 5053. E. calyptratá, Roxb: Ic. 1142 ? Syz. caryophyllifolizum, DC. Prodr. III; 259; Wall: Cat. 3562 partly, and 3551, C.; Thwaites Enium. 116. S. Jambolanunn, var. microcarpunn, Thwaites Euum. 417; Wall. Cat. 3562 C: Syz: lateriflorum, Royle. Myrtus Oamini, Linn: : exclade ayn. Ramph. and Burm.-Pluk. Alm. t. 274, 2. Rheede Hort. Mal. V; t. 29. Ramph. Herb. Amb. I. t. 41. E. obtusifolia, Roasb. Horit. Beng. 37, Fl. Ind. II, 485; Wight Ic. t. 620. Jambolifera pedunculata, Geerth. Fract. I, 78, t. 36. - Rumph. Herb. Amb. I, t. 42 ; (bad).

Not ancommon in cultivation in all the provinces and also in British Iudia but rarely wild in any of the Malay provinces. The fruit although rather anstere is eaten.

## Species of dotbtrol position.

The under-noted three species were described by Mr. Duthie in Hooker's Flora of British. India. They nre all founded on scanty specimens collected by Maingay. 1 quote the anthor's descriptions verbatim:
T. fusiformis', Dathie; young branches 4-gonons, leaves petioled obovate-lanceorate cuneate bélow subcoriaceons pellucid-panctate, lateral nerves rather close, cymer terminal compact branches angular and-somewhat winged, flowers 2 or 8 together) on thiort pedicels, calyx-tabe narrowly fuafform much produced above the ovary.

Mampa: Maingay 743.
Bark yellowish. Leaves 4t by 3 in , shining a little above, minutely dotted; midrib and nerves dark-coloared; lateral nerves uniting within the margin ; petiole about $\frac{1}{t} \mathrm{in}$. Calym-tube $\frac{1}{8} \mathrm{in}$. in length and $\frac{1}{8} \mathrm{in}$, across at the widest part; lobes 4 , rounded, reflexed after flowering. Styte persistent, exserted portion equalling the calyx-tabe.-Closely allied to 2236 of Becoari's Borneo plants.
E. maingayi, Duthie; leaves shortly petioled long oblong-lanceolate acuminates rounded at the base, racemes short axillary or from the leafless axils of the rugged lower branchlets; calyz-tube elongate olavate about $\boldsymbol{z}$ in. glandular, lọbea 4 rounded deciduons.

Mamya': Maingay 750.
Older branchlets with rugged corky bark, upper stoat, terete, reddish. Leaves
 8tyle short, acute.-This plant seems to approach nearest to $\boldsymbol{F}$. claviflona, and has a gereral resemblance to E. borneensis, Miq. FI. Ind. Bat. I, Pt..1, 484 (Jambosa), but the petioles of the batter are mooh longer.
f.tumida, Duthie; leaves oblong-ovate or obovate ahortly acuminate narrowed at the base clpeoly netved, oymes terminal and axillary equalling or exceeding the leares, calyz-tube it in. narrow swollen below the middle.

Maласса : Maingay 755.
Branchlets terete. Leaves $2 \mathbf{\}}-\mathbf{3} \mathbf{y}$ in., chocolate-coloured above, rasty-yellow beneath when dried; lateral nerves slender, uniting close within the margin; petiole $\ddagger$ in. Panicles lax, spreading; branohes acately angular. Calyw with 4 pearly equal shallow lobea,-The petals are probably free, though not expanding. The amollen part of the oalyx-tube is oconpied by the ovary.

## 9. Pseudo-dugrinia, Scortechiní.

Trees with opposite punctate leaves and few-flowered, axillary, minately bracteolate inflorescence. Calyx-tube turbinate or oblong, its month with 4 small rounded lobes, and bearing a thin annular staminiferous disc. Petals 4, orbicalar, clawed. Stamens 8, in two rows; filaments inflexed in. bud; anthers small, 2-celled. Ovary 2 -celled. Etyle short. Ovules numerous, in several series on the placentas. Fruit as in Eugenia, 1- to 2 -seeded. Distrib.-2 species, be th Malayan.

A genus which differs from Eugenia ohiefly in having only 8 stamens.
Leaves 4.5 to 6 in. long

1. $P$. perakensis. " 1.5 to 2.5 in. long . 2. P. singaporensis.
2. Pbeudo-rugenia prrakingis, Scortechini in Journ. Bot. XXIII (1885), 153. A tree, 15 feet high; young branches thin, terete. Leavies thinly coriaceous, elliptic-landeolate, slightly narrowed at the base; the apex with a slender obtuse acumen, pellucid-punctate, the main-nerves clpse, inconspicuous on the upper surface, sub-horizontal, interarching near the margin ; length 4.5 to 6 in. ; breadth 1.5 to 2 in.; petioles short. Oalys-lobes incurved. Petals 4, small, free, spreading, distant. Stamens short. Berry pisiform. Eurgenia skiophila, Duthie in Hook. fil. Fl. Br. Ind. II, 486.

## Penang: Maingay. Prrak: Scortechimi.

2. Pbeudo-bugenia singaporensis, King n. sp. A tree, 30 to 40 feet high; young branches as thin as a crow-quill or thinuer, terete, smooth, dark-brown. Leaves thinly coriaceous, elliptic-lanceolate, slightly narrowed at the base, the apex abruptly and bluntly acuminate; both surfaces (when dry), dull and of a uniform dark-brown colour; the upper with the midrib depressed and the main-nerves and reticulations obscure; the lower minately warted; the main-nerves numerous, faint; interarching near the edge; length 1.5 to 2.5 in.; breadth $\cdot 45$ to 7 in.; petioles $\cdot 1$ to $\cdot 15 \mathrm{in}$. Panicles shorter than the leaves, axillary, few-branched and few-flowered; the peduncle and branches very slender, dark coloured, 4 -angled. Flowers clavate in bad and greenish. Fruit unknown.

Singapore : Ridley 2909 ; King's Collector.1242,.5957, 8710.

## Notr.

In addition'to the two species above desoribed there are in the Calcutta Herbarinm specimens of what appears to be a third species of this genus collected by Mr. Harvey near Malacca. In these specimens the leaves are ovate with acute apices and cuneate bases, and 6 to 7 pairs of ascending main-nerves rather prominerit on the lower surface. The leaves are from 3 to 4 inches long and about half as much in breadth. The flowers measure about $\cdot 3 \mathrm{in}$. in length and rise in pairs from the stems below the leaves. Mr. Forbes also collected in Sumatra specimens (Herb. Itwbes 9889) of a mall treo with elliptic, candatemonminate leaves
cuneate at the base, which probably belong to a fourth species of Pseudo-eugenia. The flower-buds of this, which measure less than ${ }^{\circ} 1$ in. in length, are borne in pairs below the leaves.
10. Bakringtonia, Forst.

Trees. Leaves alternate, crowded towards the ends of the branches, entire or slightly crenate-serrate, pinnate-nerved, not dotted. Flowers in elongated terminal and lateral racemes, or in interrupted spikes; bracts small, deciduons. Calyx-tube ovoid or turbinate, scarcely prod duced above the ovary; lobes 2-4, valvate, or 3-5, imbricate. Petals 4 rarely 5 , much imbricate, somewhat adnate at the base to the staminal tube. Stamens numerous, in several series, connate into a short tube at the base; filaments filiform, long, all bearing anthers. Ovary inferior, 2-4-celled, crowned by an annular disc; style long, filiform, simple, stigms small; ovales 2-8 in each cell; pendulous. Fruit fibrous or somewhat berried, globose, ellipsoid or quadrangular, crowned by the calyx, by abortion l-seeded. Seed ovoid or ellipsoid, without albumen; embryo large; exhibiting two layers, cotyledons nearly obsolete: Distrib.-Species 25 ; in tropical Asia, Africa, A ustralia and Polynesia; often near the sea.

| Sect. I. Butonica. Calyz closed in bad and entire, allimately splitting into 2 .or sometimes into 3 labes: flowers pedicelled. |  |
| :---: | :---: |
| Racemes short, erect or sub-erect; fruit conical. |  |
| Racemes terminal, erect; flowers $2 \cdot 5$ to 3 in . long and of greater diameter; fruit angled but not winged at the base ... ... | 1. B. speciosa. |
| Racemes lateral or terminal; sab-ereot; flowers less than 1 in. in diam.; fruit with 8 down-ward-pointing winge at the base ... | 2. B. conoidea. |
| Racemes elongated, pendulous ; fruit ovoid | 3. B. racemosa. |
| Sect. II. Stravidiom. Calyx with 4 (sometimes $3 . o r 5$ ) imbricate lobes. |  |
| Racemes terminal, erect, short, 1- to 8 -flowered Racemes lateral, penduloas, elongate, many-llowered. | 4. B. paucifora. |
| Flowers more than 5 in . across; leaves with distinct petioles from $7 \cdot 5$ to 3 or $4 \mathrm{in}$. . in length. |  |
| Flower-buds jast before expansion aboat ${ }^{2} 25^{\circ} \mathrm{in}$. long; fruit ovoid or elliptic, not angled or only slightly so; rachis much thiokened in fruit ... | 5. B. macrostachya |
| Flower-bads just before expansion more than 25 in. long; fruit oblong, 4-angled. |  |
| Main-nerves of leaves 6 or 7 pairs; fruit 8 in. long; rachis of spike thickening alightly in fruit | 6. B. Ecortochinii. |
| Main-nerves of leaves 9 to 12 pairs; fruit glabrons, acutely 4 -angled, less than .2 in . long; rachis of epike hardly thickening in fruit |  |

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1. Blaringtonia speciosa, Forst. Char. Gen. t. 38 and t. 38 A and B. A glabrous tree, 30 to 50 feet high; young branches stont, grey. Leaves thinly coriaceons, obovate-oblong or obovate, with broad rounded apex and much narrowed base, sessile, entire ; main-nerves about 10 pairs, not prominent; length 6 to 14 in .; breadth 8.5 to 7 in . Panicles short ( 4 to 8 in . long) erect, terminal, with 1 or 2 leaf-like bracts at the base, few-llowered. Flowers 6 to 12, large ( 2.5 to 3 in. long and 5 in . in diam.), on long pedicels bracteolate at the base. Calyx with 2 large oblong, nerved ( 2 to 4 in .) lobes 75 to 1.25 in . long, persistent. Petals 4, white, larger than the calyx, ( 2.5 in . broad) decidnous. Stamens very numerons, longer than the petals bat shorter than the style. Fruit large, shining, quadrangular-truncate at the base, tapering to the apex and crowned by the persistent calyx, blantly 4 -angled, sometimes subovoid and less prominently angled, 3 in . or more in breadth at the base and slightly more in length ; pericarp very thick, fibrous, spongy. Seede ovoid, 2 or more in. long. Flor. des Serres IV, 409 ; Linn. f. Suppl. 312 ; DC. Prodr. III, 288; Roxb. Fl. Ind. II, 636; Wall. Cat. 3632, excl. B; Blame Bijdr. 1096; W. \& A. Prodr. 333; Wight Ic. t. 547 ; Miq. Fl, Ind. Bat.I, Pt. 1, 485 ; Miers in Trans. Linn. Soc. Ser. II, Bot. 1, 55, t. 10; Kurz For. FI. I, 496; Clarke in Hook. fil. Fl. Br. Ind. II, 507 ; Trimen Flora Ceylon II, 189. B. asiatica, Karz in Joarn. As. Soc 1877, Pt. 2, 70. B. ? macrophylla, Miq. l.c. 491. Nammea asiatica, Linn, Sp. PI. 731. Agasta splendida, asiatica and indica, Miers l.c. 60-64, tt. 11, 12. Butonica, Ramph Herb. Amb. III, t. 114.

In all the Provinces, on the sea-coasts: Distrib.-The shores of the Malay islands and British India; also of Australia and Polynesia.

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Indian Botany who have dealt with the Indian Barringtentes. (Mr. C. B. Clarke in Hooker's Flora of British India, and the late Dr. H. Trimen in his Flora of Oeyion) adopt the view that obtained prior to the pablication of Miers' paper, and they believe that the three species of Agasta of the latter anthor are merely forms of the Barringtonia speciosa of Forster. If Miers' arrangement, however, is to be followed, the name of the plant ocourring on the coasts of the Malay Peninsula and .of British India would be aither Agasta indica or A. asiatica according to the shape of the base of the frait. Miers hays of the frait of the form which he congiders alone entitled to the name Barringtonia speciosa, fructus non vidi, and he relies solely on Forster's figure (Char. Gen. t. 38 B, fig. b). In his account of it that figure no doubt shows a 4 -oelled fruit. Whether or not Ferster or his artist had a fally-developed fruit before him when he made the drawing referred to cannot be known. But however that may be, the characters, other than the number. of cells in the fruit of Forster's Barringtonia and of Miers' three' Agastas are practically alike, and I fail to see any good basis for the foundation on them of four speoies belonging to two genera.
2. Barbingtonia conoidea, Griff. Notul. 656: Ic. 635, 636, fig. 1. A large bush or small tree, glabrous; young branches sub-salcate. Leaves thickly membranous, oblanceolate-elliptic or cuneate : oblong; narrowed at the minately subcordate or rounded base to the short, stout petiole; the apex blunt or sub-acate; the edges obscurely crenateserralate or subentire; main-nerves 9 to 13 pairs, carved, ascending; length $4: 5$ to 10 in .; breadth 2 to 4 in .; petiole 15 to $\cdot 2 \mathrm{in}$. Rdcemes saberect, lateral or terminnl, few-flowered, about 4 in . loug; glabrons or puberulous. Flowers less than 1 in . long and 1 in . aoross, on pedicels $\cdot 5$ to $\cdot 6$ in. long. Caly $x$ with a sabcylindrie tabe, $\cdot 15 \mathrm{in}$. long'; the base with 8 gibbous processes; the limb bipartite. Petuls 4, fleshy, ovate-' lanceolate. Stamens mach exceeding the corolla. Fruit fibrous-fleshy, conoid, produced at the base into 8 wing-like semi-cordate fleshy processes and crowned at the apex by the calyx, 2.5 in . long and 1.75 in . broad at the base. Kurz For. Flor. Burma I, 497 ; Clarke in Hook. fit, F1. Br. Ind. II, 508. B. alata, Wall. Cat. 3633. Butonica alata; Miers in Trans. Linn. Soc. Ser: II, Bot. I, 70, t. 14, figs. 10 to 15.

Malacca: Griffith (Kow Dist. 2423). Peraf: Scortechini 1385. Burmah: Wallich.
$\Delta t$ onoe distinguisbed by its ourions conical fruit winged at the bage:
3. Barbingtonia racemosa, Roxb. Hort. Beng. 52; Fl. Br. Ind. IL, 634. A glabrous tree, often 50 feet high; young branches rather stoat, cinereons. Leaves membranons, obloug-obovate or oblanceolate, shortly acuminate, narrowed to the shortly petiolate base, faintly cre-nate-denticulate; main-nerves 8 to 15 pairs, spreading or ascending, thin but prominent on the lower surface when dry ; length 4 to $12 \mathrm{in}$. ; breadth 2 to 4 in ; petiole 1 to 25 iu . Racemes muoh longer thay the leaves, ( 10 to 24 in . long) from the axils of fallon leaves or terminal;
pendulous, many-flowered, minutely bracteolate. Flowers distant, 1.5 to 2 in . in diam., on thin pedicels 2 to $\cdot 3 \mathrm{in}$. long, buds globose. Oalyx turbinate, obconic, 2- or 3-partite, permanent. Petals 4, oblong. Stamens very numerous, much longer than the calyx but shorter than the style. Fruit as large as a hen's egg and of mach the same shape, but somewhat 4-sided, nearly smooth, the pericarp leathery; seed solitary ovate-oblong. DC. Prodr. III, 288; Wall. Cat. 8634; W. \& A. Prodr. 333 ; Wight Ic. t. 152, inclading fruit; Bot. Mag. t. 3831 ; Dala. \& Gibs. Bomb. Fl. 94 ; Gand. Voy. Freyc. t. 107; Vidal, F. Fl. Fil., t. 50 a ; Kurz For. Fl. I, 496 ; Clarke in Hook. fil. Fl. Br. Ind. II, 507 ; Trimen Flora Ceyl. II, 189. B. speciosa, Wall. Cat. 3632 .B. B. alba, Miq. Fl. Ind. Bat. I, Pt. 1, 487. Eugenia racemosa, Linn. Sp. Pl. 673. Stravidium album, DC. Prodr. III, 289. Butonica racemosa and alba, Miers in Trans. Linn. Soc. Ser. II, Bot. I, 65, 66, t. 13, figs. 1-17. B. rubra and inclyta, Miers l.c. 70, 71, t. 14, figs. 1-3, 19.-Rheede Hort. Mal. IV, t. 6.

In all the provinces; on the sea shores. Distrib.-Brit. India, Malayan Archipelago, Polynesia.
4. Barringtonia pauciflora, King n. sp. A tree, 30 or 40 feet high; young branches slender, glabrous, pale-brown when dry. Leares thickly membranous, broadly oblanceolate narrowed into the petiole at the base; the apex suddenly and shortly caudate-acuminate; mainnerves 8 to 10 pairs, curving npwards; length 3 to 4.5 in .; breadth $1-25$ to 2 in .; petiole -4 to 8 in ., slender. Raceme solitary, terminal; erect, 1.5 to 2 in . long, bearing only 2 or 3 flowers or sometimes only à single one. Flowers about 1.75 in . long. Oalyx-tube funnel-shaped, boldly 4 -angled, sparsely rufous-furfuraceons, 4 in . long; the lobes 4, ovate-rotund, blunt, shorter than the tabe. Petals 4, obovate-oblong, glabrous, 1 in. long. Stamens longer than the petals. Fruit unknown.

Prrak: Scortechini 939 ; King's Collector 6355.
5. Barringtonia madrostachya, Karz in Journ. As. Soc. Beng. XLVI, Pt. 2, 71 ; For. Flora Burma II, 498. A glabrous shrub or small tree; young branches pale-brown, striate. Leaves oblong-oblanceolate or oblong-elliptic, narrowed to the long slender petiole, the apex abraptly acuminate, the edges entire or with broad shallow crenations; main-nerves 14 to 18 pairs, curved, ascending, rather prominent beneath when dry; length 5 to 12 in .; breadth 2 to 5 in . ; petiole 1 to 4.5 in . Spikes lateral (often extra-axillary) or terminal, pendulous, 1 to 2 feet long, glabrous or puberulous, stoat, rather fleshy and much thickened in the fruiting stage; bracteoles minute, cadacous. Flowers sessile, crowded, nearly 2 inches long and 1 in . across when expanded. Calyxtube obconic, 4 -angled, $\cdot 25$ in. long; the limb with 4 broad, blunt lobes J. II. 18
${ }^{2} \mathbf{i}$ in. long. Petals oblong sub-acute, 1 in . long. Filaments twice as long as the petals. Fruit broadly-ovoid or elliptic, smooth, not angled or ouly slightly so, crowned by the small calyx-lobes, 1.5 to 2 in . long and about $\mathbf{1 . 3 5}$ in. in diam. Clarke in Hook, fil. Fl. Br. Ind. II, 509 (excl. syn. B. pendula, Kurz and Doxomma pendula, Miers). B. cylindrostachya, Griff. Notul. IV, 655. B. sarcostachys, Miq. Fl. Ind. Bat. I, Pt. 1, 400. Stravidium sarcostachys, Blame in Van Houtte Fl. des Serres, VII, 24. S. acuminatum, Wall. Cat. 3636. Doxomma macrostachyum, cylindrostachyum, acuminatum, Miers in Trans. Linn. Soc., Ser. II, Bot. I, 104, 100, 102. Careya macrostachya, Jack in Mal. Misc. I, 47 ; DC. Prodr. III, 295.

Malacca: Maingay (K.D. 763); Griffith (K.D. 2421): Penana: Ourtis 1581. Negri Sembilan : Ridley 1852. Peraf: Scortechini (without No.) ; Wray 1299, 2410, 3136, 3642, 3635 ; King's Collector 3402, 3779, 4136, 10075, 10206, 10615. Distrib.-Borneo, Burmah, Griffith; Gallatty.

This is allied to B. pendula, Karz-a rare species from Southern Burma originally desoribed by Griffith as Careya pendula (Notulæ IV, 661). That species, however, has narrower leaves than this with fewer nerves; the calyr-tabe is elongate, the stamens are only about one inch long; and the fruit is narrowly oblong, boldly 4 -angled, more than 2 in . long and only about 65 in . in diam. There is an excellent drawing of this plant with fall analyses of the flowers in the Herb. Kew, which was made from living speoimens by the Rev. C. Parish. The specien has been reduced in Hooker's Flora of British India to B. macrostachya from whioh it differs in the points above noted.
6. Barringtonia Scortrceinii, King n. sp. A glabrous tree, 50 to 60 feet high; young branches slender, pale-brown, glabrous. Leaves thinly coriaceous, elliptic-oblong to oblanceolate-oblong, tapering (often very much) to the petiole ; the apex acate or shortly acaminate; the margins entire or obscurely and minately dentate; main-nerves 6 or 7 pairs, spreading, curved; length 3 to 6.5 in.; breadth 1.5 to 2.5 in .; petiole 5 to :8 in. Spikes lateral, pendulons, 6 to $18 \mathrm{in}$. long, glabrous, rather slender bat slightly thickening with age. Flowers numerous, 1.5 to 2 in . long, narrow. Calyx-fube bracteate at the base, glabrons, obconic, 4 -angled, $\cdot 25 \mathrm{in}$. long ; the 4 lobes shorter than the tabe, broad, rounded. Petals oblong, blant; $\cdot 75$ in. long. Filaments 1.5 to 2 in. long. Ovary 8 -celled (asually). Fruit oblong, somewhat tapered but trancate at each end : the apex mamillate erowned by the small calyxlobes, smooth, 3 in. long and 1 in . diam.

Perak: Scortechini 237, 395, 1674, 2020; Wray 2087; King's Collector 3598, 3854, 6252 ; Curtis 1296 .

There are two distinct forms under this species; one with oblong-elliptio

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leaves and rather larger flowers; the other with leaves oblanceolate, more slender spike-rachis and smaller flowers, bat the two pass into each othor.
7. Barbingtonia sumatrana, Miq. Fl. Ind. Bat. Suppl. 315. a glabrous tree; young branches pale, as thick as a goose-quill. Lsaves coriaceous, elliptic or oblong-elliptic tapering much to the base, the apex shortly and rather abruptly acuminate, the edges obscurely serrate or entire, slightly wavy somewhat recurved when dry; upper surface shining when dry, the lower dull and paler, both minutely reticulate; main-nerves 9 to 12 pairs, thin but prominent; length 4.5 to 7.5 in.; breadth $1 \cdot 4$ to 3 in .; petiole 75 to 2 in., thickened at the base. Spikes axillary and terminal, pendulous, angled, glabrous, 9 to 15 in . long, not thickening in fruit. Flowers numerous, more than 1 in . long and nearly as much across, sessile. Calya $\cdot 5 \mathrm{in}$. long; the tube infundibuliform, acutely 4 -angled; the lobes half as long as the tabe, broadly ovate, conçave, spreading. Petals broadly oblong, very blunt, $\cdot 65$ in. long. Stamens ${ }^{-75}$ in. long or more. Style slender, 1.6 in . long. Fruit oblong, somewhat tapered to the base, less so to the calyr-crowned apex, acutely 4 -angled, smooth and shining, $1 \cdot 75 \mathrm{in}$. long, and 65 in . in diam.

Singapore: Ridloy 277, 2056. Sumatra: Miqual (Herb. Bogor 4536). Celebes: Beccari.
8. Barringtonia musiformis, King n. sp. A large tree, 60 to 80 feet high ; young branches as thick as the fore finger, brownish, glabrous. Leaves thinly coriaceous, entire, or obscurely crenate towards the apex, oblong-oblanceolate or narrowly elliptic-oblong, much tapered to the long slender petiole, the apex shortly acuminate; main-nerves 8 to 12 pairs, curved, ascending, not conspicuous; length 5 to 10 in ; breadth 1.75 to 3.25 in .; petiole 75 to 2.25 in . thickened at the base. Spikes axillary, suberect, 12 to 14 in . long, stont, striate, thickening to ${ }^{-6} \mathrm{in}$. in diameter or more in fruit, the cicatrices of the fallen flowers very prominent, scurfy-puberulons. Flowers large, sessile. Calys campanulate, 1.25 in . in diam. at the mouth, densely but minately rusty-pabes. cent; the tube subcylindric, only $\mathbf{2}$ in. long; the 4 lobes large, ovaterotand, blant, $\cdot 75$ in. long. Petals 4, concave, rotund, scurfy outside. Fruit narrowly-oblong, 4-angled, sub-truncate at each end, the apper crowned by the calyz and the 2 inch long style, minutely pabescent, 4 or 5 in. long, and 1 to 1.5 in. thick.

Perak : Ring's Oollector 5746, 6154.
I have ceen no expanded flowers of this as the collected specimens are either in bad or in fruit, Its nearest allies are B. augusta, Karz, B. pterocarpa, Kurz, and Dozomma magnificum Miers, but all these have mach smaller flowers and their leaf petioles are very short. The ripe frait of this resembles in shape small banana, bat the endocarp and pericarp have a very different texture, being in this dansely fibrons.
9. Barringtonia fusiformis, King n. sp. A small tree, 10 to 20 feet high; young branches slender, puberulous, pale when dry. Leaves membranous, oblanceolate or obovate-oblong, narrowed to the cordate base, sessile or sub-sessile; the apex obtuse or acute; the edges remotely serrate becoming almost entire when old; main-nerves 12 to 16 pairs, curved, ascending, slightly prominent on the lower surface when dry; length 4 to 8 in .; breadth 1.4 to 2.4 in .; petiole (if present) only 05 in. long. Racemes axillary, very slender, pendulous, much exceeding the leaves, lax, minutely rusty-pubescent, 1 to 2 feet long, surrounded at the base by a whorl of lanceolate persistent bracts 5 in . long. Filowers 4 in. across, distant, on slender pedicels 1 in . long; the bracteole at the base of each pedicel lanceolate, deciduons. Calyx 8 in. long; the tube obconic, densely rusty-puberulous; the teeth 4, broad, rounded, less paberulous than the tabe. Petals slightly longer than the calyx, broadly obovate. Stamens three times as long as the petals. Fruit fusiform, tapering almost equally to each end; the apex crowned by the small calyx, 4 -angled, decidnonsly rusty-pubescent, $2 \cdot 25$ in. long and only. 5 in. in diam.

Perak: Scortechini; King's Collector 10388, 10643, 10094.
The very long flower pedicels and the narrowly fasiform fruit distinguish this from all the other species.
10. Barringtonia acutangola, Gmertn. Fract. II, 97, t. 101. A glabrous tree, 25 to 50 feet high; young branches thin, pale-grey, glabrous. Leaves obovate-oblong, or cuneate-elliptic, much narrowed to the shortly' petiolate base, the apex broad rounded or subacute, the edges minutely denticulate or cuneate: main-nerves 10 to 13 pairs, spreading, not prominent ; length 2 to 5 in .; breadth $1 \cdot 1$ to 2 in .; petiole 15 to 2 in. Racemes much exceeding the leaves, slender, pendulous, many-flowered, from 6 to 15 in . long. Flowers 3 or 4 in . across, in slender pedicels from 05 to ${ }^{\circ} 25$ in. long. Calyx with short tabe and 4 rounded, regalar, ciliate teeth. Petals small, under 25 in. long. Filaments about three times as long. Fruit oblong or oblong-ovoid, truncate at both ends, crowned by the small calyx, glabrous, boldly but bluntly quadrangular; 1.25 to $1 \cdot 5$ in. long. Roxb. Fl. Ind. II. 635 ; Blume Bijdr. 1097 ; W. \& A. Prodr. 333; Miq. Fl. Ind. Bat. I, Pt. 1, 488; Dalz. \& Gibs. Bomb.' Fl. 95 ; Bedd. Fl. Sylv. t. 204; Brand. For. Fl. 235 ; Kurz For. Fl. Burm. I, 497 ; Clarke in Hook. fil. Fl. Br. Iud. II, 508; Trimen Flora Cejlon II, 191. Stravidium rubrum, DC. l.c. 289. S. acutangulum, Miers in Trans. Linn. Soc. Ser. II, Bot. I, 80 t. 17 figs. 1 to 14. S. obtus. angulum and S. Rheedii, Blume in Van Houtte Flore des Serres VII, 24; Miers l.c. Eugenia acutangula, Linn. Sp. Pl. 673.

I include this species as Malayan with some hesitation. Most of the Malayan

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specimens bearing the neme I would refor to B. spicata, Bl. It is however a widely distribated and common tree in India and partioularly so in Burms and it is quite likely to occur in Quedeh and the northern part of Perak.
11. Bibbingtonia' spicata, Blume Bijdr. 1097. A tree, 30 or 40 feet high ; young branches slender, smooth, brown when dry. Leaves oblong: oblanceolate, tapering to the short petiole, the apex acute or subacute, the edges distinctly serrate-dentate; main-nerves 8 to 10 pairs, curving slightly, ascending ; length 4 to 8 in.; breadth 1.4 to 2.4 in .; petiole $\cdot 2$ to 3 in. Spikes axillary or terminal, exceeding the leaves, very slender, pendulous; bracteoles minute, caducous. Flowers small, numerous but not crowded, sessile or with a very short pedicel, about $\cdot 5 \mathrm{in}$. in diameter when expanded. Oalyx with obconic, rusty-pabescent tube less than $\cdot 1 \mathrm{in}$. long, and 4 broad, rounded teeth half as long. Stamens $\cdot 5$ in. long. Fruit sub-globose, glabrons, crowned by the enlarged calyx-lobes, about 6 in. in diam. Miq, Fl. Ind. Bat. I, Pt. 1, 489; Vriese Ned. Kraidk. Arch. III; 41. Stravidium spicatum, DC. Prodr. III, 289; Blume in Van Houtte Flore des Serres VII, 24. S. spicatum and globosum, Miers in Trans. Linn. Soc. Ser. II, Bot. 1, 85. Gustavia globosa, Span. Trans. Linn. Soc. XV, 204. ? Stravidium denussum, pubescens, reticulatum, Horsfieldii and serratum, Miers l.c. 81 to, 86. ?\&. coccineum, DC. Prodr. III, 289 ; Miers l.c.

Malacca : Grifith (K.D.) 2425 ; Derry 1221 ; Maingay (K.D.) 765. Penang: Curtis 397. Trang: King's Collector 1404. Perak: King's Collector 4681. Province Wkllesley: Ridley 7043. Distrib.-Java, Borneo.; Motley 537, 582 ; Zollinger Cat. 534.

This resembles B. acutangula, Gærtn., but differs in having sessile flowers, shorter stamens, and sub-globose not elongated angular fruit. The leaves also are less obovate. - It is a widely distributed species and therefore presents various forms, many of which have been treated as species.

## 11. Planchonia, Blume.

Trees with alternate, membranous, crenulate, pinnately-nerved leaves without dots, crowded towards the ends of the branches. Flowers white or yellowish-green, in short terminal racemes. Calyx-tube turbinate, little produced beyond the ovary; its month with 4 imbricate lobes. Petals 4, imbricate. Stamens very nnmerous, in several series, slightly united at the base into a ring, the inner without anthers, the filaments of all long and slender. Ovary inferior, 3-4-celled, crowned by an annular disc. Style 1, long, slender, crowned by the small stigma; ovules many in each cell. Fruit large, fibrous, ovoid, crowned by the persistent calyx-lobes, 1-3-celled. Seeds several, ellipsoid, the testa coriaceous, albumen absent, cotyledons short. Distrib.-Three species; littoral, from the Andaman islands to Australia.

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$$
\begin{aligned}
& \text { Leaves obovate, distinotly arenulate; flowers sessile } \\
& \text { Leaves broadly elliptic, obscurely orenulate; flowern on } \\
& \text { long pedicels ... P. onndiaca. } \\
& \text { l... ... }
\end{aligned}
$$

1. Planchonia bundiaca, Miq. A tree, 50 feet high; young branches thicker than a goose-quill, the bark rough, pale-brown. Leaves distinctly creunlate, obovate, much and gradually narrowed into the petiole; the apex with a short triangular apicalis; both surfaces brown (when dry), the reticulations faint: main-nerves 12 to 18 pairs, spreading, depressed on the apper prominent and often pale in colour on the lower surface; length 3 to 6.5 in.; breadth 1.75 to 3 in.; petiole $\cdot 3$ to $\cdot 6$ in. Racemes 2 in . long, few-flowered. Flowers white with pink towards the centre, about 1.5 in . long, sessile. Calyx-tube 6 or 77 in . long, campanulate, ribbed below : the lobes oblong, broad, subacute. Petals narrowly oblong, acuté, longer than the calyx and about as long as the stamens. Fruit (unripe) broadly oblong-ovoid.

Perak: Wray 2366; King's Collector 7096. Distrib.-Sumatra, Forbes 3254.
2. Planchonia andamanica, King n. sp. A tree; young branches as thick as a goose-quill, pale-brown, smooth. Leaves broadly elliptic or elliptic-rotund, slightly and abruptly tapered into the narrowly winged petiole, the apex with a short triangular acumen, the edges indistinctly crenulate; upper surface olivaceous-brown, the lower palebrown, not olivaceous; main-nerves 10 to 12 pairs; spreading, dark on the upper and pale on the lower surface but not very bold on either, length 5 to 7 in.; breadth 3 to 4 in.; petioles 6 to 8 in . Racemes 3 or 4 in . long; the flowers about 2 in . long on stalks 1 to 2 in . long. Calyx 8 or 9 in . long, campanulate, its lobes large, elliptic-rotund, obtuse. Petals broadly elliptic, very obtuse. Fruit unknown.
andaman Islands: King's Collector.

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VI.-Wolf Hybrids in Gilgit.-By Major J. Manners-Smith, V.C., C.I.E.
[Read 7th August, 1801.]
Daring the last few years, since about 1897 a species of wild dog, bred as it would seem from a true wolf and a domestic village dog bas existed round the village of Minawar some 9 miles from Gilgit.

The first specimen which I saw was by moonlight at Jutial some 3 miles from Gilgit in December, 1898, or in January, 1899. At the time I mistonk the beast for a wild dog (Cyon), it being evident from its general appearance that it was not a wolf; and J had not then heard of the hybrids.

The animal was exactly like the specimen the skin and skull of which was sent to the Indian Museum in May, 1901, and like a live bitch which is still in my possession and the photograph of which is attached.

The next specimen I saw was my bitch "Jungly." She was brought in as a puppy in May, 1899. In appearance she was sooty coloured with ears that drooped forward. The villagers who brought her declared that she was a wolf and that they had seen the mother distinctly. The other pappies with her some 4 or 5 in number had, they said, escaped. 1 unfortunately did not institute any enquiries at the time, atill thinking that the puppy was that of a wild dog and that the vil.lagers did not know or recognise the difference between wolves and wild dogs.
J. II. 19

Later on however when my bitch grew up examination proved by dentition, number of mammæ and other characteristics such as the lack of any marked brush in tail, and her abnormal weight for a true wild dog that she belonged to the genus Canis and not to Cyon. It thus became evident that she must be a 'hybrid' and I began to make enquiries at Minawar to try and verify facts.

Unfortunately no very certain or absolntely reliable evidence of the animal's pedigree has been obtained. It was a well known fact however as I learnt then and from subsequent enquiries that a female wild animal-the villagers declare it to be a bitch wolf-has for 3 years past in successive winters, i.e., in 1898-99, 1899-1900, and now again in 1900 1901 when in season hang about the village precincts and has attracted the attentions of their village dogs. These have followed her some way from the village and from them she has been pleased to select a mate to satisfy her natural desires. This phenomenon has been seen and is vouched for by several reliable eye witnesses. For three years now the results of this strange anion have been proved by the capture of the young cubs.

First in 1899, when my bitch was caught and brought in to me in May. The pups then were fairly big and several escaped, one only being caught.

Then in 1900, on this occasion all the pups some 8 or 9 in number were canght, but were killed by the goat herd boys who found them when quite small. As I happened to be away from Gilgit no report was made to me at the time and no specimens of the pappies were kept to show.

Finally this year in 1901. First the pups were caught and brought in to Gilgit and a•few days after the mother. As she was injured by the trap and appeared to be dying I had her killed as well as 2 of her pups and sent the skins and skulls to the Indian Museum.

One or two of the pups are still alive in Gilgit. They are almost entirely like the village dog sire and show little sign of the wolf strain or of the characteristics of the mother except that they are shyer and more furtive in their movements than ordinary puppies. Apart however from the evidence of the men who brought in the pups I am satisfied from their wild behaviour when brought to me and which they had not, abandoned entirely several weeks after capture when last I saw them that they were really the offspring of the wild bitch. I put the pups to the mother when she was brought in to Gilgit and she allowed them to try and suckle her and though injured did nothing to harm them and appeared pleased to have them near her.

According to the villagers' statement the litter of last year which
was killed off was exactly like that of this year, i.e., the puppies all took after the domestic dog sire and not the wild mother.

On the other hand the litter of 1899 included my bitch "Jungly" and, according to the villagers, several other puppies like ber which escaped. All of these had fur of the wild wolf colour and in appearance were nearer to the wolf than to the domestic dog.

One of them is probably the mother of this year's puppies, vis., the specimen which is now in the Indian Museum, and at least one other exactly like her in shape though with very light coloured almost white fore-legs was seen by me twice during the winter of 1900.1901 when out shooting between Gilgit and Minawar. These two animals Lave been known to kill village sheep and goats and have also been seen stalking herds of wild Oorial (O. vignii).

The hills round Minawar are infested with real wolves, more being oaught and killed there each year than anywhere else in tha district. My theory as to the origin of these animals is the following. 'That in the first instance, possibly in the winter of $1897-98$ a dog wolf lared away a domestic dog bitch from the village of Minawar, or possibly that an old wolf bitch discarded by her own kiud or injured in some way accepted the services of a Minawar village dog.

There would seem to have beeu a litter in 1893, if the unimal I saw in the winter of $1898-99$ was really one of these hybrids.

Since then at any rate it is certain that at least 3 litters of hybride have been produced, and it seems probable that the last two, i.e., those born in 1900 and in 1901, were a second cross from the true wolf. As one or more of the puppies of the 1899 litter some of which escaped when my 'Jaugly' was caught, would seem to have followed the bad example of their mother and to have consorted with the Minawar village dogs. This may account for their offspring being so mach more like the true dog than they themselves.

An attempt made to breed from my "Jungly" unfortunately failed. She was served by a half bred retriever spaniel in December, 1900. About the usual period for canine gestation she gave sigus of being in pap. Her milk glands filled and she became unusually quict aud gentle and displayed great affection for the pups of another dog bitch which had been born shortly before. Usually she caunot be trusted unmuzzled with strange dogs or puppies. Nothing however resulted from herself.
"Jungly's" character is intereating and perhaps worth a short description. Though she has been brought ap with domestic dogs from the time she was a month or so old her wild instincts are by no means subdued. She will still huut anything she can unless carefully watched
wird rated. She is inclined to bnlly small dogs, even those she knows well, especially of the weaker sex.

Her iutelligence is considerable and though still shy of men and of strangers she shows affection for me and follows me well both on foot and when riding.

As an instance of her reteutive memory the following anecdote may be of interest. When she was quite a small puppy a rather short tempered fox-terrier was sent me to take care of during the summer. This dog attacked her on one occasion and bit off the tip of her ear: Several months later when she had grown to nearly full size the dog and his owner were walking round the Kennels, when the latter asked me to let ' Jungly' loose. Without thinking I did so and she at once savaged the little dog, which she undoubtedly remembered, and was with difficulty prevented from killing him. Since then she has always been suspicious of white dogs, and is generally inclined to attack dogs of that colour, though usually indifferent to others anless excited or aggrievod herself.

From regular feeding and the care taken of her 'Jungly' has grown a good deal heavier than the "wild specimen" killed this year in Gilgit and sent to the Maseum. Her coat also is not quite so dark, but in all other respects she appeared to me identical when they were compared. Her weight and measurements are as follows :-
Dimensions. Head and body 43 inches, tail without hair $13 \frac{1}{4}$, with hair 143 ; Tarsas and hind foot, anterior aspect $=7$ inches, posterior uspect $=9$ inches; Height at shoulder 24 inches ; round skull and jaws in front of ears over hair 18 inches. Weight $=$ about 60 lbs .
VII.-New species of Indian Hymenopteran-By Major C. G. Nukse. [Read 6th November, 1801.]

1 venture to send descriptions of some uew species of Apidos, which neither Mr. P. Cameron nor I have been able to identify with any described species. These are a portion of my collection of Hymenoptera made during the past three or four years, some of which have alreadybeon described by Colonel Binglam and Mr. Cameron, and the latter iatill engaged in working out the remainder. I obtained altogether some450 species, counting only the families dealt with by Colonel Bingham in his Hymenoptera, Vol. I of the Fanna of British India Series, and of these nearly a fourth appear to be hitherto undescribed.

1. Halictos Krisana, n. sp.
\&. Head and thorax closely and finely punctured, basal segment of
abdomen impanctate, remaining segments with minute slallow punctures; cordate space at the base of median segment reticulate in the centre, the sides with oblique divergent strize; margins of abdominal segments in most specimens somewhat constricted. Dark brouze-green, basal half of antennæ black, becoming reddish-brown at apex; prebecence greyish-white; wings hyaline, with a slight fulvous tint, nervures and tegala testaceous.
ci. Similar; apex of clypeus pale testaceous.

Hab. Simla; Kashmir.
Length 5-7 mm.; Exp. 9.11 mm.

## 2. Halictus clarus, n. sp.

8. Head and thorax very minutely and closely punctured, the panctures apparent only under a strong glass, clypeus with a few cosre punctures; enclosed space at the base of median segment finely reticulate, the segment concavo-truncate at apex ; abdomen impunctate, the segments slightly constricted. Black and shining, where not hidden by pubescence; flagellum of antenne more or less red, the apices of the abdominal segments testaceous, tibia and tarsi of the anterior legs, and femora, tibiz and tarsi of the median and posterior legs, honey-yellow; pubescence greyish-white, short, but especially dense on the head, scatellum, and basal margins of the abdomiual segments; wings clear Hyaline, nervures and tegulæ pale testaceous.

Hab. Deesa.
Length 6mm. ; Exp. 12mm.

## 3. Halictus polgens, a. sp.

if. Head finely and closely, thorax more sparsely, punctured, abdomen almost impunctate; cordate space at base of median segment finely reticulate, very convex, its apex forming a distinct ridge; clypeus mach produced, transverse at apex. Jet black and shining. very thinly covered with greyish pubescence, which becomes more dense on the legs. In some specimeus the apices of the abdominal segments are testaceous; wings hyaline, nervares and tegale testaceons.

ठ'. Similar, the base of first abdomiual segmeut coustricted. pubescence on the legs testaceous.

Hab. Simla.
Length 6.7 mm . ; Exp. 14mm.
This species resembles H. nireus, Biugham, (Jour. B., Nat. Hist. Soc. Vol. XII p. 124) but is a smaller and slightor insect, the clypeus is more produced, and thorax is sparsely and not closely puuctured. I have a long series of each species, aud they are readily separable.
4. Halictos testaceds, n. sp.
\$. Head and thorax finely and closely punctared, ubdomen with shallower punctures, cordate space at base of median segment reticulate. Head and thorax black, antenuæ reddish-brown, legs and abdomen testaceous, becoming paler on the apical margins of the abdominal segments and on the tarsi ; pubescence greyish and somewhat sparse; wings hyaline, nervures and tegulæ testaceous.

Hab. Simla.
Length 4-5 mm, ; Exp. 10 mm .
5. Nomia shiva, n. sp.

ㅇ. Head somewhat coarsely punctured, the punctures running into striz on the sides of the clypeus; thorax more closely and finely punctured, abdomen almost impunctate; euclosed space at base of mediau segment lougitadinally striate; three longitudinully impressed liues on mesonotum, the outer two very faint. Black, the pubescence greyish-white, dense on the clypeus and front us far as the base of the antennæ, on the pronctum, postscutellum, legs, and apical margins of abdominal segments, on the latter forming broad bands. The apical margins of the abdominal segments when denuded of pubescence are pale, almost testaceous; wings hyaline, apical margins fuiutly fusces. cent; nervures and tegulæ testaceous.

Hab. Deesa; Ferozepur.
Length 8.9 mm . ; Exp. 15.16 mm .

## 6. Nomia himalayana, il. sp.

f. Head closely and somewhat coarsely punctured, the punctures on the apex of the clypeus ruuning into strix; mesonotum and abdomen finely and closely, median segment more sparsely punctured; space at the base of mediau segmeut longitudinally striate; bead with an impressed line from near base of antennæ to anterior ocellus. Black, the pubescence rich fulvons, and very dense on the mesonotam, scutellum, and postscutellum, pale fulvous and less dense on the head. legs, and margins of the abdominal segments; wings hyaline, nervures and tegulæ testaceous.
8. Similar, the pubescence thinuer, and, except on the thorax, almost cinereous. Posterior femora and tibiæ comparatively suall.

Hab. Simla.
Leugth 7.8 mm . ; Exp. 18 mm .
7. Nomada flavozonata, d. sp.
Q. Head and thorax closely punctured, haviug a grauular appearance, abdomen shiuing and mote finely punctured; euclosed
space at the base of median segment ragose in the centre, the sides with divergent strie, which become very fine apically; head above base of antennæ concave; three longitudinally impressed lines on mespnotum, the onter two very faint; scutellum large and prominent. Red; the apex of the mandibles, a spot near the base of the antennæ, another mand the ocelli, the enclosed space at the base, the sides below, of the median segment, and narrow apical bands on the first three abdominal segmentr, black; median transverse bands, narrowed in the centre, on abdominal segments 2-4, yellowish; the head sparsely, and the sides of the median segment more densely pubescent, the pubescence with a golden tinge; wings snbhyaline and irridescent, their apices slightly infuacated, tegulæ red, nervures reddish-brown.
d. Black; the elypeus, labrum, basal portion of the mandibles, front below the bases of the antennæ (except two narrow outwardly diverging lines from the base of antennæ to the sides of the clypeus) the tegulæ, scntellnm, postscutellum, and broad medial bands on the sbdominal segments yellow; lege yellow, except the inner portions of the intermediate and posterior femora, which are ferrugineons, and a black macula on the inside of the posterior tibim; scape of antenno yellow below, black above, flagellum ferrugineous red, with a black spot on joints 2-5; clypeus and front, scape of antennæ, median segment, thorax below, and base of first abdominal segment, with white pubescence; wings alightly more hyaline than in the $\%$.

Hab. Ferozepur.
Length $\& 10 \mathrm{~mm}$., of 12 mm .; Fxp. \& 18 mm ., of 21 mm .
8. Nomada lucilla, n. sp.
$\sigma^{\prime}$. Head and thorax closely but not very finely punctured, enclosed space at base of median segment reticulate, abdomen impunctate, shining. Black; the labrum, mandibles except at apex, the apex of the clypens and of the front on each side, and two irregular spots on each of the abdominal segments yellow, the spots on the second and sixth segments largest; flagellum of the antennæ reddish-brown; apices of the femora and the whole of the tibiæ of the intermediate and posterior legs ferragineous; abdomen mottled with ferrugineous, giving it a bronzy appearance; clypeus and front with golden pubescence, thorax below and sides of median segment with somewhat sparse whitish pubescence wings subhyaline, somewhat darker towards the apex of the forewing; a clear hyaline patch across fourth [cubital and third discoidal cells; tegulæ ferrugineons-red, nervures black.

Hab. Simla.
Length 8 mm . ; Exp. 15 mm .

## 9. Nomada priscilla, n. sp.

\$ đ. Head and thorax closely but not very finely punctured, median segment and abdomen impunctate; postscutellum very prominent; an impressed line on the median segment, enclosed space at the base of the segment raised, sharply defined, convex, a few outwardly divergent strise at base, slightly rugose. Red; the abdomen black and shining; two yellow spots on second, fifth and sixth segments; some specimens have a similar spot on the fourth segment, and in others the spots, except on the second segment, are obsolete ; pubescence white, very sparse, longest on median segment; wings hyaline, aper infuscated, tegula red, nervares reddish-brown.

Hab. Deesa; Matheran.
Length 5 mm . ; Exp. 10 mm .
10. Megachilik Calioxprides, Bingham.

This species was described by Bingham in the Journal of the Bombay Natural History Society, Vol. XII, Part I, from my specimens he described the $९$, as I had not then a $\overline{8}$. The following is a description of the latter.
J. Similar to the $q$, but more slender, the abdomen cylindrical. not tapering towards the apex; the margins of the segments strongly constricted, apical segment with several teeth ; the anterior tarsi normal, not dilated.
11. Megachile vera, n. sp.
\&. Closely resembles M. ceslioxysides, Bingham, but is a somewhat robuster insect; it differs only in having the trochanters and femora of the intermediate and posterior legs blood-red, and the femora of the anterior loge dark-red.
đ. Resembles $M$. coelioxysides of the same sex, except that the apices of the tibie and the whole of the tarsi of the anterior legs are pale testaceons, the first joint of the tarsi being somewhat dilated; the intermediate lege have the trochanters, femora, and the apex of the tibise, and the posterior legs the trochanters and femora light red; the pubescence, especially on the clypens and front, has a golden tint.

Hab. Deesa; Matheran.
Length 7.9 mm. ; Exp. 13-15 mm.
12. Megachile fatinka, $\mathbf{n}$. ap.
9. Closely resembles M. colioxysides, Bingham, but the pollen brush is light red, and not white.
d. Resembles the same sex of $M$. coelioxysides, except that the
apex of the abdomen is notched but not deatate; the pubescence has a yellowish tint, especially on the clypens and front.

Hab. Matheran.
Length 8.9 mm ., Exp. 16.18 mm .
Although the above three species bear considerable superficial resemblance to one another as regards size and puncturing, the characters I have given render then readily separable. I have a long series of each of them, and these characters are constant in each species.

## 13. Megachile patblla, n. sp.

Q. Head thorax and abdomen finely and closely punctured, having a granular appearance; clypeus broader than long, transverse anteriorly; an inwardly-curved tooth at each angle of the scutellum, basal segment of the abdomen very slightly constricted. Black; the pubescence white and very sparse, forming narrow bands on apical margins of abdominal segments 1-5, yellowish-red on the inside of the posterior tarsi; pollen-brush golden; wings hyaline, nervures and tegula black.
d. Similar, but smaller.

Hab. Simla.
Length 6-7 mm. ; Exp. 12-14 mm. .
14. Megachile dlrica, n. sp.
f. Head, thorax and abdomen closely punctured, having a granular appearance; apical margins of abdominal segments 2-5 depressed, the depressed portion with pubescent bands. Black, the legs variegated below with dark red; pubescence very sparse, pure white on the head and thorax, abdominal bands greyish-white; on the tarsi the pubescence is testaceous, and on the inside of the posterior tarsi golden-red; wings hyaline, tegalæ light red, nervures black.

Hab. Matheran.
Length 8 mm . © Exp. 14 mm .

## 15. A Athididm saltator, n. sp.

q. Head, thorax, and abdomen closely and finely punctured; head slightly broader than thorax, clypens quadrilateral, its anterior margin transverse ; abdomen nearly as broad as long. Pale yellow; the flagellum of the antennæ, tips of the tarsi, base of the scutellum, and broad bands on the apical margins of abdominal segments, light red : the tips of the mandibles, extreme base of the scape of the antenner, the region of the ocelli, the central portion of the mesonotum (except two parallel yellow lines), and a line on the tibim, black; pubescence and pollen. brush white; wings hyaline, tegulæ yellow, with a red spot in the centre, nervares black.
J. II. 20
o'. Similar ; subapical segment with two, and apical segment with four teeth : a line on all the femora, and the whole of the posterior trochanters, black.

Hab. Deesa.
Length 8.9 mm . ; Exp. 16.18 mm .

## 16. Anthidivi viatiogm, n. sp.

q. Head, thorax and abdomen closoly and finely, the sides of the clypens and the face below the base of the antennæ more sparsely and shallowly punctured; clypeus hexagonal, the anterior margin tranverse and dentate, eyes slightly convergent below. Black; two spots near the apical angles of the clypeas, the sides of the face below the base of the antennæ, an elongate spot on each side of the face behind the eyes, a similar spot on the basal margin of the mesonotum, the margins of the scatellum, four irregularls-quadrate spots on abdominal segments 1-4 and two similar spots on abdominal segments five and six, yellow; legs variegated black and yellow ; pubescence sparse, greyish white, pollen-brush white with a fuscous tinge; wings subfuscous, tegalm very large, testaceons-red with dull yellow margins, nervares black.

子. Similar, larger; clypeus entirely pale yellow, with shallow punctures, its apical margin non-dentate, the four quadrate spots on abdominal segments $1-5$, sixth segment with a single coronet-shaped spot; apical abdominal segment with five teeth.

Hab. Matheran.
Length \& 7.8 mm ., of 9 mm . ; Exp. $\& 14-15 \mathrm{~mm}$., of 18 mm .

## 17. Ceratima cerea, n; sp.

Q 8. Smooth and impunctate ; eyes slightly emarginate, distinctly converging below, median segment somewhat long, anterior portion almost flat, apical portion steeply sloped; abdomen longer than the head and thorax united, basal segment constricted. Black : the clypens, scape of the antenn $\begin{gathered}\text { in front, the sides of the pronotum, two elongate spots }\end{gathered}$ on second and third abdominal segments, the whole of the tarsi and the greater part of the tibio of all the lege, bright yellow; antenno reddish-brown; wings clear hyaline, tegulm yellow, nervares very pale testaceous, except the postcostal nervure and that enclosing the radial cell, which are dark-brown.

Нав. Deésa.
Length 5.6 mm. ; Exp. $\mathbf{1 0 . 1 1 ~ m m . ~}$
18. ' Cbratima moscatilla, n. sp.
: \& c. Smooth and shining, a fow scattored punctares on the posterior margins of the head and on the mesonotam, thitd and following
abdominal segments finely and closely punctured; an impressed line along the centre of the mesonotum, median segment rounded pasteriorly, stoeply sloped, the enclosed space at its base very convex, and having a medial longitadinal carina. Black; a spot on the olypeus, a broad line from near the base of the antenno along the inner orbit of each eye, a narrow line on the cheeks, an interrupted line on the pronotum, a spot below the teguls, two contiguous spots on the sentellum, and a spot at the base of the posterior tibiæ, pale yellow; the abdomen in some specimens more or less red; wings hyaline, tegulm dark brown, nervures black.

Hab. Simla.
Length 7-8 mm.; Exp. $\mathbf{1 2 - 1 4 ~ m m . ~}$

## 19. Ceratina loquata, n. sp.

$q \delta^{\circ}$. Smooth and shining, the third and following abdominal segments and the enclosed convex space at the base of the median segment, minutely punctured; the abdomen increases in width towards the apex. Black ; a $\perp$-shaped mark on the clypent, a short line on eaoh side of it, not quite tonching the inner orbits of the eyes, a spot on the labrum, an interrapted line on the pronotum (absent in some specimens), a spot below the tegulm, two small spots on the scutellum (often obsolete), a Hine on the tibim of the anterior legs, and a spot at the base of the tibio of the posterior legs, pale yellow, often with a reddish tinge; wings hyaline, sometimes with a slightly fuscous tinge, tegulm reddish-brown, nervares black.

Hab. Simla.
Length 6-7 mm. ; Exp. 12.13 mm .

## 20. Cghioxts tatrus, n. sp.

8. Head and thorax strongly and closely, abdomen more minately punotured, the punctures on the fourth and fifth abdominal segments being extremely fine and shallow, the sixth segment impunctate; clypeus broader than long, a conspicuous longitudinal carina on the mesonotum, teeth of the scutellum moderately long and acate, scatellam rounded posteriorly; abdomen with segments 2-4 depressed in the middle apical abdominal segment long, acutely pointed, with a medial carina, the ventral plate slightly longer than the dorsal. Black; the flagellum of the antennæ, the legs, apical abdominal segment above, and the whole of the abdomen below, dark red; Pabescence snow white, dense on the clypens and froat, on the cheeks, thorax and median segment below, forming bands on abdominal segments $1-5$ above, these bandẹ much widened laterally and below; on the inside of the posterior tipiopo and tarsi the pubescence is golden ; wings hyaline, with a slight fuscous
tinge at apex, sometimes the whole wings have a fuscous tinge; tegule black, with a dark red spot in the centre; nervares black.

ס. Similar, the whole of the abdomen punctured; the apical segment with eight teeth, two lateral, four apical above, and two below; the abdomen below, except the apical segment, is black, not red.
Hab. Deesa.
Length $\& 8.11 \mathrm{~mm}$., of 7.9 mm .; Exp. \& $14-18 \mathrm{~mm}$., of $12-14 \mathrm{~mm}$.

## VIII.-Studies in the Chemistry and Physiology of the Tea Leaf. Part I. The Eneymes of the Tea Leaf.-By Habold H. Mann, B.Sc.

[ Received November 27th; Read December 4th, 1901.]
The production of a food product from the leaves of plants is in actual practice of very rare occurrence. Except in the case of a few vegetables and potherbs, and of some leaves used only as uarcotics and stimulants, it may be said not to exist except in the case of tea. And in the production of tea, if the type of leaf used, the method of collection, the induction by artificial means of a constant unnatural succession of young growing shoots be taken into consideration, the whole question becomes of so exceptional a character that a study of the chemical and physiological condition prevailing under such circumstances would probably be extremely interesting. If, in addition, such a study be combined with that of the changes which take place in the leaf after plucking until its conversion into black tea,-changes which result in profond alterations in the sabstances present and which altogether alter the commercial characteristics of these products, the matter becomes one of great economic importance. In the series of papers I hope to contribate to the Asiatic Society on this subject, and of which this is the first, I shall try, however, to very largely eliminate the direct economic interest, which will be reserved for another place and another occasion.

In order, however, to follow the subject it will be necessary to give a short account of the processes by which tea is produced. The tea leaf as used in this manufacture consists of the youngest leaf on the plant, and only the youngest two open leaves on each shoot together with the unopened leaf bud are now usually plucked. This necessitates, if a large amount of leaf is not to get too old for placking, and hence to be wasted, that every bush should be gone over by an expert placker about every seven days. Having obtained the leaf in this manner, it is allowed to wither-to lose its targescence-by exposure in very thin layers to air as cool as possible until the whole has got to such a condition that on rubbing in the hand the leaves no
longer break, but are sufficiently pliable to roll up. At this stage it is rolled, a process whose effect is to break the cells of the leaf, allow the sap to spread itself over the surface, and so come in contact with air during the process of fermentation. This latter merely consists in exposing, for a time varying from two to six hours, the rolled leaf in thin layers in as cool and airy a room as possible. Marked changes here take place; the green leaf takes on a brown coppery colour and acquires an aroma totally different from that of fresh leaf. When sufficiently fermented,-which is judged at present entirely by appearance and smell,- The whole mass of tea is dried usually by a powerfal current of hot air, sorted and put on the market.

It is evident that the changes important from our point of view principally takes place during withering and fermentation. Withering has usually been considered to be little else than a process of partial drying without the loss of pliability which would take place were the operation conducted at a high temperature, and the idea that profound chemical changes may take place has hardly been mooted. On the other hand, the speculations as to the nature and canse of the fermentation process have been legion. In the early days it was nsually considered to be merely incipient putrefaction, and this idea was supported by the fact that a slightly longer exposure than that given leads to an intensification of the brown colour, to the development of increased acidity and ultimately to putrefactive decomposition.

Prior to the experiments of Mr. Bamber, the statements made rested on no experimental basis. His work however has revolutionised the ideas on the subject. He maintained (1) that very few orga. nisms were present, and the time was too limited for their development in quantity, and that hence the process could not be cansed by bacteria, (2) that the fermentation will not take place in absence of oxygen, even if the oxygen was replaced by carbon dioxide, (3) that a large quantity of air is required, (4) that after heating the leaf with dry steam for a few minutes the fermentation proceeded normally. Hence he maintained that the so-calld fermentation process was not a fermentation at all, but was due merely to the direct chemical action of the atmospheric oxygen on the constituents of the juice exposed in thin layers, and he hence substituted the term "oxidation" for "fermentation" in naming the process.

In this position the question remained, except for mere speculative opinions, $\dagger$ until the beginning of 1900 , when Mr. Bamber retarned to the question, and to a certain extent revised his former opinion. He

[^15]then wrote as follows: "Quite recently I have succeeded after numerous attempts in isolating a minute proportion of a soluble oxidising ferment somewhat similar to the oxidases recently discovered in several plants of different natural orders. The substance in question, which evidently has a considerable bearing on the oxidising properties of the tea, apparently does not exist in the active form in the fresh green leaf, but is changed either during the withering if the leaf is bruised, or during the rolling processes when the various organic acids, etc., are liberated from the cells." This was, I believe; the first announcement of the discovery of a soluble ferment or oxidase in the tea leaf, and of course it meant that Mr. Bamber no longer attribated the changes which take place entirely to the oxidising action of the air independently of ferments of any kind.

Later in 1900 in a private communication to me, Mr. C. R. Newton of Karseong stated that he had detected an oxidase in the leaf, but the observation was never published till a few weeks ago. $\dagger$ In the meantime Mr. Aso, a Japanese scientist, has published his discovery of the same ferment, but as I have not been able to get hold of the publication in which he announces his work, $\ddagger$ I am nnable to say to what extent he has carried his researches.

My own work was done by the courtesy of Messrs. Finlay, Mnir \& Co., the Agents, the Amalgamated Tea Estate Company, Lid., the Owners, and Mr. J. D. Gwilt, the Manager of the Moondakotee Tea Estate, Darjeeling, on that estate, during the past tea-making season.

In trying to ascertain the nature of the changes which ooour during the manafacture of tea leaf, it seemed of primary importance to determine to what extent, if any, bacterial action intervenod, especially as Mr. Bamber's experiments were not quite convincing on the subject. . For this purpose it was necessary to cultivate any organisms which might be present on a medium which would as far as possible eliminate the ordinary putrefactive bacteria and only allow those which could have any effect on the tea leaf to grow. This at once puts out of court -such common media as peptogelatin, peptone-agar-agar, or any similar preparations as the basis of cultivation in which, as a matter of fact, a large namber of putrefactive organisms (many of them of the Bacillus subtilis type) do actually grow when fermenting tea is placed in contact with them. The medium finally adopted consisted of tea leaf itself ground up finely, and then placed in small patches 1 to $1 \frac{1}{2}$ inches in

[^16]diameter inside a petri dish, and sterilised. A slight change of colour took place during sterilisation, but afterwards none, and dishes so preparod could be kept for weeks. The sterilised tea leaf thus obtained was then incoulated with fermenting leaf, and in about two days colonies were evidently appearing. After three days' culture, these were examined and inocalated with sterilised tea juice, and after a further three days' growth there, the cultures of the second generation were atilised. In every case only one organism was certainly found. It produced colonies consisting of yellowish brown slimy masses without shape, and raised up like drops from the mass of the sterilised tea leaf. In texture these colonies were sticky and a little ropy. Under the microscope the organism was found to be a small bacillus about $1 \cdot 2 \mu$ long and nearly $1 \mu$ broad. A pure culture having been obtained sterilised leaf was inoculated with a solation containing the organism in large amounts. No change whatever took place in colour in three hours, -the normal time of fermentation,-bat a sour smell had developed. If freshly rolled leaf, instead of sterilised leaf, were used, the inoculated portion had taken on a sour smell in $1 \frac{1}{2}$ hours, while the check experiment was equally coloured, but the fermentation was proceeding normally. The organism was evidently in fact one of the many lactic acid bacteria and had no part whatever in the normal process of fermentation. Inasmuch as this was the only microbe which could be isolated in this way, as it had no effect on the colouring of the tea leaf, and as it cansed the leaf to beoome sour earier than it would otherwise have done, one may, I think, take it as finally settled that miorobial organisms play no essential part in the fermentation of tea, and that when present they are rather of the nature of impurities than essential factors in the process.

In the absence of bacteria capable of oansing the changes observed during the fermentation of tea, it was natural to look for engyme action, especially as during the past five years the effect of unorganised fermetats has been discovered to be paramount in cases where their inflnence had hardly been previously suspected. The curing and fermentation of tobacco is an example. Here Oscar Loew" has shown that the changes taking place during both these processes are primarily due to the action of enzymes. But in attempting to isolate the active ferments in tea, one is met at the outset by a difficulty pointed out long ago by Brown and Morris that it was very difficult to extract onxymes from vegetable tissues in presence of a solution containing tannin. Since the young tea leaf contains twonty per cent. of tannin

[^17](calculated on the dry matter) the difficulty was especially great in the present case. The method finally adopted for isolating and at a latter date for estimating the amount of oxidising enzyme present was as follows :- 10 grams of fresh (or $6-6$ grams of withered leaf) were ground up in a mortar till they formed a pulp, and in each case 5 grams of hide powder (pare for analysis) were added and the mass again ground thoroughly together. 50 cubic centimeters of water were now thoroughly incorporated with the mixture and the whole left for two hours. At the end of this time the mass was filtered quickly through cloth, with pressure, and the residue washed twice with water. It was found that practically the whole of the extractable part of the oxidising enzyme was thus removed. The liquid obtained was now mixed with four times its volume of alcohol, which precipitated the whole of the enzyme. After settling thoroughly, the precipitate was filtered again through cloth, and to the residue 25 to 30 c. c. of water were added. The whole of the enzyme was thus obtained in a small volume which on filtration gave a clear liquid in which various tests could be made.

The standard test for oxidising enzymes or oxidases is that with guaiacum resin. If an alcoholic solution of this resin be mired with a liquid containing one of the class of substances under discussion, a blue colour varying in intensity with the quantity of enzymes present will appear after two or three minutes. With the solution from tea leaf prepared as above, this reaction was obtained immediately, and if further a drop or two of Hydrogen Peroxide were added the reaction became very much more intense. It was hence at first sapposed that two enzymes were present, the one giving a blue colour without Hydrogen Peroxide, the other only producing the reaction in its preaence. If this were the case they ought surely to have different resistances to heat, and by this means one ought to be able to separate them. This was found, however, not to be the case. A solution in water containing the oxidases was exposed to various temperatures in each case for three minutes, with the following results:-

| Temperature. | Rraction with Guaiacum Rrbin. |  |
| :---: | :---: | :---: |
|  | Withont Hydrogen Peroxide. | With Hydrogen Peroxide. |
| $60^{\circ} \mathrm{C}$. | Just as intense as before henting. | Jnst as intense as before heating. |
| $70^{\circ} \mathrm{C}$. | Do. | Do. |
| $80.81{ }^{\circ} \mathrm{C}$. | Slight decrease in intensity of reaction. | Reaction distinctly lower in intensity. |
| $83.85^{\circ} \mathrm{C}$. | Reaction practically disappeared. | Reaction almost disappeared. |

There is therefore no difference in the sensitiveness of the substan: ces producing the two reactions to heat, and both are destroyed by an exposare for three minates in aqueons solation to 83 to $85^{\circ} \mathrm{C}$. and th ${ }^{\prime}$ destruction commences below $80^{\circ} \mathrm{C}$. One may therefore sas, -and the conclusion is confirmed by the result of a large number of other attempts (to be afterwards referred to ) to isolate the two apparently different enzymes,-that we have no evidence of the presence of more than one ferment oxidising gaaiacum in the tea juice. I am inclined to attribate the difference in reaction to the presence of part of the ferment in the juice as zymogen or pro-enzyme, which is brought into definite action by the Hydrogen Peroxide. The distinction between the reactions with and without Hydrogen Peroxide, therefore, remains a convenient one, and I have kept it up throughout the present work.

To estimate the amount of these enzymes 5 cc of the clear liquid prepared as above, were mixed with an equal volume of alcohol, and then 10 drops of a solution of guaiacum resin in alcohol added, and the colour measured in a Lovibond's tintometer. The measarement must almays be made at the same length of time after the addition of guaiacum tinctare. After the intensity of the coloar has been noted, $\cdot 5$ c.e. of a 10 volume solation of Hydrogen Peroxide were added and the colour again measured. The intensity of colour gives a rough measure of the relative amount of enzyme in the several cases, and has been atilised for this parpose throaghout the present work. It depends on the fact that the colour given is all bat absolately a pare blae, and hence one can neglect the amount of any other colour which may be present in the liquid, and merely take the intensity of the blue as showing the relative amount of the oxidase.

It seems almost impossible to prepare the enzyme pure in a dried condition. If the clear solation prepared as above be reprecipitated with alcohol, a mass is produced very active towards guaiacum solution, etc., bat if an attempt is made to dry the precipitate at a low temperatare its oxidising power rapidly diminishes, and when dry there is hardly any reaction left. The whole of the reactions had therefore to be stadied in the solation prepared as above, which in addition to the enzyme contained a certain proportion of gummy, pectic and saline matters.

The oxidase was very sensitive to the action of acids. A solution of the enzyme was immediately rendered absolately ineffective in a solntion containing 4 per cent. of Sulpharic Acid. 04 per cent. had, however, only very slight effect after 2 hours. 3 per cent of Acetic Acid destroyed the ferment entirely in 2 hours. By Alkalies it was less affected but still was rapidly destroyed. 3 per cent. Ammonia nearly destroyed all action after $4 \frac{1}{2}$ hours. Canstic Potash of the same strength had little J. I. 21
effect after 2 hours, but after 4 hours only a slight reaction was obtained until Hydrogen Peroxide was added, when a fairly intense blue colour was produced with guaiacum tincture. After 18 hours there was still the difference, though even with Peroxide the colour was much less intense. This is a strong indication that the latter reagent liberates the enzyme from a compound (a pro-enzyme) in which it was much less easily attacked by Alkalies than when already free.

That we have here to deal with an oxidising enzyme was made clear by its action with hydroquinone and with pyrogallol. In the former case darkening, indicating oxidation, was very rapid in presence of the enzyme, and much more so than in check solutions to which either no addition was made, or to which even a boiled solation of the ferment had been added. I was not able to isolate the product of oxidation. The same rapid darkening took place in presence of the enzyme with pyrogallol. In three hours the colour had become very dark brown, while both the duplicates were hardly tinted brown. After 18 hours the difference was extreme, the pyrogallol being almost entirely oxidised in the one case, only a light brown colour having been produced with boiled ferment or with none at all. Gallotannic Acid behaved differ-ently and showed itself far more resistant to oxidation than either of the above substances, very slight change having taken place even after 18 hours.

The reaction with Hydroquinone was so striking that it was used to determine the optimum temperature for the activity of the enzyme. Three solutions of Hydroquinone were prepared. No. 1 was kept at ordinary temperature ( $26^{\circ}$ C.) No. 2 at $50-55^{\circ}$ C. No. 3 at $60-62^{\circ}$ C. After $1 \frac{1}{2}$ hours No. 1 was hardly changed, while oxidation was proceeding rapidly in Nos. 2 and 3 and no difference could be detected between them. After 4 hours however while No. 1 still showed hardly any alteration, No. 2 was far and away abead of No. 3 in the progress of the reaction. It was regrettable that there seemed no means of measuring exactly this progress, but the experiment clearly shows that the best temperature for the action of the ferment does not exceed $53^{\circ}$ C. and that it is much more rapid at this temperature than at the usual temperature at which the operation is carried out.

The crucial test, however, as to the relation of this oxidase to the fermentation of tea was whether when a solution of the enzyme was added to tea juice, the colour which forms the mark of fermenied tea was produced more quickly than in a normal case. An experiment on this ine was therefore made, and the colour was produced considerably more quickly than in the untreated juice. An attempt was made to utilise sterilised tea juice for this parpose, but the process of sterilising to destroy the enzyme (as the ferment cannot be removed by any filtra-
tion method) induced such profound changes in the tea juice that it was impossible to make the absolute test whioh this method would have given. When a more rapid colouring of tea juice or tea leaf takes place in presence of an additional quantity of the enzyme, and at the same time proceeds normally, there seems no jastification for doubting the essential connection of the oxidase isolated from tea leaf with fermentprocess.

The next point would naturally be to ascertain the part of the leaf richest in enzyme, and the leaf of the flushing shoot plucked for manufacture which contained the most. This was therefore determined by carefully separating the leaves from one another and from the stalk, and determining the oxidase in each separately by the method previously described. The following results were obtained, the amount present in the tip leaf being nnity in each case, and the whole being calculated on the dry matter of the leaf.

|  | Relative amount of active <br> enzy me. | Relative total amount of <br> enzy me. |  |
| :--- | :---: | :---: | :---: |
| Tip nnopened leaf | $\ldots$ | 1.00 | 1.00 |
| First open leaf | $\ldots$ | .. | 65 |
| Second open leaf | $\ldots$ | .48 | 61 |
| Leaf stalk | $\ldots$. | 1.64 | $.80(?)$ |

This indicates a rapid decrease in the amount of enzyme present as the leaf becomes older, but that the stalk contains a good deal more than any other part of the shoot. The above figares much exaggerate this excess, however, owing to the fact that the stalk contains much more water than the leaf, and as a matter of fact in the fresh condition the tip leaf and the stalk contain about an equal amount of enzyme. It is interesting to compare the relation of varions other constituents of the leaves to the enzyme as given above, and for the Acidity, the Tannin, and Phosphoric Acid, we have these as follows :-

|  | Total <br> Acidity. | Acidity in tho <br> nbsence of <br> Tannin. | Tannin. | Phosphoric Acid. |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Tip leaf ... | $\ldots$ | 1.00 | 100 | 1.00 | 1.00 |
| First open leaf | $\ldots$ | .94 | 1.09 | 103 | .88 |
| Second open leaf | $\ldots$ | .94 | 1.06 | .91 | .75 |
| Leaf stalk ... | ... | .70 | 1.09 | .86 | .79 |

In each case the tip leaf is regarded as unity, and each is calculated on the dry matter: The acidity due to the tannin in each case amounted to about half the total acidity, using phenol phthalein as indicator, and appeared to be practically identical (on the dry matter) throughout the flashing shoot. The enzyme therefore appears not to bear any very close relationship to any of these constitnents calculated as above, if the stalk bo included, but if this be left out (as I think it may be, for it is to a great extent nothing but a channel of conveyance), then the enzyme will be found to follow both the Tannin and the Phosphoric Acid, bat not the acidity, except that caused by the tannic acid.

The practical consideration now oomes in as to the relation of this enzyme to quadity in tea. The only means of ascertaining this was to compare the leaf from gardens lying near one another producing distinctly different types of tea, and teas which were regarded by experts as of different quality. It is necessary, of course, in face of the distribution of the enzyme in the flushing shoot above pointed out, that the leaf shall be of approximately the same type. For instance, a stalky tea eaf could not in any sort of fashion be compared with one giving little stalk. With this reservation, which was taken into account in the experiments which follow, the figures obtained seem to indicate that a large amount of ferment means a high quality tea, and a reduction in the enzyme present means a lowering of the flavour of the produch. It is in the flavour that the effect is most marked, the strength of the tea being not nearly so much affected.

Three gardens are concerned in what follows. These are A, which, judged by market prices, has been making a medium Darjeeling tea: $B$, which has had the reputation of making about the best tea in the Darjeeling district for many years, and C, which has produced absolutely the highest value teas in the district during the past season.

A comparison was first made between a sample of leaf from $A$ and two samples from bushes of different types from $C$, No 1 being an "Assam" type of plant, and No. 2 from a "China" type. The following figures were obtained :-

|  |  | Relative amount of active <br> enzyme. | Relative total amount of <br> enzyme. |
| :--- | ---: | :---: | :---: |
| A. |  | 1.00 | 1.00 |
| C. No. 1. | $\ldots$ | 2.17 | 2.18 |
| C. No. 2. | $\ldots$ | 1.44 | 1.68 |

The amount of oxidase in $A$ is here regarded as unity, and its type of plant was "China", and all figures are given on the dry matter of the leaf as plucked for manufacture. In each case a much larger amount of enzyme was present in the leaf which made the better tea.

From Garden B, I had three samples of leaf. No. 1 was from young "Assam" plant producing excellent tea, No. 2 was from a low level extension also of "Assam" plant but giving the worst tea in the garden though still quite as good as the district average, No. 3 was from "China" plant producing tea of very high quality. Comparing, in precisely the same manner as above, all these samples of leaf with that from garden $\mathbf{A}^{\prime}$ the following figares were obtained :-


In this case again it appears that the quality varies with the quantity of ferment present in the leaf in an active form. It will be noticed that the various amounts of enzyme are much closer together when the total, including the supposed pro-enzyme, is considered, than when the active form only is taken into consideration. It may well be that this difference is a real one, and that there is some cause in certain places from soil, climate or other consideration which may prevent the formation of active enryme, and such a cause would affect the quality.

Another point remains in this connection. What effect has withering on the amount of ferment? The answer to this question has been exceedingly interesting, and seems to indicate that this operation possesses a function in the manufacture hitherto quite unsuspected, and which leads to a very different conception of the process to that hitherto held. The leaf from gardens $A$ and $B$ above considered, were allowed to wither, and taking full account of the corresponding loss of moisture, the enzyme again determined. Taking the oxidase in the fresh leaf at garden $A$ as unity (that is to say that the unit in the last table is the same as unit in the following) we have :-

|  |  | Relative amount of active enzyme. | Percentage increase during withering. | Relative total amount of enzyme. | Percentage increase dnring withering. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| ${ }^{\text {A }}$. |  | 181 | 81.0 | $1 \cdot 69$ | 69.0 |
| B No. 1 | ... | $2 \cdot 49$ | 31.9 | 187 | $44 \cdot 8$ |
| B. Na. 2 | ... | 1.88 | 60.7 | 1.87 | 41.6 |
| B. No. 3 | ... | $2 \cdot 19$ | 19.7 | $2 \cdot 19$ | $65 \cdot 9$ |

There remains to be considered the circumstances which cause the production of the oxidising enzyme by the plant. I have as yet only had the opportinity to touch upon one or two of these. It seemed probable however that the amount of light received by the plant would very materially influence the amount. Three bushes, side by side, were therefore taken, and one was so covered up for ten days, so that the leaf grew in darkness not quite suffcient to etiolate the young leaves. Leaf was plucked from all three bushes on the same day, in No. 1 as soon as it was light in the morning, in No. 2 (the darkened plant) soon afterwards, and in No. 3 late in the afternoon.

From the result it would appear that darkness favours the formation of the oxidase, and that there is a difference in this respect between the leaf gathered in the early morning and that obtained after a day's sunshine. In the leaf grown entirely in darkness the reserve stock or proenzyme seemed to have been increased, but that immediately active was rather lower than in the normally produced leaf. I intend to take np this line of investigation more thoroughly later on.

In a recent pablication I have shown how dependent the quality of tea is on the amount of Phosphoric Acid in the soil. It is curious to find that this connection of flavour and Phosphoric Acid, according to the present experiments, seems to run parallel with the apparent connection between Phosphoric Acid in the soil (and also in the leaf,) and the amount of oxidising enzyme.

I give here the analyses of soil from the gardens $\mathbf{A}$ and $\mathbf{C}$ above mentioned, and it will be at once seen that the amount of Phosphoric Acid corresponds closely with the amount of enzyme in the leaf. I am disposed to insist on this point in view of the previously indicated relationship of quality, i.e., flavour, to Phosphoric Acid in the soil.
A.
c.

## Phosphoric Acid ... ... ... .061 ... ... ... - 124

The only question remaining to be discussed with relation to the oxidase under consideration appears to be its localisation in the leaf and stalk. An attempt was made to determine its position by three methods. The first of these consisted in cutting the sections of leaf and stalk and ascertaining in what cells the brown colour commenced to form. In the leaf this always took place at definite points in the centre of the leaf. In the cells where the browning commenced there seemed to be on examination with a very high power in many cases a small irregular black body from which the browning radiated. This could only be seen where the sections are thin and consisted of little
more than one layer of cells. I have not been able yet to more exactly ascertain the nature of these small black bodies. The second means of ascertaining the whereabouts of the enzyme was to kill the leaf in chloroform vapour, when it became brown in a very few minutes, and then cut sections of the leaf and leaf stalk as before. In the leaf precisely the same occurred as was found by the first method,- the brown colouration always commenced at points in the centre of the tissue. In the stalk the result was very definite. Oxidation always occurred first just outside the fibro-vascular bundles, then it took place just inside the same layer, and thirdly the cells just inside the epidermis were attacked. A third method gave results quite agreeing with this as to the stalk, but no definite results were obtained with the leaf. In examining the sections by this method, they were first left 12 hours in alcohol to extract the tannin and precipitate the enzyme. They were then put in a drop of water on a slide, a drop of guaiacum tincture immediately added and the preparation then again washed with water. The blue compound is soluble in alcohol, and the enzyme is soluble in water so that it is necessary to do these operations as rapidly as possible.

The result obtained showed a general blueing of the section, but on leaving a short time in glycerine the parts to which the enzyme had merely spread faded, and left the rest quite heavily stained. The fibro-vascular bandles were quite free from blue colour, and as for the rest it was most intense first in the cells just outside this layer, second in the point just inside it, and third just inside the epidermis. So far as the stalk is concerned then, the several methods agree as to the points at which he greatest amount of enzyme is to be found, and this distribution is almost exactly the same as that of the largest quantity of the tannic acid.

In general, therefore, with regard to the question already considered it has been established-
(1) That an oxidase occurs in the leaf of the tea-plant used for manufacturing tea.
(2) That this oxidase is the principal agent in bringing about the fermentation and colouring of the leaf. It is most active; below $55^{\circ} \mathrm{C}$. and is destroyed about $80^{\circ} \mathrm{C}$., is very sensitive to acids, and also to alkalies, but not to quite the same extent. There is distinct evidence that part of it usually occurs as a pro-enzyme in the leaf.
(3) That it occurs in greatest quantity in the unopened tip leaf of the shoot, and that the quantity decreases as the leaves get older, but that the stalk contains at least the same amount as the tip leaf.
(4) That leaf, taking into consideration gardens of the same type, which contains the most enzyme makes the most highly flavoured tea.

This increase of enzyme in the leaf seems connectod in some way with the amount of phosphates in the soil.
(5) That the amount of enzyme in the leaf materially increases during withering, a fact which throwe an entirely new light on the nature of the process, and makes it probable that it performs much more important functions in the manufacture than those with which it has been hitherto credited.

Other enzymes occur in the tea leaf, bat I have no evidence at present that their part in the manufactare of tea is of great importance. Starch occurs in very minate proportion, and as woald be expected, a small quantity of diastase with it. This starch persists throughout the withering operation but entirely disappears during the fermentation. The diastase can however be detected right through antil the tea is fixed, but only in very small amount. The tests I made as to the existence of a proteolytic euzyme leave the matter in some donbt, but I certainly could get no reaction by Fermi and Buscaglioni's method with gelatine.

The Catalase of Oscar Loew * was, of course, present in rather large quantity, but I can attribate no important fanction in the manufacture of tea to its presence. Considering the tendency existing to form Hydrogen Peroxide in organic liquids exposed to sunlight, it seems natural to consider that it is here present to prevent the formation of this substance, which conld only be a source of injary during the growth of the tea to the plant. Its presence almost exclusively immediately under the caticle cells wonld materially support this hypothesis.

In conolusion, I have to thank two or three gentlemen whose assistance has been of material advantage to me in this work: These are Mr. Hooper of the Indian Museum, Calcutta, for making several analyses of materials for me, and to Mr. C. R. Newton of Kurseong, whose help in the microscopic part of the work was extremely valuable.

[^18]
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# NOTE ON THE PUBLICATIONS 

OF THE

## ASIATIC SOCIETY.

The Proceedings of the Asiatio Society are issued ten times a year is soon as possible after the General Meetings which are held on the first Wednesday in every month in the year except September and October ; they contain an account of the meeting with some of the shorter and less important papers read at it, while only titles or short resumés of the onger papers, which are subsequently published in the Journal, are given.

The Journal consists of three entirely distinct and separate volnmes : Part I, containing papers relating to Philology, Antiquities, ete.; Part II, containing papers relating to Physical Science; and Part III devoted to Anthropology, Ethnology, etc.

Each Part is issued in four or five numbers, and the whole forms three complete volumes corresponding to the year of publication.

The Journal of the Asiatic Society was commenced in the year 1832, previous to which the papers read befnre the Society were published in * quarto periodical, entitled Asiatic Researches, of which twenty volnmes Here issued between the yeurs 1788 and 1839,

The Journal was published regularly, one volume corresponding to wach year from 1832 to 1864 ; in that year the division into two parts above-mentioned was made, and since that date two volumes have been issued regularly every year. From 1894 an additional volume, Part III, lias been issued.

The Proceedings up to the year 1864 , were bound up with the fowrnal, but since that date have been separately issued every year.

The following is a list of the Asiatic Society's publications relating to Physical Science, still in print, which can be obtained at the Society's Bouse, No. 57, Park Street, Caleutta, or from the Society's Agents ir London, Messrs. Luzac \& Co., 46, Great Russell Street, W. C.; and from Mr. Otto Harrassowitz, Leipzig, Germany.

Astatio Researches. Vols, VII, Vols. XI and XVII, and Vols. XIX and XX @ 10/ each Rs. 50 C
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fournal of the Asiatic Society for 1843 (12), 1844 (12), 1845 (12), 1846 (5), 1847 (12), 1848 (12), 1850 (7), 1851 (7), 1857
(6), 1858 (5), 1861 (4), 1862 (5), 1864 (5), 1866 (7), $1867(6)$, 1868 (6), 1869 (8), 1870 (8), 1871 (7), 1872 (8), 1873 (8), 1874 (8), 1875 (7), 1876 (7), 1877 (8), 1878 (8), 1879 (7), 1880 (8), 1881 (7), 1882 (6), 1883 (5), 1884 (6), 1885 (6), 1886 ( 8 ), 1887 (7), $1888(7), 1889(10), 1890(9$ and 2 Supplts.), 1891 (7), 1892 (7 and Supplt.), 1893 (11), 1894 (8), 1895 (7), 1896 (8), 1897 (8), 1898 (8), 1899 (7), 1900 (7), (3) $1 / 8$ per No. to Members and @ $2 /$ per No. to NonMembers.
N. B.-The figures onclosed in brackets give the number of Nor. in each Volume.

Centenary Review of the Resenrohes of the Society from 1784 to 1883
Theobald's Cutalogue of Reptiles in the Museum of the Asiatic Society (Extra No., J. A. S. B., 1868)
Catalogue of the Mammals and Birds of Burmah, by E. Blyth (Extra No., J. A. S. B., 1875)
Catalogue of Fossil Vertebrats ... ... ...
Catalogue of the Library of the Asiatic Society, Bengal ...
Moore and Hewitson's Descriptions of New Indian Lepidoptera, Parts I-III, with 8 coloured Plates, 4to. © 6/each -... 18 u



[^0]:    * Somewhat similar conditions with corresponding resalts as to fauna prevail in the Chilas tract on the S.-E. corner of the Gilgit District.
    $\dagger$ As opposed to the snow leopard (Felis uncia).

[^1]:    - Oapt. Gardon saw a herd of them at Mirkandi on the bank of the Chitral river only $4,000 \mathrm{ft}$. above sea-level.

[^2]:    - Mynheer P. C.T. Snellen in Tijd. voor Ent., vol. xxxiii, p. 284, n. 4 (1880), recorde E. alcathoe from Billiton. It is unknown to me whether or no he considers P. tramopectus to be a aynonym of that epeoies.

[^3]:    * Vide de Nicéville, Journ. A.S.B., vol. lxiv, pt. 2, pp. 957-555 (1895).
    † Fide Aurivilling; Fint. Tide, vol, xviii, p. 141, n. 7 (1897).

[^4]:    - Since the above was written Professor Chr. Anrivillins has sent me a beantifal coloured drawing of the type specimen of Buplœa kinbergi, Wallengrén, this drawing I hope to reproduce in a later paper. It represents a female example of probably the commonest form of Ruploea foand in Hongkong and on the opposite mainlavd of Southern China. The Ruploea lorquinii of Felder and E. felderi of Butler are aynonyms of Fikinbergi. It is a Crastia, not a Tronga.

[^5]:    - Omitted altogethar by Dr. Butler in his 1878 revision of the batterdies of the genan Inuplea in the colloction of the British Museam,

[^6]:    Euplea (Tronga) mentawica, Hagen, Ent. Nach., vol. xxiv, p. 199 (1898) ; Tronga pryeri mentavica, Fruhstorfer, Berl. Ent. Zeitsoh., vol. xiiii, p. 189 (1898).

[^7]:    Specimens of this in Herb. Berol, and Herb. De Candulle have been kindly lent for study; the writer has also seen those at Kew and the British Musenm. The species is a very distinct one, nearest to D. tamarindifolia. The two plants referred to the same species at different times by Mr. Bentham are both Triptolemes, one is D. Millettii Benth., a Chinese speoies, the other is D. phyllanthoides B1., a Malayan one.

    Vidal gives the vernacular name as "Payasi."
    27. Dalbergia acaciarolia Dalz. in Kew Journ. ii. 37 (1850). D. tamarindifolia var. acaciæfolia Bak. in Hook. f. Flor. Brit. Ind. ii. 235 (1876).

    Wegtern India: Concan, Law! N. Canara, Talbot 3588! Tinnivelly Hills, Naidoo!

    A very distinct secies, differing from D. tamarindifolia, to which it is most olosely allied, in its foliage, the leaflets being glancons beneath; and in its larger, firmly coriaceons pod.

[^8]:    Leaves large-
    Leaves with their main nerves under 20 pairs, bold, the reticulations inconspionons, mostly from 8 to 14 in . long (except in Nos. 8, 9 and 10)-

    Flowers 1 inch or more across-
    Leaves on very short inconspicnous petioles, auricled $\left\{\begin{array}{l}\text { 1. E. formosa. } \\ \text { 2. E. Perakensis. } \\ \text { at the cordate base, often amplexicaul ... ... } \\ \text { 3. } \text {.. javanica. }\end{array}\right.$

    Leaves neither cordate nor amplexicaul bit narrowed at the base
    4. E. Jambos

    Flowers half an inch or at most three quarters of an inch across -

    Leaves glabrous-

    |  | 6. E.pseudo.formosa. |
    | :---: | :---: |
    | Young branches sub-terete or compressed | 7. E. papillosa. |
    |  | 8. E. densiflora. |
    | Young branches 4-angled | 10. E. Scortechinii. |
    | hairy be | 11. E. mollis. |

    Leaves 8 to 16 in . long, with very numerous (more than 20 pairs) of bold distinot sub-horizontal main nerves; flowers half an inch or more in diameter-

    $$
    \text { Reticulations of leaves distinct ... ... ... ... }\left\{\begin{array}{l}
    \text { 12. E. quadrata. } \\
    \text { 13. } \text { E. scalarinervis. } \\
    \text { 14. } \text { E. pergamentacea. } .
    \end{array}\right.
    $$

[^9]:    The species nearest to this is $\boldsymbol{E}$. pergamentacea which however has larger leaves, fewer panioles and considerably larger flowers.

[^10]:    A species poorly represented at Kew and Calcutta: recognised by its obovale leaves, pale yellow branches, nnd few-flowered, pedunculate, oorymbosejracemes or panioles.
    18. Edarnia lepidocarpa, Wall. Cat. 3618. A glabrous tree, 40 to 50 feet high: young branches greyish, terete. Leaves coriaceous, J. II. 12

[^11]:    A species allied to $\boldsymbol{B}$. densifora, Dathie, but with leaves of thinner texture, with fewer nerves and no dots. The panioles are also much shorter, fewer-flowered; and the flowers are smaller.

[^12]:    A species of which the nearest allies are E. pustulata, Dathie, and E: brachiata, Roxb., bat with more slender panicles nnd smaller flowers than the former and mone acuminate leaven than the latter. It also resemblen E. minutifiora, Miq, but that hau broadly ovate ahortly acuminate leaves and shorter panicles.
    90. Eogenla pugtolata, Duthie in Hook. fil. Fl. Br. Ind. II, 495. A tree, 20 to 50 feet high; young branches thinner than a goose-quill, terete, pale-brown, minutely warted. Leaves coriaceons, oblong or ablaug-tanceolate, shortly acuminate, much narromed to the base: uppersurface. (whon dry) smooth, shining, greopish, the nerves uanally

[^13]:    The late Mr. Miers exoluded from the genus Barringtonia everything except a plant now known by an imperfeot apecimen preserved in the Banksian collection and by Forster's drawings, which latter represent a 4 -celled fruit. The plant here deacribed to which Forster's name had, prior to the issue of Mr. Miers ${ }^{3}$ monograph in the Linnæsn Transactions, by common consent been given, is one of three forms of the plant on which Miers founded the genus Agasta. On characters largely based apon slight differences in the shape of the fruit, Miers distinguished his three apecies Aqasta splendida, asiatica and indica. The latest. writers on

[^14]:    ** - . *run -•• $\because \cdots$

[^15]:    * Chemistry and Agriculture of Tea, 1893.
    $\dagger$ See, for instance, D. Crole, Journal of the Society of Arts.

[^16]:    * Report on Ceylon Tea Soils. Colombo, 1900.
    † Indian Gardening and Planting. November 7th, 1901.
    $\ddagger$ Bulletin of the Imperial College of Agriculture, Tokio. 1901. Vol. 4, page 254.

[^17]:    - Reports of the U.S.A. Department Agriculture. Nos. 59, 60 and 65, 1899-1901.
    $\dagger$ Journal of the Chemical Society. 1898,

[^18]:    * See Beport U.S.A. Dept. Agri., No. 65, 1900.

