are far superior to the ordinary type of "Officinalis", as x any high percentage of alkaloids has sometimes been obtained from single specimens of that also. If a cultivator takes a fancy to any particular variety he can probably get a very flourishing report on its yield by the high cultivation of a few individuals, but this does not hold good in a large plantation and I should be sorry to plant faith mixed with varieties like "Angustifolia" and "Crispa". Ledgeriana I still think valuable on account of its very strong growth and much greater yield in bark. The analysis of this from Dodabetta is given in G.O. No: 1336 of the 23. June 1879 under the head of "Condaminea" as distinct from Crown barks.

17. Cultivation of Crown Barks by Government should be suspended. Crown barks will only grow at a high elevation, and there are few or no sites for them except on the Nilgiris, where only grass land, and not shola, is now available to the public. "Succirubra" and "Calisaya" on the other hand are spreading all over the Wynad, Coorg &c: it is desirable therefore that Government should keep this in view and if possible extend the cultivation of Crown barks, or at any rate work up their present estates without any fresh expenditure.

18. Yellow Barks. It is to be regretted that these are such failures, at Neddivattam, they all die out, and the climate is evidently too cold, and probably too dry for them; they grow at low elevations and in a very moist climate in their native habitat in Bolivia and Southern Peru, and

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it is useless to make further attempts at the Cultivation of "Calisaya" or its variety "Ledgeriana" at Neddivattam, but I would strongly recommend that a small garden should be opened out for experimenting on their growth at 1,000 or 2,000 feet below our present plantations; they are doing well in parts of Wynad, and in the Ouchterlony Valley at about 3,000 feet elevation.

It is not easy to distinguish the variety "Ledgeriana" from Ordinary "Calisaya" when in leaf only, but Mr: Rowson tells me he can always do so when they are in flower, whilst "Ledger" has white flowers, whilst those of the ordinary "Calisaya" are pinkish.

"Anglica" supposed to be a sport or variety of "Calisaya" is represented by a few trees at Neddivattam, its bark is said to be of little or no value.

Javanica said also to be a variety of "Calisaya" is also represented by a few plants at Neddivattam; it appears to be of no value and not to be worth growing, at least in the form it assumes at Neddivattam, which is a small very bushy shrub. I do not know whether this is the variety usually called "Josephiana"

49 Grey Barks:- "Micrantha", "Peruviana" and "Nitida" from the grey bark region around Huanico in North Peru are all represented at Neddivattam and Pykara, but they do not succeed and are in fact all fast dying out; they yield no Quinine, but are valuable for their yield of Cinchonia and Cinchonidine, it is useless to grow them at Neddivattam, but it would be a pity that they should be lost to India and I propose

propose that another site at a lower elevation should be opened out for them, "Micrantha" and "Peruviana" grow at about 4000 feet elevation and in a more moister climate than that of Neddivallam, and should be expected to answer in their present situation, but "Nitida" grows at higher elevations and might have been expected to thrive at Neddivallam.

50. Columbian bark.

Pitayensis (Pitayo bark) there are some few very healthy trees of this in the Dodabetta plantation, but the tree has not been propagated here as yet; Mr. Cross anticipates valuable results from its introduction and informs me it grows to 70 & 80 feet high and 3 to 4 feet in diameter where he met with it at 4 to 5000 feet in New Grenada, samples of the bark of our Dodabetta trees have been sent by Mr. Cross to Mr. Howard for Analysis and on this report the question of its extended cultivation must depend; it is supposed to yield much Quinine.

Santa Fe.

Santa Fe. Loft Columbian. (C. lancifolia) The plants brought by Mr. Cross from New Grenada (4 to 10000 feet elevation) are healthy and are being propagated, so it is hoped this valuable species may ere long be established on the Nilgiris. It is known to yield a very high percentage of Quinine and Mr. Cross anticipates great results from its introduction, it grows, he tells me, 70 feet high with a diameter of 3 feet in its native habitat; it may be expected to answer well at Neddivallam and perhaps also in sheltered places in Dodabetta.

Carthagena bark. (Cinchona cordifolia) the two plants brought lately by Mr. Cross from the Central Cordilleras near Bogota (elevation 4 to 6000 feet) are healthy and strong growing and are being propagated, and the prospects of establishing

establishing it on the Nilgiris are promising, it is supposed to be a strong growing large tree which its present appearance does not belie; its yield of Quinine is much the same as that of Succirubra and it will probably succeed in the same localities as that species. Mr Cross tells me that he believes the "China Cuprea" the seed of which is promised to this Government (vide Lr No. 630 of the 8th April 1881) from Bojota is the same species.

51 Palmedana. We have a few of this very distinct species in the Dodabetta plantations, it is said to be quite valueless, and its extensive propagation in Java owing to its robust and rapid growth, caused much loss and annoyance.

52. Hybrids. I am inclined to disbelieve in any hybrids of Nilgiri origin; it has been stated that there are many hybrids amongst the "officinalis" and "Calisaya" trees, but after most careful examination I can see no indication of such, nor have any of our trees the characteristics of hybrids, which I am sure would not seed so prolifically; individual trees may be gathered from many officinalis trees and also from "Calisaya" showing great difference in the shape and size of the leaves, but the same difference may be found on one and the same tree. and often on the same bough, but have varieties or sports of species, such as "Uritusinga" and "Angustifolia", varieties or sports of "officinalis", sometimes nothing very distinct

distinct, but at other times passing into the type and not to be distinguished, but of hybrids between distinct species I do not think we have any.

53. Hybridizing experiments. Though I do not believe in accidental hybrids between different species on the Galapagos, I have no doubt that the different species could be crossed, I am not inclined however to recommend any experiments of this nature, as it would be useless to attempt it without the services of a scientific gardener thoroughly trained in the art of hybridising, such as Mr. Domeney or Mr. Seden on the establishments of Messrs Bull and Veitch, and such as man could only be procured on a very high salary, and other expenses connected with any experiments of this nature would be very costly; the experiments would be

be exceedingly interesting and of great scientific value, but practically perhaps of no value, we have now in cultivation all the finest known species of the genus and it is not likely that hybridising would improve the bark, or give us anything better than, or as good as, we now possess so that we might be spending large sums to get some variations in leaf and flower, or perhaps in some cases sturdier growth.

54. Analysis of the various barks. I fear that too much reliance may hitherto have been placed on the analysis of the barks of single individuals of one species or variety, grown under unusually favorable conditions; Soil, solar influences, shade, moisture, long droughts, exposure to wind, frost &c. must probably exercise great influences on the

bark

bark, and yield of alkaloids, and Analysis should not be too much relied on unless taken from a considerable number of trees subjects to the varied conditions which they must experience in a plantation.

55. Sites for species requiring a lower elevation. A fine sheltered shola in the "Silent valley" elevation about 3000 feet, has been reserved by the Collector of Malabar at the request of the Conservator in case it should be required by this Department for the growth of "Rubber trees" or any other products. I now recommend that this should be taken up by the Forest Department at Nilambore and that a small clearing should be also once made for experiments on the growth of "grey barks" and "Yellow barks" at that elevation; if they grow well, there is ample room for opening out a considerable area; it may also be necessary to try "Carthagena" and "Santa Fé" at this lower elevation. A small pucka building should be erected, and the Cinchona Budget should furnish the necessary funds; it is also desirable to try among the Rubber trees and the "Ipecacuanha" (Cephaelis) in the same locality.

56. Renovating pits. Mr. Rowson has much improved the health of the trees in the plantations under his charge (at Cherangattam and Pykara) by the renovating pits. (2 feet cube) In many parts of the plantations the trees have a far more vigorous look than they had two years ago, it has been surmised that the lateral roots might be injured by this system, but this is not the case, where the lateral fibrils have been touched they shoot out again with great vigor through the humus in these pits; in some cases cattle manure has been put in the pits, but much of this not being available they have generally been