Dodabetta plantations, and there are some fine old trees of "Magnifolia" in the 1865 plantation which are certainly not supplies (which alone would prove that they could not be hybrids), but here I found them both known to the Superintendent (Narrainsawmy) as "Pubescens," the name "Magnifolia" not being known.

Mr. Rowson informed me that he considered them hybrids, as they had not appeared before the 1869 planting (it will be seen elsewhere that Mr. Cross detected them in the oldest planting); that they both generally came up true from seed, but that he had known many sown as these hybrids come up true "Succirubra" which he however attributed to careless gathering. He also stated that he had largely propagated "Pubescens" and not "Magnifolia" on the supposition that the bark of the former was much more valuable; the bark he also said both of "Pubescens" and "Magnifolia" had not been sent to market except from a few trees taken carelessly by coolies and mixed with other barks, but samples had been collected from one or two trees and sent home for analysis, and this analysis is given in G.O., No. 1,336, of 23rd June 1879, under "hybrid Pubescens," and is most favorable, though I am not inclined, as I have said elsewhere, to give too much reliance on the analysis from single individuals perhaps grown under very favorable circumstances. These specimens were taken from the glabrous "Magnifolia" and not from "Pubescens."

Narrainsawmy, the Dodabetta Superintendent, informed me that he did not consider "Pubescens" a hybrid, as there were large trees in the 1865 plantation which he had always been familiar with since he took charge in 1868; he also stated that if sown they sometimes come up true, but they often come up "Officinalis" (this must of course be due to careless gathering). I subsequently got Mr. Cross to make a careful examination of this species or variety both at Naduvatam and on Dodabetta. He informs me that "Magnifolia" and "Pubescens" are one and same species, and scarcely distinguishable, that he is quite familiar with the tree which he found himself in the Red bark region on the slopes of Chimborazo, but always at a higher elevation than "Succirubra", and that the Cascarilleros or bark collectors always distinguished it as the "Pàtà de Gallinazo" (or turkey buzzard's foot), whilst they called the "Succirubra" "teja" (or tile bark), but that the bark was not put up separately by these collectors. He also states that he believes this tree has never been figured or described although Weddell (Notes sur les Quinquinas) refers to no less than four species as the source of Pàtà de Gallinazo, whilst Mr Spruce in his report includes the Pàtà de Gallinazo as bark collector's lore, evidently regarding it as an *alias* of "Succirubra," though he could never have seen the trees. Mr. Cross also states that he examined the very tree at Naduvatam, that the bark was taken from for analysis, and that it is typical "Pàtà de Gallinazo" (or the glabrous "Magnifolia" of Mr. Rowson), and that there can be no mistaking the strong growing varieties of both sorts on the grass land; but that in some cases true "Succirubra" has been pointed out to him as "Pubescens" in the Naduvatam plantations and the same mistake he says seems to have occurred at Darjeeling. There is evidently some confusion about the pubescent variety, and I fear that the officials do not always distinguish between some forms of "Succirubra" and "Pubescens" when growing in shola soil, and that awkward mistakes are liable to occur both in the supply of seed and collection of bark. Mr. Cross also informs me that he found trees of this "Pàtà de Gallinazo" in the oldest plantations at Naduvatam and that he has no doubt it was introduced here from the commencement, but that it was not distinguished from "Succirubra" till it grew up and flowered or till its robuster growth became apparent.

I forward with this report carefully dried and mounted specimens of both "Magnifolia" and "Pubescens," so I trust that they may be compared with typical specimens of the various species in the Kew Herbarium. I also forward specimens of all other species referred to in this report for comparison, &c.

I examined the two trees in Dodabetta from which Narrainsawmy tells me the analysis of "Hybrid Pubescens" is given in G.O., No. 1,336, dated 23rd June 1879 (Nos. 10, 11 and 12); they are both the glabrous variety that Mr. Rowson

calls "Magnifolia" and Mr. Cross styles "Pàtà de Gallinazo." The results from the three specimens sent vary much in the percentage of the different alkaloids, and also the variations with the samples sent from Naduvatam are considerable; this is not satisfactory, though there is proof that we have in this plant a very valuable species.

The Dodabetta Superintendent informs me that this tree suffers less from frost than the "Officinalis."

Mr. Howard calls this tree "Officinalis" var. "Pubescens." It is in my opinion nearer "Succirubra" than "Pubescens," and it will be seen from some specimens that I forward that the leaves from shoots and suckers are nearly as large as those of "Succirubra" though more lanceolate in shape and more pointed. No varieties of "Officinalis" not even its largest leaved form "Uritusinga" ever produce leaves nearly as large as this.

I much fear that in some cases seed of true "Succirubra" may have been forwarded from Naduvatam to Ceylon, Darjeeling or elsewhere instead of true "Pubescens," and that unfortunate mistakes may thereby arise.

I have had long talks with Mr. Cross about this tree, and we have examined many together, and he now writes me: "the circumstance that this prolific and hardy sort has so long escaped notice, and the uncertainty that still exists as to which of the two sorts ('Succirubra' or the so-called 'Pubescens') is the richest in alkaloids is much to be wondered at." It is I now think all important that the doubts about it should be cleared up, and that we should have a careful analysis from a considerable number of both the glabrous and pubescent varieties.* Narrainsawmy of Dodabetta informs me that he sent it home to market for the first time in December 1880, and that two bales were forwarded, viz., 111 lb. of mossed "Pubescens" (not renewed) and 138 lb. of natural "Pubescens;" the report on this is not yet to hand, and will be of the greatest interest. There is not a tree of "Succirubra" in Dodabetta fit to be barked, so it is doubtlessly all from the true "Pubescens" or "Pàtà de Gallinazo" of Mr. Cross; it is besides nearly all from the glabrous variety as very few trees of the pubescent form exist in this plantation. No bark of these sorts has as yet gone to market from Naduvatam, so I think that some, both of the pubescent and glabrous varieties (from grass land and from forest soil separately), should be forwarded without further delay. If this species is really far more valuable in its yield than "Succirubra" Government have been losing enormously by the extensive propagation of the latter to the exclusion of the former. Mr. Cross states that it grows at a much higher elevation in its native country, and this is borne out by the fact that it is growing vigorously on Dodabetta above 7,000 feet elevation (where "Succirubra" is a complete failure) and by its more vigorous growth at Naduvatam in exposed situations.

This species is very strong growing, and will certainly yield far more bark in a given time than any other; it will also, I think, prove to be longer lived.

The questions, however; first, whether it is to oust "Succirubra" from the forest soil at Naduvatam, and second, to what extent it is to be planted on grass land to the exclusion of "Officinalis" must entirely depend on the report on the analysis of a sufficient quantity of its bark.

Mr. Rowson informs me that he has 5,000 "Magnifolia" on the Hooker plantation and 2,000 at Naduvatam, 5,000 "Pubescens" on the Hooker and 4,000 at Naduvatam, and there are about 1,000 at Dodabetta chiefly "Magnifolia."

* NOTE.—There is still some doubt as to "Magnifolia" and "Pubescens" being one and the same species or rather slight variations of the same species, though I myself feel fully convinced that they are. I trust, however, that the fact may be established from the dried specimens now forwarded. It is a fact that it is Magnifolia (true) which gave the favorable analysis in G.O., No. 1,336, of 23rd June 1879, as far as Dodabetta is concerned, whilst it is "Pubescens" that is being largely propagated at Naduvatam, the Naduvatam analysis was from trees growing in Ossington which I have not seen, but Mr. Cross states they are "Magnifolia."

In the 1869 planting at Naduvatam 20 per cent. of the trees are of this species.

45. *Unknown Species.**—I found five trees of a curious species in the 1865 plantation on Dodabetta. It has most curious rough bark like that of the Cork tree (Millingtonia) quite unlike any other Chinchona, and its leaves are exceedingly hairy on both sides, and it has hairy capsules; nothing is known of its origin except that it was received with the original seeds or plants. Mr. Cross thinks from the character of its bark that it may be of great value. Dried specimens of this species and fragments of the bark (to show its character) accompany this report with other specimens. "Asperifolia" Weddell is the only species I can find described at all like it in botanical works, but I have only DeCandolle and Walpers for reference, not all the later works, such as Weddell's. There are very few species known with the leaves hairy on the upper surface. The bark of this has never been analyzed.

46. *Crown Barks.—Officinalis* (*Linn*) (of which Condaminea (Lamb) is only a synonym) flourishes exceedingly well on grass land at Naduvatam, Pykara and Ootacamund as well as on shola land. Is is a small tree of no great girth, but this is, I believe, also its characteristic in the Crown bark region in Loxa.

Uritusinga.—The tree known by this name in the Dodabetta and Naduvatam plantations and also called "strong-growing Condaminea" and "broad-leaved Condaminea" is evidently only a variety of "Officinalis." It is of much stronger growth with broader leaves and promises to be a much larger tree; but twigs can often be gathered from ordinary "Officinalis," particularly from suckers or young growth, in which the leaves are quite indistinguishable from this "Uritusinga." Mr. Cross believes our tree to be the same as the "Uritusinga" of Pavon, which takes its name from a hill near Loxa, where he himself collected it, and which is now quoted in botanical works as a synonym of "Officinalis;" but it should certainly be considered as a variety, and its bark should be kept distinct from that of "Officinalis." Our plant is exceedingly strong growing and healthy and I think it should be largely grown and receive more attention; at present there are about 1,000 of it in Dodabetta, but only about a dozen at Naduvatam. "Uritusinga" is a lofty tree in its native habitat.

Angustifolia.—Evidently only a variety of "Officinalis;" it sometimes looks very distinct, the leaves being narrower and deeper colored, but it is not always true to its characteristics, and broader leaves in no way distinguishable from "Officinalis" can often be gathered on it. There is none of this on the Naduvatam side; some 700 rooted plants sent out from Ooty to Pykara as this variety have turned out to be ordinary "Officinalis." There are a few planted out in the Dodabetta plantations, but they do not show good growth, or promise to be a success; it is supposed to yield a very large percentage of quinine and there are now 10,000 rooted cuttings in the Dodabetta nurseries propagated in the glass houses from the few stock plants. Considering its poor growth I cannot recommend its extended planting until its treatment is better understood or a more favorable habitat is found for it.

Mr. Jamieson informs me that Mr. McIvor considered it hopeless to grow this variety; its growth being so slow and poor, it would be far less profitable than the ordinary variety of "Officinalis" notwithstanding the superiority in its yield in alkaloids. I can always distinguish this plant at the first glance, but Mr. Cross considers it not even a variety but only a condition of growth of "Officinalis," conduced by poverty of soil or some other condition. I cannot say that I quite agree with this, but there is the fact that some 700 plants, supposed to be this species, in the nurseries at the Ootacamund Gardens, and planted out in rich soil at Naduvatam, turned out to be ordinary "Officinalis." There is not sufficient evidence, however, as to what the original plants really were.

Var. Crispa ? Mr. Cross informs me that he recognizes many plants of the "Crispa" var. of "Officinalis" (at least the one known in Ceylon as such) supposed to be very rich in quinine, scattered about with "Officinalis" in our Dodabetta plantations. I forward dried specimens of this form which Mr. Cross distinguishes by its rather smaller leaves, but I must say that I cannot distinguish it satisfactorily from ordinary "Officinalis," and it appears at any rate to run into it.

Var. with very narrow leaf.—There are a few plants of a very narrow-leaved form of "Officinalis" in the Dodabetta plantations, of which I also forward specimens. This variety is easily distinguished, and I believe it is the one Mr. McIvor considered as "Crispa;" it is only of shrubby growth and cannot, I think, be of much value. I am very disinclined to attach too much value to the fact of a very favorable analysis (as we find in reports) of single individuals of varieties like "Angustifolia" or "Crispa" grown perhaps under very favorable conditions, or to attempt their extended cultivation on such grounds. It is of course evident that they are valuable yielders under certain conditions, but it would require stronger evidence, I think, to establish the fact that they are far superior to the ordinary type of "Officinalis," as a very 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 place faith in it with varieties like "Angustifolia" and "Crispa." Uritusinga is, I 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. 1,336, of the 23rd June 1879, under the head of "Condaminea" as distinct from Crown barks.

47. *Cultivation of Crown Barks by Government should be kept up.*—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 Wynaad, 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 stint as to expenditure.

48. *Yellow Barks.*—It is to be regretted that these are such a failure at Naduvatam; 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 it is useless to make further attempts at the cultivation of "Calisaya" or its variety "Ledgeriana" at Naduvatam; 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, I believe, growing well in parts of Wynaad 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 as the "Ledger" has white flowers, whilst those of the ordinary "Calisaya" are pinkish.

* Since this report has been copied I got Mr. Cross to examine these trees. He writes: "great discovery! incredible fact!! the celebrated 'Chinchona Crispa' of the Loxa mountains, a packet of the seed of which we collected when collecting the Officinalis." He also tells me that it is a very valuable bark, that the plant is probably almost unknown and was only collected by himself, and that the seeds which were sent to the Nilgiris were said never to have germinated.
I can find no description of C. "Crispa", and the nomenclature and synonym of the genus seems in a most confused state at present; it can, however, scarcely be the "Crispa" of Tafella mentioned in Triana's work without description, as that is said scarcely to differ from "Officinalis" and is made a variety of it by most authors which this very distinct species could never be. If Mr. Cross is correct the plants lately supposed to be "Crispa" are spurious, but I do not know where "Crispa" is originally described or by whom. Whatever this may be its bark should be analyzed at once; it has been in these plantations since 15 or 16 years without ever having been noticed; it is in flower and seed now and has probably been seeding for many years and might be propagated largely if advisable; in its bark, leaves and fruit it is utterly unlike anything else in any of the plantations.
Mr. Cross says he found it at 10,000 feet elevation, and that it grows at a higher elevation than any other known species of the genus.

Anglica, supposed to be a sport or variety of "Calisaya," is represented by a few trees at Naduvatam; 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 Naduvatam; it appears to be of no value and not to be worth growing, at least in the form it assumes at Naduvatam, 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 Naduvatam 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 Cinchonine and Cinchonidine; it is useless to grow them at Naduvatam, but it would be a pity that they should be lost to India, and I propose that another site at a lower elevation should be opened out for them. "Micrantha" and "Peruviana" grow at about 4,000 feet elevation and in a much moister climate than that of Naduvatam, and could hardly be expected to answer in their present situation; but "Nitida" grows at high elevations and might have been expected to thrive at Naduvatam.

50. *Columbian Barks*—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 grew to 70 and 80 feet high and 3 to 4 feet in diameter where he met with it at 9, to 10,000 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 Fé—Soft Columbian (C. Lancifolia).—The plants brought by Mr. Cross from New Grenada (7 to 10,000 feet elevation) are healthy and are being propagated, so it is hoped this valuable species may ere long be established on the Nílgiris. 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 Naduvatam and perhaps also in sheltered places in Dodabetta.

Carthagena Bark—(Chinchona Cordifolia).—The two plants brought lately by Mr. Cross from the Central Cordillera near Bogota (elevation 4 to 6,000 feet) are healthy and strong growing and are being propagated, and the prospects of establishing it on the Nílgiris are promising. It is supposed to be a strong growing large tree which its present appearance does not belie; its yield in 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* G.O., No. 630, of the 8th April 1881) from Bogota is the same species.

51. *Pahudiana*.—There are 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 Nílgiri 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 twigs 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. We have varieties or sports of species, such as "Uritusinga" and "Angustifolia," varieties or sports of "Officinalis," sometimes looking very distinct but at other times running 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 Nílgiris, 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. Dominey or Mr. Seden on the establishments of Messrs. Bull and Veitch, and such a 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 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 and yield of alkaloids, and analysis should not be too much relied on, unless taken from a considerable number of trees subject 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 3,000 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 Nilambúr, and that a small clearing should be at 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 Chinchona budget should furnish the necessary funds; it is also desirable to try some of 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 Naduvatam 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 filled up with dead leaves, and decaying vegetation, such as the weeds, cleared off the plantations; they have, I consider, improved the condition of the plantations in a most marked manner.

57. *Perfect Drainage most necessary*.—All the varieties of Chinchona appear to grow much better on slopes than on flats, the tree being most impatient of anything like insufficient sub-soil drainage.

58. *Lichen*.—In wind blown situations the trunks and branches are often much covered with white lichen. Mr. Rowson assures me this in no way affects the health of the trees or bark; it is easily rubbed off.

59. *Diseases and Enemies*.—There is very little sign of canker at Naduvatam, and the Chinchona seems to have few or no insect enemies; sambur and wild animals are, of course, destructive, and fencing is most necessary in some parts if the plantations are to be worked up to their highest possible yield.

60. *Number of Trees in Naduvatam*.—Appendix A is a statement of the number of casualties amongst the trees in Naduvatam Plantation during the last three years (or since Major Walker's report), and the number of trees now existing based on Major Walker's enumeration.

61. Statement showing number of plants in the nurseries at Naduvatam, 28th May 1881 :—

Botanical Names.	Plants in Nurseries and Hot House on 31st March 1880.	Plants raised during 1880-81.	Total.	Plants issued during 1880-81.	Plants planted out permanently during 1880-81.	Balance in Nurseries and Hot House on 31st March 1881.	Remarks.
C. Succirubra	216,000	585,950	801,950	489,950	12,000	300,000	
C. Officinalis	155,000	378,000	533,000	228,000	105,000	200,000	* Received from Dodabetta.
C. Calisaya var. Ledgeriana.	4,400	*1,560	5,960	50	..	†2,027	† 3,333 seedlings have died.
C. other varieties	4,000	1,305	5,305	..	2,305	3,000	
C. Pubescens	..	20,010	20,010	1,000	8,010	11,000	
Total ..	379,400	986,825	1,366,225	719,000	127,315	516,027	

PYKARA.

The Hooker Chinchona Plantation, Acreage 134·19.

62. *No. I Plot*, 1866, *A.*—Acreage 10·91, about half grass land and half shola land. The grass land chiefly Officinalis, only a few Succirubra; the crown barks have been planted too far apart, but the gaps are to be filled in this season.

The shola land all Succirubra, growth good (about 20 feet high) except a small bit on the upper portion, which is much wind blown and thin from failures, and in which supplies are to be put down this season.

All the plantation has been barked five times.

63. *No. II Plot*, 1866, *B.*—15·09 acres; about one-third grass land planted with Officinalis, about two-thirds shola land planted with Succirubra; growth good or fairly good; in portions there is a yellowish appearance in the foliage which is not noticeable at Neddivattam; it is probably due to the long drought and east wind, and will disappear with the monsoon.

All the plantation has been barked five times.

64. *No. XIII Plot*, 1873.—10·59 acres, all shola land, planted with Officinalis; a few Succirubra put in as supplies; there are about 20 Pitayensis; but 726 plants sent out from Ootacamund as Angustifolia have turned out ordinary Officinalis; growth of trees good, but the plantation is very patchy and the trees far apart caused by the inroads of sambur.

In addition to the 10½ planted acres, there are some 15 or 20 more of abandoned shola cleared in 1873, but now over-grown; it would be a good plan to fence in the plantation and to re-clear and re-plant this portion, and to plant up the vacancies in the 10½-acre plot, but it would be useless without fencing on account of wild animals.

This plantation has not been barked.

65. *No. X Plot*, 1869, *A.*—3·58 acres, grass land, Succirubra and Officinalis in nearly equal proportion; growth not good; soil poor, rocky, and gravelly. Has been barked four times.

66. *No. VII Plot*, 1868, *A.*—18·36 acres, chiefly shola land, good soil, planted with Succirubra; the growth of the trees is good, but the plantation is very patchy from many trees having died out; cause not known; the gaps are to be filled in with Officinalis, but I fear this will not answer unless the plantation is fenced in, as sambur are exceedingly troublesome in this plot, and destroy most of the young plants put out.

The above trees have all been barked four times.

Some grass land planted with Officinalis very far apart; growth short; pits have been dug for filling in more trees; the soil is good, and it would have shown far better results if it had been planted 4′× 4′ instead of 8′× 8′.

All the trees have been barked four times.

67. *No. III Plot*, 1867, *A.*—14·21 Acres. Two-thirds grass land formerly very stunted Succirubra, only a few feet high, which has last season all been up-rooted, and the ground is now pitted for Officinalis which is to be planted out this season. One-third shola land Succirubra; fine growth and barked three times.

68. *No. XI Plot*, 1869, *B.*—9·35 acres, all shola land, planted originally with Succirubra, growth good, has all been barked four times; there are supplies of Officinalis; some grey barks were dying out, and have been all up-rooted.

Five acres coppiced in June 1879, the stools bled excessively; there are 1,379 failures out of 2,226 stools, but the 847 which succeeded have grown well, and are three to six feet high with one to three stems to each stool.

69. *No. VIII Plot*, 1868, *B.*—23·74 acres, chiefly shola land, planted with Succirubra; the plot is very patchy as very many trees were injured by the hail in 1879 and died out subsequently; growth of remainder good, now pitted for supplies of Officinalis. All barked four times. About two acres of grass land covered with very fair Officinalis; all barked four times.

70. *No. XII Plot*, 1869, *C.*—6·52 acres, about three-fourths shola land and one-fourth grass land, planted almost entirely with Succirubra which nearly all died out after the hail-storm in 1879, and has been up-rooted and the plot re-planted in 1880 with Officinalis, doing well; there is a sprinkling of good old Officinalis (scattered about the plot) which were put down at the same time with the red barks.

71. *No. V Plot*, 1867, *C.*—2·71 acres, chiefly shola land, originally planted with Succirubra which all died out after the hail-storm in 1879; it was afterwards up-rooted and re-planted with Officinalis in 1880 which is doing well.

72. *No. VI Plot*, 1867, *D.*—16·07 acres, all grass land, about two-thirds, formerly very stunted Succirubra which died out after the hail-storm in 1879, was up-rooted and the plot re-planted with Officinalis in 1880 which is doing well; about one-third covered with very good Officinalis which has been barked four times.

73. *No. IX Plot*, 1868, *C.*—16·04 acres, all grass land, about two-thirds covered with fine Officinalis; all barked four times; about one-third, originally covered with stunted Succirubra which mostly died out after the hail-storm in 1879, re-planted in 1880 with Officinalis, doing well; 1,020 old Succirubra still survive, and there are 1,100 old Officinalis.

74. *No. IV Plot*, 1867, *B.*—7·02 acres, about three-fourths grass land, planted with Officinalis, fair growth (12 feet high), but very patchy from wide planting, has been pitted for supplies which are to be put down this year; all barked four times.

About one quarter shola land planted with Succirubra and Officinalis, growth good but patchy, the plot being much wind blown, pitted for supplies to be put down this year. All barked four times.

75. *State of the Hooker Plantation.*—The growth here is far inferior to that at Naduvatam, considerable tracts of grass land being planted originally with "Succirubra," which was a perfect failure, only attaining a stunted growth of a few feet; this has lately been nearly all up-rooted, and has been, or is being, replaced with "Officinalis" which grows very fairly on the grass land soil; there are still some tracts where the Succirubra must give place to Officinalis or to Pubescens.

76. *Fencing.*—Plot No. XIII, 1873, must be fenced, and a portion of the shola, which has been abandoned and allowed to revert to rank coarse growth, should be recleared and planted. Fencing is also required in Plot VII, 1868, A.

77. *Coppicing.*—2,226 Succirubra trees in No. XI Plot of 1869, four times previously barked and of good growth, were coppiced in June 1879; 1,379 stools have died, 847 are growing fairly, height three to six feet.

78. *Number of Trees in Hooker Plantation.*—Appendix B is a statement of the number of casualties amongst the trees in the Hooker Plantation during the last three years, and the number of trees now existing based on Major Walker's enumeration.

PYKARA.

The Wood Chinchona Plantation, 72·18 acres.

79. *No. V Plot*, 1865, *C.*—8·80 acres, all shola land, planted with "Succirubra" and a very few "Officinalis;" trees a good height, often over 20 feet, but not healthy in appearance, and numbers of failures; sub-soil very inferior; sized trees barked six times.

80. *No. II Plot*, 1864.—10·87 acres, all shola land, "Succirubra" and "Officinalis;" growth all poor and spindly; many failures and many blank spaces, and trees still dying out; suffers much from the north-east wind; and the sub-soil bad. All barked five times.

81. *No. VIII Plot*, 1867, *C.*—10·87 acres, all shola land, all "Succirubra;" growth good, over 20 feet high. All barked five times. Five acres 2,500 trees coppiced in June 1879; 885 stools failed to grow, 1,655 have succeeded; growth good, height 4 to 7 feet and very healthy.

82. *No. IX Plot*, 1868.—6·12 acres, all shola land, all planted with "Succirubra," nearly all gone out, except about 100 trees; re-planting has been attempted more than once without success. Soil rocky and bad.

83. *No. VII Plot*, 1867, *B.*—9·62 acres all "Succirubra," except a few "Officinalis," shola land, chiefly a flat; drainage insufficient and sub-soil sour; nearly all the trees gone out. All barked five times.

84. *No. VI Plot*, 1867, *A.*—8·39 acres, all shola land, nearly all "Succirubra;" a portion sheltered on a slope, good; the greater portion very poor growth and thin from many failures, and the remaining trees apparently dying out. Sized trees barked five times.

85. *No. I Plot*, 1863.—2·55 acres, all shola land, "Succirubra" and "Officinalis," mixed in equal proportions; very poor growth and thin, more than half died out, and many still dying; soil rocky and poor. Sized trees barked six times.

86. *No IV Plot*, 1865, *B.*—4·88 acres, lower avenue, all shola land, chiefly "Succirubra" with a few "Officinalis;" growth good in some places but patchy, as there are many blanks; casualties chiefly caused by insufficient drainage on flat portions, where there is percolation from the channel. Sized trees barked six times.

87. *No. III Plot*, 1865, *A.*—10·08 acres, upper avenue, "Succirubra" and "Officinalis;" about half and half, growth in some places fair, but not always healthy, in other parts very poor, and has been much injured by hail; many trees dead and many showing signs of dying out; upper portions very much exposed to the south-west monsoon. Sized trees barked six times.

88. *State of the Wood Plantation.*—The lower portion of this plantation exhibits very poor growth (all except Plot No. VIII, 1867, C, about 10 acres, may be pronounced a failure); it should, I think, be up-rooted and abandoned as the money required for its up-keep might be far better spent in keeping up the other plantations.

I would keep up Plots Nos. III and IV, or the avenue down the ravine in which the Pykara falls are situated; and if Government should decide to sell the remainder, I do not think these two plots or any of the land in this ravine should be alienated, as it is much resorted to by the public on account of its beautiful scenery and for its water-falls; the other portion of the Wood Estate is over a saddle and in another ravine.

89. *Coppicing.*—2,500 Succirubra trees, previously four times barked in Plot No. VIII, 1867, C (the only good growth in this lower portion of the Wood Estate) were coppiced in June 1879; 885 stools have died; 1,655 are growing and very healthy; height 4 to 7 feet.

90. *Number of Trees in the Wood Plantation.*—Appendix C is a statement of the casualties amongst the trees in the Wood Plantation during the last three years; and the number of trees now existing based on Major Walker's enumeration.

DODABETTA PLANTATION.

Acres 320·47, elevation over 7,000 feet.

91. Ascending to the plantations from the Government Gardens the first thirteen plots, as follows, are on the slope looking down on to Ootacamund or with a south-west exposure.

92. *No. XXI*, 1868, *A.*—1·61 acres, chiefly grass land with a little shola at the bottom of ravine, all planted with Officinalis 7′ × 7′; ground very steep and soil being gradually washed away; growth in fair condition and not many failures since the renewals were put down four years ago which are doing well; no late renewals, too steep for terracing, average height of the trees 15 feet; 714 trees barked once, 11 trees barked twice.

93. *No. XXVI*, 1869, *B.*—3·22 acres, nearly all grass land, very steep, soil gravelly, and being rapidly washed away, but too steep for terracing; all planted with Officinalis; trees healthy, but very far apart owing to the original wide planting, and many failures; many renewals were put down three years ago, which are doing well, but none since; average height 15 feet; 1,138 trees once barked, remaining trees small.

94. *No. XXV*, 1869, *A.*—4·68 acres, grass land, very steep; remarks the same as for No. XXVI. A portion was terraced in 1880; remainder too steep for terracing; 2,295 trees barked once, 70 trees barked twice.

95. *No. I*, 1863, *A.*—2·32 acres, all shola land, steep, and the soil has been subject to much wash, but the whole plot was terraced in 1880; all planted with Officinalis 8′ × 8′; average height 20 feet, not in very good condition; very far apart owing to wide planting and subsequent failures; renewals about 10 per cent. put down three years ago, no later renewals; 967 trees barked four times, 161 trees barked once, remainder small and not barked.

96. *No. II*, 1863, *B.*—1·67 acres, all shola land, planted with Officinalis 7′ × 7′; trees healthy; average height 22 feet, but there have been many failures; renewals one to four years of age; 1,221 trees barked five times, 47 trees once.

97. *No. III*, 1863, *C.*—3·57 acres, all shola land, planted with Officinalis; condition fair, but trees very far apart from very wide planting; average height of original trees 22 feet, many renewals one to four years of age; 1,959 trees barked five times, 65 trees once. There are a few "Pahudiana" not growing well; also one "Angustifolia" growing well.

98. *No. VI*, 1864, *B.*—7·28 acres, originally patches of shola dovetailing with grass land, very steep, and soil much washed away, but the whole was terraced in 1880, planted with "Officinalis," except some 50 Succirubra, condition bad; 6,000 seedlings planted out in alternate lines in 1880; 4,969 trees barked four times, 2,146 barked twice, 311 once.

99. *No. V*, 1864, *A.*—4·06 acres, all shola land, steep, terraced in 1880, all planted with Officinalis 8′ × 8′ and 7′ × 7′, condition fair; lately thicker planting has been attempted, 2,500 seedlings being put out in alternate lines doing fairly well; pits have also been dug for further planting; 1,900 trees barked three times, 167 barked once; 400 trees have lately been scraped on the Java principle, some are mossed and some left bare, all are renewing their bark, but those mossed more rapidly.

100. *No. IV*, 1863, *D.*—0·98 acre, all shola land, planted with Officinalis; trees fair growth, but very far apart; 900 late renewals, and now pitted for further planting. 556 trees barked five times, 58 trees once.

101. *No. XVII*, 1867, *A.*—5·62 acres, grass land, planted with Officinalis; condition good, but trees much branched from wide planting, intermediate planting between the old trees last year to an extent of 1,800 seedlings doing well; a small area where the ground is level nearly all gone out from frost; 2,853 trees barked twice, 830 trees once.

102. *No. XX*, 1867, *D.*—4·92 acres, grass land, Officinalis; condition fair, average height 14 feet; very few failures; original planting 6′×6′; 2,572 barked twice, 644 trees once; 5 trees coppiced in June 1880 as dying, no re-growth.

103. *No. XVIII*, 1867, *B.*—6·24 acres, grass land; condition fair, but growth rather stunted; 8′ to 10′ in height only; originally planted 7′ × 7′; no late renewals; 2,241 trees barked twice, 1,539 trees once.

104. *No. XIX*, 1867, *C.*—5·90 acres, grass land, growth stunted; 6′ to 8′ in height; trees gone out on a flat portion of about 1 acre said to be caused by frost; 1,692 trees barked twice, 1,314 trees once, 28 trees cut down, dead from frost.

105. The next plot, No. X, is chiefly on the ridge or saddle; all the remainder, 25 in number, are over the saddle, and have a north-east exposure, except small portions of Nos. IX and XXVII which over-top a grass hill and face south-west.

106. *No. X*, 1866, *A.*—7·44 acres, grass land, but a little shola in hollows, chiefly hill-top, much blown; growth stunted and many failures; growth better in hollows; 1,007 trees barked twice, 351 trees once.

107. *No. XI*, 1866, *B.*—12·18 acres, about two-thirds shola, one-third grass land, Officinalis; growth good; 4,627 trees barked three times, 2,615 trees twice, 1,859 trees once. 5 acres, twice barked trees, upper portion (shola land) coppiced in 1879; 3,350 trees cut, 157 have failed to sprout; growth good of remainder.

108. *No. XXVIII*, 1869, *D.*—15·33 acres grass land, Officinalis, planted 7′×7′; condition fair but growth stunted; height 8 to 10 feet, not barked; no late renewals but now pitted for intermediate planting to an extent of about 35 per cent.; 5 acres coppiced in 1879; 2,493 unbarked trees cut, failures 400; coppice growth of the rest good; 400 seedlings planted to re-place the casualties, 100 unbarked trees scraped in October 1880, some mossed and some left bare, all are renewing their bark, but those mossed renew more rapidly.

109. *No. XXIX*, 1869, *E.*—8·05 acres, grass land, Officinalis; growth good in the lower portion only a small area, rest very patchy from many failures; trees healthy but stunted; no renewals the last three years; 2,467 trees barked once, eight large dead trees felled.

110. *No. XXIV*, 1868, *D.*—13·37 acres, grass land and fern land, Officinalis; a rather flat portion of about 3 acres suffers from frost, and has gone out almost entirely; in the remainder growth stunted, but fairly healthy; many failures; no late renewals; 3,579 trees barked once. Five old dead trees cut down. Twenty-one Angustifolia trees not growing very well.

111. *No. XIV*, 1866, *E.*—4·33 acres, shola land, Officinalis; growth average, but a good many failures from frost; several spots quite bare; no renewals since four years; 715 trees barked three times, 672 trees barked once.

112. *No. XXII*, 1868, *B.*—6·04 acres, grass land, Officinalis, originally planted 7′ × 7′; many failures, and trees far apart; growth generally stunted, but fairly healthy; no renewals since four years; 706 trees barked twice, 1,709 trees once.

113. *No. XXIII*, 1868, *C.*—11·76 acres, fern land, Officinalis; very poor growth with numerous gaps, the rank growth of the common Bracken (*Pteris aquilina*) is robbing the soil of much of its virtue; it should be thoroughly eradicated as far as possible, and this plot should be pitted and planted up; 1,895 trees barked twice, and 1,302 once, two old dead trees cut down.

114. *No. XV*, 1866, *F.*—3·24 acres, about 1 acre shola, the rest grass land, Officinalis; growth poor and stunted, and many failures; 1,412 trees barked three times, and 697 trees once.

115. *No. XII*, 1866, *C.*—11·16 acres, shola land, Officinalis; growth good but patchy in places from many failures; 3,573 trees barked three times, 1,771 trees once; no renewals since four years.

116. *No. XXXIX*, 1873.—1·81 acres, shola land, 44 large Pitayensis trees; growth good, 15 feet high, not barked, except four for analysis; 557 large Officinalis doing very well, not barked; 1,000 Officinalis put down in 1880.

117. *No. XIII*, 1868, *D.*—12·68 acres, shola land, and good soil, very steep in parts, and subject to much wash, but was terraced in 1880; trees have been pruned and the growth is good and promising, but does not cover the ground which is steep and rocky in places, originally planted 8′ × 8′ which has prevented straight growth of boll; height of trees 8 to 15 feet; there was a good deal of intermediate planting four years ago; 2,971 trees barked four times, 1,524 trees once.

118. *No. VII*, 1865, *A.*—10·20 acres, shola land, soil very good, ground terraced in 1880, chiefly Officinalis; growth very good, originally planted 7′ × 7,′ but not very regularly, fairly covers the ground, trees 16 to 18 feet high; 6,601 trees barked four times, 816 trees once; there is a gap in one portion of about half an acre which has been re-planted twice, but has failed owing to frost.

About 100 Calisaya trees, growth thin and lanky.

A few Pubescens trees growing very luxuriantly; 26 Micrantha and Succirubra; growth very poor.

One of the best plots on the north-east side of the hill.

119. *No. XVI*, 1866, *G.*—9·57 acres, shola land, Officinalis, planted 7′ × 7′; growth good, but suffers somewhat from frost, does not cover the ground and requires intermediate planting; renewals 15 per cent. four years ago, of which many have failed; 1,000 seedlings put out in 1880; 3,622 trees barked three times, 1,484 trees once.

120. *No. XXXV*, 1869, *K.*—6·40 acres, shola soil, a very steep ravine and very irregularly planted with Officinalis, all lately terraced; growth good on slopes, but trees generally very far apart; about lower portions of the ravines large gaps owing to failures from frost; 531 trees barked twice, 1,663 trees once; there is one Micrantha tree not showing good growth, and a few Pubescens with very fine growth.

121. *No. XXXVIII*, 1872.—8·36 acres, chiefly grass land, steep hill side, soil poor and gravelly, Officinalis; growth poor and many failures, suffers from frost and much blown; many renewals, amongst which there are failures, re-pitted in portions for intermediate planting; the extreme upper portion suffers much from frost and wind, and has almost entirely gone out; and it would be useless to re-plant this; the upper portion of the slope has been lately terraced, and should be planted up; the Bracken should be eradicated as it is robbing the soil; about one acre shola land in the lower portion of the plot exhibits good growth; trees not barked.

122. *No. XXXIV*, 1869, *J.*—7·28 acres, grass land, planted with Officinalis, steep, rocky, and gravelly, very poor growth, many failures; 567 trees barked twice, 1,746 trees once; six old trees cut down.

123. *No. XXXIII*, 1869, *I.*—12 33 acres, grass and fern land, Officinalis, except a few Pubescens; very steep, several small land-slips; trees far apart and very irregular, at least 25 per cent. failures; a very poor plot; 271 trees barked twice, 3,487 trees once.

124. *No. XXXII*, 1869, *H.*—12·82 acres, grass and fern land, steep with rocky, gravelly, poor soil, planted with Officinalis; growth very poor and numerous failures; 627 trees barked twice, 2,150 trees once; 300 seedlings planted out in 1880.

125. *No. XXXI*, 1869, *G.*—14·08 acres, grass and fern land, steep and gravelly, Officinalis; growth very poor and numerous failures; 707 trees barked twice, 2,242 trees once; four old dead trees cut down.

126. *No. XXX*, 1869, F.—17·62 acres, grass land and fern, steep and gravelly, Officinalis; very poor growth and thin from many failures; 2,643 trees barked twice, 2,113 trees once; 11 old dead trees cut down.

127. These last five plots of 1869 planting, viz., F, G, H, I, and J form the lower portion of the north-east side of the Dodabetta Plantation, and are by far the least successful, and the trees will never cover the ground, as there are considerable portions on which growth will always fail; there is, however, here and there much fern land, on which there is now a rank growth of Bracken robbing the

soil, and if money was expended in up-rooting this, the growth of the Chinchona might be much improved in these portions.

128. *No. XXXVII*, 1870.—8·92 acres, grass land, planted with Officinalis; much of the plot is hill top with poor rocky soil; the trees were originally put down at 7′× 7′, but they are now very far apart from many failures, and the growth is poor and stunted, generally from 5′ to 10′ in height; intermediate planting up should be undertaken, but there are several perfectly bare spots on which perhaps planting would not succeed; 168 trees barked twice, 1,295 trees once.

129. *No. XXXVI*, 1869, *L.*—2·19 acres, grass land, planted with Officinalis; poor rocky soil; trees far apart and of stunted growth; height 5 to 10 feet; 176 trees barked twice, 100 trees once.

130. *No. VIII*, 1865, *B.*—17·54 acres, grass land, good loam, planted with Officinalis 7′×7′; growth good; trees average 15 feet high; not many failures; renewals 10 per cent. some four years ago, none since; 7,567 trees barked four times, 2,347 trees once.

131. *No. IX*, 1865, *C.*—13·65 acres, grass land, good sub-soil, planted with Officinalis; growth good, but somewhat stunted; trees 10 to 13 feet high; rather too much exposed to the north-east monsoon; renewals 15 per cent. some four years ago, none since; not many failures; the trees covering the ground well; 7,602 trees barked four times, 3,605 trees once.

132. *No. XXVII*, 1869, *C.*—14·50 acres, grass land; little shola land in ravine; soil generally good, but situation high and exposed; planted with Officinalis; growth fair but stunted; some of the highest part gone out; growth good towards bottom of plot; 207 trees barked twice, 1,618 trees once.

133. *Nurseries.*—The nurseries are in good order; in the Dodabetta nursery there are 2 lakhs of Officinalis seedlings.

In the nursery near the old jail about 10,000 Officinalis seedlings; also 10,000 rooted cuttings of Angustifolia transferred from the propagating houses.

In the lower nursery (near the tea) there are 20,000 Officinalis seedlings.

134. *Glass Houses.*—In the glass propagating houses 12,000 *Calisaya Ledgeriana* seedlings (from Java), 100 Pitayensis seedlings from plantation trees, 400 Pubescens seedlings from plantation trees, 40 Calisaya seedlings from plantation trees, 100 stock plants of Angustifolia; also the "Santa Fè" and "Carthagena" plants brought lately by Mr. Cross.

135. *State of Dodabetta Plantation.*—This I consider on the whole promising, and there can be no doubt as to their paying well; the great mistake has been wide planting at the commencement, and every endeavour must now be made to plant up closer, and this is receiving every attention; the plantations have been much improved of late in places by terracing, but in some parts the land is too steep for this, and should never have been opened; there are besides large blocks where the soil is very poor, and where planting must be always more or less a failure, though it will pay at the present high prices of bark; the effects of frost and wind are also very evident in many places. The eradication of the bracken fern in some of the plots requires immediate attention, and would greatly improve the growth of the Chinchona.

136. *Coppicing.*—In Plot No. XI, 1866, 3,350 "Officinalis" trees (5 acres) which had been twice barked previously were coppiced during the first ten days in June 1879; the stools bled very much and 157 died; the coppice growth of the rest is good—

Yield in green bark = 13,762 lb.
Yield in dry bark = 5,400 lb.

In Plot XXVIII, 1869, 2,493 unbarked Officinalis trees (5 acres) were coppiced from 13th to 19th June 1879; they bled very much and 400 stools died; the coppice growth of the rest being good—

Yield in green bark = 4,853 lb.
Yield in dry bark = 1,700 lb.

I attribute the failures, to the coppice having been carried out too late in the season; it is noteworthy that here, as at Naduvatam, there are many more deaths amongst the stools of the unbarked trees than from those which had been barked, which is proof that the root system of the tree does not suffer in any way from the barking process.

137. *Scraping.*—In Plot XXVIII, 1869, 100 Officinalis trees were scraped on the new Java method on 3rd October 1880, yield of bark 246 lb. green and 100 lb. dry; and in Plot V, 1864, 400 trees were scraped during October 1880, yield of bark 856 lb. green and 400 lb. dry. Some of the trees have been mossed over and others left unprotected, but all are renewing their bark satisfactorily, though more rapidly where mossed; and there are no failures whatever as far as I can see.

138. *Number of Trees in Dodabetta Plantation.*—Appendix D is a statement of the number of casualties amongst the trees in the Dodabetta plantation during the last three years and the number of trees now existing based on Major Walker's enumeration.

139. *Receipts and Expenditure.*—I will not add to the bulk of this report by any statements of receipts and expenditure, as these have been given in full in the last annual report just reviewed by Government.

140. *Dried Specimens.*—The following dried and mounted specimens accompany this report:—

Red Barks	Chinchona Succirubra (red bark) ...	From Naduvatam.
	Chinchona sp. Called Magnifolia at Naduvatam and Pàtà de Gallinazo by Mr. Cross; supposed to be a new species; was collected by Mr. Cross at high altitudes in the red bark region; called also Mr. McIvor's hybrid	Several specimens from Naduvatam and Dodabetta from forest soil and from grass land.
	Chinchona. Called Pubescens at Naduvatam and also on Dodabetta, where it is not distinguished from the last, of which it is supposed to be only a slight variety	Do.
Crown Barks	Chinchona Officinalis, typical (crown bark)	Specimens from Naduvatam and Dodabetta.
	Chinchona Officinalis, var: Uritusinga (called broad-leaved or strong-growing Condaminea)	Specimens from Dodabetta.
	Chinchona Officinalis, var: Angustifolia...	Do.
	Chinchona Officinalis, var: Crispa of Ceylon	Do.
	Chinchona Officinalis, var: with very narrow leaf, probably Crispa of Mr. McIvor.	Do.
	Chinchona Pitayensis	Do.
Yellow Barks	Chinchona Calisaya	Specimens from Dodabetta and from Naduvatam.
	Chinchona Calisaya, var: Anglica ...	Specimens from Naduvatam.
	Chinchona Calisaya, var: Javanica; so called at Naduvatam, probably "Josephiana," only a bushy shrub	Do.
	Chinchona Calisaya Ledgeriana	Do.
Grey Barks	Chinchona Micrantha	Specimens from Naduvatam and Dodabetta.
	Chinchona Nitida	Specimens from Naduvatam.
	Chinchona Peruviana	
	Chinchona Pahudiana	Specimens from Dodabetta.
	Chinchona. Unknown species with cork like bark; leaves hairy on both surfaces and hairy capsules; supposed by Mr. Cross to be the genuine "Crispa" of Loxa	Do.

141. It appears to me important that I should proceed to Darjeeling to see the large Chinchona plantations there, and the different species in cultivation, and take notes on the system of cultivation pursued and other matters which might be of use to the officers in charge of these plantations; so if Government wish it, I shall be prepared to proceed there shortly.

APPENDIX A.

NADUVATAM.

STATEMENT showing the Number of Chinchona Trees enumerated in 1878, and those that were cut since being dead, and the Balance existing on the Government Plantations, Naduvatam.

Plot.	Number as per Major Walker's Report.			Casualties in 1878-79.			Casualties in 1879-80.			Casualties in 1880-81.			Total Number of Dead Trees Cut.			Balance.			Number of Plants Planted in 1880-81.			Total Number of Trees Existing.		
	Red.	Crown.	Others.	Red.	Crown.	Others.	Red.	Crown.	Others.	Red.	Crown.	Others.	Red.	Crown.	Others.	Red.	Crown.	Others.	Red.	Crown.	Others.	Red.	Crown.	Others.
1 ..	3,197	2,325	..	113	84	..	..	..	..	199	58	..	312	142	..	2,885	2,183	..	..	..	..	2,885	2,183	..
2 ..	6,272	1,984	4	186	35	2	..	..	..	53	21	2	239	56	4	6,033	1,928	..	..	..	..	6,033	1,928	..
3 ..	3,469	224	16	..	..	..	132	..	..	118	..	6	250	..	8	3,219	224	8	..	..	..	3,219	224	8
4 ..	3,484	1,300	..	..	..	..	43	..	..	34	5	..	77	5	..	3,407	1,295	..	..	..	..	3,407	1,295	..
5 ..	1,418	640	..	..	..	..	181	..	..	6	2	..	187	2	..	1,231	638	..	..	..	..	1,231	638	..
6 ..	2,849	3,202	..	29	31	..	64	..	..	32	20	..	125	51	..	2,724	3,151	..	7	..	..	2,731	3,151	..
7 ..	7,719	7,400	..	68	52	..	197	..	..	29	58	..	294	110	..	7,425	7,290	..	113	..	..	7,538	7,290	..
8 ..	4,707	3,693	..	43	27	..	42	..	..	28	23	..	113	50	..	4,594	3,643	..	..	..	..	4,594	3,643	..
9 ..	3,625	3,305	164	..	25	13	27	..	..	37	60	12	64	85	25	3,561	3,220	139	..	..	..	3,561	3,220	139
10 ..	11,201	1,201	..	..	..	..	196	..	..	223	21	..	419	21	..	10,782	1,180	..	..	..	..	10,782	1,180	..
11 ..	9,161	795	..	..	..	..	..	..	..	55	29	..	55	29	..	9,106	766	..	..	..	..	9,106	766	..
12 ..	8,802	2,687	..	102	29	..	..	..	..	48	17	..	150	46	..	8,652	2,641	..	..	..	..	8,652	2,641	..
13 ..	209	2,764	..	..	21	..	..	..	..	3	67	..	3	88	..	206	2,676	..	..	..	..	206	2,676	..
14 ..	9,563	50	5	..	..	..	85	..	2	100	..	2	185	..	4	9,378	50	1	..	..	..	9,378	50	1
15 ..	9,347	211	..	..	11	..	92	..	..	157	..	..	249	11	..	9,098	200	..	..	..	2,905	9,098	200	2,905
16 ..	1,208	386	..	..	..	..	..	..	..	18	2	..	18	2	..	1,190	384	..	..	..	..	1,190	384	..
17 ..	4,461	1,179	..	..	9	..	44	..	..	9	..	..	53	9	..	4,408	1,170	..	..	..	..	4,408	1,170	..
18 ..	6,298	772	..	..	5	..	..	..	..	..	..	..	..	5	..	6,298	767	..	..	..	..	6,298	767	..
19 ..	7,924	350	..	..	..	..	..	..	..	..	..	..	..	..	..	7,924	350	..	..	..	..	7,924	350	..
20 ..	10,186	854	..	..	10	..	..	..	..	..	..	..	..	30	..	10,186	824	..	..	..	..	10,186	824	..
21 ..	6,300	52	..	..	..	..	..	..	..	..	20	..	..	..	..	6,300	52	..	..	..	..	6,300	52	..
22 ..	5,904	1,894	..	..	..	..	..	..	..	..	..	..	..	..	..	5,904	1,894	..	..	..	..	5,904	1,894	..
23 ..	8,719	374	..	..	..	..	1,279	..	..	..	..	..	1,279	..	..	7,440	374	..	80	..	..	7,520	374	..
24 ..	13,805	915	..	..	..	..	..	..	..	..	..	..	..	..	..	13,805	915	..	..	..	..	13,805	915	..
25 ..	7,559	823	..	..	8	..	..	..	..	..	..	..	..	8	..	7,559	815	..	..	..	..	7,559	815	..
26 ..	1,099	..	25	..	..	..	22	..	..	10	..	..	32	..	..	1,067	..	25	..	..	..	1,067	..	25
27 ..	3,190	3,000	..	..	..	..	..	..	..	..	..	..	..	..	..	3,190	3,000	..	..	..	..	3,190	3,000	..
28 ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
29 ..	2,780	1,314	387	..	48	..	..	..	..	..	..	..	..	48	..	2,780	1,266	387	..	..	..	2,780	1,266	387
Total ..	164,456	43,694	601	541	395	15	2,404	..	4	1,159	403	22	4,104	798	41	160,352	42,896	560	200	..	2,905	160,552	42,896	3,465

NADUVATAM,
20th May 1881.

(Signed) W. ROWSON,
Assistant Superintendent.

APPENDIX B.

HOOKER ESTATE.

STATEMENT showing the Number of Chinchona Trees enumerated in 1878, and those that were cut since being dead, and the Balance existing on the Government Plantations, Hooker Estate.

Plot.	Number of Trees as per Major Walker's Report.			Casualties in 1878-79.			Casualties in 1879-80.			Casualties in 1880-81.			Total Number of Dead Trees Cut.			Balance.			Number of Plants Planted in 1880-81.			Total Number of Trees Existing.		
	Red.	Crown.	Others.	Red.	Crown.	Others.	Red.	Crown.	Others.	Red.	Crown.	Others.	Red.	Crown.	Others.	Red.	Crown.	Others.	Red.	Crown.	Others.	Red.	Crown.	Others.
1 ..	4,789	2,876	..	..	42	..	87	..	..	130	36	..	217	78	..	4,572	2,798	..	..	..	..	4,572	2,798	..
2 ..	6,735	2,036	..	198	36	..	289	..	..	416	81	..	903	117	..	5,832	1,919	..	..	..	..	5,832	1,919	..
3 ..	7,539	196	..	..	..	..	..	..	..	6,114	..	..	6,114	..	..	1,425	196	..	..	..	..	1,425	196	..
4 ..	390	3,357	..	..	121	..	84	..	..	..	172	..	84	293	..	306	3,064	..	..	..	..	306	3,064	..
5 ..	1,542	207	..	..	9	..	1,784	..	..	..	11	..	*1,784	20	..	..	187	..	..	5,000	..	..	5,187	..
6 ..	5,271	5,520	..	..	247	..	5,636	..	..	..	284	..	*5,636	531	..	..	4,989	..	..	34,000	2,000	..	38,989	2,000
7 ..	4,961	3,910	1	64	89	..	..	..	..	83	179	..	147	268	..	4,814	3,642	1	..	..	..	4,814	3,642	1
8 ..	10,569	2,223	72	..	43	..	6,453	..	..	144	84	..	6,597	127	..	3,972	2,996	72	..	22,000	3,410	3,972	24,096	3,482
9 ..	7,448	1,152	..	..	24	..	6,320	..	..	108	28	..	6,428	52	..	1,020	1,100	..	..	27,950	..	1,020	29,050	..
10 ..	1,320	1,096	..	17	13	..	..	..	..	23	43	..	40	56	..	1,280	1,040	..	..	..	..	1,280	1,040	..
11 ..	4,225	390	777	..	10	..	1,399	..	..	152	11	..	1,551	21	..	2,674	369	777	150	..	..	2,824	369	777
12 ..	3,429	446	..	..	14	..	3,906	..	..	..	15	..	*3,906	29	..	..	417	..	..	16,050	2,000	..	16,467	2,000
13 ..	319	4,500	..	..	..	..	..	..	..	..	..	..	..	..	..	319	4,500	..	..	..	..	319	4,500	..
Total ..	58,537	27,909	850	279	648	..	25,958	..	..	7,170	944	..	33,407	1,592	..	26,214	26,317	850	150	105,000	7,410	26,364	131,317	8,260

* Excess 1,084 trees.

NADUVATAM,
20th May 1881.

(Signed) W. ROWSON,
Assistant Superintendent.