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Government of Madras.

Revenue DEPARTMENT.

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Proceedings of the Madras Government, Revenue Department, 7th February 1871.

Read the following papers :—

No. 87. From J. BROUGHTON, Esq., Government Quinologist, to the Acting Secretary to Government, Revenue Department, Fort Saint George, dated Ootacamund, 31st August 1870.

In the following pages I have the honour to communicate some results obtained, connected with the subject of the employment of the Cinchona febrifuge in this country, also some statistical considerations having reference to the future yield of the plantations.

2. In the original instructions* I had the honour to receive from the Home Government, I am told (in paragraph 3) that it was required "to ascertain the "preparation of the febrifuge which will "combine cheapness with efficacy in the greatest degree," (and in paragraph 4), "and, finally, it will be expected from the Chemist that he should, through his "investigations, enable Her Majesty's Government to arrive at a decision with "respect to the best and cheapest method of preparing the febrifuge for use among "the labouring classes of the natives of India. He will also be required to consider "the questions connected with the manufacture of the Cinchona febrifuge for the "use of hospitals and troops in India."

* Letter from the Under-Secretary of State, dated 22nd September 1866.

3. In a report appearing in Proceedings of Madras Government, Revenue Department, No. 240, of 13th December 1867, paragraph 10, I had the honour to propose a preparation which I then believed would combine the qualities desired in the febrifuge to be extensively used in this country. During the subsequent two years I prepared small quantities of this substance for medical trial in my experimental laboratory, and finding the results of its medical employment as encouraging as I expected from its composition, I commenced in January last to manufacture it on a larger scale in the small manufactory then just erected near the gardens at Ootacamund.

4. Up to the present date about 70 lbs. of this febrifuge have been prepared and supplied to the medical stores. As it consists of the alkaloids (mixed as they naturally occur in the plant) precipitated from solution in an uncrystallized but tolerably pure state, it has been appropriately named by Dr. Mackenzie "Amorphous quinine," by which name I trust it may henceforward be called. The results of its actual medical use seem to have been very satisfactory. I learn from the Medical Inspector-General that he intends to submit these results to Government with his own opinion of the value of the febrifuge. On general grounds I strongly recommend the extensive adoption of amorphous quinine as a febrifuge that appears to meet the full requirements of the case; but it is of course on the medical testimony to its qualities that the decision must finally rest. I now await the opinion and directions of Government on this point.

5. I find that the bark of C. Succirubra, of which half of the plantations consist, exceedingly well adapted for the preparation of amorphous quinine. I have had occasion in several foregoing reports to point out certain disadvantages which attach to this bark for the preparation of pure crystalline salts of the

respective alkaloids. These do not, however, in the least affect the manufacture of amorphous quinine, while the large total yield of the bark renders it particularly suited to the extensive and cheap manufacture which it appears to me should be established on the Neilgherries. Hence in all plans and considerations connected with the preparation of amorphous quinine, I shall only consider the bark of *C. Succirubra*. The bark of *C. Officinalis* will find its best application in the manufacture of pure crystalline sulphates of the alkaloids either in this country or in Europe.

6. In order to produce as cheap a product as possible, it will be necessary to manufacture on the spot on which the bark grows. The cost of conveying the bark from Neddivuttum to Ootacamund and the price of fuel at the latter place entail so much expense that there can be no question as to the expediency of working up the bark on the plantations themselves. The irregular and defective supply of bark has been the source of the main difficulty in carrying on the manufactory at Ootacamund. I reckon that when working at Neddivuttum, with a rough but effective "plant", with bark of mean quality, and preparing 800 lbs. of alkaloid per annum, the cost of the same (including that of the bark) will be about one Rupee per ounce. A larger outturn would still further diminish the price.

7. Having had in view for some time the eventual manufacture of considerable quantities of amorphous quinine, I have taken some pains to estimate the amount of that substance in the red barks of the plantations. My estimations were made last Spring, and depend on data given in Appendix:—

Number of trees.	Age.	Bark.	Quantity of alkaloids contained in lbs.
	Years.		
19,500	7½	Trunk	1,833
Do.	Do.	Branch	815
29,400	6½	Trunk	2,095
Do.	Do.	Branch	605
45,300	5½	Trunk	2,310
Do.	Do.	Branch	860
68,650	4½	Trunk	3,205
Do.	Do.	Branch	1,105
73,430	3½	Trunk	1,468
Do.	Do.	Branch	279
152,050	2½	Trunk	632
Do.	Do.	Branch	156
		Total ...	15,363

8. Thus at the present time the red barks alone of the Neilgherry Government plantations contain 15,000 lbs., or nearly 7 tons of a febrifuge, which I learn is equal or nearly equal to ordinary quinine sulphate in efficacy. I cannot, therefore, think that it is premature to endeavour to prepare sufficient febrifuge to supply the hospitals and dispensaries during the forthcoming year.

Proceedings of the Madras Government, Revenue Department, 7th February 1871.

9. In 1867 a considerable number of our oldest trees of red bark were cut down in order that the bark might be sent to England for sale. From the stumps have sprung vigorous shoots that have at the present time attained a height of 12 to 15 feet. I recently collected a mean specimen of the bark of these shoots. Its analysis gave in 100 parts of dry bark—

Total alkaloids	6·34
Quinine...	1·37
Cinchonidine and cinchonine	4·97
Pure sulphate of quinine obtained crystallized	1·14
„ sulphate of cinchonidine obtained crystallized ...	4·29

10. When it is considered that the shoots were but three years old, this analysis must be considered most satisfactory. It seems to justify the anticipation that coppicing will hereafter be an important means of cropping the plantations. This method has the further recommendation of furnishing excellent fuel without the necessity of destroying the sholahs. It appears to me to be very necessary that a considerable number of trees of seven years old should be cut down in order that the method of coppicing should be tried and the expenses as compared with the plan of mossing be accurately determined.

11. I will assume that after a tree aged eight years has been cut down, that the shoots, after a lapse of eight years, will produce as much bark as the original tree—an assumption that will not, under any circumstances, entail a great error. The number of growing trees of red bark on the plantations is about 591,600. If an eighth part of these be annually cut down, the bark of 73,955 trees will be annually available. This amount will yield no less than 10,323 lbs. of mixed alkaloids—a quantity which must be in considerable excess of any possible demand for febrifuge in this Presidency. The same number of trees will yield 1,730 cwts. of dry red bark, of which about 1,400 cwts. would be fit for export. This latter amount would be about a seventeenth part of the quantity of bark annually imported from South America into England.

12. I conceive that the foregoing arithmetical considerations justify the conclusion that the extension of Cinchona planting by Government has already reached its limit. From the returns of the plantations here there is a gross total of one and-a-quarter millions of trees planted. The returns of the plantations in Bengal give 1,465,999 trees planted. In Java the returns give 1,532,148. The private plantations on these hills contain at least a million trees, and as many more may be certainly reckoned for the private plantations in the Himalayan vallies. I do not possess definite information of the numbers planted in Ceylon, but they number at least 250,000 trees. In Jamaica 70,000 trees, principally red barks, are planted, and flourishing exceedingly. At St. Helena in 1868, 5,000 trees were planted, and it was expected in a year to have 20,000 planted. At Orátava in Taneriffe the cultivation is commenced with success. On the Organ mountains in Brazil the same success is attained. The only place where the cultivation has apparently been unsuccessful is at Chiffa in Algeria, where the cold winds appear to have at length nearly extinguished the plants, originally supplied from this Presidency.

13. Altogether it may be estimated that seven millions of Cinchona trees are under cultivation in various parts of the world, and that the number is increasing annually. It appears, therefore, that unless it be to supply an urgent local want, there can scarcely be further necessity for Government pressing Cinchona cultivation in other parts of this Presidency. It is most desirable for the interests of the cultivation that the demand for bark be not exceeded.

14. It would be of considerable service if a probable estimate could be formed of the amount of febrifuge that would be consumed in this Presidency, if the price were reduced to 1 Rupee the ounce. I am informed that the mean annual consumption at the Medical Stores for the five years ending 31st March 1867 was 344 lbs. of quinine sulphate and 910 lbs. of Cinchona bark, or in round numbers 475 lbs. of quinine sulphate altogether I am informed* by some authorities that four times, and by others that ten times, the amount would be consumed if the cost were reduced. It appears to me that it would be well worth while to endeavour to procure some definite information on this point before manufacture be commenced on an extensive scale.

15. If pure crystallized sulphate of quinine be prepared in this country, the *C. Officinalis* and *C. Calisaya* will be the fittest sources. I have hitherto made no attempt to manufacture pure sulphates except on a small scale. The red bark, from the difficulty of purification, would be a comparatively costly source; and the trees of *C. Officinalis* are scarcely enough developed to take their bark except at a loss. I propose eventually to make use of the small manufactory at Ootacamund for an attempt at the preparation of pure sulphate of quinine from the crown barks of the Dodabetta plantations; though whether this salt can be profitably made in this country there are at present no trustworthy experimental data to determine. The question will be attacked as soon as a supply of suitable bark is available; I am already in possession of fit apparatus for this purpose.

16. On the presumption that the report of the Medical Inspector-General abovementioned, respecting the results of the employment of amorphous quinine will be found satisfactory to Government. I have the honour to propose the following request.

17. That I be permitted to expend all the savings I can effect out of my total sanctioned Budget grant in converting, as far as possible, the now disused jail at Neddivuttum into a suitable place for performing at least the preliminary extraction of the bark on the spot, in order to avoid the cost of carriage of bark to Ootacamund.

18. I would also advise that a certain number of trees of those planted in 1863 be cut down when the season of maximum yield arrives, in order to test practically the method of cropping the plantations by coppicing. I would also recommend that a considerable part of the best bark thus obtained be sent to England for sale in open market, and the remainder be worked up in the alkaloid manufactory. As soon as a sufficient amount of our admirable crown bark is fit for cropping, I think that a supply should also be sent to the English market, as I am convinced that its good quality will give a reputation to the Indian Cinchona barks.

*I learn from the Medical Inspector-General that the amount used last year was 700 to 800 lbs., and that the demand is annually increasing.

19. In accordance with G. O., No. 426, of February 19th, 1869, a considerable number of trees were treated by Mr. McIvor's mossing process, in order that the practical and financial consequences might be determined on a sufficient scale. I presume from the tenor of he various orders on the matter that Government intend that I should examine and report on the results of the experiment. It appears to me that in order to arrive at a definite decision as to the practical value of the process, which will require an accurate considera-tion of the entailed expenses, the matter might be advantageously referred to a third person. I propose, therefore, that the various results be communicated to the Commissioner of the Neilgherries as they are obtained, who will thus be able to give Government an unbiased opinion of the gross result, and who can be referred to on the occurrence of any difference of opinion in the conduct of the experiment. If Government think fit I will, therefore, report on this subject to Mr. Breeks instead of to Government.

APPENDIX.

Data of estimates concerning C. Succirubra.

Trees of the planting of 1862 yielded a mean per tree of 3·9 lbs. of trunk bark, containing 67·13 per cent. of water, and 4·6 lbs. of branch bark containing 70·79 per cent. of water. Trunk bark dry contained 7·55 per cent. alkaloids; branch bark 3·2 per cent. of alkaloids.

2. Trees of the planting of 1863 yielded a mean of 3·6 lbs. of trunk bark, containing 67·88 per cent. water, and 2·8 lbs. of branch bark containing 71·87 per cent. of water. Trunk bark contained 6·23 per cent. of alkaloids in dry bark; branch bark 2·63 per cent. alkaloids.

3. Trees of the planting of 1864 yielded a mean of 1·775 lbs. of trunk bark, containing 60·78 per cent. of water, and 1·3 lbs. of branch bark containing 51·64 per cent. of water. Bark was allowed to get partially dry before weighing. Trunk bark contained when dry 7·33 per cent. of alkaloids; branch bark 3·07per cent.

4. Trees of the planting of 1865 yielded a mean of 2·66 lbs. of trunk bark, containing 73 per cent. of water, and 2·83 lbs of branch bark containing 75 per cent. of water. Trunk bark contained 6·49 per cent. alkaloids when dry; branch bark 2·28 per cent.

5. Trees of the planting of 1866 yielded a mean of 0·84 lbs. of trunk bark, containing 66·94 per cent. of water, and 0·66 lbs. of branch bark containing 73·68 per cent. of water. Trunk bark when dry contained 6·61 per cent. of alkaloids; branch bark 4·96 per cent.

6. Trees of the planting of 1867 yielded a mean of 0·68 lbs. of trunk bark, containing 73·09 per cent. of water, and 0·37 lbs. of branch bark containing 65·67 per cent. of water. Trunk bark contained 2·21 per cent. of alkaloids, and branch bark 0·81 per cent.

(Signed) J. BROUGHTON,
Government Quinologist.

No. 88. From the Commissioner of the Neilgherries, to the Secretary to Government, Revenue Department, dated Ootacamund, 2nd September 1870, No. 42.

I ENCLOSE replies from Messrs. Broughton and McIvor to the inquiries of the Secretary of State in his Cinchona despatch, dated 19th May 1870, No. 13, embodied in Proceedings of Government, Revenue Department, 11th July 1870, No. 27.

2. I requested the two gentlemen to record their opinions in the form of answers to the following querries:—

I. *What system of cropping the bark is the best?*

Two methods are proposed, firstly, barking the trees and covering them with moss to induce a rapid re-production of the bark; secondly, coppicing.

Mr. McIvor advocates the former. Mr. Broughton thinks that we have not yet sufficient data for deciding on the comparative advantages of the two methods, but he is "led to hold the opinion that a great part of the Neilgherry and the "whole of the smaller plantations of Southern India will be advantageously "treated as coppice."

3. The information we have at present with regard to either mode is scanty. Mr. Howard in his Analysis Reports* supports Mr. McIvor's statement that the yield of alkaloids is increased by the mossing process.

* See Proceedings of Government, 27th Sept. 1865, No. 542. Mr Howard's Report, June 15th, 1864. Proceedings of Government, 31st Oct. 1865, No. 586A. Mr. Howard's Report, August 1st, 1865, and Proceedings of Government, 20th June 1867, No. 265. Mr. Howard's Report, February 4th, 1867.

In one instance, however, he says† "the effect of the application of moss "for a few months to No. 2 (Succirubra) "does not show, as compared with the "original unmossed bark of No. 3 (Succirubra), so much real advantage as might "have been expected."

† Mr. Howard's Report, February 4th 1867.

And again‡ reporting on the third harvest of renewed bark (Succirubra), he remarks "I hoped to obtain a larger "produce than last time, but was "disappointed in finding a smaller "amount of salts of quinine, namely, 6·15 per cent. against 8·45 per cent. in the "specimen of renewed bark from the same tree on which I had the honour to "report in February 1867."

‡ Proceedings of Government, 5th August 1869, No. 68. Mr. Howard's Report, September 1st 1868.

Mr. Broughton has reported§ that "the advantages of the mossing process "applied to this bark (red bark) makes "itself at once evident to the worker "by the readiness and purity with which the sulphates crystallize."

§ Proceedings of Government, 12th April 1867, No. 206. Mr. Broughton's letter, 1st April 1867.

4. The experiments, however, from which these results have been deduced have been necessarily conducted on a very limited scale, and in all cases refer to the bark of young and individual trees only. Moreover, as yet we have no information of the cost of mossing, nor do we know what amount of bark can be annually taken from a tree without injury to its growth.

I need hardly say that I do not share in the summary condemnation of the mossing process expressed by Mr. Clarke in his report to the Bengal Government, dated 10th February 1870, paragraph 27. He says: "Dr. Anderson has decided, "after no very long experimenting, to have nothing to do with that process. "About that decision there is no second opinion at Rungbee. Any person may, "however, quickly decide it for himself in Calcutta."

That the value of the mossing process for India should be decided by an experiment in Calcutta seems to me a most eccentric proposal. Moss is abundant on the Neilgherries, and the process is undergoing a careful and systematic trial in accordance with Government Order, Revenue Department, 9th February 1869, No. 426. Until the results are known it will be well to defer judgment.

5. Messrs. Howard and Broughton's reports point out, with regard to the yield of quinine differences in the different varieties of Cinchona and in the same trees under different conditions.

Thus the per-centage‖ of quinine in the Succirubra appears to decrease with age; this is not the case with the officinalis. Again, "the¶ yield of "alkaloids varies greatly with the vigour "of growth, size of tree, and conse- "quently with character of soil. The "most vigorous and quickly grown "trees yield a far richer bark than the more stunted ones of the same age."

‖ Paragraph 7, Mr. Broughton's report, 9th December 1869, in Proceedings of Government, Revenue Department, 22nd February 1870, No. 235.

¶ Paragraph 6, Mr. Broughton's report, 9th December 1869, in Proceedings of Government, Revenue Department, 22nd February 1870, No. 235.

These circumstances may have some bearing on the point under consideration, and may possibly render different methods of cropping the bark desirable with different varieties of Cinchona and different plantations.

6. Between the two methods of cropping proposed, I take it the question to be determined is, whether an acre of land will yield more alkaloids in a given time under the mossing than under the coppicing system; and if so, whether the increased yield more than covers the increased expense.

7. I would suggest that a certain number of trees of the same age of each variety of Cinchona should be treated on each of the two systems. The bark harvested under this experiment might be annually sent home and sold for the reasons given in paragraph 12 under.

In four years it would be evident which of the two systems was the best and the experiment would be of practical value to many who have embarked in Cinchona cultivation.

8. The second question is, *whether the bark should be manufactured in India, or sent home for sale, or whether a portion should be sent home and a portion worked up on the spot.*

Mr. Broughton is entirely of opinion that the amount of febrifuge required for use in India should be manufactured in this country, because the expense of drying, powdering, conveying the bulky bark home, and importing the manufactured alkaloids are thereby avoided; because the process of manufacture can here be simplified and cheapened by employing *fresh* bark, and by preparing the alkaloids in a cheaper form than that of crystalline sulphates; and because the

necessary materials are as readily and, with the exception of sulphuric acid almost as cheaply procurable here as in England.

Mr. McIvor is unable to give a decided opinion but imagines that it would be more economical for Government to sell their bark and purchase the alkaloids than to manufacture them.

9. Both gentlemen recommend that Government should send into the home market a considerable quantity of bark, so as to enhance the reputation of the India grown barks, and remove certain prejudices arising out of occasional peculiarities in their appearances which may at first interfere with their sale.

10. The Inspector-General of Her Majesty's Indian Medical Department, (Dr. Mackenzie, C.B.,C.S.I.) reports to me that the future yearly requirements of the Madras Presidency may be put at 700 or 800 lbs of alkaloids. Allowing the same for Bombay and double for Bengal and the North of India, some 3,200 lbs. of alkaloids will be required annually.

11. For the reasons alleged by Mr. Broughton, I am of opinion that it will be more economical to manufacture in India.

12. In the interests, however, of those who have embarked in Cinchona cultivation, the Government may well send home, as suggested by Messrs. Broughton and McIvor, about 3,000 lbs of bark annually to accustom home-buyers to the Indian product.

There is often a difficulty in establishing a demand for an article which, although intrinsically superior, differs somewhat in externals from what brokers and buyers have been long accustomed to.

In sending bark of the different varieties home for sale, the Government might do good service.

This, however, should only continue for three or four years, or until such time as Indian bark finds its way home from private sources, for under no circumstances should Government, as an exporter of bark, enter into competition with private planters.

13. The third question is, *should the plantations remain permanently in the hands of Government for the supply of quinine in the hospitals and the distribution of seed and plants, or should the plantations be sold as in the case of the Government Tea plantations ?*

" Mr. McIvor thinks that Government " having firmly established this culti-
" vation should dispose of their plantations, and leave the further extensions to
" private enterprise," for the same reasons that induced the sale of the Government Tea plantations; and he states that private planters are now quite able to supply the demand for plants and seeds without the aid of Government.

Mr. Broughton thinks that Government should retain as much of their plantations as will supply a febrifuge in a cheap form and sufficient for their wants, because Government being a large consumer of the produce will thus obtain it most cheaply, and because Government can only secure for the masses a supply of febrifuge at the *cheapest* price by retaining control over all stages of its production.

14. Mr. Broughton remarks that the case of the Government Tea plantations is not a parallel one, because Government are not large consumers of Tea, and had no object in introducing its cultivation but that of developing trade and agriculture, whereas in the case of Cinchona these objects are secondary to that of ensuring a cheap and indigenous supply of an important medicine.

In support of his opinion he gives an estimate of the plant and working expenses for manufacturing here annually 800 lbs. of amorphoses alkaloids.

He calculates that the cost of such alkaloids would be 1 Rupee an ounce, that of imported quinine being at least 3 Rs.

15. It seems to me somewhat premature to decide *now* whether the Government should retain the plantations permanently in their own hands and manufacture the alkaloids they want.

But as far as I can see, I am of opinion that Government should retain possession of the plantations at any rate for a considerable time longer for reasons which I will give by-and-bye ; and by manufacturing for themselves they will, I think, for some years obtain their annual supply of alkaloids at a cheaper rate than if they imported them.

16. I am aware that it is seldom or never that Government can grow or manufacture so cheaply as private individuals, nor is the attempt generally desirable; but there are circumstances connected with the questions under consideration, which seem to me to make it exceptional. It is highly improbable that any alkaloid manufactory will be established in India except by Government. We have a gentleman on the spot in the service of Government whose scientific attainments excellently qualify him to introduce the manufacture ; and in my judgment the most weighty argument for the Government retaining the whole process of production in their own hands will be found in the opportunity thereby afforded to the Government Quinologist for simplifying and cheapening the manufacture of an efficient febrifuge for the use of the population at large.

17. It is evident* from the report of the Madras Cinchona Commission that " the four alkaloids occurring in our barks are nearly equal in febrifuge power." If Mr. Broughton is successful in the preparation of a substance from them which can be conveniently administered, which is equal or nearly equal to quinine sulphate in its medicinal effects, and which can be made so cheap as to be within reach of the million the object of the introduction of Cinchona cultivation into India, as described in the Secretary of State's despatch, No. 27, 30th September 1865, will have been attained.

*Mr. Broughton's Report, 28th November 1867. Proceedings of Government, Revenue Department, 13th December 1867, No. 240.

18. Still it may be said that Government, in the interests of the public and for the furtherance of Mr. Broughton's experiments, might establish a manufactory, and yet sell their plantations, buying bark from private growers. This I am disposed to think will be the course ultimately taken. But for sometime to come plantations will be wanted for the Quinologist's experiments as to the influence of season, age, altitude, climate, and cultivation, on the amount of alkaloids in the bark of the different varieties of Cinchona.

The investigation of these and similar problems is of great moment and will take time to complete. The information when obtained will have an important

effect in determining the conditions under which the various varieties of Cinchona will re-pay cultivation.

19. No doubt the annual working expenses of the Neilgherry plantations have been heavy. To attain the object aimed at, namely, the introduction of Cinchona into India no expense has been spared; but the working charges now should be cut down to somewhat the same level as those on private estates, two or three extra hands being retained for propagation and for planting out not more than, say, 5 acres of each new variety that may come to hand.

20. The fourth question is, *if you are of opinion that the plantations should be eventually sold, at what stage of their development should they be sold?*

Mr. McIvor thinks three or four years hence would be the best time to dispose of the plantations when the youngest plants will be sufficiently established. Mr. Broughton is against the sale of the plantations, but thinks it possible that it may eventually be found that Government possess larger plantations than they require, and that it may be advisable to sell a part.

21. If it be determined to dispose of the plantations on the ground that Government have fulfilled their mission, and "firmly* established Cinchona "cultivation in India," and that the further development of the industry may well be left to private enterprise, the mode, time, and place of sale most likely to fetch the best price have only to be considered.

Mr. McIvor's letter enclosed, paragraph 4.

The Government Cinchona trees have this advantage that their growth is in advance of all others, and their bark by being first in the market will go off at present high rates. This advantage will be lost if the bark is not sent home, and the sale of the plantations is deferred for several years.

22. As explained in my letter† to Government, submitting the Cinchona Superintendent's Annual Report for 1869-70, I am of opinion that it is not worthwhile incurring any further expense on the Mailkoondah plantation.

† 28th May 1870, No. 25.

Up to the 31st March 1870, Rs. 42,175 had been spent on this plantation, of which 75 acres have been planted out.

I take leave to refer to paragraphs 8 and 9 of my letter above quoted.

If my suggestion with regard to the Mailkoondah plantation be approved, the remaining plantations, which I would recommend the Government to retain possession of, would all be situated within easy reach of each other, and would consist as follows:—

	Acres.
Dodabetta	375
Neddivuttum and Pykarrah	750
	1,125

23. I add some general remarks. At page 141 of McCulloch's Dictionary I see it recorded that "the sum expended by the Indian Government in the purchase "of this valuable medicine (quinine) is stated to exceed five lakhs annually."

Considering this, it seems to me that the main intention of the Cinchona undertaking will be incompletely carried out, unless India be placed in a self-supplying condition. I consider it both politically and economically desirable that the febrifuge employed in this country should be supplied from internal sources; more especially if the Cinchona undertaking be intended to have the effect of providing "an abundant supply of this febrifuge at so cheap a rate as to be within the means "of the population at large, the coolies employed on works and private plantations, "the small cultivators, their wives, and families," as stated in the Secretary of State's despatch abovementioned. I can see no probability of this intention being speedily realized, unless Government lead the way in every stage of production.

24. I ought to say that it was altogether at my instance that Mr. Broughton inserted in his report an estimate of the plant and working expenses for manufacturing some 800 lbs. of alkaloids annually.

I suggested this not under the idea that the time had come for applying to Government to sanction such an outlay, but in order to have on record in some data towards forming an opinion as to the desirability of Government becoming by and bye manufacturers of their own alkaloids.

25. For the present I am quite of Mr. Broughton's opinion as expressed in his report,* dated 28th November 1867, namely, that he should steadily persevere in his endeavours "to find a process "which would yield the alkaloids in a state of sufficient purity by simple means," "and to produce an efficient febrifuge which can be prepared by a method which "an ordinary Apothecary would have little difficulty in learning to follow." Since January last he has already produced 70 lbs. of such a substance, and if this prove completely successful in the Medical Department, he can, as he suggests, "extend the manufacture and, as opportunity offers, include that of crystalline "sulphates."

* Proceedings of Government, Revenue Department, 13th December 1867, No. 240.

26. Working steadily with this end in view, Mr. Broughton will, in the course of a year or two, be able to supply reliable data:—

(1.) As to the best mode of cropping the bark.

(2.) As to the most favourable conditions for the growth of the several varieties of Cinchona.

(3.) As to the extent of plantations that will have to be retained by Government, in order to supply the quantity of febrifuge they require.

(4.) As to the cost of establishing a Government manufactory equal to the supply of India's wants.

With reliable information before them on these points it will be easy for Government to decide whether or no it be desirable to retain the plantations in their own hands and to establish a manufactory at Ootacamund or Rungbee or elsewhere.

From the Government Quinologist, to the Commissioner of the Neilgherries, dated Ootacamund, 8th August 1870.

I AM in receipt of your letter, No. 140, of July 23rd, 1870, which reiterates the inquiries contained in the despatch of the Secretary of State, which appeared in Proceedings of Government, Revenue Department, No. 27, of July 11th, 1870. To these inquiries I have the honour to append answers to the best of my opinion and present knowledge.

INQUIRY I.—*What systematic course would you recommend with reference to procuring and utilizing annually the very large quantity of febrifuge alkaloids stored in the bark of the trees.*

I am of opinion that our present experience has hardly been sufficiently matured to permit the laying down of a definite and unalterable system of cropping the plantations. There are two modes, on the results of whose trial, the method ultimately adopted of harvesting will depend. These are, first, the method of mossing the trees, of taking the bark from the living tree, and allowing it to renew under moss, advocated by Mr. McIvor; second, the method of coppicing. The first of these methods has hitherto been carried out on so small a scale that the cost and financial advantages have not been ascertained. At my recommendation the Government issued orders (G. Os., No. 2,453 of 22nd September 1868, and No. 426 of 19th February 1869) that a certain considerable number of trees should be treated by moss. This was done in May 1869 and following months, and the results obtained, together with the cost of the same, will furnish trustworthy data for determining whether the method of mossing be finally adopted. The method of coppicing appears a very suitable mode of cropping the plantations. In 1867 some hundred trees of *C. Succirubra* were cut down, in order that their bark might be sent to the English market. In the early part of this year the vigorous shoots that had sprung from the stumps had reached a height of 15 feet, and furnished bark of good quality. I am led to hold the opinion that a great part of the Neilgherry and the whole of the smaller plantations of Southren India will be advantageously treated as coppice. This plan offers the further advantage of supplying abundance of excellent fuel without encroaching on the sholas.

In a report to Government now under preparation, I propose to recommend that a considerable number of trees be cut down, in order to make a full trial of the coppice system.

It seems, therefore, to follow that it will be advisable to await a fuller experience before the exact and permanent method of taking the bark of the plantations can be decided. It will, however, be necessary, as I had the honour of showing in a late report (appearing in Proceedings of Government, No. 235, of 22nd February 1870) to avoid the months from May to November for taking the bark.

INQUIRY II.—*Should the bark be used in the Manufactory at Ootacamund for the supply of Hospitals in India or should the bark be sent to the London market for sale, or should a portion be sent Home and a portion be worked on the spot?*

I am entirely of opinion that the amount of febrifuge required for use in India should be prepared in this country. The grounds for this opinion are mainly economical, and are as follow:—The cost of drying and powdering the bark is dispensed with. The alkaloids are more readily and less expensively extracted from the bark while it is fresh. The cost of conveying the bulky bark to England, and the importation of the manufactured alkaloids to India is avoided. The manufacture by Government of the alkaloids permits of a great reduction in the labour and consequent cost of manufacture by allowing of the preparation of a cheaper form than that of the crystalline sulphates. The necessary materials are as readily and, with the exception of sulphuric acid, are almost as cheapily procured in this country as in England. But I consider that Government could, if it be thought fit, act most usefully in reference to the private growers of Cinchona by serving as a pioneer in the European market, accustoming it to the qualities of Indian barks, and thus overcoming certain prejudices which will arise from the different appearance occasionally presented by these barks as compared with the South American. Again, the

qualities possessed by the crown barks of these plantations are such as are highly prized by the home manufacturers of quinine, so that I think a considerable quantity should eventually be sent home, in order to enhance the reputation of India grown barks. The febrifuge preparations employed in this country can be more advantageously made from the coarser *C. Succirubra*, since the authority of Government will avoid the influence of the *traditional* prejudice which exists in Europe against the alkaloids other than quinine, which abound in the red barks.

INQUIRY III.—*Should the plantations remain permanently in the hands of Government for the supply of quinine in the hospitals and the distribution of seeds and plants, or should the plantations be sold as in the case of the Government Tea plantation?*

I am decidedly of opinion that as much of the plantations as hereafter will be found necessary to provide febrifuge for the supply of the hospitals and dispensaries in India should be permanently retained in the hands of Government, as I understand it forms no part of the scheme of Government to make a profit by the direct sale of bark in opposition to the private growers. But Government are very large consumers of the direct product of the plantations, and in that capacity will obtain the product at less cost than if it passes through several hands before it reaches the Medical Stores, as would be the case were Government purchasers of the febrifuge, and not proprietors. It appears to me that the ultimate end of the Cinchona undertaking, namely, that of supplying the febrifuge in the cheapest possible form to the ryots will be only effected with certainty by Government having the complete control over all stages of its production. The case of the Government Tea plantations is not a parallel one, since Government are not large consumers of Tea as they are of the products of the Cinchona plantations. In the former, the intention of the introduction of Tea cultivation into India was the development of Indian agriculture and commerce; in the Cinchona undertaking these are only accessories to the main object, which is that of obtaining a cheap and indigenous supply of the most important medicine employed in the country.

2. In order to justify the opinions I have ventured to state above, I beg to adduce a rough estimate, showing the relative cost of the febrifuge made on the spot and that imported from Europe.

3. In carrying out the instructions I had the honour of receiving from the Home Government, I have paid much attention to the production of a febrifuge for use in Indian hospitals and dispensaries, cheaper than the quinine sulphate. In the small manufactory at Ootacamund have been prepared since January last 70 lbs. of such a preparation, consisting of the mixed alkaloids precipitated in an amorphous but tolerably pure state. This has been largely used in dispensaries and hospitals, and with such success that I believe I am justified by the evidence in stating that it may nearly entirely re-place the quinine sulphate hitherto employed therein. I now subjoin an estimate for the conversion of the now disused jail at Neddivuttum into an Alkaloid Manufactory, and also estimate for the yearly cost of preparing 800 lbs. of amorphous alkaloids.

	RS.
Six large copper boilers	1,500
Eight large percolators	1,600
Setting of boilers and percolators	2,500
Sundry alterations in building	1,000
Sundry fittings	1,500
Water-supply	350
Vessels	400
Presses	900
Stock of alcohol	900
Contingencies	500
Still for recovering and rectifying alcohol	700
Native mills for grinding, etc.	40
	11,890

Yearly expenses to produce 800 *lbs. of alkaloids.*

I am informed by Mr. McIvor that the cost *on the spot* of red bark will range from 4*d.* to 6*d.* a pound. I adopt the higher price in the estimate, and reckon its mean yield at the low one of 4 per cent.

	Rs.
Bark	5,000
Cost of acid	600
,, lime	100
,, soda from Native sources	150
Labour, 24 coolies, 12 at 8 Rs., 12 at 7 Rs. per month	2,160
Superintendent's pay, at 100 Rs. ,, ...	1,200
Waste of alcohol	300
Fuel	720
Filters, bags, etc.	500
Contingencies	800
	11,530

2. Dividing these yearly total expenses by 800, we get the cost per pound Hence the cost of a pound of alkaloid is Rs. 14-6-7, or reckoning interest at 5 per cent. on "plant" about one Rupee per ounce.

3. The cost of quinine sulphate is not accurately known in this Presidency, the purchasers for the Medical Stores being effected in England. It cannot, however, be less when brought to this country than Rs. 3 per ounce, and probably averages considerably more.

4. It is difficult to estimate accurately the amount of quinine that would be used in this Presidency when its cost is thus reduced, but it will certainly exceed 800 lbs. per annum. A larger quantity would be prepared at a still less cost. I content myself with estimating the comparative costs of entirely indigenous and imported febrifuges of equivalent theraputic value at 1 Rupee and 3 Rs. respectively per ounce.

Inquiry IV.—*If you are of opinion that the plantations should be eventually sold, at what stage of their developement, that is, when do you think they ought to be sold?*

As I have stated above, I am not of opinion that the amount of plantations requisite to supply the febrifuge required in the Government dispensaries should be allowed to pass out of the hands of Government. But it is very possible that the whole of the plantations may not be required for this purpose. If this eventually be found to be the case (respecting which contingency I can offerno well grounded opinion at present), it may be found advisable to sell a part; but this is obviously a matter that cannot be decided for several years to come.

Enclosure No. 2.

From the Superintendent, Government Cinchona Plantations, to the Commissioner of the Neilgherries, dated Ootacamund, 5th August 1870, No. 204.

I have the honour to acknowledge the receipt of your letter, No. 140, dated 23rd July 1870, calling upon me for an opinion upon the various points raised by the Secretary of State in his despatch, No. 13, dated 19th May 1870.

2. With reference to the first point, namely, what systematic course should be adopted with reference to procuring and utilizing the very large quantity of alkaloids stored in the bark of the quinine-yielding Cinchona, I would recommend that the trees should never be cut down, except when absolutely necessary for the purpose of thinning the plantations. The leaves are the means by which a continuous supply of bark can be produced. The bark of an old tree may be removed, and in one year the re-produced bark will be richer in alkaloid than that which had been the growth

of years. This process may be continued year by year, and without injury to the tree. Thus a never-failing supply of bark, rich in alkaloids, may be secured. The process under which this result may be obtained is, that which has before been brought to the notice of Government, and is generally known as my mossing process. By this process, the bark may be removed annually from the trunk of the tree, also from the larger branches, and the re-produced bark of one year's growth will be richer in alkaloid and almost equal in weight to the original bark of seven or eight years growth. Thus, a harvest may be annually obtained, nearly equal in quantity, and exceeding in value what would be got were the entire plantation cut down. In the latter case, another valuable crop would not be obtained under seven or eight years, being the time required for the plants to grow to a size to produce bark of value. Another advantage of this system would be, that only the very best and richest bark would be sent into the market.

3. With regard to the advisability or otherwise of Government manufacturing quinine from bark produced on their own plantations, I feel incompetent to give a decided opinion, but my impression is, that it will cost the Government as much to produce a given quantity of quinine or any equivalent alkaloid as they could purchase it for in the market. I imagine it would be more economical for the Government to sell their bark and purchase the manufactured article. To establish the value of our plantations, and to show the success which has attended the cultivation of Cinchona in India, I think that not less than 3,000 lbs. of bark should be sent this year into the home markets.

4. Adverting to the question whether the plantations should remain permanently in the hands of Government or not, it appears to me that Government having firmly established this cultivation, should dispose of their plantations, and leave the further extension to private enterprize. The distribution of seeds and plants from Government plantations is no longer necessary, as private planters who have largely entered upon this cultivation now produce plants and seeds to an unlimited extent, and in this respect are quite independent of Government aid.

5. The reasons that rendered it advisable for Government to dispose of their Tea plantations after having established Teas as a product of India will, I think, be found to bear with equal force in the present instance.

6. Should Government decide to dispose of their plantations, it appears to me that the time for so doing with safety would be in three or four years hence, when our youngest plants will be sufficiently established to be out of reach of all danger, and the more valuable species recently introduced would also be firmly established.

7. With reference to your concluding paragraph, I have issued strict injunctions that the instructions contained in paragraph 4 of the Secretary of State's despatch shall be carried out.

No. 89. Proceedings of the Madras Government in the Public Department.

Read the following letter from W. MACKENZIE, Esq., M.D., C.S.I., Inspector-General, Indian Medical Department, to the Chief Secretary to Government, Fort Saint George, dated Fort Saint George, 21st December 1870, No. 319:—

I have the honour to report, for the information of Government, that upwards of a year ago Mr. Broughton, the Government Quinologist, forwarded to me, for trial in the hospitals of this Presidency, a preparation of the Neilgherry Plantation Cinchonas, which, as it contains the several alkaloids in the exact proportions in which they occur naturally in the bark and is easily prepared, he suggested might be found a cheap and efficient substitute for English quinine.

2. With the view of subjecting its febrifuge power to the severest test, I selected, at the outset, for experimental trial, the notoriously feverish stations of Goodaloor and Luckady, in Wynaad; Russelcondah, in the Northern Circars; and Doomagoodium, in the Upper Godavery; and the results have been so favourable that I consider I may now bring the preparation to the notice of Government, with

full confidence in its efficacy as a remedy in malarious fever, scarcely, if at all, inferior to quinine.

3. Five hundred and thirteen cases, some of which were of a severe remittent form, have been treated with this remedy with a success such as might have been expected from ordinary quinine. The average time each patient was under treatment was only 4·3 days, and the average total quantity of the drug used in each case amounted to but forty-three grains.

4. Mr. Wade, an intelligent and careful observer, who had previously conducted similar experiments with the salts of cinchonine, cinchonidine, and quinidine, was entrusted with the duty of testing the new remedy at Goodaloor, and he sums up his experience of it by stating that, although he doses not consider it fully equal in strength to quinine, and rather more apt in large doses to cause vomiting or looseness of the bowels, still he entertains a high opinion of its antiperiodic power. He reports that, amongst the eighty cases treated by him, there were "many old patients who had previously suffered from fever, with usually a small "atonic pulse, weak habit of body, flabby tongue, torpid liver, and enlarged spleen. "These were generally emaciated, and with a tendency to anasarcous effusion." Taking these complications into account, the results at Goodaloor appear to me to be very satisfactory.

5. Assistant Surgeon Hazlett, who conducted the trials at Doomagoodium, makes the following remarks regarding his experience of the value of the drug:—
"In comparing the efficacy of the amorphous alkaloid with quinine, from "fifteen to twenty grains of the latter have usually been found sufficient here to "prevent a return of the paroxysm in uncomplicated cases of intermittent fever; but "in the sixty-six cases of quotidian, which were treated with the alkaloid, there are "only sixteen in which twenty grains and less were sufficient for the same purpose, "and, in the remainder of the cases, the amount given in each ranged from twenty "to seventy-two grains; but amongst these were several severe cases which would "probably have required considerably more than twenty grains of quinine.

"Taking everything into consideration, I consider the amorphous alkaloid as "very little inferior in antiperiodic qualities to quinine, and it possesses the "advantage of much less frequently or violently causing headache or giddiness, "although it has a tendency to cause nausea, and, in occasional cases, it acts as a "purgative."

6. Assistant Apothecary Kemp reports as follows from Russelcondah:—"The "general results relative to the amorphous precipitated alkaloid are in its favour, "as a serviceable and good antiperiodic, equal to quinine, without the attending "inconveniencies which accompany the administration of the sulphate" (of *quinine.*)

7. Subsequently, I requested Dr. Scudder, at Arcot, to be good enough to give the remedy a fair trial in his dispensary practice, and he has reported as follows regarding the results—

i. "In all cases in which I have used it, I have found it a specific for the "different forms of malarious fevers, quite as much so as the quinæ sulphas.

ii. "The quantity of the amorphous quinine requires to be somewhat "larger than that of the sulphate, in order to produce the same result.

iii. "It requires about the same amount of acid to dissolve it, but does "not dissolve as speedily as the sulphate.

iv. "In *chronic cases* of fever I prefer small doses frequently repeated, in "combination with dilute sulphuric acid and infusion of chiretta, to large doses.

v. "In *acute cases* and recent, I prefer large doses without acid.

vi. "In my hands so far the amorphous quinine has been successful. "Every case has yielded to which I was able to pay proper attention, that is, "every case in which the patient has strictly followed instructions, and every case "that has occurred in hospital. I am, therefore, strongly in favour of using it in "the place of the sulphate, as far as possible."

8. The preparation may be most conveniently administered in the same dose and in precisely the same manner as the sulphate of quinine, viz., by dissolving it in

water with the aid of a little dilute sulphuric acid. It may also be given in the form of powder alone, or mixed with any convenient vehicle, or diffused through water.

9. In a previous communication to Government, marginally noted, I have stated that Mr. Broughton estimated that, when the Neilgherry Cinchona plantations were in full bearing, they would be capable of yielding about 1,300 lbs. annually of this preparation, and that the cost of it, if the manufacture were conducted on a large scale and on the plantations themselves, would eventually be reduced to a minimum of from 8 to 11 Annas per ounce.

Letter, No. 319, of 20th August 1869.
Proceedings of Government, No. 1,415, of 13th October 1869.

10. During the last five years, the annual average consumption of English-made quinine and other cinchona alkaloids in this Presidency has been nearly 400 lbs., and past experience leads me to anticipate a gradual yearly increase in future. The cost of 400 lbs., at the medium price of Rs. 2-0-9 per ounce, has been Rs. 16,400, whereas the cost of the same quantity of Mr. Broughton's preparation, even at the higher figure of 11 Annas per ounce, would only be Rs. 4,400, making a difference of Rs. 12,000. Presuming, then, that but 200 lbs. of the annual expenditure would consist of the amorphous alkaloid, there would still be a saving to Government to the extent of Rs. 6,000.

11. The therapeutic value of the remedy has been brought to the notice of the medical profession through the medium of the *Madras Medical Journal*, and I am of opinion that it might now be very advantageously introduced, as a regular supply, into dispensary practice, and thereby considerably diminish the cost to Government of the more expensive quinine.

12. I would, also, respectfully recommend that an attempt may be made to acquaint the natives of the country with its efficacy, in fever, so that they may be induced to provide themselves with an indigenous febrifuge, so cheap as to be within the reach of the poorest classes. With the view of effecting so desirable a result, I would suggest that supplies of the preparation be issued from the Medical Stores to Collectors in the more feverish districts of the Presidency, partly for gratuitous distribution, and partly for experimental sale.

13. Further trials of the remedy are still in progress in different parts of the Presidency, and the results will, in due course, be communicated for the information of Government.

ORDER THEREON, 11th January 1871, No. 29.

THE Government have received, with much satisfaction, the report submitted by the Inspector-General, Indian Medical Department, on the successful results obtained in the experiments made for testing the therapeutic value of amorphous quinine. They concur with Dr. Mackenzie in the opinion that the amorphous quinine may, with advantage, be introduced as a regular supply to dispensaries.

2. Dr. Mackenzie's suggestion that supplies of this preparation be issued to Collectors in the more feverish districts of the Presidency, partly for gratuitous distribution, and partly for experimental sale, is approved.

(True Extract.)

(Signed) R. S. ELLIS,
Chief Secretary.

No. 90. From the Superintendent of the Cinchona Plantations, Ootacamund, to the Right Honourable Lord NAPIER, K.T., Governor of Madras, etc., etc., etc., dated Madras, 26th January 1871.

WITH reference to our conversation this morning, I have the honour to observe that, in my opinion, it would be desirable not to incur any further expenditure on the upper Cinchona plantation at Mailkoondah, as this plantation is yearly injured by frost.

2. The Cinchona plants in the lower plantation are making very satisfactory growth, and it appears to me that it would be desirable to maintain this plantation, and fill up the vacancies for the next two years, when the plants will be sufficiently established to make head against the natural growth of weeds and jungle.

3. The cost of maintenance need not exceed 400 Rs. annually.

No. 91. ORDER THEREON, 7th February 1871, No. 249.

Miscellaneous.

THE Government proceed to dispose of the papers recorded above, which relate to the maintenance of the existing Cinchona plantations, and the extent to which the manufacture of quinine is to be carried on in this Presidency.

2. In the first recorded letter, Mr. Broughton proposes—

(1.) That he be authorized to expend the savings from the sanctioned Budget grant for his establishment in converting the disused jail at Neddivuttum into a suitable place for the manufacture of "amorphous quinine."

(2.) That a certain number of the trees planted in 1863 be cut down, in order to test the method of "coppicing" the plantations.

3. The propriety of adopting the first proposition hinges on the value of "amorphous quinine," on which point the report of the Inspector-General, Indian Medical Department, dated 21st December 1870, is so favourable that the Government have no hesitation in adopting Mr. Broughton's proposal, and authorizing him to carry it out, provided that the building in question can be spared for the purpose, on which point the Commissioner will report.

G. O., (Public), 11th January 1871, No. 29.

4. A provision of Rs. 7,280 has been made in the Budget for 1871-72 for converting and fitting up the building, and any expenditure on the work, which it may be desirable to incur in the short remaining period of the current official year, can doubtless be met from savings.

5. It is satisfactory to learn that so considerable a per-centage of quinine is yielded by shoots from the stumps of trees which have been felled; and in order that the value of the quinine so obtained may be tested, as also with a view to the early introduction into the English market of the Indian grown barks, the Superintendent of the Cinchona plantations will be directed to fell a moderate number of trees at the proper season, the bark of which Mr. Broughton will prepare for shipment to England.

6. The Government have already decided not to incur any further expense on the *extension* of the Neilgherry Cinchona plantations, and further operations in regard to Cinchona will be confined to the maintenance of the existing plantations, and the introduction of such superior varieties as may from time to time be discovered both on the Neilgherries and in those districts which offer suitable sites for the purpose. They are, however, inclined to believe that the Government Quinologist has under-estimated the demand for quinine, which is likely to exist when the price is considerably lowered. It must be remembered that the drug at present fetches a scarcity price, and that even in India where its effects have been experienced, the bulk of the people are altogether unacquainted with it.

7. In accordance with the request [illegible]ained in paragraph 19 of Mr. Broughton's letter, the Commissioner w[illegible]. [illegible]ested to test by a careful examination of results the value of the "mo[illegible]ess," and submit his opinion to Government.

8. The Commissioner's letter, [illegible]r 2nd, 1870, No. 42, in which are enclosed letters from Messrs. [illegible]nd Broughton, supplies information on the points indicated by the Secretary [illegible]ate's despatch, dated 19th May 1870, No. 13, calling for a report on the cou[illegible] to be adopted with reference to the Government plantations and the manufacture of quinine. Mr. Brooks has dealt thoroughly with the question, and it is unnecessary to review in detail the subject matter of his communication which embraces the suggestions of Messrs. Broughton and McIvor. It will be forwarded to Secretary of State, whose reply will influence the future position of the S[illegible]egard to the Dodabetta and Neddivuttum plantations, and the export o[illegible]acture of quinine.

9. However the main questic[illegible] relative merits of State control and private enterprise may be hereafter [illegible]e Government are desirous of effecting a sensible reduction in the cha[illegible] Neilgherry Cinchona plantations. The actual expenditure of 1869-70 [illegible]055, the Budget-estimate for the current year was 45,400, and that se[illegible] the Superintendent for 1871-72 is 39,100. The Government desire to see [illegible]ual expenditure still further reduced, and as a step in this direction, the Com[illegible]ner of the Neilgherries will be called on for a report as to the prospect of bei[illegible]e to effect a sale on reasonable terms of both the Mailkoondah plantatio[illegible]e has recommended should be sold) and also the plantation at Pykarra [illegible]gement which would still leave 825 planted acres available for State p[illegible]ould he be of opinion that a sale cannot be effected on terms which [illegible]ent ought to accept, he will consider the expediency of abandoning the [illegible]ion of the Mailkoondah plantation, altogether and of filling up with C[illegible]s and fencing in the lower portion of that plantation and the Pykarra [illegible]wing them to develop as Cinchona copses or forest, stopping all fu[illegible]ture on them, save such as may be necessary for fencing and watching t[illegible] collecting the bark. He will submit his opinion on these suggestions at [illegible]te.

10. Ordered that the followin[illegible] despatched to the Secretary of State.

(Here enter No. 6. [illegible]a February 1871.)

(True extract.)

(Signed) W. HUDLESTON,
Secretary to Government.

To the Commissioner of the Neilgherries.
,, the Government Quinologist.
,, the Board of Revenue.
,, the Accountant-General.
,, the Public Department.

Exd. F. R. Bantleman.

Government Gardens
No 264 Ootacamund 5th August

From

W. G. McIvor Esquire
Supt Govt Cinchona Plantations

To

J. W. Breeks Esquire
Commissioner
Neilgherries

Sir;

I have the honor to acknowledge the receipt of your letter No 140 dated 23rd July 1870, calling upon me for an opinion upon the various points raised by the Secretary of State in his despatch No 13 dated 19th May 1870.

2 With reference to the first point viz what systematic course should be adopted with reference to procuring and utilizing the very large quantity of Alkaloids stored in the bark of the quinine yielding

Cont. of 1871 Sec. Rev.

REVENUE.

To

THE COMMISSIONER OF THE
NEILGHERRIES,
&c. &c. &c.

Dated February 7th.

Read. Read.

G. O., 7th February 1871, No. 249.

FEBRUARY
Nos. 87—91

Cinchona Plantations.—Papers relating to their maintenance and the extent to which the manufacture of quinine is to be carried on in this Presidency, with orders thereon.

decided opinion but my impression is that it will cost the Government as much to produce a given quantity of quinine or any equivalent alkaloid as they could purchase it for in the market. I imagine it would be more economical for the Government to sell their bark and purchase the manufactured article. To establish the value of our plantations and to show the success which has attended the cultivation of Chinchona in India, I think that not less than 3000 lbs of bark should be sent this year into the home markets.

4 Adverting to the question whether the plantations should remain permanently in the hands of Government or not, it appears to me that Government

25

having firmly established, this cultivation should dispose of their plantations and leave the further extension to private enterprise. The distribution of seeds and plants from Government plantations is no longer necessary as private planters who have largely entered upon this cultivation now produce plants and seeds to an unlimited extent and in this respect are quite independent of Government aid.

5 The reasons that rendered advisable for Government to dispose of their tea plantations after having established tea as a product of India, will I think be found to bear with equal force in the present instance

6 Should Government decide to dispose of their plantations it appears to me that the time for so doing with safety would be in 3 or 4 years hence, when our youngest plants will be sufficiently established to be out of reach of all danger and the more valuable species recently introduced would also be firmly established.

7 With reference to your concluding para, I have issued strict injunctions that the instructions contained in para 4 of the Secretary of States despatch shall be carried out.

I have &c &c

(Signed) W. J. McIvor

Supt. Govt. Chinchona Plan

(True copy)

R. Daisy M.

T. Ed.

Offg. Commissioner

1870

From

W. J. McIvor Esqre

Supt Government

Cinchona Plantations

To The Commissioner

Neilgherries

Dated 5th } August/70

Received }

No 204

Enclosures

Quinine

Re parts on the

Mann face Ave

Q —

Ootacamund 21

8th August 1870

From

Mr John Broughton

Government Quinologist

To

J. W. Breeks Esquire

Commissioner Neilgherries

Ootacamund

Sir,

I am in receipt of your letter No 140 of July 23rd 1870 which reiterates the enquiries contained in the despatch of the Secretary of State which appeared in Proceedings of Government Revenue Department No 27 of July 11th 187[illegible]

To these enquiries I have the honour to append answers to the best of my opinion and present knowledge

Enquiry I.

What systematic course would you recommend with reference to procuring and utilizing annually the very large quantity of fel[illegible]

[illegible]

[illegible] alkaloids stored in the bark of the trees?

I am of opinion that our present experience has hardly been sufficiently matured to permit the laying down of a definite and unalterable system of cropping the plantations.

There are two modes on the result of whose trial the method ultimately adopted of harvesting will depend. These are.

1st The method of mossing the trees of taking the bark from the living tree, and allowing it to renew under moss, advocated by Mr. McIvor. 2nd The method of coppicing. The first of these methods has hitherto been carried out on so small a scale that the cost and financial advantages have not been ascertained. At my recommendation

the

the Government issued orders (Cr. Os. No. 2453 of 22nd September 1868 and No. 426 of 19th February 1869) that a certain considerable numbers of trees should be treated by moss. This was done in May 1869 and ~~the~~ following months, and the results obtained, together with the cost of the same, will furnish trustworthy data for determining whether the method of mossing be finally adopted. The method of coppicing appears a very suitable mode of cropping the plantations. In June 1867 some hundred trees of C. Succirubra were cut down in order that their bark might be sent to the English Market. In the early part of this year the vigorous shoots that had sprung from the stumps had reached a height of 15 feet, and furnished bark of good quality. I am led to hold the opinion that a

great

great part of the Neilgherry and the whole of the smaller plantations of South India will be advantageously treated as Coppice.

This plan offers the further advantage of supplying abundance of excellent fuel without encroaching on the Sholahs.

In a report to Government now under preparation, I propose to recommend that a considerable number of trees be cut down in order to make a full trial of the coppice system.

It seems therefore to follow that it will be advisable to await a fuller experience before the exact and permanent method of taking the bark of the plantations can be

decided

decided. It will however be nearly as I had the honor showing in a late report (appearing Proceedings of Government No. 235 of 22nd February 1870) to avoid the months from May to November for taking the Bark.

Enquiry II.

Should the bark be used in the Manufactory at Ootacamund for the supply of hospitals in India or should the bark be sent to the London Market for sale, or should a portion be sent home and a portion be worked on the spot

I am entirely of opinion that the amount of febrifuge required for use in India should be prepared in this country. The grounds for this opinion are mainly economical and are as follows. The cost of drying and powdering

the

the bark is dispensed with. The alkaloids are more readily and less expensively extracted from the bark while it is fresh. The cost of conveying the bulky bark to England, and the importation of the manufactured alkaloids to India is avoided. The manufacture by Government of the alkaloids permits of a great reduction in the labor and consequent cost of manufacture by allowing of the preparation of a cheaper form than that of the crystalline sulphates. The necessary materials are as readily and with the exception of Sulphuric Acid, are almost as cheaply procured in this country as in England. But I consider that Government could if it be

thought

thought fit, act most usefully in reference to the private growers of Cinchona by serving as a pioneer in the European market, accustoming it to the qualities of Indian barks and thus overcoming certain prejudices which will arise from the different appearance occasionally presented by these barks, as compared with the South American. Again the quality possessed by the Crown barks of these plantations are such as are highly prized by the Home manufactures of Quinine so that I think that a considerable quantity should eventually be sent home in order to enhance the reputation of Indian grown barks. The febrifuge preparations employed in

this

vernment having the complete control over all stages of its production. The case of the Government Tea plantation is not a parallel one since Government are not large consumers of Tea, as they are of the products of the Cinchona plantations. In the former the intention of the introduction of Tea cultivation into India was the development of Indian agriculture and commerce. In the Cinchona undertaking these are only accessories to the main object, which is that of obtaining a cheap and indigenous supply of the most important medicine employed in the country.

In order to justify the opinions I have ventured to state above I beg to adduce a rough estimate showing the relative cost of

of the febrifuge made on the spot and that imported from Europe.

In carrying out the instructions I had the honor of receiving from the home Government I have paid much attention to the production of a febrifuge for use in Indian Hospitals and Dispensaries, cheaper than the quinine sulphate. In the small manufactory at Cotacamund have been prepared since January last 70 lbs of such a preparation, consisting of the mixed alkaloids precipitated in an amorphous but tolerably pure state. This has been largely used in Dispensaries and Hospitals and with success that I believe I am justified by the evidence in stating that it may nearly entirely replace the quinine sulphate hitherto employed thereon. I now subjoin an Estimate for the conversion of the now

disused

dissolved Soil at Nuddiwattum into an Alkaloid manufactory above Estimate for the yearly cost of preparing 800 lbs of Amorphous Alkaloids

	Rupees
6 large copper boilers	1500
8 large percolators	1600
Fitting of boilers & percolators	2500
Sundry alterations in buildings	1000
Sundry fittings	1500
Water Supply	350
Vessels	400
Presses	900
Stock of Alcohol	900
Contingencies	500
Still for recovering and rectifying Alcohol	700
Native mills for grinding &c.	40
Rupees	11890.

Yearly expenses to produce 800 lbs of Alkaloids

I am informed by Mr. McEvoy that the cost on the spot of Red Bark will range from 4° to 6° a lbs. I adopt the higher price in the Estimate and reckon its

its mean yield at the low one of 4 per cent.

Bark	Rs. 5000
Cost of Acid	" 600
" Lime	" 100
" Soda from Native sources.	" 150
Labor 24 Coolies 120 ℔ 120 ℔ per month	" 2160
Superintendents' pay @ 100 ℔	" 1200
Waste of Alcohol	" 300
Fuel	" 720
Filter bags &c.	" 500
Contingencies	" 800
Rupees	11530.

Dividing these yearly total expenses by 800 we get the cost per lb. Hence the cost of a lb of Alkaloid is Rs. 14-6-7 or reckoning interest at 5 per cent on "plant" about one Rupee per ounce.

The cost of quinine sulphate is not accurately known in this Presidency the purchases for the Medical Stores being effected in England. It can not however be less when brought

brought to this country than R. 3 per ounce and probably averages considerably more.

It is difficult to estimate accurately the amount of quinine that would be used in this Presidency when its cost is thus reduced but it will certainly exceed 800 lbs per annum. A larger quantity would be prepared at a still less cost.

I content myself with estimating the comparative cost of entirely indigenous and imported febrifuges of equivalent therapeutic value, at 1 rupee and 3 rupees respectively per ounce.

Enquiry IV.

If you are of opinion that the plantations should be eventually sold at what stage

of

of their development, that is, when do you think they ought to be sold?

As I have stated above I am not of opinion that the amount of plantations requisite to supply the febrifuge required in the Government Dispensaries should be allowed to pass out of the hands of Government. But it is very possible that the whole of the plantations may not be required for this purpose. If this eventually be found to be the case (respecting which contingency I can offer no well grounded opinion at present) it may be found advisable to sell a part, but this is obviously a matter that cannot be decided for several years to come.

I have &c.

(Signed) John Broughton
Government Quinologist

(True copy) R. Davidson
J. G. D. Offg. Commissioner

No 42 Commissioner's Office

Ootacamund 2nd September

From

J. W. Brooks Esquire

Commissioner

Neilgherries.

To The Secretary to Government

Revenue Department

Madras.

Sir;

I enclose replies from Mr Jas Broughton and Mr Ivor to the enquiries of the Secretary of State in his Chinchona Despatch dated 19 May 1870 No 13 embodied in Proceedings of Government Revenue Department 11 July 1870 No 27.

2. I requested the two gentlemen to record their reports in the form of answers to the following queries.

it

1 What system of cropping the bark is the best?

Two methods are proposed — Firstly Barking the trees and covering them with moss to induce a rapid reproduction of the bark; Secondly, Coppicing

Mr. McIvor advocates the former Mr. Broughton thinks that we have not yet sufficient data for deciding on the comparative advantages of the two methods; but he is "led to hold the opinion that "a great part of the Neilgherry and "the whole of the smaller plantations "of Southern India will be advantageously treated as coppice"

3 The information we have at present with regard to either mode is scanty. Mr. Howard, in his Analysis Reports,* supports Mr. McIvor's statement that the yield of alkaloids is increased by the mossing process

In one instance however he says "the effect of the application of moss for a few months to No. 2 (Succirubra) does not show as compared with the original unmossed bark of No. 3 (Succirubra) so much real advantage as might have been expected" and again reporting on the third harvest of renewed bark (Succirubra) he remarks "I hoped to obtain a larger produce than last time but was disappointed in finding a smaller amount of salts of Quinine viz: 6.15 per cent against 8.45 per cent in the specimen of renewed bark from the same tree on which I had the honor to report in February 1867."

Mr. Broughton has reported× that the advantages of the mossing process applied to this Bark (Red Bark) makes itself at once evident to the worker by the readiness and purity with which the sulphates crystallizing

* See Proceedings of Government 27th Sept. 1865 No. 542. Mr. Howard's Reports June 15 1864 and Proceedings of Government 31st October 1865 No. 57 Mrs Howard's Report August 1 1865 and Proceedings of Government 20th June 1867 No. 265 Mr. Howard's Report Feb. 4. 1867

× Mr. Howard's Report Feb. 4. 1867.

× Proceedings of Government 5th August 1869 No. 68. Mr. Howard's Report Septr. 1. 1868.

× Proceedings of Government 12th April 1867 No. 206. Mr. Broughton's letter 7th April 1867.

The experiments, however, from which these results have been deduced have been necessarily conducted on a very limited scale and in all cases refer to the bark of young and individual trees only. Moreover as yet, we have no information of the cost of mossing, nor do we know what amount of bark can be annually taken from a tree without injury to its growth.

I need hardly say that I do not share in the summary condemnation of the mossing process expressed by Mr Clarke in his Report to the Bengal Government dated 10th February 1870 para 27. He says "Dr Anderson has decided after "no very long experimenting to have "nothing to do with that process. About "that decision there is no second "opinion at Ringhee. Any person may

"however, quickly decide it for himself "in Calcutta."

That the value of the mossing process for India should be decided by an experiment in Calcutta seems to me a most eccentric proposal. Moss is abundant on the Nelgherries, and the process is undergoing a careful and systematic trial in accordance with Government Order Revenue Department 19th February 1869 No 426. Until the results are known it will be well to defer judgment.

5 Messrs Howard and Broughton's reports point out, with regard to the yield of Quinine differences in the different varieties of Chinchona and in the Lamechees under different conditions.

Thus the per centage of Quinine

x Para 7 Mr Broughton's Report 9th December 69 in Proceedings of Govt Rev Dept 22nd Feb 70 No 235.

in the Succirubra appears to decrease with age; this is not the case with the Officinalis. Again[x] the yield of "Alkaloids varies greatly with the "vigour of growth, size of tree, and "consequently with character of soil." "The most vigorous and quickly grown "trees yield a far richer bark than "~~the~~ more stunted ones of the same age."

These circumstances may have some bearing on the point under consideration and may possibly render different methods of cropping the bark derivable with different varieties of chinchona and different plantations

6 Between the two methods of cropping proposed, I take it, the Question to be determined is — Whether an acre of land will yield more alkaloids in a given time under the mossing, than under the coppicing

[x] Para 6 Mr Broughton's Report 1st December 1869 in Proceedings of Government Revenue Department 22nd Feb 1870 No. 235.

System and if so whether the increased yield more than covers the increased expenses.

7. I would suggest that a certain number of trees of the same age of each variety of Chinchona should be treated on each of the two Systems. The bark harvested under this Experiment might be annually sent home and sold for the reasons given in para 12 under.

In four years it would be evident which of the two Systems was the best and the experiment would be of practical value to many who have embarked in Chinchona cultivation.

8. The second question is Whether the bark should be manufactured in India, or sent home for sale or whether a portion should be sent home and a portion

was fed upon the spot.

Mr. Broughton is entirely of opinion that the amount of febrifuges required for use in India should be manufactured in this country - because the expenses of drying - powdering - conveying the bark by sea to home and in working the manufactured alkaloids are thereby avoided: because the process of manufacture can here be simplified and cheapened by employing fresh bark and by preparing the alkaloids in a cheaper form than that of crystallized sulphates: and because the necessary materials are as readily and (with the exception of sulphuric acid) almost as cheaply procurable here as in England.

Mr. Broughton is unable to give a decided opinion but inquired

that it would be more economical for government to sell their bark and purchase their alkaloids than to manufacture them.

9 Both gentlemen recommend that government should send into the Home Bark Hill a considerable quantity of bark so as to enhance the reputation of the India grown barks and remove certain prejudices arising out of occasional peculiarities in their appearance which may at first interfere with their sale.

10. The Inspector General of Her Majesty's Indian Medical Department (Dr. Mac Kenzie C.B. C.M.) reports to me that the future yearly requirements of the Madras Presidency may be put at 700 or 800 lbs of alkaloids - allowing the same for Bombay and double for Bengal

and the North of India. Some 3200 lbs of alkaloids will be required annually.

11 For the reasons alleged by Mr. Broughton I am of opinion that it will be more economical to manufacture in India.

12 In the interests, however, of those who have embarked in Chinchona cultivation, the Government may well send home as suggested by Messrs Broughton and Mc Ivor about 3000 lbs of bark annually to accustom Home Buyers to the Indian products.

There is often a difficulty in establishing a demand for an article which although intrinsically superior differ somewhat in externals from what Brokers and Buyers have been long accustomed to

In sending bark of the different varieties, home for sale the Government might do good service;

This, however, should only continue for 3 or 4 years or until such time as Indian bark finds its way home from Private sources; for under no circumstances should Government as an exporter of bark enter into competition with private planters.

13. The third question is should the plantations remain permanently in the hands of Government for the supply of Quinine in the hospitals and the distribution of seeds and plants or should the plantations be sold as in the case of the Government Tea Plantations?

Mr. Mc Ivor thinks that Government having firmly established this cultivation should dispose of their

"plantations and leave the further "extension to private enterprise" for the same reasons that induced the sale of the Government Tea Plantations and states that private Planters are now quite able to supply the demand for Plants and seeds without the aid of Government.

Mr. Broughton thinks that Government should retain as much of their Plantations as will supply a febrifuge in a cheap form and sufficient quantity for their wants; because Government being a large consumer of the produce will thus obtain it most cheaply and because Government can only secure for the masses a supply of febrifuge at the cheapest price by retaining control over all stages of its production

14. Mr. Broughton remarks that the case of the Government

Tea Plantations is not a parallel one; because Government are not large consumers of Tea and had no object in introducing its cultivation but that of developing trade and agriculture whereas in the case of Chinchona these objects are secondary to that of ensuring a cheap and indigenous supply of an important medicine

In support of his opinion he gives an Estimate of the Plant and working expenses for manufacturing here annually 800 lbs of amorphous alkaloids

He calculates that the cost of such alkaloids would be 1 Rupee an ounce, that of imported Quinine being at least 3 Rs

15. It seems to me somewhat premature to decide now whether

it

the government should retain
the Cinchona plantations permanently
in their own hands and manufacture
the alkaloids they want. But so
far as I can see I am of opinion
opinion that government should
retain possession of the Cinchona
at any rate for a considerable
time longer for reasons which I
will give by and bye, and by
manufacturing for themselves
they will, I think for some years
obtain their annual supply of
Alkaloids at a cheaper rate
than if they imported them.

16. I am aware that it is
seldom or ever that government
can grow or manufacture so
cheaply as private individuals,
nor is this a thing to generally
desirable; but there are circum-
stances connected with the question
under consideration which seem

to me to make it an exceptional case.
It is highly improbable that any
Alkaloid manufactory will be
established in India except by
government. We have a gentleman
on the spot in the service of Govern-
ment whose scientific attainments
exceedingly qualify him to introduce
the manufacture and in my judg-
ment the most weighty argument for
the government retaining the whole
process of production in their own
hands will be found in the oppor-
tunity thereby afforded to the
government scientific for simplify-
ing and cheapening the manufacture
of an efficient febrifuge for the use
of the population at large.

17 It is evident from the
Report of the Madras Chinchona
Commission that the four alkaloids

× See Broughton's Report 28th November 1867 Proceedings of Government Revenue department 13th December 1867 Nos. 40

"occurring in our Barks are nearly "equal in febrifuge Power." If Mr. Broughton is successful in the preparation of a substance from them which can be conveniently administered, which is equal or nearly equal to Quinine Sulphate in its medicinal effects, and which can be made so cheap as to be within reach of the Million, the object of the introduction of Chinchona cultivation into India, as described in the Secretary of States Despatch No 50 - 30th September 1865, will have been attained.

18. Still it may be said that Government in the interests of the Public and for the furtherance of Mr. Broughton's experiments might establish a manufactory and yet sell their Plantations

buying bark from private growers. This, I am disposed to think will be the course ultimately taken. But for some time to come Plantations will be wanted for the Quinologists experiments as to the influence of season, age, altitude, climate and cultivation on the amount of alkaloids in the bark of the different varieties of Chinchona. The investigation of these and similar problems is of great moment and will take time to complete. The information when obtained will have an important effect in determining the conditions under which the various varieties of Chinchona will repay cultivation.

19. No doubt the annual working expenses of the Neilgherry Plantations have been heavy

To allow the object aimed at
viz the introduction of Chinchona
into India no expense has been
spared; but the working charges
now should be cut down to some-
what the same level as those
on private Estates — two or three
extra hands being retained for propa-
-gation and for planting out
not more than (say) 5 acres of
each new variety that may come
to hand.

20 The 4th Question is.

If you are of opinion that the Plan-
tations should be sold, at what stage
of their development should they be
sold?

Mr. McIvor thinks 3 or 4
years hence to be the best time to
dispose of the Plantations when the
youngest plants will be sufficiently
established. Mr. Broughton is

against the sale of the Plantations
but thinks it possible that it may
eventually be found that Government
possess larger Plantations than they
require and that it may be advisable
to sell a part.

21 If it be determined to
dispose of the Plantations on the
ground that Government have fulfil-
-led their mission and firmly established
Chinchona cultivations in India" and
that the further development of the
industry may well be left to private
enterprise, the mode, time and place
of sale most likely to fetch the
best price have only to be considered.
The Government Chinchona Trees
have this advantage — that their growth
is in advance of all others and their
Bark by being first in the market
will go off at present high rates. This
advantage will be lost if the Bark

× Mr. McIvor's letter enclosed para 4

is not sent home and the sales of the Plantations is deferred for several years.

22 As explained in my letter[x] to Government submitting the Chinchona Superintendent's Annual Report for 1869/70, I am of opinion that it is not worth while incurring any further expense on the Mailkoondah Plantation. Up to the 31st March 1870 Rs 42,175 had been spent on this Plantation of which 75 acres have been planted out. I take leave to refer to paras 8 and 9 of my letter above quoted, if my suggestion with regard to the Mailkoondah Plantations be approved, the remaining Plantations, which I would recommend the Government to retain possession of, would all be situated within easy reach of each other and would consist as follows.

Dodabetta	375 Acres
Hiddwathum & Pykarah	750
	1125

x 28th May 1870 No 25.

23. I add some general remarks at page 141 of Mc Culloch's Dictionary. I see it recorded that "the sum expended by the Indian Government on the purchase of this valuable medicine (Quinine) is stated to exceed 5 lacs annually." Considering this, it seems to me that the main intention of the Chinchona undertaking will be incompletely carried out unless India be placed in a self supplying condition. I consider it both politically and economically desirable that the febrifuge employed in this country should be supplied for from internal sources; more especially, if the Chinchona undertaking be intended to have the effect of providing an abundant supply of the febrifuge at so cheap a rate as to be within the means of the population at large, the coolies employed on works and private Plantations the sma

cultivators, their wives and families as stated in the Secretary of States Despatch above mentioned. I can see no probability of this intention being speedily realized unless government lead the way in every stage of production.

24 I ought to say that it was altogether at my instance that Mr Broughton inserted in his Report an estimate of the plant and working expenses for manufacturing some 800 lbs of Alkaloid annually. I suggested this, not under the idea that the time had come for applying to government to sanction such an outlay, but in order to have on record some data towards forming an opinion as to the desirability of government becoming by and by manufacturers of their own alkaloids.

25. For the present I am quite of Mr Broughton's opinion as expressed in his Report x

x Proceedings Government Revenue Department 13th December 1860

dated 28th November 1867 viz. that he should steadily persevere in his endeavours "to find a process which would yield the alkaloids in a state of sufficient purity by simple means" and to produce an efficient febrifuge which can be prepared by a method which an ordinary "Apothecary would have little difficulty in learning to follow".

Since the 1st of January last he has already produced lbs of such a substance and if this prove completely successful in the Medical Department he can as he suggests "extend the manufacture and as opportunity of include that of crystalline sulphate

26. Working steadily with the end in view, Mr Broughton will in the course of a year or two be able to supply reliable data –

(1) As to the best mode of cropping the Bark

(2) As to the most favorable conditions for the growth of the several varieties of Chinchona.

(3) As to the extent of Plantations that will have to be retained by Government in order to supply the quantity of febrifuge they require.

(4) As to the cost of establishing a Government Manufactory equal to the supply of India's wants. With reliable information before them on these points it will be easy for Government to decide whether or no it be desirable to retain the Plantations in their own hands and to establish a manufactory at Ootacamund or Rungbee or elsewhere.

I have &c. &c.
(Signed) J. W. Breeks
Commissioner

(True copy) R. Davidson.

T. G. D. Offg. Commissioner

Rev 1870 Dep
No 2705
From
The Commissioner
Nuthy Henries
To The Secretary to Government
Revenue Department
Madras
Dated 2nd September
Received
No 42
Enclosures
Subject
Remarks
Forwards with his Remarks,
Reports from Depots
the Ivor and Broughton,
on the Nianu factures of
with reference to the en-
quiries of the Secretary of State
in his Cinchona Despatch
dated 19th May to his embodied
in Proceedings of Govt Rev Dept

Ootacamund
31st August 1870

71

From. Mr John Broughton
Government Quinologist

To. R. A. Dalyell Esq.
Acting Secretary to Government
Revenue Department
Ootacamund

Sir,

In the following pages I have the honor to communicate some results obtained, connected with the subject of the employment of the Cinchona febrifuge in this country, also some statistical considerations having reference to the future yield of the plantations.

2. In the original instructions I had the honor to receive from the Home Government I am told (in para 3) that it was required "to ascertain the preparation of the "febrifuge which will combine cheap-"ness with efficacy in the greatest "degree." (And in para 4) "And finally it

* Letter from [illegible] dated 21 Sep 1866.

it will be expected from the chemist
that he should through his investiga-
tions enable Her Majesty's Government
to arrive at a decision with respect
to the best and cheapest method of
preparing the febrifuge for use among
the laboring classes of the natives of
India. He will also be required
to consider the questions connected
with the manufacture of the cincho-
na febrifuge for the use of Hospital
and Troops in India.

In a Report appearing in
Proceedings of Madras Government
Revenue Department No. 240 of
13th December 1867, para 10, I had
the honor to propose a preparation
which I then believed would com-
bine the qualities desired in the
febrifuge to be extensively used
in this country. During the sub-
sequent years I prepared small
quantities of this substance for
Medical trial in my experimental

laboratory and finding the results
of its medical employment as en-
couraging as I expected from its com-
position, I commenced in January
last to manufacture it on a larger
scale in the small manufactory
then just erected near the Gardens
at Votacamund.

Up to the present date about
70 lbs. of this febrifuge have been pre-
pared and supplied to the Medical
Stores. As it consists of the Alka-
loids (mixed as they naturally occur
in the plant) precipitated from
solution in an uncrystallized but
tolerably pure state, it has been
appropriately named by Dr. MacKen-
zie "Amorphous Quinine," by which
name I trust it may henceforward
be called. The results of its actual
Medical use seem to have been very
satisfactory. I learn from the
Medical Inspector General that he
intends to submit these results to

Government with his own opinion of the value of the febrifuge. On general grounds I strongly recommend the extensive adoption of Amorphous Quinine, as a febrifuge that appears to meet the full requirements of the case; but it is of course on the medical testimony to its qualities that the decision must finally rest. I now await the opinion and directions of Government on this point.

5. I find that the bark of C. Succirubra, of which half of the plantations consist, exceedingly well adapted for the preparation of Amorphous Quinine. I have had occasion in several foregoing reports to point out certain disadvantages which attach to this bark for the preparation of pure crystalline salts of the respective Alkaloids. These do not however in the least affect the manufacture of Amorphous Quinine while

while the large total yield of the bark renders it particularly suited to the extensive and cheap manufacture which it appears to me should be established on the Neilgherries. Hence in all plans and considerations connected with the preparation of Amorphous Quinine, I shall only consider the bark of C. Succirubra. The bark of C. Officinalis will find its best application in the manufacture of pure crystalline sulphates of the alkaloids, either in this country or in Europe.

6. In order to produce as cheap a product as possible, it will be necessary to manufacture on the spot on which the bark grows. The cost of conveying the bark from Neddiwuttum to Ootacamund, and the price of fuel at the latter place, entail so much expense that there can be no question as to the expediency of working up the bark on the plantation themselves. The irregular and defective supply of bark has been the source of the main difficulty in carrying on the manufactory at Ootacamund. I reckon that

that when working at Neddiwatte Estate with a rough but effective plant, with bark of mean quality, and preparing 800 lbs of Alkaloids per annum, the cost of the cinchona (including that of the bark) will be about Six Rupees per pound. A larger outturn would still further diminish the price.

7. Having had in view for some time the eventual manufacture of considerable quantities of Anderson's Quinine I have taken some pains to estimate the amount of that substance in the Red barks of the plantations. My estimations were made last Spring, and depend on data given in appendix.

Number of trees	Age years	Bark	Quantity of Alkaloids obtained in lbs:
19,500	7½	trunk	1833
___do___	___do___	branch	815
29,400	6½	trunk	2095
___do___	___do___	branch	605
45,300	5½	trunk	2310
___do___	___do___	branch	860
68,650	4½	trunk	3205
___do___	___do___	branch	1105
43,430	3½	trunk	1468
___do___	___do___	branch	279
152,050	2½	trunk	632
___do___	___do___	branch	156
		Total Pounds	15363

Thus

8. Thus at the present time the Red barks alone of the Neligherry Government plantations contain 15000 lbs. or nearly 7 tons of febrifuge which I learn is equal or nearly equal to ordinary quinine sulphate in efficacy. I cannot therefore think that it is premature to endeavor to prepare sufficient febrifuge to supply the Hospitals and Dispensaries during the forthcoming year.

9. In 1864 a considerable number of our oldest trees of Red bark were cut down in order that the bark might be sent to England for sale. From the stumps have sprung various shoots that have at the present time attained a height of 12 to 15 feet. I recently collected a mean specimen of the bark of these shoots. Its analysis gave in 100 parts of dry bark

Total Alkaloids	6.34
Quinine	1.37
Cinchonidine & Cinchonine	4.97
Pure sulphate of Quinine	1.14
Stained crystallized "	
" Sulphate of Cinchonidine	4.29
Stained crystallized	

To Mean

10. When it is considered that the shoots were but three years old, this analysis must be considered most satisfactory. It seems to justify the anticipation that coppicing will hereafter be an important means of cropping the plantations. This method has the further recommendation of furnishing excellent fuel without the necessity of destroying the sholahs. It appears to me to be very necessary that a considerable number of trees of 7 years old should be cut down in order that the method of coppicing should be tried, and the expenses as compared with the plan of mossing be accurately determined.

11. I will assume that after a tree aged eight years has been cut down that the shoots after a lapse of eight years will produce as much bark as the original tree, an assumption that will not under any circumstances entail a great error. The number of growing trees of Red bark on the plantations is about 591,600. If an eighth part of these be

be annually cut down, the bark of 73,955 trees will be annually available. This amount will yield no less than 10323 lbs. mixed alkaloids; a quantity which must be in considerable excess of any possible demand for febrifuge in this presidency. The same number of trees will yield 1730 Cwts. of dry Red bark of which about 1400 Cwts. would be fit for export. This latter amount would be about a seventeenth part of the quantity of bark annually imported from South America into England.

12. I conceive that the foregoing arithmetical considerations justify the conclusion that the extension of cinchona planting by Government has already reached its limit. From the returns of the plantations here, there is a gross total of one and a quarter million of trees planted. The returns of the plantations in Bengal give 1,405,999 trees planted. In Java, the returns give 1,532,148. The private plantations on these Hills contain at least a mill

trees, and as many more may be certainly reckoned for the private plantations in the Himalayan vallies. I do not possess definite information of the numbers planted in Ceylon, but they number at least 250,000 trees. In Jamaica 70,000 trees, principally Red barks are planted, and flourishing exceedingly. At St. Helena in 1868, 5,000 trees were planted, and it was expected in a year to have 20,000 planted. At Orotava in Teneriffe the cultivation is commenced with success. On the Organ Mountains in Brazil the same success is attained. The only place where the cultivation has apparently been unsuccessful is at Chiffa in Algeria, where the cold winds appear to have at length nearly extinguished the plants, originally supplied from this presidency.

13. Altogether it may be estimated that 7 millions of Cinchona

trees are under cultivation in various parts of the world, and that the number is increasing annually. It appears therefore that unless it be to supply an urgent local want there can scarcely be further necessity for Government pressing Cinchona cultivation in other parts of this presidency. It is most desirable for the interests of the cultivation that the demand for bark be not exceeded.

It would be of considerable service if a probable estimate could be formed of the amount of febrifuge that would be consumed in this presidency, if the price were reduced to 1 Rupee the ounce. I am informed that the mean annual consumption at the Medical Stores for the five years ending 31st March 1867, was 344 lbs of quinine sulphate and 910 lbs of Cinchona bark or in round numbers 475 lbs of quinine

quinine sulphate altogether.* I am informed by some authorities that four times, and by others that ten times the amount would be consumed, if the cost were reduced. It appears to me that it would be well worth while to endeavor to procure some definite information on this point before manufacture be commenced on an intensive scale.

16 If pure crystallized sulphate of quinine be prepared in this country the C. Officinalis and C. Calisaya will be the fittest sources. I have hitherto made no attempt to manufacture pure sulphates except on a small scale. The Red bark from the difficulty of purification would be a comparatively costly source; and the trees of C. Officinalis are scarcely enough developed to take their bark except at a loss. I propose eventually to

* I learn from the Medical Inspector General that the amount used last year was 700–800 lbs and that the demand is annually increasing.

to make use of the small manufactory at Ootacamund for an attempt at the preparation of pure sulphate of quinine from the Crown barks of the Dodabetta plantations, though whether this salt can be profitably made in this country there are at present no trustworthy experimental data to determine. The question will be attacked as soon as a supply of suitable bark is available. I am already in possession of fit apparatus for this purpose.

16. On the presumption that the report of the Medical Inspector General above mentioned respecting the results of the employment of Amorphous Quinine will be found satisfactory to Government I have the honor to propose the following request.

That I be permitted to expend all the savings I can effect out of my total sanctioned Budget grant in converting as far as possible the now disused Jail at Neddiwuttum into a suitable place for performing at least the preliminary extraction of the bark on

on the spot, in order to avoid the cost of carriage of bark to Ootacamund.

18. I would also advise that a certain number of trees, of those planted in 1863, be cut down when the season of maximum yield arrives, in order to test practically the method of cropping the plantations by coppicing. I would also recommend that a considerable part of the best bark thus obtained be sent to England for sale in open market, and the remainder be worked up in the Alkaloid manufactory. As soon as a sufficient amount of our admirable Crown bark is fit for cropping, I think that a supply should also be sent to the English market as I am convinced that its good quality will give a reputation to the Indian Cinchona barks.

19. In accordance with G. I. No. 426, of February 19th 1869, a considerable number of trees were treated by Mr. McIvor's mossing process in order that the practical and financial consequences might be determined on a sufficient scale.

I

I presume from the tenor of the various Orders on the matter that Govt. intend that I should examine and report on the results of the experiment. It appears to me that in order to arrive at a definite decision as to the practical value of the process, which will require an accurate consideration of the entailed expenses, the matter might be advantageously referred to a third person. I propose therefore that the various results be communicated to the Commissioner of the Neighberries as they are obtained, who will thus be able to give Government an unbiased opinion of the gross results and who can be referred to on the occurrence of any difference of opinion in the conduct of the experiment. If Government think fit, I will therefore report on this subject to Mr. Brett instead of to Government.

I have the honor to be,
Sir,
Your most Obedt. Servt.
John Broughton
Govt. Quinologist

Ootacamund
~~April~~ Augt. 31st 1870

Appendix.

Data of Estimates concerning C. Succirubra

Trees of the planting of 1862, yielded a mean per tree of 3.9 lbs. of Trunk bark containing 64.13 % of water; and 4.6 lbs. of Branch bark containing 70.79 % of water. Trunk bark dry contained 4.55 % alkaloids. Branch bark 3.2 % of alkaloids.

Trees of the planting of 1863, yielded a mean of 3.6 lbs. of Trunk bark, containing 64.38 % water; and 2.8 lbs. of Branch bark containing 71.87 % of water. Trunk bark contained 6.23 % of alkaloids in dry bark. Branch bark 2.63 % alkaloids.

Trees of the planting of 1864 yielded a mean of 1.745 lbs. of Trunk bark containing 60.78 % of water, and 1.3 lbs. of Branch bark containing 51.64 % of water. (bark was allowed to get partially dry before weighing) Trunk bark contained when dry 7.33 % of alkaloids. Branch bark 3.07 %.

Trees of the planting of 1865 yielded

yielded a mean of 2.66 lbs. of Trunk bark containing 73 % of water; and 2.83 lbs. of Branch bark containing 75 % of water. Trunk bark contained 6.49 % alkaloids when dry. Branch bark 2.28 %.

Trees of the planting of 1856 yielded a mean of 0.84 lbs. of Trunk bark containing 66.94 % of water, and 0.66 lbs. of Branch bark containing 73.68 % of water. Trunk bark when dry contained 6.61 % alkaloids. Branch bark 4.95 %.

Trees of the planting of 1857 yielded a mean of 0.68 lbs. Trunk bark containing 73.09 % of water, and 0.34 lbs. of Branch bark containing 65.64 % of water. Trunk bark contained 2.21 % of alkaloids, and Branch bark 0.81 %.

John Broughton
Govt Quinologist

Madras 26th January 1871.

91

From
The Superintendent of the
Chinchona Plantations
Ootacamund

To
The Right Honorable Lord Napier V.S.
Governor of Madras
&c &c &c

My Lord.

With reference to our conversation this morning, I have the honor to observe that in my opinion it would be desirable not to incur any further expenditure on the upper Chinchona Plantation at Mail Koondah as this Plantation is yearly injured by frost.

2. The Chinchona plants in the lower plantation are making very satisfactory growth, and it appears to me that it would be desirable to maintain this plantation, and fill up the vacancies for the next two years, when the plants will be sufficiently established to make head against the natural growth of weeds & jungle.

3. The cost of maintenance

need

14 December /66 No 248/9
13 —o— /67—o— 240/41
9 —o— /68—o— 117-118
19 - February /69—o— 336/7

No 2676.
Revenue 1870 Deptts.
From
The Govt. Quinologist

Dated 31st August
Recd: 5 Sept. 1870

Recd 24th Feb 3/71

Submitting report on the results obtained, connected with the subject of employment of Chinchona febrifuge

Recd 7 July 71 No 1087

C. 25 Sept 71 No 2 Sept 71

need not exceed 400 Rs annually.

I have the honor to be

My Lord,

Your most obedt Servant.

[illegible]

Supt Chinchona Plantations

Endorsement

To be added to
the other papers
& reserved for
Mr. Arbuthnot.
Mr. McTwyer's
decidedly of opinion
that the upper
plantation at
Mail condah
should be abandoned
altogether. This
unsuitable for
Cinchona and
ill situated for
a plantation
of australian
trees being in
the middle of
extensive natural
woods & without
any market for
the timber grown.
N.

Revenue 1871 Dept

№ 295-

From

The Supt. of the
Chinchona Plantn
Ootacamund

Dated 28 Jan 1871
Rec'd 30 Jan 1871

S. Ack 249-7 Feby 1871

Observing that
it would be desirable
not to incur any further
expenditure on the
upper China: Planta-
tion at Mail Kunda

Ack 7 Feby 1871

C 3 Jan 71 R 1 Feb

No. 18. Read the following letter from W. MACKENZIE, Esq., M.D., C.S.I., Inspector-General, Indian Medical Department, to the Chief Secretary to Government, Fort Saint George, dated Fort Saint George, 21st December 1870, No. 319:—

I have the honour to report, for the information of Government, that upwards of a year ago Mr. Broughton, the Government Quinologist, forwarded to me, for trial in the hospitals of this Presidency, a preparation of the Neilgherry Plantation Cinchonas, which, as it contains the several alkaloids in the exact proportions in which they occur naturally in the bark and is easily prepared, he suggested might be found a cheap and efficient substitute for English quinine.

2. With the view of subjecting its febrifuge power to the severest test, I selected, at the outset, for experimental trial, the notoriously feverish stations of Goodaloor and Luckady, in Wynaad; Russelcondah, in the Northern Circars; and Doomagoodium, in the Upper Godavery; and the results have been so favourable that I consider I may now bring the preparation to the notice of Government, with full confidence in its efficacy as a remedy in malarious fever, scarcely, if at all, inferior to quinine.

3. Five hundred and thirteen cases, some of which were of a severe remittent form, have been treated with this remedy with a success such as might have been expected from ordinary quinine. The average time each patient was under treatment was only 4·8 days, and the average total quantity of the drug used in each case amounted to but forty-three grains.

4. Mr. Wade, an intelligent and careful observer, who had previously conducted similar experiments with the salts of cinchonine, cinchonidine, and quinidine, was entrusted with the duty of testing the new remedy at Goodaloor, and he sums up his experience of it by stating that, although he does not consider it fully equal in strength to quinine, and rather more apt in large doses to cause vomiting or looseness of the bowels, still he entertains a high opinion of its antiperiodic power. He reports that, amongst the eighty cases treated by him, there were "many old patients who had previously suffered from fever, with usually a small "atonic pulse, weak habit of body, flabby tongue, torpid liver, and enlarged spleen. "These were generally emaciated, and with a tendency to anasarcous effusion." Taking these complications into account, the results at Goodaloor appear to me to be very satisfactory.

5. Assistant Surgeon Hazlett, who conducted the trials at Doomagoodium, makes the following remarks regarding his experience of the value of the drug:—
"In comparing the efficacy of the amorphous alkaloid with quinine, from "fifteen to twenty grains of the latter have usually been found sufficient here to "prevent a return of the paroxysm in uncomplicated cases of intermittent fever; but "in the sixty-six cases of quotidian, which were treated with the alkaloid, there are "only sixteen in which twenty grains and less were sufficient for the same purpose, "and, in the remainder of the cases, the amount given in each ranged from twenty "to seventy-two grains; but amongst these were several severe cases which would "probably have required considerably more than twenty grains of quinine

"Taking everything into consideration, I consider the amorphous alkaloid as "very little inferior in antiperiodic qualities to quinine, and it possesses the

"advantage of much less frequently or violently causing headache or giddiness, "although it has a tendency to cause nausea, and, in occasional cases, it acts as a "purgative."

6. Assistant Apothecary Kemp reports as follows from Russelcondah:—"The "general results relative to the amorphous precipitated alkaloid are in its favour, "as a serviceable and good antiperiodic, equal to quinine, without the attending "inconveniencies which accompany the administration of the sulphate" (of *quinine*).

7. Subsequently, I requested Dr. Scudder, at Arcot, to be good enough to give the remedy a fair trial in his dispensary practice, and he has reported as follows regarding the results—

i. "In all cases in which I have used it, I have found it a specific for the "different forms of malarious fevers, quite as much so as the quinæ sulphas.

ii. "The quantity of the amorphous quinine requires to be somewhat "larger than that of the sulphate, in order to produce the same result.

iii. "It requires about the same amount of acid to dissolve it, but does "not dissolve as speedily as the sulphate.

iv. "In *chronic cases* of fever I prefer small doses frequently repeated, in "combination with dilute sulphuric acid and infusion of chiretta, to large doses.

v. "In *acute cases* and recent, I prefer large doses without acid.

iv. "In my hands so far the amorphous quinine has been successful. "Every case has yielded to which I was able to pay proper attention, that is, "every case in which the patient has strictly followed instructions, and every case "that has occurred in hospital. I am, therefore, strongly in favour of using it in "the place of the sulphate, as far as possible."

8. The preparation may be most conveniently administered in the same dose and in precisely the same manner as the sulphate of quinine, viz., by dissolving it in water with the aid of a little dilute sulphuric acid. It may also be given in the form of powder alone, or mixed with any convenient vehicle, or diffused through water.

9. In a previous communication to Government, marginally noted, I have stated that Mr. Broughton estimated that, when the Neilgherry Cinchona plantations were in full bearing, they would be capable of yielding about 1300 lbs. annually of this preparation, and that the cost of it, if the manufacture were conducted on a large scale and on the plantations themselves, would eventually be reduced to a minimum of from 8 to 11 Annas per ounce.

Letter, No. 319, of 20th August 1869.
Proceedings of Government, No. 1415, of 13th October 1869.

10. During the last five years, the annual average consumption of English-made quinine and other cinchona alkaloids in this Presidency has been nearly 400 lbs., and past experience leads me to anticipate a gradual yearly increase in future. The cost of 400 lbs., at the medium price of Rupees 2-0-9 per ounce, has been Rupees 16,400, whereas the cost of the same quantity of Mr. Broughton's preparation, even at the higher figure of 11 Annas per ounce, would only be Rupees 4,400, making a difference of Rupees 12,000. Presuming, then, that but 200 lbs. of the annual expenditure would consist of the amorphous alkaloid, there would still be a saving to Government to the extent of Rupees 6,000.

99

11. The therapeutic value of the remedy has been brought to the notice of the medical profession through the medium of the *Madras Medical Journal*, and I am of opinion that it might now be very advantageously introduced, as a regular supply, into dispensary practice, and thereby considerably diminish the cost to Government of the more expensive quinine.

12. I would, also, respectfully recommend that an attempt may be made to acquaint the natives of the country with its efficacy, in fever, so that they may be induced to provide themselves with an indigenous febrifuge, so cheap as to be within the reach of the poorest classes. With the view of effecting so desirable a result, I would suggest that supplies of the preparation be issued from the Medical Stores to Collectors in the more feverish districts of the Presidency, partly for gratuitous distribution, and partly for experimental sale.

13. Further trials of the remedy are still in progress in different parts of the Presidency, and the results will, in due course, be communicated for the information of Government.

No. 19. ORDER THEREON, 11th January 1871, No. 29.

The Government have received, with much satisfaction, the report submitted by the Inspector-General, Indian Medical Department, on the successful results obtained in the experiments made for testing the therapeutic value of amorphous quinine. They concur with Dr. Mackenzie in the opinion that the amorphous quinine may, with advantage, be introduced as a regular supply in dispensary

2. Dr. Mackenzie's suggestion that supplies of this preparation be issued to Collectors in the more feverish districts of the Presidency, partly for gratuitous distribution, and partly for experimental sale, is approved.

(True Extract.)

R S Ellis

Chief Secretary.

To the Inspector-General, Indian Medical Department.
,, Revenue Department.
To all Collectors.
To the Examiner, Medical Accounts.

Exd. J. Wright.

20 Spare Chair

Government Gardens
Ootacamund 5th August 1870

No 204

From
W. C. McIvor Esqr
Supt Govt Chin Plants

To
J. W. Breeks Esqr
Commissioner Neilgherries
Ootacamund

Sir

1. I have the honor to acknowledge the receipt of your letter No 140 dated 23 July 1870, calling upon me for an opinion upon the various points raised by the Secretary of State in his despatch No 13 dated 19th May 1870.

2. With reference to the first point, viz: what systematic course should be adopted with reference to procuring and utilizing the very large quantity of alkaloids stored in the bark of the quinine yielding Chinchona, I would recommend, that, the trees should never be cut down, except, when absolutely necessary, for the purpose of thinning the plantations. The leaves are the means by which a continu

Revenue Department
No 182
Govt. of 1871 Madras.

PUBLIC.

To
The INSPECTOR-GENERAL,
INDIAN MEDICAL DEPARTMENT,
&c., &c., &c.

Dated January, 11th.
Recd. 19th Encl.

G. O., 11th January 1871, No. 29.

Sent 24-7 Sep 71

JANUARY.
Nos. 18-19.

Approving of the suggestion of the Inspector-General, Indian Medical Department, to issue to the more feverish districts of the Presidency amorphous quinine for gratuitous distribution and sale.

Rec'd 7 Feby 71 13. No 89

w 21 Feby 71 223

supply of bark can be produced. The bark of young trees may be removed, and in one year the reproduced bark will be richer in alkaloid than that which had been the growth of 7 years. This process may be continued year by year, and without injury to the tree. Thus a never failing supply of bark, rich in alkaloid, may be secured. The process under which this result may be obtained is, that which has before been brought to the notice of Government, and is generally known as the stripping process. By this process the bark may be removed annually from the trunk of the tree, also from the larger branches, and the reproduced bark of one year growth, will be richer in alkaloid, and almost equal in weight, to the original bark of 7 or 8 years growth. Thus, a harvest may be annually obtained, nearly equal in quantity, and exceeding in value what would be got were the entire plantation cut down. In the latter case, another valuable crop would not be obtained under 7 or 8 years, being the time required for the plants to grow to a size to produce bark of a value whether advantage of this system would be, that only the very best and richest bark would be sent into the market.

3. With regard to the advisability or otherwise of Government manufacturing quinine from bark produced on their own plantations. I feel incompetent to give a decided opinion, but my impression is, that it will cost the Government as much to produce a given quantity of quinine or any equivalent alkaloid, as they could purchase it for in the market. I imagine it would be more economical for the Government to sell their bark, and purchase the manufactured article. To establish the value of our plantations, and to enjoy the profit which has attended the cultivation of Cinchona in India, I think that not less than 2000 lbs of bark, should be sent this year into the home markets.

4. Adverting to the question whether the plantations should remain permanently in the hands of Government or not, it appears to me that Government having firmly established this cultivation should dispose of their plantations and leave the further extension to private enterprise. The distribution of seeds and plants from Government plantations is no longer necessary as private planters in the Straits largely extend upon this

Cultivation

cultivation now produce plants and seeds to an unlimited extent and in this respect are quite independent of Government aid.

The reasons that rendered it advisable for Government to dispose of their tea plantations after having established, tea as a product of India will, I think, be found to bear with equal force in the present instance.

6. Should Government decide to dispose of their plantations, it appears to me, that the time for so doing with safety, would be in 3 or 4 years hence, when our youngest plants will be sufficiently established, to be out of reach of all danger, and the more valuable species recently introduced, would also be firmly established.

7. With reference to your concluding para, I have issued strict injunctions that the instructions contained in para 4 of the Secretary of State's dispatch shall be carried out.

I have the honor to be
Sir
Your most obedient Servant
W. S. McEwen
Superintendent
Govt Chief Cinch

Ordnr
No 7 Feby 1870 No 1087

Ootacamund
8th August 1870

From, Mr John Broughton 105
Government Quinologist

To, J. W. Breeks Esq.
Commissioner Neilgherries
Ootacamund

Sir,

I am in receipt of your letter No 140, of July 23rd 1870 which reiterates the enquiries contained in the despatch of the Secretary of State, which appeared in Proceedings of Govt Revenue Department No 27, of July 11th 1870. To these enquiries I have the honor to append answers to the best of my opinion and present knowledge.

Enquiry I.

What systematic course would you recommend with reference to procuring and utilizing annually the very large quantity of febrifuge alkaloids

alkaloids stored in the bark of the trees?

I am of opinion that our present experience has hardly been sufficiently matured to permit the laying down of a definite and unalterable system of cropping the plantations. There are two modes, on the results of whose trial, the method ultimately adopted of harvesting will depend. These are 1st The method of moping the trees, of taking the bark from the living tree, and allowing it to renew under mode advocated by Mr Mc Ivor. 2d The method of coppicing. The first of these methods has hitherto been carried out on so small a scale that the cost and financial advantages have not been ascertained. At my recommendation the Government issued orders (G. Os. N.2453 of 22d Sep. 1858. and N.426, of 19th Feb 1869) that

that a certain considerable number of trees should be treated by mops. This was done in May 1869 and following months, and the results obtained, together with the cost of the same, will furnish trust-worthy data for determining whether the method of moping be finally adopted. The method of coppicing appears a very suitable mode of cropping the plantations. In 1857, some hundred trees of C. Succirubra were cut down in order that their bark might be sent to the English market. In the early part of this year the vigorous shoots that had sprung from the stumps had reached a height of 15 feet, and furnished bark of good quality. I am led to hold the opinion that a great part of the Neilgherry and the whole of the smaller plantations

of South India will be advantageously treated as coppice. This plan offers the further advantage of supplying a abundance of excellent fuel without encroaching on the Sholas.

In a report to Govt. now under preparation, I propose to recommend that a considerable number of trees be cut down in order to make a full trial of the coppice system.

It seems therefore to follow that it will be advisable to await a fuller experience, before the exact and permanent method of taking the bark of the plantations, can be decided. It will however be necessary as I had the honor showing in a late report (appearing Proceedings of Govt. No. 235, of 22nd February 1870,) to avoid the months from May to November, for taking the bark.

Enquiry

Enquiry II.

Should the bark be used in the Manufactory at Ootacamund for the supply of hospitals in India, or should the bark be sent to the London market for sale: or should a portion be sent home and a portion be worked on the spot.

I am entirely of opinion that the amount of febrifuge required for use in India should be prepared in this country. The grounds for this opinion are mainly economical and are as follows. The cost of drying and powdering the bark is dispensed with. The alkaloids are more readily and less expensively extracted from the bark while it is fresh. The cost of conveying the bulky bark to England, and the importation of the manufactured alkaloids to India is avoided. The manufacture

manufacture by Government of the alkaloids, permits of a great reduction in the labour and consequent cost of manufacture, by allowing of the preparation of a cheaper form than that of the crystalline sulphates. The necessary materials are as readily, and with the exception of sulphuric acid, are almost as cheaply procured in this country as in England. But I consider that Government could, if it be thought fit, act most usefully in reference to the private growers of Cinchona, by serving as a pioneer in the European market, accustoming it to the qualities of Indian barks, and thus overcoming certain prejudices which will arise from the different appearance occasionally presented by these barks, as compared with the

S. South American. Again the qualities possessed by the Crown barks of these plantations are such as are highly prized by the Home manufacturer of quinine, so that I think a considerable quantity should eventually be sent home in order to enhance the reputation of India grown barks. The febrifuge preparations employed in this country can be more advantageously made from the coarser C. succirubra since the authority of Government will avoid the influence of the ~~existing~~ traditional prejudice which exists in Europe against the alkaloids other than genuine, which abound in the Red barks.

Enquiry III.

Should the plantations remain permanently in the hands of

of Government for the supply of genuine in the Hospitals and the distribution of seeds and plants, or should the plantations be sold, as in the case of the Government Tea plantations?

I am decidedly of opinion that as much of the plantations as hereafter will be found necessary to provide febrifuge for the supply of the hospitals and dispensaries in India should be permanently retained in the hands of Government, as I understand it forms no part of the scheme of Govt. to make a profit by the direct sale of bark in opposition to the private growers. But Govt are very large consumers of the direct product of the plantations, and in that capacity will obtain the product at

at less cost than if it passes through several hands before it reaches the Medical Stores; as would be the case were Government purchasers of the febrifuge, and not proprietors. It appears to me that the ultimate end of the Cinchona undertaking (viz: that of supplying the febrifuge in the cheapest possible form to the ryots) will be only effected with certainty, by Govt having the complete control over all stages of its production. The case of the Government Tea plantations is not a parallel one, since Govt are not large consumers of Tea, as they are of the products of the Cinchona plantations. In the former, the intention of the introduction of Tea cultivation into India, was the development of Indian agriculture and commerce. In the Cinchona undertaking these are only accessories to the main object, which is that of

obtaining

ensuring a cheap and indigenous supply of the most important medicine employed in the country.

In order to justify the opinions I have ventured to state above I beg to adduce a rough Estimate, shewing the relative cost of the febrifuge made on the spot, and that imported from Europe.

In carrying out the instructions I took the honor of receiving from the Home Government I have paid much attention to the production of a febrifuge for use in Indian Hospitals and Dispensaries, cheaper than the quinine sulphate. In the small manufactory at Ootacamund have been prepared since January last 90 lbs. of such a preparation, consisting of the mixed alkaloids precipitated in an amorphous but colourless state. This has been largely used in Dispensaries and Hospitals, and with such success that I believe I am justified

justified by the evidence in stating that it may nearly entirely replace the quinine sulphate hitherto employed here. I now subjoin an Estimate for the conversion of the now disused Jail at Neddiwattum into an Alkaloid Manufactory. And also Estimate for the yearly cost of preparing 800 lbs. of amorphous Alkaloids.

	Rs.
6 large copper boilers	1500
8 large percolators	1600
Setting of boilers & percolators	2500
Sundry alterations in building	1000
Sundry fittings	1500
Water supply	350
Vessels	400
Presses	900
Stock of Alcohol	900
Contingencies	500
Still for recovering and rectifying Alcohol	1700
Native mills for grinding	40
Rupees	11890

Yearly Expenses to produce 800 lbs. of Alkaloids.

I am informed by Mr. Mc. Ivor that the cost on the spot of Red Bark will range from 4 to 6 a lb. I adopt the higher price in the Estimate, and reckon its mean yield at the low one of 4 per cent.

	Rs.
Bark	5000
Cost of Acid	600
" Lime	100
" Soda from native sources	150
Labor. 24 Coolies 12 @ 8/. 12 @ 7/. per month	2160
Superintendents pay @ 100 "	1200
Waste of Alcohol	300
Fuel	720
Filters bags &c.	500
Contingencies	800
Rupees	11530

Dividing these yearly total expenses by 800 we get the cost per lb. Hence the cost of a lb. of Alkaloid is Rs. 14. 3. 4/. or reckoning interest at 5 per cent on "plant" — about one Rupee per Ounce.

The cost of Quinine sulphate is not accurately known in this Presidency

Presidency; the purchases for the Medical stores being effected in England. It cannot however be less when brought to this country than Rs. 3 per ounce, and probably averages considerably more.

It is difficult to Estimate accurately the amount of quinine that would be used in this Presidency when its cost is thus reduced, but it will certainly exceed 800 lbs. per annum. A larger quantity would be prepared at a still less cost. I content myself with Estimating the comparative costs of entirely indigenous, and imported febrifuges of equivalent therapeutic value, at 1 rupee and 3 rupees respectively per ounce.

Enquiry IV.

If you are of opinion that the plantations should be eventually sold, at what stage of their development, that is, when do you think they ought to be sold?

As I have stated above, I am not of opinion that the amount of

of plantations requisite to supply the febrifuge required in the Govt. Dispensaries, should be allowed to pass out of the hands of Government. But it is very possible that the whole of the plantations may not be required for this purpose. If this eventually be found to be the case, (respecting which contingency I can offer no well grounded opinion at present) it may be found advisable to sell a part, but this is obviously a matter that cannot be decided for several years to come.

I have the honor to be,
Sir,
Your most Obed. Servt.
John Broughton
Government Quinologist

Rec: 27/05/70

No. 42

Commissioner's Office
Ootacamund
2d September 1870

From J. W. Breeks Esquire
Commissioner
Neilgherries

To The Secretary
to Government
Revenue Department
Madras

Sir,

I enclose Replies from Messrs. Broughton and McIvor to the enquiries of the Secretary of State in his Chinchona Despatch dated 19th May 1870 No. 13 embodied in Proceedings of Government Revenue Department 11th July 1870 No. 27.

2. I requested the two gentlemen to record their opinions in the form of answers to the following querries.

I. What system of cropping the Bark is the best?

Two methods are proposed - firstly, Barking the trees and covering them with moss to induce a rapid reproduction of the bark - secondly, coppicing.

Mr. McIvor advocates the former - Mr. Broughton thinks that we have not yet sufficient data for deciding on the comparative

comparative advantages of the two methods, but he is led to hold the opinion that a great part of the Neilgherry and the whole of the smaller Plantations of Southern India will be advantageously treated as coppice".

3. The information we have at present with regard to either mode is scanty. Mr. Howard in his Analysis Reports* supports Mr. McIvor's statement that the yield of Alkaloids is increased by the mossing process.

See Pro: of Govt. 27th Sept. 1865 No. 542. Mr. Howard's Report June 15. 1864. Pro: of Govt. 31st Oct. 1865 No. 556A. Mr. Howard's Report Augt 1st 1865. and Pro: of Govt 20th June 1867 No. 265. Mr. Howard's Report Febry 4th 1867.

In one instance however he says.

Mr. Howard's report Febry 4th 1867. "The effect of "the application of moss for a few months "to No. 2 (Succirubra) does not show as com- "pared with the original unmossed bark "of No. 3 (Succirubra) so much real advantage "as might have been expected."

And again reporting on the third harvest of renewed bark (Succirubra) he remarks

× Pro: of Govt. 5th Augt 1869 No. 68. Mr. Howard's Report Sept. 1st 1868.

"I hoped to obtain a larger produce than "last time but was disappointed in finding "a smaller amount of Salts of Quinine "viz. 6.15 per cent against 8.45 per cent in the "specimen of renewed bark from the same

"tree

"tree on which I had the honor to report in "February 1867".

|2|

Pro: of Govt 12th April 1867 No. 206. Mr. Broughton's Letter 1st April 1867.

Mr. Broughton has reported that "the advantages of the "mossing process applied to this Bark (Red "Bark) makes itself at once evident to the "worker by the readiness and purity with "which the Sulphates crystallize".

4. The experiments however, from which these results have been deduced, have been necessarily conducted on a very limited scale and in all cases refer to the bark of young and individual trees only. Moreover as yet we have no information of the cost of mossing, nor do we know what amount of bark can be annually taken from a tree without injury to its growth.

I need hardly say that I do not share in the summary condemnation of the mossing process expressed by Mr. Clarke in his report to the Bengal Government dated 10th February 1870 para 27. He says.

"Dr. Anderson has decided, after no very "long experimenting to have nothing to do "with that process. About that decision there "is no second opinion at Rungbee. Any person "may, however, quickly decide it for himself "in Calcutta".

That

That the value of the mossing process for India should be decided by an experiment in Calcutta seems to me a most excentric proposal. Moss is abundant on the Neilgherries, and the process is undergoing a careful and systematic trial, in accordance with Government Order, Revenue Department 9th February 1869 No. 406. Until the results are known it will be well to defer judgment.

5. Messrs. Howard and Broughton's reports point out, with regard to the yield of Quinine differences in the different varieties of Chinchona and in the same trees under different conditions.

Thus the percentage of Quinine in the Succirubra appears to decrease with age; this is not the case with the Officinalis. Again "the* yield of Alkaloids varies "greatly with the vigour of growth, size of tree, and consequently with character of soil. The most vigorous and quickly grown trees yield a far richer bark than the more stunted ones of the same age."

*para 7 Mr Broughton's report 9th December 1869 in Pro: of Govt. Rev. Depart. 22 February 1870 No. 235.

*para 6 Mr Broughton's report 9th December 1869 in Pro: of Govt. Revenue Department 22 February 1870 No. 235.

These circumstances may have some bearing on the point under consideration

and may possibly render different methods of cropping the Bark desirable with different varieties of Chinchona and different plantations.

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6. Between the two methods of cropping proposed, I take it the question to be determined is — Whether an acre of land will yield more Alkaloids in a given time under the mossing than under the coppicing system, and if so whether the increased yield, more than covers the increased expense.

7. I would suggest that a certain number of trees of the same age of each variety of Chinchona should be treated on each of the two systems. The bark harvested under this experiment might be annually sent home and sold for the reasons given in para 12 under.

In four years it would be evident which of the two systems was the best and the experiment would be of practical value to many who have embarked in Chinchona cultivation.

8. The II question is —

Whether the Bark should be manufactured in India, or sent home for sale; or whether a portion should be sent home and a portion worked on the spot.

Mr Broughton is of opinion that the amount of febrifuge required for use in India should be manufactured in this Country- because the expenses of drying, powdering, conveying the bulky bark home and importing the manufactured Alkaloids are thereby avoided: because the process of manufacture can here be simplified and cheapened by employing fresh bark, and by preparing the Alkaloids in a cheaper form than that of crystalline Sulphates: and because the necessary materials are so readily and (with the exception of Sulphuric Acid) almost as cheaply procurable here as in England.

Mr. Mc. Ivor is unable to give a decided opinion, but imagines that it would be more economical for Government to sell their bark and purchase the Alkaloids than to manufacture them.

9. Both gentlemen recommend that Government should send into the Home Market a considerable quantity of bark so as to ensure the reputation of the India grown barks and remove certain prejudices arising out of occasional peculiarities in their appearance which may at first interfere with their sale.

10. The Inspector General of Her Majesty's Indian Medical Department (J. Mac Kenzie, C.B.C.S.I.) reports to me that the future yearly requirements of the Madras Presidency may be put at 1,700 or 2000 lbs of Alkaloids. Allowing this same for Bombay and double for Bengal and the North of India, some 5000 lbs of Alkaloids will be required annually.

11. For the reasons alleged by Mr. Broughton, I am of opinion that it will be more economical to manufacture in India

12. In the interests of those who have embarked in Cinchona cultivation the Government may well send home, as suggested by Messrs Broughton and Mc Ivor, however about 5000 lbs of Bark annually to accustom Home Buyers to the Indian product.

There is often a difficulty in establishing a demand for an article which, although intrinsically superior, differs somewhat in externals from what Brokers and Buyers have been long accustomed to.

In sending bark of the different varieties home for sale, the Government might do good service.

This however should only continue

for

for 3 or 4 years or until such time as Indian Bark finds its way home from Private sources, for under no circumstances should Government as an Exporter of Bark, enter into competition with Private Planters.

13. The III question is.

Should the Plantations remain permanently in the hands of Government for the supply of Quinine in the hospitals and the distribution of seeds and Plants; or should the Plantations be sold as in the case of the Government Tea Plantations?

Mr. McIvor thinks that Government "having firmly established this cultivation should dispose of their plantations and leave the further extensions "to private enterprise" for the same reasons that induced the sale of the Government Tea Plantations; and he states that Private Planters are now quite able to supply the demand for Plants and Seeds without the aid of Government.

Mr. Broughton thinks that Government should retain as much of their Plantations as will supply a febrifuge

in

in a cheap form and sufficient for their wants - because Government being a large consumer of the produce will thus obtain it most cheaply and because Government can only secure for the masses a supply of febrifuge at the cheapest price by retaining control over all stages of its production.

14. Mr. Broughton remarks that the case of the Government Tea Plantations is not a parallel one because Government are not large consumers of Tea and had no object in introducing its cultivation but that of developing Trade and Agriculture whereas in the case of Chinchona these objects are secondary to that of ensuring a cheap and indigenous supply of an important medicine.

In support of his opinion he gives an Estimate of the Plant and working expenses for manufacturing here annually 800 lbs of Amorphous Alkaloids.

He calculates that the cost of such Alkaloids would be 1 Rs an ounce, that of imported Quinine being at least 3 Rupees.

15. It

15 It seems to me somewhat premature to decide now whether the Government should retain the Plantations permanently in their own hands and manufacture the Alkaloids they want.

But as far as I can see I am of opinion that Government should retain possession of the Plantations at any rate for a considerable time longer for reasons which I will give by and bye.

And by manufacturing for themselves they will I think for some years obtain their annual supply of Alkaloids at a cheaper rate than if they imported them.

16. I am aware that it is seldom or ever that Government can grow or manufacture so cheaply as Private Individuals, nor is the attempt generally desirable, but there are circumstances connected with the question under consideration, which seem to me to make it exceptional. It is highly improbable that any Alkaloid Manufactory will be established in India except by Government. We have a gentleman on the spot in the service of Government whose scientific attainments excellently qualify him to introduce the Manufacture. And in my judgment the most weighty argument

for

for the Government retaining the whole process of production in their own hands will be found in the opportunity thereby afforded to the Government Quinologist for simplifying and cheapening the manufacture of an efficient febrifuge for the use of the population at large.

17. It is evident* from the report of the Madras Chinchona Commission that "the four Alkaloids occurring in our Barks are nearly equal in febrifuge power." If Mr. Broughton is successful in the preparation of a substance from them which can be conveniently administered, which is equal or nearly equal to Quinine Sulphate in its medicinal effects, and which can be made so cheap as to be within reach of the million the object of the introduction of Chinchona cultivation into India, as described in the Secretary of State's despatch No. 27 30th September 1865 will have been attained.

* Mr Broughtons report 28th Novr 1867 Pro. of Government Revenue Department 13th December 1867 No. 340

18. Still it may be said that Government in the interests of the Public and for the furtherance of Mr Broughton's experiments might establish a Manufactory and yet sell their Plantations

buying

buying Bark from Private growers. This I am disposed to think, will be the course ultimately taken. But for some time to come Plantations will be wanted for the Quinologists experiments as to the influence of Season, age, altitude, climate and cultivation on the amount of Alkaloids in the Bark, of the different varieties of Chinchona.

The investigation of these and similar problems is of great moment and will take time to complete. The information when obtained will have an important effect in determining the conditions under which the various varieties of Chinchona will repay cultivation.

19. No doubt the annual working expenses of the Neilgherry Plantations have been heavy. To attain the object aimed at viz: the introduction of Chinchona into India no expense has been spared; but the working charges now should be cut down to somewhat the same level as those on private Estates, two or three extra hands being retained for propagation and for planting out not more than (say) 5 acres of each

new

new variety that may come to hand.

20. The IVth question is. [3]

<u>If you are of opinion that the Plantations should be eventually sold, at what stage of their development should they be sold?</u>

Mr. McIvor thinks 3 or 4 years hence would be the best time to dispose of the Plantations when the youngest plants will be sufficiently established. Mr. Broughton is against the sale of the Plantations but thinks it possible that it may eventually be found that Government possess larger Plantations than they require and that it may be advisable to sell a part.

21. If it be determined to dispose of the Plantations on the ground that Government have fulfilled their mission and "firmly established Chinchona cultivation in India" and that the further development of the Industry may well be left to private enterprise, the mode, time and place of sale most likely to fetch the best price have only to be considered.

Mr. McIvor's letter enclosed para 4.

The Government Chinchona Trees have this advantage that their growth is in advance of all others and their

Bark

Bark, by being first in the Market will go off at present high rates. This advantage will be lost if the Bark is not sent home and the sale of the Plantations is deferred for several years.

22. As explained in my letter* to Government submitting the Chinchona Superintendent's annual Report for 1869/70. I am of opinion that it is not worth while incurring any further expense on the Mailcondah Plantation.

*28th May 1870 ct. 25

Up to the 31st March 1870 Rs. 42,175 had been spent on this Plantation of which 75 acres have been planted out.

I take leave to refer to paras 8 and 9 of my letter above quoted.

If my suggestion with regard to the Mailkoondah Plantation be approved, the remaining plantations which I would recommend the Government to retain possession of would all be situated within easy reach of each other and would consist as follows.

Dodabetta	375 acres
Neddiwuttum and Pycarah	750 "
	1,125

23. I add some general remarks. At page 141 of Mc Culloch's Dictionary I see it recorded that "the sum expended by the "Indian Government in the purchase of "this valuable medicine (Quinine) "is stated to exceed five lacs annually." Considering this it seems to me that the main intention of the Chinchona undertaking will be incompletely carried out unless India be placed in a self-supplying condition. I consider it both politically and economically desirable that the febrifuge employed in this country should be supplied from internal sources; more especially if the Chinchona undertaking be intended to have the effect of providing "an abundant supply of this "febrifuge at so cheap a rate as to be "within the means of the population at "large, the coolies employed on works and "private plantations the small cultivators their wives and families," as stated in the Secretary of State's Despatch above mentioned. I can see no probability of this intention being speedily realized unless Government lead the way in every stage of Production.

24. I ought to say that it was altogether at my instance that Mr Broughton's inserted in his report an estimate of the Plant and working expenses for manufacturing some 800 lbs of Alkaloids annually.

I

I suggested this, not under the idea that the time had come for applying to Government to sanction such an outlay, but in order to have on record some data towards forming an opinion as to the desirability of Government becoming by and by Manufacturers of their own Alkaloids.

25. For the present, I am quite of Mr Broughton's opinion as expressed in his report* dated 28th November 1867 viz: that he should steadily persevere in his endeavours "to find a process which "would yield the Alkaloids in a state "of sufficient purity by simple means" and to produce an efficient febrifuge which can be "prepared by a method "which an ordinary Apothecary would "have little difficulty in learning to follow". Since the January last he has already produced 70 lbs of such a substance, and if this prove completely successful in the Medical Department, he can as he suggests "extend the Manufacture "and as opportunity offers include "that of Crystalline Sulphates".

26. Working steadily with this end in view Mr Broughton will in the

* Pro. of Govt Revenue Department 13th Decr 1867 No. 40.

Course

course of a year or two be able to supply reliable data.

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(1.) as to the best mode of cropping the Bark.

(2.) As to the most favorable conditions for the growth of the several varieties of Chinchona.

(3.) As to the extent of Plantations that will have to be retained by Government in order to supply the quantity of febrifuge they require.

(4.) As to the cost of establishing a Government Manufactory equal to the supply of India's wants.

With reliable information before them on these points it will be easy for Government to decide whether or no it be desirable to retain the Plantations in their own hands and to establish a Manufactory at Ootacamund or Rungbee or elsewhere.

I have the honor to be,
Sir,
Your Most Obedient Servant
[illegible]
Commissioner.

(137)

I think that unshild express a general agent to Mr. Broughton views & proposals and especially with reference to the establishment of the manufacture at Nedirontheen in the old Jail building but I agree with Mr. Arbuthnot that a report should be called for contemplating a reduction of popette of Rs. 10.000 in the annual expenditure and that the Commissioner should be particularly directed to report whether the two outlying plantations of Mailcoordah & Kycara could be brought into the market with any prospect of getting [illegible] to [illegible]

[illegible] to Lord [illegible] [illegible] & planted

price. with the view of
ascertaining in what terms the
Govt. could advantageously part
with these two Plantations it
would be desirable to know exactly
what annual saving would
be effected by abandoning them.
It might be the interest of Govt.
to give them up for a mere
nominal price if purchasers
could be found whose character
& resources warranted the belief
that the Plantations would be
preserved & economically managed.

N.

Sanctioned H.E.
[illegible]

N.D. 141

Pros: of the Madras Govt.
Under date the
Read the following
letter from the Govt.
Quinologist

H.E. 31st Augt. 1870

The Govt will now proceed to dispose of the × marginally noted papers which relate to the maintenance of the existing Cinchona plantations & the supply of quinine extent to which the manufacture of quinine is to be carried on in this Presidency.

× Letter from Govt Quinologist dated 31st Aug. 1870.
Do from Commr (with enclosures) dated 2nd Septr. 1870, No 42

I. D. S.

Mr Broughton's suggestions appear to be very sensible but before sanctioning any new source of expense in connexion with the (in chosen experiment) I think we should look into the expenditure at present incurred. The scheme of retrenchment & transfer to Local Funds

In the first named ~~Mr Broughton's~~ letter Mr. Broughton proposes ~~propositions are~~

(1) That he be authorized to expend the savings from the sanctioned Budget-grant of his Estabt. in converting the disused jail at Neddiwuttum into a suitable place for the manufacture of "Amorphous quinine".

(2) That a certain number of the trees planted

planted in 1863 be
cut down in order
to test the method
of "cropping" the plan-
tations & obtaining
quinine from the shoots
The propriety of
adopting the first
proposition mainly
hinges upon the va-
lue of "amorphous
quinine" on which
point the report of
the Insptr. Genl.
Indian Medical Deft.
~~will~~ not necessarily be awaited
will be requested to expedite it.
In the meantime, the
Commissioner of the
Neilgherries is requested
~~state~~ ascertain whether the ~~he~~
holding is likely to be required
~~aware of any~~
the purposes of the plantation
~~objections to Mr.~~
~~Broughton's scheme~~.
The

which I proposed of
Government & which
the letter sent thence to
Government was based
provided for a reduction
of expenditure of Rs 10000
on the amount budgetted
for for the current year.
I think that Mr Brooks
should at once be told
to look into the expenditure
and state what reduction
he considers feasible,
it being at the same
time intimated to him
that the Govt. wish to
reduce the expenditure
in the coming year
to Rs 10000 less than
the sum allotted for the
present year and also
that they are favorable
to Mr Broughton's primary
proposals. A.G.P.
I would attest. I
also request Dr
Mackenzie to expedite
the submission of his
report as much as
possible.

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The Govt. Quino-
logist should also
name the proba-
ble cost which
will be entailed
by it.—
3. It is satisfac-
tory to learn that
so considerable
a percentage of
quinine is yielded
by the shoots of
trees which have
been felled; and in
order that the value
of the quinine so
obtained may be
tested, and also with
a view to the early
introduction into
the English Market
of the Indian grown
crown-barks, the
Supdt. of the
Chinchona

I have no doubt that the
Nilgherries plantation
might be abandoned. It
is a mere shame at
present I am told.
A.G.P.

Chinchona plantations is requested to fell a moderate number of trees, the bark of which Mr. Broughton will prepare for shipment to England. The Govt have already decided not to incur any further expense on the extension of the Neilgherry Chinchona plantations, and further operations in regard to Chinchona will be confined to the maintenance of the existing plantations, and the acclimatization of the tree to a very limited extent in certain districts which offer suitable sites for the purpose. They are, however, inclined to believe that the Govt. Quinologist has under-estimated the demand for quinine which is likely to exist when the price is considerably lowered. It must be remembered that the drug at present fetches a scarcity price, and that even in India where its effects have been experienced, the bulk of the people are

and the introduction of such further varieties from time to time as may be deemed

are altogether un-
acquainted with it.—
AW.

The proposal at the
end should be noted
I fancy Mr B:
anticipates collision
with Mr M!

5 In accordance with
the request contained in
para 19 of Mr Broughton's
letter, the Commissioner will
be requested to test, by
an accurate examination
of results the value of
the "mossing process"
& submit his opinion
to Govt.

Revenue Department

(49)

Proceedings of the Madras Government
Under date the

Read the following papers

From the Govt. Quinologist
Subj. report on the results obtained, connected with the subject of employt. of Chinchona febrifuge. } (H.E. 31st August 1870)

From the Commr. of the Neilgherries
Forwarding replies from Messrs. McIvor & Broughton to the enquiries of the Secy. of State in Des. of 19th May last. } (— " 2d Sept. — " No. 42)

From — Do. — Do. — } (— " 19th Oct. — " — " 57)

The Govt. will now proceed to dispose of the papers recorded above which relate to the maintenance of the existing Chinchona plantations and the extent to which the manufacture of quinine is to be carried on in this Presidency.

Contains remarks by Hon. Messrs. Arbuthnot & Sim

See Encl. I. D. S.

C. 20th Sept. / 20 R.C. 4th Oct. 70

2 In the first ~~named~~ recorded letter Mr. Broughton proposes—

(1) That he be authorized to expend the savings from the sanctioned Budget grant of his Establishment in converting the disused jail at Neddiwuttum into a suitable place for the manufacture of "Amorphous quinine."

(2) That a certain number of the trees planted in 1863 be cut down in order to test the method of "~~cropping~~ coppicing" the plantations ~~and obtaining quinine from the shoots~~

3. The propriety of adopting the first proposition ~~mainly~~ hinges ~~upon~~ on the value of "Amorphous quinine" on which point the report of the Insp. Genl. Indian Medl. Deptt. of 21. Dec. 1870 is so favorable ~~must~~

(E.O. (Public) 11. Jan. 71 No. 29.)

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that the Govt. have no hesitation in adopting Mr. Broughton's proposal and authorising him to carry it out provided that the building in question can be spared for the purpose. On this point the Commr. will report.

A provision of Rs. 7280 has been made in the Budget for 71-72. for converting & fitting up the jail and any expenditure on the work wh. it may be desirable to incur in the short remaining period of the current official year can doubtless be met from savings.

~~must necessarily be awaited and he will be requested to expedite it. In the meantime, the Commissioner of the Nilgheries is requested to ascertain whether the building is likely to be required for the purposes of the plantation. The Govt. Quinologist in his Budget Estimate for 1871-72 has placed the total cost of the conversion of the Jail into a Manufactory at Rs. 310~~

4. It is satisfactory to learn that so considerable a per-centage of quinine is yielded by the shoots from stumps of trees which have been felled, and in order that the value of the quinine so obtained may be tested, and also with

with a view to the early introduction into the English Market of the Indian grown cinchona barks, the Supt. of the Cinchona plantations will be directed to fell a moderate number of trees at his superintendence, the bark of which Mr Broughton will prepare for shipment to England

5. The Govt have already decided not to incur any further expense on the extension of the Neilgherry Cinchona plantations, and further operations in regard to Cinchona will be confined to the maintenance of the existing plantations & the introduction of such superior varieties as may from time to time be discovered in

in Tarai districts which offer suitable sites for the purpose. They are, however, inclined to believe that the Govt Quinologist has under-estimated the demand for quinine which is likely to exist when the price is considerably lowered. It must be remembered that the drug at present fetches a scarcity price, and that even in India where its effects have been experienced, the bulk of the people are altogether unacquainted with it.

6. In accordance with the request contained in para

para 19 of Mr Broughton's letter, the Commissioner will be requested to test, by ~~an accurate~~ careful examination of results, the value of the "mossing process" and submit his opinion to Govt.

7. The Commissioner's letter dated Septr. 2d, 1870, No. 42, ~~with~~ in which are enclosed letters from Messrs. McIvor and Broughton, supplies information on the points indicated by the Secretary of State's Despatch dated 19th May 1870, No. 13, ~~in which~~ calling for a report

report on the course to be adopted with reference to the Govt. plantations and the manufacture of quinine. ~~was called for~~ Mr. Breeks has dealt thoroughly with the question, and it is unnecessary to review in detail the subject matter of his communication which embraces the suggestions of Messrs. Broughton and McIvor. It will be forwarded to the Secretary of State whose reply will ~~deter-~~ influence ~~mine~~ the future position of

an arrangement which would still leave 825 acres available for State purposes. Should he be of opinion that a sale cannot be effected on terms by the Government to accept, he will consider the expediency of utilising the Mailkondah tract as a Fuel Reserve - and offensive to the Pycara tract and allowing it to develope as an untended Cinchona plantation, stopping all further expenditure on it, save such as may be occasionally necessary for collecting the bark. He will submit his opinion on these suggestions at an early date.

9. Ordered that the following letter be despatched to the Secretary of State.

(Here enter)

Sir

Subject.

Mailkoondah is useless as a Chinchona plantation - but the land might be reserved for a fuel plantation.

I would not part with the Pykara for drivers reasons. The offer to save Rs 10,000 - has lapsed. I was not aware that the budget was only Rs 45,000 - It is obvious that on such a sum a saving of Rs 10,000 cannot be

suddenly made. and I earnestly deprecate sacrificing this great & important Experiment to carry out this ~~[illegible]~~ small economy.

I. D. S.

I would dispose of Mailkondah or Pycara to private parties if any reasonable offer can be got. N.

Maintenance of Industry Chinchona Plantn & the Intent of Manufacture of Quinine

The two letters referred to in this draft have not been received with his packet on this occasion

A.A.

Revenue Department.

No. 249 (6)

PROCEEDINGS of the MADRAS GOVERNMENT.

Under date the 7th ~~January~~ Feby 1871.

Read the following ~~letter~~ papers.

From the Govt. Quinologist.

Subg. report on the results obtained, connected with the subject of employt. of Chinchona febrifuge. (H.E. 31st August 1870)

From the Commr. of the Neilgherries

Forwarding replies from Messrs. McIvor & Broughton to the enquiries of the Secy. of State in Des: of 19th May last. (— " — 2d Septr. " No. 42)

Pro: Public Department.

Approving of the suggestion of the Insp. Genl. Indian Medl. Deptt. to issue to the more feverish districts of the Presdy. amorphous quinine for gratuitous distribution and sale. (11th January 1871 No. 29)

From the Supt. of the Chin. Plantations Ootacamund. (— 26th — do — " —)

J.D.S.

A.A.

Same as respects sale of Py. Kara —

The Government proceed to dispose of the papers recorded above which

which relate to the maintenance of the existing Chinchona plantations, and the extent to which the manufacture of Quinine is to be carried on in this Presidency.

2 In the first recorded letter Mr. Broughton proposes

(1) That he be authorized to expend the savings from the sanctioned Budget grant for his Establishment, in converting the disused jail at Nedatiwuttum into a suitable place for the manufacture of "Amorphous Quinine"

That

(2) That a certain number of the trees planted in 1863 be cut down in order to test the method of "coppicing" the plantations.

3. The propriety of adopting the first proposition hinges on the value of "Amorphous Quinine," on which point the report of the Inspector General Indian Medical Depart^t, dated 21st December 1870 is so favorable that the Government have no hesitation in adopting Mr. Broughton's proposal and authorising him to carry it out provided that the building in question can

(G.O. (Public) 11th Jany 1871 No. 29)

can be spared for the purpose — on which point the Commissioner will report.

4. A provision of Rs. 7,280 has been made in the Budget for 1871/72 for converting and fitting up the ~~jail~~ building, and any expenditure on the work which it may be desirable to incur in the short remaining period of the current official year can doubtless be met from savings.

5. It is satisfactory to learn that so considerable a percentage of Quinine is yielded by ~~the~~ shoots

shoots from stumps of trees which have been felled; and in order that the value of the Quinine so obtained may be tested, as also with a view to the early introduction into the English market of the Indian grown ~~—~~ barks, the Superintendent of the Chinchona plantations will be directed to fell a moderate number of trees at the proper season, the bark of which

which Mr. Broughton will prepare for shipment to England.

6. The Government have already decided not to incur any further expense on the extension of the Neilgherry Cinchona plantations, and further operations in regard to Cinchona will be confined to the maintenance of the existing plantations, and the introduction of such superior varieties as may from time to time be discovered in

Ootacamund & in those districts which offer suitable sites for the purpose. They are, however, inclined to believe that the Govt. Quinologist has underestimated the demand for Quinine which is likely to exist when the price is considerably lowered. It must be remembered that the drug at present fetches a scarcity price, and that even in India where its effects have been experienced, the bulk of the people are altogether unacquainted with it.

7. In accordance with the request contained in para

question of the relative merits of State Control and private enterprise may be hereafter decided, the Govt. are desirous of effecting a sensible reduction in the charges of the Neilgherry Cinchona plantations. The actual expenditure of 1869-70 was Rs. 47,055; the budget estimate for the current year was 45,400, and that sent in by the Superintendent for 1871-72 is 39,100. The Govt. desire to see the annual expenditure still further reduced and as a step in this direction, the Commr. of the Neilgherries will be

We merely ask whether it can be sold. It may be as useful in respectable private hands as in ours.

Does Mr. Cor. be thought still desire this? This decentralisation scheme which induced the retrenchement has been negatived — Why starve to benefit an undertaking when thousands die annually of fever.

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be called on for a report as to the prospect of being able to effect a sale on reasonable terms of both the Mail Koondah plantation (which he has recommended should be sold) and also the plantation at Pykara, an arrangement which would still leave 825 planted acres available for State purposes. Should he be of opinion that a sale cannot be effected on terms which the Govt. ought to accept, he will consider the expediency of abandoning the upper portion of the Mail Koondah plantation altogether, filling up with Cinchona plants & fencing in the lower portion of that plantation & the Pycara tract, and allowing them to develope as Cinchona

I dissent as to Pykara — J. D. S.

I think Mr. McIvor should also be consulted as to Pykara.

I did not mean this — I meant that it should be planted again where [illegible] with Cinchona [illegible] will succeed

Cinchona ~~plantation~~ copses or forest, stopping all further expenditure on them, save such as may be ~~occasionally~~ for fencing & watching them and necessary for collecting the Bark.

He will submit his opinion on these suggestions at an early date.

10.— Ordered that the following letter be despatched to the Secretary of State.

(Here Enter)

[signature]

and guarded & that it should be treated like a fuel reserve but one with Cinchona Trees, in fact that with Malcolm & Pycara it not sold should be allowed to grow up as a wild Cinchona copse.

N

We might have the papers again in Council.

3 To the Commissioner of the Neilgherries Dept
1 — Govt Quinologist
14 — Br of Rev
6 — Acctt Genl
5 — Public Dept

7