M.R.O. 1—5,006—16-10-50.

(1) Number of pages 158

(2) Date of repair 26. 3. 54

(3) Initials of the Referencer

MADRAS RECORD OFFICE

Government of Madras

Revenue DEPARTMENT

G.O. No. 617 Press
~~B.P. No.~~ ~~Mis.~~

Dated 12th March ~~195~~ 1866

Original

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Read the following papers :—

No. 175. Despatch from the Right Honorable the Secretary of State for India, (Public,) to His Excellency the Honorable the Governor in Council, Fort Saint George, dated India Office, London, 30th September 1865, No. 27 :—

No. 11 of 1865, dated February 22nd.
" 16 " " March 14th.
" 23 " " April 4th.
" 27 " " " 13th.
" 31 " " May 11th.
" 34 " " " 26th.
" 39 " " June 17th.
" 48 " " July 11th.
" 50 " " " 25th.

1. I have considered in Council your Despatches in the Revenue Department noted in the margin, on the subject of Chinchona cultivation, and have perused, with special interest, Mr. McIvor's valuable Report for 1863-64.

2. I observe, from the statement of expenses connected with Chinchona cultivation, from the commencement of operations to April 30th, 1864, that the actual expenditure has fallen short of the estimate by nearly 4,000*l*. This result is very satisfactory, and reflects great credit on Mr. McIvor's management.

3. The supply of bark transmitted with your Despatch, dated May 11th (No. 31), was submitted to Mr. Howard, and I herewith forward fifteen copies of the Report of his Analysis. You will observe that although this analysis shews that the Neilgherry barks are very rich in febrifuge alkaloids, and that they are, in this respect, incomparably superior to the barks imported from South America, yet that "the "crystallizations of quinine are mixed with some sulphate of chinchonidine, which is, "commercially, but not medically, a disadvantage." At present, quinine is the only product of the bark which has great commercial value, yet it is the opinion of the most eminent Chemists, such as Mr. Howard and Dr. De Vry, who have made the analysis of bark their special study, that, of the other Chinchona alkaloids, chinchonidine and quinidine are very nearly as efficacious as quinine, and that chinchonine, though inferior to the other three, is by no means deficient in febrifuge qualities. I consider it very important, as affecting the commercial interests of the Chinchona experiment, that an authoritative medical decision should be pronounced on the relative value of the Chincho[na] alkaloids, other than quinine, namely, chinchonidine, quinidine, and chinchonine. The best way of attaining this object would be to appoint a Commission in each Presidency, as has been suggested by Sir Ranald Martin, with instructions to test the efficacy of these alkaloids on a scale sufficiently extensive to ensure decisive results. Such a Commission should be composed of Medical men who have had long experience in the treatment of fevers, and whose report on a question of this nature would have weight with the medical profession generally. I desire that a Commission for this purpose may be nominated in your Presidency, and in the meanwhile I shall give directions for a supply of the alkaloids in question to be carefully prepared at Mr. Howard's manufactory, and sent out in sufficient quantity to ensure a satisfactory trial of their efficacy. The conclusions arrived at by the Commission should be embodied in a Report.

4. The important questions connected with the manufactory of the Chinchona febrifuge at Ootacamund, which were brought before me in your Despatch, dated

August 12th (No. 80), 1863, have received careful c ideration, and I now proce to place you in possession of my general views on subject.

5. One great object to be attained in the introduction of Chinchona culti vation into India is to provide 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 public works and private plantations, the small cultivators, their wives and families. In all future operations this object must be kept steadily in view, although it is also desirable that such a return on the produce of the bark should be secured, as will repay the original outlay and subsequent expenditure on the Chinchona undertaking with good interest.

6. There is every reason to expect that both these objects will be fully attained. Bark sent to the London market will, we know, secure good prices, and thus reim burse the Government for the outlay involved in the collection of plants and seeds in South America, their introduction into India, and subsequent cultivation there. A certain proportion of the bark harvest should, therefore, be disposed of in this way; but it is quite clear that if all the bark is sent to England, to be manufactured there, the price of the febrifuge, though somewhat lowered by reason of the increased supply, will still be such as to put the use of quinine and the other Chinchona alkaloids entirely beyond the reach of the working classes of India.

7. I am, therefore, of opinion that it will be advisable to establish a manufactory of Chinchona alkaloids in the neighbourhood of the plantations, and thus to secure a plentiful supply of the febrifuge in an efficacious and, at the same time, in an exceedingly cheap form.

8. The details of this measure involve the consideration of numerous com plicated and difficult questions, and I am not at present in a position to issue definite instructions in regard to them. But Mr. Markham will visit the Chincho plantations during the ensuing cold season, and submit a report to your Gover ment upon the whole subject, and I shall then be prepared to consider any detail plan which you may recommend, with a view to immediate commencement a system calculated to ensure the above results connexion with the cultivat of Chinchona bark.

9. With reference to the request, conta ed in your Despatch dated Marc (No. 16), 1865, that a further supply of *C. tayensis* seeds may be forwarde Madras, I have to inform you that I have al aken steps to obtain a second stalment of the seeds of this valuable spec m the forests of Popayan. F copies of Mr. Cross' Report of his former pro edings in the forests of New are herewith forwarded.

No. 176. MINUTE BY THE HONORABLE THE PRESIDENT.

1. There are two points in the accompanying Despatch from the Secretary of State, on the subject of the Chinchona Plantations, to which I wish to draw the attention of the Government.

2. In paragraph 3 of the Despatch, Sir Charles Wood, after alluding to the analysis, by Mr. Howard, of the specimens of bark transmitted by Mr. McIvor, and to some remarks made on the report of the results of the analysis upon the relative value of the pure Sulphate of Quinine and the Sulphate of Chinchonidine, with which the Quinine appears to be largely mixed in the bark sent from the Hills, directs the appointment, in each Presidency, of a Commission for the purpose of testing the relative efficacy of different alkaloids derived from the Chinchona bark on a scale sufficiently extensive to insure results decisive as to the value of each of these as a febrifuge.

3. It seems to me that the object of the Secretary of State would be best attained by sending to the different Medical Officers, in districts commonly liable to visitations of jungle fever, a sufficient supply of each of the alkaloids in question, with directions to carry out as varied a series of experiments as possible with each of them, and to report the results of these, *monthly*, in full detail, to the Commission sitting at Madras or elsewhere. Reference should be made to the Medical authorities directing them, to make such recommendations as to the districts in which the experiments should be made, the form of report to be submitted, and as to the persons of whom the Commission should consist, as may serve to guide the Government in giving its orders.

4. The next point to which I wish to direct the attention of the Government, is that which has reference to the establishment of a manufactory of Quinine, or more generally of the "Chinchona febrifuges," at Ootacamund.

5. This, although it seems at first sight to be a simple question enough, becomes complicated when taken in connexion with the professed objects of the Government in establishing the Chinchona Plantations, which, as stated in paragraph 5 of the Despatch, are as follow:—

First.—The provision of an abundant supply of febrifuges at a *cheap rate*, so as to be within the means of the population at large.

Second.—To secure a return from the bark as will re-pay the original outlay in procuring seeds and plants, and all subsequent expenditure on the Chinchona undertaking, with *good interest*.

6. The present price of bark in the English market is regulated by its quality, that is, by its power of produci inine, the manufacturer of that drug being willing to give one shilling p for bark which will yield one per cent. of Quinine, and so in proportic or bark which gives a larger proportion. He gives, therefore, 100 shillings for 1 lb., or 12 oz. of quinine yet in the bark, or 8*s.* $\frac{1}{4}$*d.* per oz.; to this price must be added the cost of extraction, the profit of the wholesale and retail dealers, so that the retail price of Quinine will not be much less than 16 shillings per oz.

7. If, however, the Government manufactures Quinine for itself at Ootacamund, or exports the whole of the produce of its Plantations to England, and purchases

such Quinine as it may require from the manufacturers, the action upon the b[ark] market will be very much the same. The pr[ice] will fall to an extent which c[an]not hardly at present be estimated. The effect, however, upon the profits of the n[ew] plantations will not be so great as might be imagined, for the first effect of a reduction in price (judging from the statements made by Mr. Cross in his pamphlet) will be a withdrawal of a large portion of the supply from South America, as even at present prices the profit is too trifling to hold out much inducement to the Cascilleros; while a reduction in the price of Quinine will increase the demand for it, and for the bark from whence it is extracted. I do not, however, think that the fall in price will exceed 50 per cent.. or that the bark for which the manufacturer now gives one shilling will be bought at less than six pence.

8. That this price will give an ample return to the Government or the private planter, who is careful to cultivate the most productive species, is very clear. The analysis given by Mr. Howard of the bark of C. Succirubra gives 6 per cent. of mixed sulphates; if we estimate the amount of quinine to be half this, and throw the other alkaloids out of consideration, the bark of this species will be worth 3*s.* per lb. at present rates, or, at the supposed reduced rate 1*s.* 6*d.* per lb. Now at 700 trees to the acre, and 2 lbs. of bark to a tree, the produce would be worth $\frac{700 \times 2 \text{ £ } 1/6}{20} = 10$ at the end of five years. The actual outlay within the same period would amount to 50£ and the gross annual return to $\frac{105}{5} = 21$£ or 42 per cent. per annum upon the capital expended. In the case of the Government this capital would have to be increased by the cost of the different expeditions to procure seeds, plants, &c., but this when divided among the 1,200 acres, which I propose to retain in the hands of Government, will not add much to the cost per acre.

9. If, however, the inferior kinds of bark are used, the profits will be very much lessened. I must now, however, allude to that portion of the Despatch which might seem to suggest the idea that the Government proposes to manufacture quinine, or other alkaloids, and to sell these at a rate *below their value* when compared with that of bark in the market of the world, for the special purpose of bringing the drug within the means of the population at large. I do not think that this can be the meaning of the despatch, for it would be evidently impossible to maintain two prices for the same article when the difference exceeds largely that created by freight, charges, and profits; but the first effect of such an attempt would be to put a stop to the cultivation of Chinchona by private individuals, and to make the Government the proprietor not only of a monopoly in the manufacture of quinine, but also of the bark required to produce it. Should it be the object of the Government to keep down the price of quinine in India, or to produce the results above stated, I am inclined to doubt the policy of the proposal to establish a manufactory of quinine at Ootacamund. It is true that the carriage of the bark to the port, and the freight to England, would be saved; but on the other hand, everything is very dear on the Hills, the skilled labor, which must be employed to extract the quinine from the bark, will cost at least double what it would in England, and when all these extra expenses come to be fairly estimated I doubt very much whether they will be counterbalanced by the saving of freight, &c.

10. The Government Plantations of 1,200 acres will gradually produce about [1]0 tons of 2,000 lbs. to the ton annually. The freight of this Home and its carriage to the place of embarkation would not exceed £6 or 7£ or 1,400£ per annum. I do not think that this would pay the cost of such an establishment as would have to be maintained on the Hills for the purpose solely of manufacturing quinine, while less than the whole quantity of bark produced on the Plantations would not be sufficient to meet the Indian demand.

11. The price, therefore, charged for the quinine manufactured in India must be high enough to ensure a return large enough to meet the various calls upon it, as interest of capital, cost of cultivation, charges of manufacture, and at the same time, whatever these may amount to, the charge must not be so much inferior to the prices in England as to make it worth any man's while to purchase quinine from the Government for the purpose of exporting it.

12. There is ample time, however, to consider the subject, and we may go into it carefully when Mr. Markham comes.

15*th November* 1865. (Signed) W. T. DENISON.

No. 177. MINUTE BY THE HONORABLE T. PYCROFT.

1. In the Despatch of the Secretary of State, under date the 30th September last, which, I may remark, was received after my Minute of 2nd November 1865 was written, it is stated that "one great object to be attained in the introduction of Chinchona cultivation into India is to provide 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 public works and private plantations, the small cultivators, their wives and families." To place the febrifuge within the reach of such persons, it must of course be sold at cost price—that is, at the actual cost of its production in this country—if not indeed much below that price.

2. A further object, also stated to be desirable, is that such a return on the produce of the bark should be secured as will re-pay the original outlay and subsequent expenditure on the Chinchona undertaking, with good interest. For this end a certain proportion of the bark harvest is to be sent to England, and sold in the London market.

3. If, as the letter of the Despatch would seem to import, the Government are to grow Chinchona and manufacture its sulphates to such an extent as to

suffice for the wants of the population at large of this Presidency only, or twenty millions, and are to sell it at such rates as shall bring it within the means of the poorest Ryots, then doubtless the full quantity of land proposed by Sir W. Denison (in his Minute of the 30th October), or 1,200 acres including the plantation at Mailkondah, will have to be brought under Chinchona cultivation, and, I should imagine, a great deal more.

Further, the sale of the febrifuge by Government at prime cost, or even below it will of course be fatal to all private enterprize in the cultivation of Chinchona, at least with a view to the sale of its alkaloids for use in this country.

4. I observe, however, that the Secretary of State remarks that the details of the measure involve the consideration of numerous complicated and difficult questions, on which he is not at present in a position to issue definite instructions, although he will be prepared to consider any detailed plan which we may be able to submit to him, calculated to produce the above results.

5. I must confess that with every desire to meet the wishes of the Secretary of State, I fail to see my way to any such detailed plan as is here referred to. I am unable to perceive how the Sulphates of Chinchona can be sold in large quantities in India at such a price as barely (if at all) to return the cost of production, and the bark be sold in England at such rates as shall repay the whole expenditure on the Chinchona undertaking with good interest. Prices like fluids will find their level. It does not appear to me to be the duty of Government, or one which they can advantageously perform, to manufacture quinine more than any other drug or commodity for the whole population of the country. I have no faith in the economy of Government manufactories, and admitting the production of the Chinchona febrifuge, in large quantities and at a low price to be an object of great importance, I cannot but think that it will be best secured by giving full scope to private enterprize and free trade, and abstaining, as far as possible, from all interference with them.

6. If, however, any such detailed plan as is alluded to by the Secretary of State can be devised, then it may be proper to prosecute operations at Mailkondah, but for the present, for the reasons I have already given, it may be best to restrict them to the four other plantations which, with the charge of the Government gardens at Ootacamund, will afford Mr. McIvor sufficient occupation.

20*th November* 1865.

(Signed) T. PYCROFT.

178. MINUTE BY THE HONORABLE H. D. PHILLIPS.

1. According to these papers, what should now be done, is simply to ascertain from the Committee, of which the Secretary of State directs the appointment, whether the three coarse alkaloids contain sufficient febrifuge power to justify their introduction and use in our Indian Hospitals, as a fair and efficient substitute for the more expensive and undoubtedly effective 'quinine.'

2. It is held by Mr. Howard and Dr. DeVry that these alkaloids are very nearly as efficacious as quinine; but it has evidently occurred to the Secretary of State, that the views of these two gentlemen may not be accepted by the profession at large, as a sufficient warrant for discontinuing a long-existing and safe practice. Hence, I conclude, the supposed necessity for Committees.

3. Assuming them to be formed and at work, it will not, I apprehend, be enough to regard the point of comparative effectiveness as a medecine, as settled by a single report from the Committee, which may be based on the first supply of extracted alkaloids. It will be advisable that there should be several successive reports resting on several supplies, prepared at intervals and by different manufacturers. So that a considerable period must elapse before the Committee can arrive at a clear judgment and unmistakable results. Should these prove favorable to the three coarse alkaloids, the attention of Government may be directed to the establishment on the Neilgherry Hills, of the manufactory to which allusion is made in the Despatch of the Secretary of State. But it will be unadvisable, I consider, to take any steps in this direction until the Government are abundantly satisfied that the alkaloids may fairly be used as a good substitute for quinine.

4. The formation of a Committee of the kind necessary will be a very expensive arrangement, and add largely to the cost of the manufactory in contemplation. Its members must be brought together at a place or places where jungle fever most prevails, and at the supposed fever season. They must work together, and to do this must relinquish their ordinary duties, for discharging which other Medical Officers must be provided and paid. It may be doubted, also, whether, at a single hospital, it will be practicable to find patients enough for effectually testing the virtues of the

alkaloid as a febribuge. Other additional patients will have to be sought; difficulties and expenses will arise in bringing to the Committee's station, a some from fever persons who, by conciliation or otherwise, may have been induced to c sent to removal from their homes or distant villages.

5. I am, therefore, clearly of opinion with His Excellency the President, th the object of the Secretary of State would best be obtained by sending to different Medical Officers in Districts commonly liable to visitations of jungle fe a sufficient supply of each of the alkaloids for use and experiment in the man suggested by His Excellency.

6. As regards the propriety and advantage of establishing the manufacto I cannot avoid feeling serious doubt. It is generally acknowledged that Gove ment establishments are, in almost every instance, costly beyond reasonable c culation, and greatly in excess of what similar establishments would cost under p sonal superintendence, by their own proprietors. It is true enough that periodi reports do reach Government shewing occasional profits from such concerns, there can be no doubt, I fancy, that much *couleur de rose* tint is ordinarily u in working up these reports, and that the profits would be a myth, if only pl color had been applied to the reporter's pictures of facts. There seems to m no reason whatever for supposing that a manufacture, such as it would appear is to be established on the Neilgherry Hills, will lose the ordinary characteristic, an I see every ground for thinking that it will be a losing concern.

7. Looking to late communications from the Collector of Coimbatore, I am further compelled to doubt whether persons on the Hills, who have taken up land for Chinchona cultivation, may not justly enough consider themselves aggrieved if Government enter the market in the manner proposed. But whether or not, the position which the Government will take must infallibly diminish private enter- prize. It will also tend to lessen the dema for land, though it may be subje t for doubt, whether any of this can be spare to private individuals, from wh at will be required by the Government itself for Chinchona cultivation, under the resolution to manufacture as much cheap quinine as will be wanted in this P esi- dency, should effect be given to the considerate and philanthropic intentions declared in the Secretary of State's Despatch.

7th December 1865.

H. D. PHILLIPS.

Exam 179. From CLEMENTS M RKHAM, Esq., to the Secretary to Govern-
nal an ment, Revenue Department, Fort Saint George, dated Ootacamund, 16th January 1866:—

1. With reference to paragraph 8 of the Despatch from the Secretary of State ndia, dated September 30th, 1865, (Public No. 27), I have the honor to submit iews on the subject of Chinchona cultivation, for the consideration of His Excel-
Age Barly the Governor of Madras in Council.

2. The objects of the Secretary of State in sanctioning the measures which opted for the introduction of Chinchona plants into India, and in causing plan-
Ye ons to be formed on the Neilgherry Hills, were the provision of an abundant cheap supply of the febrifuge derived from them for the use of hospitals and ps in India, and the spread of Chinchona cultivation throughout the Hill Dis- s, in order to bring the remedy within the reach of all classes of the Native ulation. His views on this point are distinctly stated in Despatches dated uary 16th, 1863, (paragraph 4,) and September 30th, 1865, (paragraph 5.)

3. Two preliminary steps have now been successfully taken towards the inment of these important ends. The most valuable species of Chinchona have introduced from South America into India, and, thanks to Mr. McIvor, they e been converted from wild into cultivated plants. But the actual work which lead to the attainment of the desired results has yet to be done. The ground has most ably and zealously cleared. Six years ago Chinchona plants, with the ex ption of 250 in Java, were wild forest trees, and their bark was only procured by perilous searches in the trackless wilds of the Eastern Andes; while a product so ob tained was necessarily sold at a price which put it beyond the reach of millions of su fferers from fever. Now the most valuable species are cultivated on planta- tio ns in India; their habits and requirements have been successfully studied, and th best method of producing the largest amount of febrifuge alkaloids in the bark has been ascertained beyond a doubt. It remains to discover the most economical and efficient method of bringing the febrifuge product of the bark within the reach of t e people of India, and to adopt such measures as will achieve this result. The co sideration of these points has engaged my attention for several years, but I was u able to arrive at any definite conclusions until I had personally inspected the plantations, and had fully discussed the numerous difficult and complicated questions involved in this great undertaking with Mr. McIvor. I now propose to submit certain recommendations for the consideration of His Excellency in Council, 1st, with regard to the treatment of the bark harvest; and 2nd, in connection with the spread of Chinchona cultivation.

4. But before entering upon the main subjects of this Report, I cannot refrain fr m an expression of my admiration at the ability and zeal with which Mr. McIvor s conducted the operations connected with Chinchona cultivation. The results has attained are altogether unprecedented in the annals of arboriculture. The ormation respecting the plants, which was available for his guidance, was very nty. I and other South American travellers were able to furnish him with more or less complete details respecting the climate of their Native habitat; the elevations at which the different species should be planted; and their

habit of growth in the Forests of the Andes. But we could only some him of Forest trees engaged in a struggle for life with their neighbours and, therefore, growing under very unfavorable circumstances for the elaboration of the precious alkaloids in their barks: he, with the aid of such data as could supply, had to discover the numerous requirements of the plants when und cultivation, and the treatment which would be most favorable for the formation ld the alkaloids. The success he has attained in the short space of five years is qu astonishing. It may be seen in the ravines of Dodabetta, where the species which cured the Countess of Chinchon is flourishing in a fashion such as was never known on the heights of Uritusinga or Cajanuma. It may be seen from the falls of Pycara where an avenue of beautiful trees will soon relieve the sombre sameness of a scrubby Neilgherry sholah. It may be seen far and wide along the slopes of the Neddivattam Hills, and it will soon be visible in the rich and fertile soil of the Mail Koondah forests. It is with no ordinary feelings that I have seen all this, and have been gratified with the thought that days of toil and nights of fever in the Caravayan forests, and subsequent weeks and months of intense anxiety have been so fully re-paid. We, who have laboured in South America, are amply rewarded for our work by the knowledge that it has been taken up and continued by so skilled and talented a cultivator as Mr. McIvor. I was particularly struck with the thorough and complete way in which all work has been done on the plantation The buildings, roads, bridges, and arrangements for drainage are all excellen and the system of management which has been established is manifestly workin admirably.

5. It is unnecessary that I should touch upon the numerous points con is to with Chinchona cultivation, which are fully discussed in Mr. McIvor's R and His method of propagation is most successful; and his system of planting in open, instead of under shade, could never have been questioned if the opinion those who were personally acquainted with the Chinchona forests had been regar but the more recent conclusions at which Mr. McIvor has arrived are so clo connected with the questions relating to the treatment of the bark harvest that t necessarily come within the scope of my remarks. I now proceed to lay bef His Excellency in Council the conclusions at which I have arrived respecting th treatment of the bark harvest.

6. The growth of the trees in the most advanced of the plantations—the fi Denison—is remarkably rapid, especially as regards the increase of girth and t development of bark. The species which has most completely naturalized itself in India is undoubtedly the *C. succirubra*. I found the finest trees of this species to average, under favorable conditions, a height of six feet and a girth of six inches the first year, of ten feet and thirteen inches in the second, and of fifteen feet fifteen inches in the third. But it is in the thickness of the bark and the increa yield of alkaloids that the most marked results have been obtained, and Mr. Howa analyses have shown that the method of mossing the stems, which is adopted by Mr. McIvor, secures the largest attainable deposit of alkaloids in the bark, as well as its most rapid and effectual renewal. This will perhaps be most readily seen by the

examination of a table showing the yield of unmossed, and mossed bark (both original and renewed) at different periods of growth, as follows :—

C. succirubra.								
Age of Bark.	Mossed Bark.				Unmossed Bark.			Renewed Bark.
	Time under moss.	Purified alkaloids.	Crystallized sulphates.	Chinchonine.	Purified alkaloids.	Crystallized sulphates.	Chinchonine.	
Years.	Months.	Per cent.			Per cent.			
1	6	3·40	2·80	0·60	2·59	.....	...	Renewed bark aged 1 year on a tree aged 3 years, yielded 9·72 per cent. of purified alkaloids, 2·72 of crystallized sulphates.
2½	12	6	5·20	0·80	5·06	2·43	...	Renewed bark aged 1 year and 5 months on a tree aged 3 years, yielded 7·7 per cent. of purified alkaloids, 5 of crystallized sulphates.
3½	11	8	6·94	1·06	.....	.....	...	Dr. deVry obtained 11 per cent. of alkaloids from the same sample.
3½	18	.....	11·34	...	.....	.....	...	The renewed bark which gave 2·72 per cent. of crystallized sulphate when 1 year old, on a tree aged 3 years, gave 5·85 when 18 months old.

It will thus be seen that the yield of valuable alkaloids on a tree of this species aged two and a half years is 2·43 per cent. when unmossed, and 5·20 when the bark has been mossed for a year; and that the yield of mossed bark is steadily on the increase from 2·80 when the bark has been mossed for six months on a tree a year old, to the altogether unprecedented result of 11·34 per cent. when the bark has been mossed for eighteen months on a tree three years and a half old. The yield from renewed bark is equally promising, giving 2·72 per cent. of the valuable alkaloids when one year old, and 5·85 when eighteen months old. These results give us the certainty that the correct method of treating the Chinchona trees is to cover the stems with moss, to remove the bark in strips periodically, to renew the bark by the mossing system, and to allow the tree to continue growing until it attains to its utmost size. We have not yet ascertained the extreme limit of the possible yield of alkaloids from this species, but it seems certain that it is still rapidly on the increase. It grows in perfection at an elevation of from 4,000 to 5,000 feet above the sea. At a lower elevation the bark is naturally much thinner and less rich in alkaloids, yet there is every reason to expect that even on Coffee Plantations, at 3,000 feet, the adoption of the mossing system will lead to the production of bark which will give such a return as to make the cultivation profitable.

7. Although the above system of cultivation is undoubtedly the one best [illegible] culated to give the largest returns, and therefore the one that must be adopt[illegible] the Government plantations, as well as on all private estates where care and [illegible] can be bestowed on the cultivation; it will yet require extreme attention an[illegible] personal superintendence of an instructed cultivator. Some simpler method [illegible] be taught to the numerous native Chinchona growers, who will, I trust, soo[illegible] mence work throughout the hill Districts; as well as to planters and other [illegible] merely raise the trees for the sake of supplying a febrifuge to their coolies [illegible] such cases I would recommend the system which His Excellency the Governo[illegible] proposed in paragraphs 9 and 10 of his Minute, dated October 30th, 1865, [illegible] which will, I have no doubt, prove both profitable and perfectly simple in prac[illegible] In wandering through the Chinchona forests, both in 1853 and 1860, I of c[illegible] encountered thousands of stems of felled trees, and in every instance I obs[illegible] that fresh shoots had been thrown up, and had frequently grown into decent [illegible] trees. During my visit to Hak-galla in Ceylon I examined the stem of a *C. succir[illegible]* tree which had been cut down in April 1864, and observed exactly the [illegible] thing—a shoot had sprung from the stem, and grown up quite straight to a heig[illegible] five feet, with a girth of five inches near the ground. The same thing has taken [illegible] on the Neilgherries on every occasion when a Chinchona tree has been cut do[illegible] and there is an excellent example of the vigor with which these shoots grow, i[illegible] tree growing amidst brushwood, just outside the gates of the first Denison [illegible] tation. It is a clearly ascertained fact that the felled stumps do send up vigo[illegible] shoots in this way, and we know that they may be periodically cut down, and [illegible] by treating the bark with moss, a large per-centage of alkaloids will be annu[illegible] obtained, as the shoots reach the age of three or four years. While then the [illegible] profitable though more difficult and scientific system is adopted in the Governm[illegible] Plantations and in all large undertakings, the Coppice-wood method of cultivat[illegible] will perhaps be more extensively resorted to by the numerous class of growers, who will raise bark for their own immediate use.

8. I observed that the *C. succirubra* trees at Neddivattam exhibited two varieties, one with the usual pink flowers and rich green leaves, the other with nearly white flowers and paler leaves. It is important that the cause of this difference should be clearly ascertained, as a full knowledge of all phenomena connected with the growth of the trees is of consequence to the cultivator. This is one of the numerous points which require investigation by a scientific quinologist on the spot, a subject on which I shall dwell more fully presently.

9. With the *C. succirubra* grow the various species which yield grey bark, and which seem to be generally known as *C. micrantha*. I may remark, in passing, that I do not see the propriety of this very important group of Chinchona species being represented by Mrs. Markham at Arequipa. (See *Chinchona Blue Book*, pp. 119—20). The *C. micrantha* grows with and about the same rate as *C. succirubra*, and at the age of [illegible] aged two years, and of thirteen feet with a girth of twelve inches when [illegible] have spoken of this species as important, because whereas [illegible] three years. I [illegible] Huanuco and [illegible] it yields almost exclusively [illegible] native forests of [illegible] inferior [illegible] quinine, an alkaloid of [illegible] cinchonine [illegible] disappears, and that [illegible] the bark yields an

extraordinarily large per-centage of the valuable alkaloid, quinidine. The effect of mossing on this bark is also as marked as it is on that of *C. succirubra*. Unmossed bark (aged two and a half years) of *C. micrantha* yielded only 1·86 of alkaloids, while bark of the same age, after it had been mossed for a year, gave as much as 7·52 per cent. of alkaloids, of which 5·82 was of the valuable sort. This is a very significant result. Here is a kind which is almost worthless in its own forests, but which, under careful cultivation, has been made to substitute the efficacious quinidine for its wild product chinchonine. Though it will probably never yield quinine, *C. micrantha* may now take its place on almost an equal footing with *C. succirubra*, and these two valuable species will form all the plantations at a lower elevation than 6,000 feet. The exact influences which have produced this extraordinary change in the products of *C. micrantha* bark are possibly hit upon in Mr. McIvor's interesting and very able letter to your address, dated November 24th, 1865, (No. 105); but it is quite essential that the progress of the cultivator should be assisted and guided by the investigations of the chemist, and these investigations must be made on the spot both with green and dried bark, and with plants growing under various circumstances. Without this aid the ablest cultivator must move more or less in the dark.

10. The *C. Calisaya*, the most famous of all the South American bark trees, and which in its native forests is alike the most beautiful and the richest in quinine, has not been a success in India. I was grieved to see the plants of this species only five feet ten inches high, and six and a half inches in girth, at an age of three years, while their stunted and shrubby appearance, with dim colored leaves, is as different as possible from that of the glorious Calisaya of the Caravayan forests. Mr. Howard's analysis of the Neilgherry Calisaya bark is also exceedingly disappointing. Yet there can be no doubt that we have the true species, for the plants at Neddivattam are descended from those procured by Dr. Weddell himself in the forests of Caravaya and Bolivia. There will soon be a large supply of *Calisaya* seedlings both from the trees themselves, and from the seeds obtained by Mr. Money, and a further extensive and careful trial of this most valuable species may be made. But here again the assistance of a scientific quinologist is essential, in order to discover and counteract the influences which have hitherto been so inimical to the development of *C. Calisaya* on the Neilgherries.

11. The plantations at a higher elevation than 5,500 or 6,000 feet above the sea, and up to [illegible] feet, will consist of the several varieties of *C. officinalis* of Linnæus and of the trees (*C. [illegible]* and *Pitayo*) yielding the precious barks of New Granada. So long as they are kept clear of the severe frosts of the valleys, the plants of *C. officinalis* flourish luxuriantly on the higher slopes of the Neilgherries, and indeed they are by far the most numerous of all the species. The effect of mossing on the produce of the bark of *C. officinalis*, known in commerce as *Crown bark*, has been most satisfactory. Taken a tree, a year and a half old, unmossed bark gave a total of only 1·60 per cent., which nearly half was chinchonine, while bark that had been mossed for four months yielded 2·408 of quinine. The [illegible] qualities of this bark [illegible] to the trade as *Colorado* [illegible] *Loxa Crown* will already [illegible] in the London Market. They are very much used [illegible] making [illegible] preparations. The species is [illegible] of much improvement if [illegible] on the

open grass land as well as in that of the sholas, and I am convinced that *C. officinalis* plantations will be very remunerative. *C. Pelletierifolia*, of which there are now about 160 plants, is also valuable, and the undescribed species yielding the Pitayo bark is by far the richest in alkaloids of any yet discovered. Even in its wild state the bark sent home with seeds collected by Mr. Cross, yielded 11·34 per cent. of alkaloids, of which 5·85 was quinine, 4·19 quinidine and chinchonidine, and only 1·30 chinchonine; and parcels in the market are selling at prices 10 per cent. higher than those of Calisaya bark. The Pinon de Pitayo bark belongs to a hardy tree which will flourish with *C. officinalis* on the higher slopes of the Neilgherries, Pulneys, and Koondahs; and, when treated with moss, it will increase even its present enormous yield of alkaloids. Knowing the great importance of introducing this species, I have made numerous attempts to procure seeds, and during the last two years, I have engaged Mr. Cross to collect them in the neighbourhood of Popayan. That energetic gardener has at last forwarded a small instalment of these precious seeds, and we are now watching in great anxiety for signs of their germination. I enclose a copy of Mr. Howard's Report of an analysis of the Pitayo bark forwarded with the seeds.

Enclosure No. 1.

12. Having offered the above remarks on the most recent results of cultivation with regard to the different species of Chinchona, I now proceed to discuss the main subject of this section of my Report. The method of taking the bark from the trees has been fully explained by Mr. McIvor in the specification of a patent which he has recently taken out. There are, however, several complicated questions relating to the best way of drying it and preparing it for the market which we have considered and discussed together, but which cannot be finally settled until we have the aid of an experienced quinologist, who can try experiments on the spot.

13. Here the work of the Chinchona planter is completed. His bark is ready for the market, and he only has to obtain the best price he can for it. But it is only here that the most important part of the measure undertaken by the Government commences. The principal object of the Secretary of State was to provide a cheap and abundant supply of the febrifuge for the people of India. The problem to decide is, therefore, the form which the bark should take after it has been harvested, in order to attain the great and beneficent end in view.

14. Long before quinine was discovered, decoction of bark had cured thousands of sufferers from fever; and this simple form of the febrifuge is destined, I trust, to prove a blessing to many a fever haunted District of India. Its manufacture is so simple that it may be carried on by every family that has a few trees planted at its door. It is merely necessary to pound the bark up until it will pass through a rather fine sieve, mix in the proportion of about ten ounces of bark to one gallon of water, boil, and strain off.

15. It is very desirable, however, that the alkaloids themselves, extracted from other ingredients of the bark, should be brought within the means of the poorest Native family, and until this is done Chinchona cultivation in India is not a perfect success. To suppose that this can be [illegible] bark to England, to be turned into quinine and sent out again [illegible] an ounce, is absurd.

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It is essential that some rougher and cheaper way of extracting the alkaloids should be hit upon, since the cost of producing the crystallized sulphates puts them out of the question; and I have devoted much anxious thought to the consideration of this important point. I have now no doubt whatever that the alkaloids can be extracted in a form which will lead to the desired result, and further investigations will show what preparation is cheapest and most efficacious. Meanwhile my own opinion, founded on actual experiment, is that the preparation called *quinium* will solve the question.

16. Numerous attempts have been made, from time to time, in South America, to extract the alkaloids roughly, in order to escape the expense of paying freight for so bulky an article as bark. Something of the kind was tried at Loxa in Ecuador; a Frenchman ruined himself in an attempt to establish a manufactory for this purpose at Puno, on the banks of lake Titicaca; and an Italian, at La Paz in Bolivia, actually invented the preparation called *quinio* or *quinium*, and gave some to Von Tschudi, the well known German traveller. The method was afterwards adopted by M. DeLondre of Havre, and in the French works on pharmacy it is called "*Extrait alcoolique de quinquina a la chaux.*" I received a practical lesson in the manufacture of *quinium* from an eminent Chemist in London, and the process is so simple that a brief account of it will not be out of place here.

17. The method we used differed slightly from that described in the *Journal de Pharmacie et de Chimie. Tom.* 33 (1858) *p.* 73. The object is to separate the alkaloids from the lignin, gum, starch, acids, colouring matter, and other ingredients of the bark. The first process is to mix the pounded bark with half its weight of slaked lime and a little water, and this mixture is allowed to stand for a few days in order to give time to the lime to work thoroughly. The lime takes up the acids, colouring matter, and other parts of the bark. The mixture is then treated with strong spirits and boiled. The febrifuge alkaloids are soluble in alcohol, so that, when the liquor is strained off, it consists of spirits with all the quinine, quinidine, and chinchonidine contained in the bark, in solution. It then only remains to distil off the alcohol, and the residuum is the *quinium*, containing all the febrifuge virtue of the bark. In my experiment in London, 1,000 grains of *Calisaya* bark yielded 68 grains of *quinium*, a pale brown substance, in appearance not unlike glue, which contained 33 per cent. of quinine.

18. During my stay at Ootacamund I have tried a similar experiment on a much larger scale, with bark and leaves of *C. succirubra* grown at Neddvattam. Mr. McIvor gave me his active assistance, and furnished a small still and the other necessary apparatus and ingredients. We mixed 10 lbs. of pounded bark with 5 lbs. of lime, and 6¼ lbs. of leaves with 3½ of lime. To this was added thirty bottles of arrack, which was strained and distilled off, and a very satisfactory residuum of *quinium* was obtained. It is of a reddish colour, as a portion of the colouring matter of *C. succirubra* is soluble in alcohol. The cost of the slaked lime is a mere trifle, only thirty measures to a Rupee, which is sufficient for the treatment of 75 lbs. of bark. More than two-thirds of the alcohol is recovered by distillation, so that the actual cost of a bottle of arrack at 1 Rupee is not more than 4 or 5 Annas, probably much less when *quinium* is manufactured on a large scale. I shall have the *quinium*, which we have obtained, very carefully analysed, but I have already ascertained that it is a strong febrifuge. It can be made up into quinine pills, each containing two to

three grains, and a rough calculation leads me to the conclusion that it can eventually be sold at a few annas the ounce. The manufacture is so simple that it can be taught to all native dressers, and made without expense or trouble at hospitals and dispensaries.

19. Although I would not venture to give a positive opinion until the whole subject has been investigated on the spot by a competent quinologist, I yet think that *quinium* manufactories at every place where there is a local supply of bark will lead to the achievement of the great object of Chinchona cultivation in India, namely, the provision of an abundant and cheap supply of the febrifuge in all fever districts. But there is one consideration which at first sight would appear to be fatal to success, and which therefore requires attention. It would naturally be supposed that if the alkoloids can be extracted in the form of a *quinium* at an exceedingly cheap rate, the tendency of speculators will be to buy it all up for sale to quinine manufacturers in the European markets. This, however, will not be the case because *quinium* is not saleable for manufacturing purposes. It is for this very reason that I anticipate success from the manufacture of *quinium* in India. The failure of all attempts to substitute *quinium* for bark in the South American trade convinced me that the same result would attend similar attempts in India, and thus there is no danger that the plentifulness and cheapness of the febrifuge in this form, can be interfered with by unscrupulous speculators.

20. The reasons why *quinium*, though containing all the febrifuge virtue of the bark and therefore an efficacious medicine, is of no use to the quinine manufacturer, are partly explained by Mr. Howard in the last paragraph of his Report of an analysis of bark, dated June 15th, 1864: "Importers," he says "reap in the end "more profit from sending into the European market the raw material than the "half manufactured product." The lime process has a deteriorating effect on the crystallizable properties of the alkaloids, (which is what the manufacturers require) although their medical efficacy remains unaltered.

21. Dr. de Vry, the eminent quinologist, has told me of another preparation from the bark, which he is inclined to think will be more conducive to the objects in view than *quinium*. The process of making it is described in his Report on some bark which I sent to him last July, a copy of which is herewith enclosed (Enclosure No. 2), it being the same as was adopted in the analysis. The ingredients required for the manufacture are diluted muriatic acid which costs in England, when bought by the carboy of some gallons, 2*d*. per lb.; solution of caustic soda; and apparently alcohol. But the expense of the chemicals will be very slight, 2 lbs. of muriatic acid and 1 of caustic soda being required for the treatment of a cwt. of green, and about double that quantity for dried bark. The preparation is in the form of a fine powder, which consists of all the febrifuge alkaloids of the bark.

22. I have entered into these details in order to demonstrate that a cheap medicine can be obtained from the bark, for the use of the working classes of India which will practically be as efficacious as the expensive sulphate of quinine. It will be for a skilled chemist, in concert with the cultivator, to decide, after careful consideration, whether the febrifuge powder of Dr. de Vry, or the

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quinium, or some other preparation is the one to be adopted for general use. My purpose now is to show clearly that the great end which was contemplated when the Chinchona plants were introduced into India, is by no means difficult of achievement.

23. One measure is, however, absolutely necessary for the success of this great undertaking. The cultivation of Chinchona plants has now arrived at a stage when the co-operation of a scientific quinologist with the cultivator has become of vital importance. There are numerous questions connected with the growth of the plants, with the elaboration of the alkaloids, with the drying of the bark, with the period when the bark has reached its highest per-centage of alkaloids, and with the manufacture of the febrifuge, which must be solved, and which can only be solved on the spot. I have indicated some of these points in paragraphs 8, 9, 10, 11, 12, 13 and 22 of this Report. Indeed it is impossible to consider the subject of Chinchona cultivation attentively without seeing reason, at every turn, for the conclusion that the assistance of a skilled analyzer and chemist on the spot, is urgently required at this stage of the experiment. The enclosed Memorandum by Doctor Cleghorn will shew that such a measure would be of great utility in various ways independently of its principal object.

Enclosure No. 3.

24. I would, therefore, strongly recommend that a quinologist of established reputation should be appointed to conduct the investigations above indicated in concert with Mr. McIvor, say, for three years. His duties, in addition to these investigations, would be to decide upon the form in which the febrifuge could be most economically and efficaciously prepared; to instruct medical subordinates and others in the method of manufacture, and to report whether or not it would be advisable to establish a manufactory of the sulphate of quinine itself, in this country. In deciding upon the pay and allowances that should be attached to the appointment, there is, I believe, a good precedent in the office of Chemical Reporter in the North West Provinces.

(Professor of Chemistry at Roorkee.)

25. It is quite possible that, after all, it will be found advisable to establish a Government Quinine Manufactory here, but we have no data at present to form a decided opinion on that point. If such a measure is resolved upon, it will be a great boon to the planters, because they will be able to dispose of their bark at once; and to the natives, because the cheaper febrifuge will also be largely manufactured, while the refuse of the manufactory, in the form of quinoidine, can almost be given away in any quantity.

26. I would not venture to express any further opinion respecting this appointment if it was one of an ordinary character, but in truth the number of men who are capable of filling it is so exceedingly small that the choice is narrowed, so far as I am aware, and I have made diligent enquiries, almost to one man. There are several learned quinologists in Europe, some like M. Delondre, in extreme old age, while others such as Dr. Phœbus, M. Guibourt, Mr. Weddell, Mr. Howard, Mr. Hanbury, Carl Zimmer, &c., are not in a position to accept an offer of this kind. But in Dr. J. E. deVry, the well known Dutch quinologist, who has already visited the Neilgherry plantations and analysed our barks, we one of the first practical [illegible] the present experi-

ment, who has devoted many of the best years of his life to the study of the Chinchona plant and its products, and who has been acclimatized in the tropics. I beg respectfully to suggest that, in the event of my recommendations being adopted, this appointment be offered to Dr. J. E. deVry, whose services are, I happen to know, now available.

27. The 2nd Section of my Report refers to the spread of Chinchona cultivation throughout the Hill Districts of India, a portion of the undertaking which I believe to be of the first importance; because by this means alone can the inhabitants of fever haunted districts obtain the necessary supplies of bark without trouble or expense. There are two modes by which Chinchona cultivation will be extended; the one by the operations of planters, the other by the action of Government officials, or by means of any machinery that may be available in the Districts which are suitable for the growth of Peruvian bark.

28. I am desirous most earnestly to represent that the object in introducing Chinchona cultivation into India was not to shew that the culture would prove remunerative, and that the prospects will be such as to encourage private enterprize. Private enterprize should be encouraged in so far as it tends to spread Chinchona cultivation in the various hill Districts, and to this extent it will undoubtedly further the great objects of this national undertaking. But in some respects the interests of the planter and the Government must be antagonistic. The Government must look to the medicinal, the planter to the pecuniary value of the bark. The planter merely desires to get a rapid return for his money and to keep up the price of bark. The object of the Government on the other hand, is not to make money, which is no part of its functions, but rather to reduce the price of bark as low as possible, and to bring its use within the means of the poorest cooly in the land. It was to provide an abundant supply of the Chinchona febrifuge for the people that the Secretary of State introduced this cultivation into India, and not to afford another means of making money to European speculators. But, while seeking his own profit, the planter does good service in extending the area of cultivation, and from this point of view alone can the interests of private enterprize be considered in connection with the Government measures relating to this subject.

29. Not only will extensive private plantations more or less conduce to the spread of the use of the Chinchona febrifuge amongst the laborers employed upon them; but they will also open up important tracts of hitherto neglected country, and add to the revenue at the same time that they increase the general wealth of the community. Now that analysis has proved the value of bark grown in India there seems to be every disposition on the part of planters to undertake its cultivation. As many as eighty-four pieces of land have been taken up on the Neilgherry hills, under the Waste Land Rules of March 6th, 1863, covering more than 8,000 acres, and there are very few indeed of the purchasers who have not planted Chinchona trees on their estates, while several intend to cultivate Peruvian bark exclusively, and on a very large scale. Many trees are also planted and growing well in the Wynaad District.

30. The Mail Koondah Chinchona plantation will, from the planting point of view, be very important, because it will open up a new and magnificent country, and form a nucleus of propagation round which numerous flourishing private estates will congregate. It [illegible] both direct and [illegible] a valuable source

of revenue to the Government, and the completion of good roads to it will, in a very few years, give rise to the clearing and planting of many hundreds of acres in a hitherto absolutely unproductive District. The Mail Koondah plantation should not, I conceive, be more than 200 acres, and it should be used strictly for propagating purposes, on the same principle as that at Hak-galla in Ceylon. In thus furthering the extension of Chinchona cultivation it will come strictly within the scope of the measure which is now producing such excellent results, wherever its influence is felt.

31. The Koondahs are by far the finest hills I have yet seen in India. The forests cover their sides and crests which bear more resemblance to the superb *montanas altas* of some parts of the Eastern Andes than to the scrubby sholas of the Neilgherries. The soil is of extraordinary depth and fertility both in the forests and grass land, and there are abundant supplies of water. Indeed the scenery of these beautiful hills; the long lines of forest with all the varied tints of foliage; the rich grass land intervening here and there; the magnificent waterfalls and precipices; and the sharp peaked outline of the distant mountains—is far and away the finest I have yet seen in the Western Ghauts. The land reserved by Government is, I am fully convinced, the best site for a Chinchona plantation that has yet been selected, superior either to Dodabetta or Neddivattam. The land is well protected from severe gales; three or four ranges of forest clad hills mitigate the force of the south-west monsoon, while there is no land intervening between Mail Koondah and the low country to the eastward, to prevent the plantation from receiving a good share of the north-east rains. A bullock track, on such a trace as could be hereafter converted into a cart road, may easily be made, to connect Mail Koondah with the old Malabar road, and this plantation will then be much nearer supplies and labour than any of the others. Burgher labour is already procurable on the spot. I would recommend that the necessary works and communications connected with the Koondah plantation (which has been named Stanley, after the Statesman who first sanctioned my proposals respecting the introduction of Chinchona cultivation into India) be pushed forward at once, so that plants and seeds may be ready for distribution as soon as possible. An estate of 400 acres has already been partly cleared, in an admirable position, within a short distance of the Government plantation, and others will soon follow. The progress of the Stanley plantation, in opening up the Koondahs, as well as in spreading Chinchona cultivation, is quite as important as that of any of the others.

32. The Government Chinchona plantations are, of course, of essential use to private cultivators, by furnishing them with plants and seeds, by pointing out the best methods of cultivation, by eventually taking the lead in the European market and establishing the fame of East India bark, and probably by, hereafter, in the manufacturing operations, taking part of the bark harvest off their hands. I have already discussed most of these points, but I think it right to offer my opinion on the subject of the disposal of plants and seeds. The great object of the Government is to introduce and spread Chinchona cultivation, and I have long been of opinion that the plants and seeds should be given away to all who are desirous of growing them, without any charge. The exaction of payment for them, especially as there is a per-centage of loss on the plants delivered, must have the effect of retarding the spread of the cultivation. In Ceylon, the pla[illegible]ven away, the only expense to the cultivator being the carriage to his est[illegible]lanter desirous

of undertaking the cultivation signs a form, stating that he has available land suitable for the growth of Chinchona trees, that he undertakes to plant the trees delivered to him upon the said land within 12 months, and to carefully cultivate them when so planted. These forms are filed; a register, open to inspection, is kept of applications; and each applicant is supplied in his proper turn. This plan has answered admirably: as many as 50 planters have already commenced the cultivation in Ceylon; 5,00,000 plants have been applied for, and 1,80,000 have been actually distributed. The price charged for Chinchona plants on the Neilgherries has been lately reduced to one Anna each when 5000 and upwards are taken, and to two Annas each for any number under 5000. Now 5000 is quite sufficient for any one cultivator to take, as he can propagate from his own stock for any quantity above that number. I would recommend, therefore, that the price of one Anna be charged, as now, for each plant, when over 5000 are applied for, but that any number under 5000 be furnished to applicants without charge. A register should be open for inspection, so that every applicant can see that he is served in his turn, and each applicant should sign a form similar to that in use in Ceylon. The argument in support of the practice of charging money for the plants is, I am aware, that a man will take more care of what he has paid for than of what he has got for nothing. I believe the argument to be fallacious, and that while a careless man will take care of neither, a careful man will not neglect any of his property that is worth taking care of. Any how, the plan of giving away the plants has answered perfectly in Ceylon, where many planters are taking great pains with them. It is most important that no charge for plants should be exacted from native growers, or from such officials as may be desirous of inducing the Natives in their Districts to grow Chinchona trees, and, as no difference can fairly be made between applicants, the system of charging for plants, when the number applied for is less than 5000, ought, I think, to be abolished. The great harvest of seeds, which is expected next spring, should be as widely distributed as possible, with instructions for sowing and rearing them, free of all charge.

33. The chief object of introducing Chinchona plants into India is to bring the febrifuge within reach of the classes who cannot afford to buy quinine, or nearly the whole of the sufferers from fever. This beneficent measure has hitherto received little or no attention, and scarcely any efforts have been made to induce the Natives themselves to cultivate Chinchona trees, to cause clumps of the fever dispelling plant to rise up round every village in the Hill Districts, and to see that each family is able to obtain fever bark, and understands its use. Until active steps are taken in this direction, and general success has been achieved, the Government cannot pause, for its most important work remains undone. The Secretary of State has expressed his sense of the importance of this part of the undertaking on several occasions, but especially in his Despatch dated January 16th, 1863, where he points out that the commercial advantages of Chinchona cultivation are merely a secondary consideration, and desires that Collectors be directed to introduce the plants into the Hill Districts of their Collectorates.

34. I beg to enclose, for the information of His Excellency in Council, an extract from a letter which I have addressed to the Under Secretary of State for India, dated December 26th, 1865,

Enc

the subject of Chinchona cultivation in Travancore and on the Pulney Hills, to draw special attention to the extracts which I have quoted from an admirable Minute by Mr. Maltby, the late resident of Travancore, on this subject. His enlightened measures with regard to the establishment of a Chinchona garden at Peermade, with a view to the spread of the fever healing trees throughout the hill region of Travancore, should be adopted with reference to all other mountainous parts of India.

35. Endeavours should be made to induce all villagers in Hill Districts to include Chinchona trees amongst their products, first for home consumption, and eventually for supplying bark to the villages and dispensaries in the adjacent plains. The machinery for effecting this would vary according to circumstances. Sometimes a Collector or Sub-Collector would take a personal interest in a matter of such vital consequence to the people under his charge; at others a subordinate official or Overseer in the Forest Department may take the work in hand; and it may be hoped that, at least in some localities, the Natives, on receiving a little encouragement, will initiate the cultivation of their own accord. I would suggest that such slight assistance should be extended to these efforts by the Government as the circumstances may require, in order to secure satisfactory results.

36. For instance, Mr. Levinge, the Collector of Madura, has successfully introduced some Chinchona trees into the Pulney Hills, at his own expense, with the intention of propagating from them, and I believe that Mr. Marden, of the Education Department, is seconding his efforts. A good beginning has here been made, and a little aid from the Government would ensure most important results. It is impossible for Mr. Levinge to be on the Pulneys for more than a few days at a time, while a little care bestowed on the matter from a permanent resident would lead to the cultivation of Peruvian bark at the very doors of every village in the fever haunted lower Pulneys, and the growth of a surplus supply for the use of sufferers in the Cumbum valley and other parts. A measure of great utility to the inhabitants might thus be adopted at insignificant cost, and I beg strongly to recommend that the Government should pay the salary of a man selected by Mr Levinge, who should receive instruction on the Neilgherries; and that a larger supply of Chinchona plants be furnished for the experiment on the Pulneys. Mr. Levinge might be requested to submit his views on this subject.

37. If operations are ever commenced in connection with the Perryaur Irrigation project, the opportunity should be seized of introducing Chinchona cultivation into the forests near the banks of the Perryaur, for the use of coolies engaged on the works.

38. Then, again, the Sub-Collector in charge of the Taluqs bordering on the mountains in Tinnevelly might do much towards the introduction and extension of the growth of Chinchona plants, and, if he is prepared to recommend any particular measure, a supply of plants and all other needful assistance should be furnished to him.

39. A great work, in connection with Chinchona cultivation, will be done on the Annamallays at some future day. Extensive coffee operations have already been commenced at Ponachy, and the Collector of Coimbatore may even now be able to recommend some measure, with a view to extending Chinchona cultivation in that direction.

40. But I believe that the most useful work might be done in Wynaad, under the superintendence of the Deputy Collector, who has opportunities of explaining the value of Chinchona cultivation to the natives, and who should be supplied with all the plants he may think it advisable to apply for. It seems very desirable that the views of the Collector of Malabar on this point should be placed before the Government, and favorably considered.

41. The people of Coorg and of the Mysore mountains will, I have no doubt, avail themselves very readily of any opportunities that may be extended to them of obtaining and growing the Chinchona; and I hope soon to submit a plan with this object in view, for the consideration of the Chief Commissioner. Any number of plants and seeds that he may require will, of course, be furnished from the Neilgherry Hills, in accordance with views expressed by the Secretary of State, in paragraphs 4 and 5 of his Despatch, dated January 16th, 1863.

42. If the above suggestions are favourably entertained by His Excellency in Council, and followed up from time to time as opportunities offer, a very great blessing will be conferred on the natives. The healing bark will be at their doors, and the powdered bark, or a decoction of it, will furnish them with an unfailing remedy for an otherwise incurable scourge. The work to be done is simple and easy; the good that will be effected is altogether incalculable. It is work that should take precedence of all fostering of private enterprise, and supplying of new investments for capital. Dr. Poeppig (Reise II p. 223) in a passage which I have quoted in a note to my Work (p. 506) gives testimony to the efficacy of the green bark as a cure for fever, from his own experience on three different occasions; and it is now in the power of the Madras Government to extend the blessing then enjoyed by a solitary German traveller in Peru, to a great population of sufferers from fever in this country.

43. This, as it appears to me, is the work that remains to be done in connection with Chinchona cultivation; and the necessary steps may now, I think, be foreseen, down to the time when the Government can fitly retire from active participation in it. Next to the measures suggested in the foregoing 10 paragraphs, the most urgent present work is the completion of the planting out of the 1200 acres at the Neilgherry plantations. It will be advantageous, in every point of view, if this work is finished as quickly as possible; and the use of convict labor appears to be an excellent way of effecting this, while it is, at the same time, a convenience to the prison authorities. As I have had good opportunities of judging of the way in which this measure is working, during my recent inspection of the plantations, it may be useful if I state the impressions which I have received respecting it.

44. On August 3rd, 1864, His Excellency in Council recorded an opinion that convict labour might, with much advantage, be made use of on the Chinchona plantations, and directed Mr. McIvor to submit plans for jails, to accommodate 500 prisoners at Dodabetta, Neddivattam, and Mail Koondah. On September 6th, Mr. McIvor having completed the plans, his estimate of Rupees 21,225 for the jails, to be paid out of the Budget allowance for the plantations, was sanctioned; and the whole scheme was fully approved by the Government. The jails are substantially built, and on an admirably devised plan both for health and security. That at Dodabetta consists of one, that at Neddivattam of two large and lofty rooms, with brick walls and roof, supported by beams of Angelly wood. Along each side, there

verandah rooms for dispensaries, offices, warders, &c., and the arrangements for guarding and inspection are very complete. The jails have fire places, the bed places are wooden planks raised 18 inches from the ground, and each prisoner has a rug and two cumblies. The drainage appears to be excellent. At the Dodabetta jail, there is a Jailer at Rupees 50 a month, a Head Warder at Rupees 14, 4 Warders at Rupees 10 each (total salaries Rupees 104), and 17 Policemen, for 82 convicts. At Neddivattam there will be 6 Warders and 32 Policemen for 200 convicts.

45. The Dodabetta jail was completed first, and the prisoners entered it on September 20th, 1865, consisting partly of convicts from the low country, and partly of Chinese prisoners from the Straits Settlements. Unfortunately, no one, with proper authority, was placed in charge of them. The Joint Magistrate at Ootacamund stated that it was impossible for him to visit the jail, and Mr. McIvor had no powers. Thus, from the middle of September until the middle of December, the prisoners, I presume through some inadvertence, were left without any one but the Jailer to control them. The inevitable consequence was mutiny and insubordination. At last, in the middle of December, Mr. McIvor received powers, under the provisions of Regulation I of 1833, as Superintendent of the jail at Dodabetta, and from that day, and not before, the experiment of using convict labour on the Chinchona plantations commenced.

46. The result has, I think, fully confirmed the opinion of His Excellency in Council that convict labour might be made use of on the Chinchona plantations with much advantage. Two or three days after Mr. McIvor took charge, there was an outbreak, the sure result of three previous months of anarchy. It was promptly suppressed, and the prisoners at once saw that good behaviour was their best policy. Ever since they have conducted themselves well; there has been no attempt at escape, no illness, no insubordination. They have worked well and cheerfully, and the experiment, now thoroughly tested, is a decided success. The clearest proof of this is to be found in the extra work done; for where there is a mutinous feeling or discontent, it is difficult to exact the regular tasks, while, under the influence of opposite feelings, extra work is cheerfully done. The chief employment is pitting for Chinchona plants. Free labourers do 16 pits a day. The task of the convicts is to do 20 pits; of the Chinese, 25 pits a day. For extra work, they get half an anna for 5 pits. The native convicts average 7 pits a day of extra work each man, and the Chinese 8½ pits. If cheerfulness at work, strict subordination, and an absence of sickness and of any attempt at escape, are any test of the success of a system of managing convicts, these results have been achieved at Dodabetta jail during the last month.

47. This successful experiment at Dodabetta supplies the assurance that the same results will be attained at Neddivattam jail, if Mr. McIvor is invested with similar powers. The jail at Neddivattam is now quite completed and ready for the reception of prisoners, and it is very important, for several reasons, that it should be occupied by convicts without delay. In reliance on convict labour, the free labourers have been employed on the jail instead of on the plantation work. If, therefore, the convicts are not sent up, the work will be thrown back in the plantations, the nurseries will remain overstocked, and very serious loss will be the

result. The sums spent on the jail will also have been wasted. Then it will be absolutely necessary to obtain other labour at all hazards, in order to prevent the great damage which otherwise will ensue. The labour market will thus be entirely disorganized, and there will be much consequent inconvenience and distress. On the other hand, the various advantages arising from using convict labour on these plantations, such as the relief of the crowded state of the Southern jails, the great saving of expense to the State, &c., will be lost.

48. Any fear that there are special facilities for convicts to escape from these jails is founded on a misapprehension of the facts. It stands to reason that, if the buildings are arranged with equal regard to safe keeping and inspection, and have the same machinery for guarding the prisoners, there will be exactly the same chances of escape on the plains as on the hills—no more and no less. But the arrangements for custody and inspection in the jails on the Chinchona plantations are superior to those of jails on the plains, so that there are less chances of escape in the former, while the probability of final escape is very small. At Mail Koondah it is almost impossible for a native convict to get clear away.

49. The jail at Mail Koondah, an exact counterpart of that at Dodabetta, is very nearly completed.

50. With convict labour, the work of planting the 1,200 acres will be completed in a little over two years. During this time, the quinologist will be conducting his experiments and investigations, and, in concert with the Medical authorities, deciding upon the important questions connected with the manufactory of preparations from the bark. On the departure of the convicts, the three handsome and substantial buildings at Dodabetta, Neddivattam, and Mail Koondah will be available for bark stores and manufactories. The quinologist will then be able to continue his operations on a larger scale, to furnish abundant supplies of the febrifuge, and to instruct numerous Apothecaries and Dressers in the method of manufacture. Dispensaries in every part of the country will be able to obtain and prepare their own bark. At the same time, the most advantageous moment for sending home the rich febrifuge—bearing bark will have been ascertained, and East Indian bark will stand so high in the European market that Chinchona plantations will, on all sides, prove highly remunerative. Meanwhile, the cultivation of the Peruvian bark tree will have been extended to the utmost possible extent throughout the Hill Districts of India; and the quinine febrifuge will have been brought within the reach of every sufferer from fever in the land.

51. When these results are fully achieved, the Government may fitly pause. Then, and not till then, will the work be concluded, and the Government be justified, by the sale of plantations and manufactories, in receiving back with interest the whole of its outlay. One of the greatest and most benificent measures that any ruler has ever undertaken for any country will at last be fully completed.

52. Trusting that the foregoing remarks and suggestions, all of which I have very carefully and anxiously matured, will receive favorable consideration from His Excellency in Council, I have the honor to be, &c.

(Signed) C. MARKHAM,

Proceedings of the Madras Government, Revenue Department,
12th March 1866.

ENCLOSURE No. 1.

From J. E. HOWARD, Esq., F. L. S., to the Under Secretary of State for India, dated 18th November 1865.

I have the honor to report that I have examined the small packet of the fine red Pinon de Pitayo variety of Bark, and find that it contains

Sulphate of Quinine	5·85
Quinidine and Chinchonidine	4·19
Chinchonine	1·30
	11·34

The total amount of Alkaloids (after deducting the weight of Sulphuric acid of the Sulphates) may be given as ten per cent. of the weight of the Bark sent. This gives promise of an excellent result in the hands of Mr. McIvor, if the seeds should germinate in India.

Two parcels of this red Pitayo variety are in the market at the present moment, producing, respectively, 5·00 and 4·70 per cent. of Sulphate of Quinine. The price asked for these, though less carefully selected than the packet sent by Mr. Cross, is about ten per cent. beyond that of *Calisaya*. It will be seen from this that the Bark is much esteemed in commerce.

I have also examined the packet of leaves sent, and find these to contain a proportion of Alkaloid, on the exact nature of which I should be unwilling to offer an opinion, unless I had the opportunity of experimenting on a larger portion of the material.

(Signed) J. E. HOWARD, F.L.S.

ENCLOSURE No. 2.

Report on the yield of two Chinchona barks cultivated on the Neilgherry Hills, and sent to Dr. deVry by Mr. Clements R. Markham, on August 7th, 1865.

Bark No. 1.*

The bark dried at 212° Fahr. and analyzed by my method (*Pharm. Journal, August* 1864,) yielded 3.16 grains of alkaloids, consequently 9.14 per cent, and 0.142 grains of quinovic acid, or 0.41 per cent. Of these 3.16 grains of alkaloids, 1.48 grains were disolved by ether, consequently 4.28 per cent. of alkaloids, soluble in ether, was contained in the bark.

2. The part soluble in ether, saturated with oxalic acid, yielded beautiful crystallized oxalate of quinine, and left an uncrystallizable mother liquor, from which was obtained an amorphous alkaloid, which I have found in all the young Chinchona barks that I have analyzed.

3. The part insoluble in ether contained no quinidine, whilst the sulphate, obtained by its saturation with sulphuric acid, crystallized like sulphate of quinine, and not like sulphate of chinchonine. I consider, therefore, that the part of the alkaloids of this bark which is insoluble in ether, consists chiefly, if not entirely, of chinchonidine. The presence of chinchonine could not be ascertained, for if this alkaloid really exists in the analyzed bark, its quantity must be relatively very small.

4. During my experiments I observed the relatively large amount of chincho-tannic acid contained in this bark, and also the absence of chlorophyll.

5. The yield of alkaloids being greater than I expected, I was obliged to change the filter upon which the precipitate of the crude alkaloids, mixed with an excess of lime, was collected, by which operation I sustained a small loss. The amount of alkaloids in the bark is, therefore, greater than the obtained quantity of 9.14 per cent. This was proved by the following experiment.

6. Ten grains of bark dried at 212° Fahr. were lixiviated in a narrow glass tube, so that the column of bark powder had a length of 10 centimetres, by 150 cubic centimetres of diluted hydro-chloric acid containing 4 per cent. of pure acid, which lixiviation lasted three days. The liquid obtained by this procees was afterwards precipitated by 15 cubic centimetres of a solution of caustic soda, and the precipitate collected on a filter. After washing and drying the precipitate, it was dissolved in alcohol, and the clear alcoholic solution, containing all the alkaloids of the 10 grains of bark, evaported to dryness. When the residue of the evaportion had been

* The numbers are those attached to the samples of bark in the Memorandum accompanying Mr. McIvor's letter to the Secretary to Government (Revenue Department,) dated May 3rd, 1865.

o long heated on a water bath that its weight remained constant, it was proved that this weig was 1.116 grains. The analyzed bark consequently yielded 11.16 per cent. of alkaloids, which he are forwarded with the Report.

Bark No. 4.

47.67 grains of bark dried at 212° Fahr. and analyzed by my method, yielded 1.36 grains o alkaloids, consequently 2.85 per cent., and 0.293 grains of quinovic acid, consequently 0.61 per cent. Of these 1.36 grains of alkaloids 0.77, were dissolved by ether, so that the bark conse quently contains 1.61 per cent. of alkaloids soluble in ether.

The part soluble in ether, when saturated with oxalic acid, yielded beautiful crystallizer oxalate of quinine, and left an uncrystallizable mother liquor, from which was obtained the abovementioned amorphous alkaloid. The part insoluble in ether contained no quinicine, but the quantity of 0.59 grains was too small to ascertain with certainty if this part contained either pure chinchonine, or a mixture of this with chinchonidine. During my experiments, I observed that this bark contains a large amount of chlorophyll.

Conclusion.

No. 1 bark is the most valuable specimen I ever met, as I never before manipulated a bark yielding the enormous quantity of 11 *per cent.* of alkaloids.

(Signed) J. E. deVRY.

Enclosure No. 3.

MEMORANDUM.

The indigenous *Materia Medica* of the Hill ranges of Southern India is varied and extensi and comprehends many plants of proved value.

2. The best means of bringing these into general use has often been discussed, and mes, under the earnest consideration of the Drug Committee (appointed by the Secretary of State fo India) when I left London in September 1865.

3. A few of the many officinal plants, both indigenous and naturalized, which abound and or near Ootacamund, may be mentioned.

Indigenous.		Naturalized.	
Cannabis Indica	Indian Hemp	Argemone Mexicana	Oil.
Berberis		Digitalis purpurea	Leaves.
Ophelia	Chiretta or	Mint	Essential oils.
Exacuna	Hill Gentian.	Peppermint	
Andrographis paniculata	Creyat.	Lavender	
Gnaltheria	Winter green oil.	Hyosciamus	Extracts.
Pterocarpus Marsupium	Kino.	Taraxacum	
Citrus	Citric acid.	Belladonna	
		Stammony.	Roots.
		Jalap	
		Aconite	

4. The Superintendent of the Government Garden at Ootacamund could collect specimens of these and others for transmission to the Medical stores, but the preparation of the oils, extracts, &c., could not devolve upon him, and from the want of a properly qualified *pharmacien*, there has been little progress made in the employment of Hill medicines.

5. On this account, I concur in the [illegible] to engage a skilled Pharmaceutist in order that the medicinal plants growing around us may receive due attention, and the officinal preparations be made in an approved manner on the spot, from fresh leaves, seeds or roots. In the end, I believe this would prove an economical arrangement.

Coimbatore,
14th January 1866.

(Signed) H. CLEGHORN, M. D.

Proceedings of the Madras Government, Revenue Department, 12th March 1866.

Enclosure No. 4.

Extract of a letter from Mr. CLEMENTS MARKHAM, to the Under Secretary of State for India; dated 26th December 1865, on Chinchona Cultivation in Travancore, and on the Pulney Hills.

I have been engaged in examining portions of the mountain range between Palghaut and Cape Comorin, with a view to the selection of sites for Chinchona cultivation. The spread of this cultivation throughout the hills of India by means of numerous centres of propagation is, in my view, essential to the success of the principal object for which the experiment was undertaken, and I therefore believe that the results of my recent journeys will prove useful. I shall enter fully on the general question in my Report to the Madras Government, a copy of which I shall shortly have the honor of transmitting for the information of the Secretary of State in Council. I now propose to report the particulars of my journeys in the hills of Travancore and of the Madura District.

2. Considerable progress has recently been made in planting on the Southern Ghauts, and the establishment of coffee and tea estates will always lead to the cultivation of Chinchona. The Natives are fully alive to the importance of introducing the Quinine yielding trees. The Dewan Peshkar of the Southern Division of Travancore, with whom I had a long conversation at Punnaguddy, asked me for Chinchona seeds; and in subsequent conversations with the Rajah of Travancore at Trivandrum, and with the Dewan Madava Row, I found that considerable interest was already taken in the measure. Mr. Newill, the Resident, thought it desirable that I should visit Peermade and the neighbouring Hill District, with a view to suggesting the course that should be followed by the Travancore Government, with reference to Chinchona cultivation; and I considered it to be my duty to accede to his wishes. I had the great advantage of the company of Dr. Cleghorn, the Conservator of Madras Forests, during this expedition. My travelling expenses to Peermade were defrayed by the Travancore Sirkar.

3. The mountains from Palghaut to Cape Comorin may be divided into two distinct regions, for purposes of description, which are separated from each other by that extensive unknown tract of country, where the sources of the great river Periaur are still concealed from our knowledge. The southern region extends from Cape Comorin to Courtallum, and comprises the mountain chain which divides Travancore from Tinnevelly. Near Cape Comorin isolated masses of weather-beaten rock rise abruptly from the plain, and form an outline of battlements and pinnacles against the sky; and the continuous range only commences north of the Aramboly Pass, where the mountains attain a height of 3,000 feet and upwards. The range is not broad and has little or no intermediate table-land, but slopes abruptly from the summit ridge to the rich green expanse of Travancore on one side, and to the dried up plain of Tinnevelly on the other. The peaks rise to a height of 6,000 feet. Several coffee estates have already been formed on these hills. The most southern are at Assambhoo, at an elevation of 3,000 feet, immediately above the Aramboly Pass. General Cullen, who was Resident from 1810 to 1860, originally formed a coffee garden at Assambhoo, which is now owned in partnership by the first Prince of Travancore and the Dewan. But within the last few years the Reverend J. Cox, a Missionary, a Mr. Gordon, and two planters from Ceylon (Messrs. J. and J. C. Grant) have opened coffee estates at Assambhoo with every prospect of success. The principal drawback to this site is its exposure to severe gales of wind, which do much injury to the plants. Further north, and on the Tinnevelly side at the feet of those grand precipices called Maha Indragherry and Tiranamally there is a small coffee estate owned by a wealthy and liberal-minded Mahomedan named Meer Anjemir, who lives at Punnaguddy. At the foot of the peak of Aghastya-mullay, in Travancore, a fine tract of forest land has been purchased, but not yet cleared, by General Sim. On the Tinnevelly side, in the forests near Papanassum, 500 acres have been granted to Mr. Barter of Tuticorn. This estate which has not yet been surveyed is on the Vellar river, and 50 yards of jungle are to be reserved on each side of the stream. Messrs. Cocq of Tuticorin have long had coffee estates near Courtallum, which are now managed by Mr. Crabbe; and Messrs. Binny of Madras have tea, cocoa, and spice gardens under the management of Mr. Liddell of Quilon in Arriangole Pass, at an elevation of only 1,200 feet above the sea. There are other clearings of minor importance.

4. There is a notable difference between the climate on either side of these ghauts. On the west side the slopes are abundantly watered by the south-west monsoon, and the streams flow into the backwaters, supplying the narrow strip of land with water in abundance. On these Travancore hills clearing may be carried on to any extent without detriment to the low country which could well dispense with some of its surplus moisture. But on the east side the due supply of water for the tanks and channels is a necessary of life to the people inhabiting the wide plains of Tinnevelly. Indiscriminate felling on these eastern slopes would lead to most deplorable results, and the evil is already beginning to be felt. Further grants of land have been prohibited in Tenkassy Taluq, and in Nanganary the people complain bitterly of the drying up of the streams. There can be no doubt that serious consequences will arise from indiscriminate felling; but while Rupees 1,81,000 are required for the repair of tanks and channels in Tinnevelly, and only Rupees 48,000 are granted, the failure of water cannot be *entirely* due to a reduction in the rainfall caused by clearing on the hills.

5. Chinchona plants, on a more or less efficient scale, will be hereafter cultivated on coffee clearings and other lands that I have enumerated; and it should be remembered that their beautiful foliage will be even more effectual in wringing moisture out of the passing cloud than the original jungle. The Natives are well acquainted with the value of quinine, and when trees which yield it are growing round the base of that magnificent peak, 6,000 feet above the sea, that is dedicated to their great Rishi and Physician Aghastya, they will fully appreciate the blessing that has thus been brought to their doors. Severe gales of wind cause the chief difficulty in commencing cultivation on these mountains, especially on the exposed slopes of the Agastyamullay; but the Chinchona trees, when they once get through the first two or three years of their growth, will not suffer irreparable damage from this cause.

6. I now come to the Northern Division of the mountainous region extending from the ghaut to Cape Comorin. It includes the Anamally and Pulney Hills in British territory, and the extensive Hill District within the Native States of Cochin and Travancore; and differs from the Southern Division in possessing several ridges with wide stretches of table-land, instead of the lofty lines of mountains sloping directly from their summits to the plains on either side. The Travancore portion of this region is by far the most extensive, but until quite lately no attempt had been made to open cultivation on it, and the southern part is still entirely unknown; Mr. Ma[illegible] in 1862, formed a small garden at Peermade on the western verge of the Travancore mountains, and several coffee planters have since settled in its neighbourhood. Their pioneer was Mr. [illegible], and he it was who made the road to the foot of the ghaut for the Travancore Sirkar. This road commences at Kotiam on the Cochin backwater, and passes over undulating country, covered with forest, to the foot of the mountains at Mundakayam, a distance of 33 miles. For this distance a good bandy road has been completed and bridged throughout. At Mundakayam there is a large river, Kullapoliem, where a good stone bridge is in progress, and here the ascent of a ghaut commences, which is quite equal in beauty to that of Sisparah. The road up the ghaut is not completed, and extensive blasting operations are necessary, but large gangs of coolies were at work, and rapid progress was being made. The coolies were getting four Annas a day (an ordinary laborer's pay in the plains being two Annas), and for boring rock they are paid by the foot. They get four Annas a foot, and can do three feet a day, but are not paid unless their labor results in a good blast.

7. At the top of the forest-covered mountains is the region called Peermade, a country of grassy slopes, splendid forest land, rocky ridges, and lofty peaks averaging an elevation of 3,000 feet above the sea. At its western edge, where there is a glorious view of the 30 miles of forest as far as the backwaters and the [illegible], who was then Resident of Travancore and Cochin, built a house which [illegible] established a Chinchona garden for the Travancore Government. This was in 18[illegible].

8. The [illegible] Rupees 1,00[illegible] a garden and [illegible] Rupees 300 for getting Chinchona plants from [illegible] and in December [illegible]

garden, "he then said," may be viewed as formed to aid in the introduction into the mountainous country of Travancore of the Chinchona plants, and its other objects may be considered as subordinate to this, such as the growth of tea, coffee, &c. The question is, how the Travancore Government can most successfully second the efforts of the British Government, and make due use of its mountain region in extending Chinchona cultivation. There are mountains near Maryville on which subsidiary plantations may be formed up to nearly 6,000 feet. Extensive seed beds should be formed, and there should be about 10 acres of coffee. By selling the seedlings to planters, at a yield of half a ton an acre, the profit would probably cover the cost of the garden. Tea should be raised in the same way, and the towns on the coast might be supplied with potatoes and onions. The Maryville garden was commenced by planting apples, pears, grapes, oranges, strawberries, raspberries, roses, geraniums, fuschsias, &c., and kitchen vegetables."

9. On December 11th, 1861, the four first Chinchona trees were planted by Mr. Maltby at Maryville: a *C. Peruviana* in the north-east corner, a *C. Succirubra* in the south-east, a *C. Nitida* in the south-west, and a *C. Micrantha* in the north-west. But his admirable suggestions have been very inefficiently followed out since ill-health unfortunately obliged him to retire in 1862. Mr. Newill, the present Resident, furnished us with the following Memorandum, dated December 1865:—"The Government garden at Peermade was established about three years ago. In March 1863 about 500 Chinchona plants were brought from Ootacamund by Mr. Hannay, the Superintendent of the Sirkar garden, they were then about two months old and from one to two inches high. Many died when quite young from the effects of damp, drought or cutting winds. There are now about 220 strong and healthy plants, and some 200, young plants have been propagated. The *C. Officinalis* has a tendency to throw out branches along the ground, like a creeper. The tea plants are now three or four feet high and seeding freely."

"So far the experiment has been encouraging, and it seems desirable for the Sirkar to pursue it so far as to provide the means for planters to try it on a more extensive scale, though I question the expediency of the Sirkar entering into extended operations, which may be left to the enterprise of others."

Chinchona Plants at Peermade, December 1865.

Name of Species.	Number.	Average Height.	Height of tallest.	
C. Succirubra... ...	79	5 feet.	8 feet 6 inches. ...	Age two years and ten months.
C. Micrantha... ...	46	3 „ 6 inches. ...	6 „	
C. Peruviana... ...	27	3 „	6 „	
C. Nitida...	13	2 „ 6 „ ...	3 „	
C. Officinalis... ...	60	2 „ 6 „ ...	4 „ 7 inches. ...	
Total...	225			

10. I found the plants at Maryville looking vigorous and healthy, although the leaves and some of the branches had suffered severely from the cutting land winds of the north-east monsoon. The site is not, I think, the best that could have been chosen. It is exposed to the whole force of the land wind, as well as to the south-west monsoon, yet the plants may be successfully propagated here, and if the plantation is extended, there is a well sheltered shola to the south-east. The elevation above the sea is 3,300 feet, and the temperature is suitable. The rain-fall, according to observations made for General Cullen varies, from 125 inches on the western skirts to 40 inches on the eastern crests of the ghauts. The girth, close to the ground, of the largest *C. Succirubra* tree, was nine inches. There were 225 Chinchona plants exclusive of cuttings, 5,000 Coffee and 4,000 tea seedlings. With regard to the establishment, I found that Mr. Hannay, the Superintendent, received Rupees 120 a month, a blacksmith Rupees 15, a carpenter Rupees 14, a maistry Rupees 12, and four coolies at 7 Rupees each; making Rupees 228 a month, or

about £285 a year. There is no regular allowance for the garden, and no glass house has yet been completed.

11. We have reported our impressions and submitted various recommendations respecting this garden, and generally on Chinchona cultivation in these hills, to Mr. Newill, for the consideration of the Travancore Government. The Maryville garden should be the source of supply whence Chinchona plants should be forwarded to every part of the Travancore hills, as opportunities for their cultivation may arise. With this view the expenditure might well be raised to £500 a year, a gardener might be procured, trees might be cultivated for seeds, and propagation might be extensively carried on, and the garden should be self-supporting through the sale of coffee and tea seedlings, and of kitchen vegetables. The cultivation of *C. Officinalis* should be given up, the elevation being insufficient, and attention should be turned entirely to the spread *C. Succirubra*, *Calisaya* and *Micrantha*. This measure originated by Mr. Maltby will, if properly and systematically carried out, be a great blessing to the people, and highly creditable to the Travancore Government.

12. The coffee estates, the first of which was only commenced in 1862, are from a mile to four miles north-east of the Maryville garden, and are rapidly taking the place of the beautiful natural sholas. They are at present six in number, and the extent of country taken up, cleared and planted will be seen at a glance in the following table:—

Coffee estates, &c., at Peermade on the Travancore Ghauts.

Name of estate.	Owners.	Managers.	Acres.			Remarks.
			Grant	Cleared.	Planted.	
1. Maryville... ...	Travancore Government.	Mr. Hannay... ..	...	...	...	Chinchona Plantation.
2. Hope.	Originally owned by Mr. Munro, now by a Company.	Mr. G. Baker. ...	500	300	150	Commenced in 1862.
3. Woodlands and Keppoch.	Originally owned by General Stevenson, now by four Partners— 1. General Stevenson. 2. Mr. Crawford, (Com. Agent at Aleppy). 3. Mr. Aspinall of Cochin. 4. Mr. Oughterson.	Mr. Oughterson, Mr. Stevenson, (Assistant).	500	140	110	Commenced in 1862.
4. Ashly.	Dr. Petman.	Dr. Petman... ...	200	100	60	Commenced in 1863.
5. Stagbrook.. ...	Mr. R. Baker.	Mr. R. Baker ...	200	30	30	Commenced in 1863.
6. Fairfield.... ...	Mr. H. Clarke. Dr. R. Clarke.	Mr. H. Clarke ...	900	15	...	Mr. Clarke has only recently commenced felling.
7. Twyford.... ...	Mr. Richardson, Rev. Baker, (Missionary).	Mr. Richardson ...	600	40	40	Commenced in 1864.
8. Wulunjun Canum Shola, containing 1,400 acres.	Mr. Crawford, (Com. Agent at Aleppy).	.....	500	...	...	Felling not yet commenced.
9. Messrs. Pierce, Leslie & Co. of Cochin, and Mr. Berry.	.....	.....	...	...	...	A grant of about two square miles.

13. All the country occupied by these coffee planters is well adapted for Chinchona cultivation, and I was glad to find that they were inclined to undertake it. The tract fitted for coffee extends from the crest of the Ghauts to a range of hills about three or four miles further to the eastward, and for many miles to the north and south. The country is intersected by well wooded ranges of hills occasionally running up into fine peaks, such as Amaritha-mullay overlooking the low country, which is 4,700 feet above the sea; the Anaconum peak overhanging the Woodland estate, and several others not marked on the Trigonometrical Survey, but which will be found on the accompanying map. The scenery is exceedingly beautiful. The undulating hills are covered with tufts of lemon and elephant grass (*Andropogon*), growing to a height of 6 or 8 feet; and the valleys and mountain sides are clothed with fine sholas. Unlike the comparatively stunted stems and umbrella-like foliage of the Neilgherry and Pulney hills, the trees in the Peermade sholas, at a lower elevation, grow to a great height and present a grand appearance. The undergrowth beneath them consists of cardamom, wild ginger, zedoary, rattan, a small bamboo called *etah* by the Natives, and a few ferns. The following are the principal trees—the *Parlmarum* (*Isonandra acuminata*), a large tree only recently discovered by General Cullen, much used for planking; the *Nanga*, called by the planters "iron wood," appears to be a sort of poon, (*Calophyllum*); *Anjelie* (*Artocarpus hirsutus*) yielding a very valuable timber, *Aranili* a tree of the jack tribe, from the bark of which bags are made; *Terminali catappa* or Indian almond; *Erythrina Indica* at the edges of the sholas, wild cinnamon; two species of *Engenia*, and some other *Myrtaceæ* two kinds of *Garcinia* or gamboge trees; and the *Canarium strictum* or black dammer tree, called by the Natives *Congilium-marum*. Besides the *Eugenias* there are several other beautiful flowering shrubs and herbs outside the sholas, but still under the shade of their trees, such as *Osbeckia*, *Crotalaria*, and the brilliant dark blue *Torrenia* so common on the Sispara Ghaut. These fine sholas, with their valuable timber, are fast disappearing under the axe of the planters, and the loud crash of falling trees is constantly heard on the hill sides. The sites best adapted for Chinchona planting are the forest slopes beneath the peaks called the Tumbys, and within Mr. Clarke's estate. They are well sheltered from the cutting land winds, and partially so from the south-west monsoon, while the numerous mountain streems supply abundance of water. It is, I am happy to say, the intention both of Mr. Clarke and Mr. Oughterson to undertake Chinchona cultivation.

14. A telegram from Mr. Levinge, the Collector of Madura, induced us to undertake an expedition from Peermade across the mountains by a very unfrequented route, to the Madura District. I considered it desirable to take this line, both because it would enable me to judge of the country across the whole width of the Travancore Ghauts, and because I should thus have an opportunity of consulting Mr. Levinge on the important subject of Chinchona cultivation on the Pulneys.

15. A reference to the map (Sheet No. 62) will shew that there is a very extensive mountain region between the plains of Travancore and those of Madura. The southern portion extending over an area of about 30 miles by 20, out of which issues the river Periaur, is entirely unknown and is a blank on the map. The northern part borders on the Anamallays and is almost as little known. The great river Periaur, flowing from south to north, traverses the centre of this mountain region, and after a long course, eventually turns to the west and falls into the Cochin backwater. Our route passed right over this country, crossing the Perryaur. The mountains are owned, under the Travancore Government, by the petty Rajah of Pooniat and from time immemorial there has been a track called the Pooniat road, traversing Peermade, and passing down into the Cumbum valley on the Madura side. It was used by the elephant hunters, whose old pits are still to be seen, and by the Pooniat Rajah's cardamom gatherers. The ancient Pandyon kings of Madura are said to have received their supplies of betel, pepper, and cardamoms by this route, in exchange for rice and cloth. At present the Madura people annually drive their herds up to these mountains for pasturage, but the only inhabitants are a wild tribe of wandering hill people called Malas. They are seldom seen.

16. The distance from Peermade to the Periaur river is 7½ miles on the map, 10 miles by our route; from the Periaur to the eastern crest of the ghauts 5½ miles on the map, eight miles by our route; from the crest of the ghauts to Goodalloor, on the Madura side, eight miles on the map, 12 miles by our route; a total distance of 30 miles on foot, over a most difficult country.

17. The road leads from Peermade across grassy uplands, with much rock on the surface, to the river Urraday, whose affluents water the Hope and Woodlands estates, and crosses the stream at the Urraday Tavalum. These Tavalums frequently occur on the map. They are merely places where herdsmen are in the habit of resting their bullocks, and are known by several acres being over-grown by a species of *Compositæ*, (*Blumea*) the result of bullock manure. The land must be very rich and valuable. There are several magnificent sholas on the hills overhanging the Urraday and facing to the westward; but after crossing them the country to the eastward presents a hotter and drier appearance, the sholas are smaller, there are large patches of *ertah* or hill bamboo in them indicative of a poor soil, and they often only extend a few yards on either side of the streams. We saw several bison on high hills to the south, samber bounded before us into the sholas, and there were numerous traces of elephants and cheetahs. The country appears never to have been entered by a Shikaree. We passed through the *Pambanur* (snake) *Tavalum*, and over hills covered with grass 10 and 12 feet high, a most blinding and tedious march, and finally came by a steep descent through bamboo jungle, to the banks of the Periaur.

18. Although this was nearly the lowest season, the river was 30 yards across, and we found by the marks that, during the monsoon, it rises eight feet higher. The whole of this immense volume of water now runs to waste in the Cochin backwater. But there has long been a project to throw a dam across at a point 14 miles south of where we crossed, and to make a cutting so as to throw the river over into the Madura District.

19. The coffee plantations have already begun to attract traffic over this formerly unfrequented route, and before long a good bullock track and a bridge over the Periaur will become an urgent requirement of the District. The rice and cloths of Madura will be exchanged for the silver of the planters, and the betel, cardamoms, and tobacco of Travancore. We found 200 bullocks on the banks of the Periaur laden with rice for the coffee plantations, coming from the Cumbum valley. The bullocks were driven in and made to swim across, while the bags of rice were ferried over on a rude bamboo raft; a process which seemed likely to occupy at least twenty-four hours. One only has to be a witness of proceedings such as this, to be deeply impressed with the delay and injury caused by the absence of bridges. We crossed the river on the same bamboo raft, but the coolies with our tent did not arrive until late, having been driven or rather frightened off the road by a herd of wild elephants. The river is here lined on both sides with clumps of bamboo, the bed is very rocky, and the water clear and cool. As night closed in the fires of the herdsmen and the mass of white bullocks under the bamboos were finely reflected in the river. Fires throughout the night were necessary to keep off the tigers which abound in extraordinary numbers, denoting the great abundance of other kinds of game.

20. After passing up the bamboo jungle which fringes the river on the east side we entered upon a country presenting a still more dried up appearance, though the grass was still of immense height. Stunted trees were scattered over the open hills, chiefly *Terminalia coriacea*, and here we met with the first teak trees. The land is formed into a large amphitheatre of hills with two sharp peaks, and after descending the slopes we entered a thick bamboo jungle, and had to wade along the bed of a torrent, up to our knees, for a considerable distance. The woods abound in black monkeys with white beards, jungle fowl, and imperial pigeons. The Goodaloor Tavalum is an open space in the midst of the forest, about 5½ miles from the Periaur, and close to the crest of the eastern side of the ghauts. The descent into the Cumbum valley is rapid and precipitous over huge boulders of rock, and often crossing a mountain torrent. The ghaut is clothed with splendid forest trees. Blackwood (*Dalbergia latifolia*), one of which I measured four feet from the ground and found to be 17 feet in girth, and another was at least of equal size: *Vengay* trees (*Pterocarpus marsupium*) yielding excellent wood for building purposes, as well as the gum *kino* of commerce; a tree called locally *Vekali* (*Conocarpus latifolius*,) the wood of

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which is also used for building; the black dammer tree; and lower down great quantities of the loathsome *Sterculia fœtida*, which yields an inferior kind of poon spar. Here and there we got peeps of the rich Cumbum valley as we descended, with mountains on the opposite side. On first coming out into the valley, there is a wide stretch of open grass land dotted with the *Yerkum* bush (*Calotropis gigantea*), where immense herds of cattle were feeding, and further on there are fields of castor oil, and fine crops of toor and raggee. The shade in the upper part of the valley is afforded by the umbrella thorn (*Acacia platifrous*), the *Euphorbia pentagona* growing like a tree, and the Palestine thorn (*Parkinsonia aculeata*). Lower down the valley, the road is shaded by banyans and tamarinds. I have described the irrigation of the Cumbum valley, and touched upon the subject of making a road thence to Peermade in the accompanying Memorandum on the Periaur. I need only add here that, on reaching Pereacolum where the cholera was raging, we went up to the Pulney Hills without delay, by the Pereacolum Ghaut.

21. My examination of this route convinced me that the country eastward of Peermade was unsuited for Chinchona cultivation, although I think it probable that if the dense forests round the sources and upper course of the Periaur are ever partially cleared, good sites will be found for the growth of the red and grey barks.

22. Mr. Levinge obtained 12 Chinchona plants from Ootacamund in March 1864, and they were planted in his garden at Kodakarnal, on the Pulneys, in the following April. They were then two or three inches high. The site is well sheltered, with a north-west aspect, and the land was originally not shola but common grass land: about two feet of mould below which there is large stoned gravel, and below that red clay. Holes were dug well through the gravel, and the earth was mixed with a little manure, in which the trees were planted nine feet a part each way. The site is 6,985 feet above the sea. On December 18th, 1865, the state and condition of these trees was as follows:—

CHINCHONA TREES.

At Kodakarnal on the Pulney Hills, December 1865.

Species.	Height.		Girth of stem.	Remarks.
	Ft.	In.	Inches.	
C. Succirubra, No. 1... ...	4	9	7	The largest leaf was 11×7 inches.
Do. „ 2... ...	4	9	6	
Do. „ 3... ...	5	2	4½	Three large shoots rising from the stem.
Do. „ 4... ...	3	10	5¼	
Do. „ 5... ...	...	...	.....	Numerous shoots springing from the stem.
Do. „ 6... ...	1	9	.....	Sickly.
C. Officinalis, No. 1... ...	4	8	5½	Shoots on the stem. Tree covered with buds.
Do. „ 2... ...	5	0	5	Covered with buds and flowers. Many shoots on the stem.
Do. „ 3... ...	4	5	4¾	Fine healthy tree.
C. Micrantha, No. 1... ...	4	1	6¼	Stem divided into two near the ground.
Do. „ 2... ...	...	...	.....	Sickly, broken down by an accident.
Do. „ 3... ...	3	3	4¾	Sickly, died down, and shot up again.

23. I have already described the Pulney Hills, and have recorded my opinion as to their capacity for Chinchona cultivation both in my former Report, and more fully in my work. My present visit has not induced me to alter the views which I had then formed. As the trees of C. Micrantha were drooping, I recommended that they should be transplanted to the Kodakarnal shola, near a stream where tree ferns flourish. I have also supplied Mr. Levinge with a parcel of seeds of the C. Officinalis procured from Ceylon. This species will no doubt thrive well on the upper Pulneys, as will also the C. Pitayensis, the seeds of which have just arrived at Ootacamund. C. Succirubra should be introduced into the lower Pulneys, where, however, very little progress has been made in coffee planting. The climate is too dry, and there is much fever. Mr. Sperschneider, formerly in the Forest Department, has about 40 acres of coffee in the lower Pulneys, at a place called Pali-mullay; M. Fontelerc, a Frenchman,

has a small coffee garden; and a short time ago Mr. Coyle, a Missionary, had another. The Native villages are generally on round knolls with fine jack and mango trees, surrounded by terraced cultivation, garlic, onions, potatoes, vendiam (Fenugreek) and some coffee. They are exceedingly picturesque, but are well within the fever range, and every house should have a few trees of the healing Chinchona near it. The difficulty is to find machinery for the spread of the cultivation. A Collector who takes an interest in the work can do much, an intelligent Subordinate in the Forest Department still more. On the Pulneys we now have a good beginning, and every prospect of satisfactory progress. There are the means of propagating to any extent in Mr. Levinge's nursery, and suitable sites for cultivation abound. I rode over a portion of the higher Pulneys, where there are several sholas of considerable extent with northern aspects at an elevation of 6,000 feet, which are well protected from the strong winds of both monsoons, while they receive all the moisture that reaches the hills. We selected one as the best of all, in the direction of Manavanoor, which covers about 150 acres. I have since written fully to Mr. Levinge on the whole subject. On leaving the Pulneys, we passed by the villages of Vilputty and Pullanky, crossed the heights of Tallamalla, and went down a precipitous and rocky pass on foot, to the village of Pulney.

24. It only remains to say a few words respecting the Anamallays, which I regret to say I could not spare time to visit, though I enjoyed a grand view of them from Polatchy. Here there is an unlimited area for future planting, every species of Chinchona will flourish at the different altitudes from 7,000 to 3,000 feet, and in few places will the blessing of their presence be more felt than in the neighbouring Districts. The Native hospital at Polatchy within ten miles of the Anamallays, the beneficial effects of which already extend to all the fever Districts at the foot of the hills, will hereafter receive unlimited supplies of bark, and have the febrifuge manufactured on the spot. All this is in the future, yet a commencement has already been made in planting the Anamallays.

No. 180. From CLEMENTS R. MARKHAM, Esq., to the Secretary to Government, Revenue Department, Fort Saint George, dated Bangalore, 7th February 1866.

1. With reference to paragraph 40 of my letter to your address, dated January 16th, 1866, I beg, in continuation, to submit my conclusions respecting Chinchona cultivation in Wynad, after a personal inspection of every part of that District.

2. Along the ridge of western ghâts overlooking Malabar, several grand masses of forest-covered mountain rise from Wynad plateau, and terminate in well-defined peaks at elevations of from 4,500 to 5,500 feet. The most remarkable of these mountain knots are the Velery-mulla, the Chumbra, the Koocha-mulla, and the Balasore ranges, while the Bramahgherry mountains form the boundary of Northern Wynad. The sites best adapted for Chinchona cultivation are to be found along the more sheltered slopes of these ranges.

3. The present state of the undertaking, as regards Wynad, is not so advanced as I had hoped, and this slow progress is due to the practice of charging money for the plants, a large per-centage of which die on the transit, instead of distributing widely and without stint. Good progress has, however, been made on a few estates, and several planters fully intend to give the cultivation a fair trial.

4. The estates where Chinchona plants are now growing are as follows:—There are a few in the Ouchterlony Valley, and on the plantations of the Moyaar Coffee Company. On the Naikenshola estate, in Cherambody, Mr. Minchin has a nursery containing about fifty plants of *C. Succirubra*, two or three

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feet high, as well as several trees planted out, one of which is six feet high and five inches in girth. On two estates, called the Ellembellora and Panora Peaks, on the slopes of the Chumbra hills, several trees are growing most satisfactorily. The Ellembellora Peak estate, belonging to Mr. Hinde, has an elevation of three thousand and five hundred feet, with a western aspect. Seven trees were planted out in February 1864, and they now look very healthy, with leaves untouched by the landwind. They are of the *C. Succirubra* and *C. Micrantha* species, and average a height of five to six feet, and a girth of five to seven inches. Mr. Hinde expects a cooly load of plants from the Neilgherries in a few days, and he intends to form a plantation on the slopes of the Chumbra mountain, above his estate, at an elevation of about 4,500 feet. The Panora estate is at the northern end of the Chumbra range. Mr. Rossell, the owner, planted out several Chinchona trees in December 1863, at an elevation of 3,600 feet above the sea. Not a single drop of rain fell for three months after they were planted, and there are now twelve trees of *C. Succirubra* and three of *C. Micrantha* planted out, of which three of the former are cuttings struck on the estate. Their height is from five to seven feet, and girth six to seven inches. These two estates, as well as those of Rimington on the other face of the Chumbra Hills, are admirably adapted for Chinchona cultivation, and I look forward to very satisfactory results from the future operations of their owners. On the Anapara estate, at the foot of the Chumbras, Mr. Fergusson has a fine healthy tree. It is worthy of observation that the rain-fall on these estates varies exactly as their aspects vary on the slopes of the Chumbra hills, with reference to the south-west monsoon. The following is a register of the rain-fall kept on the two estates where Chinchona trees are growing:—

Rain-fall on the slopes of the Chumbra hills (Wynad).

Month.	Panora Peak Estate.			Ellembellora Peak Estate.		
	1863.	1864.	1865	1863.	1864.	1865.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
January	1·14	0·00	0·00	.....	.....	0·00
February...	0·02	0·00	0·00	.....	.....	1·33
March	5·43	0·00	0·72	.....	.....	0·45
April	7·49	7·16	5·08	.....	4·49	7·41
May...	5·53	5·30	7·98	.....	8.44	9 37
June	56·66	39·28	22·54	.....	40 49	26 30
July...	35·84	54·68	79 60	.....	69 39	97·98
August	36·42	12·67	21·59	.....	16·47	25·78
September	7·00	7·77	5·42	.....	10·02	5·41
October	10·43	2·32	4·88	.....	5·90	7 47
November	1·14	1·60	4·77	.....	0·78	4·62
December	1·19	0·45	0·75	.....	0·26	0 76

At Baliapara, on the Koocha-mulla range, there are several plants; and Mr. Richardson has a row planted, in hard gravelly soil, in front of the Cutcherry at Manantoddy. Finally, there are nine very fine healthy plants of *C. Succirubra* on the estate of the Bramahgherry hills, belonging to the Madras Coffee Company.

5. An estate of 300 acres, on the well-wooded hills above the Tiranelly Pagoda, has been applied for by Mr. Lowry, a planter and an excellent gardener, exclusively for Chinchona cultivation. Mr. H. Gordon, who is opening largely on

the Bramahgherries and in the Tiranelly valley, has sent for 1,000 plants. Mr. Beaumont, the Managing Director of the South Indian Coffee Company, intends to form an experimental plantation at the foot of the Velery-mulla range, on the top and round the sides of a hill called Padapara. The plantation will cover about twenty acres, and will be sheltered partially from the south-west monsoon by the Velery-mullas, which tower above it. In short there now seems to be a prospect of a considerable extension of Chinchona cultivation in Wynad and, while it will be remunerative to the planters, there will hereafter be supplies of bark for their laborers, growing on the spot. I beg, therefore, to suggest that Mr. Richardson, the Deputy Collector, be supplied with all reports and proceedings on the subject of Chinchona cultivation, and especially with one of the copies of Mr. Howard's work *(Nueva Quinologia de Pavon,)* so that there may be the means of reference for cultivators in Wynad.

6. But, although the extension of this cultivation on the estates of European planters is much to be desired, it is far more important that the natives of the District should be induced to open small Chinchona gardens in every direction, and in great numbers. The people suffer fearfully from fever. The scourge has appeared exceptionally early this season, and I have myself witnessed its ravages, while I am assured that later in the year the scenes even on the public roads are loathsome and heartrending. Much of this fearful evil might easily be mitigated.

7. The Chetties, Nairs, and Moplahs, who occupy land in Wynad, generally select elevated knolls for the sites of their dwellings, which are exceedingly picturesque. They are covered with jacks, mangoes, bastard sago palms, and plantains, and overlook the rich paddy cultivation in the flats below. In most of these sites Chinchona trees would grow well, and form another item in the garden produce of the people. The healing febrifuge would be at their doors, and the use of the bark would be extended to hundreds of slaves and coolies who now die and rot on the public roads for the want of it. The machinery for carrying out this beneficent measure is at hand. The Deputy Collector will gladly superintend its details, distribute plants, select the best persons as recipients, explain the importance of the measure, and endeavour to excite an interest in the cultivation. The experiment will cost little or nothing, while the good that may be derived from it is evident. An unspeakable blessing, such as only those who have witnessed the ravages of fever amongst the coolies can fully appreciate, will be conferred on the Wynad District.

8. I venture, therefore, to recommend this measure most strongly to the favorable consideration of the Governor in Council. In the first instance, about 500 strong young Chinchona plants should be supplied to the Deputy Collector at Manantoddy, and a small sum should be sanctioned for the cost of cooly hire, tools, and the preparation of a nursery. He would then be in a position to propagate and distribute plants, and to take all such measures as, in his judgment, will be most conducive to the great object in view.

No. 181. MINUTE BY THE HONORABLE THE PRESIDENT.

1. I have before me Mr. Markham's report of his views on the subject of Chinchona cultivation, and a variety of collateral topics connected with this, together

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the Minutes of the Members of the Government upon certain propositions contained in a late Despatch from the Secretary of State. As these are, to a certain extent, embodied in Mr. Markham's report, I shall deal with them as forming part of the subject which the Government has now to consider.

2. Before, however, I proceed to discuss the various heads of Mr. Markham's report, I may say that it is very satisfactory to hear from him, so full an expression of approval of the system under which the Plantations of Chinchona have been cultivated. The success which has attended the experiment is attributable to the ability and zeal exhibited by Mr. McIvor, to whom, from the very commencement, the Government intrusted the whole superintendence and management of the Plantations. It is but fair to Mr. McIvor to say that he has taken a very extended view of the responsibility of his position. He has not only succeeded admirably in rearing and cultivating the plants, but has, by the many experiments which he has made and is making, added very much to our knowledge of the qualities of the different species, and has also discovered a mode of cultivation by which the quantity of bark, and of the alkaloids which it contains, will probably be largely increased.

3. I think I shall bring the subject more clearly before the Government if I separate altogether the questions connected with the cultivation of the plant, from those which relate to the mode of dealing with the bark after it is removed from the tree; and I will first address myself to the subject of cultivation. In a Minute which I submitted some months back, I gave an account of a visit which I had paid to the different Plantations, and I, in that, recommended that the Government should cultivate 1,200 acres, and should reserve also certain portions of land in juxtaposition to each Plantation, in order that if at any time it is thought fit to sell the Plantations, and trust altogether to private enterprize for the supply of bark, these Plantations might fetch higher prices in the market when capable of extension, than they would be if put up by themselves.

4. I gather incidentally from Mr. Markham's Report that he is desirous to see the amount of land, viz., 1,200 acres, brought under cultivation as speedily as possible; but I also gather from something which he says about the Plantation at Mailkoondah, which he wishes to limit to 200 acres, that he does not consider the addition of waste land to each Plantation advisable. It would be as well, I think, to let Mr. Markham see all the papers which have any bearing upon the subject of the cultivation of Chinchona, in order that he may know all that has been said and written with reference to this, before he commits himself to any positive opinion on this portion of the subject. Mr. Markham's observations and recommendations on the subject of Chinchona cultivation are contained in paragraphs 27 to 50. He brings prominently forward the fact that the object of the Government in introducing Chinchona cultivation into India was not to shew that its culture would prove remunerative, and the prospects such as to encourage private enterprize, but rather to reduce the price of bark as low as possible, and to bring its use within the means of the poorest cooly in the land.

5. I think, however, that in laying so much stress upon the reduction of price, Mr. Markham has overlooked a distinct expression of opinion on the part of the Secretary of State that it is desirable that such a return on the produce of the bark should be secured, as will pay the original outlay, and subsequent expenditure

on the Chinchona underaking with good interest. That the ultimate result the extension of the cultivation of Chinchona will be a reduction in the price of the febrifuge extracted from it is very clear; but this result must be produced by a very gradual process. In order to extend cultivation the prospect of good returns must be held out to the private speculator; he must believe himself able to realize larger profits from Chinchona than he can hope to do from either Coffee or Tea, for unless he can do this he will not risk his capital upon what is at present a mere speculation with the Government, of whose action he can but guess, as a competitor. Should the first planters realize large profits, other capitalists will soon be found to claim a share in these, and competition will bring down the price of bark to a minimum, which minimum will be regulated by the profits upon Tea and Coffee, the antagonists of Chinchona on the hills of India.

6. I cannot, therefore, think that it would be advisable to press Government aid upon those who have already commenced plantations in Travancore, the Pulneys, &c. The best encouragement which we can hold out to them will be the success of our plantations. If we can shew that these do yield a large return upon the capital laid out upon them, there will not be wanting men willing and indeed eager to enter upon the cultivation of Chinchona.

7. With reference to the proposals that the villagers in the hill Districts should be induced to include Chinchona trees among their products, first for home consumption, and next for supplying bark to the villages and dispensaries on the adjacent plains, I am afraid that no inducement which the Government could reasonably hold out would be productive of the least effect at present. Hereafter when the value of bark, as a product, is well established, Natives as well as Europeans will be quite open to the arguments which are addressed to their pockets, and a gradual extension of cultivation will take place.

8. Mr. Markham proposes that seeds and plants should be given away to all who are desirous of growing them without any charge. The Government has already reduced the price from four Annas to one Anna per plant when more than 5,000 are taken, and it may be as well to make the reduction general, and to charge the same price per plant for any number however small or however great; but I am not disposed to accede to Mr. Markham's proposal that they should be distributed gratuitously. It must be remembered that these plants have cost the Government a large sum, and the simplest mode of recovering this money is to put a price upon the article. I put more confidence in the saying "a man will take more care of what he has paid for than of what he has got for nothing" than Mr. Markham is inclined to do. Besides, if a man can always get what plants he requires from a Government Establishment for the mere cost of conveyance he will not do what Mr. Markham supposes, that is, go to the expense of making a propagating establishment for himself. While, therefore, I am not disposed to give away plants gratuitously, and thus to make to the cultivator a present of a sum of money equivalent to the price of about 800 plants per acre upon every acre he may choose to cultivate, I amuot at all disposed to make extra profits upon these plants, but should willingly lower the price now charged should it be shewn to be in any away excessive or unreasonable.

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9. I am quite disposed to agree with Mr. Markham as to the advantages to be derived from the application of convict labor to the cultivation of the Government Plantations; the difficulty which has prevented the extension of this to Neddiwattum and Mailkoondah is one which has sole reference to the maintenance of proper discipline among the men at places so far detached from the head quarters of the Magistrate. Attempts are now making to overcome the difficulty, and I trust that the Government may be able to avail itself of the amount of convict labor at its disposal, so as to accelerate the completion of the different plantations.

10 I have noticed, I think, all the questions relating to the cultivation of the Chinchona. I will now, therefore, deal with those portions of Mr. Markham's Report which allude to the mode of dealing with the bark.

11 I may observe, in the first place, that our treatment must be for some time empirical. We must make a variety of experiments, record their results, and finally be led to adopt the system which will produce the greatest quantity of the best description of bark from a given area at the least cost. I say the *best* description of bark, for I conceive that the interests of the Government as well as those of private individuals are in this identical; as soon as we have ascertained the best species of Chinchona, it would be but a waste of money to continue the cultivation of the inferior kinds; it is to the production of a large proportion of the better description of bark that we must look if we wish to drive the inferior kinds of South American bark out of the market, and it is to the production of the best kind of bark that we must look if we wish to reduce the price of the febrifuge. It costs as much to cultivate and maintain a plantation of inferior trees as of the best kinds, the profit to be derived must therefore depend upon the quantity and quality of the produce.

12. Mr. Markham is of opinion that in India it would be desirable to use the rougher extracts of bark, instead of the more expensive sulphate of quinine; and he suggests a preparation which he calls quinium, as being, in the first place, cheaply and easily made, and in the second place effective as a febrifuge.

13. The Secretary of State made a similar recommendation as regards some of the other alkaloids contained in the bark. It would be very easy to add "Quinium" to the list of preparations to be submitted for trial, and this had better be done at once, and it would be as well that the preparations should be made with Neilgherry bark, of which there will be an ample quantity when the three acres which I recommended to be treated as coppice are cut.

14. The experiments might be made by the Chemical Examiner here, but if the Secretary of State thinks it advisable to employ Mr. DeVry, I am inclined to think that the services of that gentleman might be found very useful in a variety of collateral enquiries.

9th February 1866. W. T. DENISON.

No. 182. MINUTE BY THE HONORABLE T. PYCROFT.

1. I concur generally in the views expressed by His Excellency the President in his Minute on Mr. Markham's Report on the Chinchona Plantations of the

Neilgherries. I will say a few words on each of Mr. Markham's proposals separately :—

1. *First.*—That a Quinologist of established reputation be located for three years at Ootacamund ; that he may, in concert with Mr. McIvor, investigate on the spot questions connected with the elaboration of alkaloids, the preparation of the bark, the most economical and efficacious mode of preparing the febrifuge, &c. &c.

It seems to me that such a measure as is here recommended is very desirable. As pointed out by Mr. Markham and Dr. Cleghorn, the gentleman who might be sent out might be profitably employed not only in studying and elucidating the various questions connected with the Chinchona alkaloids, but in developing and turning to account the medicinal plants of the Neilgherries generally.

2. *Secondly.*—That the Mailkhoondah plantation be restricted to 200 acres and be used solely for propagating purposes.

As I entertain great doubts whether the Government operations for the raising of Chinchona should be extended to Mailkoondah at all, I should of course be in favor of restricting them as much as possible if a Government Plantation is to be established there. But the question in regard to the formation of a Government Chinchona plantation at Mailkhoondad has been referred to the Secretary of State, and we must await his orders.

3. *Thirdly.*—That Chinchona seeds and plants should be distributed gratuitously to all applicants.

I am quite opposed to this. The plants and seeds should be supplied, without reference to the number taken, at such a price as shall just remunerate Government. Government should not gain by their sale, but there is no reason why they should lose. Plants are now largely applied for at one anna a piece. If that be too high it may be reduced to what will just cover the cost of rearing.

4. *Fourthly.*—That efforts be made in a variety of ways to induce the Natives to plant Chinchona.

There can be no objection to this, but it is a measure which cannot be forced. The Natives, it is to be hoped, will be brought gradually to feel the advantage of cultivating Chinchona. But I fear it is not quite so simple an affair, nor one of such easy accomplishment as supposed by Mr. Markham.

5. *Fifthly.*—That a person selected by Mr. Levinge, Collector of Madura, be sent at the Government expense to Ootacamund, there to receive instruction in the cultivation of Chinchona, which he is afterwards to carry out on the Pulneys.

I am not in favor of this, the operations of Government in the cultivation of the Chinchona should, in my opinion, be confined to the Neilgherries. There is no fear that the cultivation will not, in private hands, extend to all the hill ranges, nor is it at all necessary to interfere with its ordinary development.

6. *Sixthly.*—That convicts be at once sent to the Nediwuttum Jail.

When Government are satisfied that convicts can be securely guarded and well cared for at Nediwuttum, and that convict labor will be as economical there as free, they may be sent. But these questions are now under investigation.

T. PYCROFT.

14*th February* 1866.

Proceedings of the Madras Government, Revenue Department,
12th March 1866.

No. 183. MINUTE BY THE HONORABLE H. D. PHILLIPS.

1. The proposal temporarily to locate at Ootacamund a gentleman of acknowledged reputation as a Quinologist, for the purposes stated by Mr. Markham, is no doubt entitled to the best consideration the Secretary of State may be able to give it, and, as suggested by Dr. Cleghorn and Mr. Markham, it would obviously be productive of much general advantage and public benefit, if the gentleman selected for this duty be instructed also to give his attention to ascertaining the properties and values of the known medicinal plants of the Neilgherry Hills, and endeavouring to discover others.

2. Some recent correspondence has shewn that rather serious difficulties will attend the establishment, on a large scale, of a Government Plantation at Mailkondah. As the subject has been laid before the Secretary of State, we may await the receipt of such orders as are likely to be passed on the reference.

3. I am unable to accept, as a proper one, Mr. Markham's proposal to distribute gratuitously, Chinchona plants, which, if our several direct and indirect expenses, be formed into an aggregate, will be found, I apprehend, to have cost the Government no trifling sum. I think, however, that for the present it will be insufficient to realize, on their distribution, what may be found fairly to represent the cost of the plants to the Government.

4. It does not occur to me how, in various ways, the local authorities can lay themselves out to induce people to cultivate Chinchona. English gentlemen residing on the Hills for purposes of their own, will in that respect require no prompting. The efforts to induce persons to cultivate Chinchona, must, then, be directed towards native cultivators ; but I have never, as a Collector of a District, found the members of that class unduly slow in seizing opportunities of securing what was clear gain ; and I do not anticipate that they will want advising when the profits of Chinchona cultivation are placed beyond doubt. So long, however, as any misgiving exists, our attempts to force any particular kind of cultivation will surely be met by the assents of native cultivators qualified by claims to compensation or remission of assessment should the result be unsuccessful.

5. I quite agree that it is unadvisable to make application to the Collector of Madura (Mr. Levinge) for a person to be detached from his District to be instructed or employed in Chinchona cultivation with the object stated by Mr. Markham.

6. The propriety or otherwise of aiding Mr. McIvor's efforts in the direction of Nedivattam, by convict labor, seems to be a subject on which the Government should pass orders without any reference to the views in this respect of either Mr. McIvor or Mr. Markham. The responsibility attaching to the important measure of placing, more or less, 500 convicts at the edge of the ghaut leading down into the dence forests of the Mysore country, below Nedivattam, cannot be accepted by this Government before it has been satisfied in the clearest manner, that ample means have been provided for safely and effectually guarding convicts located at this solitary spot, 18 miles from the nearest jail station. It will also have to arrange for medical attendance, the cost of which and of the special and ordinary

jail guards will have to be weighed against the probable price of free labor, such as every English settler and planter on the Neilgherry Hills ordinarily employs.

1st March 1866. H. D. PHILLIPS.

No. 183A. MINUTE BY HIS EXCELLENCY THE COMMANDER-IN-CHIEF.

1. Before committing myself to an opinion I have carefully perused the more important papers reporting upon the Government Chinchona Plantations, with a view to seeing how far their re-consideration would modify the apprehensions I have hitherto entertained as to the ultimate success of this undertaking.

2. Mr. Markham's last Report is of a very sanguine character, and all his recommendations appear to me to be based upon the presumption that we have got the right tree, and that its growth and *produce* in India is a confirmed success, whereas, it is upon these very points that I entertain serious misgivings.

From J. E. Howard, Esq., F. S. S., to the Under Secretary of State for India, August 1st 1865.

3. The most practical opinion I have yet read is that from Mr. Howard, reporting the result of a chemical analysis from bark grown in India, and that gentleman most distinctly states in language so forcible as to imply a serious warning: "I beg to direct *special attention* to the "remark that the fine white crystallized "Sulphate of Quinine," (apparently) made "from the bark of the "C. Succirubra," *will* NOT *stand the test which is employed to "distinguish the pure article in commerce,"* &c. "It is of course *possible* to separate the "Chinchonidine," &c. "*This difficulty must be looked steadily in the face*, and I would "suggest it may be obviated either *by a change being wrought in the opinion of the "medical world as to the value of Chinchonidine as a medicine*, or *by the plant being "encouraged to produce Quinine instead of Chinchonidine.*"

Vide Mr. Howard's Report, 1st August 1865.

4. The first, probably, might be obtained through a Commission of inquiry, composed of Medical practitioners, which it is not proposed to nominate in India, for a decisive trial of the relative and positive qualities of the Chinchona alkaloids other than "Quinine."

5. The second alternative may be met by improved cultivation under the judicious management of Mr. McIvor.

6. Giving to Mr. Howard's opinions, as expressed in his Report, that weight to which I conceive they are entitled from the high scientific position he occupies, I am disposed to think we have been premature in the heavy expenses already incurred on a speculation unsupported by high medical authority, and insufficiently tested by any established practical results, and that, therefore, we should pause until it can be clearly ascertained what are to be the real merits of the produce from these plantations.

7. I myself doubt whether the plant we have been cultivating at so much cost will ever produce the true "Quinine." Mr. McIvor may think he can, by artificial process, procure this result, but I beg to doubt that gentleman's ability to so control or reverse the law of nature. Mr. Markham himself admits the "C Calisaya" has not been a success in India.

8. Therefore, until the medical and commercial world will accept the Chinchonidine or other alkaloids for the long-valued and esteemed "Quinine," or that their relative medical value have been recognized and established, I think all expenditure should be restricted to the mere maintenance of the existing plantations, unaccompanied by any further extension.

9. Without wishing in any way to detract from the zeal or acquirements of Mr. McIvor, I think he is a little premature, if not injudicious, from the position he occupies as a Government Officer, in the very sanguine views he expresses, and confident promises he holds out of almost certain and enormous returns from the young plants sold by him under the Government, for should hereafter the speculation prove unsuccessful, the Government might be charged with having misled many who, relying on the good faith of *their* authority, entered upon an investment that may terminate in failure.

10. I have been struck with the fact, that the Superintendent of the Plantations appears to estimate the success of his measures upon the apparent luxuriance and rapid growth of his young trees. At the Cape of Good Hope, I remember the finest vines being imported from France, Germany, and Italy, they grew there with great luxuriance, and produced the finest looking fruit; yet for wine, their object, they were comparatively valueless, and in like manner I have but little confidence in the success of Mr. McIvor's "moss" and straw appliances, in converting the questionable Chinchonidine into the valued Quinine, until at least I can see more practical results than I yet can recognize.

11. I scarcely anticipate from the proceedings of the proposed Medical Commission, (to be appointed locally,) any rapid advance towards a decision on the important subject to be referred to them, because from my long experience in the Colonies, I know that public questions under such circumstances are rarely viewed with moderation, or discussed without asperity; and that it is long before such opinions have any bias or influence on that high medical authority at home, whose decision alone could secure the confidence of the public in the future substitution of Chinchonidine into their medical treatment.

12. Should the Government decide to procure the services of a scientific Quinologist, I strongly recommend that a selection should be made of a gentleman altogether previously unconnected with this experiment.

13. In the opinions I have formed, I may be thought to have taken an erroneously discouraging view of this subject, but careful consideration forces the impression upon my mind, that both Mr. Markham and Mr. McIvor, in their zeal for success, have adopted in their reports a tone more sanguine than circumstances will support, and that if we yield too easily to similar views we may end in deceiving ourselves, and misleading the Government.

14. I have, therefore, thought it my duty to no longer hesitate in frankly expressing the opinions which for some time past I have personally entertained.

——*March* 1866. (Signed) J. GASPARD LEMARCHANT.

No. 183B. MINUTE BY HIS EXCELLENCY THE PRESIDENT.

I have read the Minute of His Excellency the Commander-in-Chief on the subject of the Chinchona Plantations on the Neilgherries, and I see no reason to alter or modify the opinions expressed by me in the Minutes addressed to the Government, or in the recommendations which I have made. The whole concern is confessedly an experiment, which may of course eventually fail, but which at present holds out very fair prospects of success. It is quite true that Mr. Howard's analysis of the bark shewed the presence of an Alkaloid in connection with the Sulphate of Quinine, but he also stated that a separation could be made of the Quinine from the Chinchonidine; of course the six per cent. of mixed Sulphate would be diminished perhaps to one-half or even less, but even then the produce of the plantations in Quinine alone, throwing the Chinchonidine out of the question, would pay a large interest upon the outlay. I think the Despatch may go as written, and the Minute of His Excellency the Commander-in-Chief should accompany it.

—— *March* 1866.

(Signed) W. T. DENISON.

No. 184. ORDER THEREON, 12th March 1866, No. 617.

Miscellaneous.

1. Ordered that the Principal Inspector General, Medical Department, be requested, with reference to paragraph 3 of the Despatch of the Secretary of State, above recorded, to submit a list of the Medical Officers, whom, having regard to the qualifications mentioned in the Despatch, he would recommend for appointment to the proposed Commission. Dr. Shaw will also take such suggestions, as occur to him, for ensuring a decisive trial of the relative and positive qualities, as febrifuges, of the Chinchona alkaloids other than Quinine, specified in the despatch, and of the preparations, quininium, &c., alluded to by Mr. Markham.

2. The promised supply of alkaloids has not yet been received.

3. The Principal Inspector General, Medical Department, will be furnished with a copy of paragraphs 14 to 22 of Mr. Markham's Report, and of G. O. 20th ultimo, Revenue Department, No. 460.

4. With reference to paragraph 32 of Mr. Markham's Report, the Government consider it desirable that one uniform price should be charged for plants, whatever number may be taken. Under the present arrangement, a planter requiring, say, 3,000 plants, gains by purchasing 5,000 and throwing away the surplus 2,000. Mr. McIvor will, therefore, in future charge one anna per plant in all cases. The Government do not concur with Mr. Markham as to the gratuitous distribution of seeds and plants, but wish to have Mr. McIvor's opinion on the subject. In submitting this, Mr. McIvor will state how many applications he has still on his registers, how he deals with applications, (whether by priority of date, extent of requirement, or on what other principle,) and how many of the 900,000 plants in his possession are in a fit state to send out to private applicants, possessing only ordinary skill and experience in horticulture. The Government consider that there is much truth in the remarks contained in the 58th paragraph of Mr. McIvor's last annual Report, and apprehend that any such general distribution of

delicate plants as Mr. Markham proposes would be unsuccessful. They wish to know when Mr. McIvor will be in a position to furnish well grown plants in any considerable number.

5. The Collectors of the Districts marginally noted will offer such suggestions as occur to them on paragraphs 35 to 40 of Mr. Markham's report.

Ganjam.	Malabar.
Vizagapatam.	Coimbatore.
Bellary.	Salem.
Kurnool.	Madura.
Canara.	Tinnevelly.

6. The Deputy Collector of Wynaad will be furnished with a copy of Mr. Howard's work on the Chinchona, and application will be made to the Secretary of State for a few more copies of this work. Copies of the Chinchona Manual, with the annual additions thereto, have been extensively circulated, and Mr. Richardson doubtless has these. If he has not, copies will be sent to him.

7. Ordered that a copy of Mr. Markham's Reports be sent to the Government of Bombay, the Resident of Travancore and Cochin, the Commissioner for the Territories of His Highness the Rajah of Mysore, and the Chief Commissioner Central Provinces, with the remark that the Governor in Council will be glad to afford them any assistance that may be desired in extending Chinchona culture.

8. These Proceedings will be reported to the Secretary of State.

(Signed) J. D. SIM,
Secretary to Government.

Nos 5 March/63 Nos 55 @ 5/.
- 6 " " 66A + 66B
- 3 Augt/64 " 60 @ 64 -
- 6 Sept " " 77 - 78
- 27 " 1865 " 642 - 643
- 21 & Oct " " 202 - 203
- 22 " " " 237 - ~~238~~ 240

Copy in a Letter to England
of 13th March No 6 of 1866.
Mis:

Revenue 1866 Spl
From 12th March 66
No 376
Jam C. Markham

Dated 16th January 18

Submitting his
views on the subject of
Churchma Cultivation

No 179
179

26

Inclosure

There are two Journals in the accompanying Despatch from the Acting Registrar on the subject of the Cinchona Plantations & what Lewis & Adams the attention of the Govt as far as I am able to form an opinion from the Despatch & Charles Wood, after attending to the analyses by Mr Howard, of the specimens of Bark transmitted by Mr McIvor, and to some remarks made on the report of the results of the analyses upon the relative value of the pure Sulphate & Muriate of Quinine & and the Sulphate of Cinchonidine with which the Quinine appears to be usually mixed in the Bark sent from the Hills, directs the appointments in each Presidency of a Commission for the purpose of testing the relative efficacy of different alkaloids derived from the Cinchona Bark as far as sufficiently extensive results decisive as to the value of each of them as a Febrifuge:

I concur with me that the object of the Secretary of State would be best attained by deputing to the different Medical officers indicated in the communication of Jungle Fever the preparation & supply of each

of the Alkaloids in question with directions to carry out a series of Experiments as possible with each of them, and to report the results of these monthly in full detail to the Commee sitting at Madras or elsewhere reference should be made to the Medical Authorities directing them, to make such recommendations as to the districts in which the experiments should be made. The forms, report to be submitted, and as to the persons whom the Commission should consist, as may seem to them to guide the Govt in giving its orders.

The next point to which I wish to direct the attention of the Govt is that which has reference to the establishment of a manufactory of Quinine or more generally of the "Chincona febrifuges" at Ootacamund. —

This, although it seems at first sight to be a simple question enough, becomes complicated when taken in connexion with the proposed objects of the Govt in establishing the Chincona Plantations, to which, as stated in Para 26 of the despatch are as follows.

1st The provision of an abundant supply of febrifuges at a cheap rate so as to be within the means of the population at large.

2nd To secure such a return from the Bark as will repay the original outlay in providing Seeds & Plants, and all subsequent expenditure on the Chincona undertaking with good interest.

The present price of Bark in the English market is regulated by its power of producing Quinine. The manufacturing Druggist being willing to give one shilling per lb for Bark which will yield one per cent of Quinine, and so on proportion for Bark which gives a larger proportion — gives 10 shillings for 1 lb or 120 of Quinine & so on the Bark, or 8/4 per oz. To this price must be added the cost of extraction, the profit of the wholesale and retail dealer, so that the retail price of Quinine will not be much less than 16/ per oz.

If Government the Govt manufacturing Quinine profitably & to compete with the Bark in the market

a portion of the Bark

the whole of the produce yet
Plantations in England &
purchasers and Quinine
and may require from
the manufacturers an
the action upon the Bark
market which any much
this cause. the price will
fall, to an extent which
can hardly at present be
estimated. the effect
however upon the prospects
of the new Plantations will
not be so great as might be
imagined., for the first
effect of a reduction in
price (judging from the
statements made by Mr
Cross in his Pamphlet) will
be a withdrawal of a large
portion of the supply from
South America, at even
present prices the profit
is too tempting to hold out
much inducement to the
Cascarilleros; while a re-
duction in price of Qui-
nine will increase the
demand for it, and for
the Bark from which it
is extracted — I do not
however think that the fall
in price will exceed
50 per cent. or that the
Bark for which the manu-
facturer now gives one
shilling will be bought at
less than 6 pence. —
That the price will, on an
ample return to the Grower
of the private Planter will

the produce of the Government Plantations in Ceylon & purchasers and Quinine and may require from the manufacturers an the action upon the Bark market which any much this cause. the price will fall, to an extent which can hardly at present be estimated. the effect however upon the prospects of the new Plantations will not be so great as might be imagined., for the first effect of a reduction in price (judging from the statements made by Mr Cross in his Pamphlet) will be a withdrawal of a large portion of the supply from South America, at even present prices the profit is too tempting to hold out much inducement to the Cascarilleros; while a re-duction in price of Qui-nine will increase the demand for it, and for the Bark from which it is extracted — I do not however think that the fall in price will exceed 50 per cent. or that the Bark for which the manu-facturer now gives one shilling will be bought at less than 6 pence. — That the price will, on an ample return to the Grower of the private Planter will

most productive species is very clear. — The analysis of Bark by Mr Howard of this Bark yields 6 per cent of mixed Sulphates; if we estimate the amount of Quinine to be half this amount & to be half the Alkaloids con-tained in the other species, the Bark of this species will be worth 3/0 per lb at present rates, or, at the supposed reduced rate 1/6 per lb. — now at 700 trees to the Acre, and 2 lb of Bark to the tree, the produce would be worth $\frac{700 \times 2 \times 1/6}{20} = 105$ £ at the end of five years. the actual outlay within the same period would amount to £ 50 £ and the profit return £ $\frac{10 c}{}$ = 21 £ or 42 per cent per annum upon the Capital expended — In the case of the Government Plan-tations the Capital would have been increased by the cost of the different expeditions to procure Seed, Plants &c. but this would be divided among the 1200 Acres which compose the whole Plan-tation & would not add much to the cost per Acre.

If however the inferior kinds of Bark succeeded, the profit would be proportionately less

I must now however allude to that portion of the Despatch which might seem to suggest the idea that the Government proposes to manufacture Quinine, or other alkaloids and to sell them at a rate below their value when compared with that of Bark in the market of the world for the special purpose of bringing the drug within the means of the Speculative classes - I do not think that this can be the meaning of the Despatch: for it would be evidently impossible to maintain two prices for the same article when the difference exceeds largely that created by freight charges & profits - but the first effect of such an attempt would be to put a stop to the cultivation of Cinchona by private individuals, and to make the Govt the proprietor not only of a monopoly of the manufacture of Quinine, but also of the Bark required to produce it - Should it not be the object of the Govt to keep down the price of Quinine in India, or to produce the drug at the above stated rate, I am inclined to doubt the policy of the proposal to establish a manufactory of Quinine at Rotacamund.

It is true that the carriage of the Bark to the Nilgiris and the freight to England would be saved - but on the other hand everything is very dear on the Hills, the skilled labour, which must be employed to extract the Quinine from the Bark, would cost at least double what it would in England and when all these extra expences come to be justly estimated I doubt very much whether they will be counterbalanced by the saving of freight &c -

The Govt Plantations of 1200 Acres will gradually produce about 150 Tons of 2000 lb each Ton annually. The freight of this home and its carriage to the place of manufacture would not exceed 6 or 7 £ per annum or 1400 £ per annum I do not think that the cost of such an establishment as would have to be maintained on the Hills for the purpose solely of manufacturing Quinine, while the whole quantity of Bark produced on the Plantations should not

be sufficient to meet the Indian demand.—
The price therefore charged for the Quinine manufactured in India must be high enough to ensure a return large enough to meet the various calls upon it, as Interest of Capital - Cost of Cultivation charges of manufacture, and at the same time, whatever there may be over and above the charge must not be so much superior to the prices ruling and to make it worth any man's while to purchase Quinine from the Govt for the purpose of exporting it.—
There is ample time however to consider the subject & we may go into it carefully when Mr Markham arrives

WD

Jos

copy in a Letter to England
dy 13th March 24 & of 1866. Mis:

Pros. 12 March 166

Revenue 1865. Despatch

No. 3678.

Minute by the Hon.

the President

Dated 3 Nov. 165.

Received 3 Nov. 165.

No. 176.

of the Secretary of State under date the 30 Sept last — which I may remark was received after my minute of 2 Nov. 65 was written —

Since I wrote my remarks of the 2d inst the Despatch received the Despatch from the Secretary of State under date the 30 Sept last —

~~In the Despatch~~ it is stated that one great object to be attained in the introduction of Chinese cultivation into India is to provide an abundant supply of the fabric at so cheap a rate as to bring it within the means of the population at large, the cooliegen-employed on public works and private plantations, the small cultivators their wives & families!!

To place the fabric so within the reach of such persons it must of course be sold at cost price — that is at the actual cost of its production in this country. If not it is clear much below that price —

2. A further object also stated to be desirable is that such a reduction in the price of the bark

should be carried on until
repay the original outlay
and subsequent expend-
-iture on the Clinicons
undertaking with good
interest. For this end
ient is proportion of the
which has arisen in the
the Exchequer Bill in
London Branch
£3 2s in the letter of the
Despatch warmly urges
to import the fertiliser
to spread Clinicons. The
manufacture its sulphu
to such an extent as
sufficient for the wants of
the population of any
of this Presidency of
from 20 millions.
an effect at such
rates as shall bring it
within the means of
the poorest cultivator, then
doubtless the full pecun-
-ity of land proposed
by Sir W Denison of 1200
acres including the plan-
-tation of Trichinop-
-doch will have to be brought
Clinicons cultiv
and the produce

(illegible)
(illegible 30 Oct)

further the end of the
principal principal
even below it will
course be speedily
private enterprise in
cultivation of Clini-
-cons, at least with
a view to the sale of
it. Although for cash
in this country.

3. I observe from the
Secretary of State
remarks that the details
of the measure under
consideration of
numerous complica-
-ted and difficult
questions on which
is not at present in a
position to issue definit-
-ive instructions, al-
-though will be prepared
to consider any
detailed plan which
he may hereafter submit
for their consideration
pending the above results.

4. I must confess that
with every desire to meet
the wishes of the Secretary

of Stock I shall in every way
way to any land detail
-ed plan as is here offer-
-ed to. I am inclined
fence a low stockade
-ing of thin cone wire
low in large quantity
in India, especially
as being extensively
cost of production, and
the branch stores in Sir-
-place at first on the
as the cheapest the whole
expenditure on the clim-
-cone appeared with
good in every
like fluids, with first
his land. It does
appear to me to the
fence of first-class
thick ring can advan-
-tageously for a per-
manent fence
or than any other
-ring a commodity
for the whole population
of the country. I have
no faith in the economy
of Government manu-
-facture, and admit
by the Director

Large quantity and at
a low price than
object of great importance
I cannot but think that
it will be best secured
by giving full choice
principle
for each and abolish
-ing as far as possible
from all interference
with them -

Q. If I have any such
detailed plan as is
alluded to by the Secy
of State can I decline
when it may be often
to prosecute operations
at Guildford, but
for the reasons I have already given
for the present it may
be
I have not yet to state
to the from other planta-
-tions which the Conservators
of the Western Districts
occasion
occupation -

7. Q. Your evidence to day
appears to me to
Director

omit

expediency question of esta[illegible] a manufactory Division at Boo[illegible] -mamul -

Nov. 20/65. [illegible]

Copy in a Letter to England
13th March No 6 of 1866. Mis.

From 12th March 166

Revenue 1866. Dispatch.

No. 3679.

Minute by the Hon.
Pycroft

Dated 20th Novemr 166
Received

No. 177.

17

According to these papers,
what should now be done,
is simply to ascertain from
the Committee of which the
S. of State directs the
appointment - whether the
three coarse alkaloids con-
tain sufficient febrifuge
power to justify their
introduction and use in our
Indian Hospitals, as a fair
and efficient substitute
for the more expensive and
undoubtedly efficient quinine.
Mr. Field, Dr. Howard
and Dr. De Vry state these
alkaloids are very nearly
as efficacious as quinine;-
but it has recently occurred
to the S. of S. that the views
of these two Gentlemen may
not be accepted by the Profession
at large as sufficient
warrant for so entering
a long existing & safe
practice. Hence I conclude,
he submitted necessary for
Committee.
Upon which I have formed
and at work, it will not
be advisable, he thought
to discuss the point of
comparative efficiency
as a medicine, - as settled

Copy in a Letter to England
No 13th March No 6 of 1856 Mis

the Manufactory, I cannot
avail feeling serious doubts
His question, asked that
Cod[illegible] establishment are,
in almost every instance,
costly beyond reasonable
Calculation & result in such
a short limit as to shake
the best disposed
Superintendence by their
own proprietors. It is true
enough that periodical
Reports reach Cod[illegible] showing
a annual profits from
such concerns, but there can
be no doubt, I fancy, that
much could be done
to ameliorate the
in working up these reports
and that the profits would
be in many instances
Colors had been obtained
by the reporters by unfair
facts. There seems to
me to be no reason why
Even for experimenting that
a manufactory such as it
would appear is to be established
on the Nilgherry Hills, will
lose the ordinary characteristics
and fully warrant for thinking
that it would be a losing
concern.

Too much to late comes
from the Collector of Coim-
batore stating further upon
called to doubt whether
person on the Hills who
have taken up land for
Chinchona cultivation
may with justly enough

2

consider themselves
appointed of Cod[illegible] under the
-marked on the manner pro-
posed. But whether or not,
I hope Cod[illegible] will
take most unfavorable opinion
private industrie should
allotment to keep the demand
for land though it may be
subject for doubt. That
any of them can be spared
what will be required from
private individuals, the
Cod[illegible] stock for Chinchona
cultivation, under the restriction
of manufactory as much check
pruning as will be wanted by
Cod[illegible] of the Government
proved upon the same to
the consideration of Captain Huspi
in terms delayed in the
Secretary of States despatch

W Huddleston

7 Dec 54

3

Copy in a Letter to England
No 13th March No 6 of 1856 Mis

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avail feeling serious doubts
His question, asked that
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pruning as will be wanted by
Cod[illegible] of the Government
proved upon the same to
the consideration of Captain Huspi
in terms delayed in the
Secretary of States despatch

W Huddleston

7 Dec 54

3

Trans. 12th March 186

Revenue 1865. Vol. Part.

No. 3680.

Minute by the Hon'ble
W. Phillips

Dated 7th December 186.
Received

No.

39

I hope dated 7th this
letter has only reached
me to-day & I circulate
it at once, for Consider-
ation at the Meeting
of Council. This letter will
be printed ultimately
with the Abstract Expenses
of which the same order
12:2:00 Ld. L.

From 12th March/66

Rec'd 1866 Depart

No. 467

From

C. Markham Esq.

Dated 7th } February
Rec'd 12th } 1866.

In continuation of his letter of 16th ult. submitting his conclusions respecting Chinchona cultivation in Wynaad, I strongly recommend the measure for the favorable consideration of Government.

No. 180

Original Letter to Capt. Dalrymple Clerk of 13th March 1866. Mds.

by Mr Markham's report on the cultivation of Chinchona in Wynaad and Neilgherry plantations, and the measures he proposes to adopt for the extension of the cultivation.

12 Feby/66 Recd 21 Feby

Minute

I have before me Mr Markham's report of his views on the subject of Chinchona cultivation and a variety of collateral topics connected with them, together with the minutes of the members of the Govt upon certain propositions contained in a late despatch from the Secretary of State — as these are, to a certain extent embodied in Mr Markham's report I shall deal with them as forming part of the subject which the Govt has to consider — Before however I proceed to discuss the various heads of Mr Markham's report I may say that it is very satisfactory to hear from so full an expression of approval of the system under which the plantations of Chinchona have been established — the success which has attended the experiment is attributable to the ability & zeal exhibited by Mr M'Ivor, & whom, from the very commencement, the Govt has entrusted the whole

Superintendence and ma-
=nagement of the Plantation
I attribut fair to Mr Tom
to say that he has taken a
very extended view of the
responsibility of his posi-
=tion: he has not only
succeeded admirably in
rearing & cultivating the Plants,
but has, by the many experi-
=ments which he has made
and is making, added very
much to our knowledge of
the qualities of the different
species, and has also dis-
=covered a speedy cultiv-
=ation by which the
quantity of Bark, and
the Alkaloids which it
contains, will probably
be largely increased. —
I think I shall bring the
subject more clearly before
the Govt of Ceylon all
=together the questions
connected with the cultiv-
=ation of the Plant, from
them which relate to the
mode of dealing with the
Bark after it is removed
from the Tree. and I
will have added such myself

to the subject of Cultivation.
In a minute which I subm-
=itted some months back
I gave an account of a visit
which I had paid to the diffe-
=rent Plantations, and I
in that recommended that
the Govt should cultivate
1200 Acres, and should
receive also certain per-
=centage of land in juxta-
=position to each Plantation
in order that if at any time
it thought fit to sell the
Plantations, & trust alto-
=gether to private enter-
=prise for the supply of
Bark, these Plantations
might fetch
higher prices in the mark-
=et when capabilities of
extension, than they
would be if put up by
themselves —
I gather incidentally from
Mr Markham's report
that he is desirous to see
the amount of land
under cultivation to
Govt 1200 Acres brought
under cultivation as
speedily as possible —
but I also gather from
something which he
says about the Plantation

at Mail Coondah that
which he wishes to limit
to 200 Acres, that he does
not consider the addi-
tion of waste land to cul
Plantation advisable
it could be as well
think to let Mr Markham
see all the papers which
have any bearing upon
the subject of the cultivation
of Chinchona, in order that
he may know all that
has been said & written
with reference to this
cultivation before he
commits himself to any
positive opinion on the
future of the subject —
Mr Markham recommen-
dations & recommenda-
tions on the subject of
Chinchona cultivation are
contained in Paras. 27
to 50 — he trusts prome-
=ntly forward this fact
that the Object of the Gov.
in introducing Chinchona
cultivation into India
was not to show that cu
culture would be remune-
=rative, and the pros-
=pects held out to encourage
private enterprize, but
rather to reduce the price
of Bark as low as possible

and to bring the cure within
the means of the poorest
Cooly on the Lands.
I think however that in
Laying so much stress upon
the reduction of price
Mr Markham has overlooked
a distinct expression of
opinion on the part of
Mr Lee-Yd that it is
desirable that such a
return on the produce
of the Bark should be ob-
-tained as will pay the
original outlay, and sub-
=sequent expenditure
on the Chinchona under-
=taken with good Interest
That the ultimate result
of the extension of the culti-
=vation of Chinchona would be
a reduction in the price of
the Febrifuge extracted from
it is very clear; but this
result must be produced
by a very gradual proceed-
=ing in order to extend cultivation
the prospect of good returns
must be held out to the pri-
=vate Speculator; he must
believe himself able to
realize larger profits from
Chinchona than he can hope
to do from Cotton Coffee or

Tea, for unless he can do this he will not risk his Capital upon what is at present a mere speculation with the Government, for whom after then he can but [illegible] such, as a Competitor. Should the first Planters realize large profits, other Capitalists will soon be found to claim a share in them, and competition will bring down the price of Bark to a minimum, which minimum will be regulated by the profits upon Tea. I offer the acclimatization of Chinchona in the Valley of India.

I cannot then perceive that it would be advisable to grant Government aid upon them who have already commenced Plantations in Travancore, the Subsidy & the best encouragement which we can hold out to them will be the success of our Plantations: if we can shew that they do yield a large return upon the Capital laid out upon them, there will not be wanting men willing & indeed eager to enter upon the cultivation of Chinchona.

with reference to the proposals that the villages in the Hill districts should be induced to undertake Cinchona trees among them for domestic purposes for home consumption, and next for supplying Bark to the villages & dispensaries in the adjacent Plains. I am afraid that no inducement which the Govt could reasonably hold out would be productive of the least effect at present. Hereafter when the value of Bark as a product is well established as a product in all Europeans will be quite open to the argument

* without an additional & [illegible] and expensive extension of cultivation will take place.

Mr Markham proposes that Seeds & Plants should be given away to all who are desirous of growing them without exchange. - The Govt has already reduced the price from four Annas to one Anna per plant when more than 5000 are taken and perhaps it would be well to make the reduction general and to charge the same price per plant for any number however small or however great. but I am not disposed to accede to Mr Markhams proposal that they should be distributed gratuitously. It must be remembered that these Plants have cost the Govt a large sum. & the simplest mode of securing this money is to put a price upon the article. I put much confidence in the saying "a man will take more care of what he has paid for than of what he has got for nothing" than Mr Markham is indeed to do. - besides if a man can always get what Plants he requires from

a Govt establishment for
the mere cost of conveyance
he will not do what Mr
Markham supposes, that
is, to the expense of
making a preparatory
Establishment for himself,
while the Ryots Lands
disposed to give away
plants gratuitously. and
thus to make to the cultivator
a present of a sum of
money equivalent to the
price of about 800 Plants
per Acre upon every Acre
he may choose to cultivate
Lam not at all disposed to
make extra profits upon
these Plants. but should
willingly lower the price
now charged should it
be shown to be in any
way exceptionable in unrea-
sonable —
Lam quite disposed to
agree with Mr Markham
as to the advantages to be
derived from the applic-
ation of Convict Labour
to the cultivation of the
Govt Plantations. the
difficulty which has

prevented the extension of
this to Peddiemettum &
Maulkondah is one which
has to do with reference to the
maintenance of proper
discipline among the Men
employed so far detached
from the Head Quarters
of the Magistrate. attempts
are now making to over-
come this difficulty, &
I trust that the Govt may
be able to avail itself of the
available Convict Labour
which it disposal so as to
accelerate the completion
of the different Plantations
I have also noticed what
all the questions relating
to the cultivation of the
Cinchona. I will now
therefore deal with that
portion of Mr Markhams
report which alludes to the
Money dealings with the
Bank.
I may observe in the first
place that our treatment
must be for some time
empirical — we must
make a variety of experi-
ments, record them

recalli- cant [illegible] be led to rail for the legislature which will produce the greatest quantity & the best description of Bark from a power ful at the least cost. — Any the best description of Bark for Science that interests the Govern as well as that of private individuals are in the identical — as soon as we have ascertained the best description of Quinines of Chinchona &c would be but a waste of money to continue the cultivation of the inferior kinds — it is to the production of a large proportion of the better description of Bark that we must look if we wish to drive the inferior kinds of American Bark out of the market and it is to the production of the best kind of Bark that we must look if we wish to reduce the price of the Febrifuge — & are as much to cultivate & maintain a plantation of the inferior trees as of the best kinds the profit to be derived must depend upon the quantity & quality of the produce — M'Illwham in his opinion that in India it would be desirable to use the powder extracts of Bark instead of the more expensive sulphate of Quinine — and he suggests a preparation which he calls Quinicum as being in the first place cheaply & easily made & in the second place effective as a febrifuge — The Secretary of State made a similar recommendation as regards some of the Alkaloids contained in the Bark. it would be very easy to add "Quinicum" to the list of preparations to be submitted for trial. and this had better be done above. and it would be as well that the preparations should be made with Red Peruvian Bark for which there will be a ample quantity when the trees above recommended to be treated as [illegible] are

The experiments might be made by the Chemical Examiner here but if the Secretary of State thinks it advisable to employ Mr De Fry ~~there can be no objection to his doing so~~ ~~ment except the expense~~ which will add 500 a year ~~amount to the cost of the~~ Establishment.

W Denison

February 9th/66

Mr 47/

I am directed by the Secretary of State for War to transmit to you the accompanying letter from Captain Galton, and to request that you will move the Secretary of State for India to cause the Report of Mr Markham on the Defences of Canada to be printed.

Minute on Mr Markham Report.

Copy sent to Lords Committee

Copy in a Letter to Captain Galton 13th March No 6 of 1866 Mil.

c 21 Feby 66

Proc: 12 March 1866 Ch

Revenue 1866 Departt.

No. 739 A.

Minute by the Hon:
the President -

Dated 9th July 166
Received -

No: 181

181

I concur generally in the views expressed by H.E. the President in his Minute on the Bank-Loans Report on the Chinchona plantations of the Neilgherries. I will say a few words on each of the Bank-Loans proposals separately.

1st

2. That a Quinological Establishment be established at Ootacamund for 3 years at Ootacamund that be employed con-nected with Mr. McIvor's investigation on the specific conditions connected with the elaboration of Alkaloids, the preparation of the bark, the most economical applications and dispensing the

I deem it unnecessary to suggest any detailed plan for carrying out the proposition, but I entertain a strong conviction that the Government should at once take measures for establishing a Botanical Garden at Port Elizabeth, and that if a Botanical Garden is established there, a Botanical plantation at Port Elizabeth would be found of great use to the Colony, by furnishing the inhabitants with such a number of useful plants as may be recommended by the Botanist and Naturalist, by furthering the progress of Botanical knowledge, and by affording employment to many of the unemployed poor.

I entertain a strong conviction that the establishment of a Botanical Garden at Port Elizabeth would be found of great use to the Colony, by furnishing the inhabitants with such a number of useful plants as may be recommended by the Botanist and Naturalist, by furthering the progress of Botanical knowledge, and by affording employment to many of the unemployed poor.

2dly. That the Botanical Garden at Port Elizabeth should be established on a piece of ground not exceeding 200 acres in extent, and that such piece of ground should be situated as near to the Town as possible, consistently with the object in view, namely, that of procuring a sufficient supply of water for irrigating the Garden during the dry season of the year.

3dly. That the Botanical Garden at Port Elizabeth should be established on a piece of ground not exceeding 200 acres in extent, and that such piece of ground should be situated as near to the Town as possible, consistently with the object in view, namely, that of procuring a sufficient supply of water for irrigating the Garden during the dry season of the year.

factor towards the application.

I am prejudiced against this. The practice should be applied, without reference to the number taken, at least a price on that first consumed first. They should not pay for that last taken, no reason why they should be. Planters in favor of applying for at one cent a piece. If that be high it may be reduced to that will just cover the cost of raising.

4th That a person who is a owner of wages is a planter Christian.

Objection to this, but it is a matter which cannot be proved. The practice of the Church will be brought forward by the advantage of cultivating Christians. But I fear it is not practicable to impose an application on the part of such easy access. -sion must be left. -posed by the Church. -law.

5th That a person who -es of the clergy of the Church of England & Ireland be exempt from -cumcised the Christian instruction & cultivation of Christians which he is attached to carry out in the Bahamas. I am not in favor of this - The operation is left in the cultivation of

the Chairman Honble in my opinion & consider the Resolution is. that is no fear that the call will not, in private Land, & land to all the Hill Ranges. unless it, all messages sent for with its ordinary development

6c. That Committee at once sent the Resolution to Govt. for first consideration of Committee and will send for the Resolution to Govt, and Committee has economised time as well, by my Govt. But the questions are now [illegible]

14-2-66. Ayyar

Copy in a Letter to England
of 13th March No: 6. of 1866 Mis-

Minute on
Mr Mc Clelland's
Report.

182

Feby/66

Rec'd 1866 Despatch
From 12th March 14th
No. 739 B

Minute by the Hon'ble
J. Pycroft.

Dated 14th July 66.

No. 182.

The disposal temporarily
to locate at Ootacamund
a Gentleman of distinguished
reputation as a Gun disposal
for the purpose stated by
Mr Markham, is undoubtedly
subject to the decision
determination that H.M. of State
may be able to give it
and, as suggested by Dr
Cleghorn and Mr Markham,
it would undoubtedly be
productive of much general
advantage to the health of
the Gentleman selected for
the duty, also to secure the
attention, ascertain
the properties and values
of the Neem medicinal
plants of the Nilgherry Hills,
and & hereafter to
discover others.
Some recent correspondence
has shown that certain
serious difficulties will
attend the establishment
on a large scale of a
Government Plantation
at Madras. As the
subject has been laid
before the S of State, we
may await the result
of which we shall be

be paper on this occasion.

I am unable to accept as a response, Mr Markham proposal to distribute gratuitously, Cinchona plants, which, if our record should and indeed experience, be formed into an appreciable, basis can be found, I apprehend, to base on the Government actuating them: I think however, that for the Immediate future the difficulty to realize on this distribution, that may be found fairly to represent the cost of the plants to the Government.

It does not occur to me how in various ways, the local authorities can lay them down and to induce people to cultivate Cinchona. Englishmen residing on the Hills for purposes of their own, will in that respect require no prompting. The efforts to induce, must then, be directed towards native cultivation. but I have never, as a collector of a resident found the [illegible] members of that class

[illegible] Cinchona plants,

[illegible] native cultivators

and duly to own in seizing opportunities of securing what was clear gain; and I do not anticipate that they will want advising when the profit of Cinchona cultivation are placed beyond doubt. So long however as any misgiving exists our attempts to force on barbarian Rud. of cultivation will surely be met by apathy, dissatisfied by claims to compensation & suspension of payment should the result be unsuccessful.

I quite agree that it is undesirable to make application to the Govt of Madras (Mr Lowis) for a person to be detached from his present to be instructed in cultivation of Cinchona cultivation with the sole object of introduction into Southern or otherwise of aiding Mr Mc Ivor's efforts in the direction of Madagascar, by convict labor, seems to be a subject on which the Govt should keep open without any reference to the views of either Mr Mc Ivor or Mr Markham.

[illegible] in their respective

Minute on
Mr Markham's
Report.

The responsibility attaching to the important measure of placing more or less 500 convicts at the mole of the Chaud-leading down into the dense forests of the Tuyo-ri country below Kadavattam, cannot be accepted by Govt before it has been satisfied in the clearest manner, that ample means have been provided for safety and effectually guarding convicts located at the Kolalam Chaud, 18 miles from the nearest police station. Should also have to arrange for medical attendance, the cost of which and of the Special and ordinary jail guards will have to be weighed against the probable price of free labor which a Quarry Expert will be able to obtain for Madras and Bangalore and other Madras Presidency and Mysore Districts and Planters on the Nilgherry Hills ordinary supplies.

1 March 1886

H D M

Rec: 12th March 66

Revenue 1866. Dept.

No. 739 Ec

Minute by the Hon. H. D. Phillipps.

Dated 1st. March 1866.

No. 183.

Minute.

1. Before committing myself to an opinion I have carefully perused the more important papers reporting upon the Government Chinchona Plantations with a view to seeing how far their reconsideration would modify the apprehensions I have hitherto entertained as to the ultimate success of this undertaking:

2. Mr. Markham's last Report is of a very sanguine character and all his recommendations appear to me to be based upon the presumption that we have got the right tree and that its growth and production in India is confirmed

success, whereas, it is upon these
very points that I entertain
serious misgivings.

3. The most practical from J. Howard Esq! C.S.S. To the Under-Secty of State for India. August 1865.
opinion I have yet read is that
from Mr Howard reporting the result
of a chemical analysis from bark
grown in India and that gentleman
most distinctly states in language
so forcible as to imply a serious
warning. - "I beg to direct special
attention to the remark that the pure
white crystallized "Sulphate of Quinine"
(apparently) made from the bark of
the "C. Succirubra" will not stand
the test which is employed to
distinguish the pure article in
Commerce. It is of course
possible to separate the Cinchonidine

"This difficulty must be looked
"steadily in the face, and I would
"suggest it may be obviated either
"by a change being wrought in
"the opinion of the medical world
"as to the value of Cinchonidine
"as a medicine, or by the stout
"being encouraged to produce
"Quinine instead of Cinchonidine.

4. The first probably might
Vide Mr. Howards Report 1st Augt 1866 be attained through a Commission of
inquiry composed of Medical Practi-
tioners, which it is now proposed
to nominate in India, for a
decisive trial of the relative and
positive qualities of the Cinchona
Alkaloids other than Quinine.

5. The second alternative
may be met by improved cultivation
under the judicious management of the

...Iver :-

6. Giving to Mr. Howard's opinions as expressed in his Report, ...at weight to which I conceive ... are entitled from the high ...ientific position he occupies, ... I am disposed to think ... have been premature in the ...ery expenses already incurred ... a speculation unsupported by ...h medical authority and ...ufficiently tested by any ...tablished practical results, and ... therefore, we should pause ...il it can be clearly ascertained ...t are to be the real merits ...e produce from these Plantations.

7. I myself doubt ...ther the Plant we have been cultivating at so much cost will ever produce the true "Quinine". Mr. McIver may think he can by artificial process procure this result, but I beg to doubt that gentleman's ability to so control or reverse the laws of Nature. Mr. Markham himself admits the "C. Calisaya" has not been a success in India :-

8. Therefore until the Medical and Commercial world will accept the Chinchonidine or other Alkaloids for the long valued and esteemed "quinine" or their relative Medical Value have been recognized and established, I think all expenditure should be restricted to the mere maintenance of the existing plantations, unaccompanied by any further extension

9. Without wishing in any way to detract from the zeal or acquirements of Mr. McIver I think he is a little premature, if not injudicious, from the position he occupies as a Government Officer, in the very sanguine Views he expresses and confident promises he holds out of almost certain and enormous returns, from the young plants sold by him under the Government; for should hereafter the Speculation prove unsuccessful, the Government might be charged with having misled many who relying on the good faith of their authority, entered upon an investment that may terminate in failure.

10. I have been struck

with the fact that the Superintendant of the Plantations appears to estimate the success of his measures upon the apparent luxuriance and rapid growth of his young trees. At the Cape of Good Hope I remember the finest Vines being imported from France, Germany and Italy, they grew there with great luxuriance and produced the finest looking fruit, yet for wine their Object, they were comparatively Valueless, and in like manner I have but little Confidence in the success of Mr. McIver's "moss" and Straw appliances, in converting the questionable Chinchona into the Valued Quinine, until at last I can see more practical results than I yet can recognize:-

11. I scarcely anticipate from the proceedings of the proposed Medical Commission, to be appointed locally, / any lapsed advance towards a decision on the important subject to be referred to them, because from my long experience in the Colonies I know that public questions under such circumstances are rarely viewed with moderation or discussed without asperity, and that it is long before such opinions have any bias or influence on that high Medical authority at home, whose decision alone could secure the confidence of the public in the future substitution of Chinchonidine into their Medical Treatment:

12. Should the Government decide to procure the services of a Scientific Limnologist, I strongly recommend that a selection should be made of a gentleman altogether previously unconnected with this experiment.

13. In the opinions I have formed, I may be thought to have taken an erroneously discouraging view of this subject, but careful consideration forces the impression upon my mind, that both Mr. Markham, and Mr. McIver, in their zeal from success, have adopted in their reports a tone more sanguine than circumstances will support, and that if we yield too easily to similar views we may end in deceiving ourselves, and

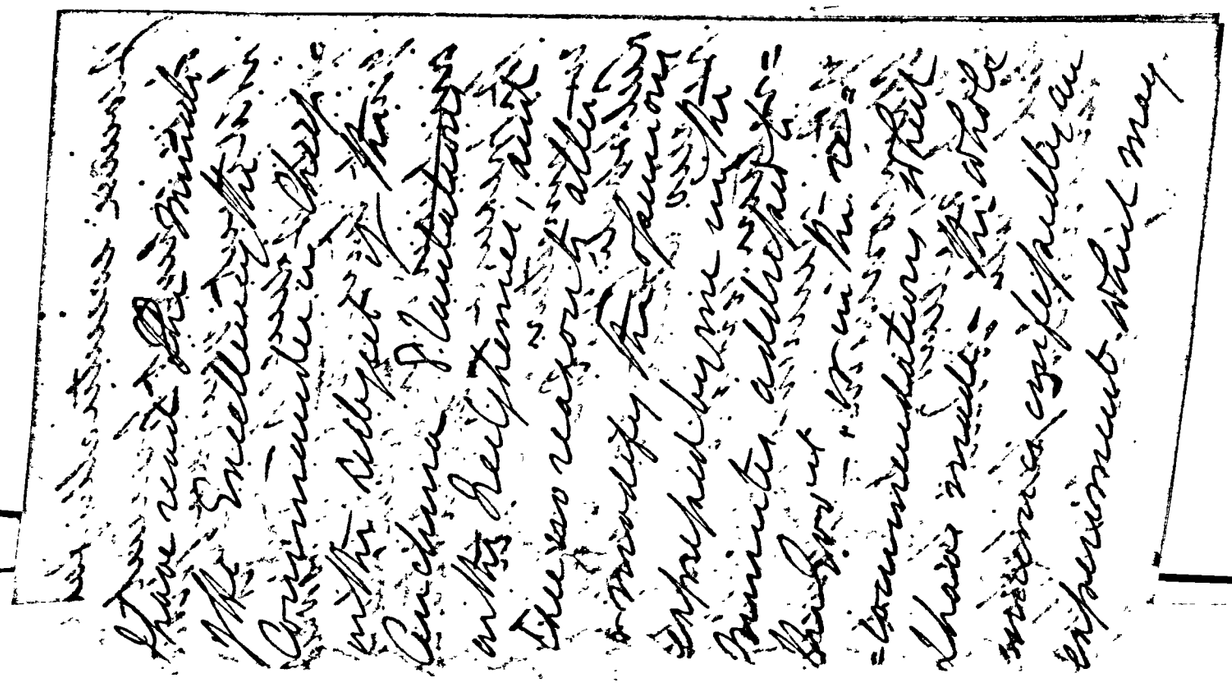
misleading the Government.—

14. I have therefore thought it my duty to no longer hesitate in frankly expressing the opinions which for some time past I have personally entertained.—

I have &c

Chief

Recd 30 [illegible]



Dispr. 12 March 66
Revenue 1866. Vol 1st

No. 7390.

Minute by His
Exc: the Commander
in Chief

Noted.

No. 183 A.

Dec 1863

I come essentially [illegible]
[illegible] without very [illegible]
[illegible] of success — the
[illegible] that Mr Howard
[illegible] of the Bankhead
[illegible] Mr Atkinson
[illegible] with the
Sulphate of Quinine — but
[illegible] states that addi-
=tion will be made
[illegible] Quinine printing
[illegible] consider — Should
[illegible] per cent of Quinine
Sulphate would be
diminished — perhaps
one half or even less — but

even from the products
[illegible] Plantations as Quinine
alone, throwing the Chinco-
=nidine out of the question
would pay a large addi-
=tional annual outlay —
I think the Bleached
may go as written — the
Remarks of the Ex Com
Comm in Chief should
accompany it

J Denison

Dr Conrad Distrib

Mem.°

I beg to circulate
for orders.

I. Despatch of the
Secy of State No.
37 of 30 Sept last
on Chinchona cultiva-
tion &c.

II. Minute of the
Member in Chg on
the same.

III. Mr Markham's
Report.

The two first were
adopted. The orders
till the receipt
of the third.

Mr Markham
makes the following
recommendations

I. That a Succursal Hospital of Establishment Superintendence should be located at Ootacamund for 3 years. in order in concert with Mr. McIvor, to investigate fully the following questions connected with the elaboration of alkaloids - the preparation of the bark - the most Economical & Efficacious mode of preparing the febrifuge &c &c. and to communicate the Results for the benefit of the Department.

2. That a Superintendent of Hospitals be appointed to the Establishment at Ootacamund, who shall be a Medical Officer of the Service, and who shall be responsible for the due performance of the duties assigned to the Establishment.

3. That the Superintendent be allowed the Services of a Native Writer, and a Peon, and that he be allowed to draw Bullock Hackeries for the conveyance of his Baggage, when moving from Station to Station.

4. That the Superintendent be allowed to draw Medicines and Stores from the Hospital at Ootacamund, and that he be allowed to purchase Medicines, Stores, Instruments, Books, Glass, Chemicals, Apparatus, Furniture, Fuel, Lights, Carriage, Establishment, Contingencies, and Miscellaneous Charges, not exceeding in the whole the sum of Rupees 1,000 per annum, and that he be allowed to draw Bullock Hackeries for the conveyance of his Baggage, when moving from Station to Station.

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pected on the out-
lay incurred. It
would be good eco-
nomy, therefore to
manufacture Quin-
ine on the spot,
instead of, as at
present, having to
send the bark to
England and re-
importing it as
Quinine. We would
therefore suggest for
your consideration
the Establishment,
as soon as our ~~bark~~
supply of bark is
sufficient, of a Gov-
ernment Manu-
factory, which,
when the requirements
of fort. permit, Pri-
vate individuals
might also find
their benefit in

Recommendation
of Mr Markham
is much less Extens
Line than this, as
he proposes that, at
all events for the
present, the Quino
Liquid should under-
go a state the conditions
under which the
layer of sulphate of
Alkaloids can be
produced of the
cheapest form of
Sulphate. It will
be seen that also
the remainder of
Statement of the formu
suggested by Quinine
will not suit the
Manufacturer in
England. Hence
Quinine cheaper
and of better
by the while Sulphate

bring it up by the calculations for Importation & Manufacture into Sulphate of Quinine. My own opinion has always been strongly in favor of carrying out the entire process from the growth of the plant to the manufacture of the Medicine, until private enterprise renders it totally unnecessary. There is, I believe, no more objection to a Govt. Manufactory than to a Govt. plantation (150 days) and success may as fairly be anticipated under

case as in the latter or at least failure need not be predicated. And a Manufactory has this much in its favor, that it will enable Govt. to restrict its planting operations with greater safety he can reckon on getting such supplies of bark as it may require over & above its own growth for public purposes at a moderate price with greater certainty than it can reckon on getting the manufactured Quinine of England. There-

-ing will always shed a favourable light upon small farmers who wish proper and immediate sale to the risks of a distant market & the dangers of either selling the Cattle or getting it prematurely destroyed in the Port with a fair & reasonable article will do much to encourage planting

II That the Mel Koondi plantations be restricted to 200 acres and used solely for preparing provisions. The total Extent

3/

devised here is 2500 Acres. His Ex. the President in his Minute of 30 Oct last proposed that this should be reduced to 500 Acres viz 200 be cultivated & 300 reserved the remaining 2000 Acres being held. The operations of 1866/7 are limited to 150 Acres in all the Plantations so that before any land is held the first can await the Expression of the Secy of State's views

III That Chinchona seeds & plants should be distributed pre-

tuitously to all applicants to on the order of application as is done in Coy. Lond. Members. Rs. 5000 are taken - One anna per plant to be charged for larger quantities.

In his report for 1860 for the Seor. Dist. in Jan of 1863 plants should be divided for sale at the following rates viz

Rs 500 — for 1000
" 300 — " 500
" 200 — " 150
" 100 — " 50

4 Rs per plant for any under 50 — The reasons for charging a price here the following viz. should one. by that people as a general rule take first care of a lot this have to pay for and [illegible] Extraction of a price by the people to [illegible] - and [illegible] I think fixed the price at 4 annas per plant is not by ourselves order that price should be for [illegible] 2 and a [illegible] plants [illegible] Rs 5000 [illegible] and [illegible] are taken by the same [illegible] This [illegible] advance in the [illegible] recommendation that it seems to me [illegible] this [illegible]

objection that the price of 2500 & 5000 plants is just the same - to that if a man really wants only 2600 plants his cheapest plan is to buy 5000 and even burn the odd 1400 - or by selling them at something under one and a penny can make a profit in that risk. The regular trade plan of a price per plant or hundred plants with a discount on large transactions seems the best.

But by Mr Mark Fawcett's plan no price is to be charged for

less than 5000 are taken and one penny per plant beyond that number. This rule in fact destroys competition - for McIvor established 80,000 plants already and in only 4 instances had the number taken been divisible in 5000 - No complaint has yet reached the public of the prices being too high - Mr McIvor's reasons for charging these four sums for seed distinction

and it will then be duty & interest the conditions that the applicant shall plant the trees in their 12 months & carefully cultivate them.

III That effort be made in a variety of ways to enlighten the people of Plant Chinchona and the like. This of course is very desirable - but the real encouragement is the discovery of the new & unexpected by Mr McLean himself in his last report - the last "The majority of

English gentlemen at present employed in cultivation are Tea Soils, from want of Experience have been unsuccessful in propagation and also in transplanting them delicate plants, although qualified to carry on the cultivation successfully when the plants are either sent or delivered to them in such a condition as will be easily transplanted: and to encouragements in the preparation of the young plants

will be at the ex
to deliver them
in such a condi-
tion as they cannot
be well objected to
transplanting.
The Dr. to the letter of
2 lb of plants a
couple of inches
high - at 4 pence
ster^g Restraint or
have been obtained
at Kilbeth Mr. Ch
factors. At home
or the Nth Lowr Can
suitably supply Estab.
plants of 12 in:
or 15 - a distinction
among dyers might
succeed

V. That for^d should
pay the salary of
a surgeon to be selected
by the Secretary. And
him to visit & attend
in the Asylum in the
College of the Chir
Edin^a.

VI. That Convicts
be sent at once to
the Aberdeen Bridewell
Jail - the Western order
of the 20 cell^s in
the 86 prop^d dept. put
called on the Inspector General of
Jails & the Sheriff
in little or
little delay as pos-
sible, a detailed
Estimate of all the
charges for the same
(Stg / Cury / inclu-
ding an European
Keeper in Each Establish

P.S.

The intimation has yet been received of the despatch of the alkaloids mentioned in Item 3 of the Leaf of State letter

J.P.S.

War Office.

In the Cipher circulated here - the Minutes are only to be entered - not printed in Extenso.

J. P.S.

Read. C 74

Despatch from Lord Wodehouse of 30 Sept 65 No 27. Public.

175 Minister of H.S.M. President.

Do. do. the Hon.ble J. Pycroft 20 Nov.r 65.

176 Do. do. the Hon.ble H. D. Phillips 7 Dec.r 65.

Return from C. Markham Esq.r of 16 Jan.y 66.

177 Do. do. 7 Feb.y 66.

178 Minute of H.M. the President of 7 Feb.y 66.

179 Do. do. the Hon.ble J. Pycroft 14 Feb.y 66.

180 Do. do. the Hon.ble H. D. Phillips 1 March 1866.

ordered that the
Principal Inspector send the
Medical Department be requested,
with reference to
para 3 of the Re-
port of the Committee of State, to
furnish a list
of the Medical
officers, whose, having
regard to the qua-
lifications mentioned in the Re-

should be re-
commended for ap-
pointment to the
proposed Commission.
Dr Shaw will also
make such sugges-
tions, as occur to
him, for ensuring
a decisive trial
of the relative &
positive qualities,
as febrifuges, of
the Chinchona Al-
kaloids - other
than Quinine -
specified
recommended in the
despatch and of
the preparations
Quinine to be al-
lowed to
supplied by Mr Mark
Inness -

The proposed
establishment of Alkaloid

has not yet been received ——
3 The Principal Inspector for N.D. will be furnished with a copy of Para. 14 to 22 of Mr Markham's Report of C.O. 20 also R.D. No 460.
4 With reference to Para 32 of Mr Markham's report, the Govt consider it undesirable that one uniform price should be charged for plants, whatever number may be taken. Under the present arrangement a plant to [illegible]

facts by purchasing 5000 and throwing away the surplus 2000 — Mr McLoon will therefore in future charge one annas per plant in all cases.
The Govt do not concur with Mr Markham's & Gratuitous distribution of seedlings — but wish to have Mr McLoon's opinion on the subject. In submitting this Mr McLoon will state how many applications he has received

on his register
how he deals with
applications, the
principle of distri-
bution of requisi-
tion or on what
other principle
and how many
of the goods that
in his possession
are in a fit state
to send out to
private applicants.
possessing only
the ordinary
amount of judg-
ment skill &
experience. The
Pet. Considers that
there is much that

in the remarks
contained in
last paragraph of Mr
the Lords Lordships
should be taken
of the Court
that the
Statutory Instru-
ment dispenses
type of delicate plant
as good machinery
principles
in simple cases
they wish to know
when Mrs Thompson
while the cases
petitioners' surgeons
well-proven standards
in any [illegible]
number of
5. The Clerk of the
District Court

finally settled
with Hyder Ali
by his restoring
to them
or from 35 to 40
of Mr MacKenzie's
Detail.

I ordered that
a Copy of Mr
MacKenzie's De-
tail be sent to
the Gov. of Bombay
the Resident at
Travancore Hook
the Com.rs for the
Ceryptures
of the
the Raja of Mysore
and the Chief Cap-
tains of Central Persons
with the Reasons why
that the Gov.t &c

Ganjam.
Vijayapatam
Bellary
Kurnool
~~Cuddapah~~
Canara
Malabar
Coimbatore
Salem
Madura
Tinnevelly.

That Orders are
given for Letters
to be sent to
Chicacole in
Ganjam

78

6. The Dep.y Com.rs
of Wynaad will
be furnished
with a Copy of
Mr. Howard's work
on the Chinchona
and attention
will be made to
the Legislature
for a few more
Copies of this work.
Copies of the Chin.
chona Manual
with the annual
additions, Directo
have been extending
circulated to
Mr. Richardson +
Messrs. Lee Rees

Chinchona

G. 0