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MADRAS RECORD OFFICE.

Government of Madras.

Revenue DEPARTMENT.

G.O. No. 1051 Press ~~Mis.~~

Dated 28-8- 1883.

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GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—the following Resolution of the Government of India, Financial Department (Agriculture), dated Calcutta, 10th July 1883.

Read—the Annual Report of the Government Chinchona Plantation in Bengal for the year 1882-83, and the Annual Report of the Quinologist for the same year.

The result of the planting operations of the year shows a decrease of about 50,000 chinchona trees on the returns of 1881-82. This is due to the uprooting of a large number of the *Calisaya* and hybrid varieties which were found to possess bark of poor quality. Some 160,000 red-bark trees were also uprooted in the ordinary rotation, and were replaced by the yellow bark and hybrid varieties. Nearly all the land within the existing chinchona reserve suitable for the cultivation has now been planted out, and the Superintendent accordingly applied, in October last, for permission to plant out with *Ledgeriana* and the hybrid variety a tract of land in the trans-Teesta portion of Darjeeling which had been reserved for Government chinchona cultivation. Both these species have been proved by repeated analyses to be very rich in quinine, while most of the yellow bark or quinine-yielding trees on the existing plantations at Mungpoo are quite young, and the whole stock is not sufficient to furnish, even when mature, enough bark to employ the factory profitably for more than a few weeks in the year. There is, in fact, no plantation of these trees actually in existence, while the nurseries have a magnificent stock of nearly half a million plants of the best sorts of yellow-bark trees which would be lost unless the seedlings were speedily planted out. The proposal for forming the new plantation was readily approved by Government, and measures have since been taken for planting out the reserve with a number of the best kinds of *Ledgeriana* and hybrid chinchonas.

2. In the Resolution recorded upon the proceedings of last year, it was remarked that there were several distinct forms of the hybrid variety, and analyses were given of the samples of bark of four of these forms. During the year under review the Superintendent had analyses made of four more of these forms, and the results obtained from all the eight hybrids are compared in the following table :—

—	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.
Crystallised sulphate of quinine	2·87	1·48	1·88	0·97	2·12	2·04	6·12	3·99
Do. do. of chinchonidine ..	2·94	2·85	2·93	1·94	2·84	2·26	2·46	3·33
Do. do. of quinidine	Traces.	Traces.	Traces.	Traces.	Traces.	Traces.	Traces.	Traces.
Chinchonine (alkaloid)	0·72	0·57	0·52	0·80	0·33	0·68	0·65	0·57

Dr. King points out that hybrid No. 4 is very poor quinine, and it was the trees of this sort that were uprooted during the year. No. 7 appears to be exceptionally rich in quinine, and the plantations of this variety might with advantage be extended.

The total number of chinchona trees of all sorts at the close of the year was 4,711,168, namely, red (*Chinchona Succirubra*) 3,713,200, yellow (*Calisaya Ledgeriana*) 662,998, hybrid unnamed variety 304,378, and other kinds 30,592.

3. It is satisfactory to observe that the crop of the year is the largest that has yet been harvested on the plantations. It amounted to 396,980 pounds of dry bark, of which 372,610 pounds were of *Succirubra*, 22,120 pounds of *Calisaya* and *Ledgeriana*, and 2,250 pounds of hybrid bark. By far the largest portion of the produce was made over to the factory for conversion into chinchona febrifuge, while about 41,800 pounds of yellow and red barks were sent at the request of the Secretary of State to London to be there converted into various forms of febrifuge and returned to this country for trial by the Medical Department.

4. The expenditure on the plantations amounted to Rs. 80,739-6-2 against the budget allotment of Rs. 82,225. Of this expenditure Rs. 17,548-3-9 was incurred

on the newly-opened trans-Teesta plantation, and on the young plantation at Sittong. This sum is chargeable to capital account. The balance, amounting to Rs. 63,191-2-5, which was spent on the old plantation, and includes charges on account of packing and carriage of bark sent to England, is chargeable as working expenses.

5. It is disappointing to notice the continued failure of *Carthagena* bark, notwithstanding that the utmost care has been taken of the plants and every endeavour made to grow them at various elevations and with various exposures. Only three plants were alive at the close of the year. An attempt has been made by the Superintendent to introduce the *Remija* plant, which is a genus botanically allied to chinchona. It is said to be less particular than chinchona as to soil and climate, and produces a quinine-yielding bark under the name of *Cuprea*. This bark forms a very large proportion of the quantity of quinine bark imported into Europe. Although the first attempt to grow the plant in the Mungpoo plantations has not been quite successful, Dr. King entertains hopes of successfully acclimatizing it, when he is able to procure a more adequate supply of seed. The Lieutenant-Governor will await the result of the experiment with much interest. The surplus seed of the *Calisaya Ledgeriana* was, as usual, distributed during the year gratuitously amongst applicants.

6. Dr. King has eventually succeeded in obtaining an analysis of the bark renewed on *Succirubra* trees that had their original bark removed by the shaving process introduced by Mr. Moens, the distinguished Director of Chinchona Cultivation to the Dutch Government. It appears that this process consists in shaving off the greater part of the bark of a living tree to the height of from 8 to 10 feet from the ground, care being taken to leave everywhere a sufficiently thick layer of bark to cover the wood. This method has had a fair trial on the Sikkim plantations, and the result has, beyond doubt, been favorable, as the bark renews perfectly. What, however, remained to be seen, was whether the renewed bark was as rich in medicinal alkaloids as the original. It was with the object of determining this question that the analysis above referred to was undertaken during the year. The results are thus described by Dr. King: "The bark renewed rather slowly, but the analysis shows that it is very rich both in quinine and chinchonidine; and there can be no doubt that in countries where red-bark trees are perfectly at home, and where their continuance in good health and vigour for a long series of years can be absolutely counted on, this shaving process must be a very excellent one."

7. An interesting feature in the operations of the year is the low cost at which the febrifuge was turned out. The price of the febrifuge necessarily fluctuates from year to year, but in no former year has it been so low as Rs. 8-8-0 a-pound. This satisfactory result is attributed chiefly to the larger percentage of the alkaloids (2·73) extracted from the bark used in manufacture. The issues, however, fell below those of 1881-82, though they were a little in advance of those for 1880-81. The following table compares the distribution in the past three years:—

	1880-81.		1881-82.		1882-83.	
	LB.	OZ.	LB.	OZ.	LB.	OZ.
To Medical Depôt, Calcutta	3,000	0	3,336	0	2,000	0
Do. do. Bombay	2,000	0	1,000	0	1,000	0
Do. do. Madras	500	0	800	0	350	0
To Colonial Government, Mauritius ...	...		...		150	0
To Surgeon-General for District Medical Officers of Bengal	...		995	4	803	12
To Inspector-General of Jails for Jails and Lockups, Bengal	...		14	12	26	12
Sold to the Public	3,150	11	4,689	0	4,569	12
Given as samples	3	2	2	9	10	0
Total ...	8,653	13	10,878	9	8,901	4

The issues to the public were 120 pounds below those of 1881-82, and not in excess of that year as stated in the Superintendent's report. The stock of febrifuge in hand on 31st March 1883 amounted to 2,902¼ pounds, which, though greater

than that with which the year opened, is by no means too large a reserve to meet emergencies.

8. The revenue derived from the sale of the febrifuge, seed, plants, and bark amounted to Rs. 1,52, 807-1-0—

	RS.	A.	P.
By sale of febrifuge, seed, plants, and bark to the public...	80,577	9	0
By credits from the Medical Depôt of Calcutta	33,766	0	0
Do. do. do. of Bombay	16,500	0	0
Do. do. do. of Madras	5,775	0	0
Do. from Colonial Government of Mauritius ...	2,475	0	0
Do. from the Surgeon-General, Bengal	13,271	8	0
Do. from the Inspector-General, Jails	442	0	0
Total ...	1,52,807	1	0

The operations of the year resulted in a profit of Rs. 60,284-9-5, which is equal to a dividend of 6½ per cent. on the capital outlay. This is exclusive of the cost of a considerable quantity of the bark sent to the Secretary of State which has not been taken into account. It must, moreover, be borne in mind that these profits do not represent the whole of the gain of the year. The cost of an equal quantity of quinine at Rs. 96 per pound would have been Rs. 4,01,328. The cost of the febrifuge used was Rs. 68,988-8-0. There was thus a saving of Rs. 3,32,340. The total saving effected since the opening of the factory by the substitution of the febrifuge for sulphate of quinine amounts to Rs. 23¼ lakhs, which is more than twice the amount of the cost of the plantations.

9. Considerable attention was given during the year to the improvement of the process of manufacture. The present system is admittedly wasteful, in that it fails to convert into febrifuge the whole of the alkaloids which the bark contains, while there is no doubt that, by the adoption of a different and more costly process of manufacture, a still larger percentage of the medicinal alkaloids could be extracted. It is not, however, equally certain whether the febrifuge so obtained could be turned out at a less cost per pound. The whole subject of the course to be adopted in the disposal of the raw produce of the plantations is still under the consideration of Government.

10. The thanks of the Lieutenant-Governor are again due to Dr. King, whose management of his department leaves nothing to be desired. Dr. King has reported very favorably of the services of Mr. Gammie, and the Lieutenant-Governor entirely concurs in the praise accorded to him. The other assistants of the department are also well spoken of.

ORDER.—Ordered that a copy of this Resolution, and of the Reports referred to, be submitted to the Government of India, Revenue and Agricultural Department, and that a copy of the Resolution be forwarded to the Superintendent of the Chinchona Plantation for information.

Ordered, further, that a copy of this Resolution, and of the Reports, be forwarded to the Medical Department of this Government, and also to the Government of Madras and to the Surgeon-General, Bengal, for information.

(By order of the Lieutenant-Governor of Bengal.)

(Signed) COLMAN MACAULAY,
Secretary to the Government of Bengal.

No. 117.

Copy, with copies of the Reports, forwarded to the Government of Madras for information.

(By order of the Lieutenant-Governor of Bengal.)

(Signed) C. W. BOLTON,
Under Secy. to the Govt. of Bengal.

CALCUTTA,
10th July 1883.

ENCLOSURES.

Letter from GEORGE KING, Esq., M.B., Superintendent, Royal Botanic Garden, Calcutta, and in charge of Chinchona Cultivation in Bengal, and Officiating Government Quinologist, to the Secretary to the Government of Bengal, Financial Department, dated Royal Botanic Garden, Seebpore, near Calcutta, 11th May 1883, No. 7.

I have the honor herewith to submit the annual report of the Quinologist for the year ending 31st March 1883.

QUINOLOGIST'S REPORT FOR 1882-83.

The factory continues to be located at Mungpoo, and it has been worked during the year under the supervision of Mr. Gammie, his son Mr. George Gammie being in immediate charge. The percentage of febrifuge extracted from the bark used in manufacture was 2·73. This is a better result than was obtained last year, and the improvement is mainly due to the larger percentage of good bark used during the year. The net result of the manufacture for the year was an outturn of 10,363¼ pounds of ordinary and 300 pounds of crystalline febrifuge.

2. The details of the expenditure will be found in the following table, in which the bark is charged at cost price :—

		RS.	A.	P.
Paid for muriatic acid, 29,003¼ lb.		5,438	2	6
Do. sulphuric acid, 1,465 lb.		183	2	0
Do. packages for do.		325	10	0
Do. carriage of do.		2,154	5	6
Do. do. of empty jars		1,053	0	9
Do. soda		1,522	8	0
Do. carriage and storage of soda		529	4	0
Do. charcoal		565	7	0
Do. casks and other plant		520	11	5
Do. carriage of other stores		222	12	0
Do. sundry expenditure		1,120	2	10
Do. labor in factory		3,116	15	6
Do. Quinologist		2,100	0	0
Do. travelling expenses		200	10	0
Do. carriage of chinchona and crystalline febrifuge.		946	10	6
Do. tins for do. do. do.		580	6	6
Do. advertisement charges		1,014	8	6
Do. labor in packing, &c.		1,204	12	6
	Total	23,529	1	6
Cost of bark, 148,160 lb. (crop of 1881-82), at Annas 2-10·075 per pound	26,347 12 6			
Cost of bark, 241,300 lb. (crop of 1882-83), at Annas 2-9·88 per pound.	42,579 6 4			
		68,927	2	10
		92,456	1	4
By febrifuge produced, 10,363 lb. 4 oz., at Rs. 8-8-9·65 per pound	83,668 10 7			
By crystalline febrifuge produced, 300 lb., at Rs. 12-13-2·47 per pound.	3,817 9 9			
		92,456	4	4

3. The cost price of febrifuge necessarily fluctuates from year to year, but it has in no former year been so low as Rs. 8-8-0. This good result is of course chiefly due to the larger percentage extracted from the bark used in manufacture.

4. The issues of febrifuge fell below those of 1881-82, but are a little in advance of those for 1880-81. The falling off last year was, however, confined to the demand for the Government Medical Depôts of Calcutta and Madras, the issues to the public having been 120 pounds in excess of those of 1881-82. The details of the distribution are given in the following table :—

	LB.	OZ.
To Medical Depôt, Calcutta	2,000	0
Do. do. Bombay	1,000	0
Do. do. Madras	350	0
To Colonial Government, Mauritius	150	0
To Surgeon-General for Bengal (for District Medical Officers of Bengal)	803	12
To Inspector-General of Jails, Bengal (for Jails and Lockups in Bengal)	26	12
Sold to the Public	4,560	12
Given as samples	10	0
Total	8,901	4

5. The stock of febrifuge on hand at the end of the year was 2,962¼ pounds. This, although considerably in excess of the stock in hand at the end of the previous year (which was only 1,500¼ pounds), is not at all too high for safety, being equal only to about four months' consumption. In the following table the total amount of febrifuge turned out since the factory was begun can be seen at a glance :—

Table showing the amount of Febrifuge produced from the commencement to 31st March 1883 and the stock at the latter date.

	LB.	OZ.
Manufactured in 1874-75	48	10
Do. in 1875-76	1,940	6
Do. in 1876-77	3,750	12
Do. in 1877-78	5,162	0
Do. in 1878-79	7,007	0
Do. in 1879-80	9,434	13
Do. in 1880-81	9,296	0
Do. in 1881-82	8,010	0
Do. in 1882-83, including crystalline febrifuge	10,663	4
Total	55,312	13

	LB.	OZ.
Supplied to Medical Depôt, Calcutta	20,840	3
Supplied to Medical Depôt, Bombay	7,200	0
Supplied to Medical Depôt, Madras	2,250	0
Supplied to Straits Settlements	30	0
Do. to Colonial Government, Mauritius	150	0
Supplied to Surgeon-General for Bengal (for District Medical Officers of Bengal)	1,799	0
Supplied to Inspector-General of Jails, Bengal (for Jails and Lockups in Bengal)	41	8
Sold for cash	19,634	4
Samples, &c.	105	10
Stock in hand on 31st March 1883, including crystalline febrifuge	3,136	4
Total	55,312	13

6. The value of the stock in hand at the end of the year is Rs. 7,058-8-4 in excess of the figure at which it stood at its beginning. The account is as follows :—

Stock on 31st March 1882.	RS.	A.	P.
Chemicals and stores	5,000	0	0
Febrifuge, 1,600 lb. 4 oz., at Rs. 11-1-8·3 per pound	20,661	6	0
Bark, 198,888 lb., at Annas 2-10·075 per pound	35,297	7	0
	56,958	13	0
Increase in value	7,058	8	4
Total	64,017	5	4

Stock on 31st March 1883.	RS.	A.	P.
Chemicals and stores			
Febrifuge, 2,962¼ lb., at Rs. 8-8-9·65 per pound	25,328	0	2
Crystalline febrifuge, 174 lb., at Rs. 12-13-2·47 per pound.	2,231	9	10
Bark, 164,808 lb., at Annas 2-8·88 per pound	29,081	12	0
Bark, 41,800 lb., sent to London and not yet accounted for, at Annas 2-9·88 per pound	7,375	15	4
	36,457	11	4
Total	64,017	5	4

7. The financial aspect of the year's work will be readily understood if the figures arrived at in the previous calculations be collected in the form of a statement of account. I have accordingly arranged them in the following balance sheet :—

Dr.

	RS.	A.	P.
To value of stock on 31st March 1882	56,958	13	0
To value of bark yielded by the new (Sittong) plantation during 1882-83, viz., 38,880 lb., at Annas 2-9·88 per pound ...	6,860	12	0
To cash received from Treasury during 1882-83 for expenditure on old plantation	63,191	2	5
To cash received from Treasury during 1882-83 for factory	23,529	1	6
Profit on the year's working	66,284	9	5
Total ...	2,16,824	6	4

Cr.

	RS.	A.	P.
By value of stock on 31st March 1883	64,017	5	4
By cash receipts from sale of chinchona febrifuge, crystalline febrifuge, seed, plants and bark	80,577	9	0
By credit from Medical Depôt, Calcutta, for bark.	766	0	0
By credits from Medical Depôts for febrifuge, viz.—			
Calcutta. RS. 33,000 A. 0 P. 0			
Bombay. 16,500 0 0			
Madras. 5,775 0 0			
	55,275	0	0
By cred. from Colonial Govern ent of Mauritius for febrifuge	2,475	0	0
By credit from Surgeon-General, Bengal, for febrifuge supplied to District Medical Officers of Bengal	13,271	8	0
By credit from Inspector-General of Jails, Bengal, for febrifuge supplied to Jails and Lockups in Bengal	442	0	0
Total ...	2,16,824	6	4

8. From this statement it appears that the year's working resulted in a profit of Rupees 66,284-9-5, which is equal to a dividend of 6¼ per cent. on the capital—a result which I trust may be considered satisfactory. Quinine ruled through the year at an average of about 10 shillings an ounce in London, which, calculating exchange at 1s. 8*d.* per rupee, is equal to Rs. 96 per pound in India. The quantity of febrifuge supplied to Government departments during the year was 4,180½ pounds, and the cost was Rs. 68,988-8-0. An equal quantity of quinine, at Rs. 96 per pound, would have cost Rs. 4,01,[illegible]. The saving to the State effected by substituting febrifuge of Government manufacture for English-made quinine was therefore Rs. 3,32,340. If this be added to similar savings from [illegible] substitution in former years, the total saving to the State in the matter of quinine amount, [illegible] above Rs. 23,25,000. And as the total cost of these plantations has been only Rs. 10,00,000, the result, I think, may be considered satisfactory. Only a very small quantity of bark was sold during the year; the profit is therefore derived solely from the sale of febrifuge. A considerable quantity of bark was sent to the Secretary of State, the cost of packing and forwarding of which was debited to the plantation during the year. But as this bark has not yet been disposed of, and no credit on account of it has been taken. The proceeds shall, however, appear in next [illegible] accounts.

9. Much attention has been given during the year both by Mr. Gammie and myself to the improvement of the process of manufacture; and, as I have already stated, a better result has been obtained during the past than during any previous year. There is no doubt that by the adoption of a different and more costly process of manufacture a still larger percentage of febrifuge might be obtained; but that the febrifuge so obtained would cost less per pound is another question. With a raw material which is cheap, bulky, and practically unlimited in supply, processes of manufacture which involve expensive carriage and apparatus are of doubtful advantage. The whole matter of manufacture is receiving most earnest attention; but the subject is not at present in a state in which it can be advantageously reported upon.

10. Mr. Gammie's continued good services again demand my warmest acknowledgment. Mr. Gammie, junior, has also worked steadily and well, as has Babu Gopal Chundra Dutta, the head of the office and sale department.

11. I annex a statement in tabular form showing the details of the cash receipts and credits for febrifuge, bark, &c., during the year. In this full credit is taken for all issues to the Surgeon-General of Bengal, although as a matter of fact the whole of the febrifuge supplied to

him has not actually been credited to the factory account in the Accountant-General's books, the necessary statements for the last few months of the year not yet having been received in the Accountant-General's office :—

Cash Income for 1882-83.

	RS.	A.	P.
Cash received from sale of chinchona febrifuge and paid into the Bank of Bengal and into Jehanabad Treasury...	75,731	0	0
Cash received from sale of crystalline febrifuge and paid into the Bank of Bengal	2,968	0	0
Cash paid into Bank of Bengal, Calcutta, and into Darjeeling Treasury on account of sales of seed, plants and bark	1,878	9	0
Credit for bark supplied to Medical Depôt, Calcutta ...	766	0	0
Do. for febrifuge supplied to Medical Depôts, viz.—			
Calcutta ... ... RS. 33,000 A. 0 P. 0			
Bombay 16,500 0 0			
Madras 5,775 0 0			
	55,275	0	0
Credit for febrifuge supplied to Colonial Government of Mauritius	2,475	0	0
Credit for febrifuge supplied to Surgeon-General, Bengal, for District Medical Officers of Bengal	13,271	8	0
Credit for febrifuge supplied to Inspector-General of Jails, Bengal, for Jails and Lockups in Bengal	442	0	0
Total credit in India ...	1,52,807	1	0

GEORGE KING, M.B., Surgeon-Major,
Superintendent, Royal Botanic Garden, Calcutta,
and Offg. Govt. Quinologist.

Annual Report on the Government Chinchona Plantation in Bengal for the Year 1882-83.

Letter from GEORGE KING, Esq., M.B, Superintendent, Royal Botanic Garden, Calcutta and in charge of Chinchona Cultivation in Bengal, to the Secretary to the Government of Bengal, Finance Department, dated Royal Botanic Gardens, Seebpore, near Calcutta, the 11th May 1883, No. 35-C :—

I have the honor herewith to submit the annual report on the Government Chinchona Plantations in Bengal for the year ending 31st March 1883.

Twenty-first Annual Report of the Government Chinchona Plantation in British Sikkim. By Surgeon-Major GEORGE KING, M.B., F.L.S., Superintendent of the Royal Botanic Garden, Calcutta, and of Chinchona Cultivation in Bengal.

The planting operations of the year leave the grand total of Chinchona trees on the Government estate on 31st March at 4,711,168 of all sorts. This shows a diminution of about 50,000 on the returns of the former year, the decrease being consequent on the uprooting of 20,000 *hybrids* and 43,697 *calisayas*, which, on analysis, were shown to have bark of rather poor quality. The removal of these inferior trees is in conformity with the policy which has been followed for some years of raising the standard of the produce of these estates by cultivating only the finest kinds of quinine-yielders. In conformity with the same policy, 160,085 red bark trees, which had to be uprooted in the ordinary rotation followed on the plantation, were replaced, not by red barks, but by yellow barks and *hybrids*. Ground was, towards the end of the year, broken at Runjung in the new Chinchona reserve across the Teesta. A European assistant has been located there, and preliminary measures have been taken for planting out there, during the year now entered on, a number of the best kinds of *Ledgeriana* and *hybrid Chinchonas*. This new clearing has been connected with Kalimpong by a bridle road. It will be under the general supervision of Mr. Gammie, who will visit it as often as may be necessary. In my last report I explained that among our *hybrid* Chinchona trees there are distinguishable several distinct forms, and I gave the results of the analysis of four of these. During the year I had analyses made of the bark of other four of these forms. For convenience of reference I give the whole of these analyses in the following table :—

Analyses of Samples of Hybrid Bark from Mungpoo.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.
Crystallised sulphate of quinine	2·87	1·48	1·88	0·97	2·12	2·04	6·12	3·99
,, ,, of chinchonidine	2·94	2·85	2·93	1·94	2·84	2·26	2·46	3·33
,, ,, of quinidine	traces.	traces.	traces.	traces.	traces.	traces.	traces.	traces.
Chinchonine (alkaloid)	0·72	0·57	0·52	0·80	0·33	0·68	0·55	0·57

In this table Nos. 1 to 4 are the analyses which I published last year. Nos. 5 to 8 are those which are now published for the first time. Hybrid No. 4, as the analyses made last year showed, is very poor in quinine, and it was the trees of this sort which, as above stated, were uprooted during the year. The total number of Chinchona trees of all sorts standing in the plantation at the end of the year is shown in the following table :—

	Red. (*C. Succirubra*).	Yellow. (*C. Ledgeriana*).	Hybrid unnamed Variety.	Other kinds.
Mungpoo Division	2,581,000	644,218	250,500	30,692
Sittong do.	1,132,200	18,780	53,878	....
Total ..	3,713,200	662,998	304,378	30,692

Grand total of all kinds on both plantations ... ... { Mungpoo ... ... 3,506,310 / Sittong 1,204,858

Total ... 4,711,168

2/ 1 *Details of the Year's Crop.*—The crop for the year is the largest that has yet been harvested on these plantations. It amounted to 396,980 pounds of dry bark, of which 38,880 pounds were collected on the young plantation at Sittong, and the rest on the old plantation. Of the total crop, 372,610 pounds were *Succirubra*, 22,120 pounds were *Calisaya* and *Ledgeriana*, and 2,250 pounds were hybrid bark. As usual, the crop was harvested by two methods—182,720 pounds having been got by uprooting trees that had begun to show signs of maturity, while the remaining 214,260 pounds were got by thinning the plantation at spots where the trees had begun to crowd each other. The bulk of the crop was made over to the factory for conversion into Chinchona febrifuge; but 27,800 pounds of yellow bark and 14,000 pounds of red bark were (at his own request) sent home to the Secretary of State, by whom the consignment has not yet been accounted for. It is, I understand, intended that these 41,900 pounds shall be converted in London into various forms of Chinchona febrifuge, and that these shall be sent to this country for trial by the Medical Department. The results, financial and other, of this experiment will probably be given in next year's report. Including the crop of last year, the total outturn from these plantations since their beginning now stands (as may be seen by the annexed table) at considerably over two-and-a-half million pounds of dry bark.

3. *Expenditure for the year.*—The budget allotment for the year was Rs. 82,225; but of this only Rs. 80,739-6-2 were spent, there being thus a saving of Rs. 1,485-9-10. Of this expenditure the sum of Rs. 17,548-3-9 was incurred on the newly opened plantation at Runjung, and on the young plantation at Sittong, which is not yet in full bearing. This amount is therefore a charge against capital or block. The remaining expenditure was incurred on the old plantation. It is therefore chargeable as working expenses, and is to be put against the year's crop. The matter stands thus—

	RS.	A.	P.
Total expenditure for the year 1882-83	80,739	6	2

Capital Expenditure.

	RS.	A.	P.
On Runjung (the newly opened plantation) including share of European, native, and office establishment and contingencies	4,165	10	7
On Sittong including share of European, native, and office establishment and contingencies	13,332	9	2

Working Expenses.

	RS.	A.	P.	RS.	A.	P.
Total expenditure on old plantation in the production of 358,100 pounds of bark, including Rs 5,612 incurred in packing and carriage of bark sent to England	63,191	2	5			
				80,739	6	2

In return for the outlay on the old plantation, there was received a crop of 358,100 pounds of bark, the cost price of which is therefore 2 annas 9·88 pies per pound. But besides these 358,100 pounds of bark yielded by the old plantation, there were collected from the thinnings of the young plantation at Sittong 38,880 pounds; and for convenience of account the Sittong bark has been taken over at the same price as the produce of the old plantation, the value of this Sittong bark being credited to the Sittong plantation which, from its commencement, has had separate accounts. The whole of the bark has, in accordance with the usual custom, been made over to the factory at cost price, and further particulars about it will be found in the Quinologist's report.

4. *Carthagena Bark.*—I regret to have to record the continued failure of *Carthagena* bark, only three plants being alive at the end of the year. Nothing could well have been more disappointing than has been the attempt to introduce this bark. The plants received from Kew at first grew vigorously, and it appeared as if the species would be easy of cultivation. Gradually, however, all the plants sickened. Every care was taken of them by Mr. Gammie; individual plants were tried at various elevations and with various exposures, but the results have been uniformly disappointing.

5. *Cuprea Bark.*—Some years ago a quinine-yielding bark, under the name of *Cuprea*, began to be poured into the London market from the northern parts of South America. The supplies of this have steadily increased, until now *Cuprea* forms a very large proportion indeed of the total quantity of quinine bark imported into Europe. At first the botanical origin of *Cuprea* was unknown; but it has now been ascertained to be the produce of a species of *Remija*, a genus botanically allied to Chinchona. *Remija* is said to be less particular than Chinchona as to soil and climate, and it is not unlikely that it may be possible to cultivate it in this country. I have therefore been anxiously trying for some time to get seed of *Remija*. I regret, however, to say that from the only packet which I have been able to secure, only a single seedling has resulted. Further efforts shall, however, be made to secure seed, and I hope before long to have a patch of *Remija* trees added to the plantation.

6. *Distribution of Plants and Seeds.*—In accordance with the wishes of Government, and with former practice, the whole crop of seed of *Chinchona Ledgeriana* (after supplying our own wants) was distributed gratuitously amongst applicants. This plantation being the only source of supply in this country of *Ledgeriana* seed, I have reason to believe that the boon of free distribution of it has been much appreciated by planters all over India, as well as in Ceylon. The sum of Rs. 996 received during the year from the sale of seedlings and of *Succirubra* seed was paid into the treasury.

7. *Land-rent.*—The rents and grazing dues received from tenants on the reserve amounted to Rs. 1,824-4-0, which sum was paid into the treasury, but it is not taken credit for amongst the plantation receipts.

8. *Estimated Crop of* 1883-84.—About 350,000 pounds of dry bark will probably be required for the factory during the year, and I propose, as usual, to regulate the bark taken by the factory demand.

9. I have now obtained an analysis of the bark renewed on *Succirubra* trees that had had their original bark removed by Mr. Moens' shaving process. The bark renewed rather slowly, but the analysis shows that it is very rich both in quinine and chinchonidine; and there can be no doubt that, in countries where red bark trees are perfectly at home and where their continuance in good health and vigour for a long series of years can be absolutely counted on, this shaving process must be a very excellent one.

Analysis of renewed Succirubra bark from Mungpoo.

Crystallised sulphate of quinine	3·70 per cent.
,, ,, of chinchonidine	4·88 ,,
Chinchonine (alkaloid)	1·81 ,,

10. The fuel plantation which was begun during the previous year has been extended during the past year, and now extends to nearly 180 acres. I have great hope that it will prove a thorough success.

11. Mr. Gammie was in charge of the plantation during the year, and conducted his work with his usual assiduity and energy. Mr. Pantling, the senior assistant, also did excellent work, and during Mr. Gammie's absence on three months' privilege leave, he officiated for Mr Gammie. The junior assistants, Messrs. Crofton, Parkes and Kennedy, also worked well.

12. The usual returns (five in number) are appended.

Table showing the number and distribution of Chinchona plants in the Government Plantations, Mungpoo Division, on 1st April 1883.

—	Plantation.				Nursery.			
	Number in permanent plantation on 1st April 1882.	Uprooted during the year 1882-83.	Planted during the year 1882-83.	Number in permanent plantation on 1st April 1883.	Number of stock plants for propagation on 1st April 1883.	Number of seedlings or rooted cuttings in nursery beds for permanent plantation.	Number of rooted plant in seed or cutting beds.	Total nursery stock on 1st April 1883.
Chinchona Hybrid	237,750	20,000	32,750	250,500	10,000	20,000	20,000	50,000
,, Succirubra	2,741,085	160,085	..	2,581,000	..	10,000	60,000	70,000
,, Calisaya	547,915	43,697	140,000	644,218	3,000	100,000	80,000	183,000
,, Micrantha ..	500	..	..	500	..	..	..	..
,, Officinalis and varieties ..	25,000	..	..	25,000	..	..	..	..
,, Pahudiana ..	5,092	..	..	5,092	..	..	..	..
,, Species yielding Carthagena bark	..	..	..	..	3	..	..	3
Total ..	3,557,342	223,782	172,750	3,506,310	13,003	130,000	160,000	303,003

Table showing the number and distribution of Chinchona plants in the Government Plantations, Sittong Division, on 1st April 1883.

—	Plantation.				Nursery.			
	Number in permanent plantation on 1st April 1882.	Uprooted during the year 1882-83.	Planted during the year 1882-83.	Number in permanent plantation on 1st April 1883.	Number of stock plants for propagation on 1st April. 1883.	Number of seedlings or rooted cuttings in nursery beds for permanent plantation.	Number of rooted plants in seed or cutting beds.	Total nursery stock on 1st April 1883.
Chinchona Hybrid	53,878	..	..	53,878	..	..	..	..
,, Succirubra ..	1,132,200	..	..	1,132,200	..	..	..	..
,, Calisaya	18,780	..	..	18,780	..	31,220	..	31,220
Total ..	1,204,858	..	..	1,204,858	..	31,220	..	31,220

Account of Dry Chinchona Bark collected during Season 1882-83.

—	Root.	No. 1, Stem.	No. 2, Stem.	Branch.	Total.	Total of each species.
	LB.	LB.	LB.	LB.	LB.	
SUCCIRUBRA—						
Mungpoo, thinning	37,360	400	24,840	39,160	101,760	..
Rungbee, do.	2,320	2,260	2,320	4,760	11,660	..
Upper Rishap do.	5,120	300	5,130	3,160	13,710	..
Do. uprooting	76,680	5,440	58,330	42,350	182,720	..
Tukdo, thinning	9,970	..	5,550	8,360	23,880	..
Sittong do.	12,180	540	9,190	16,970	38,880	..
Total Succirubra ..	143,550	8,940	105,360	114,760	372,610	372,610
HYBRID—						
Mungpoo, thinning	780	..	710	760	2,250	2,250
CALISAYA—						
Mungpoo—						
Thinning (Javanica)	2,800	..	2,200	3,200	8,200	..
Do. (Ledgeriana)	5,300	..	3,700	3,300	12,300	..
Labdah—						
Thinning (Ledgeriana)	530	..	270	820	1,620	..
Total Calisaya ..	8,630	..	6,170	7,320	22,120	22,120
TOTAL OF ALL SORTS ..	152,960	8,940	112,240	122,840	396,980	396,980

Stock of Bark on 1st April 1883.

	lb.
Succirubra bark	117,810
Calisaya ,, ...	36,271
Officinalis ,, ...	3,900
Micrantha ,, ...	3,977
Pahudiana ,, ...	600
Hybrid ,, ...	2,250
Total ...	164,808

Table showing the produce of the Government Chinchona Plantations in British Sikkim since their beginning.

Mungpoo Division.

Dry bark collected by pruning and thinning during						1869-70	...	2,400
Do.	do.		do.			1870-71	...	12,500
Do.	do.		do.			1871-72	...	39,000
Do.	do.		do.			1872-73	...	Nil
Do.	do.		do.			1873-74	...	16,000
Do.	do.		do.			1874-75	...	39,405
Crop of 1875-76	...	...	...	...	...	...	...	211,931
,, of 1876-77	...	...	...	...	...	...	...	207,781
,, of 1877-78	...	...	...	...	...	...	...	344,225
,, of 1878-79	...	...	...	...	...	...	...	261,659
,, of 1879-80	...	...	...	...	...	...	...	345,740
,, of 1880-81	...	...	...	...	...	...	...	348,560
,, of 1881-82	...	...	...	...	...	...	...	298,780
,, of 1882-83	...	...	...	...	...	...	...	358,100
						Total	...	2,486,081

Sittong Division.

Dry bark collected by pruning and thinning during						1879-80	...	15,850
Do.	do.		do.			1880-81	...	28,965
Do.	do.		do.			1881-82	...	42,790
Do.	do.		do.			1882-83	...	38,880
						Total	...	126,485

(Signed) GEORGE KING, M.B., Surgeon-Major,
Superintendent, Royal Botanic Garden,
Calcutta.

ORDER—dated 28th August 1883, No. 1051, Revenue.

Miscellaneous.

Communicated to the Board of Revenue, the Director of Agriculture, the Surgeon-General with the Government of Madras, and the Director of Government Chinchona Plantations, Parks and Gardens, Nilgiris.

2. The Carthagena variety has done far better on the Nilgiris than in Bengal. The Government would be glad to learn how the plants and cuttings made over to the Head Overseer, Dodabetta Plantation, in November 1881, have progressed since that date, and what is the present condition of the trees at Coonoor and Kalhatti.

3. The information afforded by Dr. King's report, as to the results of the shaving process, will be of interest to the various Planters' Associations, to which, and to the Editors' Table, this order will accordingly be communicated.

(True Extract.)

(Signed) H. E. STOKES,
Ag. Secretary to Government.

To the Board of Revenue.
" Director of Revenue Settlement and Agriculture.
" Surgeon-General with the Government of Madras.
" Director of Government Chinchona Plantations, Parks and Gardens, Nilgiris.
" Superintendent, Government Central Museum.
" Honorary Secretary, Agri-Horticultural Society.
" " " Nilgiri Planters' Association.
" " " Wynaad " "
" " " Yercaud " "
" Editors' Table.

Exd. W. H. French.

100 Copies.

Govt. of {1883} Madras

REVENUE.

Issued

Recd. *Encl.*

G.O., 28th August 1883, No. 1051.

AUGUST.

Government Chinchona Plantations.

Bengal Annual Report of — for 1882-83, communicated to certain authorities and Planting Associations, with remarks.

FINANCIAL DEPARTMENT.

AGRICULTURE.

CALCUTTA, THE 10TH JULY 1883.

RESOLUTION.

READ—

The Annual Report of the Government Cinchona Plantation in Bengal for the year 1882-83, and the Annual Report of the Quinologist for the same year.

The result of the planting operations of the year shows a decrease of about 50,000 cinchona trees on the returns of 1881-82. This is due to the uprooting of a large number of the *Calisaya* and hybrid varieties which were found to possess bark of poor quality. Some 160,000 red bark trees were also uprooted in the ordinary rotation, and were replaced by the yellow bark and hybrid varieties. Nearly all the land within the existing cinchona reserve suitable for the cultivation has now been planted out, and the Superintendent accordingly applied, in October last, for permission to plant out with *Ledgeriana* and the hybrid variety a tract of land in the trans-Teesta portion of Darjeeling which had been reserved for Government cinchona cultivation. Both these species have been proved by repeated analyses to be very rich in quinine, while most of the yellow bark or quinine-yielding trees on the existing plantations at Mungpoo are quite young, and the whole stock is not sufficient to furnish, even when mature, enough bark to employ the factory profitably for more than a few weeks in the year. There is in fact no plantation of these trees actually in existence, while the nurseries have a magnificent stock of nearly half a million plants of the best sorts of yellow bark trees which would be lost unless the seedlings were speedily planted out. The proposal for forming the new plantation was readily approved by Government, and measures have since been taken for planting out the reserve with a number of the best kinds of *Ledgeriana* and hybrid cinchonas.

2. In the Resolution recorded upon the proceedings of last year, it was remarked that there were several distinct forms of the hybrid variety, and analyses were given of the samples of bark of four of these forms. During the year under review the Superintendent had analyses made of four more of these forms, and the results obtained from all the eight hybrids are compared in the following table:—

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.
Crystallised sulphate of quinine	2·87	1·48	1·88	0·97	2·12	2·04	6·12	3·99
,, ,, of cinchonidine	2·94	2·85	2·93	1·04	2·84	2·26	2·46	3·33
,, ,, of quinidine	traces.	traces.	traces.	traces.	traces.	traces.	traces.	traces.
Cinchonine (alkaloid)	0·72	0·57	0·52	0·80	0·33	0·68	0·55	0·57

Dr. King points out that hybrid No. 4 is very poor in quinine, and it was the trees of this sort that were uprooted during the year. No. 7 appears to be exceptionally rich in quinine, and the plantations of this variety might with advantage be extended.

The total number of cinchona trees of all sorts at the close of the year was 4,711,168, namely red (*Cinchona Succirubra*) 3,713,200, yellow (*Calisaya Ledgeriana*) 662,998, hybrid unnamed variety 304,378, and other kinds 30,592.

3. It is satisfactory to observe that the crop of the year is the largest that has yet been harvested on the plantations. It amounted to 396,980 pounds of dry bark, of which 372,610 pounds were of *Succirubra*, 22,120 pounds of *Calisaya* and *Ledgeriana*, and 2,250 pounds of hybrid bark. By far the largest portion of the produce was made over to the factory for conversion into cinchona febrifuge, while about 41,800 pounds of yellow and red barks

were sent at the request of the Secretary of State to London to be there converted into various forms of febrifuge and returned to this country for trial by the Medical Department.

4. The expenditure on the plantations amounted to Rs. 80,739-6-2 against the budget allotment of Rs. 82,225. Of this expenditure Rs. 17,548-3-9 was incurred on the newly opened trans-Teesta plantation, and on the young plantation at Sittong. This sum is chargeable to capital account. The balance, amounting to Rs. 63,191-2-5, which was spent on the old plantation, and includes charges on account of packing and carriage of bark sent to England, is chargeable as working expenses.

5. It is disappointing to notice the continued failure of *Carthagina* bark, notwithstanding that the utmost care has been taken of the plants and every endeavour made to grow them at various elevations and with various exposures. Only three plants were alive at the close of the year. An attempt has been made by the Superintendent to introduce the *Remija* plant, which is a genus botanically allied to cinchona. It is said to be less particular than cinchona as to soil and climate, and produces a quinine-yielding bark under the name of *Cuprea*. This bark forms a very large proportion of the quantity of quinine bark imported into Europe. Although the first attempt to grow the plant in the Mungpoo plantations has not been quite successful, Dr. King entertains hopes of successfully acclimatizing it, when he is able to procure a more adequate supply of seed. The Lieutenant-Governor will await the result of the experiment with much interest. The surplus seed of the *Calisaya Ledgeriana* was as usual distributed during the year gratuitously amongst applicants.

6. Dr. King has eventually succeeded in obtaining an analysis of the bark renewed on *Succirubra* trees that had their original bark removed by the shaving process introduced by Mr. Moens, the distinguished Director of Cinchona Cultivation to the Dutch Government. It appears that this process consists in shaving off the greater part of the bark of a living tree to the height of from eight to ten feet from the ground, care being taken to leave everywhere a sufficiently thick layer of bark to cover the wood. This method has had a fair trial on the Sikkim plantations, and the result has, beyond doubt, been favourable, as the bark renews perfectly. What, however, remained to be seen was whether the renewed bark was as rich in medicinal alkaloids as the original. It was with the object of determining this question that the analysis above referred to was undertaken during the year. The results are thus described by Dr. King: "The bark renewed rather slowly, but the analysis shows that it is very rich both in quinine and cinchonidine; and there can be no doubt that in countries where red bark trees are perfectly at home, and where their continuance in good health and vigour for a long series of years can be absolutely counted on, this shaving process must be a very excellent one."

7. An interesting feature in the operations of the year is the low cost at which the febrifuge was turned out. The price of the febrifuge necessarily fluctuates from year to year, but in no former year has it been so low as Rs. 8-8 a pound. This satisfactory result is attributed chiefly to the larger percentage of the alkaloids (2·73) extracted from the bark used in manufacture. The issues, however, fell below those of 1881-82, though they were a little in advance of those for 1880-81. The following table compares the distribution in the past three years:—

	1880-81.	1881-82.	1882-83.
	lb. oz.	lb. oz.	lb. oz.
To Medical Depôt, Calcutta ...	... 3,000 0	3,386 0	2,000 0
Ditto, Bombay ...	... 2,000 0	1,000 0	1,000 0
Ditto, Madras ...	... 500 0	800 0	350 0
To Colonial Government, Mauritius ...	.....	.....	150 0
To Surgeon-General for District Medical Officers of Bengal ...	.....	995 4	803 12
To Inspector-General of Jails for jails and lock-ups, Bengal ...	.....	11 12	26 12
Sold to the public	... 3,150 11	4,680 0	4,560 12
Given as samples	... 3 2	2 9	10 0
Total	... 8,653 13	10,878 9	8,901 4

The issues to the public were 120 pounds below those of 1881-82, and not in excess of that year as stated in the Superintendent's report. The stock of

febrifuge in hand on 31st March 1883 amounted to 2,962¼ pounds, which, though greater than that with which the year opened, is by no means too large a reserve to meet emergencies.

8. The revenue derived from the sale of the febrifuge, seed, plants, and bark amounted to Rs. 1,52,807-1-0—

	Rs	A.	P.
By sale of febrifuge, seed, plants, and bark to the public ...	80,577	9	0
By credits from the Medical Depôt of Calcutta ...	33,766	0	0
Ditto ditto ditto of Bombay ...	16,500	0	0
Ditto ditto ditto of Madras ...	5,775	0	0
Ditto from Colonial Government of Mauritius ...	2,475	0	0
Ditto from the Surgeon-General, Bengal ...	13,271	8	0
Ditto from the Inspector-General, Jails ...	442	0	0
Total ...	1,52,807	1	0

The operations of the year resulted in a profit of Rs. 66,284-9-5, which is equal to a dividend of 6½ per cent on the capital outlay. This is exclusive of the cost of a considerable quantity of the bark sent to the Secretary of State which has not been taken into account. It must, moreover, be borne in mind that these profits do not represent the whole of the gain of the year. The cost of an equal quantity of quinine at Rs. 96 per pound would have been Rs. 4,01,328. The cost of the febrifuge used was Rs. 68,988-8. There was thus a saving of Rs. 3,32,340. The total saving effected since the opening of the factory by the substitution of the febrifuge for sulphate of quinine amounts to Rs. 23½ lakhs, which is more than twice the amount of the cost of the plantations.

9. Considerable attention was given during the year to the improvement of the process of manufacture. The present system is admittedly wasteful, in that it fails to convert into febrifuge the whole of the alkaloids which the bark contains, while there is no doubt that, by the adoption of a different and more costly process of manufacture, a still larger percentage of the medicinal alkaloids could be extracted. It is not, however, equally certain whether the febrifuge so obtained could be turned out at a less cost per pound. The whole subject of the course to be adopted in the disposal of the raw produce of the plantations is still under the consideration of Government.

10. The thanks of the Lieutenant-Governor are again due to Dr. King, whose management of his department leaves nothing to be desired. Dr. King has reported very favourably of the services of Mr. Gammie, and the Lieutenant-Governor entirely concurs in the praise accorded to him. The other assistants of the Department are also well spoken of.

ORDER—Ordered that a copy of this Resolution, and of the Reports referred to, be submitted to the Government of India, Revenue and Agricultural Department, and that a copy of the Resolution be forwarded to the Superintendent of the Cinchona Plantation for information.

Ordered further that a copy of this Resolution, and of the Reports, be forwarded to the Medical Department of this Government, and also to the Government of Madras, and to the Surgeon-General, Bengal, for information.

By order of the Lieutenant-Governor of Bengal,

COLMAN MACAULAY,

Secretary to the Govt. of Bengal.

No. 117.

COPY, with copies of the Reports, forwarded to the Government of Madras for information.

By order of the Lieutenant-Governor of Bengal,

Offg. Under-Secretary to the Govt. of Bengal.

CALCUTTA,
The 10th July 1883.

C. E. C.—Reg. No. 4008C—394—14-7-83.

Go / ecl^e 1051/928.8.83.

Communicated to the Board of Revenue, the Director of Agriculture, the Surgeon General with the Govt. of Madras and the Secretary of Govt. Chinchona Plantations, Paiker's Lawn, Nilgiris.

2. The Carthagena variety has done far better on the Nilgiris than in Bengal. The Govt. would be glad to learn how the plants & cuttings made over to the Head overseer, Dodabetta Plant^n in Nov^r 1881 have progressed since that date & what is the present condition of the trees at Coonoor & Kachatti.

3. The information afforded by Dr. King's report as to the results of the shaving process will be of interest to the various Planters' associations, to which & to the editors' Table this order will accordingly be communicated. LS

14/viii/83.

Mr.

You should see how the Director wishes it on his visit to Plantations with Mr Trimen & his first impressions written out & submitted when

Rob

It is submitted a separate report on the Carthagena introduced at great expense by Govt. would be useful for record information & publication. The Bengal

REVENUE (1883) DEPARTMENT.

No. 4693

From the Govt. of Bengal

Date. 10th July.

Rec^d 16 Aug. 83.

No. 111.

Ans: 2

SUBJECT.

Forwarding for information a copy of their Resolution on the annual Reports of Govt. Chin. Plantations in Bengal & of the Quinological Report for the year 1882-83.

16-8-83. Wilkinson order