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MADRAS RECORD OFFICE.

Government of Madras.

Revenue **DEPARTMENT.**

G.O. No. 1359 Press ~~Mis.~~

Dated 4-12-1882.

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GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—the following Resolution of the Government of Bengal, in the Financial Department, (Agriculture), dated Darjeeling, 28th October 1882 :—

Read—

The Annual Report of the Government Chinchona Plantation in Bengal for the year 1881-82 and the Annual Report of the Quinologist for 1881-82.

Resolution—

Considerable progress was made during the year in the propagation and planting out of two quinine-yielding trees, the *Chinchona Ledgeriana* and the unnamed hybrid variety. Of the former species 154,000 and of the latter 91,730 trees were planted out. The *Chinchona Ledgeriana*, though it apparently deserves to be ranked as a distinct species, is still entered in the returns appended to the present Report as a variety of *Calisaya*. Observation of the hybrid plants has shown that there are six distinct forms amongst them. Samples of bark of four of these forms from very young plants have been analysed by Mr. Wood, late Quinologist to the Plantation, with the following results :—

	No. 1.	No. 2.	No. 3.	No. 4.
Crystallised sulphate of quinine ...	2·87	1·48	1·88	0·97
Do. do. of cinchonidine ...	2·94	2·85	2·93	1·94
Do. do. of quinidine ...	traces.	traces.	traces.	traces.
Cinchona (alkaloid)	0·72	0·57	0·52	0·80

Evidently Nos. 1, 2 and 3 promise to be valuable quinine barks. The total number of quinine bark trees in the two plantations of Mungpoo and Sittong was, at the close of the year, 858,323, namely, *Calisaya* (including *Ledgeriana*) 566,695 and hybrids 291,628. There was no addition to the stock plantation of *Succirubra* trees, and 161,250 trees of this variety were uprooted for the sake of their bark. There are still 3,873,285 red bark trees on the two plantations, and they are considered sufficient to meet all present demand for febrifuge. There has hitherto been no success in the propagation of the commercial Carthagena bark. There are only 30 plants remaining in the plantations. Efforts will, however, be made to increase the stock, and to give it a further trial at various elevations.

2. The entire produce of the plantations for the year was 341,570lb of dry bark. Of this, 4,935lb obtained by thinning the trees at Mungpoo and Labdap, were yellow bark, the remainder was red bark. The whole of the crop, except a quantity of yellow bark which was unfitted for the manufacture of febrifuge and was sent to London for sale, was made over to the Febrifuge Factory for disposal. The proceeds of this consignment to London were small, as the bark reached London during a depressed state of the market.

3. The Lieutenant-Governor is glad to learn that the surplus seed of the *Cinchona Ledgeriana* was distributed gratuitously to applicants for it, and he desires that this practice may be followed to the utmost extent consistent with the needs of the plantations. The success of the neighbouring cinchona plantation of the Poomung Company has created a considerable demand in the Darjeeling district for young plants, and a sum of Rs. 1,746-6-5 was realized by the sale of seedlings during last year.

4. Mr. Moens, the distinguished Director of Chinchona Cultivation to the Dutch Government, visited the plantation in December 1880. His method of removing the bark crop by shaving is still under trial. The trees thus operated on

appear healthy enough, but the renewed bark is not yet fit for analysis. The Dutch method of grafting *Ledgeriana* on *Succirubra* stocks has not been attended with success, and propagation by seed will accordingly be adhered to.

5. The total expenditure on the plantations amounted to Rs. 78,495-1-9 against the budget allotment of Rs. 79,085. Of this, Rs. 10,277-5-5 represented the capital expenditure on the new plantation at Sittong, and the balance, the working expenses of the old plantations, including the charges incurred on account of the bark sent to England for sale.

6. It is explained that the reduced outturn was due to the existence of a large stock in hand concurrently with slackness of the demand in the early part of the year. Towards the end of the season the demand rapidly increased, and the total quantity disposed of rose to 10,876lb against 8,651lb in the previous year. The result was a reduction in the reserve stock to 1,502lb. This is obviously too low, and accordingly the increased weekly outturn will be maintained during the current year. The Medical Depôt of Bombay took 1,000lb less than in the previous year, but the supplies to other depôts, and especially the sale to the public, have considerably increased. The figures for the two years are—

	1880-81. lb	oz.	1881-82. lb	oz.
To Medical Depôt, Calcutta	3,000	0	3,386	0
Do. Bombay	2,000	0	1,000	0
Do. Madras	500	0	800	0
To Surgeon-General for District Medical Officers of Bengal	.....		995	4
To Inspector-General of Jails for jails and lock-ups, Bengal	.....		14	12
Sold to the public	3,150	11	4,680	0
Given as samples	3	2	2	9
Total ...	8,653	13	10,878	9

The sales to the public exceeded by 1,529lb 5oz—a circumstance which has proved beyond all doubt that the drug is rapidly advancing in the estimation of the public.

7. The cost of manufacture during the year, including the cost of the bark, was Rs. 88,957-6-5, or Rs. 11-1-8·3 per pound, being Rs. 1-13-9·675 more than the average cost per pound in 1880-81. The increased cost in 1881-82 is due—

(1) to an expenditure of Rs. 6,792 for casks, steam and other apparatus having been treated as working expenses of the year, instead of being treated as capital charges of the factory; and

(2) to a smaller outturn of febrifuge in consequence of a larger proportion of branch bark than usual having been used in the manufacture.

8. The revenue derived from the sale of the febrifuge and seed and plants, and the sale of bark in London, amounted to Rs. 2,72,213-14-8, as shown below :—

	Rs.	A.	P.
By sale of febrifuge, seed, and plants to the public ...	81,612	12	2
By credits from the Medical Depôt of Calcutta	55,918	0	0
Do. do. do. of Bombay	16,500	0	0
Do. do. do. of Madras	13,200	0	0
By credit from the Surgeon-General, Bengal	16,330	8	0
Do. Inspector-General, Jails	244	0	0
By sale of bark in London	88,408	10	6
Total ...	2,72,213	14	8

9. The net results of the year's working, after allowance made for the reduction in the stock in hand, was thus a profit of Rs. 1,30,338-0-9, *i.e.*, equal to a dividend on the capital of the concern of 13 per cent. It is necessary to recollect, however, that this includes Rs. 59,824, the sale proceeds of 44,600lb of yellow bark sold in London in 1880-31. But this does not represent the whole

of the actual gain for the year. The amount of febrifuge used in substitution of quinine in Government hospitals and dispensaries during the past year was 6,196lb. On a calculation of the average price of quinine in Calcutta at Rs. 74 per pound, the saving effected by this substitution during the year has been very nearly 3½ lakhs of rupees. The total saving, since the factory commenced working, aggregates 20 lakhs of rupees, which is about twice the amount of the capital expended on the plantation since its commencement.

10. In May 1881 a sum of Rs. 4,000 was sanctioned for the purpose of procuring an apparatus for conducting on a larger scale the experiments on which Mr. Gammie has been engaged in manufacturing quinine and ordinary and crystalline febrifuge at Mungpoo. The apparatus, however, could not be got into working order until December, and, owing to the pressure for the production of ordinary febrifuge and other difficulties, Mr. Gammie was not able to complete his experiments during the year. It has since been reported that the attempt has not been successful. A large proportion of alkaloid is extracted, but the excess is lost in the course of precipitation.

11. The whole subject of the course to be adopted in the disposal of the raw produce of the plantations is now before the Government of India, and the Lieutenant-Governor has delayed his review of these reports in order to submit it simultaneously with his view on the general question. It appears to him that the object of providing a cheap febrifuge for the people with the minimum of interference with private enterprise can best be attained by manufacturing the red bark into mixed alkaloids in India, and he has suggested the measures that should be taken to ascertain the most efficient process, and to put it in practice. He is of opinion that measures should be simultaneously taken to introduce the manufacture of sulphate of quinine from the yellow bark in India, so that the cost of freight and the other expenses incidental to manufacture in England may be saved, while the industrial resources of this country are developed. The practice of sending the bark to England for sale involves interference with the operations of private growers of the bark. He has, therefore, proposed that Government should offer to dispose of its yellow bark plantations at a valuation to any private person or firm who will undertake to establish and maintain a manufactory for sulphate of quinine in Bengal.

12. The thanks of the Lieutenant-Governor are due to Dr. King for his very efficient management of this department during the year. The factory has been under Mr. Gammie's charge, and his good services have again been brought to the notice of Government and are cordially recognized by the Lieutenant-Governor.

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.

No. 2299 T—F.

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

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

DARJEELING,
28th October 1882.

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

ENCLOSURES.

ANNUAL REPORT ON THE GOVERNMENT CHINCHONA PLANTATIONS FOR THE YEAR 1881-82.

Letter from GEORGE KING, Esq., M.B., Superintendent, Royal Botanic Gardens, Calcutta, and in charge of Chinchona Cultivation in Bengal, to the Secretary to the Government of Bengal, Financial Department, dated Royal Botanic Garden, Howrah, near Calcutta, the 15th May 1882, No. 43-C.

I HAVE the honor herewith to submit the annual report on the Government Chinchona Plantations in Bengal for the year ending 31st March 1882 :—

Twentieth Annual Report of the Government Cinchona 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.

As regards the Chinchona plantation, the year 1881-82 is chiefly remarkable for the progress which has been made during its course in the propagation and planting out of the Cinchona barks, which are known as *par excellence* quinine yielders. The chief of these, named in honor of the unfortunate collector who first introduced it to cultivation in Asia, is *Chinchona Ledgeriana*. This variety has until lately been included in the *melange* of forms to which the specific name *Calisaya* has been given. Mr. Moens, the distiguished Director of Chinchona Cultivation to the Dutch Government, has, however, recently made out what appears to be a very good claim for *Ledgeriana* to rank as a distinct species. It is, however, more convenient to continue for the present to enter in the returns appended to this report *Ledgeriana* as a variety of *Calisaya*, and this has accordingly been done. Of *Chinchona Ledgeriana* there have been planted out during the year 154,000 plants. These are now all strong and healthy, and if they continue to grow as they at present promise to do, a crop of quinine bark of very high quality should be yielded in a few years. Next in importance to *Ledgeriana* as an yielder of quinine, and of a robuster constitution, is the Chinchona which has hitherto been referred to in my annual reports as our "hybrid." A few plants of this appeared spontaneously in the old plantation at Rungbee many years ago among some seedlings raised from seed received from Dr. Thwaites, of the Ceylon Botanical Garden. They were soon recognised by the late Dr. Anderson, Mr. Clarke, and Mr. Gammie as different from the *officinalis* and *succirubra* trees by which they were surrounded. They also differ a good deal from each other, but as they all partake to some extent of the characters of both red and crown barks, they were put down as natural hybrids. Mr. Wood made an analysis of the barks of these in 1874, which showed them to be rich in quinine. Their propagation was therefore at once vigorously set about, and has been continued ever since. It was found that these varieties do not come true to seed, and this confirmed the opinion as to their hybrid origin. Propagation by cuttings was, therefore, resorted to, and it is by this means that the whole of the younger plants now in the plantation have been obtained. Colonel Beddome, Inspector-General of the Madras Forests, and *ex officio* Superintendent of the Madras Government Chinchona Plantations on the Nilgiris, visited Sikkim during the year, and he pronounced all our "hybrids" to belong to the species which, according to Mr. Cross, is called *Pata de Galinaso* by the bark-collectors of Chimborazo. This opinion is not adopted by the authorities at Kew, nor by Dr. Trimen, Director of Chinchona Cultivation in Ceylon. Observation of the growing plants shows that there are six distinct forms amongst these hybrids. Samples of bark of four of these forms have been analysed by Mr. Wood, late Quinologist to the plantation, and the results show that the four differ greatly (as will be seen from the following table) in the proportion of alkaloids which they yield :—

Analyses of four samples of hybrid bark from Mungpoo.

——	No. 1.	No. 2.	No. 3.	No. 4.
Crystallised sulphate of quinine	2·87	1·48	1·88	0·97
,, ,, of chinchonidine ...	2·94	2·85	2·03	1·94
,, ,, of quinidine	traces.	traces.	traces.	traces.
Chinchonine (alkaloid)	0·72	0·57	0·52	0·80

The samples analysed were taken from very young plants in the bark of which the alkaloids had not attained their full development. But the figures give promise that, when mature, the forms numbered 1, 2, 3 will be valuable quinine barks. Number 4, on the other hand, is

capital, the other to working expenses. The capital charges are those incurred on the young Sittong plantation which has not yet come into bearing, and of which the accounts are kept distinct. The working charges include all the money spent on the upkeep and extension of the evidently a bark closely allied to *succirubra*, and, as a source of quinine, is not worth cultivating. Samples of the bark of the remaining two forms have been sent for analysis, but the results have not yet been received. The chemical evidence afforded by the analysis just quoted goes to support the view, which has, from the first, obtained on the Sikkim Plantation, as to these new and unnamed varieties being natural hybrids. They continue, therefore, to appear under this designation in the present report. During the past year 91,730 plants of these have been permanently planted out. The number of quinine bark trees on the plantation now amounts to 858,323—namely, *Calisaya* (including *Ledgeriana*) 566,695, and hybrids 291,628. I hope during the year now entered on to bring the total number up to one million at least. To the red bark (*succirubra*) plantation no additions were made during the year; on the contrary 161,250 trees were uprooted for the sake of their bark. The number of red barks on the two plantations of Mungpoo and Sittong now stands at 3,873,285, and these at present appear to be sufficient to meet the demand for Chinchona febrifuge. The total number of Chinchona trees of all sorts contained in the plantations is shown in the following table :—

——	Red. (*C. Succirubra.*)	Yellow. (*C. Ledgeriana.*)	Hybrid unnamed variety.	Other kinds.
Mungpoo Division	2,741,085	547,915	237,750	30,622
Sittong Division	1,132,200	18,780	53,878	...
Total ...	3,873,285	566,695	291,628	30,622

Grand total of all kinds on both plantations ...	Mungpoo	3,557,372
	Sittong	1,204,858
	Total ...	4,762,230

Some years ago the species yielding the Carthagena bark of commerce was introduced from Kew and for some time it seemed to promise well. That promise has, however, been miserably belied, and we have yet only 30 plants of this sort. This Carthagena species suffers dreadfully from insect blights, and to this its bad success hitherto is entirely due. The propagation of this species has not, however, been discontinued, and I trust Mr. Gammie may before long be able to raise a sufficient stock to enable us to give it a further trial at various elevations in the permanent plantation.

2. *Details of the year's crop.*—The total quantity of dry bark of all kinds collected on the plantation during the year is 341,570 pounds. Of this 42,790 pounds were taken from the young plantation of Sittong, the remainder being yielded by the old plantation. As usual, the bulk of the crop is red bark, yellow being represented by only 4,935 pounds obtained by thinning the trees at Mungpoo and Labdah. The whole of the crop was made over to the febrifuge factory for disposal. A quantity of yellow bark unfitted for the manufacture of febrifuge was, with the sanction of Government, sent to London for sale in the open market, that being the simplest way of disposing of it. This bark was of rather poor quality. It happened, moreover, to reach London during a depressed state of the bark market. The price realised for it was therefore low, being little more than one rupee per pound. The proceeds of a consignment of 44,600 pounds of similar bark sent to London during the end of the year 1880-81 fall to be accounted for during the year under review. The amounts thus realised appear, as in previous years, in the Quinologist's report, where the financial aspect of the whole Chinchona enterprise is, as usual, dealt with.

3. *Expenditure for the year.*—The budget estimate and allotment for the year was Rs. 79,085, but on this there was a small saving, the expenditure for the year having amounted to only Rs. 78,495-1-9. The expenditure divides itself into two parts; one being chargeable to old plantation and the harvesting of the bark crop. They also include the expenditure on the bark sent to England for sale. The actual figures are as follow :—

	RS. A. P.	RS. A. P.	RS. A. P.
Total expenditnre for the year 1881-82 ...	.....	.....	78,495 1 9

			Capital expenditure.				
		RS.	A.	P.	RS.	A.	P.
Expenditure on Sittong plantation		7,661	4	6			
Proportion of European, Native, and Office Establishment ...		2,616	0	11			
					10,277	5	5
			Working expenses.				
Upkeep and working of Rungbee, Rishap, and Mungpoo		39,528	3	2			
Proportion of European, Native, and Office establishment		13,497	7	9			
					53,025	10	11
Expenses on bark sent to London for sale ...		11,325	0	0			
Proportion of European, Native, and Office Establishment ...		3,867	1	5			
					15,192	1	5
							78,495	1	9

Against the working expenses there has to be set the bark crop, the whole of which was made over to the factory and is accounted for in the Quinologist's report. The bark yielded by the old plantation during the past year cost, as near as may be, 2 annas 10·075 pies per pound. For convenience of account, the bark yielded by the Sittong plantation (42,790 pounds) was made over to the factory at the same rate; the value of it has, however, been credited in the Sittong accounts. Another year should, I think, see the Sittong plantation self-supporting.

4. *Distribution of plants and seeds.*—A very large demand exists for the seed of *Chinchona Ledgeriana*, and, after supplying the wants of the plantation itself, the whole of the surplus crop of seed of this species was distributed gratuitously amongst the various applicants whose names were entered in our register. The quantity given to each recipient was necessarily very small, the yield of seed last year having been a poor one. The success of the neighbouring Chinchona plantation of the Poomong Company has created a considerable demand in the Darjeeling district for young plants of Chinchona, and the sum of Rs. 1,746-6-5, realised by the sale of seedlings, was paid into the Darjeeling Treasury during the year.

5. *Land-rent.*—The Rents raised from settlers within the Chinchona reserve amounted during the year to Rs. 1,685-8-0. This sum was paid into the Darjeeling Treasury as land rent, and does not appear amongst the plantation receipts.

6. *Estimated crop of* 1882-83.—During the current year I propose, as heretofore, to allow the demand for febrifuge to regulate the amount of bark that is to be harvested. Probably from 300,000 to 350,000 pounds will be wanted, and that amount can easily be supplied.

7. Mr. Moen's method of removing the bark crop by shaving is still under trial. The trees thus operated on appear healthy enough, but the renewed bark is still hardly fit for analysis; I hope, however, it may soon be so. The Dutch method of grafting *Ledgeriana* on *succirubra* stocks has not hitherto answered well on the plantation. Mr. Gammie is strongly of opinion that, for Sikkim, propagation by seedlings is more to be relied on; and it certainly is cheaper. As *Ledgeriana* seed is now obtainable of fair quality, it seems on the whole advisable to adhere to propagation by seed.

8. In my last report I inadvertently omitted to refer to the visit paid to the plantation during December 1880 by Mr. Moens, the distinguished Director of Cinchona Cultivation to the Dutch Government. Mr. Moens stayed some days at Mungpoo and went over a large part of the cultivation. It was a great advantage to be able to discuss with Mr. Moens many points regarding both the plantation and factory. Mr. Moens' visit to Mungpoo was one of the fortunate results of my own visit to the Dutch plantations during the previous year.

9. In order to supply fuel and building timber for the factory, a beginning was made during the year in planting out the bare land unsuitable for Chinchona above Mungpoo. This was done partly by sowing seed *in situ*, and partly by transplanting from nurseries. About 50 acres have already been put out, and arrangements have been made for extending this highly necessary work during the current year.

10. Mr. Gammie was in charge of the plantation during the year, and to him my best acknowledgments are due for his continued excellent service. Mr. Gammie's First Assistant,

Mr. J. L. Lister, resigned the service of Government at the end of the year, and in him Government lost a trustworthy and zealous officer. Mr. Lister's place has been taken by Mr. Pantling who, as Curator of the Botanical Garden, had established a high reputation for vigour and efficiency. The junior Assistants, Messrs. Crofton, Parkes and Kennedy, have worked well during the year.

11. The usual annual returns are appended.

Table showing the number and distribution of Chinchona plants in the Government plantations, Mungpoo Division, on the 1st April 1882.

	Plantation.				Nursery.			
	Number in permanent plantation on 1st April 1881.	Uprooted during the year 1881-82.	Planted during the year 1881-82.	Number in permanent plantation on 1st April 1882.	Number of stock plants for propagation on 1st April 1882.	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 1882.
Cinchona Hybrid	146,020	..	91,730	237,750	10,000	40,000	40,000	90,000
,, Succirubra	2,902,335	161,250	..	2,741,085	..	..	80,000	286,000
,, Calisaya	393,915	..	154,000	547,915	6,000	200,000	..	..
,, Micrantha	500	..	..	500	..	..	..	..
,, Officinalis and varieties.	25,000	..	..	25,000	..	..	..	..
,, Pahudiana	5,092	..	..	5,092	..	..	..	..
,, Species yielding Carthagena bark	..	..	..	..	30	..	..	30
Total ..	3,472,862	161,250	245,730	3,557,342	16,030	240,000	120,000	376,030

Table showing the number and distribution of Chinchona plants in the Government plantations, Sittong Division, on the 1st April 1882.

	Number in permanent plantation on 1st April 1881.	Uprooted during the year 1881-82.	Planted during the year 1881-82.	Number in permanent plantation on 1st April 1882.
Cinchona Hybrid	53,878	....	....	53,878
,, Succirubra	1,132,200	....	....	1,132,200
,, Calisaya	18,780	....	....	18,780
Total ..	1,204,858	....	....	1,204,858

Account of Dry Chinchona Bark collected during Season 1881-82.

		lb	lb	lb
Succirubra—				
Rungbee—				
Thinning ...	...	17,240		
Sittong—				
Thinning ...	...	42,790		
Mungpoo—				
Thinning ...	...	38,005		
Rishap—				
Uprooting ...	...	170,400		
Tukdo—				
Uprooting ...	...	68,200		
Total Succirubra	...	.....	336,635	
Calisaya—				
Mungpoo—				
Thinning ...	...	4,175		
Labdah—				
Thinning ...	...	760		
Total Calisaya	...	.....	4,935	
GRAND TOTAL	...	.....	.....	341,570

Stock of Bark on 1st April 1882.

		lb
Succirubra bark	...	148,160
Calisaya ,,	...	41,951
Officinalis ,,	...	3,900
Micrantha ,,	...	3,977
Pahudiana ,,	...	600
Total	...	198,888

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

MUNGPOO DIVISION.

	lb.
Dry bark collected by pruning and thinning during 1869-70...	2,400
Do. do. do. 1870-71...	12,500
Do. do. do. 1871-72...	30,000
Do. do. do. 1872-73 ..	Nil
Do. do do. 1873-74 ..	16,000
Do. do. do. 1874-75 ..	30,405
Crop of 1875-76	211,031
,, 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
Total ...	2,127,981

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
Total. ...	87,605

GEORGE KING, M.B., *Surgeon-Major,*
Superintendent, Royal Botanic Garden,
Calcutta.

QUINOLOGIST'S REPORT FOR 1881-82.

LETTER from SURGEON-MAJOR GEORGE KING, Esq., M.B., Superintendent, Royal Botanic Garden, Calcutta, and of Chinchona Cultivation in Bengal, and Offg. Govt. Quinologist, to the Secretary to the Government of Bengal, Financial Department, Calcutta, dated Royal Botanic Garden, Howrah, near Calcutta, the 15th May 1882, No. 11.

I HAVE the honour herewith to submit the annual report of the Quinologist for the year ending 31st March 1882.

Quinologist's Report for 1881-82.

THE factory operations during the past, as in former years, were carried on at Mungpoo under the immediate surpervision of Mr. Gammie. The net result was an out-turn of 8,010 pounds of febrifuge, which was not only all disposed of, but in order to meet the demand a heavy inroad had to be made on the reserved stock on hand at the beginning of the year.

2. The details of the expenditure are given in the following table, at the bottom of which are included two items for the bark used in the factory, which, according to the arrangement of treating the plantation and factory as one enterprise, is charged at cost price.

	Rs.	A.	P.
Paid for muriatic acid, 31,603½lb.	5,925	10	6
,, sulphuric acid, 2,608lb.	326	0	0
,, packages for do.	395	4	0
,, carriage of do.	2,415	10	6
,, ,, of empty jars	1,166	5	9

				RS.	A.	P.
Paid for storage of soda	...	...	...	98	0	0
,, charcoal ...	...	...	...	281	4	0
,, casks and other plant	...	...	...	2,072	11	9
,, carriage of do.	...	...	...	402	3	3
,, sundry expenditure	...	...	...	1,182	10	6
,, labour in factory	...	...	...	3,384	14	6
,, Quinologist ...	...	...	...	2,400	0	0
,, carriage of febrifuge	...	...	...	759	0	4
,, tins for do.	...	...	...	555	0	0
,, advertisement charge	...	..	...	1,038	5	0
,, labour in packing, &c.	...	...	...	797	13	0
,, manufactory apparatus, including carriage, &c.	...			4,720	1	4
Charged by the Marine Department	...	...		141	8	0
Total	...			28,062	6	5

	RS.	A.	P.			
Cost of bark, 159,825lb. (crop of 1880-81), at 2 annas 9·2053 pies per pound ...	27,640	13	1			
Cost of bark, 187,375lb. (crop of 1881-82), at 2 annas 10·075 pies per pound ...	33,254	2	11			
				60,895	0	0
				88,957	6	5
By febrifuge produced, 8,010lb, @ Rs 11-1-8·3 per pound				88,957	6	5

3. The net cost of each pound of febrifuge is thus shown to be Rs. 11-1-8·3, which is a good deal above the cost of last year's outturn. There are three reasons for this increased cost :—

1st.—Items amounting to Rs. 6,792, expended for casks, steam and other apparatus, have been treated as part of the ordinary working expenditure, while they might, fairly enough, have been treated as capital charges. But the factory has no capital account, and I am unwilling to open one merely for the sake of improving the appearance of the results of the working of one year.

2nd.—While the factory establishment necessarily remained pretty much the same as last year, the outturn of manufactured product was less.

3rd.—Owing to a larger proportion of branch bark than usual having been used in the manufacture, the precentage of febrifuge yielded was slightly smaller than in the previous year.

4. The amount of febrifuge disposed of during the year exceeds that of the previous year by no less than 2,225 pounds. This increase is chiefly due to the large quantity taken by the general public, the sales to whom have risen at a bound from 3,151 pounds in 1880-81 to 4,680 pounds in the past year. The issues to Government hospitals and dispensaries exceed those of the previous year by 696 pounds, the increase being chiefly due to a very liberal expenditure in the fever-stricken district of Nuddea. The details of the distribution are shown in the following table.

	lb.	oz.
To Medical Depôt, Calcutta	3,386	0
,, Do. Bombay	1,000	0
,, Do. Madras	800	0
,, Surgeon-General for Bengal (for district medical officers of Bengal)	995	4
,, Inspector-General of Jails, Bengal, (for jails and lock-ups in Bengal)	14	12
Sold to the public	4,680	0
Given as samples, &c.	2	9
Total ...	10,878	9

5. The year was entered upon with a stock of 4,368 pounds of febrifuge in hand, and during the early part of it the demand for febrifuge was rather dull. It was therefore considered unnecessary to keep the outturn of the factory at so high a pitch as in the previous year.

But towards the end of the season the demand came with an unexpected rush and, had it not been for the large reserve carried over from 1880-81, I should have been unable to meet it, the issues for the year having exceeded the manufacture by 2,868 pounds. As will be seen by the subjoined table, the stock at the beginning of the current year is only 1,500 pounds and, as I consider this to be too low for safety, I have increased the weekly outturn of the factory from the very beginning of the current year.

Table showing the amount of febrifuge produced from the commencement to 31st March 1882, and the stock at the latter date.

	lb.	oz.
Manufactured in 1874-75 ...	48	10
,, in 1875-76 ...	1,940	6
,, in 1876-77 ...	3,750	12
,, in 1877-78 ...	5,162	0
,, in 1878-79 ...	7,007	0
,, in 1879-80 ...	9,434	13
,, in 1880-81 ...	9,296	0
,, in 1881-82 ...	8,010	0
Total ...	44,649	9

	lb.	oz.
Supplied to Medical Depôt, Calcutta	18,840	3
Supplied to Medical Depôt, Bombay	6,200	0
Supplied to Medical Depôt, Madras	1,900	0
Supplied to Straits Settlements	30	0
Supplied to Surgeon-General for Bengal (for district medical officers of Bengal) ...	995	4
Supplied to Inspector-General of Jails, Bengal (for jails and lock-ups in Bengal) ...	14	12
Sold for cash	15,073	8
Samples, &c.	95	10
Stock in hand on 31st March 1882	1,500	4
Total ...	44,649	9

6. In the plantation report I have shown that the crop of bark for the year cost at the rate of 2 annas 10·075 pies per pound and that, in conformity with the usual practice, the whole of it has been debited to the factory at that rate. The bark collected on the Sittong plantation has also, for convenience of account, been made over to the factory at the same rate. Of the total crop thus made over to the factory, part was used in manufacture, part was sent to London for sale, and the balance remains in stock. Account-sales have been received of the consignments sent to London, and (converted at the rate of 1*s.* 8*d.* per rupee) the net results are as follow :—

	Rs.	A.	P.
Proceeds of sale of 44,600 pounds of yellow cinchona bark, net £4,985 7*s.* 2*d.* at 1*s.* 8*d.* per rupee	59,824	5	0
Proceeds of sale of 27,880 pounds of yellow cinchona bark, net £2,382 0*s.* 7*d.* at 1*s.* 8*d.* per rupee	28,584	5	6
Total ...	88,408	10	6

7. The value of stock at the end of the year was, as has been explained, much less than it was at the beginning of it. This is due not only to the sale of so much of the reserve febrifuge in India, but also of a considerable quantity of yellow bark in London. The undernoted comparative statement shows the exact result :—

Stock on 31st March 1881.

	Rs.	A.	P.
Chemicals and stores	6,500	0	0
Febrifuge, 4,368 lb 13 oz. at Rs. 9-3-10·625 per lb ...	40,380	0	0
Bark, 277,802 lb over-head at 2 annas 9·2053 pies per lb ...	48,044	0	0
Total ...	94,924	0	0

Stock on 31st March 1882.

	Rs.	A.	P.
Chemicals and stores	5,000	0	0
Febrifuge, 1,500 lb 4 oz. at at Rs. 11-1-8·3 per lb ...	16,661	6	0
Bark, 198,888 lb at 2 annas 10·075 pies per lb	35,297	7	0
	56,958	13	0
Decrease in value ...	37,965	3	0
Total ...	94,924	0	0

8. The various figures above given being put together (as I have done in the following table), the net result of the year's working is seen to be an excess of revenue over expenditure of Rs. 1,30,330-0-9 :—

Dr.

	Rs.	A.	P.
To value of stock on 31st March 1881	94,924	0	0
,, value of bark yielded by the new (Sittong) plantation during 1881-82, viz. 42,790 pounds at 2 annas 10·075 pies per pound	7,594	1	9
,, cash received from treasury during 1881-82 for expenditure on old plantation ...	53,025	10	11
Spent on bark sold in London	15,192	1	5
To cash received from treasury during 1881-82 for factory..	28,062	6	5
,, stores from England ...	44	6	5
Profit on the year's working..	1,30,330	0	9
Total ...	3,29,172	11	8

Cr.

	Rs.	A.	P.	Rs.	A.	P.
By value of stock on 31 March 1882				56,958	13	0
,, cash receipts from sale of febrifuge, seeds, plants, and bark..				81,612	12	2
,, credits from medical depôts for febrifuge, viz. :—						
Calcutta ...	55,918	0	0			
Bombay ...	16,500	0	0			
Madras ...	13,200	0	0			
				85,618	0	0
,, credits from Surgeon-General, Bengal, for febrifuge supplied to district medical officers of Bengal ...	16,454	0	0			
Less amount accounted for during 1880-81..	124	0	0			
				16,330	8	0
By credit from Inspector-General of Jails, Bengal, for febrifuge supplied to jails and lock-ups in Bengal				244	0	0
,, sale of bark in London ...				88,408	10	6
Total ...				3,29,172	11	8

The profit shown in the above statement is equal to a dividend on the capital of the concern of 13 per cent., and is by far the best financial result that has yet been obtained. But this actual profit on the business of the plantation does not represent the entire pecuniary benefit that Government has derived during the year from these plantations, for the saving effected by substituting, in Government dispensaries, and hospitals, of 6,196 pounds of febrifuge for an equal quantity of quinine is very considerable. Quinine ruled much lower in price during the year under review than during 1880-81. But taking it at the low average of eight shillings per ounce in London and calculating the exchange at 1*s.* 8¼*d.* per rupee, it could not have been laid down in India under Rs. 74 per pound, while the cinchona febrifuge cost only Rs. 16-8-0 per pound. Accepting these figures, the saving for the year amounts to three and a half lakhs of rupees. This being added to the sixteen and a half lakhs saved in a similar way in former years, brings the total amount saved to Government to *twenty lakhs of rupees*, which is exactly twice the amount of the capital expended on the plantation since its commencement.

9. Owing to unavoidable delays in its transit and erection, the small steam-boiling apparatus sanctioned last year for the experimental manufacture of crystalline febrifuge and quinine was not got into working order until December. Owing to the pressure for the production of ordinary febrifuge during the concluding months of the financial year, and owing also to unexpected difficulties which have arisen in working, on a large scale, the process which Mr. Gammie had conducted so successfully on a small one, I am still unable to give a final report on the results of Mr. Gammie's steam process for manufacturing the crystalline products. Mr. Gammie asks for a few months' more delay in order that further experiments may be tried, and this I trust Government may be pleased to allow. The factory has, during the year, been under Mr. Gammie's charge, and I beg again to bring to the notice of Government the excellent manner in which he has conducted the duties connected with it. Mr. Gammie's son was appointed an assistant in the factory in the beginning of the year, and he has worked diligently and well. Baboo Gopal Chundra Dutta, the head of my Chinchona Office, has also done good work during the year.

10. As an appendix to this report, I annex a tabular statement showing the details of the cash receipts for febrifuge, bark, &c., during the year. Full credit is therein taken for all the febrifuge supplied to the Surgeon-General of Bengal, although as a matter of fact the

whose 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 1881-82.

				Rs.	A.	P.
Cash received from sale of febrifuge and paid into the Bank of Bengal and other Government treasuries ...				78,327	0	0
Cash paid into bank of Bengal, Calcutta, and into Darjeeling treasury, on account of sales of seeds, plants, and 804 pounds of bark				3,285	12	2
Credit for febrifuge supplied to medical depots, viz.—						
	Rs.	A.	P.			
Calcutta	55,918	0	0			
Bombay	16,500	0	0			
Madras	13,200	0	0			
				85,618	0	0
Credit for febrifuge supplied to Surgeon-General, Bengal, for district medical officers of Bengal				16,330	8	0
Credit for febrifuge supplied to Inspector-General of Jails, Bengal, for jails and lock-ups in Bengal				244	0	0
Total credits in India ...				1,83,805	4	2
Net proceeds of sale of bark in London (credited in London)				88,408	10	6
GRAND TOTAL ...				2,72,213	14	8

GEORGE KING, M.B., *Surgeon-Major, Superintendent, Royal Botanic Garden, Calcutta.*

ORDER—dated 4th December 1882, No. 1359, Revenue.

Miscellaneous.

Communicated to the Board of Revenue, Conservator of Forests, Surgeon-General with the Government of Madras and the Collector of the Nilgiris.

(True Extract.)

(Signed) E. F. WEBSTER,
Secretary to Government.

To the Board of Revenue.
" Conservator of Forests.
" Surgeon-General with the Government of Madras.
" Collector of Nilgiris.

Exd. C. Vencatasubbier.

80 Copies.

Govt. of (1882) Madras.

REVENUE.

Issued

Recd.

Encl.

G.O., 4th December 1882, No. 1359.

DECEMBER.

Government Chinchona Plantations

—Resolution of Bengal Government on Annual Report of the —, for 1881-82, communicated to Revenue Board and certain officers.

QUINOLOGIST'S REPORT FOR 1881-82.

No. 11, dated Royal Botanic Garden, Howrah, near Calcutta, the 15th May 1882.

From—Surgeon-Major George King, M.B., Superintendent, Royal Botanic Garden, Calcutta and of Cinchona Cultivation in Bengal, and Offg. Govt. Quinologist,

To—The Secretary to the Government of Bengal, Financial Department, Calcutta.

I have the honour herewith to submit the annual report of the Quinologist for the year ending 31st March 1882.

QUINOLOGIST'S REPORT FOR 1881-82.

The factory operations during the past, as in former years, were carried on at Mungpoo under the immediate surpervision of Mr. Gammie. The net result was an out-turn of 8,010 pounds of febrifuge, which was not only all disposed of, but in order to meet the demand a heavy inroad had to be made on the reserved stock on hand at the beginning of the year.

2. The details of the expenditure are given in the following table, at the bottom of which are included two items for the bark used in the factory, which, according to the arrangement of treating the plantation and factory as one enterprise, is charged at cost price.

			Rs.	A.	P.
Paid for muriatic acid, 31,603½lb	...	...	5,925	10	6
„ sulphuric acid, 2,608lb	...	...	326	0	0
„ packages for ditto ...	...	...	395	4	0
„ carriage of ditto ...	...	...	2,415	10	6
„ „ of empty jars	...	...	1,166	5	9
„ storage of soda ...	...	...	98	0	0
„ charcoal	...	...	281	4	0
„ casks and other plant ...	...	...	2,072	11	9
„ carriage of ditto ...	...	...	402	3	3
„ sundry expenditure ...	...	...	1,182	10	6
„ labour in factory ...	...	...	3,384	14	6
„ Quinologist ...	...	...	2,400	0	0
„ carriage of febrifuge ...	...	...	759	0	4
„ tins for ditto ...	...	...	555	0	0
„ advertisement charge ...	...	...	1,038	5	0
„ labour in packing, &c.	...	...	797	13	0
„ manufactory apparatus, including carriage, &c.			4,720	1	4
„ charged by the Marine Department		...	141	8	0
Total		...	28,062	6	5

	Rs.	A.	P.			
Cost of bark, 159,825lb (crop of 1880-81), at annas 2 pies 9·2053 per pound ...	27,640	13	1			
Cost of bark, 187,375lb (crop of 1881-82), at annas 2 pies 10·075 per pound ...	33,254	2	11			
				60,895	0	0
				88,957	6	5
By febrifuge produced, 8,010lb, @ Rs. 11-1-8·3 per pound				88,957	6	5

3. The net cost of each pound of febrifuge is thus shown to be Rs. 11-1-8·3, which is a good deal above the cost of last year's outturn. There are three reasons for this increased cost:—

1*st*.—Items amounting to Rs. 6,792, expended for casks, steam and other apparatus, have been treated as part of the ordinary working expenditure, while they might fairly enough have been treated as capital charges. But the factory has no capital account, and I am unwilling to open one merely for the sake of improving the appearance of the results of the working of one year.

2*nd*.—While the factory establishment necessarily remained pretty much the same as last year, the outturn of manufactured product was less.

3*rd*.—Owing to a larger proportion of branch bark than usual having been used in the manufacture, the percentage of febrifuge yielded was slightly smaller than in the previous year.

4. The amount of febrifuge disposed of during the year exceeds that of the previous year by no less than 2,225 pounds. This increase is chiefly due to the large quantity taken by the general public, the sales to whom have risen at a bound from 3,151 pounds in 1880-81 to 4,680 pounds in the past year. The issues to Government hospitals and dispensaries exceed those of the previous year by 696 pounds, the increase being chiefly due to a very liberal expenditure in the fever-stricken district of Nuddea. The details of the distribution are shown in the following table.

	lb.	oz.
To Medical Depôt, Calcutta	3,386	0
„ Ditto, Bombay	1,000	0
„ Ditto, Madras	800	0
„ Surgeon-General for Bengal (for district medical officers of Bengal)	995	4
„ Inspector-General of Jails, Bengal (for jails and lock-ups in Bengal)	14	12
Sold to the public	4,680	0
Given as samples, &c.	2	9
Total ...	10,878	9

5. The year was entered upon with a stock of 4,368 pounds of febrifuge in hand, and during the early part of it the demand for febrifuge was rather dull. It was therefore considered unnecessary to keep the outturn of the factory at so high a pitch as in the previous year. But towards the end of the season the demand came with an unexpected rush and, had it not been for the large reserve carried over from 1880-81, I should have been unable to meet it, the issues for the year having exceeded the manufacture by 2,868 pounds. As will be seen by the subjoined table, the stock at the beginning of the current year is only 1,500 pounds and, as I consider this to be too low for safety, I have increased the weekly outturn of the factory from the very beginning of the current year.

Table showing the amount of febrifuge produced from the commencement to 31st March 1882, *and the stock at the latter date.*

	lbs.	oz.
Manufactured in 1874-75 ...	43	10
Ditto in 1875-76 ...	1,94[illegible]	[illegible]
Ditto in 1876-77 ...	3,[illegible]2	
Ditto in 1877-78 ...	5,162	0
Ditto in 1878-79 ...	7,007	0
Ditto in 1879-80 ...	9,434	13
Ditto in 1880-81 ...	9,296	0
Ditto in 1881-82 ...	8,010	0
Total ...	44,619	9

	lbs.	oz.
Supplied to Medical Depôt, Calcutta ...	18,840	3
Supplied to Medical Depôt, Bombay ...	6,200	0
Supplied to Medical Depôt, Madras ...	1,900	0
Supplied to Straits Settlements	30	0
Ditto Surgeon-General for Bengal (for district medical officers of Bengal) ...	995	4
Supplied to Inspector-General of Jails, Bengal (for jails and lock-ups in Bengal) ...	14	12
Sold for cash	15,073	8
Samples, &c	93	10
Stock in hand on 31st March 1882	1,500	4
Total ...	44,649	9

6. In the plantation report I have shown that the crop of bark for the year cost at the rate of annas 2 pies 10·075 per pound and that, in conformity with the usual practice, the whole of it has been debited to the factory at that rate. The bark collected on the Sittong plantation has also for convenience of account been made over to the factory at the same rate. Of the total crop thus made over to the factory, part was used in manufacture, part was sent to London for sale, and the balance remains in stock. Account-sales have been

received of the consignments sent to London, and (converted at the rate of 1*s*. 8*d*. per rupee) the net results are as follows:—

	Rs.	A.	P.
Proceeds of sale of 44,600 pounds of yellow cinchona bark, net £4,985 7*s*. 2*d*. at 1*s*. 8*d*. per rupee	59,824	5	0
Proceeds of sale of 27,880 pounds of yellow cinchona bark, net £2,382 0*s*. 7*d*. at 1*s*. 8*d*. per rupee	28,584	5	6
Total ...	88,408	10	6

7. The value of stock at the end of the year was, as has been explained, much less than it was at the beginning of it. This is due not only to the sale of so much of the reserve febrifuge in India, but also of a considerable quantity of yellow bark in London. The undernoted comparative statement shows the exact result:—

Stock on 31*st March* 1881.

	Rs.	A.	P.
Chemicals and stores	6,500	0	0
Febrifuge, 4,368 pounds 13 ounces at Rs. 9-3-10·625 per pound ...	40,380	0	0
Bark, 277,802 pounds over-head at annas 2 pies 9·2053 per pound ...	48,044	0	0
Total ...	94,924	0	0

Stock on 31*st March* 1882.

	Rs.	A.	P.
Chemicals and stores	5,000	0	0
Febrifuge, 1,500 pounds 4 ounces at Rs. 11-1. 8·3 per pound	16,661	6	0
Bark, 198,888 pounds, at annas 2 pies 10·075 per pound	35,297	7	0
	56,958	13	0
Decrease in value	37,965	3	0
Total ...	94,924	0	0

8. The various figures above given being put together (as I have done in the following table), the net result of the year's working is seen to be an excess of revenue over expenditure of Rs. 1,30,330-0-9:—

Dr.

	Rs.	A.	P.
To value of stock on 31st March 1881	94,924	0	0
„ value of bark yielded by the new (Sittong) plantation during 1881-82, viz. 42,790 pounds, at annas 2 pies 10·075 per pound	7,594	1	9
„ cash received from treasury during 1881-82 for expenditure on old plantation ...	53,025	10	11
„ spent on bark sold in London ...	15,192	1	5
„ cash received from treasury during 1881-82 for factory ...	23,062	6	5
„ stores from England	44	6	5
Profit on the year's working ...	1,30,330	0	9
Total ...	3,29,172	11	8

Cr.

	Rs.	A.	P.
By value of stock on 31st March 1882	56,958	13	0
„ cash receipts from sale of febrifuge, seeds, plants, and bark ...	81,612	12	2
„ credits from medical depôts for febrifuge, viz.:—			
Rs. A. P.			
Calcutta 55,918 0 0			
Bombay 16,500 0 0			
Madras 13,200 0 0			
	85,618	0	0
„ credit from Surgeon-General, Bengal, for febrifuge supplied to district medical officers of Bengal ... 16,454 0 0			
Less amount accounted for during 1880-81 ... 124 0 0			
	16,330	8	0
By credit from Inspector-General of Jails, Bengal, for febrifuge supplied to jails and lock-ups in Bengal	244	0	0
„ sale of bark in London	88,408	10	6
Total ...	3,29,172	11	8

The profit shown in the above statement is equal to a dividend on the capital of the concern of 13 per cent., and is by far the best financial result that has yet been obtained. But this actual profit on the business of the plantation does not represent the entire pecuniary benefit that Government has derived during the year from these plantations, for the saving effected by substituting in Government dispensaries and hospitals of 6,196 pounds of febrifuge for an equal quantity of quinine is very considerable. Quinine ruled much lower in price during the year under review than during 1880-81. But taking it at the low average of eight shillings per ounce in London, and calculating the exchange at 1*s*.8½*d*. per rupee, it could not have been laid down in India under Rs. 74 per pound, while the cinchona febrifuge cost only Rs. 16-8 per pound. Accepting these figures, the saving for the year

amounts to three and a half lakhs of rupees. This being added to the sixteen and a half lakhs saved in a similar way in former years, brings the total amount saved to Government to *twenty lakhs of rupees*, which is exactly twice the amount of the capital expended on the plantation since its commencement.

9. Owing to unavoidable delays in its transit and erection, the small steam-boiling apparatus sanctioned last year for the experimental manufacture of crystalline febrifuge and quinine was not got into working order until December. Owing to the pressure for the production of ordinary febrifuge during the concluding months of the financial year, and owing also to unexpected difficulties which have arisen in working on a large scale the processes which Mr. Gammie had conducted so successfully on a small one, I am still unable to give a final report on the results of Mr. Gammie's steam process for manufacturing the crystalline products. Mr. Gammie asks for a few months' more delay in order that further experiments may be tried, and this I trust Government may be pleased to allow. The factory has during the year been under Mr. Gammie's charge, and I beg again to bring to the notice of Government the excellent manner in which he has conducted the duties connected with it. Mr. Gammie's son was appointed an assistant in the factory in the beginning of the year, and he has worked diligently and well. Baboo Gopal Chundra Dutta, the head of my cinchona office, has also done good work during the year.

10. As an appendix to this report, I annex a tabular statement showing the details of the cash receipts for febrifuge, bark, &c., during the year. Full credit is therein taken for all the febrifuge supplied 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 1881-82.

			Rs.	A.	P.
Cash received from sale of febrifuge and paid into the Bank of Bengal and other Government treasuries ...			78,327	0	0
Cash paid into Bank of Bengal, Calcutta, and into Darjeeling treasury, on account of sales of seeds, plants, and 804 pounds of bark			3,285	12	2
Credit for febrifuge supplied to medical depôts, viz.—					
	Rs.	A. P.			
Calcutta	55,918	0 0			
Bombay	16,500	0 0			
Madras	13,200	0 0			
			85,618	0	0
Credit for febrifuge supplied to Surgeon-General, Bengal, for district medical officers of Bengal			16,330	8	0
Credit for febrifuge supplied to Inspector-General of Jails, Bengal, for jails and lock-ups in Bengal ...			214	0	0
Net proceeds of sale [illegible]rk in [illegible]don (credited in London) ... credits in India			1,83,805	4	2
			88,408	10	6
GRAND TOTAL ...			2,72,213	14	8

GEORGE KING, M.B., *Surgeon-Major,*
Superintendent, Royal Botanic Garden,
Calcutta.

W. H. D'C.—Reg. No. 2135C—323—9-11-82.

QUINOLOGIST'S REPORT FOR 1881-82.

No. 11, dated Royal Botanic Garden, Howrah, near Calcutta, the 15th May 1882.

From—SURGEON-MAJOR GEORGE KING, M.B., Superintendent, Royal Botanic Garden, Calcutta and of Cinchona Cultivation in Bengal, and Offg. Govt. Quinologist,

To—The Secretary to the Government of Bengal, Financial Department, Calcutta.

I HAVE the honour herewith to submit the annual report of the Quinologist for the year ending 31st March 1882.

QUINOLOGIST'S REPORT FOR 1881-82.

THE factory operations during the past, as in former years, were carried on at Mungpoo under the immediate surpervision of Mr. Gammie. The net result was an out-turn of 8,010 pounds of febrifuge, which was not only all disposed of, but in order to meet the demand a heavy inroad had to be made on the reserved stock on hand at the beginning of the year.

2. The details of the expenditure are given in the following table, at the bottom of which are included two items for the bark used in the factory, which, according to the arrangement of treating the plantation and factory as one enterprise, is charged at cost price.

			Rs.	A.	P.
Paid for muriatic acid, 31,603½lb			5,925	10	6
„ sulphuric acid, 2,608lb			326	0	0
„ packages for ditto			395	4	0
„ carriage of ditto			2,415	10	6
„ „ of empty jars			1,166	5	9
„ storage of soda			98	0	0
„ charcoal			281	4	0
„ casks and other plant			2,072	11	9
„ carriage of ditto			402	3	3
„ sundry expenditure			1,182	10	6
„ labour in factory			3,384	14	6
„ Quinologist			2,400	0	0
„ carriage of febrifuge			759	0	4
„ tins for ditto			555	0	0
„ advertisement charge			1,038	5	0
„ labour in packing, &c.			797	13	0
„ manufactory apparatus, including carriage, &c.			4,720	1	4
„ charged by the Marine Department ...			141	8	0
Total ...			28,062	6	5
	Rs.	A. P.			
Cost of bark, 159,825lb (crop of 1880-8 at annas 2 pies 9·2053 per pound ...	27,640	13 1			
Cost of bark, 187,375lb (crop of 1881-82), at annas 2 pies 10·075 per pound ...	33,254	2 11			
			60,895	0	0
			88,957	6	5
By febrifuge produced, 8,010lb, @ Rs. 11-1-8·3 per pound			88,957	6	5

3. The net cost of each pound of febrifuge is thus shown to be Rs. 11-1-8·3, which is a good deal above the cost of last year's outturn. There are three reasons for this increased cost:—

1*st.*—Items amounting to Rs. 6,792, expended for casks, steam and other apparatus, have been treated as part of the ordinary working expenditure, while they might fairly enough have been treated as capital charges. But the factory has no capital account, and I am unwilling to open one merely for the sake of improving the appearance of the results of the working of one year.

2*nd*.—While the factory establishment necessarily remained pretty much the same as last year, the outturn of manufactured product was less.

3*rd*.—Owing to a larger proportion of branch bark than usual having been used in the manufacture, the percentage of febrifuge yielded was slightly smaller than in the previous year.

4. The amount of febrifuge disposed of during the year exceeds that of the previous year by no less than 2,225 pounds. This increase is chiefly due to the large quantity taken by the general public, the sales to whom have risen at a bound from 3,151 pounds in 1880-81 to 4,680 pounds in the past year. The issues to Government hospitals and dispensaries exceed those of the previous year by 696 pounds, the increase being chiefly due to a very liberal expenditure in the fever-stricken district of Nuddea. The details of the distribution are shown in the following table.

	lb.	oz.
To Medical Depôt, Calcutta	3 386	0
„ Ditto, Bombay	1,000	0
„ Ditto, Madras	800	0
„ Surgeon-General for Bengal (for district medical officers of Bengal)	995	4
„ Inspector-General of Jails, Bengal (for jails and lock-ups in Bengal)	14	12
Sold to the public	4,680	0
Given as samples, &c.	2	9
Total ...	10,878	9

5. The year was entered upon with a stock of 4,363 pounds of febrifuge in hand, and during the early part of it the demand for febrifuge was rather dull. It was therefore considered unnecessary to keep the outturn of the factory at so high a pitch as in the previous year. But towards the end of the season the demand came with an unexpected rush and, had it not been for the large reserve carried over from 1880-81, I should have been unable to meet it, the issues for the year having exceeded the manufacture by 2,863 pounds. As will be seen by the subjoined table, the stock at the beginning of the current year is only 1,500 pounds and, as I consider this to be too low for safety, I have increased the weekly outturn of the factory from the very beginning of the current year.

Table showing the amount of febrifuge produced from the commencement to 31*st March* 1882, *and the stock at the latter date.*

	lb.	oz.
Manufactured in 1874-75 ...	48	10
Ditto in 1875-76 ...	1,940	
Ditto in 1876-77 ...	3,7[illegible]	
Ditto in 1877-78 ...	5,162	0
Ditto in 1878-79 ...	7,007	0
Ditto in 1879-80 ...	9,434	13
Ditto in 1880-81 ...	9,296	0
Ditto in 1881-82 ...	8,010	0
Total ...	44,619	9

	lbs.	oz.
Supplied to Medical Depôt, Calcutta	18,840	3
Supplied to Medical Depôt, Bombay	6,200	0
Supplied to Medical Depôt, Madras	1,900	0
Supplied to Straits Settlements	30	0
Ditto Surgeon-General for Bengal (for district medical officers of Bengal) ...	995	4
Supplied to Inspector-General of Jails, Bengal (for jails and lock-ups in Bengal) ...	14	12
Sold for cash	15,073	8
Samples, &c	95	10
Stock in hand on 31st March 1882	1,500	4
Total ...	44,649	9

6. In the plantation report I have shown that the crop of bark for the year cost at the rate of annas 2 pies 10 075 per pound and that, in conformity with the usual practice, the whole of it has been debited to the factory at that rate. The bark collected on the Sittong plantation has also for convenience of account been made over to the factory at the same rate. Of the total crop thus made over to the factory, part was used in manufacture, part was sent to London for sale, and the balance remains in stock. Account-sales have been

received of the consignments sent to London, and (converted at the rate of 1*s*. 8*d*. per rupee) the net results are as follows:—

	Rs.	A.	P.
Proceeds of sale of 44,600 pounds of yellow cinchona bark, net £4,985 7*s*. 2*d*. at 1*s*. 8*d*. per rupee	59,824	5	0
Proceeds of sale of 27,880 pounds of yellow cinchona bark, net £2,382 0*s*. 7*d*. at 1*s*. 8*d*. per rupee	28,584	5	6
Total ...	88,408	10	6

7. The value of stock at the end of the year was, as has been explained, much less than it was at the beginning of it. This is due not only to the sale of so much of the reserve febrifuge in India, but also of a considerable quantity of yellow bark in London. The undernoted comparative statement shows the exact result:—

Stock on 31*st March* 1881.

	Rs.	A.	P.
Chemicals and stores	6,500	0	0
Febrifuge, 4,368 pounds 13 ounces at Rs. 9-3-10·625 per pound ...	40,380	0	0
Bark, 277,802 pounds over-head at annas 2 pies 9·2053 per pound ...	48,044	0	0
Total ...	94,924	0	0

Stock on 31*st March* 1882.

	Rs.	A.	P.
Chemicals and stores	5,000	0	0
Febrifuge, 1,500 pounds 4 ounces at Rs. 11-1. 8·3 per pound	16,661	6	0
Bark, 198,888 pounds, at annas 2 pies 10·075 per pound	35,297	7	0
	56,958	13	0
Decrease in value	37,965	3	0
Total ...	94,924	0	0

8. The various figures above given being put together (as I have done in the following table), the net result of the year's working is seen to be an excess of revenue over expenditure of Rs. 1,30,330-0-9:—

Dr.	Rs.	A.	P.	*Cr.*	Rs.	A.	P.
To value of stock on 31st March 1881	94,924	0	0	By value of stock on 31st March 1882	56,958	13	0
„ value of bark yielded by the new (Sittong) plantation during 1881-82, viz. 42,790 pounds, at annas 2 pies 10·075 per pound	7,594	1	9	„ cash receipts from sale of febrifuge, seeds, plants, and bark ...	81,612	12	2
„ cash received from treasury during 1881-82 for expenditure on old plantation ...	53,025	10	11	„ credits from medical depôts for febrifuge, viz.:—			
„ spent on bark sold in London ...	15,192	1	5	Calcutta 55,918 0 0			
„ cash received from treasury during 1881-82 for factory ...	28,062	6	5	Bombay 16,500 0 0			
„ stores from England	44	6	5	Madras 13,200 0 0			
Profit on the year's working ...	1,30,330	0	9		85,618	0	0
				„ credit from Surgeon-General, Bengal, for febrifuge supplied to district medical officers of Bengal ... 16,454 0 0			
				Less amount accounted for during 1880-81 ... 124 0 0			
					16,330	8	0
				By credit from Inspector-General of Jails, Bengal, for febrifuge supplied to jails and lock-ups in Bengal	244	0	0
				„ sale of bark in London	88,408	10	6
Total ...	3,29,172	11	8	Total ...	3,29,172	11	8

The profit shown in the above statement is equal to a dividend on the capital of the concern of 13 per cent., and is by far the best financial result that has yet been obtained. But this actual profit on the business of the plantation does not represent the entire pecuniary benefit that Government has derived during the year from these plantations, for the saving effected by substituting in Government dispensaries and hospitals of 6,196 pounds of febrifuge for an equal quantity of quinine is very considerable. Quinine ruled much lower in price during the year under review than during 1880-81. But taking it at the low average of eight shillings per ounce in London, and calculating the exchange at 1*s*.8½*d*. per rupee, it could not have been laid down in India under Rs. 74 per pound, while the cinchona febrifuge cost only Rs. 16-8 per pound. Accepting these figures, the saving for the year

Ro 6574

amounts to three and a half lakhs of rupees. This being added to the sixteen and a half lakhs saved in a similar way in former years, brings the total amount saved to Government to *twenty lakhs of rupees*, which is exactly twice the amount of the capital expended on the plantation since its commencement.

9. Owing to unavoidable delays in its transit and erection, the small steam-boiling apparatus sanctioned last year for the experimental manufacture of crystalline febrifuge and quinine was not got into working order until December. Owing to the pressure for the production of ordinary febrifuge during the concluding months of the financial year, and owing also to unexpected difficulties which have arisen in working on a large scale the processes which Mr. Gammie had conducted so successfully on a small one, I am still unable to give a final report on the results of Mr. Gammie's steam process for manufacturing the crystalline products. Mr. Gammie asks for a few months' more delay in order that further experiments may be tried, and this I trust Government may be pleased to allow. The factory has during the year been under Mr. Gammie's charge, and I beg again to bring to the notice of Government the excellent manner in which he has conducted the duties connected with it. Mr. Gammie's son was appointed an assistant in the factory in the beginning of the year, and he has worked diligently and well. Baboo Gopal Chundra Dutta, the head of my cinchona office, has also done good work during the year.

10. As an appendix to this report, I annex a tabular statement showing the details of the cash receipts for febrifuge, bark, &c., during the year. Full credit is therein taken for all the febrifuge supplied 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 1881-82.

			Rs.	A.	P.
Cash received from sale of febrifuge and paid into the Bank of Bengal and other Government treasuries ...			78,327	0	0
Cash paid into Bank of Bengal, Calcutta, and into Darjeeling treasury, on account of sales of seeds, plants, and 801 pounds of bark			3,285	12	2
Credit for febrifuge supplied to medical depôts, viz.—					
	Rs.	A. P.			
Calcutta	55,918	0 0			
Bombay	16,500	0 0			
Madras	13,200	0 0			
			85,618	0	0
Credit for febrifuge supplied to Surgeon-General, Bengal, for district medical officers, Bengal			16,330	8	0
Credit for febrifuge supplied to Inspector-General of Jails, Bengal, for jails and lock-ups in Bengal ...			244	0	0
Total credits in India ...			1,83,805	4	2
Net proceeds of sale of bark in London (credited in London)			88,408	10	6
GRAND TOTAL ...			2,72,213	14	8

GEORGE KING, M.B., *Surgeon-Major,*
Superintendent, Royal Botanic Garden,
Calcutta.

W. H. D'C.—Reg. No. 2135C—323—9-11-82.

QUINOLOGIST'S REPORT FOR 1881-82.

No. 11, dated Royal Botanic Garden, Howrah, near Calcutta, the 15th May 1882.

From—SURGEON-MAJOR GEORGE KING, M.B., Superintendent, Royal Botanic Garden, Calcutta and of Cinchona Cultivation in Bengal, and Offg. Govt. Quinologist,

To—The Secretary to the Government of Bengal, Financial Department, Calcutta.

I HAVE the honour herewith to submit the annual report of the Quinologist for the year ending 31st March 1882.

QUINOLOGIST'S REPORT FOR 1881-82.

THE factory operations during the past, as in former years, were carried on at Mungpoo under the immediate surpervision of Mr. Gammie. The net result was an out-turn of 8,010 pounds of febrifuge, which was not only all disposed of, but in order to meet the demand a heavy inroad had to be made on the reserved stock on hand at the beginning of the year.

2. The details of the expenditure are given in the following table, at the bottom of which are included two items for the bark used in the factory, which, according to the arrangement of treating the plantation and factory as one enterprise, is charged at cost price.

			Rs.	A.	P.
Paid for muriatic acid, 31,603½lb			5,925	10	6
„ sulphuric acid, 2,608lb			326	0	0
„ packages for ditto			395	4	0
„ carriage of ditto			2,415	10	6
„ „ of empty jars			1,166	5	9
„ storage of soda			98	0	0
„ charcoal			281	4	0
„ casks and other plant			2,072	11	9
„ carriage of ditto			402	3	3
„ sundry expenditure			1,182	10	6
„ labour in factory			3,384	14	6
„ Quinologist			2,400	0	0
„ carriage of febrifuge			759	0	4
„ tins for ditto			555	0	0
„ advertisement charge			1,038	5	0
„ labour in packing, &c.			797	13	0
„ manufactory apparatus, including carriage, &c.			4,720	1	4
„ charged by the Marine Department ...			141	8	0
Total ...			28,062	6	5
	Rs.	A. P.			
Cost of bark, 159,825lb (crop of 1880-81) at annas 2 pies 9·2053 per pound ...	27,640	13 1			
Cost of bark, 187,375lb (crop of 1881-82), at annas 2 pies 10·075 per pound ...	33,254	2 11			
			60,895	0	0
			88,957	6	5
By febrifuge produced, 8,010lb, @ Rs. 11-1-8·3 per pound			88,957	6	5

3. The net cost of each pound of febrifuge is thus shown to be Rs. 11-1-8·3, which is a good deal above the cost of last year's outturn. There are three reasons for this increased cost: —

1*st.*—Items amounting to Rs. 6,792, expended for casks, steam and other apparatus, have been treated as part of the ordinary working expenditure, while they might fairly enough have been treated as capital charges. But the factory has no capital account, and I am unwilling to open one merely for the sake of improving the appearance of the results of the working of one year.

2*nd*.—While the factory establishment necessarily remained pretty much the same as last year, the outturn of manufactured product was less.

3*rd*.—Owing to a larger proportion of branch bark than usual having been used in the manufacture, the percentage of febrifuge yielded was slightly smaller than in the previous year.

4. The amount of febrifuge disposed of during the year exceeds that of the previous year by no less than 2,225 pounds. This increase is chiefly due to the large quantity taken by the general public, the sales to whom have risen at a bound from 3,151 pounds in 1880-81 to 4,680 pounds in the past year. The issues to Government hospitals and dispensaries exceed those of the previous year by 696 pounds, the increase being chiefly due to a very liberal expenditure in the fever-stricken district of Nuddea. The details of the distribution are shown in the following table.

	lb.	oz.
To Medical Depôt, Calcutta	3 386	0
„ Ditto, Bombay	1,000	0
„ Ditto, Madras	800	0
„ Surgeon-General for Bengal (for district medical officers of Bengal)	993	4
„ Inspector-General of Jails, Bengal (for jails and lock-ups in Bengal)	14	12
Sold to the public	4,680	0
Given as samples, &c.	2	9
Total ...	10,878	9

5. The year was entered upon with a stock of 4,363 pounds of febrifuge in hand, and during the early part of it the demand for febrifuge was rather dull. It was therefore considered unnecessary to keep the outturn of the factory at so high a pitch as in the previous year. But towards the end of the season the demand came with an unexpected rush and, had it not been for the large reserve carried over from 1880-81, I should have been unable to meet it, the issues for the year having exceeded the manufacture by 2,863 pounds. As will be seen by the subjoined table, the stock at the beginning of the current year is only 1,500 pounds and, as I consider this to be too low for safety, I have increased the weekly outturn of the factory from the very beginning of the current year.

Table showing the amount of febrifuge produced from the commencement to 31*st March* 1882, *and the stock at the latter date.*

	lbs.	oz.
Manufactured in 1874-75 ...	48	10
Ditto in 1875-76 ...	1,9	6
Ditto in 1876-77 ...	3	12
Ditto in 1877-78 ...	5,162	0
Ditto in 1879-79 ...	7,007	0
Ditto in 1879-80 ...	9,434	13
Ditto in 1880-81 ...	9,296	0
Ditto in 1881-82 ...	8,010	0
Total ...	44,619	9

	lbs.	oz.
Supplied to Medical Depôt, Calcutta	18,840	3
Supplied to Medical Depôt, Bombay	6,200	0
Supplied to Medical Depôt, Madras	1,900	0
Supplied to Straits Settlements	30	0
Ditto Surgeon-General for Bengal (for district medical officers of Bengal) ...	993	4
Supplied to Inspector-General of Jails, Bengal (for jails and lock-ups in Bengal) ...	14	12
Sold for cash	15,073	8
Samples, &c	93	10
Stock in hand on 31st March 1882	1,500	4
Total ...	44,619	9

6. In the plantation report I have shown that the crop of bark for the year cost at the rate of annas 2 pies 10·075 per pound and that, in conformity with the usual practice, the whole of it has been debited to the factory at that rate. The bark collected on the Sittong plantation has also for convenience of account been made over to the factory at the same rate. Of the total crop thus made over to the factory, part was used in manufacture, part was sent to London for sale, and the balance remains in stock. Account-sales have been

received of the consignments sent to London, and (converted at the rate of 1*s*. 8*d*. per rupee) the net results are as follows :—

	Rs.	A.	P.
Proceeds of sale of 44,600 pounds of yellow cinchona bark, net £4,985 7*s*. 2*d*. at 1*s*. 8*d*. per rupee	59,824	5	0
Proceeds of sale of 27,880 pounds of yellow cinchona bark, net £2,382 0*s*. 7*d*. at 1*s*. 8*d*. per rupee	28,584	5	6
Total ...	88,408	10	6

7. The value of stock at the end of the year was, as has been explained, much less than it was at the beginning of it. This is due not only to the sale of so much of the reserve febrifuge in India, but also of a considerable quantity of yellow bark in London. The undernoted comparative statement shows the exact result :—

Stock on 31*st March* 1881.

	Rs.	A.	P.
Chemicals and stores	6,500	0	0
Febrifuge, 4,368 pounds 13 ounces at Rs. 9·3·10·625 per pound ...	40,380	0	0
Bark, 277,802 pounds over-head at annas 2 pies 9·2053 per pound ...	48,044	0	0
Total ...	94,924	0	0

Stock on 31*st March* 1882.

	Rs.	A.	P.
Chemicals and stores	5,000	0	0
Febrifuge, 1,500 pounds 4 ounces at Rs. 11·1. 8·3 per pound	16,661	6	0
Bark, 198,888 pounds, at annas 2 pies 10·075 per pound	35,297	7	0
	56,958	13	0
Decrease in value	37,965	3	0
Total ...	94,924	0	0

8. The various figures above given being put together (as I have done in the following table), the net result of the year's working is seen to be an excess of revenue over expenditure of Rs. 1,30,330-0-9 :—

Dr.

	Rs.	A.	P.
To value of stock on 31st March 1881	94,924	0	0
„ value of bark yielded by the new (Sittong) plantation during 1881-82, viz. 42,790 pounds, at annas 2 pies 10·075 per pound	7,594	1	9
„ cash received from treasury during 1881-82 for expenditure on old plantation ...	5[illegible]		11
„ spent on bark sold in London ...	15,[illegible]		5
„ cash received from treasury during 1881-82 for factory ...	28,062	6	5
„ stores from England	44	6	5
Profit on the year's working ...	1,30,330	[illegible]	9
Total ...	3,29,172	11	8

Cr.

	Rs.	A.	P.
By value of stock on 31st March 1882	56,958	13	0
„ cash receipts from sale of febrifuge, seeds, plants, and bark ...	81,612	12	2
„ credits from medical depôts for febrifuge, viz. :—			
Rs A. P.			
Calcutta 55,918 0 0			
Bombay 16,500 0 0			
Madras 13,200 0 0			
	85,618	0	0
„ credit from Surgeon-General, Bengal, for febrifuge supplied to district medical officers of Bengal ... 16,454 0 0			
Less amount accounted for during 1880-81 ... 124 0 0			
	16,330	8	0
By credit from Inspector-General of Jails, Bengal, for febrifuge supplied to jails and lock-ups in Bengal	244	0	0
„ sale of bark in London	88,408	10	6
Total ...	3,29,172	11	8

The profit shown in the above statement is equal to a dividend on the capital of the concern of 13 per cent., and is by far the best financial result that has yet been obtained. But this actual profit on the business of the plantation does not represent the entire pecuniary benefit that Government has derived during the year from these plantations, for the saving effected by substituting in Government dispensaries and hospitals of 6,196 pounds of febrifuge for an equal quantity of quinine is very considerable. Quinine ruled much lower in price during the year under review than during 1880-81. But taking it at the low average of eight shillings per ounce in London and calculating the exchange at 1*s*.8½*d*. per rupee, it could not have been laid down in India under Rs. 74 per pound, while the cinchona febrifuge cost only Rs. 16-8 per pound. Accepting these figures, the saving for the year

amounts to three and a half lakhs of rupees. This being added to the sixteen and a half lakhs saved in a similar way in former years, brings the total amount saved to Government to *twenty lakhs of rupees*, which is exactly twice the amount of the capital expended on the plantation since its commencement.

9. Owing to unavoidable delays in its transit and erection, the small steam-boiling apparatus sanctioned last year for the experimental manufacture of crystalline febrifuge and quinine was not got into working order until December. Owing to the pressure for the production of ordinary febrifuge during the concluding months of the financial year, and owing also to unexpected difficulties which have arisen in working on a large scale the processes which Mr Gammie had conducted so successfully on a small one, I am still unable to give a final report on the results of Mr. Gammie's steam process for manufacturing the crystalline products. Mr. Gammie asks for a few months' more delay in order that further experiments may be tried, and this I trust Government may be pleased to allow. The factory has during the year been under Mr. Gammie's charge, and I beg again to bring to the notice of Government the excellent manner in which he has conducted the duties connected with it. Mr. Gammie's son was appointed an assistant in the factory in the beginning of the year, and he has worked diligently and well. Baboo Gopal Chundra Dutta, the head of my cinchona office, has also done good work during the year.

10. As an appendix to this report, I annex a tabular statement showing the details of the cash receipts for febrifuge, bark, &c., during the year. Full credit is therein taken for all the febrifuge supplied 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 1881-82.

	Rs.	A.	P.
Cash received from sale of febrifuge and paid into the Bank of Bengal and other Government treasuries ...	78,327	0	0
Cash paid into Bank of Bengal, Calcutta, and into Darjeeling treasury, on account of sales of seeds, plants, and 804 pounds of bark	3,285	12	2
Credit for febrifuge supplied to medical depôts, viz.—			
Calcutta ... ... Rs. 82,018	0	0	
Bombay 1,570	0	0	
Madras 30	0	0	
	85,618	0	0
Credit for febrifuge supplied to Surgeon-General, Bengal, for district medical officers of Bengal ...	16,330	8	0
Credit for febrifuge supplied to Inspector-General of Jails, Bengal, for jails and lock-ups in Bengal ...	244	0	0
Total credits in India ...	1,83,805	4	2
Net proceeds of sale of bark in London (credited in London)	88,408	10	6
GRAND TOTAL ...	2,72,213	14	8

GEORGE KING, M.B., *Surgeon-Major*,
Superintendent, Royal Botanic Garden,
Calcutta.

W. H. D'C—Reg. No. 2135C—323—9-11-82.

Revenue (1882) Dept

No 65 of 14

From

The Supt Royal Botanic
Gardens Calcutta

Dy 15 May
Rf 15 Instt 1882

Cinchona Report
for 1881-82.

ANNUAL REPORT ON THE GOVERNMENT CINCHONA PLANTATIONS FOR THE YEAR 1881-82.

No. 430, dated Royal Botanic Garden, Howrah, near Calcutta, the 15th May 1882.

From—GEORGE KING, Esq., M.B., Superintendent, Royal Botanic Garden, Calcutta, and in charge of Cinchona Cultivation in Bengal,

To—The Secretary to the Government of Bengal, Financial Department.

I HAVE the honour herewith to submit the annual report on the Government Cinchona plantations in Bengal for the year ending 31st March 1882.

Twentieth Annual Report of the Government Cinchona Plantation in British Sikkim. By SURGEON-MAJOR GEORGE KING, M.B., F.L.S., *Superintendent of the Royal Botanic Garden, Calcutta, and of Cinchona Cultivation in Bengal.*

As regards the Cinchona plantation, the year 1881-82 is chiefly remarkable for the progress which has been made during its course in the propagation and planting out of the Cinchona barks, which are known as *par excellence* quinine yielders. The chief of these, named in honour of the unfortunate collector who first introduced it to cultivation in Asia, is *Cinchona Ledgeriana*. This variety has until lately been included in the *mélange* of forms to which the specific name *Calisaya* has been given. Mr. Moens, the distinguished Director of Cinchona Cultivation to the Dutch Government, has, however, recently made out what appears to be a very good claim for *Ledgeriana* to rank as a distinct species. It is, however, more convenient to continue for the present to enter in the returns appended to this report *Ledgeriana* as a variety of *Calisaya*, and this has accordingly been done. Of *Cinchona Ledgeriana* there have been planted out during the year 154,000 plants. These are now all strong and healthy, and if they continue to grow as they at present promise to do, a crop of quinine bark of very high quality should be yielded in a few years. Next in importance to *Ledgeriana* as an yielder of quinine, and of a robuster constitution, is the Cinchona which has hitherto been referred to in my annual reports as our "hybrid." A few plants of this appeared spontaneously in the old plantation at Rungbee many years ago among some seedlings raised from seed received from Dr. Thwaites, of the Ceylon Botanical Garden. They were soon recognised by the late Dr. Anderson, Mr. Clarke, and Mr. Gammie as different from the *officinalis* and *succirubra* trees by which they were surrounded. They also differ a good deal from each other, but as they all partake to some extent of the characters of red and crown barks, they were put down as natural hybrids. Mr. Wood made an analysis of the barks of these in 1874, which showed them to be rich in quinine. Their propagation was therefore at once vigorously set about and has been continued ever since. It was found that these varieties do not come true to seed, and this confirmed the opinion as to their hybrid origin. Propagation by cuttings was therefore resorted to, and it is by this means that the whole of the younger plants now in the plantation have been obtained. Colonel Beddome, Inspector-General of the Madras Forests, and *ex officio* Superintendent of the Madras Government Cinchona plantations on the Nilgiris, visited Sikkim during the year, and he pronounced all our "hybrids" to belong to the species which, according to Mr. Cross, is called *Pata de Galinazo* by the bark-collectors of Chimborazo. This opinion is not adopted by the authorities at Kew, nor by Dr. Trimen, Director of Cinchona Cultivation in Ceylon. Observation of the growing plants shows that there are six distinct forms amongst these hybrids. Samples of bark of four of these forms have been analysed by Mr. Wood, late Quinologist to the plantation, and the results show that the four differ greatly (as will be seen from the following table) in the proportion of alkaloids which they yield:—

Analyses of four samples of hybrid bark from Mungpoo.

	No. 1.	No. 2.	No. 3.	No. 4.
Crystallised sulphate of quinine	2·87	1·48	1·88	0·97
" " of cinchonidine ...	2·94	2·85	2·93	1·94
" " of quinidine ...	traces.	traces.	traces.	traces.
Cinchonine (alkaloid)	0·72	0·57	0·52	0·80

8-12-82 R 2-12-82

The samples analysed were taken from very young plants in the bark of which the alkaloids had not attained their full development. But the figures give promise that, when mature, the forms numbered 1, 2, 3 will be valuable quinine barks. Number 4, on the other hand, is evidently a bark closely allied to *succirubra*, and, as a source of quinine, is not worth cultivating. Samples of the bark of the remaining two forms have been sent for analysis, but the results have not yet been received. The chemical evidence afforded by the analysis just quoted goes to support the view, which has from the first obtained on the Sikkim plantation, as to these new and unnamed varieties being natural hybrids. They continue, therefore, to appear under this designation in the present report. During the past year 91,730 plants of these have been permanently planted out. The number of quinine bark trees on the plantation now amounts to 858,323—namely, *Calisaya* (including *Ledgeriana*) 566,695, and hybrids 291,628. I hope during the year now entered on to bring the total number up to one million at least. To the red bark (*succirubra*) plantation no additions were made during the year; on the contrary, 161,250 trees were uprooted for the sake of their bark. The number of red barks on the two plantations of Mungpoo and Sittong now stands at 3,873,285, and these at present appear to be sufficient to meet the demand for Cinchona febrifuge. The total number of Cinchona trees of all sorts contained in the plantations is shown in the following table:—

	Red. (*C. Succirubra*)	Yellow. (*C. Ledgeriana.*)	Hybrid unnamed variety.	Other kinds.
Mungpoo Division	2,741,685	547,915	237,750	30,622
Sittong Division	1,132,200	18,780	53,878	.....
Total ...	3,873,285	566,695	291,628	30,622

Grand total of all kinds on both plantations	Mungpoo	...	3,557,372
	Sittong	...	1,204,858
	Total	...	4,762,230

Some years ago the species yielding the Carthagena bark of commerce was introduced from Kew and for some time [illegible]ned to promise well. That promise has however been miserably belie[illegible]e have yet only 30 plants of this sort. This Carthagena species su[illegible]dfully from insect blights, and to this its bad success hitherto is entirely[illegible] The propagation of this species has not however been discontinu[illegible] Mr. Gammie may before long be able to raise a sufficient stock to t[illegible] to give it a further trial at various elevations in the permanent plantation.

2. *Details of the year's crop.*—The total quantity of dry bark of all kinds collected on the plantation during the year is 341,570 pounds. Of this 42,790 pounds were taken from the young plantation of Sittong, the remainder being yielded by the old plantation. As usual, the bulk of the crop is red bark, yellow being represented by only 4,935 pounds obtained by thinning the trees at Mungpoo and Labdah. The whole of the crop was made over to the febrifuge factory for disposal. A quantity of yellow bark unfitted for the manufacture of febrifuge was, with the sanction of Government, sent to London for sale in the open market, that being the simplest way of disposing of it. This bark was of rather poor quality. It happened, moreover, to reach London during a depressed state of the bark market. The price realised for it was therefore low, being little more than one rupee per pound. The proceeds of a consignment of 44,000 pounds of similar bark sent to London during the end of the year 1880-81 fall to be accounted for during the year under review. The amounts thus realised appear, as in previous years, in the Quinologist's report, where the financial aspect of the whole Cinchona enterprise is, as usual, dealt with.

3. *Expenditure for the year.*—The budget estimate and allotment for the year was Rs. 79,085, but on this there was a small saving, the expenditure for the year having amounted to only Rs. 78,495-1-9. The expenditure divides itself into two parts; one being chargeable to capital, the other to working

expenses. The capital charges are those incurred on the young Sittong plantation which has not yet come into bearing, and of which the accounts are kept distinct. The working charges include all the money spent on the upkeep and extension of the old plantation and the harvesting of the bark crop. They also include the expenditure on the bark sent to England for sale. The actual figures are as follows:—

	Rs. A. P.	Rs. A. P.	Rs. A. P.
Total expenditure for the year 1881-82 ...	.....	.....	78,495 1 9
Capital expenditure.			
Expenditure on Sitting plantation ...	7,661 4 6		
Proportion of European, native, and office establishment ...	2,616 0 11		
		10,277 5 5	
Working expenses.			
Upkeep and working of Rungbee, Rishap, and Mungpoo ...	39,528 3 2		
Proportion of European, native, and office establishment ...	13,497 7 9		
		53,025 10 11	
Expenses on bark sent to London for sale ...	11,325 0 0		
Proportion of European, native, and office establishment ...	3,867 1 5		
		15,192 1 5	
			78,495 1 9

Against the working e[illegible]s there has to be set the bark crop, the whole of which was m[illegible] to the factory and is accounted for in the Quinologist's report. T[illegible] de[illegible] by the old plantation during the past year cost as near as r[illegible]. pies 10·075 per pound. For convenience of account, the bark [illegible] Sittong plantation (42,790 pounds) was made over to the fac[illegible]e same rate; the value of it has, however, been credited in the Sittong accounts. Another year should, I think, see the Sittong plantation self-supporting.

4. *Distribution of plants and seeds.*—A very large demand exists for the seed of *Cinchona Ledgeriana* and, after supplying the wants of the plantation itself, the whole of the surplus crop of seed of this species was distributed gratuitously amongst the various applicants whose names were entered in our register. The quantity given to each recipient was necessarily very small, the yield of seed last year having been a poor one. The success of the neighbouring Cinchona plantation of the Poomong Company has created a considerable demand in the Darjeeling district for young plants of Cinchona, and the sum of Rs. 1,746-6-5, realised by the sale of seedlings, was paid into the Darjeeling treasury during the year.

5. *Land rent.*—The Rents raised from settlers within the Cinchona reserve amounted during the year to Rs. 1,685-8. This sum was paid into the Darjeeling treasury as land rent, and does not appear amongst the plantation receipts.

6. *Estimated crop of* 1882-83.—During the current year I propose, as heretofore, to allow the demand for febrifuge to regulate the amount of bark that is to be harvested. Probably from 300,000 to 350,000 pounds will be wanted, and that amount can easily be supplied.

7. Mr. Moens' method of removing the bark crop by shaving is still under trial. The trees thus operated on appear healthy enough, but the renewed bark is still hardly fit for analysis; I hope, however, it may soon be so. The Dutch method of grafting *Ledgeriana* on *succirubra* stocks has not hitherto answered well on the plantation. Mr. Gammie is strongly of opinion that, for Sikkim, propagation by seedlings is more to be relied on; and it certainly is cheaper. As *Ledgeriana* seed is now obtainable of fair quality, it seems on the whole advisable to adhere to propagation by seed.

8. In my last report I inadvertently omitted to refer to the visit paid to the plantation during December 1880 by Mr. Moens, the distinguished Director of Cinchona Cultivation to the Dutch Government. Mr. Moens stayed some days at Mungpoo and went over a large part of the cultivation. It was a great advantage to be able to discuss with Mr. Moens many points regarding both the plantation and factory. Mr. Moens' visit to Mungpoo was one of the fortunate results of my own visit to the Dutch plantations during the previous year.

9. In order to supply fuel and building timber for the factory, a beginning was made during the year in planting out the bare land unsuitable for Cinchona above Mungpoo. This was done partly by sowing seed *in situ*, and partly by transplanting from nurseries. About 50 acres have already been put out, and arrangements have been made for extending this highly necessary work during the current year.

10. Mr. Gammie was in charge of the plantation during the year, and to him my best acknowledgments are due for his continued excellent service. Mr. Gammie's first assistant, Mr. J. L. Lister, resigned the service of Government at the end of the year, and in him Government lost a trustworthy and zealous officer. Mr. Lister's place has been taken by Mr. Pantling who, as Curator of the Botanical Garden, had established a high reputation for vigour and efficiency. The junior assistants Messrs. Crofton, Parkes and Kennedy have worked well during the year.

11. The usual annual returns are appended.

Table showing the number and distribution of Cinchona plants in the Government plantations, Mungpoo Division, on the 1st April 1882.

	Plantation.				Nursery.			
	Number in permanent plantation on 1st April 1881.	Uprooted during the year 1881-82.	Planted during the year 1881-82.	Nursery stock on 1st April 1882.	Nursery stock plants remaining on 1st April 1882.	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 1882.
Cinchona Hybrid	146,020	.....	91,730	237,750	10,000	40,000	40,000	90,000
„ Succirubra	2,592,338	161,250	.....	2,741,085	.....	.....	.....	.....
„ Calisaya	393,915	.....	154,000	547,915	6,000	200,000	80,000	286,000
„ Micrantha	580	.....	.....	580	.....	.....	.....	.....
„ Officinalis and varieties	25,000	.....	.....	25,000	.....	.....	.....	.....
„ Pahudiana	8,092	.....	.....	8,092	.....	.....	.....	.....
„ Species yielding Carthagena bark ...	.....	.....	.....	.....	30	.....	.....	30
Total ...	3,471,963	161,250	245,730	3,557,348	16,030	240,000	120,000	376,030

Table showing the number and distribution of Cinchona plants in the Government plantation, Sittong Division, on the 1st April 1882.

	Number in permanent plantation on 1st April 1881.	Uprooted during the year 1881-82.	Planted during the year 1881-82.	Number in permanent plantation on 1st April 1882.
Cinchona Hybrid	53,878	.....	.....	53,878
„ Succirubra	1,132,200	.....	.....	1,132,200
„ Calisaya	18,780	.....	.....	18,780
Total ...	1,204,858	.....	.....	1,204,858

Account of Dry Cinchona Bark collected during season 1881-82

	lb.	lb.	lb.
Succirubra—			
Rungbee—			
Thinning	17,240		
Sittong—			
Thinning	42,790		
Mungpoo—			
Thinning	38,005		
Rishap—			
Uprooting	170,400		
Tukdo—			
Uprooting	68,200		
Total Succirubra ...	.....	336,635	
Calisaya—			
Mungpoo—			
Thinning	4,175		
Labdah—			
Thinning	760		
Total Calisaya ...	.....	4,935	
Grand Total ...	.....	.....	341,570

Stock of Bark on 1st April 1882.

	lb.
Succirubra bark	148,460
Calisaya „	41,951
Officinalis „	3,900
Micrantha „	3,977
Pahudiana „	600
Total ...	198,888

Table showing the produce of the Government Cinchona plantations in British Sikkim since their beginning.

Mungpoo Division.

	lb.
Dry bark collected by pruning and thinning during 1869-70 ...	2,400
Ditto ditto ditto 1870-71 ...	12,500
Ditto ditto ditto 1871-72 ...	39,000
Ditto ditto ditto 1872-73 ...	Nil
Ditto ditto ditto 1873-74 ...	16,000
Crop of 1875-76	39,405
„ of 1876-77	211,931
„ of 1877-78	207,781
„ of 1878-79	344,225
„ of 1879-80	261,659
„ of 1880-81	345,740
„ of 1881-82	348,569
	298,780
Total ...	2,127,981

Sittong Division.

	lb.
Dry bark collected by pruning and thinning during 1879-80 ...	15,850
Ditto ditto ditto 1880-81 ...	28,965
Ditto ditto ditto 1881-82 ...	42,790
Total ...	87,605

GEORGE KING, M.B., *Surgeon-Major,*
Superintendent, Royal Botanic Garden, Calcutta.

W. H. D'C.—Reg. No. 2136C—314—9-11-82.

ANNUAL REPORT ON THE GOVERNMENT CINCHONA PLANTATIONS FOR THE YEAR 1881-82.

No. 43C, dated Royal Botanic Garden, Howrah, near Calcutta, the 15th May 1882.

From—GEORGE KING, ESQ., M.B., Superintendent, Royal Botanic Garden, Calcutta, and in charge of Cinchona Cultivation in Bengal,

To—The Secretary to the Government of Bengal, Financial Department.

I HAVE the honour herewith to submit the annual report on the Government Cinchona plantations in Bengal for the year ending 31st March 1882.

Twentieth Annual Report of the Government Cinchona Plantation in British Sikkim. By SURGEON-MAJOR GEORGE KING, M.B., F.L.S., *Superintendent of the Royal Botanic Garden, Calcutta, and of Cinchona Cultivation in Bengal.*

As regards the Cinchona plantation, the year 1881-82 is chiefly remarkable for the progress which has been made during its course in the propagation and planting out of the Cinchona barks, which are known as *par excellence* quinine yielders. The chief of these, named in honour of the unfortunate collector who first introduced it to cultivation in Asia, is *Cinchona Ledgeriana*. This variety has until lately been included in the *mélange* of forms to which the specific name *Calisaya* has been given. Mr. Moens, the distinguished Director of Cinchona Cultivation to the Dutch Government, has, however, recently made out what appears to be a very good claim for *Ledgeriana* to rank as a distinct species. It is, however, more convenient to continue for the present to enter in the returns appended to this report *Ledgeriana* as a variety of *Calisaya*, and this has accordingly been done. Of *Cinchona Ledgeriana* there have been planted out during the year 154,000 plants. These are now all strong and healthy, and if they continue to grow as they at present promise to do, a crop of quinine bark of very high quality should be yielded in a few years. Next in importance to *Ledgeriana* as an yielder of quinine, and of a robuster constitution, is the Cinchona which has hitherto been referred to in my annual reports as our "hybrid." A few plants of this appeared spontaneously in the old plantation at Rungbee many years ago among some seedlings raised from seed received from Dr. Thwaites, of the Ceylon Botanical Garden. They were soon recognised by the late Dr. Anderson, Mr. Clarke, and Mr. Gammie as different from the *officinalis* and *succirubra* trees by which they were surrounded. They also differ a good deal from each other, but as they all partake to some extent of the characters of both red and crown barks, they were put down as natural hybrids. Mr. Wood made an analysis of the barks of these in 1874, which showed them to be quinine. Their propagation was therefore at once vigorously set about and has continued ever since. It was found that these varieties did not seed, and this confirmed the opinion as to their hybrid origin. Propagation by cuttings was therefore resorted to, and it is by this means that the majority of the younger plants now in the plantation have been obtained. Colonel Beddome, Inspector-General of the Madras Forests, and *ex officio* Superintendent of the Madras Government Cinchona plantations on the Nilgiris, visited Sikkim during the year, and he pronounced all our "hybrids" to belong to the species which, according to Mr. Cross, is called *Pata de Galinazo* by the bark-collectors of Chimborazo. This opinion is not adopted by the authorities at Kew, nor by Dr. Trimen, Director of Cinchona Cultivation in Ceylon. Observation of the growing plants shows that there are six distinct forms amongst these hybrids. Samples of bark of four of these forms have been analysed by Mr. Wood, late Quinologist to the plantation, and the results show that the four differ greatly (as will be seen from the following table) in the proportion of alkaloids which they yield:—

Analyses of four samples of hybrid bark from Mungpoo.

	No. 1.	No. 2.	No. 3.	No. 4.
Crystallised sulphate of quinine	2·87	1·48	1·88	0·97
" " of cinchonidine ...	2·94	2·85	2·93	1·94
" " of quinidine ...	traces.	traces.	traces.	traces.
Cinchonine (alkaloid)	0·72	0·57	0·52	0·89

The samples analysed were taken from very young plants in the bark of which the alkaloids had not attained their full development. But the figures give promise that, when mature, the forms numbered 1, 2, 3 will be valuable quinine barks. Number 4, on the other hand, is evidently a bark closely allied to *succirubra*, and, as a source of quinine, is not worth cultivating. Samples of the bark of the remaining two forms have been sent for analysis, but the results have not yet been received. The chemical evidence afforded by the analysis just quoted goes to support the view, which has from the first obtained on the Sikkim plantation, as to these new and unnamed varieties being natural hybrids. They continue, therefore, to appear under this designation in the present report. During the past year 91,730 plants of these have been permanently planted out. The number of quinine bark trees on the plantation now amounts to 858,323—namely, *Calisaya* (including *Ledgeriana*) 566,695, and hybrids 291,628. I hope during the year now entered on to bring the total number up to one million at least. To the red bark (*succirubra*) plantation no additions were made during the year; on the contrary, 161,250 trees were uprooted for the sake of their bark. The number of red barks on the two plantations of Mungpoo and Sittong now stands at 3,873,285, and these at present appear to be sufficient to meet the demand for Cinchona febrifuge. The total number of Cinchona trees of all sorts contained in the plantations is shown in the following table:—

	Red. (*C. Succirubra*)	Yellow. (*C. Ledgeriana.*)	Hybrid unnamed variety.	Other kinds.
Mungpoo Division	2,741,085	547,915	237,750	30,622
Sittong Division	1,132,200	18,780	53,878	.....
Total ...	3,873,285	566,695	291,628	30,622

Grand total of all kinds on both plantations	Mungpoo	3,557,372
	Sittong	1,204,858
	Total ...	4,762,230

Some years ago the species yielding the Carthagena bark of commerce was introduced from Kew and for some time it seemed to promise well. That promise has however been miserably belied [illegible] we have yet only 30 plants of this sort. This Carthagena species suf[illegible]dfully from insect blights, and to this its bad success hitherto is e[illegible]re'. The propagation of this species has not however been discon[illegible]ue[illegible]st Mr. Gammie may before long be able to raise a [illegible]fficient[illegible] o give it a further trial at various elevations in the permanent pla[illegible].

2. *Details of the year's crop.*—The total quan[illegible]ry bark of all kinds collected on the plantation during the year is 341,570 pounds. Of this 42,790 pounds were taken from the young plantation of Sittong, the remainder being yielded by the old plantation. As usual, the bulk of the crop is red bark, yellow being represented by only 4,935 pounds obtained by thinning the trees at Mungpoo and Labdah. The whole of the crop was made over to the febrifuge factory for disposal. A quantity of yellow bark unfitted for the manufacture of febrifuge was, with the sanction of Government, sent to London for sale in the open market, that being the simplest way of disposing of it. This bark was of rather poor quality. It happened, moreover, to reach London during a depressed state of the bark market. The price realised for it was therefore low, being little more than one rupee per pound. The proceeds of a consignment of 44,000 pounds of similar bark sent to London during the end of the year 1880-81 fall to be accounted for during the year under review. The amounts thus realised appear, as in previous years, in the Quinologist's report, where the financial aspect of the whole Cinchona enterprise is, as usual, dealt with.

3. *Expenditure for the year.*—The budget estimate and allotment for the year was Rs. 79,085, but on this there was a small saving, the expenditure for the year having amounted to only Rs. 78,495-1-9. The expenditure divides itself into two parts; one being chargeable to capital, the other to working

expenses. The capital charges are those incurred on the young Sittong plantation which has not yet come into bearing, and of which the accounts are kept distinct. The working charges include all the money spent on the upkeep and extension of the old plantation and the harvesting of the bark crop. They also include the expenditure on the bark sent to England for sale. The actual figures are as follows:—

	Rs. A. P.	Rs. A. P.	Rs. A. P.
Total expenditure for the year 1881-82 ...	.....	.....	78,495 1 9
Capital expenditure.			
Expenditure on Sitting plantation ...	7,661 4 6		
Proportion of European, native, and office establishment ...	2,616 0 11		
		10,277 5 5	
Working expenses.			
Upkeep and working of Rungbee, Rishap, and Mungpoo ...	39,528 3 2		
Proportion of European, native, and office establishment ...	13,497 7 9		
		53,025 10 11	
Expenses on bark sent to London for sale ...	11,325 0 0		
Proportion of European, native, and office establishment ...	3,867 1 5		
		15,192 1 5	
			78,495 1 9

Against the working expenses there has to be set the bark crop, the whole of which was made [illegible] to the factory and is accounted for in the Quinologist's report. The [illegible]ded by the old plantation during the past year cost as near as ma[illegible]10·075 per pound. For convenience of account, the bark [illegible]tong plantation (42,790 pounds) was made over to the fa[illegible]te; the value of it has, however, been credited in the Sitto[illegible]. Another year should, I think, see the Sittong plantation self-suppo[illegible].

4. *Distribution of plants and seeds.*—A very large demand exists for the seed of *Cinchona Ledgeriana* and, after supplying the wants of the plantation itself, the whole of the surplus crop of seed of this species was distributed gratuitously amongst the various applicants whose names were entered in our register. The quantity given to each recipient was necessarily very small, the yield of seed last year having been a poor one. The success of the neighbouring Cinchona plantation of the Poomong Company has created a considerable demand in the Darjeeling district for young plants of Cinchona, and the sum of Rs. 1,746-6-5, realised by the sale of seedlings, was paid into the Darjeeling treasury during the year.

5. *Land rent.*—The Rents raised from settlers within the Cinchona reserve amounted during the year to Rs. 1,685-8. This sum was paid into the Darjeeling treasury as land rent, and does not appear amongst the plantation receipts.

6. *Estimated crop of* 1882-83.—During the current year I propose, as heretofore, to allow the demand for febrifuge to regulate the amount of bark that is to be harvested. Probably from 300,000 to 350,000 pounds will be wanted, and that amount can easily be supplied.

7. Mr. Moens' method of removing the bark crop by shaving is still under trial. The trees thus operated on appear healthy enough, but the renewed bark is still hardly fit for analysis; I hope, however, it may soon be so. The Dutch method of grafting *Ledgeriana* on *succirubra* stocks has not hitherto answered well on the plantation. Mr. Gammie is strongly of opinion that, for Sikkim, propagation by seedlings is more to be relied on; and it certainly is cheaper. As *Ledgeriana* seed is now obtainable of fair quality, it seems on the whole advisable to adhere to propagation by seed.

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11. The usual annual returns are appended.

Table showing the number and distribution of Cinchona plants in the Government plantations, Mungpoo Division, on the 1st April 1882.

	Plantation.				Nursery.			
	Number in permanent plantation on 1st April 1881.	Uprooted during the year 1881-82.	Planted during the year 1881-82.	Present stock on 1st April 1882.	Number of stock plants in nursery on 1st April 1882.	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 1882.
Cinchona Hybrid	46,000	...	91,730	137,730	10,000	40,000	40,000	90,000
„ Succirubra	2,902,335	161,250	.....	2,741,085	.....	200,000	80,000	280,000
„ Calisaya	393,915	.....	154,000	547,915	6,000	.....	.....	.....
„ Micrantha	500	.....	.....	500	.....	.....	.....	.....
„ Officinalis and varieties	25,000	.....	.....	25,000	.....	.....	.....	.....
„ Pahudiana	5,092	.....	.....	5,092	.....	.....	.....	.....
„ Species yielding Carthagena bark ...	.....	.....	.....	.....	30	.....	.....	30
Total ...	3,472,362	161,250	245,730	3,557,342	16,030	240,000	120,000	376,030

Table showing the number and distribution of Cinchona plants in the Government plantation, Sittong Division, on the 1st April 1882.

	Number in permanent plantation on 1st April 1881.	Uprooted during the year 1881-82.	Planted during the year 1881-82.	Number in permanent plantation on 1st April 1882.
Cinchona Hybrid	53,879	.....	.....	53,879
„ Succirubra	1,132,200	.....	.....	1,132,200
„ Calisaya	18,780	.....	.....	18,780
Total ...	1,204,858	.....	.....	1,204,858

C

Account of Dry Cinchona Bark collected during season 1881-82

	lb.	lb.	lb.
Succirubra—			
Rungbee—			
Thinning	17,240		
Sittong—			
Thinning	42,790		
Mungpoo—			
Thinning	38,005		
Rishap—			
Uprooting	170,400		
Tukdo—			
Uprooting	68,200		
Total Succirubra ...	.....	336,635	
Calisaya—			
Mungpoo—			
Thinning	4,175		
Labdah—			
Thinning	760		
Total Calisaya ...	.....	4,935	
Grand Total ...	.....	.....	341,570

Stock of Bark on 1st April 1882.

	lb.
Succirubra bark	148,460
Calisaya „	41,951
Officinalis „	3,900
Micrantha „	3,977
Pahudiana „	600
Total ...	198,888

Table showing the produce of the Government Cinchona plantations in British Sikkim since their beginning.

Mungpoo Division.

	lb.
Dry bark collected by pruning and thinning during 1869-70 ...	2,400
Ditto ditto ditto 1870-71 ...	12,500
Ditto ditto ditto 1871-72 ...	39,000
Ditto ditto ditto 1872-73 ...	Nil
Ditto ditto ditto 1873-74 ...	16,000
Ditto ditto ditto 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	348,569
„ of 1881-82	298,780
Total ...	2,127,981

Sittong Division.

	lb.
Dry bark collected by pruning and thinning during 1879-80 ...	15,850
Ditto ditto ditto 1880-81 ...	28,965
Ditto ditto ditto 1881-82 ...	42,790
Total ...	87,605

GEORGE KING, M.B., *Surgeon-Major*,
Superintendent, Royal Botanic Garden, Calcutta.

W. H. D'C.—Reg. No. 2136C—314—9-11-82.

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No 65 3/3

Cir No. 6573 & 6574.

G.O. No 1359 of 1882

Communicated to
the Board of Revenue,
Conservator of Forests,
Surgeon-General
with the Govt of Madras
and the ~~Commissioner~~ Collector
of the Nilgiris.

From
The Supt Royl Botanic
Gardens Calcutta

Dy 15 May } 1882
Rd 15 Nov }

Print.
6.12.82

67

Ans

a copy of no 6573 should go to the Right Hon: The Governor. The remarks about hybrids would be of interest both in connection with the despatch from the Secy of State forwarding Sir Joseph Hooker's suggestion that Dr. Trimen should visit the Nilgiri Plantations to report on the hybrids found there.

Annl Report
on the Govt Cinchona
Plantations for 1881-82

No 6573

With an order.

To the Board of Revenue
" Conservator of Forests
" Surgeon-General
" Collector of Nilgiris

C. 1-12-82 R. 2-12-82

59/6

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ANNUAL REPORT ON THE GOVERNMENT CINCHONA PLANTATIONS FOR THE YEAR 1881-82.

No. 430, dated Royal Botanic Garden, Howrah, near Calcutta, the 15th May 1882.

From—George King, Esq., M.B., Superintendent, Royal Botanic Garden, Calcutta, and in charge of Cinchona Cultivation in Bengal,

To—The Secretary to the Government of Bengal, Financial Department.

I have the honour herewith to submit the annual report on the Government Cinchona plantations in Bengal for the year ending 31st March 1882.

Twentieth Annual Report of the Government Cinchona Plantation in British Sikkim. By Surgeon-Major George King, M.B., F.L.S., *Superintendent of the Royal Botanic Garden, Calcutta, and of Cinchona Cultivation in Bengal.*

As regards the Cinchona plantation, the year 1881-82 is chiefly remarkable for the progress which has been made during its course in the propagation and planting out of the Cinchona barks, which are known as *par excellence* quinine yielders. The chief of these, named in honour of the unfortunate collector who first introduced it to cultivation in Asia, is *Cinchona Ledgeriana*. This variety has until lately been included in the *mélange* of forms to which the specific name *Calisaya* has been given. Mr. Moens, the distinguished Director of Cinchona Cultivation to the Dutch Government, has, however, recently made out what appears to be a very good claim for *Ledgeriana* to rank as a distinct species. It is, however, more convenient to continue for the present to enter in the returns appended to this report *Ledgeriana* as a variety of *Calisaya*, and this has accordingly been done. Of *Cinchona Ledgeriana* there have been planted out during the year 154,000 plants. These are now all strong and healthy, and if they continue to grow as they at present promise to do, a crop of quinine bark of very high quality should be yielded in a few years. Next in importance to *Ledgeriana* as an yielder of quinine, and of a robuster constitution, is the Cinchona which has hitherto been referred to in my annual reports as our "hybrid." A few plants of this appeared spontaneously in the old plantation at Rungbee many years ago among some seedlings raised from seed received from Dr. Thwaites, of the Ceylon Botanical Garden. They were soon recognised by the late Dr. Anderson, Mr. Clarke, and Mr. Gammie as different from the *officinalis* and *succirubra* trees by which they were surrounded. They also differ a good deal from each other, but as they all partake to some extent of the characters of both red and crown barks, they were put down as natural hybrids. Mr. Wood made an analysis of the barks of these in 1874, which showed them to be rich in quinine. Their propagation was therefore at once vigorously set about, and has been continued ever since. It was found that these varieties do not [illegible] ted, and this confirmed the opinion as to their hybrid origin [illegible] ttings was therefore resorted to, and it is by this means that the younger plants now in the plantation have been obtained. Colonel [illegible]me, Inspector-General of the Madras Forests, and *ex officio* Superintendent of the Madras Government Cinchona plantations on the Nilgiris, visited Sikkim during the year, and he pronounced all our "hybrids" to belong to the species which, according to Mr. Cross, is called *Pata de Galinazo* by the bark-collectors of Chimborazo. This opinion is not adopted by the authorities at Kew, nor by Dr. Trimen, Director of Cinchona Cultivation in Ceylon. Observation of the growing plants shows that there are six distinct forms amongst these hybrids. Samples of bark of four of these forms have been analysed by Mr. Wood, late Quinologist to the plantation, and the results show that the four differ greatly (as will be seen from the following table) in the proportion of alkaloids which they yield:—

Analyses of four samples of hybrid bark from Mungpoo.

	No. 1.	No. 2.	No. 3.	No. 4.
Crystallised sulphate of quinine	2·87	1·48	1·88	0·97
" " of cinchonidine ...	2·94	2·85	2·93	1·94
" " of quinidine ...	traces.	traces.	traces.	traces.
Cinchonine (alkaloid)	0·72	0·57	0·52	0·80

The samples analysed were taken from very young plants in the bark of which the alkaloids had not attained their full development. But the figures give promise that, when mature, the forms numbered 1, 2, 3 will be valuable quinine barks. Number 4, on the other hand, is evidently a bark closely allied to *succirubra*, and, as a source of quinine, is not worth cultivating. Samples of the bark of the remaining two forms have been sent for analysis, but the results have not yet been received. The chemical evidence afforded by the analysis just quoted goes to support the view, which has from the first obtained on the Sikkim plantation, as to these new and unnamed varieties being natural hybrids. They continue, therefore, to appear under this designation in the present report. During the past year 91,730 plants of these have been permanently planted out. The number of quinine bark trees on the plantation now amounts to 858,323—namely, *Calisaya* (including *Ledgeriana*) 566,695, and hybrids 291,628. I hope during the year now entered on to bring the total number up to one million at least. To the red bark (*succirubra*) plantation no additions were made during the year; on the contrary, 161,250 trees were uprooted for the sake of their bark. The number of red barks on the two plantations of Mungpoo and Sittong now stands at 3,873,285, and these at present appear to be sufficient to meet the demand for Cinchona febrifuge. The total number of Cinchona trees of all sorts contained in the plantations is shown in the following table:—

	Red. (*C. Succirubra*)	Yellow. (*C. Ledgeriana.*)	Hybrid unnamed variety.	Other kinds.
Mungpoo Division	2,741,085	547,915	237,750	30,622
Sittong Division	1,132,200	18,780	53,878	.....
Total ...	3,873,285	566,695	291,628	30,622

Grand total of all kinds on both plantations	Mungpoo	3,557,372
	Sittong	1,204,858
	Total ...	4,762,230

Some years ago the species yielding the Carthagena bark of commerce was introduced from Kew and for some time it seemed to promise well. That promise has however been miserably belied, and we have yet only 30 plants of this sort. This Carthagena species suffers dreadfully from insect blights, and to this its bad success hitherto is entirely due. The propagation of this species has not however been discontinued, and I trust Mr. Gammie may before long be able to raise a sufficient number of plants to give it a further trial at various elevations in the plantations.

2. *Details of the year's crop.*—The total quantity of bark of all kinds collected on the plantation during the year amounted to 47,570 pounds. Of this 42,790 pounds were taken from the young plantation of Sittong, the remainder being yielded by the old plantation. As usual, the bulk of the crop is red bark, yellow being represented by only 4,935 pounds obtained by thinning the trees at Mungpoo and Labdah. The whole of the crop was made over to the febrifuge factory for disposal. A quantity of yellow bark unfitted for the manufacture of febrifuge was, with the sanction of Government, sent to London for sale in the open market, that being the simplest way of disposing of it. This bark was of rather poor quality. It happened, moreover, to reach London during a depressed state of the bark market. The price realised for it was therefore low, being little more than one rupee per pound. The proceeds of a consignment of 44,600 pounds of similar bark sent to London during the end of the year 1880-81 fall to be accounted for during the year under review. The amounts thus realised appear, as in previous years, in the Quinologist's report, where the financial aspect of the whole Cinchona enterprise is, as usual, dealt with.

3. *Expenditure for the year.*—The budget estimate and allotment for the year was Rs. 79,085, but on this there was a small saving, the expenditure for the year having amounted to only Rs. 78,495-1-9. The expenditure divides itself into two parts; one being chargeable to capital, the other to working

expenses. The capital charges are those incurred on the young Sittong plantation which has not yet come into bearing, and of which the accounts are kept distinct. The working charges include all the money spent on the upkeep and extension of the old plantation and the harvesting of the bark crop. They also include the expenditure on the bark sent to England for sale. The actual figures are as follows:—

	Rs. A. P.	Rs. A. P.	Rs. A. P.
Total expenditure for the year 1881-82 ...	.....	.....	78,495 1 9
Capital expenditure.			
Expenditure on Sitting plantation ...	7,661 4 6		
Proportion of European, native, and office establishment ...	2,616 0 11	10,277 5 5	
Working expenses.			
Upkeep and working of Rungbee, Rishap, and Mungpoo ...	39,528 3 2		
Proportion of European, native, and office establishment ...	13,497 7 9	53,025 10 11	
Expenses on bark sent to London for sale. ...	11,325 0 0		
Proportion of European, native, and office establishment ...	3,867 1 5	15,192 1 5	
			78,495 1 9

Against the working expenses there has to be set the bark crop, the whole of which was made over to the factory and is accounted for in the Quinologist's report. The yield by the old plantation during the past year cost as near as ... lbs 10·075 per pound. For convenience of account, the Sittong plantation (42,790 pounds) was made over to the ... at a fixed rate; the value of it has, however, been credited in the Sittong accounts. Another year should, I think, see the Sittong plantation self-supporting.

4. *Distribution of plants and seeds.*—A very large demand exists for the seed of *Cinchona Ledgeriana* and, after supplying the wants of the plantation itself, the whole of the surplus crop of seed of this species was distributed gratuitously amongst the various applicants whose names were entered in our register. The quantity given to each recipient was necessarily very small, the yield of seed last year having been a poor one. The success of the neighbouring Cinchona plantation of the Poomong Company has created a considerable demand in the Darjeeling district for young plants of Cinchona, and the sum of Rs. 1,746-6-5, realised by the sale of seedlings, was paid into the Darjeeling treasury during the year.

5. *Land rent.*—The Rents raised from settlers within the Cinchona reserve amounted during the year to Rs. 1,685-8. This sum was paid into the Darjeeling treasury as land rent, and does not appear amongst the plantation receipts.

6. *Estimated crop of* 1882-83.—During the current year I propose, as heretofore, to allow the demand for febrifuge to regulate the amount of bark that is to be harvested. Probably from 300,000 to 350,000 pounds will be wanted, and that amount can easily be supplied.

7. Mr. Moens' method of removing the bark crop by shaving is still under trial. The trees thus operated on appear healthy enough, but the renewed bark is still hardly fit for analysis; I hope, however, it may soon be so. The Dutch method of grafting *Ledgeriana* on *succirubra* stocks has not hitherto answered well on the plantation. Mr. Gammie is strongly of opinion that, for Sikkim, propagation by seedlings is more to be relied on; and it certainly is cheaper. As *Ledgeriana* seed is now obtainable of fair quality, it seems on the whole advisable to adhere to propagation by seed.

8. In my last report I inadvertently omitted to refer to the visit paid to the plantation during December 1880 by Mr. Moens, the distinguished Director of Cinchona Cultivation to the Dutch Government. Mr. Moens stayed some days at Mungpoo and went over a large part of the cultivation. It was a great advantage to be able to discuss with Mr. Moens many points regarding both the plantation and factory. Mr. Moens' visit to Mungpoo was one of the fortunate results of my own visit to the Dutch plantations during the previous year.

9. In order to supply fuel and building timber for the factory, a beginning was made during the year in planting out the bare land unsuitable for Cinchona above Mungpoo. This was done partly by sowing seed *in situ*, and partly by transplanting from nurseries. About 50 acres have already been put out, and arrangements have been made for extending this highly necessary work during the current year.

10. Mr. Gammie was in charge of the plantation during the year, and to him my best acknowledgments are due for his continued excellent service. Mr. Gammie's first assistant, Mr. J. L. Lister, resigned the service of Government at the end of the year, and in him Government lost a trustworthy and zealous officer. Mr. Lister's place has been taken by Mr. Pantling who, as Curator of the Botanical Garden, had established a high reputation for vigour and efficiency. The junior assistants Messrs. Crofton, Parkes and Kennedy have worked well during the year.

11. The usual annual returns are appended.

Table showing the number and distribution of Cinchona plants in the Government plantations, Mungpoo Division, on the 1st April 1882.

	Plantation.				Nursery.			
	Number in permanent plantation on 1st April 1881.	Uprooted during the year 1881-82.	Planted during the year 1881.	Present stock on 1st April 1882.	Stock plants in nursery on 1st April 1881.	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 1882.
Cinchona Hybrid	146,020	.....	91,730	237,750	10,000	40,000	40,000	90,000
„ Succirubra	2,902,335	161,250	.....	2,741,085	.....	.....	.....	.....
„ Calisaya	393,915	.....	154,000	547,915	6,000	200,000	80,000	286,000
„ Micrantha	500	.....	.....	500	.....	.....	.....	.....
„ Officinalis and varieties	25,000	.....	.....	25,000	.....	.....	.....	.....
„ Pahudiana	5,092	.....	.....	5,092	.....	.....	.....	.....
„ Species yielding Carthagena bark ...	.....	.....	.....	.....	30	.....	.....	30
Total ...	3,472,862	161,250	245,730	3,557,342	16,030	240,000	120,000	376,030

Table showing the number and distribution of Cinchona plants in the Government plantation, Sittong Division, on the 1st April 1882.

	Number in permanent plantation on 1st April 1881.	Uprooted during the year 1881-82.	Planted during the year 1881-82.	Number in permanent plantation on 1st April 1882.
Cinchona Hybrid	53,878	.....	.....	53,878
„ Succirubra	1,132,200	.....	.....	1,132,200
„ Calisaya	18,780	.....	.....	18,780
Total ...	1,204,858	.....	.....	1,204,858

5-82

Account of Dry Cinchona Bark collected during season 1881-82

		lb.	lb.	lb.
Succirubra—				
Rungbee—				
Thinning ...	...	17,240		
Sittong—				
Thinning ...	...	42,790		
Mungpoo—				
Thinning ...	...	38,005		
Rishap—				
Uprooting ...	...	170,400		
Tukdo—				
Uprooting ...	...	68,200		
Total Succirubra	...	.....	336,635	
Calisaya—				
Mungpoo—				
Thinning ...	...	4,175		
Labdah—				
Thinning ...	...	760		
Total Calisaya	...	.....	4,935	
Grand Total	...	.....	.....	341,570

Stock of Bark on 1st April 1882.

	lb.
Succirubra bark	148,460
Calisaya „	41,951
Officinalis „	3,900
Micrantha „	3,977
Pahudiana „	600
Total ...	198,888

Table showing the produce of the Government Cinchona plantations in British Sikkim since their beginning.

Mungpoo Division.

	lb.
Dry bark collected by pruning and thinning during 1869-70 ...	2,400
Ditto ditto ditto 1870-71 ...	12,500
Ditto ditto ditto 1871-72 ...	39,000
Ditto ditto ditto 1872-73 ...	Nil
Ditto ditto ditto 1873-74 ...	16,000
Ditto ditto ditto 1874-75 ...	39,405
Ditto ditto ditto ...	211,931
Crop of 1875-76	207,781
„ of 1876-77	344,225
„ of 1877-78	261,659
„ of 1878-79	345,740
„ of 1879-80	348,569
„ of 1880-81	298,780
„ of 1881-82	
Total ...	2,127,981

Sittong Division.

	lb.
Dry bark collected by pruning and thinning during 1879-80 ...	15,850
Ditto ditto ditto 1880-81 ...	28,965
Ditto ditto ditto 1881-82 ...	42,790
Total ...	87,605

GEORGE KING, M.B., *Surgeon-Major,*
Superintendent, Royal Botanic Garden, Calcutta.

W. H. D'C.—Reg. No. 2136C—314—9-11-82.

QUINOLOGIST'S REPORT FOR 1881-82.

No. 11, dated Royal Botanic Garden, Howrah, near Calcutta, the 15th May 1882.

From—Surgeon-Major George King, M.B., Superintendent, Royal Botanic Garden, Calcutta and of Cinchona Cultivation in Bengal, and Offg. Govt. Quinologist,

To—The Secretary to the Government of Bengal, Financial Department, Calcutta.

I have the honour herewith to submit the annual report of the Quinologist for the year ending 31st March 1882.

QUINOLOGIST'S REPORT FOR 1881-82.

The factory operations during the past, as in former years, were carried on at Mungpoo under the immediate surpervision of Mr. Gammie. The net result was an out-turn of 8,010 pounds of febrifuge, which was not only all disposed of, but in order to meet the demand a heavy inroad had to be made on the reserved stock on hand at the beginning of the year.

2. The details of the expenditure are given in the following table, at the bottom of which are included two items for the bark used in the factory, which, according to the arrangement of treating the plantation and factory as one enterprise, is charged at cost price.

			Rs.	A.	P.
Paid for muriatic acid, 31,603½lb	...	...	5,925	10	6
„ sulphuric acid, 2,608lb	...	...	326	0	0
„ packages for ditto ...	...	...	395	4	0
„ carriage of ditto ...	...	...	2,415	10	6
„ „ of empty jars	...	...	1,166	5	9
„ storage of soda ...	...	...	98	0	0
„ charcoal	...	...	281	4	0
„ casks and other plant ...	...	...	2,072	11	9
„ carriage of ditto ...	...	...	402	3	3
„ sundry expenditure ...	...	...	1,182	10	6
„ labour in factory ...	...	...	3,384	14	6
„ Quinologist ...	...	...	2,400	0	0
„ carriage of febrifuge ...	...	...	759	0	4
„ tins for ditto ...	...	...	555	0	0
„ advertisement charge ...	...	...	1,038	5	0
„ labour in packing, &c.	...	...	797	13	0
„ manufactory [illegible] ature including carriage, &c.			4,720	1	4
„ charges [illegible] partment	...		141	8	0
	Total	...	28,062	6	5

	Rs.	A.	P.			
Cost of bark, 159,825lb (crop of 1880-81), at annas 2 pies 9·2053 per pound ...	27,640	13	1			
Cost of bark, 187,375lb (crop of 1881-82), at annas 2 pies 10·075 per pound ...	33,254	2	11			
				60,895	0	0
				88,957	6	5
By febrifuge produced, 8,010lb, @ Rs. 11-1-8·3 per pound				88,957	6	5

3. The net cost of each pound of febrifuge is thus shown to be Rs. 11-1-8·3, which is a good deal above the cost of last year's outturn. There are three reasons for this increased cost: —

1*st*.—Items amounting to Rs. 6,792, expended for casks, steam and other apparatus, have been treated as part of the ordinary working expenditure, while they might fairly enough have been treated as capital charges. But the factory has no capital account, and I am unwilling to open one merely for the sake of improving the appearance of the results of the working of one year.

2nd.—While the factory establishment necessarily remained pretty much the same as last year, the outturn of manufactured product was less.

3rd.—Owing to a larger proportion of branch bark than usual having been used in the manufacture, the percentage of febrifuge yielded was slightly smaller than in the previous year.

4. The amount of febrifuge disposed of during the year exceeds that of the previous year by no less than 2,225 pounds. This increase is chiefly due to the large quantity taken by the general public, the sales to whom have risen at a bound from 3,151 pounds in 1880-81 to 4,680 pounds in the past year. The issues to Government hospitals and dispensaries exceed those of the previous year by 696 pounds, the increase being chiefly due to a very liberal expenditure in the fever-stricken district of Nuddea. The details of the distribution are shown in the following table.

	lb.	oz.
To Medical Depôt, Calcutta	3 386	0
„ Ditto, Bombay	1,000	0
„ Ditto, Madras	800	0
„ Surgeon-General for Bengal (for district medical officers of Bengal)	995	4
„ Inspector-General of Jails, Bengal (for jails and lock-ups in Bengal)	14	12
Sold to the public	4,680	0
Given as samples, &c.	2	9
Total ...	10,878	9

5. The year was entered upon with a stock of 4,368 pounds of febrifuge in hand, and during the early part of it the demand for febrifuge was rather dull. It was therefore considered unnecessary to keep the outturn of the factory at so high a pitch as in the previous year. But towards the end of the season the demand came with an unexpected rush and, had it not been for the large reserve carried over from 1880-81, I should have been unable to meet it, the issues for the year having exceeded the manufacture by 2,868 pounds. As will be seen by the subjoined table, the stock at the beginning of the current year is only 1,500 pounds and, as I consider this to be too low for safety, I have increased the weekly outturn of the factory from the very beginning of the current year.

Table showing the amount of febrifuge produced from the commencement to 31st March 1882, and the stock at the latter date.

	lb.	oz.		lbs.	oz.
Manufactured in 1874-75 ...	48	10	Supplied to Depôt, Calcutta ...	13,840	3
Ditto in 1875-76 ...	1940	6	Supplied to Medical Depôt, Bombay	6,200	0
Ditto in 1876-77 ...	3,750	12	Supplied to Medical Depôt, Madras	1,900	0
Ditto in 1877-78 ...	5,162	0	Supplied to Straits Settlements	30	0
Ditto in 1878-79 ...	7,007	0	Ditto Surgeon-General for Bengal (for district medical officers of Bengal) ...	995	4
Ditto in 1879-80 ...	9,434	13	Supplied to Inspector-General of Jails, Bengal (for jails and lock-ups in Bengal) ...	14	12
Ditto in 1880-81 ...	9,296	0	Sold for cash	15,073	8
Ditto in 1881-82 ...	8,010	0	Samples, &c	95	10
Total ...	44,619	9	Stock in hand on 31st March 1882	1,500	4
			Total ...	44,619	9

6. In the plantation report I have shown that the crop of bark for the year cost at the rate of annas 2 pies 10 075 per pound and that, in conformity with the usual practice, the whole of it has been debited to the factory at that rate. The bark collected on the Sittong plantation has also for convenience of account been made over to the factory at the same rate. Of the total crop thus made over to the factory, part was used in manufacture, part was sent to London for sale, and the balance remains in stock. Account-sales have been

received of the consignments sent to London, and (converted at the rate of 1*s.* 8*d.* per rupee) the net results are as follows:—

	Rs.	A.	P.
Proceeds of sale of 44,600 pounds of yellow cinchona bark, net £4,985 7*s.* 2*d.* at 1*s.* 8*d.* per rupee	59,824	5	0
Proceeds of sale of 27,880 pounds of yellow cinchona bark, net £2,382 0*s.* 7*d.* at 1*s.* 8*d.* per rupee	28,584	5	6
Total ...	88,408	10	6

7. The value of stock at the end of the year was, as has been explained, much less than it was at the beginning of it. This is due not only to the sale of so much of the reserve febrifuge in India, but also of a considerable quantity of yellow bark in London. The undernoted comparative statement shows the exact result:—

Stock on 31st March 1881.

	Rs.	A.	P.
Chemicals and stores	6,500	0	0
Febrifuge, 4,368 pounds 13 ounces at Rs. 9-3-10·625 per pound ...	40,380	0	0
Bark, 277,802 pounds over-head at annas 2 pies 9·2053 per pound ...	48,044	0	0
Total ...	94,924	0	0

Stock on 31st March 1882.

	Rs.	A.	P.
Chemicals and stores	5,000	0	0
Febrifuge, 1,500 pounds 4 ounces at Rs. 11-1. 8·3 per pound	16,661	6	0
Bark, 198,888 pounds, at annas 2 pies 10·075 per pound	35,297	7	0
	56,958	13	0
Decrease in value	37,965	3	0
Total ...	94,924	0	0

8. The various figures above given being put together (as I have done in the following table), the net result of the year's working is seen to be an excess of revenue over expenditure of Rs. 1,30,330-0-9:—

Dr.

	Rs.	A.	P.
To value of stock on 31st March 1881	94,924	0	0
„ value of bark yielded by the new (Sittong) plantation during 1881-82, viz. 42,790 pounds, at annas 2 pies 10·075 per pound	7,594	1	9
„ cash received from treasury during 1881-82 for expenditure on old plantation ...	53,025	10	11
„ spent on bark sold in London ...	15,192	1	5
„ cash received from treasury during 1881-82 for factory, ...	28,062	6	6
„ stores from England ...	[illegible]		
Profit on the year's working	[illegible]		
Total ...	3,29,173	11	8

Cr.

	Rs.	A.	P.
By value of stock on 31st March 1882	56,953	13	0
„ cash receipts from sale of febrifuge, seeds, plants, and bark ...	81,612	12	2
„ credits from medical depôts for febrifuge, viz.:— Rs A. P.			
Calcutta 55,918 0 0			
Bombay 16,500 0 0			
Madras 13,200 0 0			
	85,618	0	0
„ credit from Surgeon-General, Bengal, for febrifuge supplied to district medical officers of Bengal ... 16,454 0 0			
Less amount accounted for during 1880-81 ... 124 0 0			
	16,330	8	0
By credit from Inspector-General of Jails, Bengal, for febrifuge supplied to jails and lock-ups in Bengal	244	0	0
„ sale of bark in London	88,408	10	6
Total ...	3,29,173	11	8

The profit shown in the above statement is equal to a dividend on the capital of the concern of 13 per cent., and is by far the best financial result that has yet been obtained. But this actual profit on the business of the plantation does not represent the entire pecuniary benefit that Government has derived during the year from these plantations, for the saving effected by substituting in Government dispensaries and hospitals of 6,196 pounds of febrifuge for an equal quantity of quinine is very considerable. Quinine ruled much lower in price during the year under review than during 1880-81. But taking it at the low average of eight shillings per ounce in London, and calculating the exchange at 1*s.* 8½*d.* per rupee, it could not have been laid down in India under Rs. 74 per pound, while the cinchona febrifuge cost only Rs. 16-8 per pound. Accepting these figures, the saving for the year

amounts to three and a half lakhs of rupees. This being added to the sixteen and a half lakhs saved in a similar way in former years, brings the total amount saved to Government to *twenty lakhs of rupees*, which is exactly twice the amount of the capital expended on the plantation since its commencement.

9. Owing to unavoidable delays in its transit and erection, the small steam-boiling apparatus sanctioned last year for the experimental manufacture of crystalline febrifuge and quinine was not got into working order until December. Owing to the pressure for the production of ordinary febrifuge during the concluding months of the financial year, and owing also to unexpected difficulties which have arisen in working on a large scale the processes which Mr. Gammie had conducted so successfully on a small one, I am still unable to give a final report on the results of Mr. Gammie's steam process for manufacturing the crystalline products. Mr. Gammie asks for a few months' more delay in order that further experiments may be tried, and this I trust Government may be pleased to allow. The factory has during the year been under Mr. Gammie's charge, and I beg again to bring to the notice of Government the excellent manner in which he has conducted the duties connected with it. Mr. Gammie's son was appointed an assistant in the factory in the beginning of the year, and he has worked diligently and well. Baboo Gopal Chundra Dutta, the head of my cinchona office, has also done good work during the year.

10. As an appendix to this report, I annex a tabular statement showing the details of the cash receipts for febrifuge, bark, &c., during the year. Full credit is therein taken for all the febrifuge supplied 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 1881-82.

	Rs.	A.	P.
Cash received from sale of febrifuge and paid into the Bank of Bengal and other Government treasuries ...	78,327	0	0
Cash paid into Bank of Bengal, Calcutta, and into Darjeeling treasury, on account of sales of seeds, plants, and 804 pounds of bark	3,285	12	2
Credit for febrifuge supplied to medical depôts, viz.—			
Calcutta 55,918 0 0			
Bombay 16,500 0 0			
Madras 13,200 0 0			
	85,618	0	0
Credit for febrifuge supplied to Surgeon-General, Bengal, for district medical officers of Bengal ...	16,330	8	0
Credit for febrifuge supplied to Inspector-General of Jails, Bengal, for jails and lock-ups in Bengal ...	244	0	0
Total credits in India ...	1,83,805	4	2
Net proceeds of sale of bark in London (credited in London)	88,408	10	6
GRAND TOTAL ...	2,72,213	14	8

GEORGE KING, M.B., *Surgeon-Major*,
Superintendent, Royal Botanic Garden,
Calcutta.

W. H. D'C.—Reg. No. 2135C—323—9-11-82.

FINANCIAL DEPARTMENT.

AGRICULTURE.

DARJEELING, THE 28TH OCTOBER 1882.

RESOLUTION.

READ—

The Annual Report of the Government Cinchona Plantation in Bengal for the year 1881-82, and the Annual Report of the Quinologist for 1881-82.

Considerable progress was made during the year in the propagation and planting out of two quinine-yielding trees, the *Cinchona Ledgeriana* and the unnamed hybrid variety. Of the former species 154,000 and of the latter 91,730 trees were planted out. The *Cinchona Ledgeriana*, though it apparently deserves to be ranked as a distinct species, is still entered in the returns appended to the present Report as a variety of *Calisaya*. Observation of the hybrid plants has shown that there are six distinct forms amongst them. Samples of bark of four of these forms from very young plants have been analysed by Mr. Wood, late Quinologist to the Plantation, with the following results:—

	No. 1.	No. 2.	No. 3.	No 4.
Crystallised sulphate of quinine ..	2·87	1·48	1·88	0·97
Ditto ditto of cinchonidine ..	2·94	2·85	2·93	1·94
Ditto ditto of quinidine ..	traces.	traces.	traces.	traces.
Cinchona (alkaloid)	0·72	0·57	0·52	0·80

Evidently Nos. 1, 2, and 3 promise to be valuable quinine barks. The total number of quinine bark trees in the two plantations of Mungpoo and Sittong was, at the close of the year, 858,323, namely, *Calisaya* (including *Ledgeriana*) 566,695 and hybrids 291,628. There was no addition to the stock plantation of *Succirubra* trees, and 161,250 trees of this variety were uprooted for the sake of their bark. There are still 3,873,285 red bark trees on the two plantations, and they are considered sufficient to meet all present demand for febrifuge. There has hitherto been no success in the propagation of the commercial Carthagena bark. There are only 30 plants remaining in the plantations. Efforts will, however, be made to increase the stock, and to give it a further trial at various elevations.

2. The entire produce of the plantations for the year was 341,570lb of dry bark. Of this, 4,935lb, obtained by thinning the trees at Mungpoo and Labdap, were yellow bark, the remainder was red bark. The whole of the crop, except a quantity of yellow bark which was unfitted for the manufacture of febrifuge and was sent to London for sale, was made over to the Febrifuge Factory for disposal. The proceeds of this consignment to London were small, as the bark reached London during a depressed state of the market.

3. The Lieutenant-Governor is glad to learn that the surplus seed of the *Cinchona Ledgeriana* was distributed gratuitously to applicants for it, and he desires that this practice may be followed to the utmost extent consistent with the needs of the plantations. The success of the neighbouring cinchona plantation of the Poomung Company has created a considerable demand in the Darjeeling district for young plants, and a sum of Rs. 1,746-6-5 was realized by the sale of seedlings during last year.

4. Mr. Moens, the distinguished Director of Cinchona Cultivation to the Dutch Government, visited the plantation in December 1880. His method of removing the bark crop by shaving is still under trial. The trees thus operated on appear healthy enough, but the renewed bark is not yet fit for analysis. The Dutch method of grafting *Ledgeriana* on *Succirubra* stocks has not been attended with success, and propagation by seed will accordingly be adhered to.

5. The total expenditure on the plantations amounted to Rs. 78,495-1-9 against the budget allotment of Rs. 79,085. Of this, Rs. 10,277-5-5 represented the capital expenditure on the new plantation at Sittong, and the balance, the working expenses of the old plantations, including the charges incurred on account of the bark sent to England for sale.

6. It is explained that the reduced outturn was due to the existence of a large stock in hand concurrently with slackness of the demand in the early part of the year. Towards the end of the season the demand rapidly increased, and the total quantity disposed of rose to 10,876lb against 8,651lb in the previous year. The result was a reduction in the reserve stock to 1,502lb. This is obviously too low, and accordingly the increased weekly outturn will be maintained during the current year. The Medical Depôt of Bombay took 1,000lb less than in the previous year, but the supplies to other depôts, and especially the sale to the public, have considerably increased. The figures for the two years are—

	1880-81.	1881-82.
	lb oz.	lb oz.
To Medical Depôt, Calcutta	3,000 0	3,386 0
Ditto, Bombay	2,000 0	1,000 0
Ditto, Madras	500 0	800 0
To Surgeon-General for District Medical Officers of Bengal	....	995 4
To Inspector-General of Jails for jails and lock-ups, Bengal	....	14 12
Sold to the public	3,150 11	4,680 0
Given as samples	3 2	2 9
Total	8,653 13	10,878 9

The sales to the public exceeded by 1,529lb 5oz—a circumstance which has proved beyond all doubt that the drug is rapidly advancing in the estimation of the public.

7. The cost of manufacture during the year, including the cost of the bark, was Rs. 88,957-6-5, or Rs. 11-1-8·3 per pound, being Rs. 1-13-9·675 more than the average cost per pound in 1880-81. The increased cost in 1881-82 is due—

(1) to an expenditure of Rs. 6,792 for casks, steam and other apparatus having been treated as working expenses of the year, instead of being treated as capital charges of the factory; and

(2) to a smaller outturn of febrifuge in consequence of a larger proportion of branch bark than usual having been used in the manufacture.

8. The revenue derived from the sale of the febrifuge and seed and plants, and the sale bark in London, amounted to Rs. 2,72,213-14-8, as shown below—

	Rs.	A.	P.
By sale of febrifuge seed and plants to the public ..	81,612	12	2
By credits from the Medical Depôt of Calcutta ..	55,918	0	0
Ditto ditto ditto of Bombay ..	16,500	0	0
Ditto ditto ditto of Madras ..	13,200	0	0
By credit from the Surgeon-General, Bengal ..	16,330	8	0
Ditto Inspector-General, Jails ..	244	0	0
By sale of bark in London	88,408	10	6
Total ..	2,72,213	14	8

9. The net result of the year's working, after allowance made for the reduction in the stock in hand, was thus a profit of Rs. 1,30,338-0-9, *i.e.* equal to a dividend on the capital of the concern of 13 per cent. It is necessary to recollect, however, that this includes Rs. 59,824, the sale proceeds of 44,600lb of yellow bark sold in London in 1880-81. But this does not represent the whole of the actual gain for the year. The amount of febrifuge used in substitution of quinine in Government hospitals and dispensaries during the past year was 6,196lb. On a calculation of the average price of quinine in Calcutta at Rs. 74

per pound, the saving effected by this substitution during the year has been very nearly 3½ lakhs of rupees. The total saving, since the factory commenced working, aggregates 20 lakhs of rupees, which is about twice the amount of the capital expended on the Plantation since its commencement.

10. In May 1881 a sum of Rs. 4,000 was sanctioned for the purpose of procuring an apparatus for conducting, on a larger scale the experiments on which Mr. Gammie has been engaged in manufacturing quinine and ordinary and crystalline febrifuge at Mungpoo. The apparatus, however, could not be got into working order until December, and, owing to the pressure for the production of ordinary febrifuge and other difficulties, Mr. Gammie was not able to complete his experiments during the year. It has since been reported that the attempt has not been successful. A large proportion of alkaloid is extracted, but the excess is lost in the course of precipitation.

11. The whole subject of the course to be adopted in the disposal of the raw produce of the plantations is now before the Government of India, and the Lieutenant-Governor has delayed his review of these reports in order to submit it simultaneously with his view on the general question. It appears to him that the object of providing a cheap febrifuge for the people with the minimum of interference with private enterprise can best be attained by manufacturing the red bark into mixed alkaloids in India, and he has suggested the measures that should be taken to ascertain the most efficient process, and to put it in practice. He is of opinion that measures should be simultaneously taken to introduce the manufacture of sulphate of quinine from the yellow bark in India, so that the cost of freight and the other expenses incidental to manufacture in England may be saved, while the industrial resources of this country are developed. The practice of sending the bark to England for sale involves interference with the operations of private growers of the bark. He has therefore proposed that Government should offer to dispose of its yellow bark plantations at a valuation to any private person or firm who will undertake to establish and maintain a manufactory for sulphate of quinine in Bengal.

12. The thanks of the Lieutenant-Governor are due to Dr. King for his very efficient management of this department during the year. The factory has been under Mr. Gammie's charge, and his good services have again been brought to the notice of Government and are cordially recognized by the Lieutenant-Governor.

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 Government of Bengal.

No. 2299T—F.

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

By order of the Lieutenant-Governor of Bengal,

Macaulay

Secretary to the Government of Bengal.

DARJEELING,
The 28th October 1882.

W. LeB.—Reg. No. 536—31-10-82.

Revenue (1882) Departmental

No 6889.

From The Govt. of Bengal.

Recd 28 Dec 81
Rev 82

No 2299 F.F.

Encl 2

Copy of Resolution
No. the Annual Report of
the Govt. Cinchona Plant-
ation, and of Remarks
thereon.

Office. See the Secretary's
instruction written
on the back of this

Ent: 1359 of 4. 12. 82

Encl.

Read: Cun: 6889 with Enclosures as noted
Order

Communicated to the Board of
Revenue, Conservator of Forests,
Surgeon General with the Govt.
of Madras & the Collectors
of the Nilgiris ~~in lieu of~~
~~intimation of G.O. Nos. no 1359~~
~~dt 16 Dec. 1880~~

~~Ent~~

~~for~~ 6/12/82 Mit

This order had better go instead of that
on Cur: nos: 6673 & 6674 passed
by the Right Hon: The Governor. This
Cur: no 6889 containing both Memo:
papers & the order of the Bengal
Govt. thereon. The Govr's attention might
be called to the G.O. in the former
file which moved in that case, & the
Hon'ble of forwarding the

The Resolution of the Govt of Bengal
and this Correspondence returned
herewith

Ind Branch Asst

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