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MADRAS RECORD OFFICE.

Government of Madras.

Revenue DEPARTMENT.

G.O. No.	<u>1093</u>	Press Mis.
Dated	<u>4-9-</u>	<u>1880.</u>

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I

GOVERNMENT OF MADRAS.
REVENUE DEPARTMENT.

4th September 1880, No. 1,093.

READ THE FOLLOWING PAPER :—

Endorsement of the Officiating Assistant Secretary to the Government of Bengal, Financial Department, dated Calcutta, 14th July 1880, No. 147.

No. 90. Resolution of the Government of Bengal in the Financial Department, (Agriculture), dated Darjeeling, 26th June 1880.

READ—

Letter from the Superintendent of the Royal Botanical Garden, Calcutta, and of the Government Chinchona Cultivation in Bengal, No. 57-C, dated 13th May 1880, submitting the annual report of the Government Chinchona Plantation in British Sikkim for the year 1879-80.

Letter from the same Officer, No. 25, dated 13th May 1880, submitting the annual report of the Quinologist for the year 1879-80.

DR. KING, who in addition to his own duties as Superintendent of the Plantations, has since December last been officiating in the office of the Government Quinologist, has submitted both the reports in time.

2. The season was unusually favorable for planting operations, and about three-quarters of a million of young trees were planted out, of which 644,222 were *Succirubra*, covering an area of a little above 196 acres, against 353,415 planted over an area of 120 acres in the previous year. During the year 276,700 trees of this species were put out on the new plantation of Sittong, covering an area of nearly 101 acres; 258,620 were planted on the old plantation of Rishap and Mungpoo, though on virgin soil, and 108,900 replaced those that had to be uprooted for the bark crop. In addition to these, a good many young plants were utilized in filling up gaps as they occurred in the older parts of the plantation. It is gratifying to observe that the efforts made to propagate the *Calisaya* and hybrid varieties have at last begun to bear fruit. Of the hybrid species, 39,400 were planted during the year at Mungpoo, and 36,680 at Sittong, and of *Calisaya* 12,782 were planted out at the latter plantation. The nursery stock of all three kinds has also been kept up, the year ending with a total of 16,000 stock plants and 403,000 young ones.

3. In the Resolution recorded upon the proceedings of last year, it was stated that the Lieutenant-Governor, in view of the more extensive cultivation of *Chinchona calisaya*, had authorized Dr. King to proceed to Java and ascertain the conditions under which the Dutch have successfully grown that variety of chinchona. Dr. King accordingly visited the plantations in Java during the year. The result of his visit to that island was embodied by him in an interesting report received by Government on the 22nd November last, and forwarded to the Government of India on the 15th December 1879. The report shows that, in respect of soil and climate, the Java plantations have great advantages over those of Sikkim, but on the other hand labor is much cheaper in British Sikkim. The conclusions arrived at by Dr. King were that efforts should be made to graft *Ledgeriana* and approved varieties of *Calisaya* on *Succirubra* stocks; that attention should be directed towards propagating the best varieties of *Calisaya*; that trial should be given to the Java plan of shaving the bark of chinchona trees; and that a more suitable locality for chinchona cultivation than Sikkim should be sought for in Burma, the Andaman Islands, and the Khasi Hills. The Dutch method of shaving the bark of living trees has already been tried at Mungpoo, but there has been as yet no time to judge of the results.

4. The entire produce of the plantations for the year was 361,590 lb. of dry bark against 261,659 lb. in 1878-79; of this, 29,520 lb. were yellow and the rest red bark. The new plantation of Sittong grew its first crop during the year, and of

the bark gathered, 15,850 lb. represented the yield of that plantation. The aggregate yield of bark in former years amounted to 1,134,901 lb., so that the total produce of the plantations since their opening, including the crop of the past year, has been 1,496,491 lb.

5. As usual, the red bark crop of the old plantation was obtained by one of the three methods of uprooting, coppicing, and thinning; but the yellow bark was entirely got by thinning the *Calisaya* trees planted from 1869 to 1871. The figures given by Dr. King under this head may be summed up as follows:—

Obtained by uprooting	...	...	...	...	...	...	Lb.
Do. by coppicing	...	...	...	...	...	...	168,015
Do. by thinning	...	...	...	...	...	...	38,550
	...	...	...	...	...	...	154,995
						Total	361,590

From 100 acres of eleven-years-old trees uprooted, the average yield of bark of all kinds was 1,680 lb. per acre. The average yield of 26 acres of ten-years-old trees coppiced was 1,482 lb. per acre. The outturn showed great inequalities; for while a patch of trees on low Rishap yielded at the rate of 2,584 lb. per acre, another patch of the same age, but planted a little higher up on the same ridge, produced only 1,560 lb.

6. The total expenditure on the plantation amounted to Rs. 69,973-0-4, of which Rs. 15,204-4-6 represented the capital expenditure on the new plantation at Sittong, and Rs. 54,768-11-10 the working expenses of the old plantations.

7. The Superintendent's proposal to take 350,000 lb. of red bark as the crop of the next year has the Lieutenant-Governor's approval. Should it be found as the season advances that more is likely to be wanted, the Lieutenant-Governor is assured that it will not be difficult to increase the quantity to 400,000 lb.

8. In accordance with the orders of the Government of India, 14,240 lb. of the yellow or *Calisaya* bark was sent to England for sale towards the close of the year; but as Mr. Gammie has now succeeded in making sulphate of quinine of excellent quality from this bark, it will probably not be desirable to send any more away.

9. The introduction upon the plantations of a new species of chinchona which yields the Carthagena or Columbian bark, is an interesting feature in the operations, and it is hoped that the plants brought out to India from Kew may be successfully propagated.

10. The Superintendent reports that there is a considerable demand for seed of *Chinchona succirubra* among the coffee-planters of Ceylon, who sow it broadcast between the trees on their plantations, as also for seed of *Chinchona calisaya*; but it has been found impossible to meet the demand for the seed of the latter variety to the full extent, as the bulk is required for the Government Plantation.

11. The total outturn of the febrifuge factory for the year just passed was 9,434 lb. 13 oz. against 7,007 lb. in the previous year. The demand of that year, however, amounted to 7,955 lb. 7 oz., which Mr. Wood, the Quinologist, was able to meet from the large stock that he had on hand at the commencement of the year. The febrifuge factory has been extended during the year, and is now on a sufficiently large scale to meet all probable current demands, and at the same time to maintain a sufficient reserve stock of the alkaloid as now manufactured. It was remarked in the resolution on last year's report that the question of manufacturing a superior drug was under consideration. The object which Government had in view in appointing the Chinchona Febrifuge Committee in 1877 was to determine how far the febrifuge was susceptible of improvement by excluding its amorphous constituents. Whilst discussing this question, the Committee recommended for trial a mixture made of four parts of sulphate of quinine, eight of sulphate of cinchonidine, and nine of sulphate of cinchonine. The result of this trial, as reported in July last, showed that the antiperiodic properties of the febrifuge are not dimi-

nished by the elimination of the amorphous alkaloids, while the triple sulphate has the advantage of creating less nausea and gastric disturbance than the ordinary febrifuge. At the same time the Committee considered that the proportion of cases in which the febrifuge had been found to create great nausea was so small, while its efficacy as a remedy in the treatment of fevers had been so unmistakably established, that the remedial advantages to be gained by substituting for it a finer preparation were not sufficient to warrant any great increase of cost. In view, however, of the extension in the cultivation of *Chinchona calisaya* and the probability of the manufacture from it of pure sulphate of quinine being undertaken, they recommended that a small factory should be established at which the preparation of the pure alkaloids of *Chinchona succirubra* could in the mean time be carried on, so that the cost of producing the triple sulphate could at once be ascertained. Accordingly, after personal consultation with Mr. Wood and Dr. King, the Lieutenant-Governor submitted to the Government of India in August last a proposal to erect a small factory for the manufacture of the triple sulphate and of pure sulphate of quinine. This question, and that of the appointment of a Quinologist in succession to Mr. Wood, are now under the consideration of the Government of India.

12. The cost of manufacture in the present factory during the year, including the cost of the bark, has been Rs. 95,531-3-7, or Rs. 10-2-0 per pound, being 12 annas 7 pies per pound less than in 1878-79.

13. The febrifuge of last year was disposed of as follows:—

	LB.	OZ.
To the Medical Dépôt, Calcutta	3,500	0
Ditto ditto, Bombay	1,600	0
Ditto ditto, Madras	300	0
Sold to the public	2,757	8
Samples, loss in packing, consumed in experiments, &c., &c. ...	6	8
Total ...	8,164	0

The sales to the public have exceeded those of 1878-79 by 358 lb.—a circumstance which proves beyond all doubt that the drug is rising in general estimation.

14. The result of the operations of the past year, from a financial point of view, has been most satisfactory. The revenue derived from the sale of the febrifuge, and a small quantity of bark, seed, and plants to the medical depôts and to the public, amounted to Rs. 1,36,773, as shown below:—

	RS.	A.	P.
Febrifuge sold to the public	46,803	8	0
Seed, plant, and bark sold to the public	739	8	0
Credit Medical Dépôt, Calcutta	57,850	0	0
Ditto ditto, Bombay	26,425	0	0
Ditto ditto, Madras	4,955	0	0
Total	1,36,773	0	0

This sum, according to the figures given in the Quinologist's report, was Rs. 56,260 in excess of the expenditure on account of both the plantations and the factory.

15. The total expenditure on the plantation from its commencement (including compound interest at 4 per cent.) is a little less than ten lakhs of rupees. The cash transactions for the year, therefore, show a profit of rather more than 5½ per cent. on the capital. But this does not represent the whole of the gain for the year, for the stock in hand has been increased in value by Rs. 42,775, which is equal to another 4 per cent. on the capital. The amount of febrifuge used in substitution of quinine in Government hospitals and dispensaries during the past year was 5,400 lb. Calculating the average price of quinine in Calcutta at Rs. 90 (a rather low estimate), the saving effected by this substitution during the year has been

very nearly four lakhs of rupees, and the total saving since the factory commenced working aggregates $11\frac{3}{4}$ lakhs of rupees, or more than the plantations have cost since their opening.

16. The Lieutenant-Governor regrets the loss of the valuable services of Mr. Wood, who resigned his appointment of Quinologist during the year. The thanks of Government are due to Dr. King, whose management of his department leaves nothing to be desired. Dr. King reports very favorably of the services of Mr. Gammie, who has been in charge of the factory throughout the year, and who has very intelligently carried out with great success experiments for preparing sulphate of quinine, and an improved and purer febrifuge. The sulphate of quinine prepared by Mr. Gammie, though on a small scale, has been declared on analysis to be equal to that of the best European makers. In addition to his work in the factory, Mr. Gammie has devoted much time and attention to the plantations. The Lieutenant-Governor entirely concurs in the praise accorded to Mr. Gammie by Dr. King. The other assistants of the Superintendent are also highly spoken of.

ORDER.—Ordered that a copy of this resolution, and of the reports referred to, be submitted to the Government of India in the Home, Revenue, and Agricultural Department, and that another copy of the resolution be forwarded for the information of Dr. King.

Ordered, further, that a copy of the resolution, and of the reports, be forwarded to the Medical Department of this office, and also to the Government of Madras, and Surgeon-General of Bengal.

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

(Signed) A. MACKENZIE,
Secretary to the Govt. of Bengal.

ENCLOSURE.

From G. KING, Esq., M.B., Superintendent, Royal Botanic Garden, Calcutta, and in charge of Chinchona Cultivation in Bengal, to the Secretary to the Government of Bengal, Revenue Department, dated Howrah, the 13th May 1880, No. 57-C.

I HAVE the honor herewith to submit the Annual Report on the Government Chinchona Plantations in Bengal for the year ending 31st March 1880.

Eighteenth Annual Report of the Government Chinchona Plantations in British Sikkim, by Surgeon-Major G. KING, M.B., F.L.S., Superintendent of the Royal Botanical Garden, Calcutta, and of Chinchona Cultivation in Bengal.

THE work of the year 1879-80 may be summarised as follows:—the plantation was extended by about three quarters of a million of young trees, a crop of 361,590 pounds of dry bark was harvested, a new kind of Chinchona was brought into cultivation, viz., the species yielding the Carthagena bark of commerce, and the nursery stock was maintained at a sufficiently high level for the supply of young plants for the year now entered upon. The weather of the cold season was as showery and as favorable for planting as that of the corresponding season of the previous year was the reverse.

2. *Details of the year's planting.*—The planting operations of the year exceed those of any former year, nearly three quarters of a million of young trees having been permanently planted out. As usual, *Succirubra* was the species most largely planted, and of this no less than 644,222 were put out. These were distributed as follows:—

	Plants.	Acres.
Planted on the old plantation (Rishap and Mungpoo)		
on new land	258,620	95
Planted to replace uprooted plants	108,900	...
„ on the new plantation (Sittong) on new land...	276,700	101.6
Total	644,220	196.6

In addition to these, a large number of young plants were used in filling up vacancies in the older parts of the plantation. A notable feature in the planting of the year is the comparatively large number of *Calisaya* and hybrid plants that have been put out. Efforts have been made for some years to propagate these very valuable sorts, and these efforts are now beginning to bear fruit. Of the hybrid species, the bark of which was so highly valued by our late Quinologist, Mr. Wood, 39,400 were planted during the year at Mungpoo and 36,680 at Sittong; and of *Calisaya* 12,782 were put out at Sittong. The nursery stock of all these three kinds has been kept up and, as the appended returns show, the year ended with a total of 16,000 stock-plants for propagating from, and of young plants to the number of 403,000.

3. *Details of the year's crop.*—The crop for the year was 361,590 pounds of dry bark, which, with the exception of 29,520 of yellow, was all red bark. The whole of this red bark was not, however, got as heretofore from the older plantation, for during the past year the new plantation of Sittong yielded its first crop in the shape of 15,850 pounds taken from trees which it was found necessary to thin out. The red bark crop from the old plantation was taken as usual by one of the three methods of uprooting, coppicing or thinning. Full details of the amounts obtained in each of these ways will be found in the tabular statement appended to this report. These figures show that of the 100 acres of eleven-year-old trees which were uprooted, the average yield of bark of all kinds (root, stem, and branch) was 1,680 pounds per acre. The figures also illustrate, as distinctly as do those of former years, the great inequality of yield of chinchonas; for, while a patch of trees on lower Rishap yielded at the rate of 2,584 pounds per acre, another patch of trees of the same age, but planted a little higher up on the same ridge, yielded only 1,560 pounds. The average yield of the 26 acres of ten-year-old trees that were coppiced was 1,482 pounds per acre. The yellow bark collected was entirely got by thinning the *Calisaya* trees planted from 1869 to 1871.

4. *Expenditure for the year.*—The budget allotment for the year amounted to Rs. 71,230, but of this, not quite the whole was spent, there being a net saving of Rs. 1,256-15-8. Of the expenditure the whole of the sum spent on the new (or Sittong) plantation is debitable to Capital; but no capital charges having been incurred during the year on the old plantation the entire expenditure on it is debitable to Working Expenses and has to be set against the crop. The expenditure for the year is thus divisible into capital expenditure on Sittong and working expenditure on the old plantation. The figures are as follows:—

	RS.	A.	P.
Total expenditure for the year	69,973	0	4
<i>Capital—</i>			
Expenditure on Sittong	12,261	14	6
Proportion of European and office establishment	2,939	6	0
	15,201	4	6
<i>Working Expenses—</i>			
Up-keep and working of Mungpoo, Rishap, and Rungbee plantation	44,180	7	9
Proportion of European and office establishment	10,588	4	1
	54,768	11	10
	69,973	0	4

Against the working expenditure on the old plantation (Rs. 54,768-11-10) there has to be set the crop of bark, amounting to 345,740 pounds. The cost of the bark per pound is therefore annas 2 pies 6-4147, which is lower than the rate of any previous year. The whole of this bark has been made over to the Quinologist, and the cost of producing it has been debited to his account. It will be observed that the Sittong plantation yielded as its first crop some bark taken from trees thinned out to prevent overcrowding. This bark I have, in order to simplify accounts, made over to the Quinologist at the same rate as that taken from the older plantation, and the value of it has been placed to the credit of the Sittong plantation. It will be recollected that this Sittong plantation is a young one that has not yet come into bearing. Having been put out in the light of the experience gained in the conduct of Rungbee, Rishap and Mungpoo, it has cost much less in proportion than these older plantations. Hitherto no revenue has been derived from Sittong, but as its accounts have from the beginning been kept separate, I anticipate that when it comes into full bearing its produce will be found to cost a good deal less in proportion to capital than that of its older neighbours.

5. *Introduction of a new species of Chinchona.*—During the year four plants were received from Sir J. D. Hooker of the valuable species of Chinchona which yields the bark known in commerce as Carthagena or Columbian. Although long known in the market by its produce, Columbia by Mr. R. Cross (already known as the most successful of all Chinchona seed-collectors), who was commissioned by the Secretary of State to go to South America to procure them. These seeds were made over to the Royal Botanic Garden at Kew, and it is to this great institution, so ably presided over by Sir J. D. Hooker, that we are mainly indebted for the introduction of this new and valuable species. The plants were brought out to India from Kew by the late Mr. A. Biermann, Curator of the Calcutta Botanical Garden, to whose care of them during the voyage is due the excellent condition in which they reached the plantation. They are now growing well and there is every probability that we shall soon be able to propagate them successfully.

6. *Distribution of Seed.*—A considerable demand for *Succirubra* seed still continues from Ceylon where coffee planters have adopted the plan of scattering it broadcast between the trees on their plantations. A large demand exists for seed of the fine variety of *Calisaya* known as *Ledgeriana*, but this it has been possible to meet only to a small extent as the bulk of our small yield of *Ledgeriana* seed is required for the Government plantation.

7. *Land Rent.*—The rents collected from settlers within the reserve amounted this year to Rs. 1,592-4-0, which sum was, as in former years, paid into the Darjeeling Treasury as land revenue and does not appear amongst the plantation receipts.

8. *Survey of the Sittong Plantation.*—Arrangements have been made by the Surveyor-General of India for the survey at an early date of the land suitable for Chinchona on the ridges on both sides of the valley of the Ryang.

9. *Estimated Crop of 1880-81.*—About 350,000 pounds of red bark will, I think, be sufficient to keep the febrifuge factory supplied, and I propose to take that as the crop for the current year. Should it be found as the season proceeds that more is likely to be wanted, it will not be difficult to take a larger crop, say of 400,000 pounds.

10. *Despatch of Bark to London for sale.*—In accordance with the orders of Government, arrangements were made towards the end of the year for sending a quantity of the *Calisaya* bark which had accumulated in the factory store-room to London for sale, and since the expiry of the year part of this bark has actually been despatched. It has not been customary to send the produce of the Sikkim plantations to England for sale, and this step of sending some yellow bark to London was taken solely because yellow bark is unsuitable for the manufacture of chinchona febrifuge. Certain experiments which Mr. Gammie has recently been occupied with in the factory at Mungpoo lead, however, to the belief that it may be possible to make sulphate of quinine from yellow bark on the plantation. Should Mr. Gammie's process be found on further inquiry and experiment to be an economical one, it will not be necessary to export any more of our yellow bark.

11. During the year I was sent by Government to visit the Dutch chinchona plantations in Java. The results of my visit having already been communicated to Government in a special report submitted soon after my return, I need not refer to them here further than to say that, after having seen growing trees of the celebrated variety of *Calisaya* which the Dutch have named *Ledgeriana*, I have no hesitation in saying that our best varieties of *Calisaya* are identical with that variety, and that, if we do not succeed in producing such rich bark as the Dutch, it is simply because the volcanic soil and equatorial climate of Java are more suitable for the growth of chinchona than are the soil and climate of Sikkim. On the other hand, Sikkim enjoys an abundance of good and cheap labor, and I am more strongly than ever of opinion that *Calisaya* should be as extensively propagated as possible in the Sikkim plantation. The Dutch method of shaving the bark off living trees has, in accordance with the orders of Government, been tried at Mungpoo. There has not as yet been time to judge of the results, and these must be reserved for future report. The plan of grafting yellow barks on *Succirubra* stocks, so successfully practised in Java, will be tried at Mungpoo as soon as the weather is favorable.

12. The commercial aspect of the year's working will be treated of in the Quinologist's report. According to the plan suggested by Mr. Wood and myself and accepted by Government, the entire crop of bark is taken over by the Quinologist at cost price and is by him manufactured into febrifuge. The amount of febrifuge used in substitution of quinine in Government hospitals and dispensaries during the past year was 5,400 pounds. Taking the average price in Calcutta of quinine for the year at Rs. 90 per pound (a low estimate) the saving effected by this substitution has been very nearly four lakhs of rupees. The saving in former years from the substitution of the febrifuge having amounted to seven and three-quarter lakhs

of rupees, the total saving up to the end of last year therefore reaches eleven and three-quarter lakhs, which is quite a lakh and a half more than the plantations (including compound interest at four per cent.) have cost since their commencement.

13. My best acknowledgments are due to the three officers in immediate charge of the plantation. The ability and energy of Mr. Gammie, the Resident Manager, are already well known to Government, and during the past, as during former years, he has done most excellent service. And in this he has been well seconded by the Assistant Managers Messrs. Lister and Pantling. The Head Writer in charge of my office, Baboo Gopal Chundra Dutta, has worked well during the year and his services also deserve acknowledgment.

14. The usual returns (four in number) are appended.

Table showing the Number and Distribution of Chinchona Plants in the Government Plantations, Mungpoo Division, on the 1st April 1880.

Names of Species of Chinchona.	Number in permanent plantation on 1st April 1879.	Uprooted during the year 1879-80.	Planted during the year 1879-80.	Number in permanent plantation on 1st April 1880.	Number of stock plants for propagation.	Number of seedlings or rooted cuttings in nursery beds for permanent plantations.	Number of rooted plants in seed or cutting beds.	Total nursery stock at 1st April 1880.
C. New variety	21,300	..	39,400	60,700	10,000	47,000	45,000	102,000
C. Succirubra	2,734,465	108,900	367,520	2,933,085	..	40,000	..	40,000
C. Calisaya	654,500	..	..	354,500	6,000	180,000	80,000	266,000
C. Micrantha	20,000	19,500	..	500	..	..	..	..
C. Officialis and varieties ..	25,000	..	..	25,000	..	..	..	..
C. Pahudiana	5,092	..	..	5,092	..	..	..	..
C. Species yielding Carthagena bark	..	..	..	..	4	..	..	4
Total ..	3,160,357	128,400	406,920	3,438,877	16,004	267,000	125,000	408,004

Table showing the Number and Distribution of Chinchona Plants in the Government Plantation, Sittong Division, on the 1st April 1880.

Names of Species of Chinchona.	In permanent plantation on 1st April 1879.	Planted during the year 1879-80.	Number in permanent plantation on 1st April 1880.	Number of stock plants for propagation.	Number of seedlings or rooted cuttings in nursery beds for permanent plantations.	Number of rooted plants in seed and cutting beds.	Total nursery stock at 1st April 1880.
C. New variety	12,198	36,680	48,878	..	5,000	..	5,000
C. Succirubra	855,500	276,700	1,132,200	..	..	..	..
C. Calisaya	..	12,782	12,782	..	6,000	..	6,000
Total ..	867,698	326,162	1,193,860	..	11,000	..	11,000

Account of Dry Chinchona Bark collected during Season 1879-80.

	Year of planting.	Distance apart of planting.	Original number of plants	Approximate area in acres.	TOTAL.				Total of each species.
					Root.	Stem.	Branch.	Total.	
<i>Succirubra</i> —		FEET.			LB.	LB.	LB.	LB.	LB.
Lower Rishap—									
Uprooting	1868-69	6 × 6	32,670	27	24,410	30,010	15,345	69,765	..
Upper Rishap—									
Uprooting	1869	6 × 6	76,230	63	31,650	42,205	24,425	98,280	..
Coppicing	"	6 × 6	21,780	18	285	16,125	9,310	25,720	..
Thinning	"	6 × 6	..	..	4,090	3,650	2,915	10,655	..
Mungpoo Ridge—									
Thinning	1872-76	4 × 4	..	..	13,690	14,510	23,215	51,415	..
Tukdo Ridge—									
Thinning	1871-73	6×6&4×4	..	..	7,625	7,410	8,475	23,510	..
Rungbee—									
Coppicing	1869	6 × 6	9,680	8	..	7,785	4,945	12,830	..
Thinning	1867-69	6 × 6	..	..	8,605	8,735	6,705	24,045	..
Sittong—									
Thinning	1876	4 × 4	..	..	2,315	3,390	10,145	15,850	..
Total <i>Succirubra</i>	..	..	..	..	92,670	133,920	105,480	332,070	332,070
<i>Calisaya</i> —									
Mungpoo—									
Thinning	1869-71	5 × 5	..	..	10,055	11,159	8,306	29,520	29,520
Totals of both sorts ..	..	..	..	..	102,725	145,079	113,786	361,590	361,590

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

MUNGPOO DIVISION.					LB.
Dry bark collected by pruning and thinning during					
Do.	do.	do.	1869-70	..	2,400
Do.	do.	do.	1870-71	..	12,500
Do.	do.	do.	1871-72	..	39,000
Do.	do.	do.	1872-73	..	Nil.
Do.	do.	do.	1873-74	..	16,000
Do.	do.	do.	1874-75	..	39,405
Crop of 1875-76	..	..	..	..	211,931
Do. 1876-77	..	..	..	..	207,781
Do. 1877-78	..	..	..	..	344,225
Do. 1878-79	..	..	..	..	261,659
Do. 1879-80	..	..	..	..	345,740
Total					1,480,641

SITTONG DIVISION.		LB.
Dry bark collected by pruning and thinning during 1879-80		15,850
Total ...		15,850

COPY forwarded to the Secretary to the Government of Madras.
(By order of the Lieutenant-Governor of Bengal.)

(Signed) HEM CHUNDERKERR,
Offg. Asst. Secy. to the Govt. of Bengal.

No. 91. ORDER THEREON, 4th September 1880, No. 1,093.

Miscellaneous.

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

2. The report of the Quinologist was not received with the foregoing resolution, and the Government of Bengal will be addressed on the subject.

(True Extract.)

(Signed) C. G. MASTER,
Secretary to Government.

To the Board of Revenue.
,, the Surgeon-General with the Madras Government.
,, the Commissioner of the Nilgiris.
,, the Conservator of Forests.
,, the Superintendent of the Government Central Museum.

Exd. W. H. French.

90 Copies.

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Annual Report to the Government of the United Provinces on Public Works for the year 1870-71,—Communicated to the Board of Revenue and printed by order of the Government of Bengal, from the report of 1870-71 of the Commissioner of our late Government that the report of the Assistant was not to be read with the report of the Commissioner (the Government of Bengal) and not with the report of the subject.

Sir
 we have not enough
 copies of the paper
 his letter he wanted
 as before - A draft letter
 to Bengal is submitted.

87
119.180.

Two spare copies which are
available in the city
office.

No, only one copy is
here.

ANNUAL REPORT ON THE GOVERNMENT CINCHONA PLANTATIONS
FOR THE YEAR 1879-80.

No. 57C., dated Howrah, the 13th May 1880.

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, Revenue Department.

I HAVE the honor herewith to submit the Annual Report on the Government
Cinchona Plantations in Bengal for the year ending 31st March 1880.

*Eighteenth Annual Report of the Government Cinchona Plantations in British Sikkim by
SURGEON-MAJOR GEORGE KING, M. B., F. L. S., Superintendent of the Royal Botanical
Garden, Calcutta, and of Cinchona Cultivation in Bengal.*

THE work of the year 1879-80 may be summarised as follows:—the
plantation was extended by about three quarters of a million of young trees, a
crop of 361,590 pounds of dry bark was harvested, a new kind of Cinchona was
brought into cultivation, viz. the species yielding the Carthagena bark of
commerce, and the nursery stock was maintained at a sufficiently high level for
the supply of young plants for the year now entered upon. The weather of
the cold season was as showery and as favourable for planting as that of the
corresponding season of the previous year was the reverse.

2. *Details of the year's planting.*—The planting operations of the year exceed
those of any former year, nearly three quarters of a million of young trees
having been permanently planted out. As usual, *Succirubra* was the species
most largely planted, and of this no less than 644,222 were put out. These
were distributed as follows:—

	Plants.	Acres.
Planted on the old plantation (Rishap and Mungpoo)	258,620	95
on new land	108,900	...
Planted to replace uprooted plants	276,700	101.6
" on the new plantation (Sittong) on new land		
Total	644,220	196.6

In addition to these, a large number of young plants were used in filling up
vacancies in the older parts of the plantation. A notable feature in the plant-
ing of the year is the comparatively large number of *Calisaya* and hybrid plants
that have been put out. Efforts have been made for some years to propagate
these very valuable sorts, and these efforts are now beginning to bear fruit. Of
the hybrid species, the bark of which was so highly valued by our late Quino-
logist, Mr. Wood, 39,400 were planted during the year at Mungpoo and 36,680 at
Sittong; and of *Calisaya* 12,782 were put out at Sittong. The nursery stock
of all these three kinds has been kept up and, as the appended returns show,
the year ended with a total of 16,000 stock-plants for propagating from, and
of young plants to the number of 403,000.

3. *Details of the year's crop.*—The crop for the year was 361,590 pounds
of dry bark, which, with the exception of 29,520 of yellow, was all red bark.
The whole of this red bark was not, however, got as heretofore from the older
plantation, for during the past year the new plantation of Sittong yielded its
first crop in the shape of 15,850 pounds taken from trees which it was found
necessary to thin out. The red bark crop from the old plantation was taken
as usual by one of the three methods of uprooting, coppicing or thinning.
Full details of the amounts obtained in each of these ways will be found in
the tabular statement appended to this report. These figures show that of
the 100 acres of eleven-year old trees which were uprooted, the average yield
of bark of all kinds (root, stem, and branch) was 1,680 pounds per acre. The
figures also illustrate, as distinctly as do those of former years, the great inequality
of yield of cinchonas; for, while a patch of trees on lower Rishap yielded at
the rate of 2,584 pounds per acre, another patch of trees of the same age, but
planted a little higher up on the same ridge, yielded only 1,560 pounds. The
average yield of the 26 acres of ten-year old trees that were coppiced was

1,482 pounds per acre. The yellow bark collected was entirely got by thinning the *Calisaya* trees planted from 1869 to 1871.

4. *Expenditure for the year.*—The budget allotment for the year amounted to Rs. 71,230, but of this not quite the whole was spent, there being a net saving of Rs. 1,256-15-8. Of the expenditure the whole of the sum spent on the new (or Sittong) plantation is debitable to capital; but no capital charges having been incurred during the year on the old plantation the entire expenditure on it is debitable to working expenses and has to be set against the crop. The expenditure for the year is thus divisible into capital expenditure on Sittong and working expenditure on the old plantation. The figures are as follows:—

Total expenditure for the year	Rs.	P.	A.
Capital—	69,973	0	4
Expenditure on Sittong	Rs.	A.	P.
Proportion of European and office establishment	12,264	14	6
	2,939	6	0
Working Expenses—	15,204	4	6
Up-keep and working of Mungpoo, Rishap, and Rungbee plantation	44,180	7	9
Proportion of European and office establishment	10,588	4	1
	54,768	11	10
	69,973	0	4

Against the working expenditure on the old plantation (Rs. 54,768-11-10) there has to be set the crop of bark amounting to 345,740 pounds. The cost of the bark per pound is therefore annas 2 pies 6-4147, which is lower than the rate of any previous year. The whole of this bark has been made over to the Quinologist, and the cost of producing it has been debited to his account. It will be observed that the Sittong plantation yielded as its first crop some bark taken from trees thinned out to prevent overcrowding. This bark I have, in order to simplify accounts, made over to the Quinologist at the same rate as that taken from the older plantation, and the value of it has been placed to the credit of the Sittong plantation. It will be recollected that this Sittong plantation is a young one that has not yet come into bearing. Having been put out in the light of the experience gained in the conduct of Rungbee, Rishap and Mungpoo, it has cost much less in proportion than these older plantations. Hitherto no revenue has been derived from Sittong, but as its accounts have from the beginning been kept separate, I anticipate that when it comes into full bearing its produce will be found to cost a good deal less in proportion to capital than that of its older neighbours.

5. *Introduction of a new species of Cinchona.*—During the year four plants were received from Sir J. D. Hooker of the valuable species of Cinchona which yields the bark known in commerce as Carthagena or Columbian. Although long known in the market by its produce, this species has never been brought into cultivation in India. Seeds of it were brought from Columbia by Mr. R. Cross (already known as the most successful of all Cinchona seed-collectors) who was commissioned by the Secretary of State to go to South America to procure them. These seeds were made over to the Royal Botanic Garden at Kew, and it is to this great institution, so ably presided over by Sir J. D. Hooker, that we are mainly indebted for the introduction of this new and valuable species. The plants were brought out to India from Kew by the late Mr. A. Biermann, Curator of the Calcutta Botanical Garden, to whose care of them during the voyage is due the excellent condition in which they reached the plantation. They are now growing well and there is every probability that we shall soon be able to propagate them successfully.

6. *Distribution of seed.*—A considerable demand for *Succirubra* seed still continues from Ceylon where coffee planters have adopted the plan of scattering it broadcast between the trees on their plantations. A large demand

exists for seed of the fine variety of *Calisaya* known as *Ledgeriana*, but this it has been possible to meet only to a small extent as the bulk of our small yield of *Ledgeriana* seed is required for the Government plantation.

7. *Land rent.*—The rents collected from settlers within the reserve amounted this year to Rs. 1,592-4, which sum was, as in former years, paid into the Darjeeling treasury as land revenue and does not appear amongst the plantation receipts.

8. *Survey of the Sittong plantation.*—Arrangements have been made by the Surveyor-General of India for the survey at an early date of the land suitable for Cinchona on the ridges on both sides of the valley of the Ryang.

9. *Estimated crop of 1880-81.*—About 350,000 pounds of red bark will, I think, be sufficient to keep the febrifuge factory supplied, and I propose to take that as the crop for the current year. Should it be found as the season proceeds that more is likely to be wanted, it will not be difficult to take a larger crop, say of 400,000 pounds.

10. *Despatch of bark to London for sale.*—In accordance with the orders of Government, arrangements were made towards the end of the year for sending a quantity of the *Calisaya* bark which had accumulated in the factory store-room to London for sale, and since the expiry of the year part of this bark has actually been despatched. It has not been customary to send the produce of the Sikkim plantations to England for sale, and this step of sending some yellow bark to London was taken solely because yellow bark is unsuitable for the manufacture of Cinchona febrifuge. Certain experiments which Mr. Gammie has recently been occupied with in the factory at Mungpoo lead, however, to the belief that it may be possible to make sulphate of quinine from yellow bark on the plantation. Should Mr. Gammie's process be found on further enquiry and experiment to be an economical one, it will not be necessary to export any more of our yellow bark.

11. During the year I was sent by Government to visit the Dutch cinchona plantations in Java. The results of my visit having already been communicated to Government in a special report submitted soon after my return, I need not refer to them here further than to say that, after having seen growing trees of the celebrated variety of *Calisaya* which the Dutch have named *Ledgeriana*, I have no hesitation in saying that our best varieties of *Calisaya* are identical with that variety, and that, if we do not succeed in producing such rich bark as the Dutch, it is simply because the volcanic soil and equatorial climate of Java are more suitable for the growth of cinchona than are the soil and climate of Sikkim. On the other hand, Sikkim enjoys an abundance of good and cheap labour, and I am more strongly than ever of opinion that *Calisaya* should be as extensively propagated as possible in the Sikkim plantation. The Dutch method of shaving the bark off living trees has, in accordance with the orders of Government, been tried at Mungpoo. There has not as yet been time to judge of the results, and these must be reserved for future report. The plan of grafting yellow barks on *Succirubra* stocks, so successfully practised in Java, will be tried at Mungpoo as soon as the weather is favourable.

12. The commercial aspect of the year's working will be treated of in the Quinologist's report. According to the plan suggested by Mr. Wood and myself and accepted by Government, the entire crop of bark is taken over by the Quinologist at cost price and is by him manufactured into febrifuge. The amount of febrifuge used in substitution of quinine in Government hospitals and dispensaries during the past year was 5,400 pounds. Taking the average price in Calcutta of quinine for the year at Rs. 90 per pound (a low estimate) the saving effected by this substitution has been very nearly four lakhs of rupees. The saving in former years from the substitution of the febrifuge having amounted to seven and three quarter lakhs of rupees, the total saving up to the end of last year therefore reaches eleven and three quarter lakhs, which is quite a lakh and a half more than the plantations (including compound interest at four per cent.) have cost since their commencement.

13. My best acknowledgments are due to the three officers in immediate charge of the plantation. The ability and energy of Mr. Gammie, the Resident Manager, are already well known to Government, and during the past, as

during former years, he has done most excellent service. And in this he has been well seconded by the Assistant Managers Messrs. Lister and Pantling. The Head Writer in charge of my office, Baboo Gopal Chundra Dutta, has worked well during the year and his services also deserve acknowledgment.

14. The usual returns (four in number) are appended.

Table showing the number and distribution of Cinchona Plants in the Government Plantations, Mungpoo Division, on the 1st April 1880.

NAMES OF SPECIES OF CINCHONA.	Number in permanent plantation on 1st April 1879.	Uprooted during the year 1879-80.	Planted during the year 1879-80.	Number in permanent plantation on 1st April 1880.	Number of stock plants for propagation.	Number of seedlings or rooted cuttings in nursery beds for permanent plantations.	Number of rooted plants in seed or cutting beds.	Total nursery stock at 1st April 1880.
C. New variety	21,300		39,400	60,700	10,000	47,000	45,000	102,000
C. Succirubra	2,731,465	103,000	307,520	2,993,085		40,000		40,000
C. Calisaya	354,500			354,500	6,000	180,000	80,000	268,000
C. Micantha	20,000	19,500		500				
C. Officinalis and varieties	25,000			25,000				
C. Pahudiana	5,092			5,092				
C. Species yielding Carthagena bark								
Total	3,160,357	123,400	406,920	3,438,877	16,000	267,000	125,000	408,000

Table showing the number and distribution of Cinchona Plants in the Government Plantation, Sittong Division, on the 1st April 1880.

NAMES OF SPECIES OF CINCHONA.	In permanent plantation on 1st April 1879.	Planted during the year 1879-80.	Number in permanent plantation on 1st April 1880.	Number of stock plants for propagation.	Number of seedlings or rooted cuttings in nursery beds for permanent plantations.	Number of rooted plants in seed and cutting beds.	Total nursery stock at 1st April 1880.
C. New variety	12,193	36,680	48,873		5,000		5,000
C. Succirubra	855,500	276,700	1,132,200		6,000		6,000
C. Calisaya	12,782	12,782	12,782		11,000		11,000
Total	860,475	326,162	1,193,860		11,000		11,000

Account of Dry Cinchona Bark collected during Season 1879-80.

during Season 1879-80.										
		Year of planting.	Distance apart of planting.	Original number of plants.	Approximate area in acres.	TOTAL.				Total of each species.
						Root.	Stem.	Branch.	Total.	
SUCCIRUBRA.										
Lower Rishap—			Feet.			lb.	lb.	lb.	lb.	
Uprooting	...	1868-69	6 × 6	32,670	27	24,410	30,010	15,345	69,765	
Upper Rishap—	...									
Uprooting	...	1869	6 × 6	76,230	63	31,650	42,205	24,425	98,280	
Coppicing	...	"	6 × 6	21,780	18	16,125	9,310	25,720	51,155	
Thinning	...	"	6 × 6			4,090	8,650	2,915	15,655	
Mungpoo Ridge—	...									
Thinning	...	1872-76	4 × 4			13,690	14,510	23,215	51,415	
Tukdo Ridge—	...									
Thinning	...	1871-73	6 × 6 & 4 × 4			7,625	7,410	8,475	23,510	
Rungbee—	...									
Coppicing	...	1869	6 × 6	9,630	8		7,785	4,945	12,830	
Thinning	...	1867-69	6 × 6			8,605	8,735	6,705	24,045	
Sittong—	...									
Thinning	...	1876	4 × 4			2,315	3,390	10,145	15,850	
Total Succirubra		...				92,670	133,920	105,180	332,070	
Calisaya—										
Mungpoo—										
Thinning	...	1869-71	5 × 5			10,055	11,159	8,506	29,720	
Totals of both sorts		...				102,725	145,079	113,786	361,590	

Table showing the Produce of the Government Cinchona Plantations in British Sikkim since their beginning.

MUNGROO DIVISION.

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
Ditto 1876-77	...	207,781
Ditto 1877-78	...	344,225
Ditto 1878-79	...	261,659
Ditto 1879-80	...	345,740
Total	...	1,480,641

SITTONG DIVISION.

Dry bark collected by pruning and thinning during 1879-80	...	15,850
Total	...	15,850

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FINANCIAL DEPARTMENT.

AGRICULTURE.

DARJEELING, THE 26TH JUNE 1880.

RESOLUTION.

READ—

Letter from the Superintendent of the Royal Botanical Garden, Calcutta, and of the Government Cinchona Cultivation in Bengal, No. 57C, dated 13th May 1880, submitting the annual report of the Government Cinchona Plantation in British Sikkim for the year 1879-80.

Letter from the same officer, No. 25, dated 13th May 1880, submitting the annual report of the Quinologist for the year 1879-80.

Dr. King, who in addition to his own duties as Superintendent of the Plantations, has since December last been officiating in the office of the Government Quinologist, has submitted both the reports in time.

2. The season was unusually favourable for planting operations, and about three-quarters of a million of young trees were planted out, of which 644,222 were *Succirubra*, covering an area of a little above 196 acres, against 353,415 planted over an area of 120 acres in the previous year. During the year 276,700 trees of this species were put out on the new plantation of Sittong, covering an area of nearly 101 acres; 258,620 were planted on the old plantation of Rishap and Mungpoo, though on virgin soil, and 108,900 replaced those that had to be uprooted for the bark crop. In addition to these, a good many young plants were utilized in filling up gaps as they occurred in the older parts of the plantation. It is gratifying to observe that the efforts made to propagate the *Calisaya* and hybrid varieties have at last begun to bear fruit. Of the hybrid species, 39,400 were planted during the year at Mungpoo, and 36,680 at Sittong, and of *Calisaya* 12,782 were planted out at the latter plantation. The nursery stock of all three kinds has also been kept up, the year ending with a total of 16,000 stock plants and 403,000 young ones.

3. In the Resolution recorded upon the proceedings of last year, it was stated that the Lieutenant-Governor, in view of the more extensive cultivation of *Cinchona calisaya*, had authorized Dr. King to proceed to Java and ascertain the conditions under which the Dutch have successfully grown that variety of cinchona. Dr. King accordingly visited the plantations in Java during the year. The result of his visit to that island was embodied by him in an interesting report received by Government on the 22nd November last, and forwarded to the Government of India on the 15th December 1879. The report shows that, in respect of soil and climate, the Java plantations have great advantages over those of Sikkim, but on the other hand labour is much cheaper in British Sikkim. The conclusions arrived at by Dr. King were that efforts should be made to graft *Ledgeriana* and approved varieties of *Calisaya* on *Succirubra* stocks; that attention should be directed towards propagating the best varieties of *Calisaya*; that trial should be given to the Java plan of shaving the bark of cinchona trees; and that a more suitable locality for cinchona cultivation than Sikkim should be sought for in Burma, the Andaman Islands, and the Khasi Hills. The Dutch method of shaving the bark of living trees has already been tried at Mungpoo, but there has been as yet no time to judge of the results.

4. The entire produce of the plantations for the year was 361,590lb of dry bark against 261,659lb in 1878-79; of this, 29,520lb were yellow and the rest red bark. The new plantation of Sittong grew its first crop during the year, and of the bark gathered, 15,850lb represented the yield of that plantation. The aggregate yield of bark in former years amounted to 1,134,901lb, so that the total produce of the plantations since their opening, including the crop of the past year, has been 1,496,491lb.

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5. As usual, the red bark crop of the old plantation was obtained by one of the three methods of uprooting, coppicing, and thinning; but the yellow bark was entirely got by thinning the *Calisaya* trees planted from 1869 to 1871. The figures given by Dr. King under this head may be summed up as follows:—

Obtained by uprooting ...	lb.
Do. by coppicing ...	168,045
Do. by thinning ...	38,550
	154,995
Total ...	361,590

From 100 acres of eleven years old trees uprooted, the average yield of bark of all kinds was 1,680lb per acre. The average yield of 26 acres of ten years old trees coppiced was 1,482lb per acre. The outturn showed great inequalities; for while a patch of trees on low Rishap yielded at the rate of 2,584lb per acre, another patch of the same age, but planted a little higher up on the same ridge, produced only 1,560lb.

6. The total expenditure on the plantation amounted to Rs. 69,973-0-4, of which Rs. 15,204-4-6 represented the capital expenditure on the new plantation at Sittong, and Rs. 54,768-11-10 the working expenses of the old plantations.

7. The Superintendent's proposal to take 350,000lb of red bark as the crop of the next year has the Lieutenant-Governor's approval. Should it be found as the season advances that more is likely to be wanted, the Lieutenant-Governor is assured that it will not be difficult to increase the quantity to 400,000lb.

8. In accordance with the orders of the Government of India, 14,240lb of the yellow or *Calisaya* bark was sent to England for sale towards the close of the year; but as Mr. Gammie has now succeeded in making sulphate of quinine of excellent quality from this bark, it will probably not be desirable to send any more away.

9. The introduction upon the plantations of a new species of cinchona which yields the Carthagena or Columbian bark, is an interesting feature in the operations, and it is hoped that the plants brought out to India from Kew may be successfully propagated.

10. The Superintendent reports that there is a considerable demand for seed of *Cinchona succirubra* among the coffee-planters of Ceylon, who sow it broadcast between the trees on their plantations, as also for seed of *Cinchona calisaya*; but it has been found impossible to meet the demand for the seed of the latter variety to the full extent, as the bulk is required for the Government Plantation.

11. The total outturn of the febrifuge factory for the year just passed was 9,434lb 13oz against 7,007lb in the previous year. The demand of that year, however, amounted to 7,955lb 7oz., which Mr. Wood, the Quinologist, was able to meet from the large stock that he had on hand at the commencement of the year. The febrifuge factory has been extended during the year, and is now on a sufficiently large scale to meet all probable current demands, and at the same time to maintain a sufficient reserve stock of the alkaloid as now manufactured. It was remarked in the resolution on last year's report that the question of manufacturing a superior drug was under consideration. The object which Government had in view in appointing the Cinchona Febrifuge Committee in 1877 was to determine how far the febrifuge was susceptible of improvement by excluding its amorphous constituents. Whilst discussing this question, the Committee recommended for trial a mixture made of four parts of sulphate of quinine, eight of sulphate of cinchonidine, and nine of sulphate of cinchonine. The result of this trial, as reported in July last, showed that the antiperiodic properties of the febrifuge are not diminished by the elimination of the amorphous alkaloids, while the triple sulphate has the advantage of creating less nausea and gastric disturbance than the ordinary febrifuge. As the same time the Committee considered that the proportion of cases in which the febrifuge had been found to create great nausea was so small, while its efficacy as a remedy in the treatment of fevers had been so unmistakably established, that the remedial advantages to be gained by substituting for it a finer preparation were not sufficient to warrant any great increase of cost,

In view, however, of the extension in the cultivation of *Cinchona calisaya* and the probability of the manufacture from it of pure sulphate of quinine being undertaken, they recommended that a small factory should be established at which the preparation of the pure alkaloids of *Cinchona succirubra* could in the meantime be carried on, so that the cost of producing the triple sulphate could at once be ascertained. Accordingly, after personal consultation with Mr. Wood and Dr. King, the Lieutenant-Governor submitted to the Government of India in August last a proposal to erect a small factory for the manufacture of the triple sulphate and of pure sulphate of quinine. This question, and that of the appointment of a Quinologist in succession to Mr. Wood, are now under the consideration of the Government of India.

12. The cost of manufacture in the present factory during the year, including the cost of the bark, has been Rs. 95,531-3-7, or Rs. 10-2 per pound, being 12 annas 7 pie per pound less than in 1878-79.

13. The febrifuge of last year was disposed of as follows:—

	lb.	oz.
To the Medical Depot, Calcutta	...	3,500 0
Ditto ditto, Bombay	...	1,600 0
Ditto ditto, Madras	...	300 0
Ditto ditto, Madras	...	2,757 8
Sold to the public	...	6 8
Samples, loss in packing, consumed in experiments, &c., &c.	...	...
Total	...	8,164 0

The sales to the public have exceeded those of 1878-79 by 358lbs—a circumstance which proves beyond all doubt that the drug is rising in general estimation.

14. The result of the operations of the past year, from a financial point of view, has been most satisfactory. The revenue derived from the sale of the febrifuge, and a small quantity of bark, seed, and plants to the medical depôts and to the public, amounted to Rs. 1,36,773, as shown below:—

	Rs.	A.	P.
Febrifuge sold to the public	46,803	8	0
Seed, plant, and bark sold to the public	739	8	0
Credit Medical Depot, Calcutta	57,850	0	0
Ditto ditto, Bombay	26,425	0	0
Ditto ditto, Madras	4,955	0	0
Total	1,36,773	0	0

This sum, according to the figures given in the Quinologist's report, was Rs. 56,260 in excess of the expenditure on account of both the plantations and the factory.

15. The total expenditure on the plantation from its commencement (including compound interest at 4 per cent.) is a little less than ten lakhs of rupees. The cash transactions for the year, therefore, show a profit of rather more than The cash transactions for the year, therefore, show a profit of rather more than 5½ per cent on the capital. But this does not represent the whole of the gain for the year, for the stock in hand has been increased in value by Rs. 42,775, which is equal to another 4 per cent. on the capital. The amount of febrifuge used in substitution of quinine in Government hospitals and dispensaries during the past year was 5,400lb. Calculating the average price of quinine in Calcutta at Rs. 90 (a rather low estimate), the saving effected by this substitution during the year has been very nearly four lakhs of rupees, and the total saving since the factory commenced working aggregates 11½ lakhs of rupees, or more than the plantations have cost since their opening.

16. The Lieutenant-Governor regrets the loss of the valuable services of Mr. Wood, who resigned his appointment of Quinologist during the year. The thanks of Government are due to Dr. King, whose management of his department leaves nothing to be desired. Dr. King reports very favourably of the services of Mr. Gammie, who has been in charge of the factory throughout the year, and who has very intelligently carried out with great success experiments for preparing sulphate of quinine, and an improved and purer febrifuge. The sulphate of quinine prepared by Mr. Gammie, though on a small scale,

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has been declared on analysis to be equal to that of the best European makers. In addition to his work in the factory, Mr. Gammie has devoted much time and attention to the plantations. The Lieutenant-Governor entirely concurs in the praise accorded to Mr. Gammie by Dr. King. The other assistants of the Superintendent are also highly spoken of.

ORDER.—Ordered that a copy of this resolution, and of the reports referred to, be submitted to the Government of India in the Home, Revenue, and Agricultural Department, and that another copy of the resolution be forwarded for the information of Dr. King.

Ordered further that a copy of the resolution, and of the reports, be forwarded to the Medical Department of this office, and also to the Government of Madras, and Surgeon-General of Bengal.

(By order of the Lieutenant-Governor of Bengal)

A. MACKENZIE,

Secretary to the Govt. of Bengal.

No. 147.

Copy forwarded to the Secretary to the Government of Madras.

By order of the Lieutenant-Governor of Bengal,

Henry Dundas Kerr
Offg. Asst. Secy. to the Govt. of Bengal.

CALCUTTA,
The 14th July 1880.

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